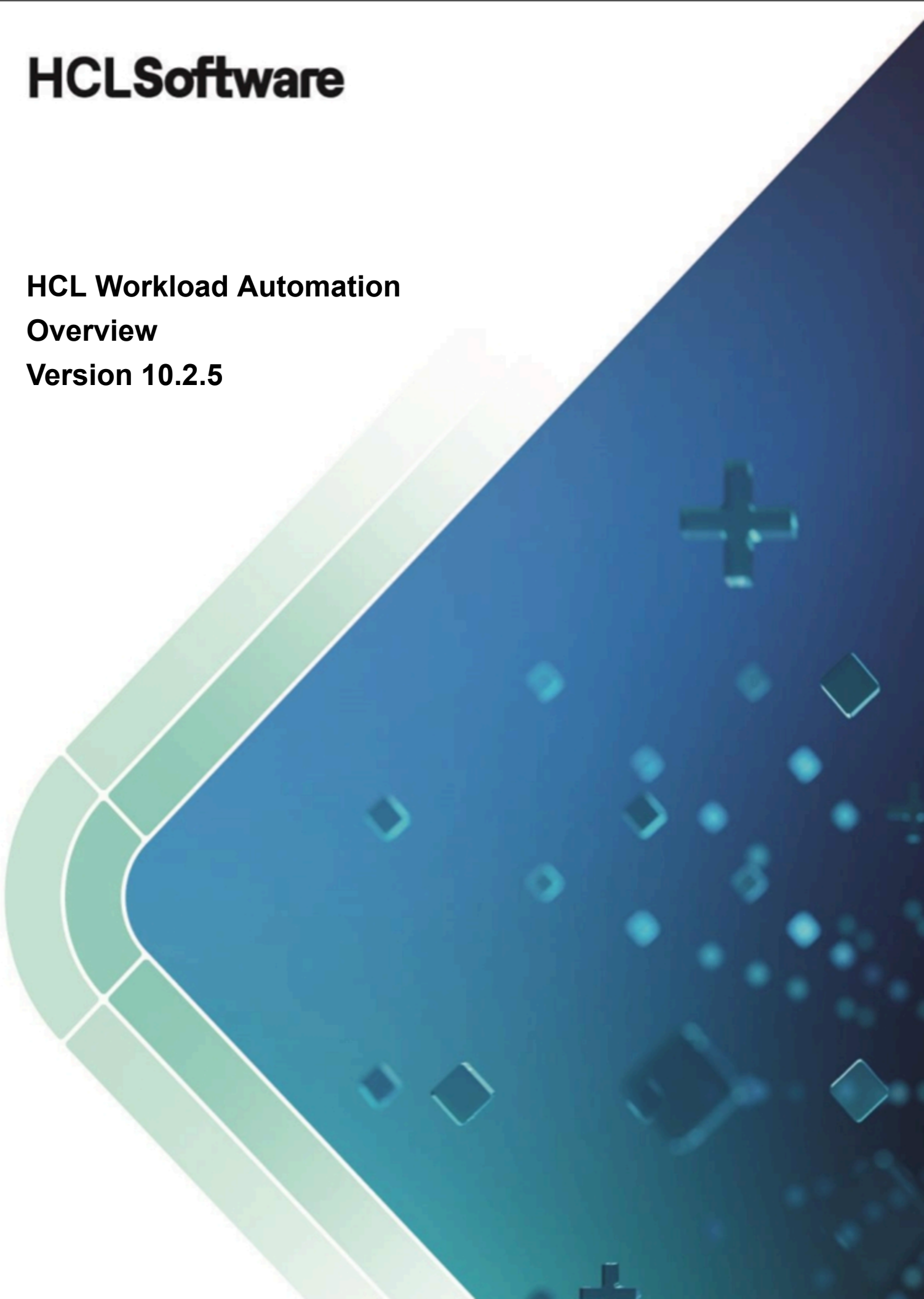
HCLSoftware

HCL Workload Automation
Overview
Version 10.2.5



Note

Before using this information and the product it supports, read the information in Notices on page ccxiii.

This edition applies to version 10, release 2, modification level 5 of HCL Workload Automation (program number 5698-T09) and to all subsequent releases and modifications until otherwise indicated in new editions.

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About this publication

Read this publication for information about the product suite.

Overview describes the family of HCL Workload Automation products and its enterprise workload management functions. It gives introductory information about the following products.

- HCL Workload Automation
- HCL Workload Automation for Z
- Dynamic Workload Console

What is new in this release

Learn what is new in this release.

For information about the new or changed functions in this release, see Summary of enhancements on page 12.

Accessibility

Accessibility features help users with a physical disability, such as restricted mobility or limited vision, to use software products successfully.

With this product, you can use assistive technologies to hear and navigate the interface. You can also use the keyboard instead of the mouse to operate all features of the graphical user interface.

For detailed information, see the appendix about accessibility in the *HCL Workload Automation User's Guide and Reference*.

How to read syntax diagrams

Syntax diagrams help to show syntax in a graphical way.

Throughout this publication, syntax is described in diagrams like the one shown here, which describes the SRSTAT TSO command:

```
{ SRSTAT } ' resource name ' [ SUBSYS ( { OPCA | subsystem name | MSTR } ) ] [ AVAIL ( { KEEP | RESET | NO | YES } ) ] [
DEVIATION ( { KEEP | amount | RESET } ) ] [ QUANTITY ( { KEEP | amount | RESET } ) ] [ CREATE ( { YES | NO } ) ] [ TRACE ( { 0 |
trace level } ) ]
```

The symbols have these meanings:

►►———

The statement begins here.

———►

The statement is continued on the next line.

►———

The statement is continued from a previous line.

The statement ends here.

Read the syntax diagrams from left to right and from top to bottom, following the path of the line.

These are the conventions used in the diagrams:

- Required items appear on the horizontal line (main path):

```
STATEMENT required item
```

- Optional items appear below the main path:

```
STATEMENT  [optional item]
```

- An arrow returning to the left above the item indicates an item that you can repeat. If a separator is required between items, it is shown on the repeat arrow.

```
STATEMENT repeatable item
```

- If you can choose from two or more items, they appear vertically in a stack.
  - If you must choose one of the items, one item of the stack appears on the main path:

```
STATEMENT { required choice 1  | required choice 2 }
```

  - If choosing one of the items is optional, the entire stack appears below the main path:

```
STATEMENT [ { optional choice 1  | optional choice 2 } ]
```

  - A repeat arrow above a stack indicates that you can make more than one choice from the stacked items:

```
STATEMENT [ {  | optional choice 1  | optional choice 2  | optional choice 3 } ]
```

```
STATEMENT {  | required choice 1  | required choice 2  | required choice 3 }
```

- Parameters that are above the main line are default parameters:

```
STATEMENT [ { default  | alternative } ]
```

- Keywords appear in uppercase (for example, STATEMENT).
- Parentheses and commas must be entered as part of the command syntax, as shown.
- For complex commands, the item attributes might not fit on one horizontal line. If that line cannot be split, the attributes appear at the bottom of the syntax diagram:

```
STATEMENT { required choice 1 [ optional choice 1 ( { default | alternative } ) ] [ optional choice 2 ( { default |
alternative } ) ] | required choice 2 | required choice 3 }
```

Chapter 1. Summary of enhancements

HCL Workload Automation provides the following enhancements:

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Version 9.4

HCL Workload Automation for Z

Version 10.2

Version 10.1

Version 9.5

HCL Workload Automation version 10.2.5 enhancements

Learn about the HCL Workload Automation version 10.2.5 features.

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Learn about the HCL Workload Automation version 10.2.5 enhancements.

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Changed features, improvements, and RFEs

Advancing security with FIPS 140-3 compliance

FIPS is a U.S. government security standard that defines **security requirements for cryptographic modules** used to protect sensitive information. **FIPS 140-3** is the latest version of the U.S. and Canadian government security standard that defines security requirements for cryptographic modules in IT and telecommunications products. Its purpose is to ensure that products handling sensitive data via cryptography are secure and reliable. Federal agencies must use FIPS 140-3 validated modules. It is also widely adopted by defence contractors and financial institutions.

The introduction of FIPS 140-3 compliance ensures a robust and secure automation solution. This significant enhancement enables organizations, particularly those in regulated industries and federal sectors, to leverage HCL Workload Automation while adhering to stringent U.S. government security standards for cryptographic modules.

HCL Workload Automation now natively supports FIPS 140-3 by restricting cryptographic algorithms to the permitted subset, ensuring that data protection mechanisms align with these rigorous specifications, while carefully managing necessary, FIPS-permitted exceptions during transition.

A new and improved version of the secure command empowers administrators to activate or deactivate FIPS compliance post-installation. Key capabilities of secure include:

FIPS activation

Configures the environment for FIPS 140-3 operation. This includes verifying compatibility (for example with Windows users) and converting any existing passwords stored with the older TripleDES algorithm to the FIPS-approved AES encryption standard. It then activates FIPS flags across essential configuration files and restarts the affected components. The activation process can accommodate transitional phases for algorithms like TripleDES, as permitted, before full conversion.

FIPS deactivation

Reverts the FIPS-specific settings in the aforementioned configuration files and restarts the components, should FIPS mode need to be disabled.

The introduction of integrated FIPS 140-3 compliance offers significant advantages:

Enhanced Security Standards

Operate your environment in alignment with rigorous, federally mandated cryptographic standards.

Simplified Regulatory Adherence

Enable organizations in government, finance, healthcare, and other regulated sectors to confidently deploy HCL Workload Automation.

Dedicated Compliance Management

Utilize the secure script for straightforward and centralized control over FIPS activation and deactivation.

Robust Data Protection

Ensure sensitive data, particularly passwords, are protected using FIPS-validated encryption algorithms like AES.

Flexible and Controlled Migration

Benefit from a clear process for enabling FIPS in new or existing environments, with guidance for migrating older FIPS-configured setups.

With FIPS 140-3 compliance, HCL Workload Automation provides an even more secure and trustworthy platform, empowering you to meet demanding security requirements while automating your critical business processes.

To ensure FIPS compliance, all HCL Workload Automation components must be at version 10.2.5 or later, certificates must employ at least a robust 2K RSA key and use encryption algorithms different from `MD5-RSA` and `SHA1-RSA`.

FIPS mode is primarily for meeting specific government security standards. If your organization does not need to enable it, the product continues to deliver robust security without it. If your organization does not requires adhering to FIPS, you can install or upgrade as usual and FIPS will not be enabled in your environment.

When you perform a fresh installation, FIPS is disabled by default: you can enable it by setting the **enablefips** parameter to `true` when running the installation commands. When you upgrade from a previous version, HCL Workload Automation checks your current FIPS settings and applies the same settings in the upgraded environment. Before you start the upgrade, ensure your certificates meet FIPS 140-3 standards. FIPS is supported on all supported operating systems with the exception of IBM i operating systems.

For more information about FIPS, see Enabling and disabling FIPS.

Streamlined engine reporting configuration in administration panel

Discover a more intuitive and controlled method for managing reporting credentials on a per-engine basis. The primary goal is to provide users with a dedicated and user-friendly interface to configure and update database access required for reporting functionalities tied to specific engines.

Previously, managing these specific credentials might have involved less direct methods. Now, administrators can easily handle this task: upon selecting an engine from the Administration Panel and clicking the edit icon, the familiar edit modal appears, now featuring a distinct "Reporting" tab. Within this tab, users can enable reporting for the selected engine and securely input the necessary Database User ID and Password. Successful saving of these credentials is confirmed instantly via a toast notification, ensuring a clear and immediate feedback loop.

This refinement offers clear advantages:

Enhanced User Experience

Provides a dedicated, easy-to-navigate interface for reporting setup.

Centralized Control

Simplifies the management of reporting credentials for each engine directly within its configuration.

Improved Efficiency

Speeds up the process of configuring or updating reporting details.

This focused update improves the administrative experience by making the setup and maintenance of engine-specific reporting credentials more straightforward and secure.

Navigating OQL Queries in the Orchestration Monitor

The Orchestration Monitor OQL query functionality has been significantly enhanced to improve usability and performance. The new design empowers you with greater control and a more intuitive interface for managing your queries.

When interacting with the query input section, you can now:

- Manually trigger searches using a dedicated search icon or by simply pressing Enter. This removes the automatic running of queries while typing.
- Expand or collapse additional filters via an interactive visual icon, enabling a cleaner and more focused workspace.

The ability to precisely control query runs and filter options means you can now craft highly specific queries for workstations, job streams, jobs, and more without interruption. This leads to faster issue resolution and more efficient operational management.

User Object Credential Management - Ensuring operational continuity and security

The User Object Credential Management enables you to securely update the passwords stored within user objects directly from a central point of control. This ensures that changes are applied consistently across both the database and plan instances, guaranteeing operational continuity and better adherence to your security policies.

Previously, updating the credentials stored in user objects was often a manual, multi-step process. These password changes had to be applied separately to the database and then manually propagated to any active plans, a procedure prone to human error and delays. This disconnect could lead to authentication failures for in-flight tasks that rely on these objects, causing unexpected job failures, disrupting critical business processes, and creating potential security compliance gaps.

The introduction of this feature brings significant advantages:

Limit service disruptions

Update credentials for user objects across both the database and all running plan instances with a single action. This prevents authentication failures and ensures your job streams continue to run without interruption.

Strengthen security and compliance

Enforce password policies consistently for the credentials within your user objects and respond quickly to security mandates. Centralized control simplifies audits and demonstrates adherence to your organization's security standards.

Increase operational efficiency

Drastically reduce the time and effort required to manage user object credentials. What was once a complex, multi-system task becomes a single, swift operation, freeing up your team to focus on more strategic initiatives.

User Object Credential Management enables more resilient, secure, and efficient automation.

Monitor certificate expiration - Total certificate control

The Monitor certificate expiration provides a centralized view of your certificates directly within the Orchestration Monitor. This gives you immediate visibility into certificate validity, making it simple to track expiration dates and proactively manage the rotation process to maintain security and service availability.

The introduction of proactive certificate monitoring brings a number of benefits:

Prevent service outages

Gain a clear, at-a-glance view of all monitored certificates and their expiration dates. By receiving advance warning, you can plan and perform certificate rotations with zero downtime, preventing outages caused by expired credentials.

Enhance security and compliance

Ensure your environment is always protected with valid, trusted certificates. Proactive monitoring simplifies security audits and demonstrates a robust, compliant process.

Streamline certificate management

By centralizing certificate information within the Orchestration Monitor, you reduce administrative overhead and simplify the entire lifecycle management for your team.

By integrating certificate oversight directly into your daily monitoring, this feature transforms a manual task into a simple part of your operational routine, bolstering both the security and reliability of your automation.

Changed features, improvements, and RFEs in version 10.2.5

A list of features changed and improved since the previous release and major improvements.

The following features have changed or have been introduced or removed since the previous release:

New command for setting Dynamic Workload Console environment

You can now use the dwc_env command to set the environment on the Dynamic Workload Console. Launch the command as follows: dl

Windows **On Windows operating systems**

```
dwc_env.cmd
```

UNIX **On UNIX operating systems**

```
. ./dwc_env.sh
```

After setting the environment, you can launch the commands located on the Dynamic Workload Console (secure and certman) without specifying the command path.

The command is located in the installation directory of the Dynamic Workload Console.

The certman command can now verify the security level of certificates in your environment

The check on certificates is performed automatically at installation or upgrade time. If the current certificates are not secure, a warning message is displayed.

New databases supported

The following databases are now supported:

- Amazon RDS for Postgres
- Google Cloud SQL for Postgres

These databases offer a powerful combination of flexibility, scalability, and ease of use, scalability and performance together with high availability and reliability.

Requests for Enhancements (RFEs) give customers the opportunity to collaborate directly with the product development team and other users. The team prioritizes and develops new product features based on proposals made by customers.

HCL Workload Automation V 10.2.5 delivers the following RFEs:

User object credential management

The User object credential management enables you to securely update the passwords stored within user objects directly from a central point of control in the Dynamic Workload Console. You can also perform the same action from the Orchestration CLI with a simple command, for more information see altpass

Monitor certificate expiration

The monitor certificate expiration provides a centralized view of your workstation certificates directly within the Orchestration Monitor. This enables you to track expiration dates and proactively manage the rotation process to maintain security and service availability. For more information on the Orchestration Monitor, see Orchestration Monitor overview

Loop detection between jobs and job streams in current and trial plans

Ensure robust detection of loops involving nodes (that is jobs and job streams) in both the current and trial plans. By enabling the new property `com.ibm.tws.planner.monitor.verboseLoopLogging=true` in the `TWSConfig.properties` file, the product logs loop-related notifications in the `trace.log` file whenever loops are detected.

To minimize log verbosity, notifications are only generated when there is a change in loop structure—such as a job or job stream entering or exiting the loop.

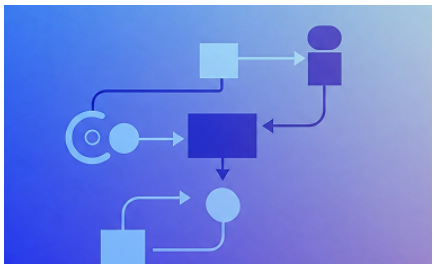
For more information, see Detecting loops between jobs and job streams in current and trial plans

To submit a new RFE, write to us at HWAinfo@hcl.com

HCL Workload Automation version 10.2.4 enhancements

Learn about the HCL Workload Automation version 10.2.4 features.

Table 2.



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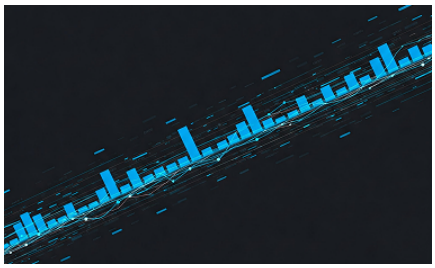

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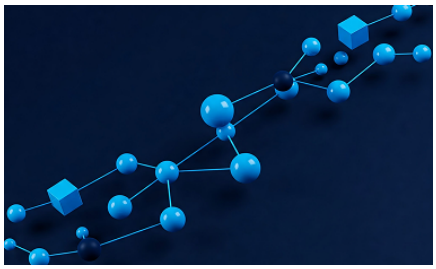
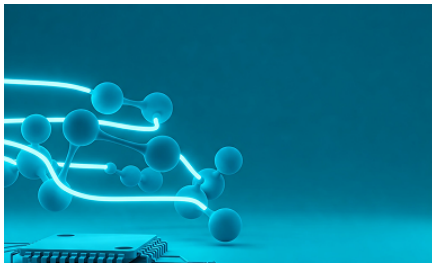
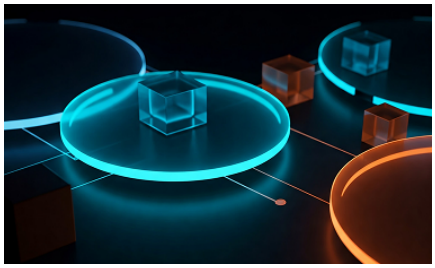
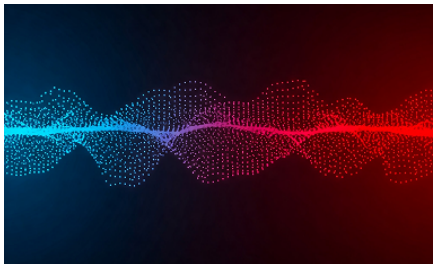
Table 2. (continued)

Maximize efficiency with Nesting	**Monitor with OQL**	**Operator instructions**
		
on page 24	on page 26	on page 27
Security - Password vaults	**Security - Password encryption**	**Security - Certman improvements**
		
on page 27	on page 28	on page 28
Workstations - Graphical Designer	**RCGs - Graphical Designer**	**Resources - Graphical Designer**
		
on page 29	on page 30	on page 30
Workflow details available	**Enhanced job monitoring**	**Performance optimization**

Learn about the HCL Workload Automation version 10.2.4 enhancements.

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Changed features, improvements, and RFEs

Maximize workflow efficiency with advanced job stream submission and management

Transform the way you handle automated workflows with cutting-edge features designed to streamline submissions, enhance flexibility, and offer greater control over your orchestration processes. To achieve this, you can use the Job Stream Submission job, which is designed to automate the submission of job streams for processing. The new version of this job features the following improvements:

Hierarchical orchestration

Unlock advanced automation scenarios through nested job streams. This powerful feature enables you to build intricate, multi-layered workflows by embedding job streams within others. This enables precise orchestration of complex sequences of interdependent jobs and job streams, providing a structured approach to managing sophisticated processes.

Automated submission efficiency:

Streamline and optimize your operational flow by automating the submission of job streams for processing. This enhancement reduces manual intervention, accelerates workflow initiation, and improves overall efficiency by ensuring timely execution of your automated processes.

Real-time monitoring

Maintain comprehensive awareness of your active workflows with detailed, real-time monitoring accessible via the Workflow details view in the Dynamic Workload Console. This provides immediate insight into the status of each job stream, enabling proactive issue identification and resolution, ensuring smooth and predictable operations.

Flexible management options

Gain granular control over running job streams with enhanced drill-down capabilities within the Workflow details view. This enables you to investigate the status of individual components and, crucially, to restart the

Job Stream Submission job as needed. This dynamic management capability ensures operational continuity and enables a swift recovery from unexpected issues.

Customizable Behavior

You can now configure whether the Job Stream Submission job actively monitors the run of the submitted job streams and adjusts its own status based on their final outcome. Alternatively, you can maintain the previous behavior where the submission job completes successfully regardless of the downstream job stream results, providing flexibility in how you track and manage workflow dependencies.

These advancements in job stream submission and management empower you with unparalleled precision, efficiency, and control over your automated workflows. By streamlining submissions, enabling sophisticated nested structures, providing real-time visibility, offering flexible management options, and allowing for customizable behavior, these features simplify even the most complex processes and significantly enhance your orchestration capabilities.

For more information, see the topic about job stream submission jobs in *User's Guide and Reference*.

Filtering with Orchestration Query Language in the Orchestration Monitor

Harness the power of OQL for enhanced monitoring.

Experience the power of Orchestration Query Language (OQL) directly in the Orchestration Monitor of the Dynamic Workload Console.

Toggle the OQL button in the Orchestration Monitor and effortlessly filter workstations, jobs, job streams, and resources with comprehensive syntax, tailoring your view for superior monitoring and gaining precise insights for optimal workload management.

Operational efficiency through precise monitoring

By leveraging OQL in the Orchestration Monitor, you can filter workstations, jobs, job streams, and resources with comprehensive syntax. This precise filtering enables operations teams to quickly pinpoint specific areas of interest or concern in your environment, reducing the time spent sifting through irrelevant data and leading to faster identification and resolution of issues.

Faster issue resolution and reduced downtime

OQL empowers you to easily and quickly retrieve required results by writing targeted queries. This rapid access to specific information about the production plan environment enables operations teams to diagnose problems more efficiently, leading to quicker resolutions and minimizing potential downtime, which directly translates to increased system availability and business continuity.

Streamlined operations across multiple interfaces

OQL is not limited to a single interface; it can be used with REST API V2, Orchestration CLI, and the Orchestration Monitor of the Dynamic Workload Console. This consistency across different tools provides flexibility for various user roles and automation needs, streamlining operations and reducing the learning curve for different interaction methods, leading to increased team productivity.

Get access to OQL and enhance your monitoring capabilities, improve operational efficiency, reduce downtime, optimize workload management, and proactively address potential issues. For more information, see Using Orchestration Query Language.

Operator instructions within the Orchestration Monitor

The Orchestration Monitor now features the **Operator instructions** panel.

Operators can now retrieve definition details for jobs and job streams with the new **Operator Instructions** panel within the Orchestration Monitor. The panel displays information from the **Description** and **Documentation** fields of the job or job stream definition, to facilitate a rapid comprehension of item parameters during monitoring activities.

Enhanced operational efficiency

Operators can quickly access crucial definition information about jobs and job streams directly within the Orchestration Monitor. This rapid access to details from the **Description** and **Documentation** fields facilitates a faster comprehension of job or job stream parameters during monitoring activities, leading to more efficient operations.

Reduced downtime

By providing operators with immediate access to relevant information, the **Operator Instructions** panel enables them to better understand the context and purpose of running jobs and job streams. This improved understanding can lead to more effective monitoring, quicker identification of potential issues, and ultimately, a reduction in system downtime.

Faster issue resolution

When an issue arises, operators can instantly retrieve definition details for the affected job, job instance, and the associated job stream. This readily available information can significantly speed up the troubleshooting process, allowing operators to diagnose and resolve problems more quickly, minimizing business impact. This deeper understanding empowers operators to make more informed decisions during monitoring and when taking necessary actions.

Simplified sharing and onboarding

The **Operator Instructions** feature centralizes key information about jobs and job streams, making it easily accessible to all authorized personnel. This can streamline knowledge sharing within operations teams and facilitate the onboarding of new operators by providing them with immediate access to essential details.

The **Operator Instructions** panel gives operators the necessary details to improve their monitoring effectiveness. and achieve a faster comprehension of item parameters, ultimately contributing to a more efficient and informed operational environment.

For more information about OQL syntax, see Orchestration Monitor overview.

Discover the new and improved integration with password vaults

Take password management to a new level with the new integrated capabilities for password storage and management.

You can now configure one or more **dynamic agents, pools, or dynamic pools** to interact with CyberArk or other password vaults and obtain the passwords required to run your jobs. Employing pools or dynamic pools guarantees high availability by automatically selecting the best-suited agent to contact the password vault.

Enhanced security

The new integration provides a centralized and secure solution for managing credentials, significantly reducing the risk of unauthorized access and security breaches.

Reduced operational overhead

Automating password retrieval through integration with password vaults removes the manual effort involved in managing and updating passwords across numerous jobs and systems, freeing up staff for more strategic tasks.

Increased efficiency and reliability

Jobs are less likely to fail due to incorrect or expired passwords, as the system automatically retrieves the current credentials from the vault at runtime. The high availability ensured by using pools or dynamic pools minimizes disruptions.

Flexibility and scalability

The support for multiple password vaults and custom scripts enables integration with existing security infrastructure and easy scaling of automation efforts.

Smooth integration

Dynamic agents, pools, and dynamic pools can be configured to interact with a chosen password vault to obtain necessary passwords at runtime.

Easy configuration

The ability to create multiple profiles on agents provides flexibility for different password vaults or specific queries.

Streamlined upgrade

Existing users on versions 10.2.1 and later benefit from an automatic migration of their CyberArk configurations, simplifying the adoption of the new feature.

This feature requires all HCL Workload Automation components to be at version 10.2.4 or later.

In conclusion, the new password vault integration in HCL Workload Automation offers a compelling value proposition by providing a secure, efficient, and flexible solution for managing passwords in automated workflows, directly addressing key security and operational challenges associated with managing a growing IT landscape.

For more information about configuring dynamic agents to function as proxies by creating a profile, see the topic about configuring the agent to work with a password vault in *Administration Guide*.

For more information about specifying the required information in the job definition, see Obtaining passwords from password vaultsthe topic about obtaining passwords from password vaults in *User's Guide and Reference*.

Improved security for password encryption

Ensure a higher security level with the AES algorithm. This feature is especially convenient for encrypting the passwords stored in `.opts` configuration files used for PeopleSoft and SAP.

The Triple DES encryption algorithm has been deprecated by NIST (National Institute of Standards and Technology) and is no longer recommended for new systems. It has been replaced with the AES (Advanced Encryption Standard) encryption algorithm, which offers the following advantages:

Enhanced Security and Reduced Risk

The latest version uses the Advanced Encryption Standard (AES) algorithm as the default for password encryption, which offers a higher level of security compared to the deprecated Triple DES (3DES). AES supports longer key lengths (128, 192, and 256 bits), making encrypted passwords more resistant to brute-force attacks. This significantly reduces the risk of unauthorized access to sensitive systems integrated with HCL Workload Automation, protecting valuable data and the integrity of critical business processes.

Improved Compliance and Adherence to Modern Standards

NIST now recommends AES as the current encryption standard. By adopting the latest HCL Workload Automation, clients ensure they align with modern security best practices and industry standards, potentially aiding in meeting regulatory compliance requirements.

Increased Efficiency and Reduced Operational Costs

AES is significantly faster and more efficient than 3DES, especially in software implementations. This leads to quicker password encryption and decryption processes, consuming less computational power and memory, potentially resulting in faster processing times and reduced expenses for resources and processing time.

Easier Transition and Minimal Disruption

The upgrade process is designed to be seamless. If clients were previously using 3DES, their encrypted passwords are automatically and seamlessly converted to the new AES algorithm during the upgrade, requiring no manual intervention. This minimizes disruption to existing operations and reduces the burden on staff.

Flexible and Versatile Password Management

A secure script that can be used to optionally encrypt passwords for SAP or PeopleSoft, even after the upgrade. This script offers flexibility, allowing administrators to encrypt passwords used during installation, upgrade, and management processes. Clients can choose to use a custom passphrase for potentially reusable passwords or leverage the standard encryption method with a unique key for each installation, further enhancing security by preventing decryption across different components.

The AES encryption provides stronger security, improved efficiency, better compliance, and a seamless upgrade process, ultimately contributing to a more secure and reliable automation environment for critical business operations. The availability of the secure script further empowers administrators with flexible password management options, reducing potential vulnerabilities and enhancing overall system security.

For further details, see the topic about automatic encryption for key product files in *Administration Guide*.

Unlocking the enhanced capabilities of Certman

Experience a more efficient certificate management, powered by Certman.

The new version of HCL Workload Automation features extended Certman possibilities, including the `delete` command, which provides the capability to remove aliases from a keystore or trustore on a master domain manager, an agent (using the newly implemented `agentscope` keyword), or the Dynamic Workload Console.

Enhanced certificate management

The `certman delete` command enables the removal of aliases from keystores or trustores on various components (master domain manager, agents, Dynamic Workload Console). This streamlines certificate management tasks, saving administrators time and effort compared to potentially more complex manual procedures. Efficient certificate management translates to reduced operational overhead and faster response times for security-related tasks.

Improved security posture

The ability to specifically delete aliases, whether from the keystore, truststore, or both, on different HCL Workload Automation components (including agents via the agentscope keyword) provides more precise control over security certificates. This granular control enables you to maintain a cleaner and more secure certificate environment by removing unnecessary or outdated aliases, reducing potential security vulnerabilities.

Simplified compliance

By enabling the easy removal of unused or expired certificate aliases, the `certman delete` command helps you maintain a more organized and up-to-date certificate inventory. This simplified management contributes to better compliance with security policies and regulations, making audits smoother and less time-consuming**.**

By upgrading to the latest version of HCL Workload Automation, you can leverage these enhanced Certman capabilities to achieve more efficient, secure, and manageable certificate operations, ultimately benefiting from reduced operational costs, improved security, and better compliance.

For more information about the `certman delete` command, see Remove an alias from the keystore or truststore. For further and more general Certman information, see Managing certificates using Certman.

Workstation management within the Graphical Designer

You can now create and manage workstations directly within the Graphical Designer, with a unified and visual approach to your scheduling infrastructure. This provides significant operational advantages:

Centralized workstation control

By creating and managing workstations directly within the Graphical Designer, you gain a consolidated and visual perspective of your entire scheduling environment. This centralized approach minimizes the potential for errors and provides unparalleled control over your automation.

Simplified workstation lifecycle management

The Graphical Designer streamlines the entire workstation lifecycle. Upon initiating creation, the system guides you through selecting the workstation type, including Pool, Dynamic Pool, Extended Agent, and more. After entering the necessary details, the new workstation is added to the Assets list, making it immediately available for scheduling. Furthermore, the Assets tab provides consistent functionality to effortlessly edit, duplicate, or delete workstation definitions, simplifying ongoing maintenance and configuration.

The integrated workstation management within the Graphical Designer delivers a centralized and visual approach to administering your scheduling environment. By providing simplified creation and lifecycle management, this feature minimizes errors and grants you unprecedented control over your automation infrastructure, leading to a new level of operational efficiency.

See Managing workstation definitions to learn how to create workstations from the Graphical Designer interface.

Run cycle groups available as triggers in the Graphical Designer

You can now create and assign run cycle groups as **Triggers** to job streams directly in the Graphical Designer to design a precise, time-driven automation.

This intuitive integration provides significant operational advantages:

Enhanced scheduling precision

By visually defining and managing run cycle groups directly within the Graphical Designer, you gain unprecedented control over when your job streams run. This removes the complexities and potential errors associated with manual scheduling configurations. The visual interface makes it easy to define intricate scheduling patterns, ensuring that your automation runs exactly when needed, minimizing the risk of incorrect run times.

Streamlined design

Integrating run cycle group creation and assignment into the Graphical Designer simplifies the entire automation design process. You can now define both the tasks and their precise run schedule within a single, intuitive environment. This ease of use empowers you to build and deploy a time-driven automation more quickly and effectively.

The integration of Run cycle groups as **Triggers** within the Graphical Designer offers a powerful and intuitive approach to time-driven automation. By enhancing scheduling precision, streamlining workflow design and freeing up valuable resources, this feature enables you to achieve a greater operational efficiency and focus on strategic growth.

Resources available in the Graphical Designer

You can now associate resources with jobs and job streams directly within the Graphical Designer to build a responsive automation framework attuned to immediate resource accessibility.

This delivers notable operational benefits:

Improved automation responsiveness

By visually linking and managing resource dependencies directly within the Graphical Designer, you achieve superior control over when your jobs and job streams run. The visual interface facilitates the definition of clear resource needs, guaranteeing that your automation operates only when the necessary resources are available, preventing failures due to resource constraints.

Simplified workload creation

Integrating resources into the Graphical Designer streamlines the entire automation design process. You can now define jobs and job streams and their resource dependencies within a unified, user-friendly environment. This ease of use enables you to construct and implement resource-aware automation more rapidly and efficiently. Furthermore, the Orchestration Monitor provides a centralized view for tracking resource status and dependencies, enhancing visibility and control.

The integration of resource management in the Graphical Designer empowers you with a more intuitive, efficient, and agile approach to automation. It simplifies complex workloads, reduces errors, and improves overall productivity.

Workflow details available in the Orchestration Monitor

Elevate your operational efficiency with the introduction of Workflow Details in the Orchestration Monitor. This new feature provides unprecedented real-time visibility into the granular execution of your automation.

Enhanced operational insight and proactive management

Workflow details enable you to track the precise completion percentage of data transfers, monitor the status of individual steps within intricate business processes, and receive immediate updates on key activities. This granular insight empowers your operations teams to proactively manage their workload. Potential bottlenecks or delays become instantly apparent, enabling swift adjustments and preventing disruptions before they impact critical business outcomes. This proactive approach translates directly into improved service levels and reduced downtime.

Accelerated issue resolution

When issues do arise, Workflow details provide the necessary context for rapid diagnosis and resolution. Instead of sifting through logs, your teams can pinpoint the exact stage where a problem occurred, understand the specific details, and implement corrective actions swiftly. This dramatically reduces the impact of failures on business operations and ensures business continuity.

Optimized resource allocation:

You can identify processes that are taking longer than expected or consuming excessive resources, allowing for optimization efforts. This leads to increased efficiency, reduced operational costs, and the ability to handle a greater volume of work with existing resources.

By providing granular, real-time insights, Workflow details empowers businesses to enhance operational efficiency, accelerate issue resolution, optimize resource utilization, and gain unprecedented control over their integrated environment, ultimately contributing to improved business agility and resilience.

Enhanced job control post-submission

Quick job definition adjustments in the Orchestration Monitor and Job Stream View.

Gain unprecedented control over your jobs with the newly introduced monitoring actions. Directly within the Orchestration Monitor or Job Stream View, you can now control job processing by modifying the job definition without the need to go back to the original database definition. Simply use the following actions to modify the future instances of the selected job definition:

- Set hold for definition
- Remove hold for definition
- Set no operation for definition
- Remove no operation for definition

Increased operational agility and responsiveness

This feature enables you to make quick adjustments to job definitions directly from the Orchestration Monitor or Job Stream View. This removes the time-consuming process of navigating back to the original database definition, enabling faster responses to changing business requirements and immediate control over future job executions.

Improved efficiency and reduced administrative overhead

By enabling modifications from the monitoring interface, you can streamline the job definition adjustment process. Operations teams can save significant time and effort by avoiding the need to access and modify database records, leading to increased efficiency and lower administrative overhead.

Enhanced control

being able to set or remove **Hold** and **No operation** directly from the monitoring views provides unprecedented control over how future instances of jobs are processed. This enables proactive management of the workload based on real-time conditions.

For more information, see Modifying job definitions from job instances.

Performance enhancements

The following improvements have been introduced with the new release:

Improved dynamic agent memory management

HCL Workload Automation version 10.2.4 introduces significant improvements in dynamic agent memory handling. Under substantial workloads of up to 600,000 job submissions, the agent now exhibits negligible memory consumption and efficiently releases resources.

This enhancement provides greater stability and resilience for your workload automation environment, reduces the risk of memory-related issues, and enables higher job throughput without impacting system performance.

Orchestration Monitor query performance boost

The Orchestration Monitor now provides significantly faster access to critical workload information. Query results, based on tests with 250 entries, appear three times as quickly compared to the Workload Monitor.

This improved performance gives you quicker insights into your automation. Faster query times mean less waiting, enabling faster identification of potential issues, quicker decision-making, and improved overall operational efficiency. This enables more proactive monitoring and a more responsive monitoring experience.

Note: Data taken from test environments. The time represents the user process duration, starting from opening the monitor interface to obtaining a query result with 250 entries.

Changed features, improvements, and RFEs in version 10.2.4

A list of features changed and improved since the previous release and major improvements.

The following features have changed or have been introduced or removed since the previous release:

Drivers for Db2 for z/OS no longer shipped with the product

Whereas previously the drivers for Db2 for z/OS were included in the Dynamic Workload Console package, now they must be obtained from your Db2 for z/OS installation. If you use Db2 for z/OS with the Dynamic Workload Console version 10.2.4 or later, transfer the drivers in binary mode from the directory where you installed Db2 for z/OS to a directory of your choice. Specify this directory using the **dbdriverspath** parameter when running the configuredb or dwcinst scripts.

Requests for Enhancements (RFEs) give customers the opportunity to collaborate directly with the product development team and other users. The team prioritizes and develops new product features based on proposals made by customers.

HCL Workload Automation V 10.2.4 delivers the following RFEs:

WAD-I-83

Request: CyberArk and password vault management need to be improved and made more effective.

Resolution: Several improvements have been added in password vault management. For more information, see Discover the new and improved integration with password vaults on page 24.

WAO-466

Request: Remove the 1000-character limit from the `Comment` field of job stream definitions.

Resolution: The `Documentation` field, previously known as `Comment`, has been increased to 4000 characters.

WAO-514

Request: A solution to visually differentiate production and non-production environments.

Resolution: With the `Private Label Settings` page, customers can now personalize environments with custom images. For more information, see Personalizing interfaces with custom images

WAO-544

Request: Add **Operator instructions** for jobs and job streams, as already present on HCL Workload Automation for Z.

Resolution: The Orchestration Monitor now features the **Operator instructions** panel. For more information, see Orchestration Monitor overview

WAO-574

Request: A solution that prevents HCL Workload Automation stored audit files from containing not valid JSON.

Resolution: The content within the audit JSON files is valid JSON. Each individual line now constitutes valid JSON.

WAO-I-3, WAO-I-64, WAO-I-124, WAO-I-190, WAO-423

Request: Enhancing the Dynamic Workload Console with more flexible filtering options, such as combining multiple filter criteria simultaneously, specifying multiple values for a single filter, adding multiple values for the same filter within a widget and so on.

Resolution: The Orchestration Monitor now supports Orchestration Query Language filters to enhance monitoring activities. For more information, see Using Orchestration Query Language.

ZWS-I-238

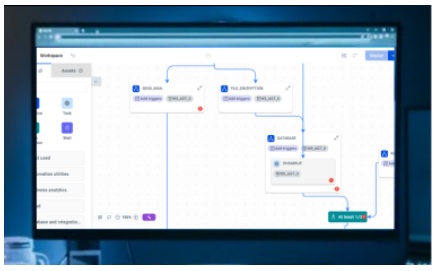
Request: Adding a new administrative role to the Dynamic Workload Console to determine which rights and activities are available to each user.

Resolution: The new **Administration Panel** in the Dynamic Workload Console allows for detailed and granular management of engine settings.

To submit a new RFE, write to us at HWAinfo@hcl.com

HCL Workload Automation version 10.2.3 enhancements

Learn about the HCL Workload Automation version 10.2.3 features.



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Graphical Designer

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PostgreSQL database

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Amazon RDS for MSSQL

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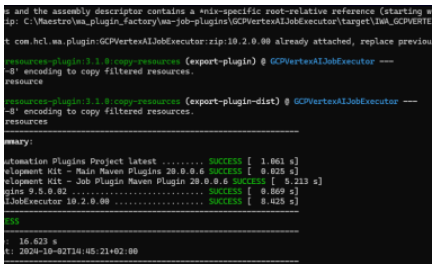
Private Label settings

on page 35

Certman

on page 35

My HCLSoftware portal



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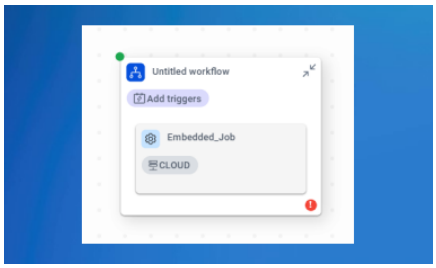
OCLI model commands

on page 37

REST API V2



on page 37

Embedded jobs

Learn about the HCL Workload Automation version 10.2.3 enhancements.

on page 37

Changed features

Discover the Graphical Designer: a brand-new way to design your orchestration

The Dynamic Workload Console version 10.2.5 comes with a brand-new Graphical Designer.

The Graphical Designer introduces drag and drop canvas capabilities that improve and simplify your automation design process. It uses a low-code, streamlined palette-based design and intuitive tabs, making editing your canvas workspace simple and efficient. A mini-map is also available to help you confidently navigate over workspaces that contain multiple complex job streams.

If you enjoy a smooth user experience, intuitive operations and an effective automation, the new Graphical Designer is everything you have been waiting for.

For more information, see Graphical Designer overview.

Elevate your data management with PostgreSQL database

Improve database performance and reliability by implementing the PostgreSQL database in your HCL Workload Automation environment.

You can now use the PostgreSQL database to create the database for the master domain manager and Dynamic Workload Console.

PostgreSQL offers an extensive list of features related to performance, security, and configuration options. It is free and open-source, and its high customizability supports tailoring it to the specific needs of your environment. It also provides scalability, availability, and functionality suitable for large volumes of data.

PostgreSQL replaces OneDB and Informix, which are no longer supported.

For more information about using PostgreSQL to create the database for the master domain manager and Dynamic Workload Console, see the topics about creating and populating the database for the master domain manager and Dynamic Workload Console in *HCL Workload Automation: Planning and Installation*.

Unleash the power of the cloud using Amazon RDS for MSSQL

You can now create the databases for the master domain manager and the Dynamic Workload Console using Amazon RDS for MSSQL.

Amazon RDS for MSSQL is a powerful, scalable managed database service that makes it easier to set up, operate, and scale SQL Server deployments in the cloud. It provides a powerful and convenient option for managing MSSQL databases in the cloud.

Amazon RDS for MSSQL also simplifies database management, enhances security, and provides the flexibility to scale up or down as your needs change.

For more information about creating the database using Amazon RDS for MSSQL, see the topics about creating the database for MSSQL cloud-based databases for the master domain manager and the Dynamic Workload Console.

Customize your interfaces with Private Label Settings

You can now use **Private Label Settings** to enhance your visual identity in HCL Workload Automation.

Your brand visuals are your business signature. You can incorporate your brand visual identity in the Dynamic Workload Console and Self-Service Catalog interfaces by uploading your logo and icon images in just a few clicks from the **Private Label Settings** page.

Your logo is displayed in the login pages of both Dynamic Workload Console and Self-Service Catalog, while the icon is displayed in the navigation bar of the Dynamic Workload Console.

Start customizing your interfaces today to better match your brand personality.

For more information, see Personalizing interfaces with custom images.

Certman: the new tool to manage certificates

Nowadays, having secure communications is paramount for businesses. To satisfy this crucial need, there is a new tool in HCL Workload Automation named Certman.

Certman enables you to quickly generate, extract, verify, and import your custom certificates based on the Secure Socket Layer (SSL) protocol, making the whole process more intuitive and easier to manage. You only need to run a few simple commands, and everything is automatically set.

Simplify your certificate management with Certman, and your communication security will no longer be a chore!

For further information about the usage of Certman, see Managing certificates using Certman.

Effortlessly optimize your license usage with the new My HCLSoftware portal

Unlock seamless license management and unparalleled convenience with the new My HCLSoftware (MHS) portal. Instantly view your license consumption at a glance and effortlessly keep your costs under control.

My HCLSoftware portal offers an intuitive and user-friendly interface, ensuring all the information you need is easily accessible. Designed with enhanced user experience in mind, it simplifies navigation and boosts efficiency.

This new portal replaces the Flexera (FNO) portal used in previous releases.

Configuring the new portal is quick and easy. Once the installation is finished, simply configure the dedicated options using optman, as described in Global options - detailed descriptionthe topic about the detailed description for global options in *Administration Guide*. The dedicated options include:

- **licenseProxyServer**
- **licenseProxyServerPort**
- **licenseProxyUser**
- **licenseProxyPassword**
- **licenseRefreshToken**
- **licenseServerUrl** The URL value is https://api.hcltechsw.com/.

Additional resources

- For a general overview about My HCLSoftware, see My HCLSoftware - an overview.
- For detailed information about My HCLSoftware, see What is My HCLSoftware? and How to register as a Customer on HCLSoftware portals.
- For more information about the criteria used in the license computation process, see the topic about license computation model in *Administration Guide*.
- For more information about enabling license management, see the topic about enabling product license management in *HCL Workload Automation: Planning and Installation*.

Frequently asked questions

Q: Is my Flexera account valid for My HCLSoftware?

A: Customer accounts in Flexera are available on MHS. So whatever account you had in Flexera, you will have that same access in MHS. All customers have access to MHS and should use their same login credentials.

Q: Are the existing licenses already available on MHS or are there some actions to be taken?

A: Customer entitlements are in sync between Flexera and MHS, so you will be able to deploy licenses on MHS.

Q: When I move to MHS, for how long will previous data be stored on Flexera?

A: Flexera will be available until June 30, 2025. It will not be available after that date.

Power your Orchestration CLI model commands with the newly supported items

You can now use Orchestration CLI model commands for new items to design your automation more efficiently.

The Orchestration CLI is a stand-alone command-line application you can download and install independently. It provides an efficient and streamlined interface from which you can design and monitor your automation environments.

The Orchestration CLI now supports model commands for the following items:

- Variables
- Variable tables
- Calendars
- Credentials
- Prompts
- Resources
- Run cycle groups
- Event rules
- Workstation classes
- Domains

You can now use the Orchestration CLI to design more sophisticated automation scenarios from a single point of control, increasing your productivity and efficiency without compromising on quality or scope.

Discover more about the Orchestration CLI and the new model commands.

Explore the new items now available with the scalable and flexible REST APIs V2

The powerful and flexible REST APIs V2 can now be used with more items, making more complex automation scenarios possible.

REST APIs enable the integration of workload scheduling capabilities with external products and solutions. With the implementation of our REST APIs V2, this integration is easier to configure, more powerful and flexible.

You can now use the new, more capable REST APIs V2 in conjunction with more items, including:

- Prompts
- Resources
- Run cycle groups
- Workstation classes
- Domains
- Event rules

The extended API V2 support to these items lets you easily create more complex, highly efficient automated environments, enabling HCL Workload Automation to work seamlessly in concert with all the third party products and solutions you need.

Discover how to drive your automation with REST APIs and find out more about the capabilities of the new APIs V2.

Embedded job definitions for enhanced customization

A job stream embedded job definition is a self-contained job configuration that remains immune to external changes and gives precise control and customization within the job stream.

You can now create job definitions within job streams without referencing task templates. Embedded job definitions do not exist as standalone entities, they are solely manageable by editing job stream definitions: this provides greater control and customization capabilities. Embedded jobs contribute to a clutter-free environment by removing the necessity for single-use job templates. For more information, see Creating an embedded job in a job stream.

Changed features and feature capabilities in version 10.2.3

A list of features changed since the previous release

The following features have changed or have been introduced or removed since the previous release:

OneDB and Infomix databases replaced by PostgreSQL

OneDB and Informix are no longer supported and support for PostgreSQL has been introduced to replace them. PostgreSQL provides a number of advantages, such as enhanced performance, robust features, and seamless scalability, as described in Elevate your data management with PostgreSQL database on page 34. If you are using OneDB or Informix and want to upgrade to version 10.2.3, you can extract all your definitions from OneDB or Informix and import them into a supported database. For more information, see the topics about connecting the Dynamic Workload Console to a new node or database in *HCL Workload Automation: Planning and Installation* and connecting the master domain manager to a new database in *Administration Guide*.

Derby database is no longer supported

Derby database is no longer supported.

If you upgrade from an environment where you are using Derby, you have to install a supported database and extract all your definitions from Derby as described in the topic about connecting the Dynamic Workload Console to a new node or database in *HCL Workload Automation: Planning and Installation*.

FIPS compliance temporarily not supported

FIPS compliance is not supported in the current product version. This is because OpenSSL 3.0 libraries do not provide a FIPS-compliant validation algorithm for P12 certificates. Development is in progress with the aim of supporting FIPS in upcoming releases.

An optional parameter named **enablefips** is available in the serverinst and twsinst scripts to check FIPS settings before you install or upgrade. The default value in a fresh installation is `false`.

If you are upgrading from an environment where FIPS compliance is supported, you should disable FIPS configuration. When upgrading, a check is performed on your settings to ensure FIPS is not enabled. If it is enabled, the upgrade stops and an error message is displayed. To resume the upgrade, set the **enablefips** parameter to `false` when running the serverinst and twsinst scripts. The upgrade proceeds and the configuration files are updated accordingly. For more information, see the FAQ about FIPS compliance in section FAQ - Upgrade procedures in *Planning and Installation Guide*.

Red Hat Enterprise Linux (RHEL) 7 out of support

Red Hat Enterprise Linux (RHEL) 7 went out of support in June 2024. As a result, it is not supported in HCL Workload Automation version 10.2.3.

Certificates now managed using the certman command

While in previous versions it was possible to generate certificates at installation time using the serverinst command, the new certman command can now manage certificates more efficiently and easily. For more information, see Certman: the new tool to manage certificates on page 35.

HCL Workload Automation version 10.2.2 enhancements

Learn about the HCL Workload Automation version 10.2.2 enhancements.

HCL Workload Automation version 10.2.2 includes the following enhancements:

- Changed features and feature capabilities in version 10.2.2 on page 42
- Satisfying Requests for Enhancements (RFEs) in version 10.2.2 on page 43

Installation without root privileges extended to all HCL Workload Automation components

You can now install all server components (such as master domain managers, domain managers, dynamic domain managers and so on) and fault-tolerant agents using a user account that does not have root privileges.

On supported UNIX operating systems, you can now choose whether to install server components and fault-tolerant agents using a user account with or without root privileges. This is especially useful if security policies in your organization require not to share the password for root users. This installation method is already available since previous releases for dynamic agents, HCL Workload Automation Agent (also known as the agent with z-centric capabilities), and Dynamic Workload Console.

Note that if you choose this installation method, known as **no-root installation**, only the user who performs the installation can use HCL Workload Automation.

This enhancement applies only to supported UNIX operating systems, while the installation method on Windows operating systems remains unchanged.

For more information, see the topics about user management, agent installation procedure, before upgrading, uninstalling the main components and uninstalling agents using the twsinst script in *HCL Workload Automation: Planning and Installation*. Also see the **uname** parameter in the twinst script and the **wauser** parameter in the serverinst script.

Orchestration CLI extended to include model commands

Orchestration CLI is a stand-alone command-line application that you can download and install independently without requiring any other HCL Workload Automation component. You can install Orchestration CLI on any workstation where you want to manage and control workflows. It is designed to replace the composer and conman commands, by providing a more modern, efficient, and versatile interface. By using Orchestration CLI, you can automate tasks efficiently, reducing manual effort and operational overhead. Orchestration CLI helps you streamline command-line interactions, enhance cross-platform compatibility, and build a more efficient workload automation process. It also simplifies maintenance, lowers costs, and minimizes IT requirements.

Orchestration CLI also provides a more modern and user-friendly interface, and is designed to be intuitive and efficient, making it easier for administrators and users to complete tasks. It combines modernity, compatibility, and enhanced functionality, when compared to the conman and composer command line.

In addition to the plan commands, already available in previous releases, model commands are now available in the Orchestration CLI. You can use these commands to create or modify the object definitions for folders, jobs, job streams, and other scheduling or security items in replacement of the corresponding composer commands.

See the list in the Model commands section in *User's Guide and Reference*.

For more information, see the topic about Orchestration CLI commands in *User's Guide and Reference*.

Easier configuration for Orchestration CLI

You can now easily change the configuration of your Orchestration CLI by switching between multiple configuration files. Use configuration files to establish one or more environments to run HCL Workload Automation. Setting up different environments, with specific configuration settings, helps you tailor your environment, efficiently manage workloads, and utilize resources effectively.

You can create multiple contexts with different configuration settings using Orchestration CLI. This feature allows you to manage various workflow scenarios by changing the context. You can use context commands to manage or switch between multiple contexts and to perform actions in a specific context. The default context is the one that you create initially until you change it using the commands. Unless you explicitly specify the context in the command, all commands are run using the default context.

See the list in the Context commands section in *User's Guide and Reference*.

For more information, see the topic about Orchestration CLI commands in *User's Guide and Reference*.

Automation as code: object definitions in JSON and YAML formats

In addition to the traditional scheduling language used in previous product versions, you can now create, display, and modify object definitions in JSON and YAML formats.

JSON and YAML formats guarantee a large number of advantages; for example, YAML is designed for readability, is intuitive, and easy to write. JSON, on the other hand, is designed to simplify parsing and is natively compatible with JavaScript. Both formats are very useful in DevOps and make manipulating object definitions easier and more immediate. This also enhances flexibility, performance optimization, compliance with standards, and integration ease.

The flexibility to support diverse serialization formats provides you with a range of choices. You can select the most appropriate format for specific use cases, aligning with the requirements of various services and platforms. You can select the one that best fits the requirements for a particular scenario. Some systems or services might use a specific serialization format as a standard. By supporting multiple formats, HCL Workload Automation can integrate easily with different services and platforms. In some scenarios, older systems or external services might still rely on older serialization formats. The support for multiple formats ensures compatibility with diverse platforms and reduces friction in the integration process. For more information, see the topic about managing multiple formats in *User's Guide and Reference*.

Observability with OpenTelemetry

Gain a deeper insight into your environment with OpenTelemetry

Observability has become a key concept in computer science, particularly in the fields of systems and network management, and more recently, in cloud-native applications. It provides a large number of advantages to developers and system administrators, such as:

Improved System Understanding

Observability helps developers and system administrators gain a deep understanding of their environment. By observing the environment state and its changes over time, they can understand tits behavior, identify patterns, and make informed decisions.

Enhanced Debugging

Debugging becomes more efficient with observability. It allows for the identification of anomalies or bugs in the environment. By observing the full environment over time, system administrators can pinpoint where the issue originated, what caused it, and how it affected the system.

Proactive Problem Solving

Observability supports proactive problem solving. Instead of waiting for a component to fail, observability allows issues to be detected and addressed before they cause a failure. This leads to increased reliability and availability.

Informed Decision Making

Observability provides the data necessary for informed decision-making. It provides insights into how changes in the environment affect its performance and behavior. This information is crucial when making decisions about upgrading, scaling, and allocating resources.

Efficient Resource Utilization

Observability can lead to more efficient resource utilization. By understanding the behavior of the environment, administrators can optimize resource allocation, reducing costs and improving system performance at the same time.

You can now use observability to gain insights on the performance and behavior of your HCL Workload Automation environment for monitoring and analysis, and improve overall system reliability and user experience. For example, you can use metrics to analyze **traces**, metrics, and logs and filter the information you are capturing, thus reducing unnecessary noise and excess costs. Additionally, filtering makes it easier to also add custom tags to metrics for streamlined organization and searching.

For more information, see the topic about OpenTelemetry in *User's Guide and Reference*.

CyberArk and Kerberos integrations automatically installed on dynamic agents

CyberArk and Kerberos integrations are now available by default on each dynamic agent. The related documentation is available on Automation Hub, together with the previous versions of the integrations.

This enhancement simplifies installation and configuration for these important integrations which strengthen security, compliance, and efficiency.

Serviceability enhancements

A number of serviceability enhancements have been inserted in the current release. The main items are as follows:

UNIX **Support for populated *DATA_DIR***

On UNIX operating system, you can now specify at installation time a *TWA_DATA_DIR* and *DWC_DATA_dir* folder which is already populated. In previous releases, only an empty *DATA_DIR* was supported.

Improvements in the wa_pull_info script

The wa_pull_info script gathers information about your environment and can be used when requested by Software Support to diagnose and troubleshoot a problem. This script now features a number of usability improvements, such as:

- improved error handling
- higher number of information gathered
- improved video output, displaying only the most important steps and errors found, while the full output is stored in a file.

For more information about the script, see the topic about the wa_pull_info in *User's Guide and Reference*.

Changed features and feature capabilities in version 10.2.2

A list of features changed since the previous release

The following features have changed or have been introduced or removed since the previous release:

FIPS compliance temporarily not supported

FIPS compliance is not supported in the current product version. This is because OpenSSL 3.0 libraries do not provide a FIPS-compliant validation algorithm for P12 certificates. Development is in progress with the aim of supporting FIPS in upcoming releases.

A new optional parameter named **enablefips** is available in the serverinst and twsinst scripts to check FIPS settings before you install or upgrade. The default value in a fresh installation is `false`.

If you are upgrading from an environment where FIPS compliance is supported, you should disable FIPS configuration. When upgrading, a check is performed on your settings to ensure FIPS is not enabled.
If it is enabled, the upgrade stops and an error message is displayed. To resume the upgrade, set the **enablefips** parameter to `false` when running the serverinst and twsinst scripts. The upgrade proceeds and the configuration files are updated accordingly. For more information, see the FAQ about FIPS compliance in section FAQ - Upgrade procedures in *Planning and Installation Guide*.

SSL FIPS enabled option removed

The **SSL FIPS enabled** option is no longer present in the `localopts` and `ita.ini` files and has been replaced with the new **SSL FIPS compliance** option.

New SSL configuration options available in `localopts` file

Two new options (**ssl_config file** and **ssl_cipher_suites**) are now available for configuring SSL on dynamic agents and fault-tolerant agents. Use the new options to specify a configuration file for OpenSSL and a list

of encryption algorithms for TLS v 1.3. For more information, see the section about setting local options in *Administration Guide*.

Changes in supported operating systems - version 10.2.2

Support for operating systems has been streamlined and rationalized, therefore Linux PPC is no longer supported. For a complete list of supported operating systems, see Supported Operating Systems.

Satisfying Requests for Enhancements (RFEs) in version 10.2.2

HCL Workload Automation satisfies Requests for Enhancements (RFEs).

Requests for Enhancements (RFEs) give customers the opportunity to collaborate directly with the product development team and other users. The team prioritizes and develops new product features based on proposals made by customers.

HCL Workload Automation V 10.2.2 delivers the following RFEs:

Certificate rotation parameters now available in `values.yaml` file in cloud environments

You can now rotate certificates by setting the following new keys in the `values.yaml` file:

- **duration**
- **renewBefore**

This is useful for testing purposes, especially if the master domain manager and agents are in different clusters, and also in production environments, if a different rotation policy exists.

Improvements in job management

With the recent enhancements in job management, when adding a job definition along with its description to a job stream, the description of the job definition remains visible.

To submit a new RFE, write to us at HWAinfo@hcl.com

HCL Workload Automation version 10.2.1 enhancements

Learn about the HCL Workload Automation version 10.2.1 enhancements.

HCL Workload Automation version 10.2.1 includes the following enhancements:

- Enhanced security for default certificates on page 44
- Certificates downloadable to fault-tolerant agents at installation time or later on page 45
- New OCLI plan commands supported on page 45
- Support for OpenSSL 3.0.x libraries from UNIX operating systems on page 45
- New actions available in the Orchestration Monitor on page 46
- Customizing the login page on page 46
- Changed features and feature capabilities in version 10.2.1 on page 46

Enhanced security for default certificates

Enhanced security for default certificates.

Certificates, either default or custom, are now required when installing HCL Workload Automation. You can no longer install HCL Workload Automation without securing your environment with certificates.

Default certificates are generated automatically when you install the master domain manager. To generate default certificates, define the password for the certificates using the **sslpassword** parameter when you run the serverinst script. The certificates are generated using a strong 4k encryption key and the password you specified. These certificates feature a long-term expiration date and are unique for each environment you install. Because the certificates are unique for each environment, if you install a new master domain manager and want it to communicate with an existing Dynamic Workload Console, you need to import the certificates from the master domain manager to the Dynamic Workload Console. For more information, see the FAQ about connecting a new or upgraded master domain manager to an existing Dynamic Workload Console.

The certificates are then stored on the master domain manager in the *installation_directory*/`defaultCerts` and *TWA_DATA_DIR*/`ssl/depot` directories. You can use the *TWA_DATA_DIR*/`ssl/depot` folder to retrieve the default certificates for the other product components.

Before you install the other server components (backup master domain manager, domain manager, backup domain manager, dynamic domain manager, backup dynamic domain manager) or the Dynamic Workload Console with the installation scripts, copy the certificates from the master domain manager to the workstation where you plan to install the component.

When you run the installation script, specify the **sslkeysfolder** and **sslpassword** parameters. These parameters indicate the path on the local workstation where the certificates are stored and the password you defined for the certificates when installing the master domain manager.

When you install a dynamic agent or fault-tolerant agent using the twsinst script, specify the wauser and wapassword parameters. The agent uses these parameters to log in to the master domain manager and download the default certificates from the *TWA_DATA_DIR*/`ssl/depot` directory.

If you are upgrading all your components from earlier versions where you used default certificates, the certificates are updated automatically. Before you upgrade your environment, create an environment variable named `JKS_SSL_PASSWORD` on each server component (with the exception of the master domain manager) and on each Dynamic Workload Console workstation. In the `JKS_SSL_PASSWORD` environment variable store the password for the default certificates. For both fault-tolerant agents and dynamic agents, the updated certificates are downloaded automatically from the master domain manager without user intervention. You can find useful information about upgrading in the topic about FAQ on upgrade procedures in Planning and Installation.

If you plan to upgrade a part of your environment, for example you plan to connect an agent at 10.2.*x* version with a master domain manager at an earlier version, convert the certificates to the new `.PEM` format before the upgrade, as described in the topic about upgrading in a mixed-version environment when using default certificates.

For more information, see the upgrade procedures in the section about upgrading from the CLI in *HCL Workload Automation: Planning and Installation*.

For more information about connection security, see Connection security overviewthe connection security overview in *Administration Guide*.

For more information about using default certificates, see SSL connection by using the default certificatesthe section about SSL connection by using the default certificates in *Administration Guide*.

For more information about all the installation commands, see the reference section about the installation commands in *HCL Workload Automation: Planning and Installation*.

Certificates downloadable to fault-tolerant agents at installation time or later

Download certificates to fault-tolerant agents using the twsinst or AgentCertificateDownloader scripts.

You can now download certificates from the master domain manager to fault-tolerant agents, either at installation time with the twsinst script, or at a later time with the AgentCertificateDownloader script. For more information, see the Reference section in *HCL Workload Automation: Planning and Installation*

New OCLI plan commands supported

New OCLI plan commands supported.

The following new plan commands are now available in the OCLI:

- fence. For more information, see the section about Orchestration CLI commands in *User's Guide and Reference*.
- limit cpu. For more information, see the section about Orchestration CLI commands in *User's Guide and Reference*.
- limit sched. For more information, see the section about Orchestration CLI commands in *User's Guide and Reference*.
- altrpri. For more information, see the section about Orchestration CLI commands in *User's Guide and Reference*.

Support for OpenSSL 3.0.*x* libraries from UNIX operating systems

If you install the master domain manager on recent UNIX operating systems, you can use the OpenSSL 3.0.*x* libraries provided with the operating system. The list of UNIX operating systems whose libraries you can use is as follows:

- Ubuntu 22
- AIX 7.3
- Red Hat 9

This is useful in case a vulnerability is discovered in a library: you can upgrade to a newer version and HCL Workload Automation can work seamlessly with the updated library.

To ensure HCL Workload Automation uses these libraries, always launch the installation or upgrade procedure from a brand new shell. You can also check the OpenSSL library currently in use with the which openssl command and check the OpenSSL version with the openssl version command.

If your operating system does not provide OpenSSL 3.0.*x* libraries, you can use the libraries packaged and installed with HCL Workload Automation.

New actions available in the Orchestration Monitor

Brand-new actions are available in the Orchestration Monitor of the Dynamic Workload Console.

You can now quickly change the priority for jobs and job streams, modify the limit for job streams and workstations, and update the fence value for workstations directly from the Orchestration Monitor. In just few clicks, you can have a granular control on your environment.

Customizing the login page

You can now customize the login page of the Dynamic Workload Console and Self-Service Catalog with personalized labels and logo. For more information, see Personalizing the login page

Changed features and feature capabilities in version 10.2.1

A list of features changed since the previous release

The following features have changed or have been introduced or removed since the previous release:

Improved performance with asynchronous calls

Asynchronous calls are now supported. This improves performance, responsiveness, and scalability because you can proceed with other tasks, while one or more calls are processed in the background.

Global Security Kit (GSKit) code removed from the product

GSKit is a set of libraries and utilities provided by IBM for SSL or TLS communication. Removal of GSKit does not impair communication in your environment, also in case some of your agents are still at a back-level version.

Communication between components is ensured by the TLS protocol, which leverages OpenSSL 3.0 and supports also agents at back-level versions. GSKit-related options have been removed from the `localopts` file and replaced with the new options listed below, which you can use to define the SSL version and level:

- **SSL Version**
- **SSL Ciphers**
- **CLI SSL Ciphers**
- **CLI SSL Version**

For more information, see the section about setting local options in *Administration Guide*.

Certificates can now be downloaded to fault-tolerant agents using the twsinst and AgentCertificateDownloader scripts

You can now download certificates from the master domain manager to fault-tolerant agents, either at installation time with the twsinst script, or at a later time with the AgentCertificateDownloader script. For more information, see the Reference section in *HCL Workload Automation: Planning and Installation*.

HCL Workload Automation version 10.2.0 enhancements

Learn about the HCL Workload Automation version 10.2.0 enhancements.

HCL Workload Automation version 10.2.0 includes the following enhancements:

Enhanced monitoring

Introducing the new and improved monitoring features.

Discover an enhanced monitoring experience that revolves around a single point of access to control your whole workload.

Tree view

Monitor your workload efficiently with the intuitive tree view navigation system. The tree view keeps the current query and the folder you are exploring synchronized, enabling you to explore the whole of your automated workload going from folder to folder effortlessly.

Saved queries

With just a few clicks, you can now save, edit, and share your queries, transforming the task of monitoring your business processes into a simple and efficient activity. You can also save queries generated while navigating the tree view, making designing your monitoring workflow a seamless experience.

Advanced query

The reworked advanced query tool gives you granular control over your workload, enabling you to find any item in no time. Advanced queries can also be saved, edited and shared.

Dependencies

You can now visualize all the dependencies of a job or job stream at a glance in a new dedicated page. Dependencies are displayed as information cards that you can interact with.

Look and feel

The new graphic interface is easier to read, easier to use and easier to manage. Processes are more streamlined and intuitive, and every activity flows into each other smoothly to guarantee a pleasant monitoring experience.

Self-Service Catalog Approval Flow

Introducing the Self-Service Catalog Approval Flow.

Make the services of your Self-Service Catalog more interactive with the new Approval Flow feature.

With the Approval Flow feature, you can decide the outcome of a request using a human-in-the-loop approach, leveraging the integration with Jira or ServiceNow.

You may need an approval for a specific service on the Self-Service Catalog. For example, a manager may need to approve a new license request for a software to check if such request fits in the budget. With the Approval Flow feature, you can specify the need for an approval in the definition of a specific service.

The Self-Service Catalog user can monitor the status of the service, which changes according to the status of the ticket on Jira or ServiceNow.

Thanks to this new feature, requests that would require many different steps to be approved can be processed in just few clicks!

New enhanced integrations

Empower your workflows with the new enhanced integrations.

HCL Workload Automation V10.2 includes the following enhanced integrations:

- Jira
- ServiceNow
- RESTful
- JSONata
- IBM Robotic Process Automation (IBM RPA) integration

Thanks to Jira and ServiceNow integrations, you can open tickets or service requests on one of these two applications, monitor tickets and requests, or open a ticket and monitor it.

You can also use these integrations to enable human interaction to approve or reject requests or ask for more information.

Thanks to RESTful integration, you can quickly integrate any application that uses REST APIs, call an API and track it directly from the job avoiding the creation of several jobs.

Thanks to JSONata integration, you can easily manipulate data and pass the output properties from one job to another.

Thanks to IBM RPA integration, you can automate UI-based tasks by converting human-based actions in scripts and schedule them with HCL Workload Automation.

Enhanced AI Data Advisor

Introducing AI Data Advisor (AIDA) enhancements.

New Machine Learning engine

Neural Prophet has been adopted as AIDA Machine Learning engine. It enables:

- More accurate predictions.
- Multivariate analysis of data to highlight correlation among KPIs.

- Improved time-to-value due to a faster training with less resource usage.
- Easy of extention to other Machine Learning models.

Metrics aggregation

Dynamic data compression depending on data variance. It enables a huge improvement in storage usage.

Customizable alert detection

Alert detection can be customized to better suit customer needs.

- In the common.env configuration file (or in the value.yaml file for Kubernetes deployments), you can use the PROPHET_ORCHESTRATOR **schedule_alert** parameter to set how often KPIs data must be checked against their prediction to detect anomalies.

Changed features and feature capabilities in version 10.2

A list of features changed since the previous release

The following features have changed or have been introduced or removed since the previous release:

Open Liberty provided with the installation package

Open Liberty is now supported along with WebSphere Application Server Liberty Base. Open Liberty is an open-source Java EE runtime that is lightweight and easy to use. It is designed to be used for microservices and cloud-native applications. Open Liberty has a smaller footprint than WebSphere Application Server Liberty Base, which means it uses less memory and has higher throughput. Open Liberty contains full support for Java EE 7.0 8.0, and MicroProfile features. Note that Open Liberty is available for distributed environments only.

If you perform a fresh installation of HCL Workload Automation, you can choose between installing on an existing WebSphere Application Server Liberty Base instance or install Open Liberty, as described in the typical installation scenario in *Planning and Installation Guide*.

If you have WebSphere Application Server Liberty Base already installed in your environment and plan to continue using it with HCL Workload Automation, you can proceed with the standard installation as described in the typical installation scenario in *Planning and Installation Guide*.

You can also move from WebSphere Application Server Liberty Base to Open Liberty when you upgrade HCL Workload Automation, as described in the section about moving from WebSphere Application Server Liberty Base to Open Liberty in *Planning and Installation Guide*.WebSphere Application Server Liberty refers both to WebSphere Application Server Liberty Base and Open Liberty.

Custom certificates enhancements

Default SSL certificates are no longer provided with the containers of the server, console, and agent components. For more information see HCL Workload Automation

Enabling installation of dynamic agents on container with a remote gateway

It is now possible to deploy a new dynamic agent and enable the communication directly with another agent gateway. For more information see HCL Workload Automation and Workload Automation Dynamic Agent and

HCL Workload Automation version 10.1.0 Fix Pack 4 enhancements

Learn about the HCL Workload Automation version 10.1 Fix Pack 4 enhancements.

HCL Workload Automation version 10.1 Fix Pack 4 includes the following enhancements:

- Changed features and feature capabilities in version 10.1 Fix Pack 4.

HCL Workload Automation version 10.1.0 Fix Pack 3 enhancements

Learn about the HCL Workload Automation version 10.1 Fix Pack 3 enhancements.

HCL Workload Automation version 10.1 Fix Pack 3 includes the following enhancements:

- Exporting variable tables with multiple lines on page 50
- Improved user experience with the new Run Cycle Preview on page 51
- Use of base folder in Orchestration CLI commands on page 51
- HCL Workload Automation Observability for Datadog on page 51
- Improved product quality, thanks to the resolution of many APARs and defects. For the complete list of APARs and defects, see: Fix Pack readmes.

Exporting variable tables with multiple lines

You can now export variable tables with multiple lines.

You can now export a variable with multiple lines in a job stream.

This can be achieved in two ways:

- Add \n into the property value wrapping the value with quotes (works on Windows and Unix platforms).

```
For exmaple:
jobprop VAR1 "line_1\nline_2\nline_3" -> is displayed as
line_1
line_2
line_3
jobprop VAR2 "\"line_1\nline_2\nline_3\"" -> is displayed as
"line_1
line_2
line_3
"
```

- Write the property value starting with quotes, and then press enter when a new line is needed (works only on UNIX platforms).

```
jobprop VAR2 "line_1
line_2
line_3"
-> is displayed as
line_1
line_2
line_3
jobprop VAR2 "\"line_1
line_2
line_3\""
```

Use of base folder in Orchestration CLI commands

Use of base folder in Orchestration CLI commands.

In the configuration of Orchestration CLI, the current folder field has been enhanced with an option to use base folder that helps the user to fetch the result of files specified in that field. For more information refer Configuring Orchestration CLI

Improved user experience with the new Run Cycle Preview

Improved user experience with the new Run Cycle Preview

The Run Cycle Preview is now available for job streams and run cycle groups, showing you the instances generated on a full year basis. With a renewed design, it provides you with accessible calendar and colors and a higher level of detail and control.

Watch a customer scenario that shows how easy is to use the Run Cycle Preview in this video, on the Workload Automation YouTube channel.

HCL Workload Automation Observability for Datadog

HCL Workload Automation Observability for Datadog is available to monitor HCL Workload Automation metrics, events, audit and infrastructure logs.

By integrating with Datadog, one of the market leaders in the Observability space, HCL Workload Automation enhances the concept of Monitoring, enabling complete end-to-end visibility into your workload data, network, infrastructure, and more. HCL Workload Automation Observability for Datadog provides the following set of dashboards reachable from the main **Overview Dashboard**:

Jobs and Job Streams

This dashboard shows the status of Jobs, Critical Jobs, and Job Streams.

KPIs and Workstations

This dashboard shows the HCL Workload Automation KPIs information for each engine and allows drill-down to view KPIs time series in a graphical representation.

Auditing

This dashboard shows audit information such as user actions. You can view audit information for a selected time range, user, and object.

Infrastructure

This dashboard provides infrastructure details of HCL Workload Automation deployment on Kubernetes cluster.

Monitors

You can create your own monitors and alerts. Some predefined monitors are already configured in the Observability Dashboard for Datadog as an example.

For details about deploying and customizing the HCL Workload Automation Observability for Datadog, see this readme file.

You can also read this blog article and watch this video.

HCL Workload Automation version 10.1.0 Fix Pack 2 enhancements

Learn about the HCL Workload Automation version 10.1 Fix Pack 2 enhancements.

HCL Workload Automation version 10.1 Fix Pack 2 includes the following enhancements:

- HCL Workload Automation on Amazon Web Services on page 52
- Improved product quality, thanks to the resolution of many APARs and defects. For the complete list of APARs and defects, see: Fix Pack readmes.

HCL Workload Automation on Amazon Web Services

You can now deploy HCL Workload Automation directly on Amazon Web Services (AWS).

You can find and subscribe to HCL Workload Automation on AWS Marketplace and deploy the product through the Amazon Web Services platform without BYOL license requirements.

You can easily create stacks using AWS CloudFormation and deploy HCL Workload Automation quickly and fast, thanks to the cloud deployment.

By deploying HCL Workload Automation on AWS, you can also experience the AWS meter usage: you only pay for the jobs that you submit, and you can receive the bill directly on your AWS account.

For more information, see Deploying on Amazon Web Services.

HCL Workload Automation version 10.1.0 Fix Pack 1 enhancements

Learn about the HCL Workload Automation version 10.1 Fix Pack 1 enhancements.

HCL Workload Automation version 10.1 Fix Pack 1 includes the following enhancements:

- Self-Service Catalog enhancements on page 53
- Orchestration CLI on page 53
- Introducing REST API V2 on page 54
- Orchestration Query Language (OQL) on page 54

Self-Service Catalog enhancements

Self-Service Catalog: a business-oriented interface to submit on-demand business flow.

A new and improved version of the Self-Service Catalog is available. You can now launch your services quickly and easily and check on them at anytime by accessing the Self-Service Catalog from any device.

To use the Self-Service Catalog you do not need to be a Workload Automation expert, but you can leverage on services based on automation capabilities in no time, provided you are connected to the Dynamic Workload Console in Single Sign-On (SSO). For more information, see Configuring the Dynamic Workload Console for Single Sign-On.

The HCL Workload Automation scheduler or application designer can now define services directly from the Workload Designer marking the job streams as services and specifying service parameters. As part of the job stream definition, the service definitions now can be easily transferred to a different environment

When creating and editing SSC-ready job streams, it is recommended you use the Dynamic Workload Console.

For more information about defining SSC-ready job streams, see the online help for job stream definitions in the Dynamic Workload Console and section about job stream definition in *User's Guide and Reference* for editing the job stream from the command line.

Note: Upgrading to the latest version, the catalogs created in the previous Self-Service Catalog are not visible in the new interface. In the new Self-Service Catalog interface, you can see the catalogs created with the new Workload Designer from the V10.1 Fix Pack 1 or later. Use the previous interface to see the catalogs created with the previous Self-Service Catalog.

Orchestration CLI

The new command line interface to run jobs or job streams and to interact with HCL Workload Automation server.

The installation package for HCL Workload Automation contains the installation files for Orchestration CLI. After downloading the package, you can connect Orchestration CLI to any of the HCL Workload Automation servers by configuring the `config.yaml` file. Orchestration CLI is a stand-alone application that can be used on any desktop or server, or on dynamic agents and replaces conman.

You can use the same Orchestration CLI with multiple servers of HCL Workload Automation. Orchestration CLI is also compatible with later versions of HCL Workload Automation and no need to update each time when the server is updated. For more information, see Orchestration CLI.

Introducing REST API V2

HCL Workload Automation REST API V2 to better integrate workload scheduling capabilities with external products and solutions.

A new version of REST APIs has been introduced to operate on the product from both User Interface and Command Line Interface.

The new features of REST API V2 are designed to make the user experience even smoother:

- Enhanced filtering opportunities: according to how specific your query needs to be, you can decide whether to use planFilter, which is similar to conman syntax and offers the same filtering capabilities, or OQL syntax, which is simpler and allows ordering the results. You can also decide to use both of them, using planFilter for filtering and OQL for ordering.
- Improved payloads for easier consumption: both the hierarchy and the structure of payloads have been revamped to improve their understanding and usage.
- Introduction of efficient multi-item endpoints: each action can be performed by ID and by filter. In this way, you can decide whether to operate on a single item or on multiple items.

Orchestration Query Language (OQL)

Orchestration Query Language: querying has never been so easy.

The Orchestration Query Language (OQL) is a new syntax that applies to REST API V2 and helps you monitoring your HCL Workload Automation production plan environment. .

Creating queries and retrieving items in your database is now quicker and easier than before thanks to the different intuitive OQL keywords at your service.

For more information, see the section about Monitoring your environment in the Dynamic Workload Console User's Guide.

Enhancing authentication using API Keys

Use API Keys to authenticate a command line or application easily and quickly.

You can create both Personal and Service API Keys in the Dynamic Workload Console and easily assign them to either specific users or groups. A comprehensive API Keys monitoring tool gives you full control over every valid, expiring and expired API Key that have been associated with an engine. For more information, see the topic about authenticating the command-line client using API Keys in Dynamic Workload Console User's Guide

You can use API Keys to authenticate the command line. You can use an API Key to get authenticated when you launch composer, conman, wappman, and ocli commands, instead of having to provide username and password as in previous versions.

To use the API Key with these commands, you need to have a specific set of authorizations defined in the security file, so that you can generate and retrieve the key from the Dynamic Workload Console. To find out the required authorizations, see the topic about Object type - file in the Classic security model section of the Administration Guide.

To generate the key from the Dynamic Workload Console, perform the steps listed in the section about accessing HCL Workload Automation from the command-line client using API Keys in *Dynamic Workload Console User's Guide*.

After generating the token, you can either specify it in the command line with the **-jwt** parameter, or add it in the `useropts` file.

For more information about adding JWT in the `useropts` file, see the topic about setting user options in *Administration Guide*.

For more information about using JWT with commands, see the topics about running conman and composer and about the wappman command in *User's Guide and Reference*.

You can also use the API Key to authenticate the master domain manager when installing the agents. This authentication allows the product to download the JWT or the certificates to be used for secure communication between master domain manager and dynamic agents. If you provide the API Key (with the **apikey** parameter), you no longer need to specify username and password (**wauser** and **wapassword** parameters) as in previous versions.

For more information about using the API Key for authentication purposes, see the topics about the twsinst and AgentCertificateDownloader scripts and about example installation commands in *HCL Workload Automation: Planning and Installation*.

Ensure there are no misalignments in date and time in your network nor significant network delays because this might impact JWT performance.

Enhancing agent authentication using JSON Web Tokens

Use JSON Web Tokens to enhance your agent authentication standard.

A JSON Web Token (JWT) is a standardized, self-contained access token which makes it possible for two parties to securely exchange data. Authentication information, expiry time information, and other user-defined claims are digitally signed, so that no database queries are required and the session does not need to be stored on a server.

JWT is especially suited for authentication purposes. Its short messages can be encrypted and securely convey who the sender is and whether they have the necessary access rights. It is also very useful in REST applications, because it ensures stateless protocols, since the information for the authentication is sent with the request.

JWT ensures mutual authentication between master domain manager and dynamic agents. Using JWT is easier and more immediate than downloading and maintaining certificates and, in a containerized environment, you no longer need to configure the ingress controller for SSL passthrough. For more information about JWT on containers, see the **Ingress controller** section in HCL Workload Automation Server.

To download the JWT on your dynamic agents at installation time, use the **jwt** parameter as explained in the section about the twsinst script in *HCL Workload Automation: Planning and Installation*. You can also download the JWT at a later time as explained in the section about AgentCertificateDownloader script in *HCL Workload Automation: Planning and Installation*.

You can find some installation examples in the section about example installation commands in *HCL Workload Automation: Planning and Installation*

You can also revoke a JWT simply by deleting the workstation definition where the JWT is installed. For more information about deleting a scheduling object from the command line and Dynamic Workload Console, see the section about revoking and reissuing a JSON Web Token in *User's Guide and Reference*.

Ensure there are no misalignments in date and time in your network nor significant network delays because this might prevent JWT from working.

Advanced password encryption

New encryption method for increased security

Security is a major concern in today's interconnected world. Government organizations, financial institutions, healthcare providers, and insurance companies are just a few examples of the types of entities who are taking security seriously.

You can optionally encrypt the passwords that you will use while installing, upgrading, and managing HCL Workload Automation. The secure command uses the AES method and prints the encrypted password to the screen or saves it to a file.

For more information, see the section about encrypting passwords and the secure script in *HCL Workload Automation: Planning and Installation*.

HCL Workload Automation Observability for Splunk

HCL Workload Automation Observability for Splunk is available to monitor HCL Workload Automation metrics, events, audit and infrastructure logs.

By integrating with Splunk, one of the market leaders in the Observability space, HCL Workload Automation enhances the concept of Monitoring, enabling complete end-to-end visibility into your workload data, network, infrastructure, and more. HCL Workload Automation Observability for Splunk provides the following set of dashboards which are deployed on Splunk Enterprise and are reachable from the main **Overview Dashboard**:

Jobs and Job Streams

This dashboard shows the status of Jobs, Critical Jobs, and Job Streams.

KPIs and Workstations

This dashboard shows the HCL Workload Automation KPIs information for each engine and allows drill-down to view KPIs time series in a graphical representation.

Activity Monitoring

This dashboard shows workstation and audit information such as user actions. You can view audit information for a selected time range, user, and object.

Infra Monitoring

This dashboard provides infrastructure details of HCL Workload Automation deployment on Kubernetes cluster.

Alerts

This dashboard provides details about custom alerts created for HCL Workload Automation events. Some predefined alerts are already configured in the Observability Dashboard for Splunk as an example.

For details about deploying and customizing the HCL Workload Automation Observability for Splunk, see this readme file.

You can also read this blog article and watch this video.

HCL Workload Automation Observability for Dynatrace

HCL Workload Automation Observability for Dynatrace is available to monitor HCL Workload Automation metrics, events, audit and infrastructure logs.

By integrating with Dynatrace, one of the market leaders in the Observability space, HCL Workload Automation enhances the concept of Monitoring, enabling complete end-to-end visibility into your workload data, network, infrastructure, and more. HCL Workload Automation Observability for Dynatrace provides the following set of dashboards reachable from the main **Overview Dashboard**:

Jobs and Job Streams

This dashboard shows the status of Jobs, Critical Jobs, and Job Streams.

KPIs and Workstations

This dashboard shows the HCL Workload Automation KPIs information for each engine and allows drill-down to view KPIs time series in a graphical representation.

Auditing

This dashboard shows audit information such as user actions. You can view audit information for a selected time range, user, and object.

Infrastructure

This dashboard provides infrastructure details of HCL Workload Automation deployment on Kubernetes cluster.

Alerts

This dashboard provides details about custom alerts created for HCL Workload Automation events. Some predefined alerts are already configured in the Observability Dashboard for Dynatrace as an example.

For details about deploying and customizing the HCL Workload Automation Observability for Dynatrace, see this readme file.

You can also watch this video.

Installing the agent on IBM i with a user different from QSECOFR

You can now install dynamic agents on IBM i with a user different from QSECOFR.

You can now use a user different from QSECOFR to install IBM i agents. In this case, the new **allObjAuth** parameter is required when running the twsinst command to indicate that the user has the required ALLOBJ authority. Ensure the user is existing and has ALLOBJ authorization. The agent is started after connecting to the system with the TWSUSER or the user defined at installation time.

When you upgrade or uninstall the agent, a check is performed to ensure you are using the same user that performed the installation. If you used **allObjAuth** parameter at installation time, specify it again when upgrading or uninstalling the agent.

The name of the user used to perform the installation is maintained in the *TWA_DATA_DIR*`/installation/instInfo/instUser` file.

For more information, see the sections about installing, upgrading, and uninstalling agents on IBM i systems and agent installation parameters on IBM i systems in *Planning and Installation Guide*.

Changed features and feature capabilities in version 10.1 Fix Pack 1

A list of features changed since the previous release

The following features have changed or have been introduced or removed since the previous release:

REST APIs documentation automatically integrated into the product documentation

Information about REST APIs is automatically extracted from the code and integrated into the documentation at HCL Workload Automation API for easier reading and increased retrievability.

File Proxies now selected randomly in the Managed File Transfer integration

By default, the integration uses the File Proxy specified by the dynamic domain manager. You can also optionally define a list of preferred File Proxies to be used instead of the default list.

The File Proxy is selected randomly in the list provided by the dynamic domain manager. If you provided a custom list, the random selection is performed only on your list.

The random selection mechanism ensures higher tolerance for peaks in workload and workstation failures. For more information, see File Transfer Integration on Automation Hub.

Default storing mechanism of job log changed

When you perform a fresh installation, by default the job log is stored in memory instead of being stored in a file, as in the previous releases. This ensures compliance with the PCI standard. For more information, see the section about log files and archived files in *Administration Guide*.

Enhanced security with the conn_verify property

You can now optionally set the **conn_verify** property to `1` or `2`, so that the agent must provide valid certificates in order to establish an SSL connection. The default value is **0**, which means that no verification is performed on certificates.

Hostname verification for File Proxy

You can now optionally enable a check on the hostname defined for the certificates used by File Proxy. To enable the verification, create the Java system property named `wa.fileproxy.enforceSSLhostnameVerify` and set it to true.

Hostname verification for the mail sender plug-in

You can now optionally define the **MAILPLUGIN_ENABLE_HOST_VERIFICATION** property in the `TWSConfig.properties` file to enable the verification of the hostname of the SMTP server. If you set the property to **yes**, hostname verification is enabled, if you set it to **no**, no verification is performed. The default value for fresh installations is **yes**.

Higher security for job integrations

The **Verify host name** check box is selected by default in some integrations. Starting from version 10.1 Fix Pack 1, to increase the security standard provided by the product, this selection starts a check on the data contained in the keystore file. Ensure you provide the correct path and credentials to the keystore file in the **Certificates** section for the following integrations:

- JSR 352 Java Batch
- Restful
- Job Management
- Job Stream Submission
- Variable Table

If the information in the **Credentials** section is not correct, this causes the job to fail with an error similar to the following:

```
AWKJMJ041E An error occurred during the Job submission.
The error was "AWKSPI006E Keystore authentication failed. The error message is
"No certificates provided, cannot verify the hostname."
```

If your integrations fail after upgrading to Fix Pack 1, you have the following options:

- deselect the **Verify host name** check box.
- provide the correct path and credentials to the keystore file.

Satisfying Requests for Enhancements (RFEs) in version 10.1 Fix Pack 1

HCL Workload Automation satisfies Requests for Enhancements (RFEs).

Requests for Enhancements (RFEs) give customers the opportunity to collaborate directly with the product development team and other users. The team prioritizes and develops new product features based on proposals made by customers.

HCL Workload Automation V 10.1 Fix Pack 1 delivers the following RFEs:

RFE 149367 - Installation of dynamic agents on Windows operating systems using Local System Account

You can now install dynamic agents on Windows operating systems without providing a specific user. This means that you no longer need to provide **twsuser** credentials to the operator performing the installation. Moreover, the password no longer expires, ensuring a smooth running of your jobs. For more information, see the section about agent installation parameters in *HCL Workload Automation: Planning and Installation*.

RFE 69917, AHA 46 - Interactive jobs supported on dynamic agents installed on Windows operating systems

You can now determine the behavior of native and executable jobs starting interactive programs on dynamic agents installed on Windows operating systems. Interactive programs run only if the job user has an active session open when the job runs. If there is no active session for the job user, the job behavior is defined by the new **RunInteractiveJobOnInvalidSession** property in the `JobManager.ini` file. You can set the property to `true` to enable jobs to start interactive programs even if there is no active session for the job user. Alternatively, set the property to `false` to prevent jobs from starting interactive programs if there is no active session for the job user. This feature was already available for fault-tolerant agents and is now also available by default for dynamic agents. For more information about enabling and disabling this feature, see the section about configuring properties of the native job launcher [NativeJobLauncher] in *Administration Guide*.

For example, consider a job which consists of both interactive instructions (for example, using a text editor), and batch instructions, which run in background when the job is launched. If you set the **RunInteractiveJobOnInvalidSession** property to `true`, batch instructions can run even if the interactive part is not displayed because the user does not have an active session at the moment.

RFE 60060 - dynamic agents to track the workload on the local system

This capability is now available using the Orchestration CLI and REST APIs version 2, as described in Orchestration CLI on page 53 and Introducing REST API V2 on page 54.

To submit a new RFE, write us here: HWAinfo@hcl.com

HCL Workload Automation version 10.1.0 enhancements

Learn about the HCL Workload Automation version 10.1.0 enhancements.

HCL Workload Automation version 10.1.0 includes the following enhancements:

- Connecting to the license server using a proxy on page 64
- Changed features and feature capabilities on page 65
- Satisfying Requests for Enhancements (RFEs) in version 10.2 on page 67

Managed file transfer

The File Transfer integration, already available on Automation Hub, now provides full capabilities for managing and processing all your file transfers using HCL Workload Automation with no need for third-party products. The main enhancements are as follows:

Support for File Proxy

A new component, named File Proxy, is now available by default on each master domain manager. You can use the File Proxy to manage securely files to be transferred with the File Transfer integration available on Automation Hub. All transfer operations are performed by HCL Workload Automation, with no need of third-party products.

You can also optionally install your File Proxy as a stand-alone component on a workstation different from the master domain manager, for example to reduce network traffic and resource usage on the master domain manager. You can configure your stand-alone File Proxy in high availability by defining the URLs of alternate file proxies or a load balancer in the **Broker.fileproxy.urls** property in the `BrokerWorkstation.properties` file. For more information, see the section about the `BrokerWorkstation.properties` file in *Administration Guide*.

Ensure the selected workstation runs a supported version of a Windows or Linux operating system and proceed with the installation and start of the service, as described in the sections about the fileproxyinst and fileproxystart commands in *HCL Workload Automation: Planning and Installation*.

Support for file transfers via the Workstation-to-Workstation internal protocol

You can now easily transfer files to and from agents connected to the same master domain manager. You no longer have to specify the address of the workstations involved in the file transfer, but you can simply define the workstations from the File Transfer integration. Ensure both the master domain manager and agents are at version 10.1. For more information about the integration, see the File Transfer integration on Automation Hub.

Search on remote file systems

You can now perform a search operation on the file system of a remote workstation. On Linux systems, if you do not specify a path, the search is performed on the working directory. On Windows systems, the path is required.

Integrations with Managed File Transfer (MFT) tools as well as Robotic Process Automation (RPA) tools

More integrations with other MFT tools as well as RPA tools to support orchestration of all data transfer using HCL Workload Automation.

Workload Designer: a new concept to manage your workload

Workload Designer: a new concept to manage your workload.

An innovative infrastructure and design have been thought to simplify the user experience and create a more responsive, fast and fluid user interface.

You do not need to switch among the Dynamic Workload Console pages to complete your business workflow anymore. The new Workload Designer contains everything you need. Automate business-critical processes from a single point of access and control.

Automate fast, automate better.

Detecting anomalies in your workload with AI Data Advisor (AIDA)

Starting from this release, a new component is available in HCL Workload Automation - AI Data Advisor (AIDA) - based on Artificial Intelligence and Machine Learning, for early anomaly detection and analysis.

AIDA enables fast and simplified data-driven decision making, for an intelligent workload management. By analyzing historical data and metrics gathered by HCL Workload Automation and predicting their future patterns, AIDA identifies anomalies in the trend of Key Performance Indicators (such as the number of completed jobs in the current plan, the job duration, the job end-time) and sends alerts immediately to anticipate and prevent problems and delays. Alerts show up on the Workload Dashboard and can be notified via email.

For more information, see *AI Data Advisor (AIDA) User's Guide*.

Furthermore, you can always take your environments under control by adding the AIDA widget to your custom dashboard. For further information, see Creating a customized dashboard for monitoring.

For instructions about how to install AIDA, see Deploying AI Data Advisor.

HCL Clara integrated with the Dynamic Workload Console

Starting from this release, HCL Clara is available from the Dynamic Workload Console.

HCL Clara, an Intelligent Virtual Assistant, is the Workload Automation product expert which you can contact directly from the Dynamic Workload Console to learn the product capabilities, execute routine tasks, and get troubleshooting assistance.

Find out more about Clara here: https://help.hcltechsw.com/solutions/clara/index.html.

For instructions about how to add Clara chat box to the Dynamic Workload Console, see Integrating Clara in the Dynamic Workload Console.

Automatic encryption at rest for key product files

Starting from this release, key HCL Workload Automation files are automatically encrypted for all fresh installations using AES-256 or AES-128 cryptography.

Data breaches are becoming more and more common and pervasive in today's business world. Encryption is a key feature when it comes to protect sensitive data, such as the data at rest stored in your Symphony plan or message queues. For this reason, all fresh installations starting from this release automatically encrypt key product files using AES-256 or AES-128 cryptography.

Data at rest means data is not being accessed or used but instead stored on your computer, external hard drive, cloud storage, server, or database. Encryption at rest ensures that this data is protected and encrypted.

If you want HCL Workload Automation to encrypt files such as the Symphony file, messages queues, and the `useropts` file at runtime, you do not need to take any actions. By default, the product is automatically encrypted without your intervention. You can also define the folder containing the certificates and the certificates password using the **sslpassword** and **sslkeysfolder** parameters when installing the master domain manager and agents, both fault-tolerant agents and dynamic agents.

You can optionally avoid the encryption at installation time, by setting the **useEncryption** parameter in the serverinst and twsinst commands to `false`.

For more information, see the section about automatic encryption in *Administration Guide* and the sections about master components installation - serverinst script and agent installation parameters - twsinst script in *HCL Workload Automation: Planning and Installation*.

Automatic SSL configuration for fault-tolerant agents

Configure WebSphere Application Server Liberty Base and fault-tolerant agents in SSL mode

You can now configure WebSphere Application Server Liberty Base and fault-tolerant agents in SSL mode and provide your certificates at installation time using the command-line installation and setting the **sslkeysfolder** and **sslpassword** parameters. This ensures encryption in motion for all data moving within your environment.

Note: You are strongly recommended to customize the default certificates straight after the installation process has completed to ensure your environment is secure.

For more information about installation parameters, see the section about master components installation parameters - serverinst script and agent installation parameters - twsinst script in *HCL Workload Automation: Planning and Installation*.

HCL Workload Automation also generates certificates in GSKit format. To enable FIPS compliance, set the **ssl fips enabled** option to `yes` in the `localopts` file after the installation has completed and restart the product. As a result, options for GSKit are automatically used by HCL Workload Automation.

For more information about the `localopts` file, see the section about setting local options in *Administration Guide*.

Support for Google Cloud SQL for SQL server

You can now install your on-premises HCL Workload Automation environment also on Google Cloud SQL for SQL server, a fully-managed database service that helps you set up, maintain, manage, and administer your relational databases on Google Cloud Platform.

You only need to install your database, then proceed with the command-line installation for master domain manager and Dynamic Workload Console, as always, specifying MSSQL as the database type.

For the complete command-line installation procedure, see the section about the typical installation scenario in *Planning and Installation Guide*

For more information, see the section about Creating Azure SQL or Google Cloud SQL for SQL server databases for the master domain manager and Dynamic Workload Console in *Planning and Installation Guide*.

HCL Workload Automation events now logged for monitoring tools

Increasing observability for HCL Workload Automation events

You can now monitor the availability of your infrastructure and services, monitor performance, and analyze bottlenecks. HCL Workload Automation features an improved mechanism for monitoring and auditing events. The monitoring engine generates a .json file containing all WebSphere Application Server Liberty Base events, a file which is consumable by all applications using .json and meeting the OpenMetrics standard, for example AI Data Advisor (AIDA), Splunk and Fluentd.

By further analyzing these values through a data analytics tool, such as AI Data Advisor (AIDA), you detect anomalies and anticipate failure or degradations. For more information about AIDA and how to use it, see *AI Data Advisor (AIDA) User's Guide*.

You can also install Instana and monitor the whole infrastructure, both on-premises and cloud, on which you have installed HCL Workload Automation.

On the cloud side, within the server and agent containers you have a number of sidecar containers which monitor .json log files. On the on-premises side, you can feed your monitoring tool the .json log files and monitor WebSphere Application Server Liberty Base in your environment by creating custom dashboards in the monitoring tool.

This enhancement grants an immediate deep dive into events generated in the HCL Workload Automation environment.

For more information about the metrics HCL Workload Automation exposes, see the section about monitoring HCL Workload Automation in *User's Guide and Reference*.

To enable logging in .json format, add the **JSON** and **JSON_NO_UTF8** keys, depending on the output format you require, in the `BmEvents.conf` file. For more information, see the section about the `BmEvents` configuration file in *User's Guide and Reference*.

You can also find more information in the video Get your focus right with observability!

Connecting to the license server using a proxy

Connecting to the license server if your master domain manager cannot connect to the Internet

You can now set up a proxy in case the master domain manager is located on a network without Internet access.

You only need to set up a proxy server and indicate the specifics of the proxy server when installing the master domain manager using the serverinst command. For more information, see the FAQ about How do I connect to the license server if the master domain manager using a proxy server? in *HCL Workload Automation: Planning and Installation*.

Changed features and feature capabilities

A list of features changed since the previous release

The following features have changed or have been introduced or removed since the previous release:

Scheduling objects defined using REST APIs

Starting from product version 9.5, Fix Pack 2, a back-level version of the composer command line was provided to create definitions of a subset of scheduling objects which did not support REST APIs. The back-level version was named composer951. This back-level command line is now no longer available because all scheduling objects support REST APIs.

JAVA APIs deprecated

JAVA APIs are deprecated and have been replaced with REST APIs. For more information about REST APIs, see Driving HCL Workload Automation with REST API.

Rationalization of the JobManager.ini file

The contents of the `JobManager.ini` have been trimmed and revised to remove some properties which are reserved for internal use. These properties have been moved to a file named `JobManagerInternal.ini`, which is located in the binary directory and is overridden at each product upgrade. This file is not documented because it is not relevant for the final user. For more information about the `JobManager.ini` file, see the section about configuring the agent in *Administration Guide*.

Ensure higher security and safety of your data with TLS V1.2

HCL Workload Automation no longer supports TLS V1.0 and TLS V1.1. Only TLS V1.2 is supported. This enhancement ensures a higher security level for SSL communication.

Audit file log moved to master domain manager and backup master domain manager

When you choose to keep track of changes to scheduling objects, you can store your audit trails in a file, in the HCL Workload Automation database or in both. While in previous versions, the file was stored on agents, with the current version, the file has been moved to the master domain manager and backup master domain manager. For more information, see the section about enabling and storing audit trails in *Administration Guide*.

enPlanAudit global option is now immediately effective

While in previous versions the **enPlanAudit** global option required to run a JnextPlan command to make changes effective, starting from the current version, changes to **enPlanAudit** global option are immediately effective. For more information, see the summary about global options in *Administration Guide*.

Audit file format changed

The format of the file where you can optionally store the auditing information for your environment has been changed from `.csv` to `.json`. For more information, see the section about enabling and storing audit trails in *Administration Guide*.

Job Duration Predictor job deprecated

The Job Duration Predictor job is now deprecated and has been removed. Instead, a new HCL Workload Automation component is available: AI Data Advisor (AIDA), based on Artificial Intelligence and Machine

Learning, for early anomaly detection and analysis. For further information about AIDA, see the *AI Data Advisor (AIDA) User's Guide*.

New and improved command for password encryption

A new command is now available for encrypting and decrypting passwords you use with HCL Workload Automation with the `xor`, `3DES`, and `AES` algorithms. For more information, see the section about encrypting passwords in *Planning and Installation Guide*.

Several integrations now available on Automation Hub

The following integrations are no longer available with HCL Workload Automation and can be installed from Automation Hub:

- Amazon EC2
- Apache Spark
- Enterprise Java Beans (EJB)
- Hadoop Distributed File System
- Hadoop Map Reduce
- IBM BigInsights
- IBM Cloudant
- IBM Cognos
- IBM InfoSphere DataStage
- IBM SoftLayer
- IBM WebSphere MQ
- Informatica PowerCenter
- J2EE (JMS)
- Job Duration Predictor. This job has been replaced by AI Data Advisor (AIDA). For further information about AIDA, see the *AI Data Advisor (AIDA) User's Guide*.
- Microsoft Azure
- MQTT
- Oozie
- Oracle E-Business Suite
- TEC Event Integration Facility (EIF) Event Forwarder, also known as TEC Event Forwarder
- Salesforce
- SAP BusinessObjects BI
- SAP PI Channel
- Web Services

Support for several products and integrations no longer available

The products and integrations listed below are no longer supported and the related documentation has been removed from the library:

- Application Lab
- Application Performance Management (APM)

- Extended agent for Multiple Virtual Storage (MVS)
- IBM Tivoli Monitoring (ITM)
- Option Editor
- OSLC Automation
- OSLC Provisioning
- Provisioning BigInsights
- Remote EJB, also known as EJB APIs. These APIs have been replaced by restful APIs.
- SmartCloud Control Desk (SCCD)
- SOAP WebServices based on WSDL. These services have been replaced by restful APIs.
- Tivoli Business Service Manager (TBSM)
- Tivoli Enterprise Portal (TEP)
- Tivoli Provisioning Manager (TPM)
- Tivoli Storage Manager (TSM)
- Tivoli System Automation for Multiplatforms (TSAMP)
- Tivoli NetView has been replaced with Simple Network Management Protocol (SNMP).
- workload broker jobs

As a result, optman parameters related to OSLC have been removed.

Also, the following **optman** options are no longer supported and are forced to their default value:

enTimezone

Deprecated and forced to `yes`.

enSwfaultTol

Deprecated and forced to `no`.

enRetainNameOnRerunFrom

Deprecated and forced to `no`.

ignoreCals

Deprecated and forced to `yes`.

For more information about **optman** options, see the section about global options in *Administration Guide*.

Satisfying Requests for Enhancements (RFEs) in version 10.2

HCL Workload Automation satisfies Requests for Enhancements (RFEs).

Requests for Enhancements (RFEs) give customers the opportunity to collaborate directly with the product development team and other users. The team prioritizes and develops new product features based on proposals made by customers.

HCL Workload Automation V 10.2 delivers the following RFEs:

datecalc utility is now available also for dynamic agents

You can now use the datacalc utility to resolve date expressions and return dates in the format you choose also on dynamic agents. For more information, see the section about the datacalc utility in *User's Guide and Reference*.

The `init.cfg` file is no longer overwritten during the upgrade phase

The `init.cfg` file is a file available for customization and so it should not be overwritten during the upgrade phase from Version 9.4 Fix Pack *x*. The file has now been moved to the following paths:

TWA_DATA_DIR

tws_install_dir

where *tws_install_dir* is the directory path where the agent is installed.

If you perform an upgrade from Version 9.4 Fix Pack *x* to Version 10.1, the file is automatically moved to the paths listed above.

For more information about the `init.cfg` file, see the section about rule operation notes in *User's Guide and Reference*.

Modified By and Last Modified have been reintroduced

With the new Workload Designer, the item information regarding who modified it and the last modify has been reintroduced.

To submit a new RFE, write us here: HWAinfo@hcl.com

HCL Workload Automation version 9.5 Fix Pack 6 enhancements

Learn about the HCL Workload Automation version 9.5 Fix Pack 6 enhancements.

About this task

HCL Workload Automation version 9.5 Fix Pack 6 includes the following enhancements:

- USERJOBS clean up utility on page 68
- WebSphere Liberty ciphers on page 69
- Enabling or disabling auditing of database GET operations on page 69

USERJOBS clean up utility

New tool to clean up dynamic domain manager database tables

The USERJOBS tool has been developed to clean up dynamic domain manager database tables in case of jobs in never-ending EXEC status in the USERJBOBS job stream. To resolve USERJOBS carryforward issues, the new cleanuserjobs.sh(bat) command is now available in the `TWDWB/bin` directory to automate the procedure. The command syntax is as follows:

On Windows operating systems

```
cleanuserjobs.bat -dbUsr username -dbPwd password
-jobnum jobnumber | -file filename
```

On UNIX operating systems

```
cleanuserjobs.sh -dbUsr username -dbPwd password
-jobnum jobnumber | -file filename
```

where:

- *jobnumber* supports the following formats: *#Jjobnumber*, *Jjobnumber* or *jobnumber*.
- *filename* contains a list of jobs, with one job per row.

For more information, see the topic about cleanuserjobs in *User's Guide and Reference*.

WebSphere Liberty ciphers

New command to automate cipher listing for WebSphere Liberty

A new ./listciphers.sh(bat) command is now available in the `TWDWB/bin` directory to automate the procedure listing all available ciphers defined in WebSphere Liberty.

Enabling or disabling auditing of database GET operations

You can now enable or disable the auditing of database GET operations

The security improvements introduced with Fix Pack 5 have increased the amount of logging required when you perform a GET operation on a database object. This might lead to performance problems when requesting a high number of database objects. To prevent these problems, you can now enable or disable auditing on database GET operations using the **enDbGetOpsAudit** global option. All other database operations are not affected.

To enable or disable auditing of these specific operations, use the **enDbGetOpsAudit** global option. For more information about global options, see Setting global options.

HCL Workload Automation version 9.5 Fix Pack 5 enhancements

Learn about the HCL Workload Automation version 9.5 Fix Pack 5 enhancements.

About this task

HCL Workload Automation version 9.5 Fix Pack 5 includes the following enhancements:

- Support for OneDB pre-defined and customized reports
- Support for OneDB Version 2.0.1.0

- Job logs are now more secure and compliant with the PCI standard. For more information, see the section about Log files and archived files in *Administration Guide*.
- You can now install or upgrade your master domain manager and dynamic domain manager in SSL mode. For more information, see the section about Configuring your master domain manager and broker in SSL mode in *HCL Workload Automation: Planning and Installation*.
- The support statement for SAP S/4HANA, on-premise edition, has been extended to 2020 and future fix packs, based on SAP_BASIS 7.55 component.
- Changed features and feature capabilities on page 70
- Satisfying Requests for Enhancements (RFEs) in version 9.5 Fix Pack 5 on page 71

Changed features and feature capabilities

A list of features changed since the previous release

The following features have changed or have been introduced since the previous release:

Supported WebSphere Application Server Liberty Base versions

HCL Workload Automation Version 9.5 Fix Pack 5 was formally tested by using WebSphere Application Server Liberty Base 21.0.0.10 and 21.0.0.11.

Updated OpenSSL libraries

HCL Workload Automation Version 9.5 Fix Pack 5 has been updated with OpenSSL libraries version 1.1.1l 24 Aug 2021 (1.1.1.12)

HCL Workload Automation includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit (https://www.openssl.org/).

IBM WebSphere SDK Java Technology Edition

HCL Workload Automation Version 9.5 Fix Pack 5 has been updated with WebSphere SDK Java Technology Edition version 8.0.6.36

OpenJ9/OpenJDK Runtime Environment

HCL Workload Automation Version 9.5 Fix Pack 5 has been updated with OpenJ9 version 1.8.0_302

HCL Clara integration

HCL Clara is an **Intelligent Virtual Assistant** that improves the HCL Workload Automation customer experience with natural language processing interactions, enabling customized self-service automation with immediate 24x7 response as L1 and L2 assistant. Clara is the product expert users can consult to learn HCL Workload Automation capabilities and execute routine tasks. Find out more about HCL Clara here https://help.hcltechsw.com/solutions/clara/index.html

HCL HERO integration

HCL HERO (HEalthcheck & Runbook Optimizer) effectively helps HCL Workload Automation Administrators monitor the health of their servers and perform informed recovery actions with specialized runbooks, keeping Workload Automation environments responsive and reliable. By providing both actual KPIs and AI-powered

trend estimation of KPIs, HERO enables the prediction of potential problems. Find out more about HCL HERO here https://help.hcltechsw.com/solutions/hero/index.html

Satisfying Requests for Enhancements (RFEs) in version 9.5 Fix Pack 5

HCL Workload Automation satisfies Requests for Enhancements (RFEs).

Requests for Enhancements (RFEs) give customers the opportunity to collaborate directly with the product development team and other users. The team prioritizes and develops new product features based on proposals made by customers.

HCL Workload Automation V9.5 Fix Pack 5 delivers the following RFEs:

RFE 116956 - Integrate dynamic agents authentication with Kerberos

A new integration with Kerberos is now available onAutomation Hub. You can use it to communicate securely over an insecure network by leveraging the Kerberos Authentication Protocol for submitting jobs on dynamic agents.

RFE 126270 - Dependency details prompt while removing jobs

You can now see an alert message that indicates the dependencies of a job selected for deletion. This only works for the current network. If dependent jobs are part of a larger network, they will not be deleted.

RFE 141877 - Dynamic Workload Console Monitor Jobs 'Hold with Successors' does not give the option to block the function

You can now enable or disable the **Hold with successors** feature for different user roles. This feature is enabled by default for the Administrator and has to be manually edited in an XML file to make it visible in the **More actions** menu in the **Monitor Job** page for any other role.

RFE 149991 - Add support for group authority on IBM i DA

When specifying the user that runs a job on the IBM i workstation, you can define a user which is part of an operating system group

RFE 150599 - Workstation should show offline for agent pools connected to a dynamic domain manager

A new API on the dynamic domain manager is now available. The API checks if there is at least one agent available for a given pool, so the caller can determine if the pool workstation is online or offline, same as for z-centric or dynamic agents.

To submit a new RFE, write us here: HWAinfo@hcl.com

HCL Workload Automation version 9.5 Fix Pack 4 enhancements

Learn about the HCL Workload Automation version 9.5 Fix Pack 4 enhancements.

About this task

HCL Workload Automation version 9.5 Fix Pack 4 includes the following enhancements:

Support for Azure SQL

Support for Azure SQL database.

You can now install your on-premises HCL Workload Automation environment also on Azure SQL. Azure SQL consists of a family of managed, secure, and intelligent products that use the SQL Server database engine in the Azure cloud.

You only need to install your database, then proceed with the command-line installation for master domain manager and Dynamic Workload Console, as always, specifying MSSQL as the database type.

For the complete command-line installation procedure, see the section about the typical installation scenario in *Planning and Installation Guide*

For more information, see the section about Creating and populating the database for Azure SQL for the master domain manager and Dynamic Workload Console in *Planning and Installation Guide*.

Support for OneDB

OneDB database is now supported

OneDB is a decentralized backend, handling user authentication, data storage, and validation. Hosting an instance is very simple, so you can decide where you want to store your data, gaining complete control and ownership over your data.

The procedure for creating the OneDB database for the master domain manager is the same as the procedure for Informix. For more information, see WA-130928 WA-131789OneDB and Infomix databases replaced by PostgreSQL on page 37.

HCL Workload Automation determines automatically if you are installing on an Informix or OneDB database and behaves accordingly.

For more information about installing from the CLI, see the section about master components installation - serverinst script and Dynamic Workload Console installation - dwcinst script in *HCL Workload Automation: Planning and Installation*.

Automatic deployment of security certificates on agents

You can now download and deploy certificates in `.PEM` format from the master domain manager when installing dynamic and fault-tolerant agents.

When installing the agent with a fresh installation using the twsinst script, you only need to provide the credentials to connect to the master domain manager using the **wauser** and **wapassword** parameters. The certificates in `.PEM` or `.jks` format are automatically downloaded and deployed to the agent without further intervention.

If you have previously installed dynamic agents, you can run the AgentCertificateDownloader script on the agent. The script connects to the master domain manager, downloads the certificates in `.PEM` format, and deploys them to the agent. The certificates must be available on the master domain manager in a specific path. For more information, see the section about the AgentCertificateDownloader script in *HCL Workload Automation: Planning and Installation*.

For the complete command-line installation procedure, see the section about the typical installation scenario in *Planning and Installation Guide*.

For more information, see the section about agent installation parameters - twsinst in *Planning and Installation Guide*.

Ensuring identity and access management with credential vaults

Credential vaults offer a secure mechanism to store user names and passwords. You can use them to submit HCL Workload Automation jobs without specifying any passwords, which are retrieved from the credential vault.

You can now integrate HCL Workload Automation with credential vaults by simply deploying a library file and customizing a properties file.

To enable the integration, you only need to download the package from Automation Hub and deploy it to all your dynamic agents, together with a customized version of the `JobManager.ini` file. Sample jobs are provided in the documentation on Automation Hub for deploying all required files to all your dynamic agents.

The HCL Workload Automation managed service on Now

HCL Workload Automation is available as managed service on Now.

HCL Workload Automation on Now cloud-native-as-a-service provides the freedom to deploy anywhere and the flexibility to scale on a dedicated environment.

HCL Workload Automation on Now offers a fully managed cloud experience. Outsource the administration and management of the server to HCL Software so you can concentrate on automating and enhancing your business processes.

For more information, see the section about deploying with containers in the *Planning and Installation Guide*.

New enhancements for cloud and Docker containers

The HCL Workload Automation product component containers have been updated with a number of new features.

The product component containers available on Google GKE, Amazon EKS, Azure AKS, Red Hat OpenShift, and the Docker containers have been updated to include the following new features:

- Import and deploy HCL Workload Automation for Z containers on IBM z/OS Container Extensions (IBM zCX). For details about how to configure the required properties on the z/OS Management Facility and how to import and deploy the HCL Workload Automation for Z containers, see the section about deploying Docker containers on IBM zCX in *HCL Workload Scheduler for Z: Planning and Installation*.
- Additional metrics are monitored by Prometheus and made available in the preconfigured Grafana dashboards available on Automation Hub. Automation Hub gives you access to the downloadable JSON file on the Grafana web site. You can access the preconfigured dashboard named, **Grafana Dashboard: Kubernetes Environments**, that is available for cluster monitoring, including monitoring pods. A separate preconfigured dashboard, **Grafana Dashboard: Distributed Environments**, is available for on-premises deployments, including Docker deployments. Gain insights on workload statistics (jobs per status, total count or grouped by folder or by workstation), critical job information (risk level, confidence factor, incomplete predecessors, estimated end), workstation status (running, linked), database connection status, message queues, and WebSphere Application Server Liberty Base performance statistics. For more information about configuring authentication and the list of exposed metrics, see the section about monitoring with prometheus in the *User's Guide and Reference*.
- Automation Hub integrations (plug-ins) can now be automatically installed with the server and console container deployment. You no longer need to download the integrations you need individually from Automation Hub.
  To automate your business processes, you can now select the integrations you want to include and after the deployment, you can begin to include jobs related to these integrations into your workload.
- New procedure for installing custom integrations. In addition to the integrations available on Automation Hub, you can this extend your library of integrations with custom plug-ins that you create. For information about creating custom plug-ins see Workload Automation Lutist Development Kit on Automation Hub.

For more information, see the readme files linked in the related section for each cloud provider in the chapter about deploying containers in the *Planning and Installation Guide*.

Monitoring performance metrics with Prometheus and viewing results on Grafana

HCL Workload Automation exposes a number of metrics to provide you with insight into the state, health, and performance of your environment and infrastructure.

You can access the product APIs for monitoring and retrieving insightful metrics data. The metrics are exposed and can be visualized with tools for displaying application metrics such as, the open source tool Grafana. If you use Grafana, you can take advantage of the preconfigured dashboard that is available on Automation Hub. Automation Hub gives you access to the downloadable JSON file on the Grafana web site. Use the **Grafana Dashboard: Distributed Environments** for you on-premises deployments including Docker. A separate preconfigured dashboard named, **Grafana Dashboard: Kubernetes Environments**, is available for cluster monitoring, including monitoring pods.

For more information about configuring authentication and the list of exposed metrics, see the section about exposing metrics in the *User's Guide and Reference*.

Keeping your license server connection under control

Display real-time notifications about the status of your license server connection

Proper communication with the license server is crucial to maintaining your environment up and running.

From the Dynamic Workload Console, you can now easily access the notifications regarding the license server.

For more information, see the section about how to verify the connection to the license server in *HCL Workload Automation: Planning and Installation*.

Changed features and feature capabilities

A list of features changed since the previous release

The following features have changed or have been introduced since the previous release:

Supported WebSphere Application Server Liberty Base versions

IBM Workload Scheduler Version 9.5 Fix Pack 4 was formally tested by using WebSphere Application Server Liberty Base V21.0.0.4 and V21.0.0.5.

Updated OpenSSL libraries

HCL Workload Automation Version 9.5 Fix Pack 4 has been updated with OpenSSL libraries.

HCL Workload Automation includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit (https://www.openssl.org/).

Dynamic Workload Console Managing Custom roles

Dynamic Workload Console users are granted access to resources based on the role to which they have been assigned. Now you use **Entities** to add users to the related role or create new entities to be associated to the role.

Audit Report Inclusion in the Dynamic Workload Console

Under the **Type of Report** section you can now find: **Audit Detail Report** option: use to view detailed listing of all occurrences of the different audit types. You will also find **Audit General Report** option: use this to view general listing of all occurrences of the different audit types.

New database version supported

Support has been added for MSSQL, version 19.

Satisfying Requests for Enhancements (RFEs) in version 9.5 Fix Pack 4

HCL Workload Automation satisfies Requests for Enhancements (RFEs).

Requests for Enhancements (RFEs) give customers the opportunity to collaborate directly with the product development team and other users. The team prioritizes and develops new product features based on proposals made by customers.

HCL Workload Automation V9.5 Fix Pack 4 delivers the following RFEs:

Support for credentials

You can now specify the user that runs a job on the IBM i workstation. Credentials can be specified from the graphical user interface or specifying them in the job definition. For more info, see IBM i jobs.

Support for userid in IBM i jobs

AllowRoot (AllowQsecofr) feature for IBM i agents has been implemented. For more information, see the section about configuring properties of the native job launcher in *Administration Guide*.

Unexpected error message after wappman -export is now fixed

The wappman export command works as expected and the WAT files are correctly exported.

Ensuring identity and access management with credential vaults

Credential vaults offer a secure mechanism to store user names and passwords. You can use them to submit HCL Workload Automation jobs without specifying any passwords, which are retrieved from the credential vault.

You can now integrate HCL Workload Automation with credential vaults by simply deploying a library file and customizing a properties file.

Certificate validation on agents

Dynamic and z-centric agents can now ensure the certificate they receive is valid and has been issued by a recognized CA. For more information, see Customizing the SSL connection between the agents and the Z controller when using your certificates

Notifications are now available in the Dynamic Workload Console about the status of your connections to the license server

Connection to the license server is crucial to your workload. You can now check the status of the connection in real time. For more information, see the FAQ about How do I verify my connection to the local license server? in *HCL Workload Automation: Planning and Installation*.

White labelling

HCL Workload Automation provides the capability to customize user interface labels. You can now personalize the UI labels for the following UIs: Self-Service Catalog and Self-Service Dashboards mobile applications.

To submit a new RFE, write us here: HWAinfo@hcl.com

HCL Workload Automation version 9.5 Fix Pack 3 enhancements

Learn about the HCL Workload Automation version 9.5 Fix Pack 3 enhancements.

About this task

HCL Workload Automation version 9.5 Fix Pack 3 includes the following enhancements:

- Alerting system for widgets in the dashboards on page 77
- Customizing roles on page 77
- Optimized file transfer operations on page 77
- A new dashboard for monitoring file transfer jobs on page 78
- Launch in context on page 78

Alerting system for widgets in the dashboards

Receive notification in case of events thanks to the new alerting system for widgets.

A new alerting system has been introduced to allow notifications in case of event. A list of notifications has been introduced in the top bar as a bottom down list.

For information about the monitoring of the workload using a dashboard see Creating a customized dashboard for monitoring

Customizing roles

Customization of the roles in the Dynamic Workload Console

Now you can manage your custom roles from the Dynamic Workload Console in the Manage Roles page. Edit, delete, duplicate, or create a new role quickly and easily, from a single panel.

See Customizing roles in the Dynamic Workload Console User's Guide

Optimized file transfer operations

With the file transfer integration, you can transfer files quickly and easily.

With the enhanced version of the File Transfer integration, you are granted a consolidated and coordinated approach to scheduling and automating transfer of files. The highlights of the enhanced integration are as follows:

- A new dashboard available on Automation Hub for monitoring file transfer operations
- Completion time estimate

- Parallel file transfer
- Rerun from point of failure
- Selective re-transfer
- Improved file selection by using wildcards and regular expressions
- File transfer status and details on files transferred
- Post-processing of transferred files: delete, rename, move
- File transfer to and from z-centric agents

For a detailed description about creating a file transfer job, see Automation Hub.

See how the file transfer integration can help you manage your file transfers in the video Discover the new file transfer integration, available on the Workload Automation YouTube channel.

A new dashboard for monitoring file transfer jobs

A new dashboard is now available for monitoring file transfer jobs

In addition to the Optimized file transfer integration, you can now download from Automation Hub a separate dashboard for monitoring all your file transfer jobs:

File transfer dashboard: KPI

This dashboard is recommended if you have a large number of file transfer jobs in your environment. It contains two gauges with the most relevant statuses for jobs: error and running. The remaining statuses are available in smaller charts. A pie chart is also available for monitoring your file transfer jobs in all statuses.

Double click on any chart to open a **Monitor Jobs** panel listing all file transfer jobs in the specified status.

You can customize the dashboard to match your environment setup and meet all your requirements.

Launch in context

Quickly open your Dynamic Workload Console pages with the launch in context feature.

Thanks to the launch in context feature, you can have all the Dynamic Workload Console pages at your fingertips.

You can obtain the URLs by easily accessing the bookmark icon in the page of your interest. Thus, you can quickly access the Dynamic Workload Console pages without the complexity and waste of time of building the URLs.

Furthermore, you can obtain the URLs with the filters and query parameters that you need to monitor your workload and instantly see the results.

But it is not all, the launch in context is also secure because the Dynamic Workload Console pages are launched accordingly with the user roles and authorizations.

For further information, see Launching in context with the Dynamic Workload Console

For further information, see the *Launching in context with the Dynamic Workload Console* section in the *HCL Workload Automation Administration Guide*

Automatic SSL configuration

Configure WebSphere Application Server Liberty Base and dynamic agents in SSL mode

You can now configure WebSphere Application Server Liberty Base and dynamic agents in SSL mode at installation time.

When you perform a fresh installation from the CLI, you can now optionally specify the **sslkeysfolder** and **sslpassword** parameters to have your environment automatically set up in SSL mode. You only need to provide the path to the certificates and the password you want to define for the keystore and truststore. HCL Workload Automation automatically generates the keystore and truststore with the specified password and configures WebSphere Application Server Liberty Base and dynamic agents in SSL mode.

For more information, see the sections about Master components installation - serverinst script, Dynamic Workload Console installation - dwcinst script, and Agent installation parameters - twsinst script in *HCL Workload Automation: Planning and Installation*.

You can also see how these parameters are used in a typical installation in the topics about installing the master domain manager, Dynamic Workload Console, and agents in the Typical installation section in *HCL Workload Automation: Planning and Installation*.

Automatic evaluation of critical jobs at risk

You can now set the **riskConfidence** optman key to obtain an automatic evaluation of the risk level for a critical job.

If the probability of completing the critical job before the deadline is below the level you set for the **riskConfidence** key, the critical job is considered at high risk. The calculation is performed by comparing the confidence factor of completing before deadline and the percentage specified in this parameter.

For more information, see the section about global options in *Administration Guide*.

Export and import a dashboard

Replicate your dashboard by exporting and importing it on your Dynamic Workload Console.

Now you can easily export your dashboards from your Dynamic Workload Console and import them anywhere, on your environment. For further information, see the *Exporting and importing a dashboard* section in the *Dynamic Workload Console Guide*.

Not enough time to create a customized dashboard? Don’t worry, we provide useful dashboards ready to be used as is! Discover all the available dashboards on Automation Hub.

Monitoring your workload is never been so easy!

Dashboards support XML-based data sources

New output in XML format for the REST API requests.

With this new feature, you can now integrate more and more data in your dashboards. You can create new REST API data sources that retrieve data not only in JSON but also in XML format, as output for the REST API request. This enables you to retrieve data from different environments, such as SAP environments.

For information about the monitoring of the workload using a dashboard, see Workload Dashboard

For further information about the monitoring of the workload using a dashboard, see the *Monitoring the progress of your plan* section in the *Dynamic Workload Console Guide*.

Compression integration

With the Compression integration, you can compress and extract your files quickly and easily.

Data compression is the process of encoding, restructuring, or otherwise modifying data to reduce its size. Fundamentally, it involves re-encoding information using fewer bits than the original representation.

The main advantages of compression are reductions in storage hardware, data transmission time, and communication bandwidth. This can result in significant cost savings. Compressed files require significantly less storage capacity than uncompressed files, meaning a significant decrease in expenses for storage. A compressed file also requires less time for transfer while consuming less network bandwidth. This can also help with costs, and also increases productivity.

With the Compression integration, you can take advantage of speedy and secure processing to minimize the impact of intensive compression jobs.

For more information, see Automation Hub.

Encryption integration

With the Encryption integration, you can encrypt, decrypt, and sign your files using symmetric or asymmetric encryption.

Data breaches are becoming more and more common in today's interconnected world and data security is a primary concern. Encryption technology is one of the key methods for protecting information, by scrambling data to make sure unintended recipients are not able to make any sense of the data. To keep your data and information secure, you can use the Encryption integration, which encrypts, decrypts and signs your files using symmetric or asymmetric encryption.

The basic difference between these two types of encryption is that symmetric encryption uses one key for both encryption and decryption, and the asymmetric encryption uses public key for encryption and a private key for decryption.

Because the algorithm behind symmetric encryption is less complex and executes faster, this is the preferred technique when processing bulk data. On the other hand, asymmetric encryption is considered to be more secure than symmetric encryption as it uses two keys for the process: the public key used for encryption is available to everyone, while the private key is not disclosed.

When you use symmetric encryption, you can encrypt and decrypt files. When you use asymmetric encryption, you can encrypt, decrypt, and sign files.

For more information, see Automation Hub.

Deploy HCL Workload Automation containers on AWS EKS

You can use Amazon Elastic Kubernetes Service (EKS) to run HCL Workload Automation containers on Amazon Web Services (AWS) EKS cloud.

Deploy and manage HCL Workload Automation containerized product components on the Amazon Web Services secure cloud platform. Containers and Kubernetes improve time to value and enable you to more easily scale your environment to meet business needs and at a lower cost. The containers run on a cluster based on the available compute resources and resource requirements of each container. You can run and scale one or more containers as a pod.

The product components are deployed using a chart and the product component container images. By default, a single server (master domain manager), console (Dynamic Workload Console), and dynamic agent are installed.

HCL Workload Automation can be deployed across a single cluster, but you can add multiple instances of the product components by using a different namespace in the cluster.

For more information, about deploying the containerized product components on the Amazon Web Services secure cloud platform, see the section about deploying with containers on Amazon EKS in the *Planning and Installation Guide*.

Deploy HCL Workload Automation containers on Azure AKS

Run HCL Workload Automation containerized product components on Azure Kubernetes Service (AKS).

Deploy and manage HCL Workload Automation containerized product components on the Azure AKS, a container orchestration service available on the Microsoft Azure public cloud. You can use Azure AKS to deploy, scale up, scale down and manage containers in the cluster environment. You can also deploy and run an Azure SQL database.

The product components are deployed using a chart and the product component container images. By default, a single server (master domain manager), console (Dynamic Workload Console), and dynamic agent are installed.

HCL Workload Automation can be deployed across a single cluster, but you can add multiple instances of the product components by using a different namespace in the cluster.

Azure AKS supports session affinity in a load balancing cluster, a feature which maintains each user session always active on the same pod. This ensures that the Dynamic Workload Console always connects to the same server during a session and that the user can perform any number of operations smoothly and seamlessly.

For more information, about deploying the containerized product components on the Azure AKS cloud platform, see the section about deploying with containers on Azure AKS in the *Planning and Installation Guide*.

Deploy HCL Workload Automation containers on Google GKE

Run HCL Workload Automation containerized product components on Google GKE.

Google Kubernetes Engine (GKE) provides a managed environment for deploying, managing, and scaling your containerized applications using Google infrastructure. The Google GKE environment consists of multiple machines grouped together to form a cluster. You can also deploy and run Google Cloud SQL for SQL server.

You can use Google GKE to deploy, scale up, scale down, and manage containers in the cluster environment.

Google GKE supports session affinity in a load balancing cluster, a feature which maintains each user session always active on the same pod. This ensures that the Dynamic Workload Console always connects to the same server during a session and that the user can perform any number of operations smoothly and seamlessly.

The product components are deployed using a chart and the product component container images. By default, a single server (master domain manager), console (Dynamic Workload Console), and dynamic agent are installed.

HCL Workload Automation can be deployed across a single cluster, but you can add multiple instances of the product components by using a different namespace in the cluster.

For more information about deploying the containerized product components on the Google GKE cloud platform, see the section about deploying with containers on Google GKE in the *Planning and Installation Guide*.

HCL Workload Automation is available on SoFy

HCL Workload Automation is a containerized product and is now available on HCL Software Factory (SoFy).

SoFy is a catalog of Kubernetes enabled products that can be easily deployed to a cloud-native environment. SoFy uses Docker images and Helm technology to deploy HCL Workload Automation product components to a Kubernetes cluster of your choice (public or private). HCL SoFy provides a temporary environment-sandbox to deploy and test solutions. When you are ready to implement the solution, simply download the Helm installation package and run the software on the cloud provider of your choice.

For more information, see the section about deploying with containers from the HCL SoFy catalog in the *Planning and Installation Guide*.

HCL Workload Automation is Red Hat certified

HCL Workload Automation is a containerized product and is Red Hat certified.

HCL Workload Automation container images are Red Hat certified and available in the Red Hat Catalog. Deploy HCL Workload Automation containerized software to take advantage of a scalable Kubernetes-based container platform to automate deployment, scaling and operations of application containers across clusters.

You can access the container images in the Red Hat Catalog at: https://catalog.redhat.com/software/container-stacks/search?q=HCL&p=1.

Deploying HCL Workload Automation with Linux on Z Docker containers

The deployment of HCL Workload Automation is easier and faster with Linux on Z Docker containers.

A wide variety of enterprises such as manufacturing, government agencies, financial services, and many more use mainframe systems for many high-throughput applications and services.

Applications on mainframe systems are at the core of most systems but rewriting and refactoring them for a different platform is expensive and time-consuming. The combination of standardization of your workload scheduling environment

with the performance and resiliency of mainframe systems allows you to safely run the most critical applications at a very large scale.

Docker is a state-of-the-art technology which creates, deploys, and runs applications by using containers. Packages are provided containing an application with all of the components it requires, such as libraries, specific configurations, and other dependencies, and deploy it in no time on any other Linux on Z workstation, regardless of any different settings between the source and the target workstation.

Docker adoption ensures and provides an easy method to replicate environments quickly in development, build, test, and production environments, speeding up the time it takes to get from build to production significantly. Install your environment using Docker to improve scalability, portability, and efficiency.

With just a few, simple commands you can install one or more of the out-of-the-box packages provided. The provided packages are as follows:

- HCL Workload Automation Server
- HCL Workload Automation Console
- HCL Workload Automation dynamic agent
- HCL Workload Automation z-centric agent

Requires Docker compose to be installed on the local workstation.

For more information about deploying Docker compose, see the section about Deploying Docker compose on Linux on Z. For more information about the deployment with containers on Linux on Z, see the section about Deploying containers with Docker in *Planning and Installation Guide*.

Support for Db2 Version 11.5 Standard Edition

Entitlement to Db2 Version 11.5 Standard Edition is available with Fix Pack 3.

With HCL Workload Automation V9.5 Fix Pack 3, you are entitled to use Db2 V11.5 Standard Edition.

Moving your workload from an on-premises to a cloud environment

Moving your workload from an on-premises to a cloud environment is a simple procedure which grants a number of benefits.

You can now move your HCL Workload Automation workload to the Amazon Elastic Kubernetes Service (EKS) and to OpenShift.

Cloud computing reduces or eliminates the need for businesses to purchase equipment, operate and maintain data centers. This generates a significant savings on hardware, facilities, applications, and other expenses required from on-premises computing. It also aids disaster recovery: hosting systems and storing documents on the cloud provides a smart safeguard in case of an emergency and enables quicker deployment.

Known for flexible scalability, cloud technologies support businesses to do more than just scale up or back when needed. They allow you to better employ smart technology, integrate the cloud footprint across your organization, and adapt strategies for cost control to proactively plan for growth.

For more information, see the section about Shifting your workload from an on-premises to a cloud environment in *Administration Guide*.

Enhanced integrations

Several integrations have been updated to address fixes and enhancements.

For more information and download instructions about the job plug-ins and integrations available for HCL Workload Automation go to Automation Hub.

The following integrations have been updated:

File Transfer

The file transfer integration has been optimized for file transfer operations. See full details of the enhancement in Optimized file transfer operations on page 77.

SAP Hana Lifecycle Management

The SAP Hana Cloud Platform Application Lifecycle integration enables you to redeploy an application, start an application to trigger the operation, stop, delete and also to know the status of an application.

IBM Sterling

New security feature TLS and TCP added in Protocol field.

Apache Spark

Support has been added for Apache Spark version 2.3.0.

Apache Oozie

The plug-in has been enhanced to include detailed logs on the Oozie server for the script.

Changed features and feature capabilities

A list of features changed since the previous release

The following features have changed or have been introduced since the previous release:

New Web site for the HCL Workload Automation product documentation

The latest version of the HCL Workload Automation product documentation, version 9.5 Fix Pack 3/SPE3 can be found on the HCL Software Product Documentation web site at https://help.hcltechsw.com/workloadautomation/welcome/index.html. The former website, https://workloadautomation.hcldoc.com/help/index.jsp, continues to host previous versions of the product documentation (version 9.4.0.x).

Support for file transfer jobs on agents at Version 9.3

Agents at Version 9.3 can run existing file transfer jobs without problems. Jobs you create or edit from the Dynamic Workload Console at Version 9.5, Fix Pack 3 are not supported on agents at Version 9.3, but you can work around this problem by saving the jobs in the composer command line after editing them with the Dynamic Workload Console. The best practice is applying the latest fix pack level to the agents.

Skip objects when importing a workload application template

You can select the objects within a workload application template you do not want to import, both from the Dynamic Workload Console and wappman command. If you choose to skip an object, an object with the same name must be present in the target environment, otherwise an error message is returned. For more information, see the section about Reusing a workload in another environment in *Dynamic Workload Console User's Guide* and wappman in *User's Guide and Reference*.

New optman option to specify the default licensing model for HCL Workload Automation workstations

You can now use the **defaultWksLicenseType** option to specify the default licensing model to be applied to HCL Workload Automation workstations. In a Docker environment, this causes all workstations to be created with the value assigned to the **defaultWksLicenseType** option. For more information, see the section about global options in *Administration Guide*.

The term $SLAVES was removed from the security file and replaced with the term $AGENTS

Because it is politically incorrect, the term **$SLAVES**, which applies to all fault-tolerant agents in both the classic and role-based security models, was replaced with the term **$AGENTS** with the same scope. No change is required to your existing scripts nor environments. For more information, see the section about Configuring user authorization (Security file) in *Administration Guide*.

Improvements in time zone management for external follows dependencies for jobs and job streams

When the product evaluates matching criteria to resolve external follows dependencies it compares the start times using local time if both job stream instances use the same timezone, or it uses UTC in case they use different timezones. For more information, see the section about Managing external follows dependencies for jobs and job streams in *User's Guide and Reference*.

Support for proxy servers when contacting the license server

You can now use a proxy server when contacting the license server. This is especially useful when your HCL Workload Automation environment cannot connect to the Internet. To set up communication with the proxy server, use the **licenseProxyPassword**, **licenseProxyServer**, **licenseProxyServerPort**, **licenseProxyUser** global options. For more information about global options, see the section about setting global options in *Administration Guide*.

Satisfying Requests for Enhancements (RFEs)

HCL Workload Automation satisfies Requests for Enhancements (RFEs).

Requests for Enhancements (RFEs) give customers the opportunity to collaborate directly with the product development team and other users. The team prioritizes and develops new product features based on proposals made by customers.

HCL Workload Automation V9.5 Fix Pack 3 delivers the following RFEs:

RFE 18054: Custom role privileges

Now you can define new custom roles, assign specific privileges to a set of users, and also assign privileges outside the scope of the existing system role.

RFE 116406: Add state=cancl on showjobs command

You can now filter jobs which are in **canceled** status. For more information, see the section about wildcards in *User's Guide and Reference*.

REF 116762: Improvements for Event Driven Workload Automation

You can now optionally modify the event processor server, for example to use a load balancer, by adding the Broker.Workstation.evtproc property in the BrokerWorkstation.properties file. For more information, see the section about the BrokerWorkstation.properties file in *Administration Guide*.

RFE 117719: End time column available for job streams in monitoring panel

This column is available when creating a job task, with this enhancements the end time column is also available for job streams.

RFE 123642: DWC historical reports' self-cleaning option

A new self-cleaning property has been enabled to remove all temporary files created after a report generation.

RFE 124339: New Graphical View order settings.

Now you can reorganize the dependencies view in the Graphical View by clicking on the Graphical view button and choosing the order in which you want to see them. The available options are:

- From right to left
- From left to right
- From top to bottom
- From bottom to top

By default, it is set to from top to bottom.

You can also edit the *TdwcGlobalSettings.xml* file to customize the default Graphical View settings.

RFE 126163: DWC user with read only access locks out an ISPF user with modify privilege

z/OS environment only. Now if you open a list of job dependencies from the Dynamic Workload Console, the related ISPF panel is locked and it is not possible to edit dependencies until the job dependencies panel is closed.

RFE 85329 / RFE 130134: Ability to clean the query history

When you have a very high number of past queries saved in the Query drop-down list, it is not easy to find the query that you really need. With this fix pack, you can manage the list either by removing single queries or clearing all the query history.

RFE 133936: Enhancement to composer binary to allow schedule objects to be pulled via "Active" or "DRAFT" status

Two new filters (**draft** and **active**) are now available with the composer command to filter job stream in draft or active status. For more information, see the section about filters and wildcards in *User's Guide and Reference*.

RFE 134893: default licensing model for HCL Workload Automation workstations

You can now specify the default licensing model for HCL Workload Automation workstations. By setting appropriately the values of the **defaultWksLicenseType** and **licenseType** global options, you can define the default licensing model to be applied to each workstation at creation time. For more information, see the detailed description of global options in *Administration Guide*.

RFE 137834: Modify the configureDB upgrade script to include any Subsequent additional IDs

Modify the configureDB database upgrade script to include any additional Subsequent Database IDs for DB2. In the script which translates 9.3 database to the 9.5 structure, capture the roles assigned to the views before they were dropped and recreate them so you can reassign those roles at the end of the process. It should also assign those roles to any new views created. For more information, see the FAQ about How can I avoid providing the database administrator credentials when creating the database with DB2 in *Planning and Installation Guide*.

RFE 139348: The report output limit has been improved to avoid Dynamic Workload Console issues

The default value for the Enable output limit checkbox has been increased from 5000 to 10000. This enables you to obtain the expected report output, and the Dynamic Workload Console to continue to work correctly without issues.

Furthermore, if a different default value is needed, a user with administration grants can uncomment the new SQL_REPORT_HTML_FORMAT_RESULT_MAX_NUMBER key in the *TDWCGlobalsettings.xml* file and enter the desired default value (either higher or lower to the default 10000).

Note: For HTML format, the SQL_REPORT_HTML_FORMAT_RESULT_MAX_NUMBER key is valid for all reports. For PDF format, the key is valid for Custom reports only.

If you want to generate a report with less than 30000 records, you can use both HTML and PDF formats. If you want to generate a report with more than 30000 records, use only the PDF format to avoid reliability issues with the browser.

For further information about how to modify the *TDWCGlobalsettings.xml* file, see the Customizing your global settings section in the Dynamic Workload Console User's Guide.

RFE 140107, 140108: Ability to perform actions on engines in the Dynamic Workload Console through a script or API call

To be able to schedule and run HCL Workload Automation processes in an automated way without having to log in to the Dynamic Workload Console, you can now perform actions such as create/edit, share/unshare, and delete on an engine through a script or by calling an API.

RFE 140216: Update optman global Options through REST API

You can now use REST APIs to update global options, in addition to the standard optman command.

RFE 141849: Justification fields for Workload Application Template import operation

You can now maintain an audit trail recording any changes and the related justifications while creating workload application templates with the wappman command. For more information, see the section about the wappman command and Deploying a workload application in *User's Guide and Reference*.

RFE 143098: Add all authenticated users

Simply adding a line into the authentication file, now it is possible to add all new users to a group and - without any other configuration - they will be authorized to login into the Dynamic Workload Console.

From now it is not necessary to assign a role to every single user. If the user registry already contains groups of users that are properly defined for using the console, it is possible to assign roles to groups too. If groups are not available in the user registry, then the special role **all authenticated users** can be used to assign roles to *all* the users at once.

For more information, see the All authenticated Users section in the *Administration Guide*.

RFE 143162: Prevent job streams from completing in error when the start condition is not met

The new **enStartCondSuccOnDeadline** global option is now available to specify if you want your job stream to be cancelled when the start condition is not met, even if the Start once option is not selected. By setting this option, you can avoid that your job stream completes in error due to just one failed run, also in the case when it previously ran successfully several times. With the new **enStartCondSuccOnDeadline** global option set to `yes`, when the deadline for the start condition is met, the monitoring job is confirmed in SUCC status and the job stream is canceled. When the option is set to `no`, the monitoring job is killed, so both the monitoring job and the job stream change to ABEND status. For more information, see the detailed description of global options in *Administration Guide*.

RFE 143169/143839: Managing an event rule in the Dynamic Workload Console

Usability improvements for event rule actions such as editing, duplicating, and deleting event rules in the Dynamic Workload Console Workload Designer. In addition, more space is now provided in the properties section for events and actions.

RFE 143196: possibility to select object to be imported during a WAT import

You can now select the objects to be imported while creating a workload application template and skip unwanted objects. For more information, see the section about deploying a workload application and the wappman command in *User's Guide and Reference*.

RFE 143260: Latest Start included in the critical path list and hot list

To identify problems related to a critical path that has a potential or high risk, the Latest Start time is now included in the critical path, in the hot list, and in the results of a monitor critical job query in the Dynamic Workload Console. The time before which the job must start is displayed provided all dependencies are satisfied.

RFE 142794

HCL Workload Automation Version 9.5 Fix Pack 3 has been updated with OpenSSL version 1.1.1g.

HCL Workload Automation includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit (https://www.openssl.org/).

RFE 148080: Provides the capability to constrain a product component pod to run on particular nodes

The **nodeAffinityRequired** parameter has been added to the configurable parameters that can be customized when deploying product components with containers. With this parameter, you can determine on which nodes a component can be deployed using custom labels on nodes and label selectors specified in pods.

See the readme files for the following supported cloud providers in the *Planning and Installation Guide*: Red Hat OpenShift, HCL Workload Automation on SoFy.Amazon EKS, and Azure AKS.

To submit a new RFE, write us here: HWAinfo@hcl.com

HCL Workload Automation version 9.5 Fix Pack 2 enhancements

Learn about the HCL Workload Automation version 9.5 Fix Pack 2 enhancements.

About this task

HCL Workload Automation version 9.5 Fix Pack 2 includes the following enhancements:

Automation Hub: the future of automation

Automation Hub is the new automation command center that empowers your Workload Automation with new integrations.

A showcase where you can browse through the existing integrations, but also discover a bunch of integrations to bring your experience to the next level.

Some of the old plug-ins previously provided with the product, are now out-of-the-box integrations available on Automation Hub. The related documentation has been removed from the product library and has been made available on Automation Hub.

In addition to these job plug-ins, you can find new integrations on Automation Hub that extend your automation processes.

On Automation Hub you find not only the old plug-ins but also new integrations that extend your automation processes.

The following is a list of all integrations that you can find on Automation Hub:

- Ansible
- Chef Boostrap
- Chef Runlist
- Kubernetes
- UrbanCode Deploy
- Apache Oozie
- Apache Spark
- Amazon EC2
- Database
- EJB
- File Transfer
- Hadoop Distributed File System
- Hadoop MapReducer
- IBM Cloudant NoSQL database
- IBM InfoSphere DataStage
- IBM MQ
- IBM SoftLayer
- IBM Sterling Connect:Direct
- Informatica PowerCenter
- J2EE
- Java
- JSR 352 Java Batch
- Microsoft Azure
- MQTT
- MS SQL
- Oracle E-Business
- RESTful Web Services
- Salesforce
- SAP BusinessObjects BI
- SAP PI Channel
- Web Services

The integrations are available for distributed and z/OS environments.

For further information, see Changed features and feature capabilities on page 94.

Workload Automation, Lutist Development Kit: do-it-yourself!

Workload Automation, Lutist Development Kit is the new tool that enables you to create and publish your own integrations.

Create your tailored and reliable solution by expanding the automation integrations.

Workload Automation, Lutist Development Kit is a maven-based project that enables you to easily and quickly create new integrations.

You need only to write a few lines of code and enrich them with a short description and a help panel; and then? Just share it with the community!

If you want, you can also add a business scenario and a video to let customers understand that is the solution that covers their business automation needs.

It's time to be creative!

Discover more on Automation Hub

Event rules have never been so easy

A brand new experience that optimizes the creation and editing of event rules.

A modernized user experience that makes the definition of event rules easier, intuitive, and well-organized, thanks to the folder-based structure.

Not only the visual usability has been enhanced, but also the whole management of the event rule definitions, their properties and the interactions with them.

A lot of news? Don't worry, the new contextual help can guide you through the new interface and its fields. On the home page, you can find the page-related topics, and if they are not sufficient, you can search for what you need by using the search bar.

Furthermore, by clicking on a field, the help automatically updates itself and shows you the information about the selected field.

A new user experience, tailored to fit your needs.

Continuous operation with automatic failover

Automatic switchover to a backup engine and event processing server when the active master domain manager becomes unavailable.

Ensure continuous operation with the automatic failover and high availability features of HCL Workload Automation. Configure one or more backup engines so that when a backup detects that the active master becomes unavailable, it triggers a long-term switchmgr operation to itself. You can optionally define potential backups in a list adding preferential backups at the top of the list. The backup engines monitor the behavior of the master domain manager to detect anomalous behavior. If one or more of the following behaviors persist for more than 5 minutes, an automatic long-term switchmgr operation is triggered:

- WebSphere Application Server Liberty Base is down. HCL Workload Automation monitors WebSphere Application Server Liberty Base and tries to restart it if it is down.
- The fault-tolerant agent of the master domain manager is monitored to check on the status of processes such as, Batchman, Mailman and Jobman. If one or more of these processes are down, the master domain manager makes three attempts to restart them. If the master is unsuccessful, then the automatic failover is triggered.
- The engine can no longer contact the database, for example, due to a network outage.

If you have defined potential backups in a list, and a switch after 5 minutes is not possible with the first backup in the list because it is unavailable, then an attempt is made to contact the remaining backups in the list, following the order specified in the list, until an available backup is found to perform the switch. In this case, 5 minutes pass between each attempt.

Similarly, if a backup event processor detects that the event processor (which can be different from the master domain manager) is no longer available, the backup triggers a long-term switchevtproc to itself. You can configure a subset of workstations to act as a backup for the event processor. This is a separate list from the potential master domain manager backups because you might have a workstation that can serve as the event processor backup, but you do not want it to act as a potential master domain manager backup.

When you perform a fresh installation of the product, these features are enabled by default. When upgrading from an existing back-level version, the features are disabled and can be configured. Note that the automatic failover feature requires that the master domain manager and the backup master domain managers are installed by the same user.

For information about configuring automatic failover, see the topic about enabling automatic failover in the *Administration Guide*.

To achieve a high availability configuration, configure a load balancer in front of the master domain manager and backup master domain managers so that users are unaware of when a switch occurs and administrators configure a single engine connection in single-sign on that points to the name or IP address and port number of the load balancer and not ever need to know the hostname of the current active master. In a high available configuration, where the master and backup masters are configured behind a load balancer, workload requests are dispatched across all configured nodes to avoid any single node from being overloaded and avoids a single point of failure. To see a sample of an end-to-end high availability configuration, see the related topic in the *Administration Guide* An active-active high availability scenario.

Organize scheduling objects in workflow folders

Gain greater business agility by organizing your scheduling objects in a hierarchy of folders. Organize them by lines of business, departments, geographies, or any custom category that makes sense for your business operations.

With this fix pack, you can now organize the following scheduling objects into workflow folders:

- jobs
- job streams
- workstations
- workstation classes
- calendars
- event rules

- prompts
- resources
- run cycle groups
- variable tables
- workload applications

Folders also simplify security access. Associate access control lists to individual folders to restrict the rights to which folder any single user or group can access. You can also delegate security management of a specific folder and its sub-folders to other users.

For more information, see the section about Organizing scheduling objects into folders in *User's Guide and Reference*.

Using the `composer rename` command, you can easily move objects into folders with specific names that originate from naming conventions used in the original object names themselves, thus simplifying the object name. Support for wildcards and a preview option make organizing your workload simple and easy.

Remember: Before renaming a scheduling object or moving it into a dedicated folder, verify if there are event rules that reference this object, and create a duplicate of the event rule using the new object name and folder path. For more details about the correct sequence of steps, see the topic about organizing scheduling objects into folders in the *User's Guide and Reference*.

There are a number of composer and conman commands that can be used to manage folders. See the folder definition in the section about defining scheduling objects in the *User's Guide and Reference*.

For an overview on folders, specifically for organizing jobs and job streams, watch the video, Greater business agility and enforced security of Lines Of Business with workflow folders, on the Workload Automation YouTube channel.

Workload Dashboard enhancements

A list of enhancements introduced with the version 9.5 fix pack 2

See the data from more than one engine at the same time

It is now possible to select more than one engine in the dashboard and see the related results in the widgets.

Alerting system for widgets

A new alerting system has been introduced to allow notifications in case of event. You can now activate a system of notification for each widget; by doing so, every change of status in the dashboard will be notified with a reminder at the right of the top bar.

For information about the monitoring of the workload using a dashboard see Workload Dashboard

Enhance security with encrypted passwords

Enhance security in your organizations by encrypting the passwords you provide when installing the product

You can now encrypt your passwords using the {**xor**} or **{aes}** encoding before launching the installation scripts. To encrypt the passwords, you run a simple script, then provide the encrypted output to the installation commands (configureDb, serverinst, and dwcinst) or save it to the properties files for each command and run the installation process using the properties files.

The encryption mechanism is based on WebSphere Application Server Liberty Base, therefore you have to install WebSphere Application Server Liberty Base before you start installing the product, if you plan to use encrypted passwords.

For more information about installing the product, see Typical installation scenariothe section about the typical installation scenario in *Planning and Installation Guide*.

Enable support for long object names in the security file

You can now define scheduling objects with long names in the security file

Starting from this release, you can define a number of scheduling objects into folders, as explained in Organize scheduling objects in workflow folders on page 92. This might result in long names for scheduling objects, a scenario which is now supported in the security file.

By default, this feature is disabled. To enable it, set the **enSecFileExtendedFields** global option to `yes`, as explained in the section about global options in Administration Guide. The change becomes effective as soon as you modify a security object.

Changed features and feature capabilities

A list of features changed since the previous release

The following features have changed or have been introduced since the previous release:

A new home for Workload Automation plug-ins

Automation Hub is a new concept for automating business workflows.

In previous versions, all job plug-ins were provided with the product and obtaining new plug-ins meant you were bound to the product releases.

With Fix Pack 2, you can still access the usual plug-ins from the product, but going forward, any updates, and the related documentation, can be found on Automation Hub. Furthermore, the continuous delivery of new plug-ins - now called integrations - enables you to download and use new integrations in the product, at any time.

A new way to automate your business workflows and a more flexible solution to having only the integrations of your interest integrated in the product.

But that is not all, if you do not find the integration that you are looking for, you can make a request for it or, you can create it yourself. To create a new integration, you can use the Workload Automation, Lutist Development Kit, and then share your integration with the community.

Let's automate more and automate better.

Identifying workstations, resources, and prompts

Fix pack 2 adds the support for defining scheduling objects in folders. As a consequence, workstations, resources, and prompts are no longer identified in the plan solely by their names, but also by the folder in which they are defined. The name and folder association is mapped to a unique identifier. In the `localopts` file, the **this_cpu** option is the unique identifier of the workstation. You can verify the unique identifier for workstations, resources, and prompts by submitting the composer list command, together with the `;showid` filter, or by submitting the conman commands: `showcpus`, `showresources`, and `showprompts`, together with the `;showid` filter.

Identifying workstations and resources by their unique identifier avoids the problem that occurred in previous versions when objects were renamed in the plan. For example, if an object was renamed and then carried forward to a new production plan, references to the old object name were lost. With the implementation of the unique identifier, this will no longer occur and dependencies will be correctly resolved. However, if a workstation or resource is renamed, its new name is visible to all V9.5FP2 instances (or later), but earlier instances continue to see the old name of the object.

For examples, see the conman showcpus command and the composer list command in the *User's Guide and Reference*.

Modification of the use of wildcards in workstation classes

With the introduction of folders in which to define workstation classes, a change has taken place with respect to the use of wildcards in specifying members of a workstation class. While in the previous releases, wildcards included all workstations, starting from version 9.5, Fix Pack 2, wildcards include all the workstations defined in the same folder (including sub-folders, if any) as the workstation class definition.

For more information about the use of wildcards in workstation classes, see the topic about workstation class definition in *User's Guide and Reference*.

Extended agent installed with a master domain manager

With a fresh installation of a master domain manager on Linux and UNIX, a new extended agent is installed on the master domain manager workstation which is used to communicate where to run the FINAL job stream. With an extended agent, the $MASTER keyword can be used to indicate that the agent's host workstation is the master domain manager. If the role of the master domain manager is switched to another workstation, then the $MASTER keyword automatically detects the new master domain manager. This change is to facilitate the automatic failover feature. See Continuous operation with automatic failover on page 91.

Scheduling objects defined using REST APIs

Starting from product version 9.5, Fix Pack 2, the composer command line to create object definitions uses REST APIs. This means that when you create a definition using composer, new APIs are used, which are not compatible with the APIs installed on master domain managers with previous product versions. As a result, you cannot use a composer at version 9.5, Fix Pack 2 level, to create a definitions on a master domain manager where a previous version of the product is installed. This change applies to the following object definitions:

- calendar
- domain

- prompt
- resource
- variable table
- variable and parameter
- Windows user
- workstation
- workstation class

The default value for the mm resolve master local options has changed

With this fix pack, the default value for the mm resolve master local option in the `localopts` file has changed from `no` to `yes`.

Create a JSDL job definition

To create a JSDL job definition in IBM Workload Scheduler using the Job Brokering Definition Console refer to the previous documentation releases.

Remove deleted folders, prompts, workstations, and resources from the database

When deleting a workstation, if the workstation is still in the plan, then another workstation cannot be renamed with the name of the deleted workstation for the number of days specified by the global option folderDays. However, a brand new workstation can be created with the name of the deleted workstation. This behavior applies only to dynamic agents, pools, and dynamic pools. The default value is 10 days.

When deleting a folder, a prompt, or resource, if there are still objects in the plan that reference these objects, then another folder, prompt, or resource cannot be renamed with the name of the deleted folder, prompt or resource for the number of days specified by folderDays. However, a brand new folder, prompt, or resource can be created with the name of the deleted object. See the folderDays global option in the *Administration Guide*

Satisfying Requests for Enhancements (RFEs)

HCL Workload Automation satisfies Requests for Enhancements (RFEs).

Requests for Enhancements (RFEs) give customers the opportunity to collaborate directly with the product development team and other users. The team prioritizes and develops new product features based on proposals made by customers.

HCL Workload Automation V9.5 Fix Pack 2 delivers the following RFEs:

RFE 120948: Intercept SAP jobs by SAP users, and limit executions on TWS by "n" jobs per user

Control and limit the number of jobs submitted by each user. When the established number of jobs for the specific user is exceeded, the jobs are queued and submitted at a later time. To implement this feature, two new options have been added in the options file:

MAX_JOBS_TO_RELEASE_FOR_USER

Defines the maximum number of jobs released for each user each time the release job is submitted. If this option is less than or equal to 0, the option is ignored and all jobs are released when the release job is submitted.

RELEASE_ALL_INTERCEPTED_JOBS_FOR_REQUEST

Releases jobs for each user on a cyclic basis, based on the number of jobs specified in the **max_jobs_to_release_for_user** option. The default value is **ON**, which means that all jobs are submitted for each user:

- If the **max_jobs_to_release_for_user** option is less than or equal to **0**, all jobs are released for each user.
- If the **max_jobs_to_release_for_user** option is higher than **0**, the specified number of jobs is submitted for each user on a cyclic basis. For example, if **max_jobs_to_release_for_user**=**5**, the first **5** jobs are submitted for each user, then the following 5 jobs for each user, and so on, until all jobs for all users are submitted.

If this option is set to **OFF**, it releases for each user only the number of jobs specified in the **max_jobs_to_release_for_user** option. The remaining jobs are submitted only when a new release job is submitted:

- If the **max_jobs_to_release_for_user** option is less than or equal to **0**, all jobs are released for each user.
- If the **max_jobs_to_release_for_user** option is higher than **0**, only the specified number of jobs is submitted, then no other job is submitted until the new release job. If **max_jobs_to_release_for_user**=**5**, the first **5** jobs are submitted for each user, then no other job is submitted until the new release job.

For more information, see the section about defining configuration options in *Scheduling Job Integrations with HCL Workload Automation*.

RFE 128243: Job run numbers are not unique on a single agent in the plan when you have a very high number of rerun jobs

When you have a very high number of rerun jobs, accessing information about a specific job instance, specifying the CPUNAME and the job number, does not provide the expected result. With this fix pack, the job number is not considered an identifying factor when running conman commands. When submitting a conman command, you are prompted to confirm a selection of results that correspond to the filters specified with the exception of conman show commands (for example, conman showjob),where you are not prompted for confirmation but, instead, all results corresponding to the filters specified are displayed.

RFE 132029: Add run number check within MakePlan before locking the database

The MakePlan process was modified to perform a check on the previous day run number and comparing it with the new run number ensuring it has increased by 1. If the new run number is not reflected in the database, MakePlan should abend. This check must be done prior to the locking of the database by Planner.

RFE 133169: Additional query filter criteria has been added for multiple homogeneous engine selection

When monitoring your workload from the Dynamic Workload Console with a multiple engine selection, only filters in common between distributed and z/OS engines were shown. This behavior is still valid for the selection of non-homogeneous engines. For multiple homogeneous engines, the same filter options for a single engine are now available.

RFE 134569: DWC 9.5 not rendering properly (height) in resolutions over 1100px

The Dynamic Workload Console now supports every kind of resolution.

RFE 136191: JS EVERY DONOTSTART is not using untilDays. Allow configuration of the value for the global option untilDays for job streams

The untilDays option removes obsolete job and job stream instances from the plan. In previous versions, a hardcoded value of 2 days was set for job streams that did not have an until time set, resulting in cancellation of the job stream after two days. In the case of a job stream with the EVERY ONOVERLAP DONOTSTART keywords, if one or more jobs defined in the job stream abend, and are not resolved within the 2-day period specified by UntilDays, then the abended jobs are not carried forward and the job stream is canceled. This global option can now be configured for the number of days most appropriate for your scheduling environment. If you require maintaining a job stream longer than the number of days specified by untilDays, you can explicitly set an until time for that specific job stream.

For jobs, either you set an until time at the job level, or it assumes the until time of its job stream. If no until time is set for either job or job stream, then the until time is calculated by adding the setting for untilDays to the time the job enters the production plan.

With the release of this fix pack, the global option untilDays is now configurable. The default value is 0. If the default value is used, then for jobs, no default time is set for the until time (latest start time). For job streams, if the default is used, then the default until time is 2 days. See the *Administration Guide* for more information about the untilDays global option.

RFE 137732: Wappman functionality does not support the replacing or modifying of an existing job stream

In HCL Workload Automation 9.3 Fix Pack 3, wappman import/export and replace is used for continuous deployment across environments. After the upgrade to V94FP5, wappman cannot be used to modify the existing job stream definitions and its related objects like resources and jobs. With HCL Workload Automation 9.5 Fix Pack 2, the import, export and replace with wappman has been reintroduced.

RFE 137969 - Dynamic Workload Console Explore: ITEMS visible in List View

Workload Designer explore is now available with list view along with data view. By default, data view will be listed in Dynamic Workload Console when explore option is clicked. List view can be traversed from explore view and gives the details Name, type, workstation and object locked by.

It is easy to switch between the views from explore and once the view is switched, it retains the last view for easy reference in Dynamic Workload Console.

RFE 138951: Support for an existing Oracle user

When creating and populating the Oracle database schema during a fresh installation of the server or Dynamic Workload Console component, by default a check is performed to detect if the Workload Automation Oracle user already exists. If the Oracle user is found, but it does not contain the Workload Automation schema, the database schema is not created for this user. If no user is found, the installation creates the Oracle user and the Workload Automation schema. This behavior can be configured using the **-skipdbcheck** parameter in the installation scripts. By default this parameter is set to `false`. If this parameter is set to `true`, the installation creates the Workload Automation schema even if the existing Oracle user does not contain the Workload Automation schema.

For more information about the **-skipdbcheck** parameter, see the syntax for the serverinst, configureDB, and dwcinst scripts described in the reference section of the *Planning and Installation Guide*.

RFE 139443: The Dynamic Workload Console does not accept special characters (#, $ etc.) in the Application Description name but these characters are allowed in HCL Workload Automation for Z

Special characters are valid for the z/OS job stream name, which corresponds to the application ID.

RFE 140942: Ability to remove/control rerun option for broker jobs

By default, when a broker job fails because of a missing resource, the product attempts to find an available resource every 600 seconds, rerunning the job each time. With this enhancement, after the first failed attempt to find an available resource, the job FAILS. To enable this new behavior, add the hidden property, **Broker.Workstation.Enable.RerunOnAllocFailure**, to the `BrokerWorkstation.properties` file and set the property to "false". By default, the value of this property is "true".

RFE 140989: Add an SSH client in the DOCKER image of the HCL Workload Automation Agent (z-centric)

An SSH client has been added to the HCL Workload Automation Agent DOCKER image which allows secure and encrypted remote connections.

RFE 139843: Possibility to specify the maximum number of objects shown in each graphical view

By changing a property in the setting file it is now possible to edit the maximum number of objects shown in a graphical view. see this section for more information: https://www.ibm.com/support/knowledgecenter/SSGSPN_9.5.0/com.ibm.tivoli.itws.doc_9.5/distr/src_tsweb/General_Help/awsadgraphviews.htm

To submit a new RFE, write us here: HWAinfo@hcl.com

HCL Workload Automation version 9.5 Fix Pack 1 enhancements

Learn about the HCL Workload Automation version 9.5 Fix Pack 1 enhancements.

About this task

HCL Workload Automation version 9.5 Fix Pack 1 includes the following enhancements:

Dynamic Workload Broker user interface and command line

The resource and jobstore commands have been reactivated.

The Broker cli and Broker UI are available in version 9.5 Fix pack 1. They are not supported in version 9.5.

Note: To make Broker cli and Broker UI work, both Dynamic Workload Console and master domain manager should be updated to the version 9.5, Fix Pack 1.

Renaming and moving jobs and job streams into folders

Move jobs and job streams into folders and sub-folders in batch mode where the folder names are based on tokens contained in the job and job stream name.

You might have used simple to complex naming conventions when creating job and job stream names to easily identify and manage them. With character length restrictions for these names, creative abbreviations are required to stay within the limits. This can often lead to unreadable names.

You can now migrate multiple jobs and job streams, in batch mode, whose names contain common pattern matching into specified folders and sub-folders, where the folder names are extracted from the job and job stream names themselves. Naming folders by using tokens from the job and job stream names frees up characters so that you can rename jobs and job streams with more meaningful names, in addition to the folder names.

To rename and move jobs and job streams into folders, the composer rename command has been extended to support wildcard characters. The wildcard characters are used to replace pattern matching tokens in the job and job stream names and enable you to migrate the jobs and job streams in bulk, rather than one at a time. A ;preview option is provided to test the command before actually running it to ensure you obtain the expected result.

For more information, see the topic about organizing jobs and job stream into folder in *User's Guide and Reference*.

File transfer job plug-in enhancements

Version 9.5 Fix Pack 1 delivers the following enhancements to the File transfer job plug-in:

RFE 124923: Appending text to an existing file

The File transfer job plug-in now includes an option to append the data contained in the transferred file to the existing file on the destination system. This avoids overwriting the existing file and preserves any changes that were made to the file prior to the transfer. The option applies to file transfers of type download and for files encoded as text.

RFE 123295: Deleting a source file after an upload transfer

An option has been added to specify if you want to delete the source files after a file transfer of type "upload".

RFE 127294: Specifying FTP SIte subcommands

An option has been added for file transfers originating from a distributed environment to a z/OS target workstation, using the FTP protocol, to specify SIte subcommands. For example, you can specify a subcommand to define primary and secondary space allocations.

Deploying HCL Workload Automation Agent on Red Hat OpenShift

The deployment of HCL Workload Automation agent container is now available also for OpenShift.

The HCL Workload Automation agent container can be deployed onto OpenShift, a container application platform based on Kubernetes and useful to orchestrate containers.

For further details about the deployment on OpenShift refer to the topic about deploying HCL Workload Automation Agent on Red Hat OpenShift in *HCL Workload Automation: Planning and Installation*.

Delegating administrator privileges on folders to other users

The HCL Workload Automation administrator can grant permissions to a user on a folder so that the user can freely create new access control lists or modify existing access control lists on the folder or any sub-folders to which the user has been delegated administrator permissions. The user can in turn give access to the folder or sub-folder to other users by specifying an existing role to which the user wants to grant the access, as well as the folder. In this way, the HCL Workload Automation administrator can delegate the security to various organizations in the business to other users who can act independently as administrators for that organization.

A new access type "acl" has been added for folder objects. With this type of access, users can create access control lists for the folder assigned to them by assigning predefined roles to users and groups on the entire folder hierarchy or on specific sub-folders.

For more information about delegating permissions on folders, see the topic about granting administrator permissions to a user on a folder in the *Dynamic Workload Console User's Guide*.

OpenID Connect Provider as an identity provider

Enable web single sign-on and use the OpenID Connect Provider as an identity provider.

Client applications, for example, the Dynamic Workload Console, can verify the identity of a user by relying on authentication from an OpenID Connect Provider. You can configure the WebSphere Application Server Liberty Base server to function as

an OpenID Connect Client to take advantage of web single sign-on and to use the OpenID Connect Provider as an identity provider.

To simplify the configuration of the WebSphere Application Server Liberty Base server, a sample configuration file in XML format is provided.

For more information about configuring WebSphere Application Server Liberty Base server to function as an OpenID Connect Client, see the related topic in the *Administration Guide*.

Workload dashboard improvements

Take a look and try the latest improvements of the workload dashboard.

With the latest release, new enhancements have been added to the workload dashboard.

- Simplification of the use of the **Table widget** combined with **Engine list** datasource: By selecting the **Engine list** and the **Table** widget, the related fields are automatically displayed in the list without the need to add them manually.
- Light redesign of **KPI** and **Bar chart** widgets, with different colors and a smoother style.
- Additional widgets: **Bubble chart** and **Free text**. The Bubble chart retrieves data from any associated data source showing a series of bubbles of different sizes placed in descending order. The Free text gives the possibility to have useful notes at your fingertips.

For an overview on the Workload Dashboard, watch the video, New Workload Dashboard, on the Workload Automation YouTube channel.

Satisfying Requests for Enhancements (RFEs)

HCL Workload Automation satisfies Requests for Enhancements (RFEs).

Requests for Enhancements (RFEs) give customers the opportunity to collaborate directly with the product development team and other users. The team prioritizes and develops new product features based on proposals made by customers.

HCL Workload Automation V9.5 Fix Pack 1 delivers the following RFEs:

RFE 124923

Appending text to an existing file. For details, see File transfer job plug-in enhancements on page 100.

RFE 127294

Specifying FTP SIte subcommands. See File transfer job plug-in enhancements on page 100 for more details.

RFE 123295

Delete file on server after download. See File transfer job plug-in enhancements on page 100 for more details.

To submit a new RFE, write us here: HWAinfo@hcl.com

HCL Workload Automation version 9.5 enhancements

Learn about the HCL Workload Automation version 9.5 enhancements.

About this task

HCL Workload Automation version 9.5 includes the following enhancements:

Monitoring child jobs

Dynamic Agent ISERIES is now able to manage :CHILDS and :NOCHILDS ending tokens in case of SBMJOB command.

It is now possible to include or exclude the child jobs monitoring also with the SBMJOB command. To define if monitoring or not the child jobs you can use the :CHILDS or :NOCHILDS ending token or the "Child job options" field on the Dynamic Workload Console.

Moreover, on the Dynamic Workload Console, it has been added a new field where it is possible to specify the Local Data Area (LDA) source from which data are automatically extracted.

Easier deployment

The deployment of HCL Workload Automation has been substantially simplified.

The standard installation process has been dramatically improved, eliminating the method based on IBM® Installation Manager, and reducing the prerequisite software stack.

You can now deploy HCL Workload Automation using one of these methods:

Command-line based installation

The command-line installation is a very simple procedure, which supports installing all components (master domain manager, backup domain manager, dynamic domain manager, backup dynamic domain manager, Dynamic Workload Console, and agents) using dedicated commands. You can choose to maintain the default values already defined in the properties file, specify all or part of the parameters in the command line when typing the command, or edit all or part of the parameters stored in the properties file. For more information see the typical installation scenario documented in *Planning and Installation Guide*.

Docker containers

Docker is a platform that automates the deployment of applications inside software containers. Docker adoption ensures standardization of your workload scheduling environment and provides an easy method to replicate environments quickly in development, build, test, and production environments, speeding up the time it takes to get from build to production significantly. Install your environment using Docker to improve scalability, portability, and efficiency.

For further details, see Deploying HCL Workload Automation with Docker compose on page 104.

To simplify administration, configuration, and backup and recovery on UNIX systems, a new default behavior has been implemented with regard to the storage of product data and data generated by HCL Workload Automation, such as logs and configuration information. These files are now stored by default in the <*data_dir*> directory, which you can optionally customize at installation time.

By default, this directory is *TWA_home*/TWSDATA for the server and agent components, and *DWC_home*/DWC_DATA for the Dynamic Workload Console. The product binaries are stored instead, in the installation directory.

You can optionally customize the <*data_dir*> directory at installation time by setting the **--data_dir** argument when you install using the command-line installation. If you want to maintain the previous behavior, you can set the **--data_dir** argument to the HCL Workload Automation installation directory.

If you deploy the product components using Docker containers, the <*data_dir*> is set to the default directory name and location, and it cannot be modified.

Find how easy it is to deploy HCL Workload Automation using containers and learn all the advantages of the integration between HCL Workload Automation and the containers world in the Unleash the power of containers with Workload Automation video.

Deploying HCL Workload Automation with Docker compose

The deployment of HCL Workload Automation is easier and faster with Docker containers.

Following you can find more details about the HCL Workload Automation deployment with containers:

Docker containers

Docker is a state-of-the-art technology which creates, deploys, and runs applications by using containers. Packages are provided containing an application with all of the components it requires, such as libraries,

specific configurations, and other dependencies, and deploy it in no time on any other Linux or Windows workstation, regardless of any different settings between the source and the target workstation.

Docker adoption ensures standardization of your workload scheduling environment and provides an easy method to replicate environments quickly in development, build, test, and production environments, speeding up the time it takes to get from build to production significantly. Install your environment using Docker to improve scalability, portability, and efficiency.

With just a few, simple commands you can install one or more of the out-of-the-box packages provided. The provided packages are as follows:

- HCL Workload Automation Server
- HCL Workload Automation Console
- HCL Workload Automation Agent

Requires Docker to be installed on the local workstation.

For further details about the deployment with containers see the section on deploying with Docker compose in the *Planning and Installation Guide*.

The Dynamic Workload Console has evolved

The Dynamic Workload Console has evolved with a new graphical layout, features, and improved functionality.

Dynamic Workload Console V9.5 has undergone both an architectural and web redesign. A more modern feature-rich intuitive interface on a new foundation of modern technology while maintaining your current workload logic and processes.

The interface is based on new architectural foundation of modern front-end technologies while maintaining current workload logic and processes. With this refurbishment, Dashboard Application Services Hub (DASH) is replaced by a lean, high-performance in-house solution that is now based on a lightweight, highly composable, fast to start, dynamic application server runtime environment, WebSphere Application Server Liberty. Modern front-end technologies such as ReactJS, Redux, React-Saga, and SaSS form the user interface infrastructure.

The streamlined design of the console accommodates a number of features that improve the overall user experience to deliver results for your business:

- A new live dashboard experience enables smart troubleshooting use cases for proactive incident management.
- New integrated web help system.
- Customizable options to make your most commonly used or critical operations more accessible with pins and favorites.

Automatic switching of dynamic scheduling

Dynamic workload broker automatically started on the new master domain manager or dynamic domain manager during the switchover.

In previous releases, when switching a master domain manager or dynamic domain manager to a backup workstation, there were a number of manual steps that required attention to ensure dynamic scheduling continuity and to avoid having two concurrently active servers. The dynamic workload broker server had to be stopped manually and the new instance had to be manually started after the backup workstation took over.

With Version 9.5, when a switchmgr command is submitted, an automatic process is triggered by which the old server stops the dynamic scheduling services and the new server starts a new instance of the dynamic workload broker server when the older server has completed the switch and the backup workstation has taken over.

Greater business agility with workflow folders

Gain greater business agility by categorizing your jobs and job streams in a hierarchy of folders organized by lines of business, departments, geographies, or any other custom categories that make sense for your business operations.

Workflow folders enable business-oriented triggering and monitoring of activities related to jobs and job streams. A hierarchy of folders can be used to group jobs and job streams according to your lines of business, departments, geographies, or other custom categories that make sense for your business operations. Filtering for and monitoring your jobs and job streams defined in folders means you no longer have to rely on complicated and restrictive naming conventions. Furthermore, you can associate access control lists to individual folders to manage the security of your jobs and job streams.

You can create folders with different levels of authorization that define the set of actions that users or groups can perform on the objects defined in each folder. More than one folder can be associated tot he same Access Control List (ACL), and the level of security is also applied to any sub-folders. Each ACL assigns security roles to user or groups, in a specific security domain or folder.

For more information about designing folders see the related section in the *Dynamic Workload Console User's Guide*.

For working with folders from the composer and conman command line, see the job, job stream, folder definitions, and composer commands in the *User's Guide and Reference*.

For an overview on folders, watch the video, Greater business agility and enforced security of Lines Of Business with workflow folders, on the Workload Automation YouTube channel.

SAP integration certification

SAP® Certified
Integration with SAP® S/4HANA

HCL Workload Automation demonstrated a technical alignment with SAP solutions and has been granted certification for the following SAP integrations:

- SAP Certified Integration with SAP NetWeaver
- SAP Certified Integration with SAP S/4HANA

Through the integrations, HCL Workload Automation can access SAP BW on HANA Process Chains to handle and manage them externally and can invoke and track InfoPackages.

For a more detailed description of the integrations read the blog Workload Automation is SAP S/4HANA certified!

New EJB Plug-in

With the EJB plug-in, you can schedule, monitor and control the execution of EJB JAR files.

With the brand new plug-in for EJB you can schedule, monitor and control the execution of EJB JAR files deployed on a WebSphere Application Server and integrate them into more complex, composite batch workflows.

You can schedule and monitor an EJB JAR file on a time or event basis. You can even set a conditional dependency for the JAR file execution, based on the value of variables passed from one job to another, in the same job stream or in a different job stream.

You can monitor and control EJB JAR files execution from the Dynamic Workload Console, from which you can also restart in case of failure.

The plug-in is available for HCL Workload Automation distributed, HCL Workload Automation for z/OS, and for HCL Workload Automation on Cloud.

For more information, see the topic about EJB jobs in the *User's Guide and Reference*.

Database job plug-in enhancement

The database job plug-in provides new features that simplify the access to the query results and speed up the export of the database job properties.

The new "Output file" field enables you to specify a fully qualified path to where the SQL query output can be saved. By directing the queries results to a file instead of the job log, you can easily access them directly on the server where the dynamic agent runs the job.

Moreover, if the SQL query output is a single row, the name and value columns are automatically exported as properties that can be passed to another job to save you time.

For further details about the database job plug-in, see the documentation on Automation Hub.

A brand new way to monitor your scheduling plan by using either a customized dashboard or the dashboard template provided

With the new infrastructure of the Dynamic Workload Console, the way you create the dashboard for your scheduling objects has completely changed and improved.

With the new infrastructure of the Dynamic Workload Console we completely changed and improved the creation of the dashboard for your scheduling objects.

Maintaining and keeping control of a scheduling environment can be challenging. The right solution, when monitoring different machines and environments, is to have everything in one place. That is why the new dashboard represents the best choice. You can choose to create and customize your own dashboard or use one of the dashboard templates available. The possibility to have customized data sources with information from internal plan or from an external REST API, helps you in creating the perfect solution for monitoring. By creating boards and filling it with widgets, you will be able to control every scheduling object; from the health of your machines to the list or the number of critical jobs.

For more information about the new dashboard see the Dynamic Workload Console User's Guide.

New reporting system

With Dynamic Workload Console V9.5, the look and feel of the reporting system has renovated and you have the possibility to import the report templates created by using Business Intelligent Report Tool (BIRT), a new reporting system for the Dynamic Workload Console.

The reporting system is now organized in **predefined reports** and **personalized reports**. By using the **predefined reports** you can still perform the same actions as in the previous versions, but with an improved user experience that makes it easier and more intuitive. You can still create tasks to generate reports about job run statistics, workstation workload summaries or custom SQL reports.

With the **Personalized Reports** you can manage templates created with Business Intelligent Report Tool (BIRT) and use them to generate reports to retrieve data from the HCL Workload Automation database.

For more information about the new reporting system, see the Dynamic Workload Console User's Guide

AI-based algorithms for predictive estimation of job duration

A powerful analytical tool based on Artificial Intelligence (AI) algorithms for the prediction of estimated job durations. Through the deployment of the agent docker container, you can enable the monitoring of jobs to provide input to the AI-based tool to predict job duration. In addition, the tool also uses machine learning to train the tool to adjust predictions comparing previously predicted durations with actual durations. The tool uses a very sophisticated algorithm that considers the previous 50 job runs of a job instance to forecast the estimated durations for the next 7 job runs

The tool can be particularly useful to measure and forecast the durations of jobs along a critical path and provide insight on the probability that SLAs will be met.

Satisfying Requests for Enhancements (RFEs)

HCL Workload Automation satisfies Requests for Enhancements (RFEs).

Requests for Enhancements (RFEs) give customers the opportunity to collaborate directly with the product development team and other users. The team prioritizes and develops new product features based on proposals made by customers.

HCL Workload Automation V9.5 delivers the following RFE:

RFE 111374

Database job plug-in enhancement. For details, see Database job plug-in enhancement on page 107.

RFE 76018, 95837, 111724

Support for Oracle Database 12c Release 2 has been added.

RFE 56265

Install server using WAS file registry security and run WAS as no root. With this enhancement, HCL Workload Automation administrators can reuse WAS instances without any system administration intervention.

RFE 60662

Export Job Stream graphical view from the HCL Workload Automation database to Microsoft Visio format (svg). Once exported, Job Stream graphical view can also be edited in Visio.

RFE 85442

You can now edit the default Workload Dashboard.

RFE 89772

When running setupDWC.sh, you can now use both -record and -gapath options.

RFE 95837

Full High Availability configuration is now supported for DWC HA with Oracle DB.

RFE 107141

db2jcc.jar hardcoded in resource.xml has been updated to use a real Type 4 db2 connection.

RFE 98249

On the Dynamic Workload Console it is now possible to move filters to a new browser window.

RFE 111576

During the installation process, the account password is no longer exposed as a command line argument.

RFE 120283

CentOs 7.x is now supported for master domain manager and Dynamic Workload Console.

RFE 31567, 121197, 121199

The following enhancements have been implemented for Filemonitor utility command:

- Support for hh:mm:ss format when specifying parameter "-timeout"
- Support for global expressions like */opt/C4SF0/app/ITT/in/SIRE_TRD/[!_]** where *[!_]** means: *All the files starting with underscore*.

RFE 125781

Internet Explorer V11 with compatibility mode is now supported for the Dynamic Workload Console.

RFE 58672

Self Service Catalog now implements a form based authentication to let users Login / Logout in a easier way.

RFE 115277

Dynamic Workload Console Critical Status Widget default drill through format can now be configured. Also, it now includes other columns in addition to the Deadline column: Confidence Factor, Planned Start, Estimated Start, Estimated End, In Error Predecessors, Late Predecessors, Not Completed Predecessors, Completed Predecessors. With the inclusion of these additional fields, it is now clear to an operator why a job is in potential or high risk. Obviously, additional drill through might be required for specific job details.

To view a complete list of RFEs, new, planned, and delivered, see: RFE online community.

Changed features and feature capabilities

A list of features changed since the previous release

The following features have changed or have been introduced since the previous release:

***data_dir* path for the master domain manager and Dynamic Workload Console**

To simplify administration, configuration, and backup and recovery on UNIX systems, a new default behavior has been implemented with regard to the storage of product data and data generated by HCL Workload Automation, such as logs and configuration information. These files are now stored by default in the <*data_dir*> directory, which you can optionally customize at installation time.

By default, this directory is *TWA_home*/TWSDATA for the server and agent components, and *DWC_home*/DWC_DATA for the Dynamic Workload Console. The product binaries are stored instead, in the installation directory.

With a similar approach, also the configuration files for Open Liberty on UNIX systems are stored in the *TWA_DATA_DIR* directory, while binary files are stored in TWA_home.

For more information, see the section about Liberty configuration in *Planning and Installation Guide*

You can optionally customize the <*data_dir*> directory at installation time by setting the **--data_dir** argument when you install using the command-line installation. If you want to maintain the previous behavior, you can set the **--data_dir** argument to the HCL Workload Automation installation directory.

If you deploy the product components using Docker containers, the <*data_dir*> is set to the default directory name and location, and it cannot be modified.

enLegacyId optman option no longer supported

The `enLegacyId` option is no longer supported and has been removed from **optman**. The `enLegacyId` option was introduced to determine how job streams are to be named when operating in mixed environments with versions of IBM Workload Scheduler older than version 8.3, managed by a version 8.5 master domain manager. The default behavior now corresponds to having the `enLegacyId` option set to `no`, which means that the Job Scheduler instance is assigned a new ID following the standard mechanism of IBM Workload Scheduler. If you have defined in your environment any automated procedures based on the name of carried forward job steams, you need to take this change into account.

timezone optman option deprecated

The `timezone` option is now deprecated and will be removed in the next fix pack. By default, this option is set to `yes`.

Event 118 displayed by IBM Tivoli Enterprise Console is no longer issued.

The mstJobSched event that is logged when you are using the integration with IBM Tivoli Enterprise Console is no longer issued and has been removed from the documentation.

Table 3. The following event is no longer logged for the integration with IBM Tivoli Enterprise Console.

Event	Number	Description
mstJobSched	118	Job in scheduled status

Dynamic workload broker changes

The lifecycle of the dynamic workload broker is now completely automatic and is designed to keep dynamic workload broker active at all times. For this reason the following commands are no longer necessary and have been removed:

- startBrokerApplication
- stopBrokerApplication
- brokerApplicationStatus

HCL Workload Automation *Limited Fault-tolerant Agent for IBMi*

The *Limited Fault-tolerant Agent for IBMi* is no longer available and is replaced with the dynamic agent.

HCL Workload Automation version 9.4 Fix Pack 4 enhancements

Learn about the HCL Workload Automation version 9.4 Fix Pack 4 enhancements.

HCL Workload Automation version 9.4 Fix Pack 4 includes the following enhancements:

DevOps made easier with workload applications

If you have a few use cases where the workload application templates replicated in your workload environment are a little too rigid, then this new enhancement will add the flexibility you are looking for.

After a workload application is exported into a workload environment, the contents such as, job streams, jobs, and other objects, are created in the environment and an association to the workload application is maintained. This allows for easy subsequent updates and synchronization between the workload application template exported from the source environment and the workload application in the target environment. The workload application can be easily replaced and updated. However, there might be certain circumstances where you prefer not to have an association to the workload application so that the imported objects can be freely updated or deleted.

When importing a workload application template, you can now specify whether you prefer to import only the objects contained in the template, without any ties to the workload application, or to import the objects maintaining their association to the workload application. Even after you have imported the contents of a workload application template into a target environment, removing the association to the original workload application template, you still have some options through the wappman command line that enable you to manage the objects as a whole, such as deleting all of the objects or replacing all of the objects.

These workload application template enhancements are supported when connected to an engine with version 9.4.0.4 or later

For details about importing a workload application template, see the topic about importing in the *User's Guide and Reference*, as well as the topic containing the command syntax for the wappman command.

Additional agent support

New agent support.

Support for fault-tolerant agents, dynamic agents, and z/OS agents has been extended on Sun Solaris SPARC 64-bit.

Automatically register agents to pools

Starting from HCL Workload Automation version 9.4 Fix Pack 4, you can automatically register dynamic agentsin pools by editing a file.

Starting from version 9.4 Fix Pack 1, you can automatically register dynamic agents in pools by editing the `pools.properties` file located in `<TWS_home>/ITA/cpa/config`.

The file is composed by a series of lines with a list of pools to which the agent will be automatically registered. To make the changes in this file effective on the agent, you must stop and start the agent.

Because an agent can encounter problems and is not able to register and go online, for example, if it does not find a pool defined in the system, there are options that can be used in the `pools.properties` file to allow the agent to go online even if some pools are not defined.

This alternative way of registering dynamic agents to a pool can be useful when you need to quickly add more than one agent to a pool, or when you want to associate multiple pools to a dynamic agent.

For details about how to automatically register agents to pools, see the related topic in the *Planning and Installation Guide*.

Option to determine when fileCreated event is sent

The **-modificationCompletedTime** option can optionally be specified with the **-event fileCreated** argument to determine when the **fileCreated** event is sent.

The filemonitor utility is used to check for changes in files (files that are either created or modified). You can now specify the **-modificationCompletedTime** <*seconds*> option with the **-event fileCreated** argument to determine when the **fileCreated** event is sent.

This option is optional and when specified, if a file is created, the event is not sent immediately, but only after the interval of time specified by -**modificationCompletedTime**<*seconds*> has elapsed, and during which no subsequent changes were made to the file, which includes the file being deleted and recreated with the same name.

For more information about the filemonitor utility and syntax, see the related topic in the *User's Guide and Reference*.

Satisfying Requests for Enhancements (RFEs)

HCL Workload Automation satisfies Requests for Enhancements (RFEs).

Requests for Enhancements (RFEs) give customers the opportunity to collaborate directly with the product development team and other users. The team prioritizes and develops new product features based on proposals made by customers.

HCL Workload Automation V9.4 Fix Pack 4 delivers the following RFE:

RFE 117399: Windows™ 2016 WSCF cluster support

Support has been extended to Microsoft™ Windows™ Server 2016 Failover Clustering (WSCF) on agents.

To view a complete list of RFEs, new, planned, and delivered, see: RFE online community.

HCL Workload Automation version 9.4 Fix Pack 3 enhancements

Learn about the HCL Workload Automation version 9.4 Fix Pack 3 enhancements.

HCL Workload Automation version 9.4 Fix Pack 3 includes the following enhancements:

Extra opportunities for modifying job definitions already in the plan

Modify a job instance in the plan before it runs or modify an instance of a job in the plan that has already run and rerun the modified job.

You can modify a job definition in the database whenever and as many times as you want. However, there are times when you need to make changes to the job definition, but it has already been submitted into the plan and runs as is. This results in extra work and lost time in updating the definition in the database and then getting it into the plan to run.

This feature adds the flexibility you need so that you can now make changes to the definition even after it has already been submitted into the plan, maintaining the original definition in the database. With this additional flexibility, you can edit the job definition on-the-fly before it runs or rerun a job with a different definition. This can be done from either the Job Stream Graphical View, the job monitoring view, or from the conman command line.

Maybe you want to substitute the command or script executed by the job with a different one? Maybe you just need to tweak an argument? Maybe you need to rerun a job updating the logon name, priority, or connection server? Whatever the change, this enhancement allows you to quickly react and avoid possible disasters, and increase your productivity by addressing additional scenarios in your workload that were not contemplated at the time you modeled or planned your workload.

For details about how to modify the job definition in the plan see the conman commands altjob and rerun in the *User's Guide and Reference*.

For details about how to modify the job definition in the plan from the Dynamic Workload Console, see the topic about controlling job and job stream processing in the *Dynamic Workload Console User's Guide*.

See an introduction to this feature in the video,New opportunities to react and recover, available on the Workload Automation YouTube channel.

Troubleshooting stalled jobs

Quickly identify what is holding back jobs that are ready to run but, for some unknown reason, do not run.

Sometimes your jobs are all ready to go, but for some anomalous reason, they do not start. A job can sometimes encounter specific circumstances where, although everything seems to be in check, there is still something that needs to be done before the job can start. You know that any dependencies it might have on predecessors have been resolved, you also know that the start time has come and gone, but something else is holding it back.

A new action is available when monitoring jobs that helps you identify the most commonly found circumstances under which a job ready to run, does not. In addition to problem determination, it also helps you in resolving the problem for these common situations. Sometimes it is as simple as tweaking the limit, other times a workstation needs to be linked or started. Whatever the reason might be, you can save time in determining the problem and identifying the solution with a new action available from the Dynamic Workload Console, "**Why a job does not start**?.

For details about how to troubleshoot stalled jobs, see the troubleshooting topic about why jobs do not start in the *Troubleshooting Guide*.

Auto refresh Plan View

Continuous update of the Show Plan View graphical view at regular intervals.

To display a graphical view of your plan, you specify filter criteria such as, a scheduled time range, job stream name, and workstation name to narrow the results in the view. You can also choose to enable an automatic refresh mechanism of the view to ensure you are viewing the most up-to-date results at all times.

An auto fresh option has been added to the **Show Plan View** filter page. Enabling this option triggers an auto fresh of the view at regular intervals. By default, the view is refreshed every five minutes. From the view itself, you can control the auto refresh from the toolbar to pause, stop, and resume.

You can also configure the default refresh interval by editing the **PlanViewAutorefresh** section in the `TdwcGlobalSettings.xml` configuration file.

See the topic about displaying a graphical plan view in the *Dynamic Workload Console User's Guide*.

For information about editing the auto refresh default value in the **PlanViewAutorefresh** section of the `TdwcGlobalSettings.xml` file, see the information about customizing the global settings in the *Administration Guide*.

Easy installation for patches on agents

You can now easily install patches on your agents

You can now easily install patches on agents using the **twinst** command with the -**patch** argument.

When you specify this argument, only the files present in the patch package are replaced in the installed product while all other product files remain unchanged. For more information, see the section about upgrading agents and master domain managers in Planning and Installation.

Enhancements to IBM i job monitoring and control

Monitoring and control facilities for IBM i jobs have been enhanced to simplify the management of IBM i inquiry messages.

Automated reply to inquiry messages

For the most frequent IBM i inquiry messages, you can define standard rules to automate the reply to the waiting messages. When defining an IBM i job, by using the Workload Designer of the Dynamic Workload Console or the composer command line, you can specify the list of messages for which you want to set up an automated reply. When specifying the automated replies, a new parameter has been added to the job definition: the **Message Max Replies** parameter. It represents the maximum number of automated replies accepted for a specific message. This new parameter optimizes the management of IBM i inquiry messages.

For example, when you set a wrong reply to a message in the job definition, IBM i system keeps on sending out the same inquiry message repeatedly, while waiting for the correct reply. To avoid this issue, HCL Workload Automation has now the capability to intercept and disable the wrong reply and require, with a prompt, a direct reply from the Dynamic Workload Console. The job remains in SUSP (suspended) status until the correct reply is provided.

Reliable monitoring of IBM i job status changes

As an inquiry message receives an automated reply, the IBM i job status changes from SUSP (suspended) to EXEC (executing) and vice versa. All the job status changes are monitored and tracked. This is useful, for example, when you want to create an event rule definition to send an email every time a job status change occurs.

Improved trace facilities

Trace facilities for IBM i jobs have been improved. To specify the desired tracking level, customize your IBM i agent by setting the required parameters in the JobManager.ini file, in accordance with the settings on the IBM i system.

For more information, see the section about scheduling jobs on IBM i systems in *User's Guide and Reference*.

See the video: Simplify workload management for your IBM i Systems on the Workload Automation YouTube channel. More videos are available for the features released with V9.4 Fix Pack 3 on this dedicated playlist: Workload Scheduler V9.4, Fix Pack 3.

New Plug-ins for Cloud Automation

Amazon EC2, IBM SoftLayer, and Microsoft Azure plug-ins are available to manage the provisioning and de-provisioning of virtual machines in the cloud, on as-needed basis.

Customers choose to move their application to the cloud to focus on business optimization. Once in the cloud, applications rely on systems provisioned and de-provisioned to run defined business workflows but unpredictable workload volumes. Customers face a new question: Is it better to over-provision cloud resources with the risk of wasting them, or under-provision with the risk of degrading performance and delay the business process?

How about provisioning just the right amount of resources for only the time-period you need them? Exactly what you need, when you need it, and rather than incur extra costs and waste, de-provision when you’re done, all automatically.

To succeed in this challenge, a new approach is required, that strictly ties business workflow with cloud resource management. While managing a business application, IT organizations need to be able to orchestrate provisioning and de-provisioning of the infrastructure needed by the business application in the cloud.

HCL Workload Automation provides three Cloud Automation plug-ins, for different cloud providers, to manage the provisioning and de-provisioning of virtual machines in the cloud, on as-needed basis. By orchestrating the application workflow and the workflow that manages the entire lifecycle of the virtual machines needed by the application (including the actions: start, stop, snapshot, etc…), HCL Workload Automation can increase both business and infrastructure agility. The plug-ins are:

- Plug-in for **Amazon Web Services (EC2)**
- Plug-in for **IBM SoftLayer**
- Plug-in for **Microsoft Azure**

Select your cloud provider, and add one or more jobs in the job stream that automates your business process flow to provide a flexible and dynamic allocation of cloud resources to your workload.

For more information about the Cloud Automation plug-ins, see *Scheduling Job Integrations with HCL Workload Automation*.

See the video: Workload Scheduler for Cloud Automation on the Workload Automation YouTube channel. More videos are available for the features released with V9.4 Fix Pack 3 on this dedicated playlist: Workload Scheduler V9.4, Fix Pack 3.

Apache Spark Plug-in

With the new HCL Workload Automation plug-in for Apache Spark, you can schedule, monitor and control Apache Spark jobs.

Apache Spark is a lightning-fast cluster computing technology, designed for fast computation. It is based on Hadoop Map Reduce and extends the MapReduce model to efficiently use it for more types of computations, which includes interactive queries and stream processing. The main feature of Apache Spark is its in-memory cluster computing that increases the processing speed of an application. HCL Workload Automation provides a plug-in for Apache Spark that helps you manage your big data processing and analytics. With the plug-in for Apache Spark, you can define, schedule, monitor, and control Apache Spark jobs. Add one or more Apache Spark jobs in the job stream that automates your business process flow to obtain an end-to-end workload management solution.

For details, see *Scheduling Job Integrations with HCL Workload Automation*

Restarting JSR 352 Java Batch jobs from the point of failure

You can restart JSR 352 Java Batch jobs from the point of failure.

During the execution of a JSR 352 Java Batch job, when monitoring the job from the Dynamic Workload Console, the **Workflow Details** panel displays information about the steps that already started on the JSR 352 Java Batch server.

From the Monitor jobs view, in the Job Type column, click the hyperlink Workflow Details. The **Workflow Details** panel opens. If the JSR 352 Java Batch job fails, you can restart the workflow from the first failed step, within the same job instance.

For details about defining, monitoring, and restarting JSR 352 Java Batch jobs, see *HCL Workload Automation: User's Guide and Reference*.

More flexibility in managing successors for job actions

Hold, rerun and release successors in the plan during the monitoring of your workload.

You can now hold, release and rerun the successors during your job monitoring.

You have a list of all successors for the selected job, view the successors in two separate tables and decide if you want to run all internal successors, all internal and external successors, or a subset of them. By default, all successors are selected. By selecting the mode you can also control how successors are selected: manually, including successors in the same job stream or including successors in other job streams.

For more information about how to rerun successors from the command line, see the section about the **listsucc** and **rerunsucc** commands in the *User's Guide and Reference*.

For more information about how to specify the rerun options in the job definition from the Dynamic Workload Console, see the section about using job recovery actions to control job processing in the *Dynamic Workload Console User's Guide*.

Satisfying Requests for Enhancements (RFEs)

HCL Workload Automation satisfies Requests for Enhancements (RFEs).

Requests for Enhancements (RFEs) give customers the opportunity to collaborate directly with the product development team and other users. The team prioritizes and develops new product features based on proposals made by customers.

HCL Workload Automation V9.4 Fix Pack 3 delivers the following RFEs:

RFE 89523: Modify/change job definition directly in the plan

Edit the definition of jobs in the plan that have not yet started or, that have already run and rerun them with a different definition. See Extra opportunities for modifying job definitions already in the plan on page 114.

RFE 102777: Warning-Troubleshooting if limit is reached

A dedicated action to help determine why jobs that are ready to run, do not run, and how to solve the issue. See Troubleshooting stalled jobs on page 114.

RFE 110252: Improvements for Java batch

Restart JSR 352 Java Batch jobs from the point of failure. See Restarting JSR 352 Java Batch jobs from the point of failure on page 117.

RFE 114673: Autorefresh for Plan Graphical View

From the Dynamic Workload Console, an option to refresh the Plan View at regular intervals. By default, the view is refreshed every 5 minutes. The refresh interval is configurable by editing the value in the **PlanViewAutorefresh** section in the `TdwcGlobalSettings.xml` configuration file. See Auto refresh Plan View on page 115.

RFE 114590: Submit job (SBMJOB) on IBM i dynamic agents

A new parameter has been introduced, **MessageMax Replies**. See Enhancements to IBM i job monitoring and control on page 115

To view a complete list of RFEs, new, planned, and delivered, see: RFE online community .

HCL Workload Automation version 9.4 Fix Pack 2 enhancements

Learn about the HCL Workload Automation version 9.4 Fix Pack 2 enhancements.

HCL Workload Automation version 9.4 Fix Pack 2 includes the following enhancements:

Rerun multiple jobs

Rerun multiple jobs without having to confirm the rerun action for each individual job.

You can now select multiple jobs from the Dynamic Workload Console and rerun all of them in a single action. Previously, a confirmation dialog prompted you to confirm the rerun for each job selected. When rerunning a large number of jobs this can be time consuming. With this enhancement, a confirmation dialog lists the jobs you want to rerun and prompts you a single time to confirm the rerun on all of the jobs.

A side effect of this new feature is a more responsive user interface with improved response times. The more frequently used actions such as, setting the priority or limit from the Dynamic Workload Console monitoring portlet, have been updated so that they run more smoothly.

Rollback procedure

Roll back a master domain manager to a previous fix pack level or release if the master domain manager was installed with IBM Installation Manager.

To roll back a master domain manager to a previous fix pack level or release, you first need to create a backup before installing the new fix pack or release. This allows you to then perform a rollback procedure after the fix pack or release has been installed.

For details about the procedure see the topic about rolling back a master domain manager in the *Planning and Installation Guide*.

Actual workstation in pool and dynamic pool

The name of the workstation where a job, scheduled to run on a pool or dynamic pool, actually ran.

When jobs are scheduled to run on pools or dynamic pools, you might want to monitor the job or the workstation where the job ran. Previously, this information was available only in the job log. With this enhancement, the name of the actual workstation where the job ran is also available in a new column in the monitor job query. This detail is available if the job has started or has already run. This information can also be output in reports.

This information can also be useful when you need to determine your license consumption and therefore need to know on which workstation in the pool the job actually ran.

Satisfying Requests for Enhancements (RFEs)

HCL Workload Automation satisfies Requests for Enhancements (RFEs).

Requests for Enhancements (RFEs) give customers the opportunity to collaborate directly with the product development team and other users. The team prioritizes and develops new product features based on proposals made by customers.

HCL Workload Automation V9.4 Fix Pack 2 delivers the following RFEs:

RFE 179819: Database job executor handles stored procedure errors

Enhance the database job executor to handle stored procedure errors.

RFE 109287: Rerun multiple jobs with a single confirmation prompt

Rerun multiple selected jobs when monitoring jobs and confirm the action for all jobs only once. See Rerun multiple jobs on page 119.

RFE 102143: Lengthen text field for script path

Lengthen the size of the field related to a script to be run. When defining a job that runs a script as the task, the text field specifying the path to the script can now accommodate a much longer string. For example, if the path is quite long or if it contains numerous variables, they are now displayed in the text field when you view the job definition from both the Workload Designer and from the **List Workload Definitions** portlet.

Replying to messages for IBM i child jobs

Support for replying to messages for an IBM i parent job was introduced in a previous release. With this release, the same support is extended to IBM i child jobs. When an IBM i job is in SUSP (suspended) status, waiting for a reply to a message, you can reply to the message for parent and child jobs from the Dynamic Workload Console when monitoring the parent job.

Add actual start date in job stream view

In addition to the scheduled start date, information related to the actual start date has been added to the tooltip for jobs and job streams in the Job Stream View on both distributed and z/OS engines.

RFE 15616: Actual workstation displayed when monitoring jobs

When jobs are scheduled to run on pools or dynamic pools, the name of the actual workstation where the job runs can be monitored if the job has started or has already run. See Actual workstation in pool and dynamic pool on page 119

RFE 108425: File monitor support for existing files

Normally the filemonitor utility runs an initial scan and then runs subsequent scans to detect any new or changed files since the initial scan that match specific criteria. This means that if there are any existing files matching the criteria when the initial scan runs, they are not considered. The utility has been updated with a new parameter to be able to discover existing files during the initial scan that match the criteria and can therefore generate an event. For more information see the **-generateEventsOnFirstScan** argument for the filemonitor utility in the *User's Guide and Reference*

To view a complete list of RFEs, new, planned, and delivered, see: RFE online community .

HCL Workload Automation version 9.4 Fix Pack 1 enhancements

Learn about the HCL Workload Automation version 9.4 Fix Pack 1 enhancements.

HCL Workload Automation version 9.4 Fix Pack 1 includes the following enhancements:

Revamped graphical views

Enhancements made to the graphical view of your database objects has been extended to the plan to provide a consistent view and user experience.

Consistent views and revamped user experience across graphical views: Job Stream View, Preproduction Plan View, Show Plan View, Modelling Graphical View

Simple shapes to easily identify objects have been used, new icons to improve the interaction and quickly identify actions have been created, new colors and background to better visualize the objects have been applied.

Merge Impact View with the Job Stream View to provide a more comprehensive view for monitoring and recovery actions

In previous releases the Impact View and Job Stream View were provided as separate views to monitor the progress of your job streams in the plan. With this release, the Impact View has been merged with the Job Stream View to provide a single view from where you can analyze one or more job streams, jobs, dependencies and also analyze the impact a job stream and its jobs can have on the rest of the plan. This view is available in both distributed and z/OS environments.

Automatic refresh in Job Stream View

In previous releases, any actions performed in this view that affect the plan required a manual refresh of the view using the Refresh option. With this release, the view is automatically refreshed so that the information is always up-to-date. The automatic refresh is supported only on connections to engines at the Version 9.4 Fix Pack 1 level or later.

Persistent layout

The flexibility of the layout of the graphical view from the Workload Designer in distributed environments enables you to reposition objects in whichever way is most useful or meaningful for you. If you save your layout in the Workload Designer, the same layout or positioning is maintained when you open the same job stream in the Job Stream View.

For more information, see the topic about graphical views in the plan in the *Dynamic Workload Console User's Guide*.

See the videos: Dynamic Workload Console Graphical Views Revamped and Ensuring Workload Automation operation continuity 24/7 on the Workload Automation YouTube channel. More videos are available for the features released with V9.4 FP1 on this dedicated playlist: Workload Scheduler v9.4, Fix Pack 1.

What-if enhancements

Fix pack 1 delivers a number of enhancements in the What-if Analysis Gantt view.

What-if analysis available from non-critical jobs in a z/OS environment

In addition to launching the What-if analysis from any critical job in a z/OS environment, you can now also launch it from any non-critical job that is part of the critical network.

Assess impact on critical jobs quickly by narrowing the display of successors to only critical jobs

Show the impact only on critical jobs, excluding all other successor jobs. Viewing the impact in this way narrows the results to display only the most critical and also improves performance when there is a high number of successor jobs to display.

Optimizing performance with the capability of excluding predecessors from the view

An new option has been added to the `Tdwcglobalsettings.xml` file, **whatIfAutoLoadPreds**, that enables you to manage whether or not you want to automatically load predecessors in the view. You might want to exclude them from the view to optimize performance when you have hundreds of predecessors. The default setting is to load all predecessors in the What-if Analysis Gantt view.

Setting the Earliest Start Time to the Estimated Start Time calculated by the server

Even if all predecessors are not displayed in the view, you can still consider the impact of predecessors on a job's Earliest Start Time. The server calculates an Estimated Start Time for the job and through a new action named "Set Earliest Start Time to server estimation", you can set the job's Earliest Start Time, to the time calculated by the server as the Estimated Start Time.

For more information about What-if analysis capabilities, see the topic about analyzing the impact of changes on your environment in the *Dynamic Workload Console User's Guide*.

HCL Workload Automation Job Management Plug-in

The new Job Management plug-in is available to run actions on a job in a job stream.

The new Job Management plug-in is available in the Automation Utilities plug-in category. Automation Utilities are plug-ins that facilitate specific HCL Workload Automation operations. Use the Job Management plug-in, to run one of the following actions on any job in the job stream where the Job Management job is running:

Table 4.

Actions that you can run on a job
• Rerun • Rerun the job and all its successor jobs • Rerun the job and its successor jobs in the same job stream • Release • Release Dependencies • Cancel • Cancel Pending • Hold • Kill • Confirm ABEND • Confirm SUCC

The Job Management plug-in simplifies recovery scenarios and enables the automation of iterative workflows.

For more information, see the topic about Job Management jobs in the *User's Guide and Reference*.

See the video Automation of Iterative Workflows on the Workload Automation YouTube channel.

Automation of Iterative Workflows

The new Job Management plug-in enables iterative processing of a sequence of jobs within a job stream while a condition is met.

For complex workflows, the iteration of sequence of jobs within the overall orchestration can be a challenging task. By selecting the option to rerun a job with all its successors jobs in the same job stream, the Job Management plug-in enables iterative processing of a sequence of jobs while a condition is met. It is like a DO WHILE statement in programming languages.

It is just a matter of adding a Job Management job at the end of the sequence of jobs that you want to iterate. The Job Management job requests to rerun the first job in the sequence along with its successor jobs. The iteration is controlled by the output conditions of the first job in the sequence: it stops when the condition is no longer satisfied.

For more information, see the topic about Job Management jobs in the *User's Guide and Reference*.

For a complete scenario, see the video Automation of Iterative Workflows on the Workload Automation YouTube channel.

Advanced rerun flexibility

Ensure workload continuity with the new and improved recovery options for failed jobs

The new advanced rerun options help you orchestrate your workflows seamlessly, building recovery logic into the job definition itself and rerunning job successors directly from the Monitor Workload view.

When you create a job definition, you can now specify that you want the job to rerun for a specific number of times and after a specific interval, in case of failure. This ensures that fewer alerts are generated and the workflow continues smoothly. For example, if you have a job that needs to connect to a server which is periodically restarted, you can specify in the job definition that you want the job to rerun for a specific number of times and after a specified interval.

If the parent job ran on a workstation that is part of a pool or a dynamic pool, you can decide whether it must rerun on the same workstation or on a different one. This is because the workload on pools and dynamic pools is assigned dynamically based on a number of criteria and the job might be rerun on a different workstation.

Also, if a job fails, you can identify all its successors at a glance and decide whether you want to rerun the job with its successors. You can rerun either all successors in the same job stream, or all successors overall, both in the same job stream and in other job streams, if any.

For more information about how to specify the rerun options in the job definition from the command line, see the section about defining job rerun and recovery actions in *User's Guide and Reference*. For more information about how to specify the rerun options in the job definition from the Dynamic Workload Console, see the section about using job recovery actions to control job processing in the *Dynamic Workload Console User's Guide*.

For more information about how to rerun the job and its successors from the command line, see the section about the **listsucc** and **rerunsucc** commands in the *User's Guide and Reference*.

Use the **Job Management** plug-in to further automate your workflows. With the plug-in, you can perform a number of actions on jobs, such as rerun the job, with or without its successors, release its dependencies, or cancel the job, and many more. For example, in a recovery scenario, you can insert a Job Management job in your workflow. This causes the original job to rerun automatically when the relevant recovery job completes successfully, reducing effort and time consumption.

For a detailed video about this feature, see the **Advanced Rerun Flexibility** video available on the Workload Automation YouTube channel.

HCL Workload Automation Job Stream Submission Plug-in

The new Job Stream Submission plug-in is available to automate the submission of a job stream for processing.

The new Job Stream Submission plug-in is available in the Automation Utilities plug-in category. Automation Utilities are plug-ins that facilitate specific HCL Workload Automation operations. Use the Job Stream Submission plug-in, to submit a job stream for processing.

By adding the Job Stream Submission plug-in to your workflow, you can automate the submission of a specific job stream, minimizing code scripts and manual effort. Also, you can specify the earliest start time for the job stream and define the variable table associated to the job stream.

For more information, see the topic about Job Stream Submission jobs in the *User's Guide and Reference*.

Condition-based workload automation

Have your workflows start at just the right time

Condition-based workload automation provides a simple and immediate way to have your workflows start at just the right time. You can define in your job stream a condition that, when met, releases the job stream to run as scheduled.

For example, if you have a job stream containing jobs which analyze one or more files, you can have the job stream start only after the file or files have been modified or created. Also, if the job stream contains jobs which process the data in a database, you might want to have the job stream start after enough rows have been written into the database. You can also have HCL Workload Automation check repeatedly whether the condition is met.

You can start your workflow based on one of the following conditions:

- One or more files being created
- One or more files being modified
- A job completing with its output condition satisfied. You can apply this logic to the job stream or to specific jobs in the job stream.

For more information, see the section about condition-based workflow automation in the *User's Guide and Reference*.

You can also find a detailed explanation of the benefits provided by this enhancement in the Marketing-oriented video and in the How to video on the Workload Automation YouTube channel.

Monitor file changes using the filemonitor utility

Monitor changes in files with an easy-to-use utility command

Use the filemonitor utility to check for changes of files (files that were either created or modified). This could be useful when, for example, you want to make sure that a file exists before running a job that processes that file. By defining a job that runs the filemonitor utility, you can implement file dependency, that is, a relationship between a file and an operation in which specific activity on the file determines the starting of the operation.

You can use the **filemonitor** utility as a stand-alone command, or you can set the **filemonitor** keywords as additional parameters for the start condition of a job stream, either in the Workload Designer or from the **composer** command line. For more information about the start condition, see the section about condition-based workflow automation in the *User's Guide and Reference*.

For more information, see the section about filemonitor in the *User's Guide and Reference*.

For a comprehensive library of videos about the new features for this release, see the Workload Scheduler version 9.4, Fix pack 1 playlist available on the Workload Automation YouTube channel.

New keyword for defining the latest start time in job streams

Manage the lastest start time for job streams more efficiently

The **jsuntil** keyword defines the latest start time of a job stream. It also determines the behavior of the jobs in the job stream when the job stream is approaching its latest start time. Use the **jsuntil** keyword to avoid that the job stream is either suppressed, canceled, or set to continue (depending on the action specified in the **onuntil** keyword) if it starts before its

latest start time. For example, if you have a job stream with **jsuntil** set to 10:00 am, and one of the jobs starts running at 9:59 am, the job and its successors run as scheduled.

This keyword is mutually exclusive with the **until** keyword.

There is also a major difference with between the **until** and **jsuntil** keywords:

If you specify the until keyword in your job stream definition

This keyword is evaluated also after the job stream has started. As a result, if the latest start time expires before the job stream completes successfully, the action specified in the related **onuntil** keyword is performed on the job stream and on its jobs, which have not yet started.

If you specify the jsuntil keyword in your job stream definition

This keyword is evaluated only once, as soon as all dependencies of the job stream are satisfied and the job stream state changes to READY. If the latest start time defined using the **jsuntil** keyword has not expired at this time, it is no longer evaluated and the job stream runs independently of it. However, to prevent the job stream from remaining in READY state indefinitely, two days after the time specified in the **jsuntil** keyword has expired, the job stream is suppressed by default.

For more information, see the section about the **jsuntil** keyword in *User's Guide and Reference*.

New keyword for defining actions on late jobs

Manage the deadline for jobs in job streams more efficiently

The **onlate** keyword defines the action to be taken on a job in job stream when the job's deadline expires. If the job is running when the deadline expires, it is killed. Killed jobs end in the ABEND state. Any jobs or job streams that are dependent on a killed job are not released. If the dependency on the job is a conditional dependency on the job completing in ABEND state, that dependency is released.

For more information, see the section about the **onlate** keyword in *User's Guide and Reference*.

Higher level of control over the What-If Analysis

A new **optman** global option is available to administrators, to make the What-If Analysis feature optional in your environment.

Administrator's level of control over the What-If Analysis has increased with the introduction of a new **optman** global option. By setting the **optman** `enWhatIf | wi` global option to *no*, administrators can centrally disable the What-If Analysis feature, which is enabled by default in your environment to simulate and evaluate the impact of changes on the current plan. You have to run "JnextPlan" to make the change effective.

For more information, see the topic about analyzing the impact of changes on your environment in the *Dynamic Workload Console User's Guide*.

For more information, about the interaction of the `enWhatIf | wi` global option with the `enWorkloadServiceAssurance | wa` global option, which enables or disables privileged processing of mission-critical jobs and their predecessors, see the topic about disabling the What-If Analysis in the *Administration Guide*.

Preparing and installing a Docker image for dynamic agents

Quickly provision new dynamic agents with little effort.

A Docker container automates the task of installing a running dynamic agent, along with everything that is required to run it: code, runtime, system tools, system libraries, and settings.

It provides a mechanism known as a **Dockerfile**, which is used to codify the steps to install and configure your dynamic agent. This is a plain text file that uses a standard set of commands to perform the all the installation and configuration steps. The resulting Docker image is a static image of the full set of software for the dynamic agent with the exact configuration.

An image is then built to become a Docker Container, which is a unique running instance of the software with its own processes, state, and configuration. You can start as many Docker Containers from a given image as necessary. This gives you the possibility to quickly provision multiple running instances of your software, each with their own processes, state, and configuration, quickly and easily.

For more information, see the section about preparing and installing a Docker image for dynamic agents in the *User's Guide and Reference*.

For a detailed video about this feature, see the **Docker Agent for Workload Scheduler** video available on the Workload Automation YouTube channel.

Upgrading from version 8.6.*x*

Support for upgrades from previous versions.

HCL Workload Automation V9.4 General Availability supported upgrades from V9.*x*. With this fix pack, support is being extended to V8.6.*x* instances.

For HCL Workload Automation V8.6.*x* instances, the upgrade is supported only for the master domain manager using the parallel upgrade method. The direct upgrade is not supported for HCL Workload Automation V8.6.*x* instances. The only supported scenario for the upgrade of a V8.6.*x* master domain manager is to install a new master domain manager configured as a backup.

You can upgrade a V8.6.*x* single instance of the Dynamic Workload Console either on the same workstation where the back-level is installed, but in a different directory, or on a new workstation.

When a V8.6.*x* instance of the Dynamic Workload Console is installed with one or more components in the same directory, then you must upgrade the Dynamic Workload Console in a new directory and then uninstall the old version. The additional components either remain at the V8.6 level or they can be upgraded to V9.4

Note:

If you are upgrading from V9.1, V9.2, or V9.3 to V9.4.*x*, you can upgrade directly to the latest fix pack level, with just one single step (without the need to upgrade to V9.4.0 first). For more information, see the fix pack readme file.

New options in managing workload applications

New options are available to make the management of workload applications more flexible in your environment.

The following new options are available:

Export a job stream definition as a workload application template

From the Workload Designer, you can export a job stream definition and save it as a workload application template in a compressed file. The job stream definition can then be imported in another environment.

For more information, see the topic about exporting a job stream definition as a workload application template in the *Dynamic Workload Console User's Guide*.

Rename a workload application during the import process

A new parameter **-workloadApplicationName <workload_application_name>** is available for the **wappman -import** command to rename the workload application during the import process. A similar option is available when importing a workload application from the Dynamic Workload Console.

For more information, see the topic about the wappman command in the *User's Guide and Reference*.

Modify the mapping file according to rules defined using regular expressions

You can optionally request that the mapping file produced by the export process is automatically modified by the import process, according to rules defined using regular expressions and specified in ad-hoc files.

For more information, see the topic about using regular expressions to modify the mapping file in the *User's Guide and Reference*.

Integration with IBM UrbanCode Deploy

A new integration with IBM UrbanCode Deploy is available to streamline your application deployment.

Workload applications can be created and then exported so that they can be imported in other HCL Workload Automation environments.

To export and import a workload application you can use either the Dynamic Workload Console or the **wappman** command line.

As an alternative to the import process, you can automate the deployment of an application from one environment to another by using the Workload Automation plug-in of the IBM UrbanCode Deploy tool. Through the definition of a reusable template, the integration with IBM UrbanCode Deploy streamlines the deployment of your application with all of its associated scheduling objects. For details about this plug-in, see the IBM UrbanCode Deploy documentation.

For a comprehensive library of videos about the new features for this release, see the Workload Scheduler version 9.4, Fix Pack 1 playlist available on the Workload Automation YouTube channel.

Satisfying Requests for Enhancements (RFEs)

HCL Workload Automation satisfies Requests for Enhancements (RFEs).

Requests for Enhancements (RFEs) give customers the opportunity to collaborate directly with the product development team and other users. The team prioritizes and develops new product features based on proposals made by customers.

HCL Workload Automation V9.4 Fix Pack 1 delivers the following RFEs:

RFE 17980

Restart the job stream from the given job of a job stream. (Internal ID 57221)

RFE 25295

Rerun a specific job and all of it successors, both in the same job stream and in other job streams. For more information, see the section about condition-based workflow automation in the *User's Guide and Reference*. (Internal ID 65671)

RFE 33200

Create external dependency from the graphical Plan View. (Internal ID 79752)

RFE 44226

Need a copy button on the Monitor Jobs panel EDIT JCL. (Internal ID 99136)

RFE 46521

Improve recovery options for a job. (Internal ID 103418)

RFE 65873

Changed behavior of selections in tables in the Dynamic Workload Console. When performing an action on a selected item in the table, either by right-clicking or from the toolbar, after the action is performed the selection is cleared so that you can perform a different action on a different selection. You can also multi-select items in a table and perform an action on all selected items. (Internal ID 125267)

RFE 69212

When rerunning a job in a pool, you can optionally rerun the job on the same workstation where it previously ran. For more information, see the section about condition-based workflow automation in the *User's Guide and Reference*. (Internal ID 130343)

RFE 78682

Additional columns are now available when monitoring jobs on multiple engines. (Internal ID 144976)

RFE 80759

Hyperlinked properties when updated should auto-refresh automatically in DWC. (Internal ID 146988)

RFE 101904

Search option improvements in the Dynamic Workload Console Workload Designer allows for object selection before inputting keyword so that the search is run against the object selected. (Internal ID 172565)

RFE 101905

The search field in the Dynamic Workload Console Workload Designer now provides user assistance with examples of the syntax that can be used in the field. (Internal ID 172564)

RFE 104082

Dynamic Workload Console - Disable IE Compatibility View. (Internal ID 175746)

To view a complete list of RFEs, new, planned, and delivered, see: RFE online community .

HCL Workload Automation version 9.4 enhancements

Learn about the HCL Workload Automation version 9.4 enhancements.

About this task

HCL Workload Automation version 9.4 includes the following enhancements:

Agent upgrade with minimal scheduling disruption

Upgrade your agents with little or no impact on your job scheduling.

Planning the maintenance of your agents no longer means negotiating rare idle time windows. You want to ensure scheduling continuity while minimizing upgrade efforts. If an upgrade is not carefully planned, you risk prolonged scheduling downtime and unmet service level agreements.

With HCL Workload Automation agent upgrade with minimal scheduling disruption, both fault-tolerant agent and dynamic agent instances can be upgraded with minimal impact to scheduling activities. The agents are stopped for the shortest possible time, and although any jobs already running when the upgrade process begins continue to run as planned, no new jobs begin execution during this brief period. Once the upgrade is complete, the agent is restarted and quickly reconnects with its jobs. Any jobs that were actively running before the upgrade that have not yet completed, continue to run according to schedule, and any that have since finished running, report a successful status as usual.

The same behavior is applied to active agent command-line interfaces and processes such as conman or composer. After the agent upgrade, all processes and command-line interfaces resume and continue to run regularly.

The entire upgrade process is reliable and fail-safe with an automatic backup and restore feature in case of failure, and it all takes just a few minutes to complete.

Important: The agent upgrade with minimal scheduling disruption is supported for upgrading only version 9.*x* fault-tolerant and dynamic agent instances.

For information about upgrading agents with minimal disruption, see the topic about upgrading agents in the *Planning and Installation Guide*.

See the video Agent upgrade with minimal scheduling disruption on the Workload Automation YouTube channel.

HCL Workload Automation Plug-in for Cloudant

With the new HCL Workload Automation plug-in for Cloudant, you can schedule, monitor and control the execution of actions on IBM Cloudant NoSQL database, on its documents, or attachments.

With the HCL Workload Automation plug-in for IBM Cloudant NoSQL database, you can schedule, monitor, and control the following actions:

- Create, read, and delete a Cloudant database
- Start and monitor a Cloudant database replication
- Create, read, update, and delete Cloudant database documents
- Create, read, update, and delete Cloudant database attachments

You can gain many benefits from this integration. See the following examples:

- You can schedule and monitor a database replication on a time or event basis. You can even set a conditional dependency for the database replication, based on the value of variables passed from one job to another, such as the size of the database.
- You can monitor and control Cloudant operations from the Dynamic Workload Console , from which you can also restart in case of failure.
- Daily logs generated by your Cloudant application can be automatically uploaded to your Cloudant database as documents or document attachments.
- You can balance your Cloudant workload and integrate it with the rest of your process flow.

The plug-in is available for HCL Workload Automation on Premises, on Cloud (Saas), and on the Bluemix platform.

For more information, see the section about defining Cloudant jobs in *Scheduling Job Integrations with HCL Workload Automation*.

Keeping track of changes to scheduling objects

Keep a detailed auditing track of all changes to scheduling objects in your environment

Maintaining and keeping control of a complex scheduling environment can be a challenging task: multiple schedulers, operators, and administrators have access to the job flows and can implement changes. Regardless of the complexity of this task, however, you must keep a record of every change being implemented. You can now easily track down everything with HCL Workload Automation and obtain detailed reports with just a few clicks using the integration with Tivoli Common Reporting.

Administrators can optionally enforce a policy by which each user making a change to an object must provide a justification for the change.

Administrators can maintain an audit trail, consisting of detailed information about the user who performed the change, the time and date when the change was performed, the reason why the change was implemented, and the details of the change for every modified item.

From the Dynamic Workload Console, HCL Workload Automation administrators, operators, and schedulers can review all changes to scheduling objects, both in the database and in the plan, discover which user performed a specific change, and the time and date when the change was performed.

Schedulers can review the history of all changes made on a specific object at any time and check previous versions of the object in scheduling language.

For more information, see the section about keeping track of changes in *Dynamic Workload Console User's Guide*.

You can find more information and a detailed business scenario in the Stay in control of your workload video.

This new feature causes three changes in your default optman settings:

auditStore

When you upgrade the master domain manager from a previous release, the default value for this global option is changed. The default value is now **both**. If you customized the default value in the previous release, the value is overwritten with the new value, with the exception of the **auditStore** option with the **DB** value assigned. If the **auditStore** option was set to **DB**, this value is maintained and is not overwritten.

enDbAudit

When you upgrade the master domain manager from a previous release, the default value for this global option is changed. The default value is now **1**. If you customized the default value in the previous release, the value is overwritten with the new value

enPlanAudit

When you upgrade the master domain manager from a previous release, the default value for this global option is changed. The default value is now **1**. If you customized the default value in the previous release, the value is overwritten with the new value

Auditing release management

Auditing your release management process ensures your changes are delivered consistent every time and with the same level of quality.

Automate and schedule the development, test, and promotion into production of an application or business process with the option to rollback to a previous version should something go wrong. When pushing any change into production, it usually goes through various cycles of development, testing, and fixing. It also passes through various environments to do this, and not all environments are identical. This is where versioning is key. Keeping track of different versions in the test and production environment is critical in avoiding conflicts. You need a release management process that is simple and that can push changes into production in a consistent and reliable manner.

With HCL Workload Automation, changes can be promoted from one environment to another by creating and exporting a workload application template. A workload application template is a compressed file containing one or more job streams and all the related jobs contained in them, including dependencies, files, resources, calendars, run cycle groups, and prompts. With this easy method for replicating job flows across environments, automating and scheduling the development, test, and promotion into production is simple and easy.

For more information, see the section about keeping track of changes in *Dynamic Workload Console User's Guide*.

For more information about defining workload application templates, see *User's Guide and Reference*.

More information and a detailed business scenario is explained in this video: Streamline your release management process.

Version control

Gain full control of changes in your scheduling environment.

Version control is most often used to track and control changes to software source code. However, to meet change management and auditing requirements, version control must also be applied to the scheduling objects, like jobs and job streams, associated to a certain application.

HCL Workload Automation is a modern, advanced workload automation solution supporting Version Control. HCL Workload Automation maintains all versions of your scheduling objects in the database, and you can easily access them from the Dynamic Workload Console. For each scheduling object, you can view the history of changes, discover which user made a specific change, the time stamp of the change, and the reason for the change. Then, you can compare two different versions in a comparison viewer and restore a previous version.

For more information, see the section about keeping track of changes in *Dynamic Workload Console User's Guide*.

More information and a detailed business scenario is explained in this video: Version Control.

Backup copy of `tws_env` script

When upgrading an agent or master domain manager, a backup copy of the `tws_env` script is created, and a new one is installed.

To address new product features, the upgrade installation process for a master domain manager and for agents installs a new version of the `tws_env` script in the directory <*TWA_HOME*>/TWS, where <*TWA_HOME*> is the HCL Workload Automation installation directory. A backup copy of your original version is created. in a backup directory. After the upgrade process, merge the content of the new version with the content of the original version to carry your customized content into the new version.

For more information, see the "Configuring" topic that explains how to set the environment variables in the *Planning and Installation Guide*.

New event-driven workload automation action to open a ServiceNow incident

About this task

HCL Workload Automation provides an event-driven workload automation action, `Open Incident`, available through the integration with ServiceNow to automatically trigger the opening of an incident when a job that matches a defined policy ends in error.

For more information about the `Open Incident` action, see the section "Action providers and definitions" in *User's Guide and Reference*.

IBM i job definition enhancements

The IBM i job definition has been enhanced for jobs running SBMJOB command .

The job definition for IBM i jobs has been simplified as far as the specification of the input parameters for jobs running SBMJOB command. Input parameters include the custom libraries that you can specify in addition to the system libraries.

For more information, see the section about defining IBM i jobs in *User's Guide and Reference*.

Passing variables between jobs

The IBM i job definition has been enhanced for jobs running SBMJOB command .

Passing variables between jobs has become an easy task. You can now use variable tables to set variables exported from a job, and pass the variables to any successor job, in the same job stream or in a different job stream.

To export variables from a job into a variable table, an ad-hoc HCL Workload Automation job type is available: the VariableTable job type. The VariableTable job must be added to the job stream as a successor of the job that is exporting variables. The VariableTable job sets the exported variables in a variable table and makes them available to any other successor job, in the same job stream or in a different job stream.

You can easily define a VariableTable job by using the Dynamic Workload Console or composer command line.

For more information, see the section about passing variables by using variable tables in *User's Guide and Reference*.

Graphical view enhancements

A new graphical view has been released using modern UX design principles.

A new graphical view has been released using modern UX design principles.

The graphical view has been redesigned to enhance the user experience (UX). The new design helps the user to accomplish the tasks easily and efficiently. Simple shapes to easily identify objects have been used, new icons to improve the interaction and quickly identify actions have been created, new colors and background to better visualize the objects have been applied.

For more information, see the section about Graphical View in Dynamic Workload Console User's Guide.

HCL Workload Automation REST API

HCL Workload Automation REST API to easily integrate workload scheduling capabilities with external products and solutions.

HCL Workload Automation provides a set of fully functional APIs that are implemented based on Representational State Transfer (REST) services. The REST APIs help you easily integrate workload scheduling capabilities with external products and solutions. The same product functionality covered by the existing J2EE APIs is available with the REST APIs. The REST APIs are programming language independent and favor easier network configuration and firewall traversal. They allow you to exploit heterogeneous environments and provide new automation opportunities with direct impact on productivity. You can access the REST APIs by connecting to your master domain manager or backup domain manager through the HTTPS port.

For information about the REST APIs available and the possibility to try them out on the Swagger UI, see the topic about driving HCL Workload Automation using the REST APIs in the *Developer's Guide: Driving HCL Workload Automation*.

You can try out the REST API services and the operations available for each on the Swagger UI connecting to:

```
https://hostname:port_number/twsd
```

where,

hostname

The hostname of the master domain manager or the backup master domain manager.

port_number

The HTTPS port number of the master domain manager or backup domain manager. The default is 31116.

HCL Workload Automation REST API samples can be found here: REST API samples.

Satisfying Requests for Enhancements (RFEs)

HCL Workload Automation satisfies Requests for Enhancements (RFEs).

Requests for Enhancements (RFEs) give customers the opportunity to collaborate directly with the product development team and other users. The team prioritizes and develops new product features based on proposals made by customers.

HCL Workload Automation V9.4 delivers numerous RFEs. The following are a sample of a few of them:

- **RFE 56898**: Two significant changes have been implemented in the variable tables. The first addresses character lengths for variable names and variable values. The lengths have been extended to 64 and 1024 characters respectively. The second change addresses the possibility to use a variable in place of a static file name when defining file dependencies for dynamic agents. The variable is defined in the variable table of the workstation on which the file exists, and is resolved at later time rendering the file name dynamic and more flexible for use in your plans.
- **RFE 73944**: Job log enriched with information about the start time and end time of job on a dynamic agent that ends in FAIL.

- **RFE 109970**: Job log enriched with information about user id of the user experiencing the job failure.
- **RFE 162189**: Job log for dynamic agents now shows timestamp with the same format as for FTAs.
- **RFE 81886**: changePassword command now provides a new parameter -skipdbuser to skip the update of the db user password.
- **RFE 162160**: Dynamic Workload Console V9.3 can now be installed on AIX V7.2 .
- **RFE 133854**: HCL Workload Automation identifies the best time window for agent upgrades. This RFE is addressed through the new features of Agent upgrade with minimal scheduling disruption.
- **RFE 125642, RFE 79392**: HCL Workload Automation provides more flexibility when displaying jobs and job streams in the Workload Designer graphical view.
- **RFE 79391**: The Workload Designer graphical view has been enriched with the capability to search for jobs and job streams.
- **RFE 76136**: The timestamp in the auditing information stored in the database now shows seconds and hundreds of seconds.
- **RFE 79395**: Users can now input a note for jobs and job streams that are modified in the plan.
- **RFE 108197**: HCL Workload Automation provides change version control for scheduling object definitions.
- **RFE 126406**: Dynamic Workload Console shows a message for every important action against the current plan.
- **RFE 141427**: A recycle bin is now available in the Workload Designer.
- **RFE 156327**: The Workload Application Template now includes also the event rules for the workstations and the job streams contained in the template.
- **RFE 156524**: A capability has been added to control resources assigned to a job in progress when the resources are no longer required by the job.

To view a complete list of RFEs, new, planned, and delivered, see: RFE online community .

Scheduling with the Agent for z/OS 9.4 enhancements

See the enhancements of the Scheduling with Agent for z/OS 9.4

HCL Workload Automation Distributed Agent for z/OS provides the following enhancements:

EDWA for Scheduling with the Agent for z/OS on page 136

New opportunities for modifying job definitions already in the plan or in the database on page 137

EDWA for Scheduling with the Agent for z/OS

Event-driven workload automation (EDWA) for Scheduling with the Agent for z/OS

You can now address event-driven workload automation for your z/OS network.

With this new feature, you can carry out a predefined set of actions in response to events of any kind that occur in the environment. Specifically, the scheduler can detect an activity impacting a data set and trigger any kind of action when the event of closure is verified.

New opportunities for modifying job definitions already in the plan or in the database

Modify a job instance in the plan before it runs, modify an instance of a job in the plan that has already run and rerun the modified job or modify the job definition explicitly in the production plan getting the JCL directly from a remote data set.

You can now edit the JCL on zAgent if a job is in error and modify the job definition explicitly in the database getting the JCL directly from a remote data set.

With the extra opportunities for modifying job definitions you can now modify a job instance in the plan or in the database before it runs or modify an instance of a job in the plan that has already run and rerun it.

This feature adds the flexibility you need so that you can now make changes to the definition even after it has already been submitted into the plan, maintaining the original definition in the database. With this additional flexibility you can go and get the JCL and run it again changing the data set name containing the JCL, change the JCL defined explicitly in the production plan file and you can also change the job definition explicitly in the production plan file getting the JCL from the remote data set. This can be done from either the Job Stream Graphical View, the job monitoring view, or from the conman command line.

For details about how to modify the job definition in the plan see the section about Edit JCL in the Dynamic Workload Console on page 207 and in the section JCL Editing in the *HCL Workload Automation: User's Guide and Reference*.

HCL Workload Automation for Z Small Programming Enhancements released in April 2025

The following features were provided with HCL Workload Automation for Z small programming enhancements (SPEs) released for Version 10.2, in April 2025 **(APAR HC00008)**.

Listing the successor shadow jobs bound to a job in your CP

From the ISPF panels you can now list the shadow jobs that are bound to a local job in your current plan, thus enabling you to evaluate the impact of performing the following actions on the local job instance:

- Browsing an occurrence external dependencies
- Browsing an operation dependencies
- Browsing an operation external dependencies
- Deleting an occurrence
- Deleting an operation
- Setting an occurrence to complete
- Rerunning an occurrence
- Setting an occurrence to waiting

For details, see the topic about listing the z/OS shadow jobs in *Managing the Workload*.

A more efficient flow of data between the Z controller and Federator

To enhance the processing of the events sent from the Z controller to the Federator, in the MIRROPTS statement you can now set THREADNUM to define the number of threads used by the DB Filler task and

SOCKETNUM to define the number of sockets per thread. For details, see the topic about the MIRROPTS statement in *Customization and Tuning*.

ZWS-I-31 Update sample code in line with product changes

The EQQJVXIT sample exit stored in SEQQSAMP has been updated with the latest DSECT for the current plan record layout.

HCL Workload Automation for Z version 10.2 enhancements

HCL Workload Automation for Z version 10.2 includes the following enhancements.

Enhance the performance of the interfaces by mirroring the current plan on a database

Thanks to the Federator component which is automatically installed with the Dynamic Workload Console V10.2.3, you can now replicate the z/OS current plan on a database. This enables you to query your jobs, job streams, and workstations on the configured database through the Federator, without affecting the Z controller, which results in a performance enhancement of both the Dynamic Workload Console and REST APIs V2.

Find detailed information about activating the replication of data to a database in the topic Mirroring the z/OS current plan to enable the Orchestration Monitorin the section about mirroring the current plan to enable the Orchestration Monitor in the *Dynamic Workload Console User's Guide* and watch the video available in the Workload Automation channel on YouTube.

Have granular control over your workload through the Orchestration Monitor of the Dynamic Workload Console V10.2.3

By registering your z/OS engine to the Federator component of the Dynamic Workload Console V10.2.3, you are enabled to:

- Monitor jobs, job streams, and workstations from the new Orchestration Monitor.
- Perform actions on the monitored objects through the REST APIs V2, with which you can also run OQL queries.

For details about the Orchestration Monitor, see Orchestration Monitor overview. For details about OQL, see Using Orchestration Query Language.

The Event-filtering exit (User Exit 4) has been added to the User Exits Workbench tool

The Event-filtering exit (User Exit 4) has now been added to the list of exits that you can customize with the Workbench tool. For details, see Event-filtering exit (User Exit 4)the section about creating user exits through the User Exits Workbench in *Customization and Tuning*.

Elevate your data management with PostgreSQL database

Improve database performance and reliability by implementing the PostgreSQL database in your HCL Workload Automation environment.

You can now use the PostgreSQL database for creating the database for the Dynamic Workload Console.

PostgreSQL offers an extensive list of features related to performance, security, and configuration options. It is free and open-source, and its high customizability supports tailoring it to the specific needs of your environment. It also provides scalability, availability, and functionality suitable for large volumes of data.

PostgreSQL replaces OneDB and Informix, which are no longer supported.

For more information about using PostgreSQL to create the database for the Dynamic Workload Console, see the topic about creating and populating the database for PostgreSQL for the Dynamic Workload Console in *HCL Workload Scheduler for Z: Planning and Installation*.

Unleash the power of the cloud using Amazon RDS for MSSQL

Amazon RDS for MSSQL is a powerful, scalable managed database service that makes it easier to set up, operate, and scale SQL Server deployments in the cloud. It provides a powerful and convenient option for managing MSSQL databases in the cloud.

Amazon RDS for MSSQL also simplifies database management, enhances security, and provides the flexibility to scale up or down as your needs change.

For more information about using Amazon RDS for MSSQL to create the database for the Dynamic Workload Console, see the topic about creating and populating the database for MSSQL for the Dynamic Workload Console in *HCL Workload Scheduler for Z: Planning and Installation*.

Derby database is no longer supported

Derby database is no longer supported.

If you upgrade from an environment where you are using Derby, you have to install a supported database and extract all your definitions from Derby as described in the topic about connecting the Dynamic Workload Console to a new node or database in *HCL Workload Automation: Planning and Installation*.

Deprecated functions

The following functions were delivered and supported until HCL Workload Automation for Z V10.1, and are now deprecated:

- Open Services for Lifecycle Collaboration (OSLC) integration.
- Direct access storage device (DASD) connection method between the Z controller and trackers.

HCL Workload Automation for Z Small Programming Enhancements released in December 2023

The following features were provided with HCL Workload Automation for Z small programming enhancements (SPEs) released for Version 10.1, in December 2023 (APAR HC00007).

Integrating with IBM Z JCL Expert

By integrating with IBM Z JCL Expert, you can now stop wasting time searching for and fixing errors. You can check multiple JCLs simultaneously and automate the checking process.

From the Dynamic Workload Console V10.2.1 you can:

1. Invoke IBM JCL Expert when a job ends in error.
2. Verify the output of the JCL check in a new panel.
3. Speed up the debug process.
4. Automatically validate your JCL coding to ensure compliance with custom rules.

Keep your environment safe with the power of IBM Z JCL Expert! For detailed information, see the section about integrating with IBM Z JCL Expert in *Managing the Workload*.

Creating exits through the User Exits Workbench

The User Exits Workbench tool enables you to create and customize a number of user exits with the IBM z/OS Metal C language, instead of the Assembler language. You can quickly create, edit, compile, and link-edit the user exits from a single ISPF panel, as an alternative to creating them manually. For more details, see the section about creating user exits through the User Exits Workbench in *Customization and Tuning*.

Time-dependent operations hold on trackers

For trackers using JES2 for z/OS V3.1, or later: When a time-dependent operation scheduled on a tracker is ready to be run and you have set the JESSYMBOL HOLDUNTL parameter in OPCOPTS, the operation will be sent to the tracker at the time resulting from the IA time minus the seconds set in JESSYMBOL HOLDUNTL. On the tracker, JES2 holds the operation until the time dependency is resolved and optimizes the resources required for execution, then the operation is run.

This applies only to jobs that run on computer automatic workstations, except for virtual and started-task workstations.

Increase default MAXREL size for EQQADDS and EQQLTDS (RFE ZWS-I-40)

In EQQPCS01 sample, the maximum record length (MAXRECL) of EQQADDS and EQQLTDS data sets has been increased from 131072 to 400000.

Restore the CP at the moment just before a human error (RFE ZWS-I-178)

If manual actions were performed on some application occurrences by error but the new current plan still exists and is valid, you can have HCL Workload Automation for Z to take over the new current plan again, until the date and time of the latest valid record. This prevents re-creating the CP including *all* the archived JT events, even those that could be invalid or inconsistent after the detected errors.

For more details about the procedure to follow, see Re-creating the current plan from the new-current-plan and EQQJTARC until a specific date.

Java runtime now installed automatically

Java runtime is now installed automatically when you install an agent. For this reason, the -**addjruntime** parameter in the **twsinst** script is ignored when set to `false` and Java runtime is always installed by default. For more information, see the section about the **twsinst** script in *HCL Workload Scheduler for Z: Planning and Installation*.

Improved security for your environment

Custom certificates in `p12` format are now used for ensuring SSL communication in your environment. `p12` certificates are secure and easy to use. Default certificates are no longer supported. For more information about configuring your environment with custom certificates, see the topic about installing a Dynamic Workload Console server in *HCL Workload Scheduler for Z: Planning and Installation* and the topic about customizing the SSL connection between the agents and Z controller when using your certificates (SAF) in *Scheduling End-to-end with z-centric Capabilities*.

HCL Workload Automation for Z Small Programming Enhancements released in July 2023

The following features were provided with HCL Workload Automation for Z small programming enhancements (SPEs) released for Version 10.1, in July 2023 (APAR HC00006).

Opening an incident through ServiceNow

When an anomaly is detected, the faster you react the better! To have the Z controller open incidents through ServiceNow© and manage issues through a ticketing system, now you can:

- Integrate HCL Workload Automation for Z with ServiceNow. For detailed information, see the section about opening incidents through ServiceNow in *Managing the Workload* or the video that summarizes the main integration steps on the HCL Workload Automation YouTube channel.
- Use the Servicenow plug-in, available for z-centric agents on Automation Hub.

Defining jobs outside of EQQJBLIB and job-library-read exit (EQQUX002)

Typically, you define jobs in the concatenated libraries referenced by EQQJBLIB or with the job-library-read exit (EQQUX002). To define operations whose jobs are located outside of both EQQJBLIB and EQQUX002, you are now provided with the JOBLIBRARY user field. By setting this user field, HCL Workload Automation for Z dynamically allocates the specified library when required.

For more detailed information, see the section about defining jobs in *Managing the Workload*.

Provide EXECUTE command for WTO workstations (RFE ZWS-I-95)

You can now issue an Execute command on a WTO general workstation, even if the job submission is deactivated on the Z controller.

EQQAUDIT should include records if operation is manually held (RFE ZWS-I-167)

If you update the Manually Hold or NOP option by using the ISPF fast path 5.3 - Automatic Options, the modified value is displayed in the EQQAUDIT report as "CHANGED VALUE".

Processing applications in batch through the batch loader and BCIT utilities

You are now provided with the batch loader and BCIT programs to perform in the batch environment some of the functions that you would otherwise perform online with the HCL Workload Automation for Z panels, such as creating, updating, and monitoring application descriptions, group definitions, and operator instructions.

For detailed information, see *Managing the Workload*.

HCL Workload Automation for Z Small Programming Enhancements released in November 2022

The following features were provided with HCL Workload Automation for Z small programming enhancements (SPEs) released for Version 10.1, in November 2022 (APAR HC00005).

Self-Service Catalog enhancements

A new and improved version of the Self-Service Catalog is available. You can now launch your services quickly and easily and check on them at any time by accessing the Self-Service Catalog from any device.

To use the Self-Service Catalog you do not need to be a Workload Automation expert, but you can leverage on services based on automation capabilities in no time, provided that you are connected to the Dynamic Workload Console in Single Sign-On (SSO). For more information, see Configuring the Dynamic Workload Console for Single Sign-Onthe section about configuring the Dynamic Workload Console for Single Sign-On on *HCL Workload Scheduler for Z: Planning and Installation*.

The HCL Workload Automation scheduler or application designer creates annotations in the Dynamic Workload Console and marks them as services, so that they are available for managing from the Self-Service Catalog interface.

To create and edit SSC-ready annotations, it is recommended that you use the Dynamic Workload Console. For more information about defining SSC-ready annotations, see the online help for annotation definitions in the Dynamic Workload Console.

Deploying z-centric and dynamic agents on Kubernetes to orchestrate your workload on cloud

A cloud deployment ensures access anytime anywhere and is a fast and efficient way to get up and running quickly. It also simplifies maintenance, lowers costs, provides rapid upscale and downscale, minimizes IT requirements and physical on-premises data storage.

To ensure a fast and responsive experience when using HCL Workload Automation for Z, you can now deploy z-centric and dynamic agents on a Kubernetes cluster. With the sample Helm Chart provided, you install and configure the agent with a single yaml file.

Orchestrating your Kubernetes workload from a containerized agent optimizes allocations of resources in your cluster and reduces the chance of human errors. Find out more in the video Orchestrating Your Workload on Cloud from IBM Z Workload Scheduler on the Workload Automation YouTube channel.

For details, see Deploying z-centric and dynamic agents on Kubernetesthe section about Deploying z-centric and dynamic agents on Kubernetes in *HCL Workload Scheduler for Z: Planning and Installation*.

Better performance and stronger security with TLS V1.3

HCL Workload Automation for Z supports TLS V1.3, which provides a faster and more responsive connection and more secure cipher suites for encryption. By supporting the Server Name Indication (SNI), an extension of

the TLS protocol, HCL Workload Automation for Z is enabled to securely connect any z-centric agent deployed on a cloud cluster.

For details about how to configure TLS, see the section about customizing TLS to connect components in *Customization and Tuning*.

Advanced password encryption

Security is a major concern in today's interconnected world. Government organizations, financial institutions, healthcare providers, and insurance companies are just a few examples of the types of entities who are taking security seriously.

You can optionally encrypt the passwords that you will use while installing, upgrading, and managing HCL Workload Automation. The encryption of the passwords performed by the `secure` command is based on the AES method. For details, see the section about encrypting passwords in *HCL Workload Scheduler for Z: Planning and Installation*.

Installing the agents on IBM i with a user different from QSECOFR

You can use a user different from QSECOFR to install z-centric and dynamic agents on IBM i. In this case, the new **allObjAuth** parameter is required when running the **twsinst** command, to indicate that the user has the required ALLOBJ authority. Ensure that the user is existing and is assigned ALLOBJ authorization. The agent is started after connecting to the system with the TWSUSER or the user defined at installation time.

When you upgrade or uninstall the agent, a check is performed to ensure that you are using the same user who performed the installation. If you used **allObjAuth** parameter at installation time, specify it again when upgrading or uninstalling the agent.

The name of the user used to perform the installation is maintained in the `TWA_DATA_DIR/installation/instInfo/instUser` file.

For more information, see Installing agents on IBM i systems, Upgrading agents on IBM i systems, and Uninstalling agents on IBM i systems

Enable SAF Keyring Support for TCPOPTS

Reduce vulnerabilities with TCPIP connections by providing RACF key ring support

To strengthen security, preventing loss of data and service outage, you can now set a single SAF key ring for HTTP and TCP/IP communications. This applies to the communications between:

- Tracker and Z controller
- Data store and Z controller
- Server and remote interface

For details, see the SSLKEYSTORETYPE parameter of the TCPOPTS statement in *Customization and Tuning*.

HCL Workload Automation for Z version 10.1 enhancements

HCL Workload Automation for Z version 10.1 includes the following enhancements.

HCL Clara integrated with the Dynamic Workload Console

HCL Clara, an Intelligent Virtual Assistant, is the Workload Automation product expert which you can contact directly from the Dynamic Workload Console to learn the product capabilities, execute routine tasks, and get troubleshooting assistance.

Find out more about Clara here: https://help.hcltechsw.com/solutions/clara/index.html.

For instructions about how to integrate Clara with the Dynamic Workload Console, see Integrating Clara in the Dynamic Workload Console.

Managed File Transfer

The File Transfer integration, already available on Automation Hub, now features three important enhancements:

- **Support for File Proxy**: A new component, called File Proxy, is now available for you to install. Through the File Proxy you manage securely files to be transferred with the File Transfer integration on any workstation that runs a supported version of Windows or Linux operating system. All transfer operations are performed by HCL Workload Automation for Z with no need of third-party products.
- **Support for file transfers via the Workstation-to-Workstation internal protocol**: You can easily transfer files to and from z-centric agents. You no longer have to specify the address of the workstations involved in the file transfer, but you can simply define the workstations from the File Transfer integration. Ensure that the agents are at version 10.1. For more information about the integration, see File Transfer integration.
- **Search on remote file systems**: You can perform search operations on the file system of a remote workstation. On Linux, if you do not specify a path, the search is performed on the working directory. On Windows, the path is required.

A renewed experience of Workload Designer

Workload Designer: a new concept to manage your workload. An innovative infrastructure and design have been thought to simplify the user experience and create a more responsive, fast and fluid user interface. You do not need to switch among the Dynamic Workload Console pages to complete your business workflow anymore. The new Workload Designer contains everything you need. Automate business-critical processes from a single point of access and control.

Automate fast, automate better.

Detecting anomalies in your workload with AI Data Advisor (AIDA)

Starting from this release, a new component is available in HCL Workload Automation for Z: AI Data Advisor (AIDA), based on Artificial Intelligence and Machine Learning, for early anomaly detection and analysis.

AIDA enables fast and simplified data-driven decision making, for an intelligent workload management. By analyzing historical data and metrics gathered by IBM Workload Scheduler and predicting their future patterns, AIDA identifies anomalies in the trend of Key Performance Indicators (such as the number of completed jobs in the current plan, the job duration, the job end-time) and sends alerts immediately to anticipate and prevent problems and delays. Alerts show up on the Workload Dashboard and can be notified via email.

For more information, see the *AI Data Advisor (AIDA) User's Guide*.

Chatbot based solution to enhance incident management process

When a problem arises, reacting is crucial. Identifying the issue, gathering possible solutions, choosing the best way to proceed are the fundamentals of problem-solving. In this realm, rapid communication becomes critical. By integrating with IBM Z ChatOps, HCL Workload Automation for Z provides you with a chat tool where you are notified about incidents and can share information with other team members. You are alerted through the chat platform of your choice (such as Microsoft Teams, Slack, or Mattermost) and communicate with the other chat users to share data and perform actions. Collaboration becomes easy, immediate, and effective for promoting teamwork and addressing daily issues.

For detailed information, see the section about posting incidents and sharing information through a chat tool in *Managing the Workload*.

For an overview of this feature, watch the video Chatbot based solution to manage incidents on the HCL Workload Automation YouTube channel.

Exposing metrics to monitor your workload

HCL Workload Automation for Z now exposes metrics about the status of your jobs by using OpenMetrics standard. The data collected can be processed by multiple data analytic tools, creating an easy and unified way to control and monitor your workload.

For details, see the section about exposing metrics to monitor your workload in *Managing the Workload*.

Ensure highest security and safety of your data with TLS V1.2

To ensure highest safety of your data, HCL Workload Automation for Z now supports the more secure and modern TLS V1.2.

TLS V1.0 and V1.1 are no longer supported. To communicate with the Dynamic Workload Console, master domain manager, and dynamic domain manager through TLS it is required that you configured secure ciphers, such as ECC or AES-GCM ciphers. For details about how to configure TLS, see .

Job running on a z-centric agent is set to Error if query job status is unknown

When a connection problem occurs between the Z controller and a z-centric agent where a job is running, if the query status for that job is unknown, the job is *not* set to Ready but it is set to Error with UNKN.

Rationalization of the JobManager.ini file

The contents of the `JobManager.ini` file have been trimmed and revised to remove some properties which are reserved for internal use. These properties have been moved to a file named `JobManagerInternal.ini`, which is

located in the binary directory and is overridden at each product upgrade. This file is not documented because it is not relevant for the final user. For more information about the `JobManager.ini` file, see the section about configuring the agent in *Scheduling End-to-end with z-centric Capabilities*.

New and improved command for password encryption

A new command is now available for encrypting and decrypting passwords that you use with HCL Workload Automation for Z with the `xor`, `3DES`, and `AES` algorithms. For more information, see the section about encrypting passwords in *HCL Workload Scheduler for Z: Planning and Installation*.

Java software prerequisite changed to version 11

Java is a prerequisite for Java job plug-ins and other Java-based functions. With this release, the supported version has been changed to Version 11. This version of Java is not available on HP-UX and Solaris SPARC operating systems. If you install on these operating systems, use the Java Version 11 provided with the operating systems. This change applies to the **twsinst** script: before launching this command on HP-UX and Solaris SPARC operating systems, provide the path to Java. For more information, see the section about the **twsinst** command in *HCL Workload Scheduler for Z: Planning and Installation*.

SEQQSAMP JCL samples have incorrect or obsolete REGION size (RFE 66985)

The JCL samples with a region different from 0 MB have now a region of 64 MB.

DBGRANT script for DELETE authorization (RFE 103251)

By granting a user access to the reporting tables and views with the **dbgrant** script, users are now enabled to both edit and delete them.

Display USER LEVEL at controller startup (RFE 115863)

At controller and server startup, message EQQZ286I is issued to show the maximum user level supported by the system.

Increasing the limitation of potential successors in the current plan (RFEs 144541, 144596)

Product scalability has been improved by increasing the limitation of potential successors in the current plan from 1000 to 3000.

User-defined JCL skeleton should be available for EQQEMAIL solution (RFE 145320)

You can define your own JCL to be used when an email is sent upon an alert condition, instead of using the predefined EQQEMAIL members. You can use any text for the JCL, no parsing is performed by HCL Workload Automation for Z. For more details, see the section about sending an email when an alert condition occurs in *Managing the Workload*.

DYNAMICDEL(YES) should be the default (RFE 148581)

In *Customization and Tuning*, all users who significantly use the dynamic addition of special resources are recommended to set BATCHOPT DYNAMICDEL(YES). This setting prevents the size of the data space from increasing in time, with an initial performance degradation that worsens until the space available is exhausted

and the batch job terminates with Abend 01D. For this reason, the default value of the DYNAMICDEL parameter in the BATCHOPT statement has been changed from NO to YES.

Pool dynamic workstation shows offline status if resources are unavailable to schedule jobs (RFE 150599 Workstation should show offline for agent pools tied to a DDM)

If a pool dynamic workstation is found without available resources, it is set offline until resources become available again; in that case, the workstation becomes active again.

When the PULSEIVL parameter of the HTTPOPTS or ROUTOPTS statement is set to 0 (which is the default), the heartbeat checking:

- Is run for dynamic domain managers according to the policy established by the Z controller.
- Is not run for z-centric agents.

Automatic health check performed periodically. A message is issued if vital services are no longer available. (RFE 151638 Startup message of the controller is needed when every service is available)

On the Z controller and tracker, a periodic check is performed to ensure that the following vital subtasks are active:

For the Z controller

General Service, Normal Mode Manager, Workstation Analyzer, Event Manager, Submit Task, Event Writer

For the tracker

Submit Task, Event Writer

A message is issued every time one of these subtasks is started, ended, or abended.

Enhance description on the number of occurrences (RFE 151653)

When setting the MAXOCCNUM parameter in BATCHOPT statement, it is advisable not to set the parameter to a larger number than required by actual workload needs, because the increased overhead incurred could cause a noticeable performance degradation.

Several integrations now available on Automation Hub

The following integrations are no longer available with IBM® Workload Scheduler and can be installed from Automation Hub:

- Amazon EC2
- Apache Spark
- IBM BigInsights
- IBM Cloudant
- IBM Cognos
- IBM InfoSphere DataStage
- Enterprise Java Beans (EJB)

- Hadoop Map Reduce
- IBM SoftLayer
- Informatica PowerCenter
- J2EE (JMS)
- Microsoft Azure
- MQTT
- Oozie
- Oracle E-Business Suite
- Salesforce
- SAP BusinessObjects BI
- SAP PI Channel
- Web Services
- IBM WebSphere MQ

HCL Workload Automation for Z Small Programming Enhancements released in December 2020

The following features were provided with HCL Workload Automation for Z small programming enhancements (SPEs) released for Version 9.5, in December 2020 (APAR HC00002).

Deploying Docker containers on IBM z/OS Container Extensions (IBM zCX)

You can import and deploy HCL Workload Automation for Z containers on IBM z/OS Container Extensions (IBM zCX).

For details about how to configure the required properties on the z/OS Management Facility and how to import and deploy the HCL Workload Automation for Z containers, see the section about deploying Docker containers on IBM zCX in *HCL Workload Scheduler for Z: Planning and Installation*.

Entitlement to Db2 V11.5

With APAR HC00002, you are entitled to use Db2 V11.5 Standard Edition.

Setting the user field named SUBJOBUSER to cause a job or started task to be submitted with a specific user ID

With APAR HC00003 you have an additional method to determine the authority given to a job or started task. By setting the user field named SUBJOBUSER you can decide that a job or started task be submitted by a specified user ID. For detailed information, see the section about the normal production jobs in *HCL Workload Scheduler for Z: Planning and Installation*.

Deploying with Docker on Linux on Z and IBM z/OS Containers Extensions (zCX)

The deployment of HCL Workload Automation is easier and faster with Docker containers.

Applications on mainframe systems are at the core of most systems but rewriting and refactoring them for a different platform is expensive and time-consuming. The combination of standardization of your workload scheduling environment with the performance and resiliency of mainframe systems allows you to safely run the most critical applications at a very large scale.

Docker is a state-of-the-art technology which creates, deploys, and runs applications by using containers. Packages are provided containing an application with all of the components it requires, such as libraries, specific configurations, and other dependencies, and deploy it in no time on any Linux on Z workstation, regardless of any different settings between the source and the target workstation.

Docker adoption ensures and provides an easy method to replicate environments quickly in development, build, test, and production environments, speeding up the time it takes to get from build to production significantly. Install your environment using Docker to improve scalability, portability, and efficiency.

With just a few, simple commands you can install one or more of the out-of-the-box packages provided. The provided packages are as follows:

- HCL Workload Automation Server
- HCL Workload Automation Console
- HCL Workload Automation Agent, both dynamic and z-centric.

Requires Docker to be installed on your local workstation.

For detailed information about the deployment with containers on Linux on Z, see the section about deploying with Docker in *HCL Workload Scheduler for Z: Planning and Installation*.

Listing the critical successors of an operation (RFE 115332)

You can learn if an operation in the current plan might have an impact on other operations defined as a critical path target (flagged as CRITICAL=P) by using the LIST CRITSUCS request that is available through:

- Program interface (PIF). For more detailed information, see *Developer's Guide: Driving HCL Workload Automation for Z*.
- Workload Automation Programming Language. For details, see *Programming Language for z/OS: User's Guide and Reference*.
- REST APIs.
- Dynamic Workload Console.

Find how easy is to use this feature through the REST APIs and Dynamic Workload Console in the video Listing Critical Successor Jobs available on the Workload Automation YouTube channel.

Setting how HCL Workload Automation for Z uses the IA date and time of an operation (RFE 55445)

You can decide how HCL Workload Automation for Z uses the operation IA date and time to determine the predecessors, by setting JTOPTS OPIADEP as follows:

YES

Operation IA is used to determine the matching predecessor (default).

TIME

If the operation is time-dependent, the operation IA is not used to determine the matching predecessor; the occurrence IA is used instead.

NO

Operation IA is not used to determine the matching predecessor.

The MODIFY commands DOPIADEP and SOPIADEP are also available to respectively display and set the value for JTOPTS OPIADEP. For details, see the section about modifying the scheduler in *Managing the Workload*.

Creating the EQQADMIN class to associate a RACF® user ID (RFE 138916)

You can use the resource class EQQADMIN to:

- Associate a RACF user ID to the Dynamic Workload Console user ID with which you connect to the Z connector.
- Automatically obtain a RACF user ID based on the Dynamic Workload Console user ID with which you connect to the Z connector.

For detailed information, see the section about creating the EQQADMIN class in *Customization and Tuning*. The video Single sign-on by RACF integration is also available on the Workload Automation YouTube channel.

Keep current job submit status after controller recycle (RFE 105074)

You can have HCL Workload Automation for Z use the latest values that were set for job submission by setting the SAVEJSUB parameter of the JTOPTS statement.

For details about JTOPTS, see *Customization and Tuning*.

EQQEVDS data set not shared between tasks (RFE 137868)

To prevent that the same data set is configured as the event data set on different subsystems, (in this case the second subsystem would not start), the following message is issued on MLOG and SYSLOG:

```
EQQZ076E THE EVENT DATA SET IS ALREADY IN USE. IT CANNOT BE SHARED.
```

Setting up EQQJOBS installation aid

To be able to run EQQJOBS, you can now use the following alternative method:

From the SEQQCLIB library, invoke the EQQ#JOBS CLIST (where the symbol # depends from the code page you are using, this is related to code page 1047) by issuing the `EXEC` command.

In this way, the required libraries are automatically allocated, and EQQJOBS is automatically invoked.

Sending an email when the alert conditions HIGHRISK and POTENTRISK occur

In addition to the existing alert conditions, you can now set that an email is sent when the following conditions occur:

HIGHRISK:

The risk level of a critical operation in CP has become High.

POTENTRISK:

The risk level of a critical operation in CP has become Potential.

For more details, see the MAIL parameter of the ALERTS statement in *Customization and Tuning*.

Supporting authentication through Zowe JWT token

The JWT secret that signs the JWT token is a private key that is generated during Zowe keystore configuration. Support for authenticating through JWT is now provided. For detailed information, see the section about supporting authentication through Zowe JWT token in *HCL Workload Scheduler for Z: Planning and Installation*.

Enabling jobs submission on z-centric and dynamic agents

For jobs that you submit on z-centric and dynamic agents, use the license computation model to keep track of your license usage and maintain compliance. For more information, see the section about license computation model in *Scheduling End-to-end with z-centric Capabilities*.

To configure the Z controller to enable you to schedule jobs on those agents, see the section about enabling jobs submission on z-centric and dynamic agents in *Scheduling End-to-end with z-centric Capabilities*.

With the Dynamic Workload Console V9.5, Fix Pack 3 the following enhancements have been implemented.

Optimized file transfer operations

With the enhanced version of the File Transfer integration, you are granted a consolidated and coordinated approach to scheduling and automating transfer of files. The highlights of the enhanced integration are as follows:

- Integrated dashboard for monitoring file transfer operations
- Completion time estimate
- Parallel file transfer
- Rerun from point of failure
- Selective re-transfer
- Improved multiple selection
- File transfer status and details on files transferred
- Post-processing of transferred files: delete, rename, move
- File transfer to and from Z systems

For a detailed description about creating a file transfer job, see Automation Hub. The video Discover the new file transfer integration is also available on the Workload Automation YouTube channel.

Filtering jobs according to their task type

From the General filter for z/OS jobs window you can browse the jobs according to their task type, which is the identifier specified as the TASKTYPE in the job JCL. You can specify more than one value, separated by commas. This filter is valid if you are connected to a controller v9.5.0.3.

Automatic SSL configuration

You can now configure your environment in SSL mode at installation time, by providing the path to the certificates and the password you want to define for the keystore and truststore in the **sslkeysfolder** and **sslpassword** parameters respectively. HCL Workload Automation for Z automatically generates the keystore and truststore with the specified password and configures your environment in SSL mode. For details about these parameters, see the section about the Dynamic Workload Console installation with the **dwcinst** script in *HCL Workload Scheduler for Z: Planning and Installation*.

HCL Workload Automation for Z Small Programming Enhancements released in April 2020

The following features were provided with HCL Workload Automation for Z small programming enhancements (SPEs) released for Version 9.5, in April 2020 .

Controlling the system where a z/OS job is to be run

(RFE 136248 - SYSAFF in a JCL of its destinations

RFE 136251 - JOB CLASS in a JCL as defined in the Operation)

The system where you submit a z/OS job does not always coincide with the system where the job will be executed. JES could decide to execute the job to another system, where the required resources are available. As a consequence, the checks made by the controller on the system where the job is submitted do not guarantee that the same conditions are found in the system where the job will be executed.

You can prevent this situation by controlling the system where the job is to be executed. This is also useful when you want a job that is more critical to you to be run on systems with higher performance.

For more details, see the section about controlling the system where a z/OS job is to be executed in *Managing the Workload*.

RFE 87769 - Send an email if operation ended in error or is late

You can have HCL Workload Automation for Z send an email to a specific recipient or list of recipients when one of the following alert conditions occurs:

- DURATION
- ERROPER
- LATEOPER
- OPCERROR
- SPECRES
- WLMOPER

For more detailed information, see the section about sending an email when an alert condition occurs in *Managing the Workload*.

Integrating with Zowe™

Zowe is an open-source project that enables you to interact with z/OS through modern interfaces. With the WA plug-in for the Zowe command line (CLI) you can now issue Workload Automation commands to remotely control your workload: monitor and modify jobs, jostreams, and resources, and issue WAPL commands.

Additionally, you can access the WA API through the API Mediation Layer (API ML) or connect the plug-in directly to the WA API.

For detailed information, see *HCL Workload Scheduler for Z: Planning and Installation*.

Watch the video **Open Workload Automation to the modern era - Meet Zowe** at this link.

RFE 106361 User-defined action: Postpone set in error action

For an operation that does not start or complete within the time that you set, you can define that it is set to Error if its status allows it. If the operation status does not allow it, the action is no longer ignored but it is postponed at the time when the operation status allows it.

RFE 140989: Add an SSH client in the DOCKER image of the HCL Workload Automation Agent (z-centric)

An SSH client has been added to the HCL Workload Automation Agent DOCKER image, which allows secure and encrypted remote connections.

A new home for Workload Automation plug-ins

Automation Hub is a new concept for automating business workflows.

In previous versions, all job plug-ins were provided with the product and obtaining new plug-ins meant you were bound to the product releases. Now, you can still access the usual plug-ins from the product, but going forward, any updates, and the related documentation, can be found on Automation Hub. Furthermore, the continuous delivery of new plug-ins, now called *integrations*, enables you to download and use new integrations in the product, at any time.

A new way to automate your business workflows and a more flexible solution to having only the integrations of your interest integrated in the product.

But that is not all, if you do not find the integration that you are looking for, you can make a request for it or, you can create it yourself. To create a new integration, you can use the Workload Automation, Lutist Development Kit, and then share your integration with the community.

With the Dynamic Workload Console V9.5 Fix Pack 2, the following enhancements have been implemented:

Enhance security by encrypting the passwords that you provide when installing Dynamic Workload Console and Z connector

You can now encrypt your passwords using the {**xor**} or **{aes}** encoding before starting the installation process. To encrypt the passwords, you run a simple script, then provide the encrypted output to the installation commands (`configureDb` and `dwcinst`) or save it to the properties files for each command and run the installation process using the properties files.

The encryption mechanism is based on WebSphere Application Server Liberty Base, therefore you have to install WebSphere Application Server Liberty Base before you start installing the product, if you plan to use encrypted passwords.

For details, see the section about encrypting passwords in *HCL Workload Scheduler for Z: Planning and Installation*.

Connect to DB2 for z/OS

Dynamic Workload Console can now use DB2 for z/OS. For detailed information about creating and populating the DB2 for z/OS tables, see *HCL Workload Scheduler for Z: Planning and Installation*.

From the Workload Dashboard see data from more than one engine at the same time

You can select more than one engine in the dashboard and see the related results in the widgets.

RFE 133169 Additional query filter criteria has been added for multiple homogeneous engines

When monitoring your workload from the Dynamic Workload Console with a multiple engine selection, only filters in common between distributed and z/OS engines were shown. This behavior is still valid for the selection of non-homogeneous engines. For multiple homogeneous engines, the same filter options for a single engine are now available.

RFE 139443 - The Dynamic Workload Console does not accept special characters (#, $ etc.) in the Application Description name but these characters are allowed in HCL Workload Automation for Z

This Request for Enhancement was satisfied. Special characters are valid for the z/OS job stream name, which corresponds to the application ID.

HCL Workload Automation for Z Small Programming Enhancements released in June 2019

The following features were provided with HCL Workload Automation for Z small programming enhancements (SPEs) released for Version 9.5, in June 2019.

DB2 Reporting feature

- You can now customize the DB2 table prefix, whose default is set to `MDL`. For details, see the DBOPT initialization statement in *Customization and Tuning*.
- The following columns have been added to tables *`DB2TablePrefix`*`.JOS_JOB_STATISTICS` and *`DB2TablePrefix`*`.JHR_JOB_HISTORY_RUNS`:
  - SUBSYSTEM NAME
  - WORKSTATON TYPE (either `FTA`, `zCentric`, `Dynamic`, or `zOS`)
- In the Dynamic Workload Console, the following columns have been added to the DB2 reports. You can filter on their values.
  - SUBSYSTEM NAME
  - WORKSTATON TYPE

For detailed information, see the section about reporting with HCL Workload Automation for Z in *Managing the Workload*.

TLS V1.2 support

The connection through the Transport Layer Security (TLS) V1.2 protocol is now supported between HCL Workload Automation for Z and:

- HCL Workload Automation Agents. For details, see the section about customizing SSL connection in *Scheduling End-to-end with z-centric Capabilities*.
- Dynamic Workload Console. For details, see the section about customizing TLS to connect components with HCL Workload Automation for Z in *Customization and Tuning*.
- Master domain manager and dynamic domain manager.

New keywords for JOBREC

In the JOBREC statement for file transfer job types, the following keywords have been added :

- APPENDTEXT(YES | NO)
- DELETEAFTERDOWNLOAD(YES | NO)
- DELETEAFTERUPLOAD(YES | NO)
- EXTRACOMMAND(*FTP SIte subcommand*)
- LOCALPWD(YES | NO)
- LOCALUSR(YES | NO)

For details, see *Scheduling End-to-end with z-centric Capabilities*.

MCP performance has been improved

The performance, when updating the current plan, has been improved; in particular, when you change the status of a job and/or when you are using the MCP Data Space.

Message EQQN228I has been created to track the number of JT and MCP events that accumulate during DP batch job run. The frequency of the message is determined by the JTAPPLCNT and JTAPPLMCP parameters in the JTOPTS statement.

For detailed information about JTOPTS, see *Customization and Tuning*.

With the Dynamic Workload Console V9.5, Fix Pack 1 the following enhancements have been implemented.

Dynamic Workload Console can be installed on WebSphere Application Server for z/OS Liberty.

For details, see *HCL Workload Scheduler for Z: Planning and Installation*.

Filtering jobs that are late

From the General filter for z/OS jobs window, you can browse the jobs in the current plan that are late according to the following criteria:

- Their latest start time
- The day and time you specified in the Not Started Alert or Not Started Action field.
- Either their latest start time, or by the day and time that you specified in the Not Started Alert or Not Started Action field.

Setting alerts or actions if a job in plan does not start or complete

You can edit the properties of a job in plan, by modifying or setting that an action is taken if the job does not start or complete within the specified date and time.

Dependencies Resolution

From the Self-Service Catalog you can define the dependencies resolution for the service, as follows:

None

No dependency resolution is necessary. This is the default value.

All

Both predecessor and successor dependencies must be resolved.

Predecessor

Predecessor dependencies must be resolved.

Successor

Successor dependencies must be resolved.

HCL Workload Automation for Z version 9.5 enhancements

HCL Workload Automation for Z version 9.5 includes the following enhancements.

- Setting alerts or actions if an operation does not start or complete on page 157
- Filtering operations that are late on page 158
- Optimizing the workload through a smooth submission of the operations on page 158
- Integrating with IBM Common Data Provider for z Systems on page 159
- Specifying a return code for a completed operation in OPSTAT on page 159
- NOPing operations after that time dependencies and special resources are resolved on page 159
- Deploying Dynamic Workload Console and HCL Workload Automation Agent with Docker containers on page 159
- The Dynamic Workload Console has evolved on page 105
- A brand new way to monitor your scheduling plan by using either a customized dashboard or the dashboard template provided on page 107
- New reporting system on page 108
- After migrating, old SSX writer queue is copied in the new SSX if the FMIDs are the same on page 161
- Miscellaneous on page 161

Setting alerts or actions if an operation does not start or complete

In the JTOPTS statement, specify NOTSTARTCOMP(Y) to have an alert issued or an action taken when an operation does not complete or start within its deadline or by the time that you specify.

In the TIME SPECIFICATIONS panel you set how you want to be notified about the operation completion or start, when it does not occur at expected time.

Deadline and Action

Deadline day and time for the operation to complete, related to the application start time. If the operation does not complete within this time setting, an alert is issued and, optionally, an action taken.

Not Started Alert

Day offset and time, related to the application start day, used to check if the operation has not yet started. If, by the time specified, the operation has not started, an alert is issued.

Not Started Action

Day offset and time, related to the application start day, used to check if the operation has not yet started. If, by the time specified, the operation has not started, an alert is issued and an action taken.

For detailed information about how to set alerts and actions through ISPF panels, see *Managing the Workload*. You can set a Deadline Action, Not Started Alert, and Not Started Action also through the following interfaces:

Program interface (PIF) and Batch Command Interface (BCIT)

The following segments and requests have been added or updated (see Driving HCL Workload Automation for Z):

- ADLAT
- ADOP
- ADVDD
- CPLAT, Insert CPLAT, Delete CPLAT
- CPOP, Insert CPOP, Modify CPOP
- List CPOPCOM

Workload Automation Programming Language (WAPL)

The following statements and requests have been added or updated (see *Workload Automation Programming Language for z/OS User's Guide and Reference*):

- ADLAT
- ADOP
- ADVDD
- Insert CPLAT, Delete CPLAT
- CPOP, Insert CPOP, Modify CPOP
- List CPOPCOM

Batch loader

The following statements have been added or updated (see *Managing the Workload*):

- ADLAT
- ADOP
- ADVDD

REST APIs

```
SELECT
GET --> /{engine}/model/jobstream/{jobstreamId}
INSERT
POST --> /{engine}/model/jobstream/
REPLACE
PUT --> /{engine}/model/jobstream/{jobstreamId}
```

Note: The object ID has now a new layout, Base64-encoded, that enables you to use the Swagger button **Try it out!**

Filtering operations that are late

From the SELECTING OPERATIONS (EQQSOPFP) panel, you can browse and modify the operations in the current plan that are late according to the following criteria:

- Their latest start time
- The day and time you specified in the Not Started Alert or Not Started Action field.
- Either their latest start time, or by the day and time that you specified in the Not Started Alert or Not Started Action field.

For more information about querying operations that are late through the ISPF panels, see *Managing the Workload*.

Optimizing the workload through a smooth submission of the operations

In the JTOPTS initialization statement, you can better balance the submission of operations by prioritizing the jobs that are urgent (with priority 9) or that belong to a critical path.

With the Smooth Submission feature active, you can also set SMOOTHSUBCONFLEVEL and SMOOTHSUBDELAY in the BATCHOPT statement, to have the controller add a delay in submitting the remaining operations. This delay, however, will never exceed the operations' latest start time.

See an introduction to this feature in the video IBM Z Workload Scheduler: workload optimization, available on the Workload Automation YouTube channel.

For detailed information about optimizing the workload through a smooth submission of the operations, see *Customization and Tuning*.

Integrating with IBM Common Data Provider for z Systems

Nowadays, the complexity of data requires an effective way to rapidly understand information and operate on it. Analyzing operational data in near real-time and making it accessible across an enterprise is a major requirement. HCL Workload Automation for Z can now integrate with IBM Common Data Provider for z Systems to collect data that is valuable to you and distribute it to a variety of analytics engines, such as Splunk, IBM Z Operations Analytics, or Elasticsearch.

In the OPCOPTS statement, you enable the logging of data to be used with IBM Common Data Provider for z Systems by setting CDP(YES), and specifying the required and optional settings in the other CDP-related parameters.

See an introduction to this feature in the video IBM Z Workload Scheduler integrating with IBM Common Data Provider for z Systems, available on the Workload Automation YouTube channel.

Specifying a return code for a completed operation in OPSTAT

The TSO command OPSTAT now supports the parameter COMPLCODE, to specify a return code for a completed operation.

For details about the OPSTAT command, see *Managing the Workload*.

NOPing operations after that time dependencies and special resources are resolved

In the JTOPTS statement, you can set the NOPWAIT parameter to specify that an operation that you are NOPing is actually NOPed after that time dependencies and special resources, if any, are resolved.

For more details about the JTOPTS statement, see *Customization and Tuning*.

Deploying Dynamic Workload Console and HCL Workload Automation Agent with Docker containers

The deployment of Dynamic Workload Console and HCL Workload Automation Agent is faster and easier with Docker containers.

Docker adoption ensures standardization of your workload scheduling environment and provides an easy method to replicate environments quickly in development, build, test, and production environments, speeding up the time it takes to get from build to production significantly. Install your environment using Docker to improve scalability, portability, and efficiency.

With just a few, simple commands you can install one or more of the out-of-the-box packages provided. The provided packages are as follows:

- HCL Workload Automation Console
- HCL Workload Automation Agent

Requires Docker to be installed on the local workstation.

For further details about the deployment with containers, see *HCL Workload Automation: Planning and Installation*.

The Dynamic Workload Console has evolved

The Dynamic Workload Console has evolved with a new graphical layout, features, and improved functionality.

Dynamic Workload Console V9.5 has undergone both an architectural and web redesign. A more modern feature-rich intuitive interface on a new foundation of modern technology while maintaining your current workload logic and processes.

The interface is based on new architectural foundation of modern front-end technologies while maintaining current workload logic and processes. With this refurbishment, Dashboard Application Services Hub (DASH) is replaced by a lean, high-performance in-house solution that is now based on a lightweight, highly composable, fast to start, dynamic application server runtime environment, WebSphere Application Server Liberty. Modern front-end technologies such as ReactJS, Redux, React-Saga, and SaSS form the user interface infrastructure.

The streamlined design of the console accommodates a number of features that improve the overall user experience to deliver results for your business:

- A new live dashboard experience enables smart troubleshooting use cases for proactive incident management.
- New integrated web help system.
- Customizable options to make your most commonly used or critical operations more accessible with pins and favorites.

A brand new way to monitor your scheduling plan by using either a customized dashboard or the dashboard template provided

With the new infrastructure of the Dynamic Workload Console, the way you create the dashboard for your scheduling objects has completely changed and improved.

With the new infrastructure of the Dynamic Workload Console we completely changed and improved the creation of the dashboard for your scheduling objects.

Maintaining and keeping control of a scheduling environment can be challenging. The right solution, when monitoring different machines and environments, is to have everything in one place. That is why the new dashboard represents the best choice. You can choose to create and customize your own dashboard or use one of the dashboard templates available. The possibility to have customized data sources with information from internal plan or from an external REST API, helps you in creating the perfect solution for monitoring. By creating boards and filling it with widgets, you will be able to control every scheduling object; from the health of your machines to the list or the number of critical jobs.

For more information about the new dashboard see the Dynamic Workload Console User's Guide.

New reporting system

With Dynamic Workload Console V9.5, the look and feel of the reporting system has renovated and you have the possibility to import the report templates created by using Business Intelligent Report Tool (BIRT), a new reporting system for the Dynamic Workload Console.

The reporting system is now organized in **predefined reports** and **personalized reports**. By using the **predefined reports** you can still perform the same actions as in the previous versions, but with an improved user experience that makes it easier and more intuitive. You can still create tasks to generate reports about job run statistics, workstation workload summaries or custom SQL reports.

With the **Personalized Reports** you can manage templates created with Business Intelligent Report Tool (BIRT) and use them to generate reports to retrieve data from the HCL Workload Automation database.

For more information about the new reporting system, see the Dynamic Workload Console User's Guide

New EJB Plug-in

With the EJB plug-in, you can schedule, monitor and control the execution of EJB JAR files.

With the brand new plug-in for EJB you can schedule, monitor and control the execution of EJB JAR files deployed on a WebSphere Application Server and integrate them into more complex, composite batch workflows.

You can schedule and monitor an EJB JAR file on a time or event basis. You can even set a conditional dependency for the JAR file execution, based on the value of variables passed from one job to another, in the same job stream or in a different job stream.

You can monitor and control EJB JAR files execution from the Dynamic Workload Console, from which you can also restart in case of failure.

The plug-in is available for HCL Workload Automation distributed, HCL Workload Automation for z/OS, and for HCL Workload Automation on Cloud.

For more information, see the topic about EJB jobs in the *User's Guide and Reference*.

After migrating, old SSX writer queue is copied in the new SSX if the FMIDs are the same

When you specify BUILDSSX(REBUILD) in OPCOPTS to rebuild the SSX at a new level, the event-writer queue from the old SSX is copied to the new SSX, if the FMIDs are the same. In this way, all the events are kept.

For more details about the OPCOPTS statement, see *Customization and Tuning*.

Miscellaneous

The following enhancements are also included with HCL Workload Automation for Z V9.5.

- A new sample JCL named EQQICVFY is generated by the EQQJOBS dialog. This sample job verifies that the CP records are not corrupted, and, if they are, repairs the FOPs and LOPs in the CP3C VSAM record.
- If you are replacing an application and the duration parameter is not specified in the ADOP statement, the EQQYLTOP batch program does not override the original duration value.
- When you modify the remote job information in the current plan, an automatic re-bind of the shadow job is performed.
- The DB2 history function is no longer supported. Use the reporting feature to archive historical data. For more information, see *Managing the Workload*.
- The Workload Automation Programming Language procedure EQQYXJCL is deprecated. To run EQQYXTOP, you are provided with the procedure EQQYXJPX. For more information, see *Programming Language for z/OS: User's Guide and Reference*.

Chapter 2. Overview of HCL Workload Automation

HCL Workload Automation is the state-of-the-art production workload manager, designed to help you meet your present and future data processing challenges. Its scope encompasses your entire enterprise information system, including heterogeneous environments.

Pressures on today's data processing (DP) environment are making it increasingly difficult to maintain the same level of service to customers. Many installations find that their batch window is shrinking. More critical jobs must be finished before the morning online work begins. Conversely, requirements for the integrated availability of online services during the traditional batch window put pressure on the resources available for processing the production workload. Increasing by 7 days a week, 24 hours a day is not only a DP objective but a requirement.

Users and owners of DP services are also making more use of batch services than ever before. The batch workload tends to increase each year at a rate slightly below the increase in the online workload. Combine this with the increase in data use by batch jobs, and the end result is a significant increase in the volume of work.

Furthermore, there is a shortage of people with the required skills to operate and manage increasingly complex DP environments. The complex interrelationships between production activities, between manual and machine tasks, have become unmanageable without a workload management tool.

HCL Workload Automation simplifies systems management across heterogeneous environments by integrating systems management functions. There are three main components to the portfolio:

HCL Workload Automation for Z

The scheduler in z/OS® environments.

HCL Workload Automation

The scheduler in distributed environments

Dynamic Workload Console

A Web-based, graphical user interface for both HCL Workload Automation for Z and HCL Workload Automation.

The state-of-the-art solution

The portfolio provides leading-edge solutions to problems in production workload management. It can automate, plan, and control the processing of your enterprise's entire production workload, not just the batch subset. The portfolio works as an “automatic driver? for your production workload to maximize the throughput of work, and optimize your resources, but also allows you to intervene manually as required.

When the portfolio interfaces with other system management products, it forms part of an integrated automation and systems management platform for your DP operation.

Automation

About this task

By automating management of your production workload with the portfolio, you can minimize human errors in production workload processing and free your staff for more productive work. The portfolio helps you plan, drive, and control the processing of your production workload. These are important steps toward automation and unattended operations. Whether you are running one or more systems at a single site, or at several distributed sites, the portfolio helps you automate your production workload by:

- Coordinating all shifts and production work across installations of all sizes, from a single point of control
- Automating complex and repetitive operator tasks
- Dynamically modifying your production workload schedule in response to changes in the production environment (such as urgent jobs, changed priorities, or hardware failures) and then managing the workload accordingly
- Resolving workload dependencies
- Managing utilization of shared resources
- Tracking each unit of work
- Detecting unsuccessful processing
- Displaying status information and instructions to guide operations personnel in their work

The portfolio lets you centralize and integrate control of your production workload and reduces the number of tasks that your staff need to perform.

Workload monitoring

About this task

Besides providing a single point of control for the production workload across your systems, the portfolio:

- Monitors the production workload in real time, providing operations staff with the latest information on the status of the workload so that they can react quickly when problems occur.
- Provides security interfaces that ensure the protection of your services and data.
- Enables manual intervention in the processing of work.
- Reports the current status of your production workload processing.
- Provides reports that can serve as the basis for documenting your service level agreements with users. Your customers can see when and how their work is to be processed.

Automatic workload recovery

The portfolio enables processing production workload to continue even when system or connection failures occur. If one system fails, the portfolio can restart the processing on another system. When the controlling system is running in a z/OS® system complex (sysplex), a hot standby function can automatically transfer control of the production workload to another system in the sysplex. Because the portfolio continues to manage the production workload during failures, you can maintain the integrity of your processing schedules and continue to service your customers.

In HCL Workload Automation, a switchmgr function provides the possibility to replace a failing master domain manager or domain manager workstation with an appropriately configured backup fault-tolerant agent or domain manager .

Business solutions

About this task

The portfolio provides business solutions by:

- Driving production according to your business objectives
- Automating the production workload to enhance company productivity
- Providing you with information about current and future workloads
- Managing a high number of activities efficiently.

User productivity

About this task

Your DP staff and users can realize significant productivity gains through the portfolio's:

- Fast-path implementation.
- Immediate response to dialog requests for workload status inquiries. Users are provided with detailed real-time information about production workload processing so that they can detect and promptly correct errors.
- Automation of operator tasks such as error recovery and data set cleanup.

Growth incentive

About this task

As you implement automation and control you can manage greater production workload volumes. The portfolio brings growth within your DP operation by providing:

- Ways of absorbing the increasing batch workload without increasing operations personnel
- An open interface for submitting and tracking the workload on a variety of operating systems
- Interfaces with other systems management application programs
- An open interface for, and communicating with, programs on other platforms
- Management of current and future production workload volumes
- Simulation facilities to forecast future workloads

How HCL Workload Automation benefits your staff

About this task

In a typical enterprise, many people contribute to the implementation and operation of HCL Workload Automation:

- Scheduling manager on page 165
- Operations manager on page 165
- Shift supervisor on page 166
- Application programmer on page 166

- Console operators on page 166
- Workstation operators, such as print operators, job setup staff, and login receptionists on page 167
- End users on page 167
- Service desk on page 167

This section describes how the portfolio can directly benefit your DP staff.

Role of the scheduling manager as the focal point

About this task

HCL Workload Automation makes it possible for the scheduling manager to maintain current and future production processing across your enterprise. The portfolio benefits the scheduling manager in the following ways:

- Automatically scheduling all production workload activities.
- Automatically resolving the complexity of production workload dependencies and driving the work in the most efficient way.
- Supporting the simulation of future workloads on the system. The scheduling manager can evaluate, in advance, the effect of changes in production workload volumes or processing resources.
- Giving a real-time view of the status of work as it flows through the system so that the scheduling manager can quickly:
    - Respond to customer queries about the status of their work
    - Identify problems in the workload processing.
- Providing facilities for manual intervention.
- Managing many workload problems automatically. The production-workload-restart facilities, hot standby, automatic recovery of jobs and started tasks, and data set cleanup provide the scheduling manager with comprehensive error-management and disaster-management facilities.
- Providing a log of changes to the production workload data through the audit-trail facility. This assists the scheduling manager in resolving problems caused by user errors.
- Managing hard-to-plan work.

Role of the operations manager

About this task

The reporting, planning, and control functions can help the operations manager do the following:

- Improve the efficiency of the operation
- Improve control of service levels and quality
- Set service level agreements for user applications and for services provided
- Improve relationships with user departments
- Increase the return on your IT investment
- Develop staff potential.

A powerful tool for the shift supervisor

About this task

The portfolio is important for the shift supervisor, especially in multisystem complexes, where local and remote systems are controlled from a central site. The portfolio can help the shift supervisor do the following:

- Monitor and control the production workload through multisystem complexes
- Control the use of mountable devices
- Separate information about work status from system and other information
- Provide users with status information directly
- Manage the workload if a system failure occurs
- Make changes to the current plan in response to unplanned events, such as equipment failures, personnel absences, and rush jobs.

Role of the application programmer

About this task

The user-authority checking functionality enables application development groups to use all the planning and control functions in parallel with, but in isolation from, production systems and services.

The portfolio can be a valuable tool for application development staff when they are doing the following:

- Packaging new applications for the production environment
- Testing new JCL in final packaged form
- Testing new applications and modifying existing ones

Console operators

About this task

The portfolio can free console operators from the following time-consuming tasks:

- Starting and stopping started tasks
- Preparing JCL before job submission
- Submitting jobs
- Verifying the sequence of work
- Reporting job status
- Performing data set cleanup in recovery and rerun situations

- Responding to workload failure
- Preparing the JCL for step-level restarts.

Workstation operators

About this task

The portfolio helps workstation operators do their work by providing the following:

- Complete and timely status information
- Up-to-date ready lists that prioritize the work flow
- Online assistance in operator instructions.

End users and the service desk

About this task

Your users often need to be informed about the status of workload processing. They can use the Dynamic Workload Console to check the status of the processing of their job streams themselves from a personal workstation. Users can make queries using the Dynamic Workload Console without having to be familiar with the portfolio, ISPF, or TSO, and without having to be logged on to a local system.

In addition, users can always be informed about the status of the processing of their job streams from their mobile device. The Self-Service Catalog and Self-Service Dashboards mobile applications connect users their environments where they can both submit job streams to run and monitor the ongoing progress.

The help desk can use the Dynamic Workload Console in the same way to answer queries from users about the progress of their workload processing.

Chapter 3. Who performs workload management

About this task

The primary roles most directly responsible for workload management are:

The IT administrator

Is the general IT administrator of all the hardware and software used by the company. He is in charge of installing, supporting, and maintaining servers or other computer systems, and planning for and responding to service outages and other problems.

He installs and maintains the job scheduling tool.

The HCL Workload Automation IT administrator

A good deal of his time is focused on keeping job scheduling running smoothly. He rarely does any actual scheduling himself, but instead acts as the person in the background who supports those who do. The HCL Workload Automation IT administrator:

- Defines and maintains the security for the job scheduling tool.
- On certain occasions does a minimal amount of tuning and customization of the job scheduling tool.
- Guarantees that the job scheduling tool environments are up and running all of the time, and if something goes wrong he needs to quickly resolve the problem.
- Monitors the health status of the job scheduling tool infrastructure. Uses tools that alert him (usually via email or pager) and create alerts or automatically open a trouble-ticket to alert the responsible person when there is a problem.
- Occasionally spends his time helping to fix job scheduling problems that the job schedulers cannot understand.
- Generates and uses reports.
- Occasionally documents major problems and work-arounds on the community website.
- Interacts mainly with fellow team members, programmers, and job schedulers.
- Sometimes makes suggestions to management about capacity planning and IT software purchases.

The job scheduler

Is the primary actor in workload management and needs to easily create and maintain a plan containing the company workload. He is responsible for modeling the company workload, and for designing, fixing, and maintaining schedules. His main responsibilities are to:

- Manage workload complexity and dependencies.
- Optimize schedule efficiency, flexibility, resiliency.
- Analyze and fix modeling issues.
- Look proactively for the schedule's integrity.

The scheduling operator

Is responsible for performing all operational processes and procedures, ensuring the business continuity of the workflow. His main responsibilities are to:

- Monitor critical events and perform first analysis of problems.
- Manage and coordinate the resolution of issues.
- Ensure that operations continue.

He is usually not dedicated to monitoring job scheduling alone.

The Scheduling and Operations manager

He:

- Does not use job scheduling tools himself; but is interested in the operational data from the tools, such as reports on long and late running jobs and service level agreement status.
- Makes sure his team has the knowledge and tools they need to schedule and manage jobs efficiently.
- Is always looking for ways to reduce cost in his organization by making his team more efficient.
- Believes that process is the key to IT management and also thinks that his team's job scheduling process can be improved. He is familiar with ITUP of which his IT organization has implemented the basic aspects of change management. Consequently, his team follows this process.

Chapter 4. A business scenario

The purpose of the following scenario is to show how the choice of the correct workload scheduling product, together with process improvement and integration, and well-defined roles and responsibilities, can improve the business of a manufacturing enterprise.

The company

Fine Cola is a medium-sized enterprise that produces and distributes soft drinks to retailers across the country. It owns a production plant and several strategically located distribution centers. The primary customers of Fine Cola are foodstore chains and the quantity and size of their orders is usually regular and stable. Order quantities, however, peek in the warmer season and during holidays. Moreover, in the mid term, Fine Cola wants to increase its business by gaining market in other countries. Fine Cola's sales people are always keen to place new orders and increase the customer portfolio. These characteristics determine Fine Cola's production and distribution processes. Production and distribution can be broken down into ongoing subprocesses or phases which are constantly interlocked with each other. They are:

Inventory

Underlays the entire production process. The raw materials database is sized on the production levels supplemented by minimum safety levels. The production levels are in turn based on the order quantity for the specific period.

Ordering

Raw material quantity levels must be available to production according to the preset production levels. Orders must be planned and issued in advance to take into account delivery times by third-party suppliers.

Production

General production levels are planned for well in advance based on customer orders. Production is regularly increased by an additional five percent to provide the capability to honor unplanned-for orders.

Supply

From the production plant the soft drinks are transported to the distribution centers according to the customer delivery schedules.

Delivery

The last phase of the process. Fine Cola sodas are delivered from the distribution centers to the customer shelves.

Inventory, ordering, and production take place in the production plant. Supply takes place from the production plant to the distribution centers. Delivery takes place from the distribution centers to the end destinations.

These phases are tightly bound to each other. While each soda placed on the shelf might be regarded as the outcome of a specific sequence that starts with inventory and terminates with delivery, all phases are actually constantly interwoven. In fact, the same data is shared in one way or another by all or most phases, and applications are designed to carry on the daily operations and set up future ones.

Fine Cola uses the following databases for running the above-mentioned subprocesses:

Customer Orders

Contains all orders for the upcoming period from Fine Cola's customer base. Provides input to:

- Inventory

Raw Materials

Contains the quantities in stock of the raw materials required to produce Fine Cola's sodas. From here, orders are dispatched to suppliers when stock levels reach a pre-set minimum. Receives input from:

- Production Volumes

Production Volumes

Contains the quantities of sodas that are to be produced daily according to order volumes. Provides input to:

- Inventory
- Raw Materials

Receives input from:

- Inventory

Inventory

Contains the quantities in stock of the finished product. Is monitored to verify that the quantities in stock are sufficient to honor the orders of a specific time interval. Provides input to and receives input from:

- Production Volumes
- To Supply

To Supply

Contains the quantities of sodas that must be sent periodically from the manufacturing plant to the distribution centers to satisfy foodstore orders for the upcoming period. Provides input to:

- Inventory
- To Deliver

To Deliver

Contains the quantities that are to be delivered from each distribution center to the foodstores in its area. Provides input to:

- Customer Orders

Receives input from:

- To Supply

The company workload is both application oriented, such as accounting, payroll, supplier and utility payments, purchasing, ordering, fulfillment, and system-oriented, such as data backup, migration, export, transfer or load operations. Typically, the workload processes multiple data items such as accounts, orders, transactions, database records, at the same time.

These core applications are highly relevant for the profitability of the company and also directly influence customer satisfaction.

To create added value and exceed customers expectations, the company must strengthen integration with business applications and provide complete scheduling capabilities and tighter integration with enterprise applications.

The challenge

Currently the databases are not automatically integrated with each other and need continual human intervention to be updated. This affects Fine Cola's operations because:

- The process as a whole is onerous and prone to error.
- The interfaces between phases are slow and not very efficient.

The company realizes it needs to better integrate with the distribution centers because processing is extremely low during the regular office hours in the warmer seasons and during holidays. Users experience applications freezing, often taking considerable time before being available for them to use again. This lack of integration is causing problems for the organization in terms of lost productivity, while applications come back online. This is a problem because the interruption of important processing is not acceptable when the company wants to expand the business. The response time for service level agreements (SLAs) must continue to be met if a resource goes down, a workstation breaks, or there is urgency for maintenance, and even more during peak periods even if the resources are geographically distributed. On the other hand the company does not want to buy new IT resources (hardware, software, applications) because this would not be used during the other periods of the year.

Fine Cola realizes that their main weakness lies in their processing. They need to implement a solution that:

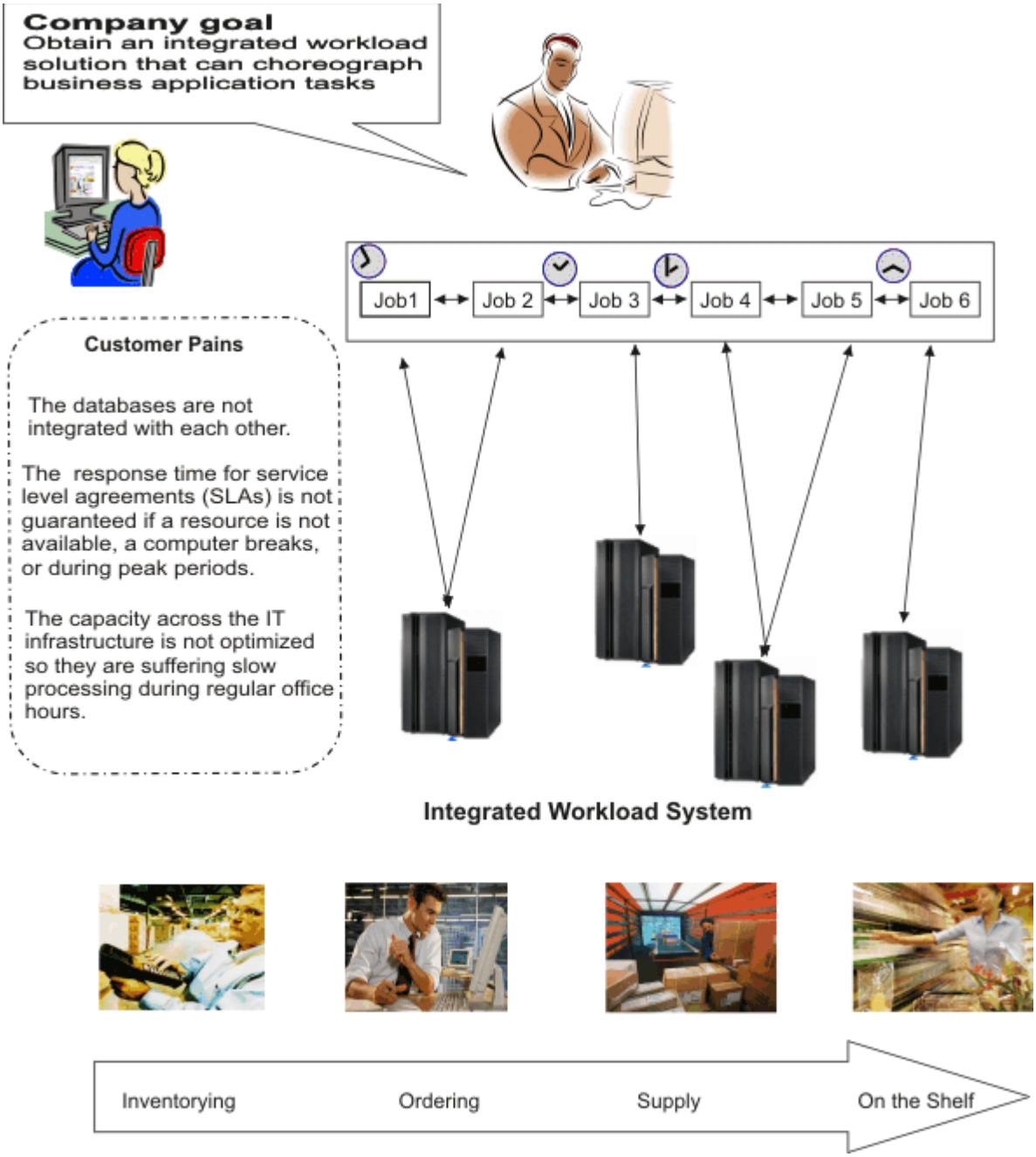
- Integrates the data behind their processing workflow from inventory to distribution. This makes it possible to automatically trigger the daily operations without much need for human intervention. It also gives Fine Cola complete control over the entire business process, reducing human intervention only to exception handling.
- Integrates external data coming from third parties, such as selected customers and raw material suppliers, into their process flow. Such data is provided to Fine Cola in several formats and from different applications and should be integrated into Fine Cola's databases in a seamless manner.
- Enables daily backups of their data as well as subsequent reorganization of the DB2® database with as little impact as possible on their processes. Processing of data collected online during the previous day is the next step.
- Optimizes capacity across the IT infrastructure and runs a high workload, much more than before, using shared resources, even if the resources are geographically distributed.
- Ensures 24x7x365 availability of critical business services. Disaster recovery plans are no longer sufficient because the business requires recovery within a couple of hours, not days. Recovering from last night tapes and recapturing

lost transactions after a system or application failure is no longer a viable option for the company in a highly competitive market.
- Has very low probability of failure leading to maximum system reliability.

The main company goal at this time is to obtain an integrated workload solution that can entirely choreograph its business application tasks. This means solutions that optimize capacity across the IT infrastructure and run a tremendous workload, much more than before, using less resources. For example, if the company has a problem and a primary server does not process the workload, the company wants to automate the quick redistribution of system resources to process workloads and scale up or down for flawless execution. In this way the company reduces costs because it speeds recovery time, no matter what the source. The goal is to have a view of the best available resources across this dynamically shifting cross-enterprise pool.

Example

Figure 1. The Fine Cola company integrated workload solution



The solution

About this task

Fine Cola decides that one important step toward improving their process execution is to adopt a solution based on automatic and dynamic workload scheduling. The solution is based on a choice that strengthens integration with business applications to run the following tasks:

- Read data from one database to update other databases.
- Read data from external applications, process it, and add it to the appropriate databases.
- Provide the information necessary for the operation of every phase.
- Trigger some of the phases when predetermined thresholds are reached.
- Back up their data without interrupting production.
- From a capacity management perspective, understands the size of an application and what resources it requires, models that against the existing resources and is able to predict and forecast the capacity that the new application needs as it is defined in the enterprise.
- From an availability management perspective, use the resources available in the environment to support the application and understand out how to work to effectively schedule, monitor, and manage that application as it is submitted. Then if the resources are not available, interact with the change management and provisioning processes to dynamically allocate the necessary resources.
- Have a business management process monitoring all the various policies and driving a consistent view of the policies for the application.

After analyzing the workload management products available on the market, Fine Cola has chosen to use HCL Workload Automation and specifically the dynamic domain manager to:

- Optimize and automate the tasks to process their applications and dynamically adapt their processing in response to changes in the environment.
- Plan, choreograph, and schedule required changes to applications to minimize the impact of changes on critical production workloads, and ensure that workload processes are updated to reflect changes throughout asset life cycles.
- Minimize the total amount of time that is required to deliver the output of the task resolution processes.
- Handle dependencies between tasks, data, and external applications so that the entire workload can be managed homogeneously in the same process flow.
- Create a policy-based view of workflow automation, not just workload automation, but cross-enterprise workflow, and direct that workflow across the enterprise while planning, scheduling, managing, and monitoring all these things. Dynamically tuning the cross-enterprise capacity to support this dynamic view of workloads.
- Automatically transfer entire workloads across multiple platforms, and update policies across multiple platforms.
- Balance between the ability to provide sophisticated planning, testing, choreographing, monitoring, and adaptation of workload processes with fault tolerance and redundancy for high availability of the scheduling infrastructure, while minimizing server and network resource requirements.
- Perfectly integrate with each other.

HCL Workload Automation operates at both a macro-level and micro-level to prepare work schedules and to preprocess work items where necessary so that the delivery resources can be matched to the demands of the flow of work in an optimal fashion.

The dynamic domain manager dynamically routes workload to the best available resources based on application requirements and business policies. Moreover it optimizes the IT computing resource use according to SLAs.

Fine Cola's applications are mapped to what in HCL Workload Automation terminology are units of work called jobs. Some of these jobs are statically allocated to dedicated resources to run (static job definition), others are dynamically allocated to physical or virtual resources according to the job importance, requirements, scheduling policies, and based on the environment resource characteristics, relationships, availability, load, and performance (dynamic job definition). They drive the resource allocation to meet the job SLA and the resource optimization.

Jobs that run as a unit (such as a weekly backup application), along with times, priorities, and other dependencies that determine the exact order of the jobs are grouped into job streams.

Fine Cola's job streams are collections of jobs that are grouped for organizational purposes. The jobs of any particular job stream are related because they:

- Operate toward the completion of related tasks. For example, the jobs of `Jobstream100` run tasks designed to convert incoming customer orders into operational data.
- Might be dependent on each other. Some jobs might have to wait for the completion of predecessor jobs before they can start running. The jobs are usually laid out in a sequence where the outcome of a predecessor is fed to a successor job.
- Share the same programs, applications, and databases.
- Share the same time-frames within the planning period.

Using HCL Workload Automation, Fine Cola's business process is structured in the following way:

1. At the start of each day, `Jobstream100`:
    a. Extracts the new incoming orders from the Customer Orders database.
    b. Checks an external application where a number of selected customers can place unforeseen orders. If there are orders, they are extracted and merged with the other data.
    c. Copies the consolidated orders into a separate database view.
    d. Sorts them by due delivery date and by quantity and makes a report.
2. As soon as the report is available, `Jobstream200` extracts the numbers from the report and compares them with relevant data in the Inventory database. The goal is to determine the production volume required in the next production cycle to satisfy the orders.
3. `Jobstream300` extracts the production volume data and updates the Production Volumes database with the quantities of each type of soda that is to be manufactured in the next cycle.
4. `Jobstream400` reads the data in the Production Volumes database and:
    a. Calculates the quantities of raw materials required to run the upcoming production cycle.
    b. Flags these quantities as `allocated to next cycle` in the Raw Materials database.
    c. Checks the quantities to see if they have reached the minimum stock levels and triggers orders to Fine Cola's raw material suppliers if necessary.
5. `Jobstream500` reads the report with upcoming due orders from the Customer Orders database and:
    a. Produces the transportation schedules and destinations.
    b. Updates the To Supply database.
    c. Sends the delivery schedules to the distribution centers.
6. `Jobstream600` reads the distribution center databases and:

    a. Extracts the orders that have been filled.
    b. Updates the Customer Orders database so that invoices can be prepared and sent.
7. `Jobstream700` makes a backup of every database.

Fine Cola sets up a long term plan that encompasses the entire workload, spanning job streams that run on a daily basis and job streams that have other reoccurrences. From the long term plan, a current plan is extracted at the beginning of every time unit. The time period of the current plan can be chosen to vary from some hours to several days. Fine Cola has chosen to set their current plan on a daily basis. At the start of every day a new daily plan is built by their workload scheduling software: data is taken from the long term plan and from the daily plan of the previous day to include any jobs that might not have completed.

The company must also ensure that during peek periods the jobs in the critical path are run in the required time frame. To ensure this they converted some jobs from static definition to dynamic definition to manage the extra orders using the dynamic domain manager. With the dynamic domain manager, the company can:

- Manage the automatic discovery of available resources in the scheduling environment with their characteristics and relationships.
- Assign to the job the appropriate resources for running based on the job requirements and on the administration polices.
- Optimize the use of the resources by assigning to the job the required resources based on the SLA.
- Manage and control the resource consumption and load.
- Dispatch jobs to target resources that meet the requirements to run the job.

The HCL Workload Automation relational database contains the information related to the jobs, the job streams, the workstations where they run, and the time specifications that rule their operation. It also contains data used by the dynamic domain manager, such as information about the current IT environment, the resource real time performance, and load data. It also stores the job definitions and keeps track of resources assigned to each job.

In this way, Fine Cola's scheduling analyst can create and change any of these objects at any time and Fine Cola's IT administrator can dynamically assign the best set of resources to match allocation requests based on the defined policies, without any impact on the business.

The IT administrator can also ensure the correct concurrent or exclusive use of the resources across the different jobs according to resource characteristics. If the resource request cannot be immediately carried out, he can use dynamic scheduling to automatically queue the resource until changes in the resource utilization or in the environment lead to its fulfillment.

The workload scheduling plan can be changed as quickly and dynamically as the business and operational needs require. The scheduling analyst makes full use of the trial and forecast planning options available in the scheduler to adjust and optimize workload scheduling and, as a consequence, Fine Cola's line of operations.

To respond to any unexpected and unplanned-for demands, individual jobs can be added ad hoc to the scheduling plan at any time.

Moreover, the company can use dynamic scheduling to rapidly adapt to the increase of workload during peak periods driving the requirement for workload virtualization, that is the ability to manage and control the workload so that it can be slit, routed to appropriate resources and capacity, and dynamically moved around in logical resource pools.

If a resource is not available, the SLA defined continues to be met because the job processing is restarted from the point where the failure happens.

Typical everyday scenarios

About this task

This section describes roles and responsibilities of Fine Cola's IT staff and everyday scenarios they might face on any typical day. Fine Cola's IT staff, involved in workload scheduling are:

- The scheduling analyst. He is in charge of modeling the company workload, and for designing, fixing, and maintaining schedules. His main responsibilities are:
  - Managing Fine Cola's workload complexity and dependencies.
  - Optimizing the schedule's efficiency, flexibility, and resilience.
  - Analyzing and fixing modeling issues; look pro-actively for the schedule's integrity.
- The operations analyst. His main responsibilities are:
  - Monitoring critical events and performing first analysis of problems.
  - Managing and coordinating the resolution of issues.
  - Ensuring that operations continue.
- The IT infrastructure administrator. His main responsibilities are:
  - Fulfilling the need to assign physical or virtual resources to jobs according to the job importance, requirements, scheduling policies, and based on the environment resources characteristics, relationships, availability, load, and performance.
  - Managing the advanced reservation or provisioning of required resources.
  - Drive the resource allocation to meet the job SLA and the resource optimization data without service disruption, and possibly transparently for the users.
  - Backing up the schedule daily with no impact on operations.
  - Ensuring high availability of the infrastructure. If a resource goes down or a workstation is not available, the SLA-defined availability must continue to be met.
  - Defining and maintaining the environment topology.

Managing the workload

About this task

Together with the IT infrastructure administrator and other staff, the scheduling analyst agrees on a change in the application workflow that should go into production in a month. The change impacts `Jobstream100` and includes:

- Defining a new job and replacing some job dependencies in the job stream.
- Defining two `Jobstream100` instances to run twice a day for a week and during the summer season. He must therefore:

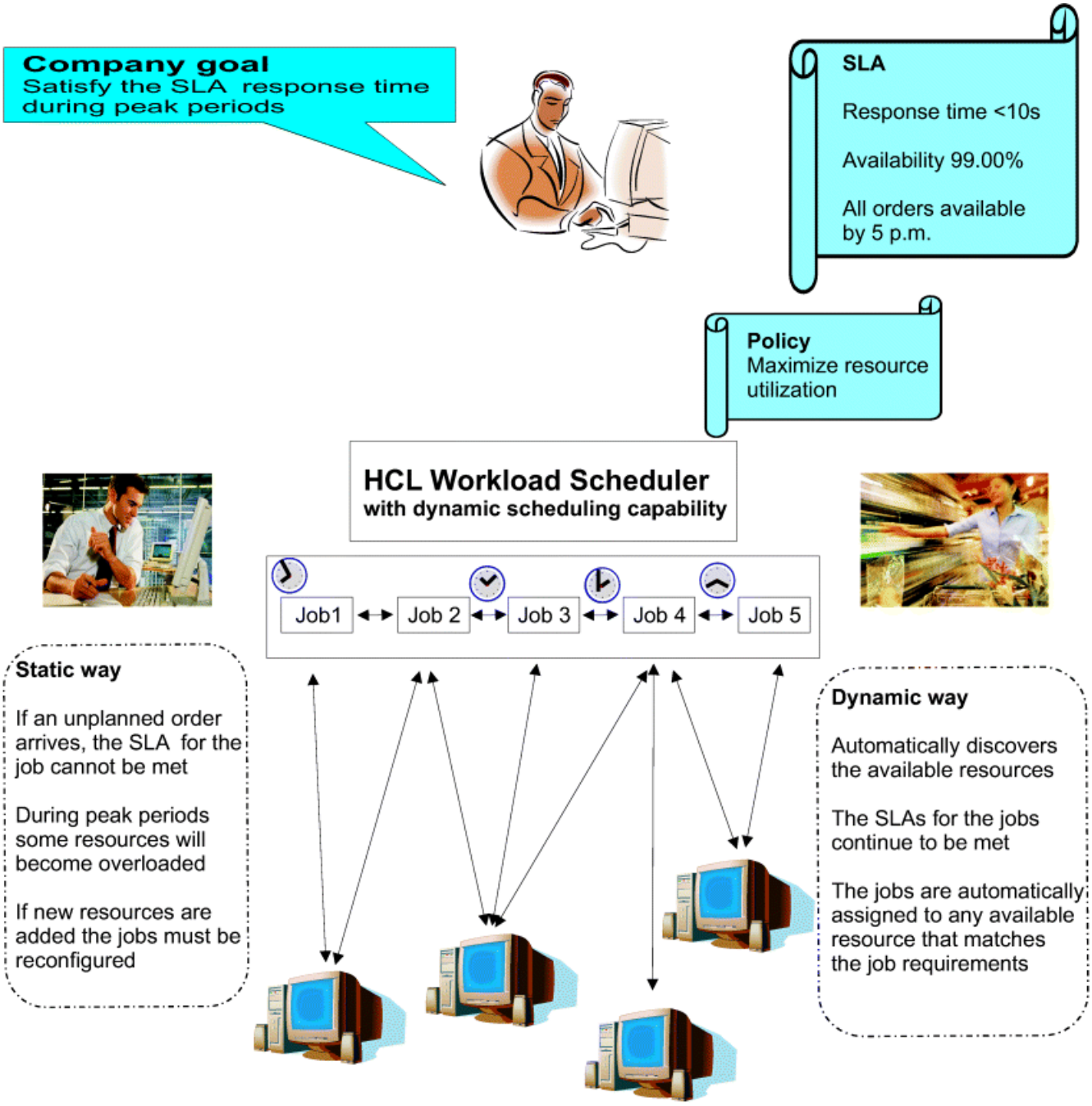
- Define a run cycle for each of the two instances. The first run cycle has the expected start time of 9 a.m. The second is scheduled to start at 5 p.m.
- Agree with the IT infrastructure administrator the pool of resources that satisfy the job SLA in terms of RAM and microprocessors.

He then proceeds in the following way:

1. He reviews the new stream logic and sets a plan. He wants to design the changes, test them over three days, and have a first automatic test run within a week.
2. He proceeds to apply the changes to `Jobstream100`. While he does this, he realizes that the application specialist must modify the tasks (scripts) contained in some of the jobs.
3. For this reason he leaves the job stream in draft state while the work is still in progress, so that it is not included in the plan generated every day.
4. To apply the changes he operates directly using the job stream editor available with Fine Cola's scheduling product: defining a new job by renaming an existing job definition and adding a new dependency.
5. After he has finished drafting the changes, he saves the job stream with a validity date set to tomorrow and active status on the test system.
6. Before launching the plan containing the modified job stream, he generates a trial plan to verify that the dependencies are correctly resolved.
7. When the trial plan ends, he analyzes job statistics and finds that a different design of dependencies could improve total elapsed time.
8. He applies the changes, sets the new dependencies, and creates a plan extension. The job stream is rescheduled and run in a test environment correctly and timely.
9. He meets the IT infrastructure administrator to verify that all the resources involved in the running of the new plan are available on the following days.
10. The IT infrastructure administrator, after analyzing the plan of availability of the IT resources, warns him that one of the required resources will not be available the next week.
11. The IT infrastructure administrator asks the scheduling analyst to run a forecast plan.
12. He then runs a forecast plan, which contains the scheduled activities for next week, to verify that the unavailability of the resources will not cause any major problem.
13. He finds that the unavailability of the resources will cause a decrease in performance because the other resources become overloaded.
14. He notifies the IT infrastructure administrator of the potential problem.
15. The IT infrastructure administrator analyzes the availability of resources between departments and realizes that the resources belonging to another department meet the requirements to run the job definition.
16. The scheduling analyst moves the workload from static to dynamic resource allocation. He uses the dynamic domain manager to route workloads to the best available systems by matching load requirements and business policies to available resource capacities.
17. He identifies the jobs in the critical path and modifies their definitions so that they can be run dynamically.
18. He finally sets a date to run the new plan in the production environment and notifies the IT infrastructure administrator.

Figure 2: How to satisfy SLA response time during peak periods using the dynamic scheduling capability of HCL Workload Automation. on page 180 shows how the Fine Cola company can dynamically manage its workload using the added dynamic scheduling capability of HCL Workload Automation and satisfying the SLA response time.

Figure 2. How to satisfy SLA response time during peak periods using the dynamic scheduling capability of HCL Workload Automation.



Monitoring the workload

While the operations analyst monitors the automated workload on a typical work day, he realizes that `Job306`, which is in the critical path of the schedule, is in the `abend` status. Because of this, `Jobstream300` does not complete in the necessary time frame, causing a negative effect on the rest of the schedule. The consequent delay in running the plan might cause problems to Fine Cola's daily operations. With the help of the Dynamic Workload Console he then:

1. Analyzes the job and error logs in the current plan and finds that the error occurred for an unmanaged exception. The error might occur again and he cannot simply restart `Job306`.
2. Identifies the application specialist who is responsible for `Job306` and opens a problem ticket containing all the information concerning the job.
3. Queries the status of depending jobs, exports the list in Comma Separated Variables (CSV) format, and attaches it to the ticket so that it can be viewed with a spreadsheet. Requests that the ticket be answered with high priority.

After an internal analysis, the application specialist finds that there is a broken execution path that must be fixed. The expected time for resolution is three hours, including a hot fix and a regression test.

One hour later, however, the operations analyst realizes that even if the application support team works overtime, the fix will not be completed before the end of the day and it will be impossible to close the daily processing today. He checks the status of the depending jobs and sets a target time to have the hot fix loaded into production during the night.

Then, sometime during the night:

1. The application team releases the hot fix and notifies the scheduling analyst who loads the new job into the production system, and notifies the operations analyst.
2. The operations analyst connects to the scheduling system from home to restart the job stream.
3. The operations analyst restarts `Job306`. The fix works and the job completes, as expected, one hour too late to complete the depending jobs before the next daily plan extension.
4. Early next morning the plan for the day is created. Because of the functionality of the latest version of HCL Workload Automation, the jobs depending on `Job306`, that could not complete in time, are now simply moved to run today, keeping their name and all their active file dependencies.
5. The operations analyst monitors the process remotely. When he arrives at work in the morning, he checks the actual completion of the daily workload. Everything completed successfully and he closes the ticket.

Managing the organization of the IT infrastructure

About this task

Two weeks before Christmas, the IT infrastructure administrator receives a notification from the scheduling analyst that an unplanned order adds so many tasks to a job stream in the critical path that its completion is delayed by a day. This causes a delay also in the completion of the plan scheduled to run the week before Christmas. The scheduling analyst advises him that he has already run the forecast plan and verified that with this addition the SLA for the job stream cannot be met and also the resources will become overloaded. To avoid this, concurrent jobs that need to use the same resource will need to wait until the requested quantity is available causing delay in the delivery of the order.

To find a solution to the potential problem and achieve the goals set for workload processing, without buying additional resources, using the dynamic domain manager, he proceeds in the following way:

1. He performs an automatic discovery of the resources available in the scheduling domain with their characteristics and relationships.
2. He finds a pool of resources in the Inventory department that meet the SLA to run the jobs. These resources have the required RAM, microprocessor, operating system, and application environments to run the new job stream and will be used at half their capacity during Christmas.

   Without the use of dynamic scheduling he could not adapt the new workload processing to match load requirements with business policies and priorities, and resource availability and capacity. The only way to solve the problem would be to buy new hardware to run the added job streams increasing the cost of IT management infrastructure without optimizing the use of the existing resources.
3. He determines, based on the policies and jobs dispatching, how many new resources are required to run the new job stream.
4. He manages the definition of business-oriented performance goals for the entire domain of servers, provides an end-to-end view of actual performance relative to those goals, and manages the server resource allocation and load to meet the performance goals.
5. He identifies the required resources and finds an agreement with the Inventory department manager, to share the required resource between the two departments.
6. He defines a new logical resource in which he outlines the machines that are shared between the departments.
7. He communicates to the Ordering department the new agreement with the resource optimization.
8. Now he can guarantee the running of jobs within the time frame according to policies, rules, and resources planned availability. In this way he can also satisfy the optimization policy to maximize resource utilization.
9. The scheduling analyst now builds a feasible production plan.

   Using dynamic scheduling he met the constraints imposed by rules and policies and achieved SLA goals, optimizing execution time, throughput, cost, and reliability.

The benefits

About this task

By adopting a workload scheduling strategy, and in particular by using HCL Workload Automation and its dynamic scheduling capabilities, Fine Cola is experiencing significant and immediate benefits, such as:

- The successful integration of all its manufacturing and distribution processes.

  Because of how Fine Cola implemented their new processing flow, every customer order is active from the time a customer service representative receives it until the loading dock ships the merchandise and finance sends an invoice. Now orders can be tracked more easily, and manufacturing, inventory, and shipping among many different locations can be coordinated simultaneously. If an unplanned order arrives, it can be easily managed in the new dynamic IT infrastructure.

- The standardization and speeding up of the manufacturing process.

  HCL Workload Automation has helped to automate many of the steps of Fine Cola's manufacturing process. This results in savings in time and increase in productivity.

- Reduce inventory

  The manufacturing process flows more smoothly, and this improves visibility of the order fulfillment process inside the company. This can lead to reduced inventory of the raw materials used, and can help better plan deliveries to customers, reducing the finished goods inventory at the warehouses and shipping docks.

- Optimize IT infrastructures

  The dynamic allocation of the IT resources maximizes the workload throughput across the enterprise reducing costs, improving performance, and aligning IT with business needs and service demands.

- Guarantees Fault Tolerance and High Availability

  HCL Workload Automation can recover from server, agent, and communication failures and it can restart from the point where the failure happened. No status information will be lost due to failure events. Moreover if a computer breaks, its workload is automatically routed to another computer that can guarantee the SLAs.

In conclusion, this solution provides business value because it:

- Delivers service response times according to service level objectives.
- Understands dependencies on services for each line of business.
- Accommodates unpredictable use patterns with predictive logic.
- Understands service relationships to each other and to the IT infrastructure and business process layers.
- Provides network fault tolerance and high availability of the scheduling infrastructure.
- Reduces system and operational complexity and leverages IT staff skills and knowledge.
- Integrates systems quickly and easily, with minimal disruption to existing business processes.

Chapter 5. HCL Workload Automation

The HCL Workload Automation scheduling features help you plan every phase of production. During the plan processing period, the HCL Workload Automation production control programs manage the production environment and automate most operator activities. HCL Workload Automation prepares jobs for execution, resolves interdependencies, and launches and tracks each job. Because jobs start running as soon as their dependencies are satisfied, idle time is minimized, and throughput improves significantly. Jobs always run in sequence and, if a job fails, HCL Workload Automation handles the recovery process with little or no operator intervention.

Overview

The next sections provide an outline of HCL Workload Automation.

What is HCL Workload Automation

HCL Workload Automation is composed of the following parts:

HCL Workload Automation engine

The scheduling engine. It runs on every computer of a HCL Workload Automation network. During installation, the engine is configured for the role that the workstation will play within the scheduling network, such as master domain manager, domain manager, or agent.

The Dynamic Workload Console

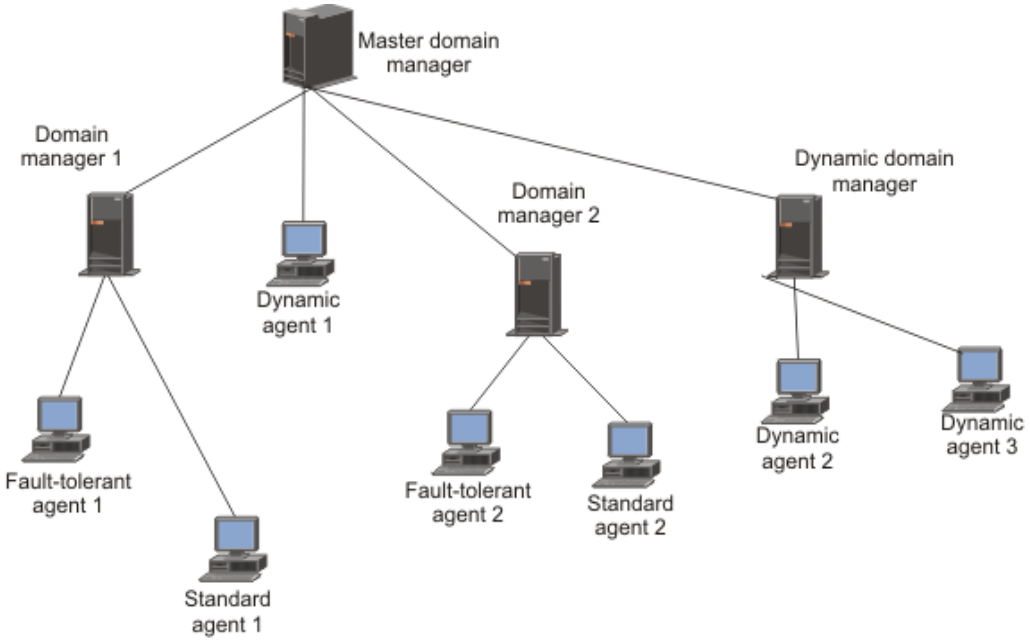
Is Web-based, light, powerful, and user friendly. It can be used on any computer that has a web browser and provides access to all the current HCL Workload Automation functions. It is the strategic graphical user interface for the entire HCL Workload Automation portfolio.

The HCL Workload Automation network

An HCL Workload Automation network is made up of the workstations, or CPUs, on which jobs and job streams are run.

An HCL Workload Automation network contains at least one HCL Workload Automation domain, the master domain, in which the master domain manager is the management hub. Additional domains can be used to divide a widely distributed network into smaller, locally managed groups.

Figure 3. HCL Workload Automation network made up by two domains



Using multiple domains reduces the amount of network traffic by reducing the amount of communication required between the master domain manager and other computers.

In a single domain configuration, the master domain manager maintains communication with all of the workstations in the scheduling network.

In a multi-domain configuration, the master domain manager communicates with the workstations in its domain and with the subordinate domain managers. The subordinate domain managers, in turn, communicate with the workstations in their domains and with their subordinate domain managers. Multiple domains also provide fault-tolerance by limiting the problems caused by losing a domain manager to a single domain. To limit the effects further, you can designate backup domain managers to take over if their domain managers fail.

Every time the production plan is created or extended the master domain manager creates a production control file, named Symphony™. HCL Workload Automation is then restarted in the network, and the master domain manager sends a copy of the new production control file to each of its automatically linked agents and subordinate domain managers. The domain managers, in turn, send copies to their automatically linked agents and subordinate domain managers.

Once the network is started, scheduling messages like job starts and completions are passed from the agents to their domain managers, through the parent domain managers to the master domain manager. The master domain manager then broadcasts the messages throughout the hierarchical tree to update the production control files of domain managers and fault tolerant agents running in Full Status mode.

Manager and agent types

About this task

Primarily, workstation definitions refer to physical workstations. However, in the case of extended and network agents, the workstations are logical definitions that must be hosted by a physical HCL Workload Automation workstation.

HCL Workload Automation workstations can be of the following types:

Master domain manager (MDM)

The domain manager in the topmost domain of a HCL Workload Automation network. It either contains or connects to the relational database that stores the scheduling object definitions. It creates or updates the production file when the plan is created or extended and distributes it in the network. It performs all logging and reporting for the network.

Backup master

A fault-tolerant agent or domain manager capable of assuming the responsibilities of the master domain manager for automatic workload recovery.

Domain manager

The management hub in a domain. All communications to and from the agents in a domain are routed through the domain manager.

Backup domain manager

A fault-tolerant agent capable of assuming the responsibilities of its domain manager.

Dynamic domain manager

An installed component in a distributed HCL Workload Automation network that is the management hub in a domain. All communication to and from the dynamic agents in the domain is routed through the dynamic domain manager.

Backup dynamic domain manager

A workstation which can act as a backup for the dynamic domain manager, when problems occur. It is effectively a dynamic domain manager, waiting to be activated. Its use is optional.

Fault-tolerant agent (FTA)

A workstation capable of resolving local dependencies and launching its jobs in the absence of a domain manager.

Dynamic agent

Dynamic agents run the same types of jobs as fault-tolerant agents. From classic job types such as docommand and scripts, to more specific job types such as Java, database, file transfers, InfoSphere DataStage, Cognos, and OSLC to name a few. Dynamic agents can be defined in pools and dynamic pools.

Run workload dynamically

It communicates with the server the status of its resources. In this way the product is able to dynamically run your workload to the best available resources by:

- Automatically discovering scheduling environment resources.
- Automatically following resource changes

- Requesting additional resources when needed
- Matching job requirements to available resources
- Controlling and optimizing use of resources

The characteristics listed above provides high availability and load balancing potentialities to your environment and well suite virtualized environments.

When a job is submitted, either as part of a job stream in the plan or through ad hoc submission, HCL Workload Automation checks the job requirements, the available resources and the related characteristics and submits the job to the resource that best meets the requirements to run it.

Run both existing job types and job types with advanced options

It can run:

- Existing job types. For example docommand and scripts.
- Job types with advanced options, both those supplied with the product and the additional types implemented through the custom plug-ins. For example, those supplied with the product are DB2®, file transfer, and web services. Those implemented through the custom plug-ins are the ones you developed using the Workload Automation, Lutist Development Kit. To run these job types you must also install the Java™ run time.

Manage dynamic workload broker logical resource

It can remotely run, from the agent, the dynamic workload broker **resource** command on the server. To manage the **resource** command you must also install the Java™ run time.

Pool

Pools are groups in which you add specific dynamic agent workstations according to the requirements of the job. Jobs are assigned dynamically to the best available dynamic agent applying a load balancing policy by choosing the agent with the lesser amount of jobs to run.

Dynamic pool

Dynamic pools are groups in which you specify the requirements and HCL Workload Automation selects the dynamic agents that meet the requirements. Jobs are assigned dynamically to the best available dynamic agent applying an optimization policy to identify the best agent.

Standard agent

A workstation that launches jobs only under the direction of its domain manager. It is not fault-tolerant.

Extended agent

A logical workstation definition that helps you launch and control jobs on other systems and applications, such as PeopleSoft, SAP, and z/OS®.

z-centric agent

Runs jobs scheduled from HCL Workload Automation for Z but is installed in the HCL Workload Automation environment. It has no fault-tolerance and communicates directly with the HCL Workload Automation for Z

controller through the RESTful HTTP interface. In HCL Workload Automation for Z it has the same functionality as a computer automatic workstation even though it runs in the distributed environment.

Network Agent

A logical workstation definition for creating dependencies between jobs and job streams in separate HCL Workload Automation networks.

Topology

About this task

A key to choosing how to set up HCL Workload Automation domains for an enterprise is the concept of localized processing. The idea is to separate or localize the enterprises's scheduling needs based on a common set of characteristics.

Common characteristics are things such as geographical locations, business functions, and application groupings. Grouping related processing can limit the amount of interdependency information that needs to be communicated between domains. The benefits of localizing processing in domains are:

- Decreased network traffic. Keeping processing localized to domains eliminates the need for frequent interdomain communications.
- Provides a convenient way to tighten security and simplify administration. Security and administration can be defined at, and limited to, the domain level. Instead of network-wide or workstation-specific administration, you can have domain administration.
- Network and workstation fault tolerance can be optimized. In a multiple domain HCL Workload Automation network, you can define backups for each domain manager, so that problems in one domain do not disrupt operations in other domains.

Networking

About this task

The following questions will help in making decisions about how to set up your enterprise's HCL Workload Automation network. Some questions involve aspects of your network, and others involve the applications controlled by HCL Workload Automation. You may need to consult with other people in your organization to resolve some issues.

- How large is your HCL Workload Automation network? How many computers does it hold? How many applications and jobs does it run?

  The size of your network will help you decide whether to use a single domain or the multiple domain architecture. If you have a small number of computers, or a small number of applications to control with HCL Workload Automation, there may not be a need for multiple domains.
- How many geographic locations will be covered in your HCL Workload Automation network? How reliable and efficient is the communication between locations?

This is one of the primary reasons for choosing a multiple domain architecture. One domain for each geographical location is a common configuration. If you choose single domain architecture, you will be more reliant on the network to maintain continuous processing.

- Do you need centralized or decentralized management of HCL Workload Automation?

  A HCL Workload Automation network, with either a single domain or multiple domains, gives you the ability to manage HCL Workload Automation from a single node, the master domain manager. If you want to manage multiple locations separately, you can consider the installation of a separate HCL Workload Automation network at each location. Note that some degree of decentralized management is possible in a stand-alone HCL Workload Automation network by mounting or sharing file systems.

- Do you have multiple physical or logical entities at a single site? Are there different buildings, and several floors in each building? Are there different departments or business functions? Are there different applications?

  These may be reasons for choosing a multi-domain configuration. For example, a domain for each building, department, business function, or each application (manufacturing, financial, engineering, etc.).

- Do you run applications, like SAP R/3, that will operate with HCL Workload Automation?

  If they are discrete and separate from other applications, you may choose to put them in a separate HCL Workload Automation domain.

- Would you like your HCL Workload Automation domains to mirror your Windows™ domains?

  This is not required, but may be useful.

- Do you want to isolate or differentiate a set of systems based on performance or other criteria?

  This may provide another reason to define multiple HCL Workload Automation domains to localize systems based on performance or platform type.

- How much network traffic do you have now?

  If your network traffic is manageable, the need for multiple domains is less important.

- Do your job dependencies cross system boundaries, geographical boundaries, or application boundaries? For example, does the start of Job1 on CPU3 depend on the completion of Job2 running on CPU4?

  The degree of interdependence between jobs is an important consideration when laying out your HCL Workload Automation network. If you use multiple domains, you should try to keep interdependent objects in the same domain. This will decrease network traffic and take better advantage of the domain architecture.

- What level of fault-tolerance do you require?

  An obvious disadvantage of the single domain configuration is the reliance on a single domain manager. In a multi-domain network, the loss of a single domain manager affects only the agents in its domain.

HCL Workload Automation components

About this task

HCL Workload Automation uses several manager processes to efficiently segregate and manage networking, dependency resolution, and job launching. These processes communicate among themselves through the use of message queues. Message queues are also used by the Console Manager (conman) to integrate operator commands into the batch process.

On any computer running HCL Workload Automation there are a series of active management processes. They are started as a system service, or by the `StartUp` command. The following are the main processes of a fault-tolerant agent:

Netman

The network management process that establishes network connections between remote `mailman` processes and local `Writer` processes.

Mailman

The mail management process that sends and receives inter-CPU messages.

Batchman

The production control process. Working from Symphony™, the production control file, it runs jobs streams, resolves dependencies, and directs `jobman` to launch jobs.

Writer

The network `writer` process that passes incoming messages to the local `mailman` process.

Jobman

The job management process that launches and tracks jobs under the direction of `batchman`.

The following are the main processes of a dynamic agent:

agent

The network management process that establishes network connections to the master domain manager or the dynamic domain manager.

JobManager

The process that manages all of the dynamic agent operations, such as, sending events, and directing `TaskLauncher` to launch jobs.

TaskLauncher

The job management process that launches and tracks jobs under the direction of `JobManager`.

JobManagerGW

Manages the communication between dynamic agents and the master or dynamic domain manager through a firewall.

Monman

The event management process that turns on the event monitoring engine on the workstation.

In addition, HCL Workload Automation uses two command line interfaces:

Composer

The command-line program used to define, manage, and store scheduling objects in the HCL Workload Automation database. The composer command-line program can be installed and used on any computer connected through TCP/IP to the system where the master domain manager is installed. It does not require the installation of a HCL Workload Automation workstation as a prerequisite. It communicates through HTTP/HTTPS with the master domain manager where the relational database management system (RDBMS) is installed. The HTTP/HTTPS communication setup and the authentication check are managed by the WebSphere® Application Server - Express® infrastructure. The composer uses edit files to update the scheduling database.

Conman

The console manager. It is the user interface for plan running activities by means of the command line interface. `Conman` writes information that is received by either the local `netman` or `mailman` processes.

HCL Workload Automation scheduling objects

About this task

Scheduling with HCL Workload Automation includes the capability to do the following:

- Schedule jobs across a network.
- Group jobs into job streams according, for example, to function or application.
- Set limits on the number of jobs that can run concurrently.
- Create job streams based on day of the week, on specified dates and times, or by customized calendars.
- Ensure correct processing order by identifying dependencies such as successful completion of previous jobs, availability of resources, or existence of required files.
- Set automatic recovery procedures for unsuccessful jobs.
- Forward incomplete jobs to the next production day.

Starting from version 8.3, the HCL Workload Automation scheduling objects are stored in a relational database. This results in a significant improvement, in comparison with previous versions, of how objects are defined and managed in the database. Each object can now be managed independently without having to use lists of scheduling objects like calendars, parameters, prompts and resources. The command syntax used to define and manage these objects has also become direct and powerful.

HCL Workload Automation administrators and operators work with these objects for their scheduling activity:

Workstation

Also referred to as *CPU*. Usually an individual computer on which jobs and job streams are run. Workstations are defined in the HCL Workload Automation database as a unique object. A workstation definition is required for every computer that executes jobs or job streams in the HCL Workload Automation network.

Workstation class

A group of workstations. Any number of workstations can be placed in a class. Job streams and jobs can be assigned to execute on a workstation class. This makes replication of a job or job stream across many workstations easy.

Domain

All workstations in a distributed HCL Workload Automation network are organized in one or more domains, each of which consists of one or more agents and a domain manager acting as the management hub. Most communication to and from the agents in the domain is routed through the domain manager. You can organize all agents in your network in a single domain, or in multiple domains. A single domain network consists of a master domain manager and any number of agents. A multiple domain network consists of a master domain manager, any number of lower tier domain managers, and any number of agents in each domain.

Folder

A smart workflow folder is a container of jobs, job streams, and other folders. Use smart workflow folders to organize your jobs and job streams according to your lines of business or other custom categories. A folder can contain one or more jobs or job streams, while each job stream can be associated to one folder. If no folder is defined for a job stream, the root folder (/) is used by default.

Job

A script or command, run on the user's behalf, run and controlled by HCL Workload Automation.

Job stream

A list of jobs that run as a unit (such as a weekly backup application), along with run cycles, times, priorities, and other dependencies that determine the exact order in which the jobs run.

Calendar

A list of scheduling dates. Each calendar can be assigned to multiple job streams. Assigning a calendar to a job stream causes that job stream to run on the dates specified in the calendar. A calendar can be used as an inclusive or as an exclusive run cycle.

Run cycle

A cycle that specifies the days that a job stream is scheduled to run. Run cycles are defined as part of job streams and may include calendars that were previously defined. There are three types of run cycles: a Simple run cycle, a Weekly run cycle, or a Calendar run cycle (commonly called a calendar). Each type of run cycle can be inclusive or exclusive. That is, each run cycle can define the days when a job stream is included in the production cycle, or when the job stream is excluded from the production cycle.

Run cycle group

A run cycle group is a list of run cycles that are combined together to produce a set of run dates. You can optionally define a run cycle group for your job stream instead of, or in addition to, a number of single run cycles. Unlike run cycles, run cycle groups are not tied to a specific job stream and therefore can be reused in several different job streams to apply the same scheduling rules each time.

Run cycles are organized into subsets within a run cycle groups. The subsets are in a logical OR relationship with each other. They enable you to apply exclusive run cycles to a subset of the inclusive run cycles. The result of the run cycle group is a run date or a set of run dates.

Prompt

An object that can be used as a dependency for jobs and job streams. A prompt must be answered affirmatively for the dependent job or job stream to launch. There are two types of prompts: predefined and ad hoc. An ad hoc prompt is defined within the properties of a job or job stream and is unique to that job or job stream. A predefined prompt is defined in the HCL Workload Automation database and can be used by any job or job stream.

Resource

An object representing either physical or logical resources on your system. Once defined in the HCL Workload Automation database, resources can be used as dependencies for jobs and job streams. For example, you can define a resource named *tapes* with a unit value of two. Then, define jobs that require two available tape drives as a dependency. Jobs with this dependency cannot run concurrently because each time a job is run the *tapes* resource is in use.

Variable and variable table

A variable can be used to substitute values in scheduling objects contained in jobs and job streams; that is, in JCL, log on, prompts dependencies, file dependencies, and recovery prompts. The values are replaced in the job scripts at run time. Variables are global (that is, they can be used on any agent of the domain) and are defined in the database in groups called `variable tables`.

Parameter

A parameter can be used to substitute values in jobs and job streams just like global variables. The difference is that a parameter is defined on the specific workstation where the related job is to run and has no global effect, but only on that specific workstation. Parameters cannot be used when scripting extended agent jobs.

User

On Windows™ workstations, the user name specified in the `Logon` field of a job definition must have a matching user definition. The definitions provide the user passwords required by HCL Workload Automation to launch jobs.

Event rule

A scheduling event rule defines a set of actions that are to run upon the occurrence of specific event conditions. The definition of an event rule correlates events and triggers actions. When you define an event rule, you specify one or more events, a correlation rule, and the one or more actions that are triggered by those events. Moreover, you can specify validity dates, a daily time interval of activity, and a common time zone for all the time restrictions that are set.

Workload application

A workload application is an HCL Workload Automation database object that acts as a container for one or more job streams. You can use workload applications to standardize a workload automation solution so

that the solution can be reused in one or more HCL Workload Automation environments thereby automating business processes.

You prepare a workload application template in a source HCL Workload Automation environment and then export it so that it can be deployed in a target environment. The export process extracts from the source environment all of the elements necessary to reproduce the solution in another environment. It produces a compressed file containing a number of files required to import the workload application into the target environment.

You can control how jobs and job streams are processed with the following attributes:

Dependencies

Conditions that must be satisfied before a job or job stream can run. You can set the following types of dependencies:

- A predecessor job or job stream must have completed successfully.
- One or more specific resources must be available.
- Access to specific files must be granted.
- An affirmative response to a prompt.

Time constraints

Conditions based on time, such as:

- The time at which a job or job stream should start.
- The time after which a job or job stream cannot start.
- The repetition rate at which a job or job stream is to be run within a specified time slot.

Job priority

A priority system according to which jobs and job streams are queued for execution.

Job fence

A filter defined for workstations. Only jobs and job streams whose priority exceeds the job fence value can run on a workstation.

Limit

Sets a limit to the number of jobs that can be launched concurrently on a workstation.

The production process

HCL Workload Automation production is based on a plan that runs in a *production period*. The production period is defined by the user when creating or extending the production plan. It can span from a few hours to some days (by default it is a 24 hours period). Before the start of each production period, HCL Workload Automation executes a program that creates the production plan starting from the modeling data stored in the database and from an intermediate plan called *preproduction*

plan. Then another program includes the uncompleted schedules from the previous production period into the current plan and another different program logs all the statistics of the previous production into an archive.

All of the required information for that production period is placed into a production control file named Symphony™. During the production period, the production control file is continually being updated to reflect the work that needs to be done, the work in progress, and the work that has been completed. A copy of the Symphony™ file is sent to all subordinate domain managers and to all the fault-tolerant agents in the same domain. The subordinate domain managers distribute their copy to all the fault-tolerant agents in their domain and to all the domain managers that are subordinate to them, and so on down the line. This causes fault-tolerant agents throughout the network to continue processing even if the network connection to their domain manager is down. From the graphical interfaces or the command line interface, the operator can view and make changes in the current production by making changes in the Symphony™ file.

HCL Workload Automation processes monitor the production control file and make calls to the operating system to launch jobs as required. The operating system runs the job, and in return informs HCL Workload Automation if the job completed successfully or not. This information is entered into the production control file to indicate the status of the job.

Scheduling

About this task

Scheduling objects are workstations, workstation classes, domains, jobs, job streams, resources, prompts, calendars, variables and variable tables, parameters, event rules, and run cycle groups. Scheduling objects are managed with the Composer program and are stored in the HCL Workload Automation database. To create or modify an object, you can use either the HCL Workload Automation command line interface or one of the graphical interfaces.

Scheduling includes the following tasks:

- Defining and maintaining workstations
- Defining scheduling objects
- Defining job streams
- Starting and stopping production processing
- Viewing and modifying jobs and job streams.

Creating job streams

The primary processing task of HCL Workload Automation is to run job streams. A job stream is an outline of batch processing consisting of a list of jobs. Job streams can be defined using either the command line interface or one of the graphical interfaces. Using either graphical interface you can easily create and modify job streams. You can use their job stream editors to work with the jobs and the `follows` dependencies between the jobs, as well as the job stream run cycles. You can also easily specify time restrictions, resource dependencies, file dependencies, and prompt dependencies at the job stream level.

Job streams can be defined as *draft*. A draft job stream is not considered when resolving dependencies and is not added to the production plan. It becomes actual only after the *draft* keyword is removed from its definition, and the `JnextPlan` command is run to add it to the preproduction plan and so to the production plan.

Setting job recovery

About this task

When defining a job, consider that in some instances it might not complete successfully. The administrator can define a recovery option and recovery actions when defining the job. The following recovery options are available:

- Do not continue with the next job. This stops the execution of the job stream and puts it in the *stuck* state. This is the default action.
- Continue with the next job.
- Run the job again.

Optionally, a recovery prompt can be associated to the job. A recovery prompt is a local prompt to display when the job completes unsuccessfully. Processing does not continue until the prompt is answered affirmatively.

Another option is to define a recovery job that can be run in the place of the original job if it completes unsuccessfully. The recovery job must have been defined previously. Processing stops if the recovery job does not complete successfully.

Defining and managing mission-critical jobs

About this task

Job schedulers can use the HCL Workload Automation command line or the Dynamic Workload Console to flag jobs as mission-critical and specify their deadlines. A critical job and all its predecessors make up what is called a *critical network*. At planning time, HCL Workload Automation calculates the start time of the critical job and of each of its predecessors starting from the critical job deadline and estimated duration. While the plan runs, this information is dynamically kept up-to-date based on how the plan is progressing. If a predecessor, or the critical job itself, is becoming late, HCL Workload Automation automatically prioritizes its submission and promotes it to get more system resources and thus meet its deadline.

You can also customize the **riskConfidence** `optman` parameter to define when a critical job should be flagged as `High Risk`. The job status is calculated comparing the confidence factor of completing before deadline and the percentage specified in this parameter. If the probability of completing before the deadline is below **riskConfidence,** then the critical job is considered at high risk. For more information about the **riskConfidence** `optman` parameter, see the section about global options in *Administration Guide*.

Within a critical network, HCL Workload Automation dynamically identifies the path of predecessors that is potentially most at risk; this is called the *critical path*. HCL Workload Automation calculates the level of risk that each critical job has of missing its deadline; a high risk indicates that the estimated end of the critical job is after its deadline while a potential risk indicates that some predecessors of the critical job have a warning condition, for example are late or in error.

The Dynamic Workload Console provides specialized views for tracking the progress of critical jobs and their predecessors. Job schedulers and operators can access the views from the Dashboard or by creating Monitor Critical Jobs tasks.

The initial view lists all critical jobs for the engine, showing the status: normal, potential risk, or high risk. From this view, an operator can navigate to see:

- The hot list of jobs that put the critical deadline at risk.
- The critical path.
- Details of all critical predecessors.
- Details of completed critical predecessors.
- Job logs of jobs that have already run.

Using the views, operators can monitor the progress of the critical network , find out about current and potential problems, release dependencies, and rerun jobs.

For example:

1. To flag a critical job and follow it up, the Job scheduler opens the Workload Designer on the Dynamic Workload Console, marks the specific job as critical, and sets the deadline for 5 a.m.

   When `JnextPlan` is run, the critical start dates for this job, and all the jobs that are identified as its predecessors, are calculated.

2. To track a specific critical job, the operator proceeds as follows:
   a. The operator checks the dashboards and sees that there are critical jobs scheduled on one of the engines.
   b. He clicks the link to get a list of the critical jobs.

      The specific job shows a `Potential Risk` status.

   c. He selects the job and clicks **Hot List** to see the predecessor job or jobs that are putting the critical job at risk.

      One of the predecessor jobs is listed as being in error.

   d. He selects the job and clicks **Job log**.

      The log shows that the job failed because of incorrect credentials for a related database.

   e. After discovering that the database password was changed that day, he changes the job definition in the symphony file and reruns the job.
   f. When he comes back to the dashboard, he notices that there are no longer any jobs in potential risk. Also, the critical jobs list that was opened when clicking on the potential risk link no longer shows the critical job after the job is rerun.
   g. The job is now running after being automatically promoted, getting higher priority for submission and system resources.
   h. No further problems need fixing and the critical job finally completes at 4.45 a.m.

Scheduling workload dynamically

About this task

You can choose to set HCL Workload Automation to dynamically associate your submitted workload (or part of it) to the best available resources at run time.

The HCL Workload Automation installation process includes the option to install the dynamic scheduling capability. If you select this option, you get the following functionality:

- Automatically discover scheduling environment resources
- Match job requirements to available resources
- Control and optimize use of resources
- Automatically follow resource changes
- Request additional resources when needed

You can submit HCL Workload Automation jobs, including jobs defined to run on extended agents, as well as J2EE applications (if you selected the option to schedule J2EE at installation time). To schedule workload dynamically, you:

1. Use the Dynamic Workload Console to define the agents you want to use for running workload as logical resources or groups of resources.
2. Update your HCL Workload Automation job definitions to make as destination CPU the dynamic workload broker workstation (this workstation works as a bridge between the scheduler engine and the pool of resources)
3. For every HCL Workload Automation job, add a JSDL (Job Submission Description Language) job definition where you match the job with required resources, candidate hosts, and scheduling and optimization preferences. Use the Dynamic Workload Console to do this easily.

When a job is thus submitted, either as part of a job stream in the plan or through ad hoc submission, HCL Workload Automation checks the job requirements, the available resources and the related characteristics and submits the job to the resource that best meets the requirements.

Running production

Production consists of taking the definitions of the scheduling objects from the database, together with their time constraints and their dependencies, and building and running the production control file.

Running the plan

About this task

The production plan contains information about which jobs to run, on which fault-tolerant agent, and what dependencies must be satisfied before each job is launched. HCL Workload Automation creates the production plan starting from the modeling data stored in the database and from an intermediate plan called the preproduction plan. The preproduction plan is automatically created and managed by the product. To avoid problems, the database is locked during the generation of the plan and is unlocked when the generation completes or if an error condition occurs. The preproduction plan is used to identify in advance the job stream instances and the external follows job stream dependencies involved in a specified time period.

You use the `JnextPlan` command on the master domain manager to generate the production plan and distribute it across the HCL Workload Automation network.

To generate and start a new production plan, HCL Workload Automation performs the following steps:

1. Updates the preproduction plan with the objects defined in the database that were added or updated since the last time the plan was created or extended.
2. Retrieves from the preproduction plan the information about the job streams to run in the specified time period and saves it in an intermediate production plan.
3. Includes in the new production plan the uncompleted job streams from the previous production plan.
4. Creates the new production plan and stores it in a file named Symphony™. The production plan data is also replicated in the database.
5. Distributes a copy of the Symphony™ file to the workstations involved in the new product plan processing.
6. Logs all the statistics of the previous production plan into an archive.
7. Updates the job stream state in the preproduction plan.

The copy of the newly-generated Symphony™ file is used starting from the top domain's fault-tolerant agents and domain managers of the child domains and down the tree to all subordinate domains.

Each fault-tolerant agent that receives the production plan can continue processing even if the network connection to its domain manager goes down.

At each destination fault-tolerant agent, HCL Workload Automation performs the following actions to manage job processing:

1. Accesses the copy of the Symphony™ file and reads the instructions about which job to run.
2. Makes calls to the operating system to launch jobs as required.
3. Updates its copy of the Symphony™ file with the job processing results and sends notification back up the tree to the master domain manager and to all full status fault-tolerant agents. The original copy of the Symphony™ file is stored on the master domain manager and the copies stored on the backup master domain managers, if defined, are updated accordingly.

This means that during job processing, each fault-tolerant agent has its own copy of the Symphony™ file updated with the information about the jobs it is running (or that are running in its domain and child domains if the fault-tolerant agent is full-status or a domain manager), and the master domain manager (and backup master domain manager if defined) has the copy of the Symphony™ file that contains all updates coming from all fault-tolerant agents. In this way the Symphony™ file on the master domain manager is kept up-to-date with the jobs still to run, the jobs running, and the jobs already completed.

After the production plan is generated for the first time, it can be extended to the next production period with the `JnextPlan` command. The Symphony™ file is refreshed with the latest changes and redistributed throughout the network.

Running job streams

Depending on their run cycle definition, job streams are taken from the HCL Workload Automation database and automatically inserted into the current production plan.

While the job stream is in the plan, and has not completed, you can still modify any of its components. That is, you can modify the job stream properties, the properties of its jobs, their sequence, the workstation or resources they use, and so on, to satisfy last-minute requirements.

You can also hold, release, or cancel a job stream, as well as change the maximum number of jobs within the job stream that can run concurrently. You can change the priority previously assigned to the job stream and release the job stream from all its dependencies.

Last minute changes to the current production plan include the possibility to submit jobs and job streams that are already defined in the HCL Workload Automation database but were not included in the plan. You can also submit jobs that are being defined ad hoc. These jobs are submitted to the current plan but are not stored in the database.

Starting from version 8.3, you can create and manage multiple instances of the same job stream over a number of days or at different times within the same day. This new feature introduced the possibility to have in the same plan more than one instance of the same job stream with the same name. Each job stream instance is identified by the job stream name, the name of the workstation where it is scheduled to run, and by the start time defined in the preproduction plan.

Monitoring

About this task

Monitoring is done by listing plan objects. Using lists, you can see the status of all or of subsets of the following objects in the current plan:

- Job stream instances
- Job instances
- Domains
- Workstations
- Resources
- File dependencies
- Prompt dependencies

You can use these lists also to manage some of these objects. For example, you can reallocate resources, link or unlink workstations, kill jobs, or switch domain manager.

Reporting

About this task

As part of the preproduction and post-production processes, reports are generated which show summary or detail information about the previous or next production day. These reports can also be generated ad-hoc. The following reports are available:

- Job details listing
- Prompt listing
- Calendar listing
- Parameter listing
- Resource listing
- Job History listing

- Job histogram
- Planned production schedule
- Planned production summary
- Planned production detail
- Actual production summary
- Actual production detail
- Cross reference report

In addition, during production, a standard list file (STDLIST) is created for each job instance launched by HCL Workload Automation. Standard list files contain header and trailer banners, echoed commands, and errors and warnings. These files can be used to troubleshoot problems in job execution.

Auditing

About this task

An auditing option helps track changes to the database and the plan.

For the database, all user modifications, except for the delta of the modifications, are logged. If an object is opened and saved, the action is logged even if no modification is made.

For the plan, all user modifications to the plan are logged. Actions are logged whether or not they are successful.

Audit files are logged to a flat text file on individual machines in the HCL Workload Automation network. This minimizes the risk of audit failure due to network issues and allows a straightforward approach to writing the log. The log formats are basically the same for both the plan and the database. The logs consist of a header portion which is the same for all records, an “action ID”, and a section of data which varies according to the action type. All data is stored in clear text and formatted to be readable and editable from a text editor such as vi or notepad.

Using event-driven workload automation

About this task

Use this optional feature to set up and run rules that perform predefined actions in response to particular events occurring on your agents. Your organization can benefit from using this feature by adding on-demand workload automation to plan-based job scheduling, gaining savings in time and resources.

Event-driven workload automation is based on the concept of event rule. In HCL Workload Automation an event rule is a scheduling object and is made up of events, event-correlating conditions, and actions. When you define an event rule, you specify one or more events, a correlation rule, and one or more actions that are triggered by those events. Moreover, you can specify validity dates, a daily time interval of activity, and a common time zone for all the time restrictions that are set.

You can set up event rules to:

- Trigger the execution of batch jobs and job streams based on the occurrence or combination of real time events
- Reply to prompts

- Notify users when anomalous conditions occur in the HCL Workload Automation scheduling environment or batch scheduling activity
- Invoke an external product when a particular event condition occurs

HCL Workload Automation includes a set of predefined event and action plug-ins, but also provides a software development kit with samples and templates for your application programmers to develop their own plug-ins.

Options and security

The HCL Workload Automation options files determine how HCL Workload Automation runs on your system. Several performance, tuning, security, logging, and other configuration options are available.

Setting the HCL Workload Automation options

About this task

You can set two types of properties to configure your HCL Workload Automation run time environment, properties that are set on the master domain manager and affect processing on all workstations in the HCL Workload Automation network, and properties that are set locally on a workstation and affect processing on that workstation only. The former are managed using the HCL Workload Automation command line program named `optman`, and the latter you define locally on the workstation by customizing the configuration files `useropts`, `localopts`, and `jobmanrc`.

Global options are used to:

- Define if the security files of all the workstations of the network can be created and managed only from the master domain manager or if the root user or administrator of each workstation can create and manage their own.
- Select whether to enable or disable database auditing.
- Control which objects in the plan the user is permitted to list when running a query.
- Select whether to enable plan auditing.
- Select whether to enable strong encryption.
- Enter the number of days for which you want to save job statistics.
- Set the minimum and maximum lengths of the preproduction plan in days.
- Determine if uncompleted job streams are carried forward from the old to the new production control file.
- Remove or clean up job stream instances from the plan that ended in error.
- Define the start time of the HCL Workload Automation processing day.

Local options are used to:

- Specify the name of the local workstation
- Prevent the launching of jobs run by root in UNIX™
- Prevent unknown clients from connecting to the system
- Specify a number of performance options
- Specify a number of logging preferences
- Set SSL security options.

Setting security

About this task

Security is accomplished with the use of a security file that contains one or more user definitions. Each user definition identifies a set of users, the objects they are permitted to access, and the types of actions they can perform.

A template file is installed with the product. Edit the template to create the user definitions and compile and install it with a utility program to create a new operational security file. After it is installed, you make further modifications by creating an editable copy with another utility.

An individual file can be maintained on each workstation, or a single security file can be created on the master domain manager and copied to each domain manager, fault-tolerant agent, and standard agent.

Secure authentication and encryption

About this task

Security is enhanced for connections between protected and non-protected domains by applying the authentication and encryption mechanism based on the Secure Sockets Layer (SSL) protocol. SSL uses digital certificates to authenticate the identity of a workstation.

The HCL Workload Automation administrator must plan how authentication will be used within the network:

- Use one certificate for the entire HCL Workload Automation network.
- Use a separate certificate for each domain.
- Use a separate certificate for each workstation.

SSL support is automatically installed with HCL Workload Automation.

Work across firewalls

About this task

For previous versions of HCL Workload Automation, running the commands to start or stop a workstation or to get the standard list required opening a direct TCP/IP connection between the originator and the destination nodes. In a firewall environment, this forces users to break the firewall to open a direct communication path between the master and each fault-tolerant agent in the network.

HCL Workload Automation provides a configurable attribute, named *behindfirewall*, in the workstation's definition in the database. You can set this attribute to ON to indicate that a firewall exists between that particular workstation and its domain manager, and that the link between the domain manager and the workstation (which can be another domain manager) is the only allowed link between the domains.

Also, for all the workstations having this attribute set to ON, the commands to start or stop the workstation or to get the standard list will be transmitted through the domain hierarchy instead of opening a direct connection between the master (or domain manager) and the workstation.

Centralized security mechanism

About this task

A new global option makes it possible to change the security model in the HCL Workload Automation network. If you use this option, then the security files for the fault-tolerant agents in the network can be created or modified only on the master domain manager. The HCL Workload Automation administrator is responsible for creating, updating, and distributing the security files for all the agents where user access is required. Setting this global option triggers a security mechanism to identify and trust the HCL Workload Automation network corresponding to that master domain manager.

If you prefer the traditional security model, you can still use it by not activating the global variable.

Using time zones

About this task

HCL Workload Automation supports different time zones. Enabling time zones provides you with the ability to manage your workload across a multiple time zone environment. Both the 3-character and the variable length notations are supported with the current version of HCL Workload Automation. The variable length notation format is area/city, for example Europe/Paris as equivalent to ECT (European Central Time). The 3-character notation is supported for capability with earlier versions of the product.

Once configured, time zones can be specified for start and deadline times within jobs and job streams.

Using the access methods of HCL Workload Automation

Access methods are used to extend the job scheduling capability of HCL Workload Automation to other systems and applications. They run on:

- **Extended agents**
- **Dynamic agents** and **HCL Workload Automation for Z agents**

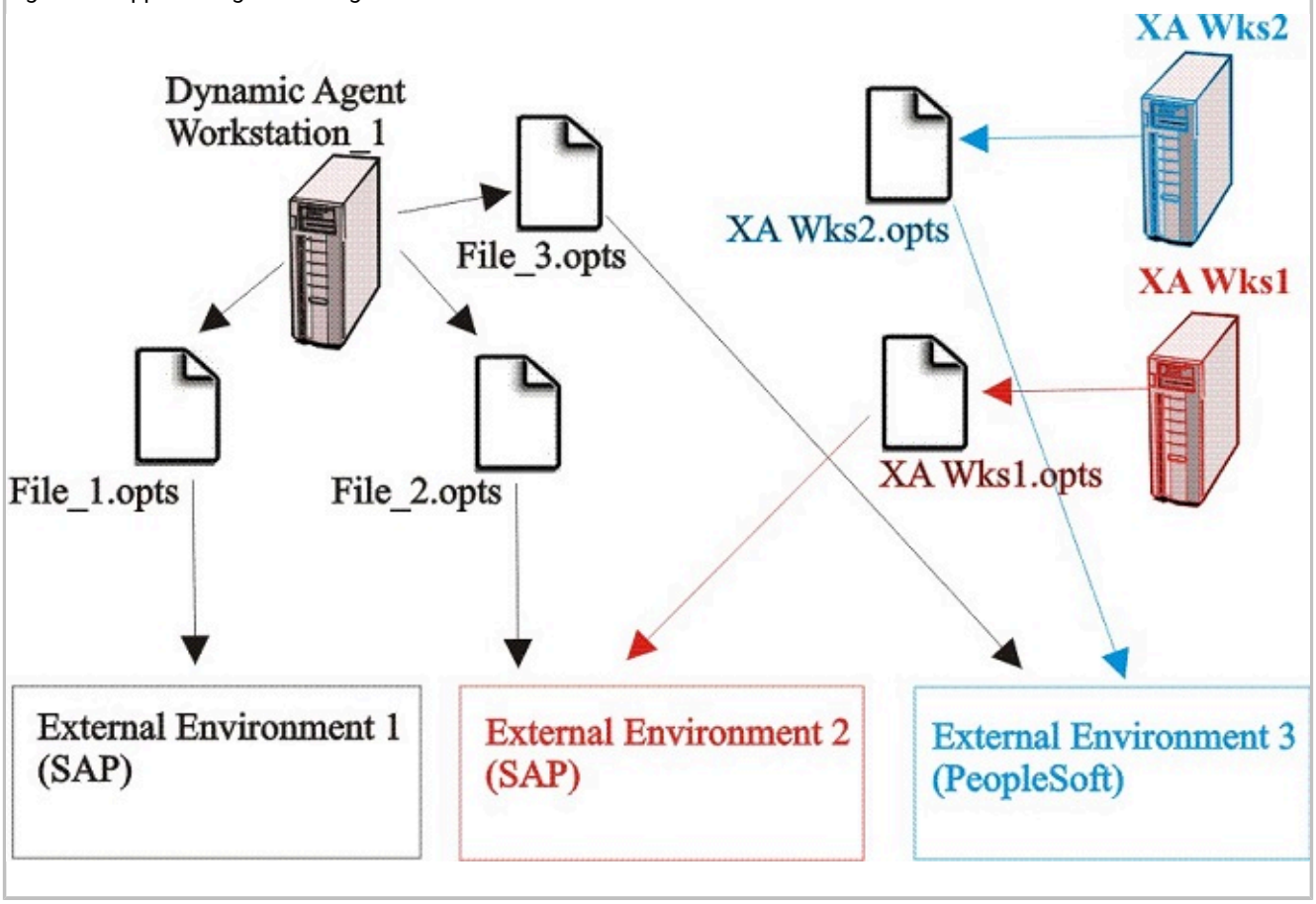
For more details, see Supported agents on page 205.

An access method needs to interact with the external system either through its command line or the Dynamic Workload Console. HCL Workload Automation includes the following access methods:

- PeopleSoft (psagent)
- SAP R/3 (r3batch)

Figure 4: Supported agents configuration on page 205 shows the typical configuration for the extended agent and the dynamic agent.

Figure 4. Supported agents configuration



Supported agents

The HCL Workload Automation access methods can run on extended agents and on dynamic agents (including HCL Workload Automation for Z agents).

You can extend HCL Workload Automation capabilities for scheduling on one or more external applications, such as PeopleSoft and SAP R/3. The agents needed to extend scheduling capabilities on these external applications using HCL Workload Automation are:

Extended agents

Extended agents extend the static scheduling capability. They are logical workstations related to an access method hosted by a physical HCL Workload Automation workstation (not another extended agent). More than one extended agent workstation can be hosted by the same HCL Workload Automation workstation and rely on the same access method. The extended agent is defined in a standard HCL Workload Automation workstation definition, which gives the extended agent a name and identifies the access method. The access method is a program that is run by the hosting workstation whenever HCL Workload Automation submits a job to an external system.

Jobs are defined for an extended agent in the same manner as for other HCL Workload Automation workstations, except for the job attributes that depend on the external system or application.

To launch and monitor a job on an extended agent, the host runs the access method, passing it job details as command line options. The access method communicates with the external system to launch the job and returns the status of the job. To launch a job in an external environment, HCL Workload Automation runs the extended agent access method providing it with the extended agent workstation name and information about the job. The method looks at the corresponding file named `XANAME_accessmethod.opts` (where `XANAME` is the name of the extended agent workstation) to determine which external environment instance it will connect to. The access method can then launch jobs on that instance and monitor them through completion, writing job progress and status information in the standard list file of the job.

A physical workstation can host a maximum of 255 extended agents.

Extended agents can also be used to run jobs in an end-to-end environment, where their scheduling and monitoring tasks are performed by a HCL Workload Automation for Z controller.

Dynamic agents and HCL Workload Automation for Z agents (z-centric)

To run access methods on external applications using dynamic agents, you define a job of type **Access Method**. The access method communicates with the external system to launch the job and returns the status of the job. The method looks at the corresponding file named `optionsfile_accessmethod.opts` (where `optionsfile` is the configuration file that depends on the selected access method). The dynamic agent and the HCL Workload Automation for Z agent can have more than one `.opts` associated file to determine which external environment instance to connect to. The access method can launch jobs on that instance and monitor them through completion, writing job progress and status information in the standard list file of the job.

Chapter 6. Dynamic Workload Console

About this task

The Dynamic Workload Console is a Web-based user interface for:

- HCL Workload Automation

It is the strategic user interface for the HCL Workload Automation suite of products and includes support for the latest functions and enhancements available with the scheduling engines.

The Dynamic Workload Console is a light, powerful and user-friendly single point of operational control for the entire scheduling network. It allows for single sign-on and authentication to one or many schedulers, is highly scalable, and provides real-time monitoring, management and reporting of enterprise workloads. It also greatly simplifies report creation and customization.

With Dynamic Workload Console you can:

- Manage your workload to design objects in the database, handle plans, submit jobs or job streams, and monitor objects in the plan.
- Design and control the topology of your scheduling environment, that is workstations and domains.
- Define and run reports to gather historical data or details about your plans. You can also generate and run customized SQL reports.
- Define and manage logical resources or groups of logical resources for use with dynamic scheduling.

You can access the Dynamic Workload Console from any computer in your environment using a web browser through both secure HTTPS or HTTP protocol.

The first and main actions you perform when you connect to the Dynamic Workload Console are:

Creating a connection to a scheduling engine (HCL Workload Automation)

You type the details (such as IP address, user name, and password) to access a scheduling engine, and, optionally, a database to operate with objects defined in plans or stored in the database. You can also define new scheduling objects in the database.

From the Dynamic Workload Console you can access the current plan, a trial plan, a forecast plan, or an archived plan for the distributed environment or the current plan for the z/OS® environment.

You might want to access the database to perform actions against objects stored in it or generate reports showing historical or statistical data.

In addition, working both on the database and on plans, you can create and run event rules to define and trigger actions that you want to run in response to events occurring on HCL Workload Automation nodes.

Spicifying filtering criteria to manage scheduling objects in the plan

You specify some filtering criteria to query a list of scheduling objects whose attributes satisfy the criteria you specified. Starting from this list, you can navigate and modify the content of the plan, switching between objects, opening more lists and accessing other plans or other HCL Workload Automation environments.

The console provides also the following graphical views tools to manage your workload:

Graphical view (for modeling)

A graphical extension to the Workload Designer that shows graphical representations of job stream definitions in the database. It provides an intuitive way to create and maintain them.

Plan view (for monitoring)

A high-level representation of a plan of any type, showing a filtered set of job streams and their mutual dependencies.

Job stream view (for monitoring, troubleshooting, and impact analysis)

A expansible graphical representation of job streams and jobs in the plan. It provides a straightforward, multilevel analysis of how job and job stream completion affects plan progress and provides a direct way to work with jobs, job streams and their dependencies.

Preproduction plan view (for workload planning)

Contains job stream instances and job stream dependencies to be run during a specified time interval covered by the plan.

From each view, you can take actions on objects, view their properties, and easily switch between the views. Graphics can be exported to PNG and SVG files.

Chapter 7. End-to-end scheduling

About this task

By using end-to-end scheduling, you can schedule and control jobs on mainframe, Windows™, and UNIX™ environments, for truly distributed scheduling. In the end-to-end configuration, HCL Workload Automation for Z is used as the planner for the job scheduling environment. HCL Workload Automation domain managers, standard, fault-tolerant, and z-centric agents are used to schedule on the distributed platforms. The agents replace the use of tracker agents.

HCL Workload Automation for Z also allows you to access job streams (schedules in HCL Workload Automation) and add them to the current plan in HCL Workload Automation for Z. In addition, you can build dependencies among HCL Workload Automation for Z job streams and HCL Workload Automation jobs. From HCL Workload Automation for Z, you can monitor and control the distributed agents.

The benefits that can be gained from using end-to-end scheduling are the following:

- Connecting either fault-tolerant or z-centric HCL Workload Automation agents to HCL Workload Automation for Z.
- Scheduling on additional operating systems.
- Synchronization of work in mainframe and distributed environments.
- The ability for HCL Workload Automation for Z to use multi-tier architecture with domain managers.

You can manage distributed scheduling by activating either of the following features:

- End-to-end scheduling with fault tolerance capabilities on page 209
- End-to-end scheduling with z-centric capabilities on page 211

End-to-end scheduling with fault tolerance capabilities

Learn about End-to-end scheduling with fault tolerance capabilities.

End-to-end scheduling with fault tolerance capabilities directly connects HCL Workload Automation standard agents, fault-tolerant agents, and domain managers (with their underlying agents and domains) to HCL Workload Automation for Z. HCL Workload Automation for Z is seen by the distributed network as the master domain manager.

HCL Workload Automation for Z creates the production plan also for the distributed network and sends it to the domain managers and to the directly-connected agents. The domain managers send a copy of the plan to each of their agents and subordinate domain managers for execution.

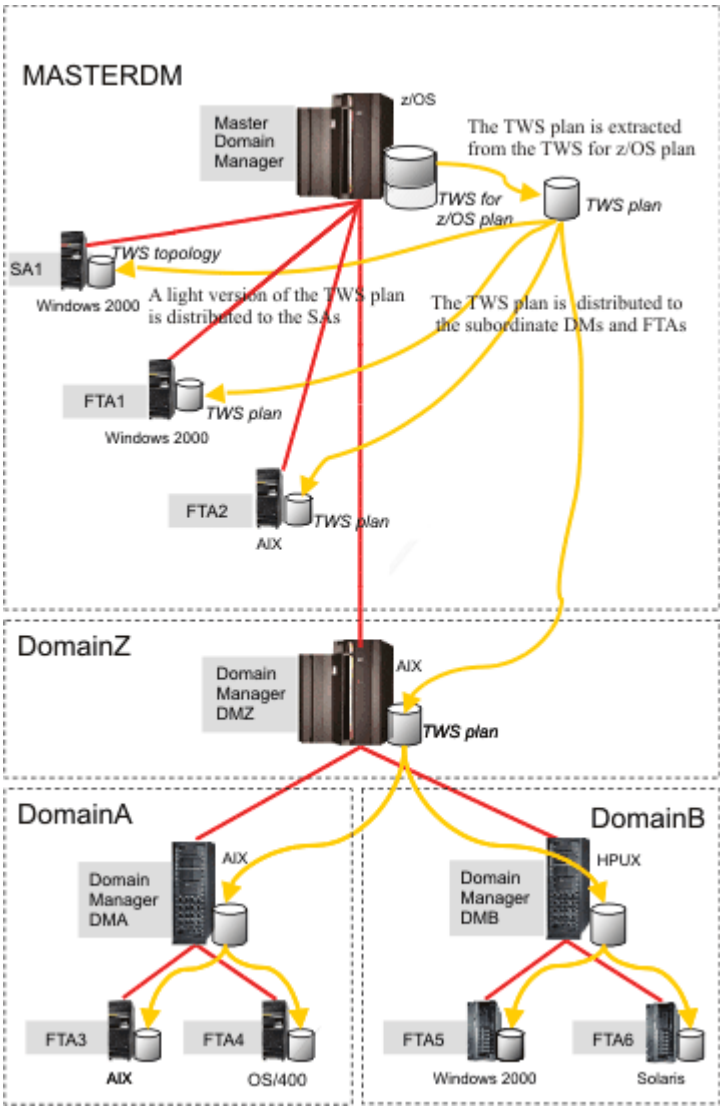
The HCL Workload Automation domain managers function as the broker systems for the distributed network by resolving all dependencies for their subordinate managers and agents. They send their updates (in the form of events) to HCL Workload Automation for Z so that it can update the plan accordingly. HCL Workload Automation for Z handles its own jobs and notifies the domain managers of all the status changes of the HCL Workload Automation for Z jobs that involve the HCL Workload Automation plan. In this configuration, the domain managers and all the distributed agents recognize HCL Workload Automation for Z as the master domain manager and notify it of all the changes occurring in their own plans. At

the same time, the agents are not permitted to interfere with the HCL Workload Automation for Z jobs, because they are viewed as running on the master that is the only node that is in charge of them.

In the HCL Workload Automation for Z current plan, you can specify jobs to run on workstations in the HCL Workload Automation network. HCL Workload Automation for Z passes the job information to the Symphony™ file in the HCL Workload Automation for Z server, which in turn passes the Symphony™ file to the HCL Workload Automation domain managers (DMZ) to distribute and process. In turn, HCL Workload Automation reports the status of running and completed jobs back to the current plan for monitoring in the HCL Workload Automation for Z engine.

Figure 5: End-to-end with fault tolerance capabilities configuration on page 210 shows an HCL Workload Automation network managed by an HCL Workload Automation for Z and the flow of data.

Figure 5. End-to-end with fault tolerance capabilities configuration



End-to-end scheduling with z-centric capabilities

Learn about End-to-end scheduling with z-centric capabilities.

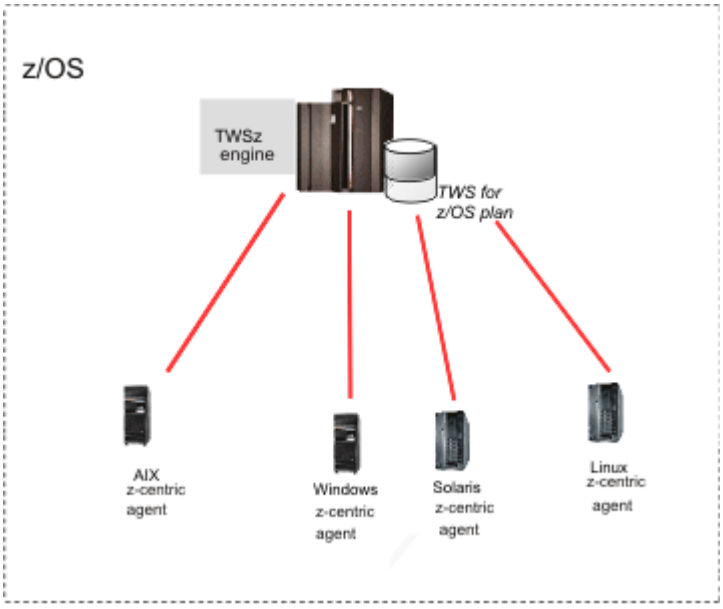
End-to-end scheduling with z-centric capabilities directly connects HCL Workload Automation z-centric agents to HCL Workload Automation for Z, that is the master domain manager for the distributed network.

Powerful mainframe capabilities, such as standard variable substitution, automatic recovery statements and alternate workstation, are supported to manage distributed workload.

Communication between the z-centric agents and HCL Workload Automation for Z controller is direct, through the HTTP or HTTPS protocol.

Figure 6: End-to-end with z-centric capabilities configuration on page 211 shows a network with this configuration.

Figure 6. End-to-end with z-centric capabilities configuration



Distributed agents

About this task

A distributed agent is a computer running HCL Workload Automation on which you can schedule jobs from HCL Workload Automation for Z. Examples of distributed agents are the following: standard agents, extended agents, fault-tolerant agents, and domain managers.

The following is a description of the types of distributed agents:

Domain Manager

The management hub in a domain. All communications to and from the agents in a domain are routed through the domain manager.

Backup Domain Manager

A fault-tolerant agent or domain manager capable of assuming the responsibilities of its domain manager for automatic workload recovery.

Dynamic workload broker

It is installed on the domain manager and performs the job management and resource management activities. It always presides over the dynamic scheduling.

Fault-tolerant Agent (FTA)

A workstation capable of resolving local dependencies and launching its jobs in the absence of a domain manager.

Standard Agent

A workstation that launches jobs only under the direction of its domain manager.

Extended Agent

A logical workstation definition that helps you launch and control jobs on other systems and applications, such as PeopleSoft, SAP, and z/OS® JES2 and JES3.

z-centric Agent

A workstation that runs jobs scheduled from HCL Workload Automation for Z. The controller directly handles the communication with this type of agent.

Pool

Pools are groups in which you add specific dynamic agent workstations according to the requirements of the job. Jobs are assigned dynamically to the best available dynamic agent applying a load balancing policy by choosing the agent with the lesser amount of jobs to run.

Dynamic pool

Dynamic pools are groups in which you specify the requirements and jobs are assigned dynamically to the best available dynamic agent meeting the requirements and applying an optimization policy to identify the best agent.

Distributed agents replace tracker agents in HCL Workload Automation for Z. The distributed agents help you schedule on non-z/OS systems with a more reliable and scalable agent.

In the HCL Workload Automation for Z plan, the logical representation of a distributed agent is called a fault-tolerant workstation or a z-centric workstation.

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