



Tivoli software

**Comprehensive workload management for
your enterprise computing environment
with IBM Tivoli Workload Scheduler**

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Workload scheduling

Widely distributed, “open” network computer resources are the norm in today’s network environment. These resources make up a complex grouping of applications, desktops, networks and servers, each with specific requirements and functions.

In both distributed and IBM® z/OS™ environments, workload scheduling—the orderly sequencing of batch program execution—should be flexible to accommodate varying resources and levels of demands securely and automatically. If you want timely scheduling that can help you meet your service-level agreements, your IT department should be able to set policies that govern batch activity.

Systems administrators are in a unique position to understand the extraordinary batch workload demands created when key business processes are automated. With the addition of each new application—whether for enterprise resource planning, customer relationship management, financial reporting or another vital business activity—the batch workload can grow at an incredible rate. At many companies there is a potential for daily batch processing workloads to triple or even quadruple in several years. At the same time, the window for processing jobs is shrinking, with many critical jobs needing to be completed before each day’s regular online work begins.

The workload management challenge can be further complicated by inter-dependencies between jobs and the availability of personnel who understand how to manage batch jobs in the context of important business priorities. Consider, for example, the requirements that can be triggered when a customer places an order over the Internet. Depending on the environment, the customer’s request could initiate a UNIX® job to acknowledge the order, an IBM AS/400® and iSeries™ job to order parts, an OS/390® and zSeries™ job to debit the customer’s bank account or payment system and a Microsoft® Windows NT® job to print a docket and address labels. If any job fails, the company’s revenues and customer satisfaction might be at risk.

Because batch workloads provide the raw material for many of today’s automated business processes, it is more important than ever for systems administrators to have an efficient, reliable and scalable way to manage their batch workloads seamlessly in a distributed environment. When evaluating management software options to help you plan, organize and execute

workload production in your environment, you should consider several key criteria, such as the ability to:

- *Integrate workloads from multiple applications, across multiple platforms and operating systems*
- *Handle rapidly increasing batch workload demands*
- *Automate tasks to enhance productivity of resources and personnel*
- *Drive business value by integrating with other systems management solutions*

Workload scheduling on other application environments

IBM Tivoli® Workload Scheduler for Applications is the Tivoli software offering that provides tight integration with premier business solutions. Certified by the applications vendors, Tivoli Workload Scheduler for Applications introduces the sophisticated scheduling features of Tivoli Workload Scheduler into application environments including SAP R/3, PeopleSoft, Oracle e-business applications and host-based schedulers.

Following are just a few of the capabilities that are made possible for other applications:

SAP R/3

- *Simplifies troubleshooting by providing current information on job status and statistics and generating a variety of useful reports*
- *Certified by SAP for Workload Scheduler Extended Agent for R/3*

PeopleSoft

- *Lets you monitor and execute jobs from the Tivoli Workload Scheduler environment on specified days and times in a prescribed order*
- *Has PeopleSoft certification for PeopleSoft 7.0 and 7.5*

Oracle e-business applications

- *Allows you to schedule jobs using the sophisticated job scheduling features of Tivoli Workload Scheduler*

Host-based schedulers

- *Lets you schedule and control OPC, CA7, MVS™ and OS/390 jobs using the sophisticated features of Tivoli Workload Scheduler*

Highlights

Workload scheduling on a z/OS or OS/390 system

Tivoli Workload Scheduler for z/OS is the Tivoli software foundation for enterprise workload management, and it provides a comprehensive set of services for managing a single-image z/OS system or multivendor networks and systems and automating the workload—from a single point of control.

Tivoli Workload Scheduler for z/OS expands the scope for automating your data processing operations. It plans and automatically schedules the production workload. From a single point of control, it drives and controls the workload processing at both local and remote sites. By using Tivoli Workload Scheduler for z/OS to increase automation, you can use your data processing resources more efficiently, have more control over your data processing assets and better manage your production workload processing.

Tivoli Workload Scheduler for z/OS consists of a base product, the agent and a number of features. Every z/OS system in your complex requires the base product. One z/OS system in your complex is designated as the controlling system and runs the engine feature. Only one engine feature is required, even when you want to start standby engines on other z/OS systems in a sysplex.

Tivoli Workload Scheduler for z/OS and Tivoli Workload Scheduler address your production workload in the distributed environment. You can schedule, control and monitor jobs in Tivoli Workload Scheduler from Tivoli Workload Scheduler for z/OS.

The workload on other operating environments can also be controlled with the open interfaces provided with Tivoli Workload Scheduler for z/OS. Sample programs using TCP/IP or an NJE/RSCS (network job entry/remote spooling communication subsystem) combination show you how to control the workload in environments that currently have no scheduling feature.

Automating your workload scheduling in a distributed environment can help you better meet your service-level agreements.

What is distributed workload scheduling?

Key components of distributed workload scheduling architecture include the following:

Heterogeneous platform support—Provides the ability to manage a wide range of hardware platforms and operating systems with one scheduling solution.

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Redundancy—Can replicate and manage your computing environment in the event of component failure, helping provide a reliable backup.

Network fault tolerance—Helps provide reliability in the e-business application scheduling environment by allowing network processing to continue before, during and after a node or network failure.

Efficient enterprise communications—Allows multiple, interdependent scheduling networks to communicate directly (“peer to peer”) rather than through a central master controller or broker, reducing the risks associated with the failure of the central node. Passes only the information that is needed, helping reduce bandwidth consumption.

Multitier management—Establishes a hierarchy within a scheduling architecture that enables a single, consolidated view of the scheduling universe.

User security—Provides protection against individual users taking unauthorized actions while using the tool, and supplies enough granularity to allow or deny access to the complete range of functions within the product.

Network security—Helps fill the security gaps that exist in most standard operating system security.

Schedule, coordinate and automate your batch processing operations through a single, centralized console.

The Tivoli solution for comprehensive workload management

Tivoli Workload Scheduler is a production automation solution specifically designed to help you manage workloads in today’s complex, distributed environment. It helps provide consistent and reliable operations by giving you the ability to use a single console to schedule, coordinate and automate many of your batch processing requirements across the enterprise.

Tivoli Workload Scheduler, Version 8.1 provides key features (listed on pages 4 and 5) to manage the workload of both a centralized z/OS or OS/390 environment and a distributed environment and offers significantly enhanced performance and stability. Based on Java™ technology, the new graphical user interface—the Job Scheduling Console—provides a multiplatform interface for configuring, viewing and modifying aspects of workload planning in your enterprise environment. The Job Scheduling Console can make it simple to

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complete many essential workload management tasks. The Job Scheduling Console helps you:

- *Create the objects that form building blocks to formulate and organize your workload plan*
- *Schedule your jobs by creating a plan for job execution, using many different types of job dependency rules*
- *Monitor the execution of your jobs and take immediate action to resolve issues caused by jobs that fail*
- *Modify the execution of your workload plan by adding, modifying or deleting jobs to accommodate current conditions*

In effect, Tivoli Workload Scheduler can function as an “automatic driver” for your daily production workload. The software can help you maximize job throughput, optimize the way you use your resources and intervene manually when circumstances require a change in your job stream plan. Tivoli Workload Scheduler also integrates with various other systems management products, which can help enhance the business value you derive from your data processing operations.

Fault tolerance is critical in allowing network processing to continue before, during and after a node or network failure.

One of the strongest attributes of Tivoli Workload Scheduler—and unique to the Tivoli solution for workload scheduling—is the added security of fault tolerance. Fault tolerance helps give you the additional security that your network processing needs and can remain operational despite network failure. Additional security features, increased automation and ease-of-integration can help increase your business value, and Tivoli Workload Scheduler offers you a comprehensive solution for workload management.

Incorporating fault tolerance into your enterprise

By operating over a multitier management structure Tivoli Workload Scheduler can enable you to manage workload scheduling across your environment from a single point of control. Without proper backup this data is at risk, along with your ability to maintain your desired service levels. Tivoli Workload Scheduler features a well-designed fault tolerant architecture that can help you perform your workloads without interruption and provide the level of security you need.

Elements of this fault tolerant architecture include a *central master controller or broker*—where job scheduling definitions and objects are created and

scheduling repositories are maintained. Next is the *backup master controller*, which serves as your first line of defense in the event of the failure of your central master controller or broker. Other elements in the fault tolerant architecture are the *domain managers*, which control only a specific domain or network.

Information flow between various domains or networks is handled by way of direct, “peer to peer” communication, making it unnecessary (except under special circumstances) to flow communications through the master controller. This helps avoid risks associated with master controller failure. More important, it can enable faster job execution. Unlike competitors operating under a serial architecture, the more endpoints you add, the faster your overall throughput can be—which can help generate a substantial return on investment.

Like a central master controller or broker, a domain manager can also have its own backup, making each subnetwork within this configuration fault tolerant.

Fault tolerant agents (FTAs) control activities at the local level and do not have managerial responsibilities over other network nodes. At the beginning of the processing day each FTA is given a set of scheduling instructions that govern the scheduling activity of each FTA and which can allow it to continue processing even if it loses communication with its domain manager. FTAs also have a sophisticated mechanism to coordinate their activity when network connectivity gets restored, automatically sending updated information to each interested node in the network.

Master controllers, backup master controllers and FTAs each can continue processing in the event of a network outage—one of the most important distinguishing benefits of Tivoli Workload Scheduler. To accomplish this, Tivoli Workload Scheduler distributes the workload across master controllers and agents, allowing them to operate autonomously whenever possible. By distributing relevant scheduling instructions to each node at the beginning of the day, individual nodes can be empowered to operate with minimal or no intervention by their hierarchical managers.

Internetwork dependencies through a fault tolerant architecture

Fault tolerant architecture allows you to set up many independent or interdependent networks within your enterprise. Internetwork dependencies

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Tivoli Workload Scheduler can help you manage workloads across a variety of applications, operating systems and platforms.

allow information to flow on a need-to-know basis among networks. This can give you greater flexibility to configure communications along the most desirable network path, which can dramatically reduce network traffic.

Additional security through a fault tolerant architecture

Tivoli Workload Scheduler features several elements to enhance security. Through IP validation you can validate that any node in your network is communicating with another valid node. In addition, users wanting to access Tivoli Workload Scheduler are required to have a valid user login and password whenever they attempt to launch a job. Users can initiate only activities for which they are authorized. Sensitive data can be encrypted before being sent over the network.

Integrating workloads across multiple platforms

Tivoli Workload Scheduler provides outstanding flexibility for managing workloads across a variety of applications, operating systems and platforms. The software can help you manage the batch processing requirements generated by many e-business applications, including major strategic applications such as SAP R/3 and Oracle, as well as custom applications for tasks such as payroll, transaction processing, invoicing, order processing and more.

In addition, Tivoli Workload Scheduler can be run across different operating systems (OS/390, z/OS, Linux®, UNIX, Windows®, AS/400) even in an enterprise environment that has hardware from various other vendors, including IBM, DEC and Sun™. This capability can give you the flexibility to manage workloads efficiently, despite your heterogeneous environment. Tivoli Workload Scheduler can make it easier for you to monitor, control and automate the flow of work on both local and remote systems.

Managing increased batch workload demands

Tivoli Workload Scheduler also provides outstanding scalability in terms of the number of jobs that can be managed and the number of endpoints that can participate in the Tivoli Workload Scheduler network.

The addition of in-line compression and caching can make it possible to achieve a significant improvement in the number of jobs handled per minute, compared to the previous version. Depending on the environment, Tivoli Workload Scheduler can help you manage hundreds—or even thousands—of

jobs per minute during peak demand periods in a distributed environment and hundreds of thousands of jobs on z/OS and OS/390 systems.

In addition, the software's Job Scheduling Console runs on the user's desktop, making it easier for you to connect more operators or administrators to the job scheduling engine. The software offers outstanding flexibility for managing access to the workload scheduling engine. Each user has a distinct user profile and view of the batch workflow that's appropriate to the user's job function.

Extensive automation to enhance productivity

Tivoli Workload Scheduler is designed to help you plan and organize the phases of workload production and gives you the ability to automate most operator activities. The software's production control programs can automatically prepare jobs for execution, resolve interdependencies and then launch and track each job through to completion. This level of automation helps check that jobs begin as soon as their dependencies are satisfied, which can help minimize idle time and significantly improve throughput across your data processing sites. If a particular job fails, Tivoli Workload Scheduler often can handle the recovery process with little or no operator intervention.

Tivoli Workload Scheduler can help improve the productivity of your staff by automating many complex and repetitive operator tasks, such as:

- *Submission and recovery of jobs and started tasks*
- *Data set cleanup in error and rerun situations*
- *Substitution of variables in job control language before job submission*
- *Dynamic modification of the production workload schedule in response to changes in the production environment (such as urgent jobs, changed priorities or hardware failures)*
- *Managed utilization of shared resources (such as tape and cartridge drives)*

Whether you are running one or more systems at a single site—or at several enterprise sites—the management software can help you automate your production workload by coordinating shifts and production work across installations of many sizes, from a single point of control. The centralized workload management capability can reduce the need for skilled personnel at remote locations and can help you manage your enterprise systems in an efficient and cost-effective way. Tivoli Workload Scheduler also permits

multiple administrators to use the Job Scheduling Console, enabling control over the enterprise sites and departments within your enterprise.

Tivoli Workload Scheduler also gives you additional flexibility for managing your data processing operations by providing features such as national language support (in nine languages), time zone support (optional) and job auditing support (optional).

Integration to drive business value

In addition to being designed to increase the efficiency of your batch processing activities, Tivoli Workload Scheduler offers important capabilities designed to help drive business value. The software can help you develop operating plans based on your descriptions of the operations department and its production workload. These operating plans can be used to provide a basis for setting service-level agreements with your internal customers. The operating plans can also be used as long-term planning tools, which may help you increase returns on your investments in information technology by helping you simulate the effects of changes on your production workload and resource availability.

Tivoli Workload Scheduler is also designed to integrate with various other systems management solutions, allowing you to manage resources in the context of important business goals. When using Tivoli Workload Scheduler alone, your management capabilities are focused primarily on monitoring and efficiently executing jobs and job streams. However, Tivoli Workload Scheduler also integrates with other systems management products such as Tivoli Business Systems Manager.

Because Tivoli Business Systems Manager understands the relationships between various applications, systems and devices, it can help you view resources in relation to the business processes or lines of business they support. When problems arise (such as a job failure), Tivoli Business Systems Manager can enable you to immediately determine which business systems are affected and how to correct the situation.

This integration between Tivoli Workload Scheduler and Tivoli Business Systems Manager can enable you to manage workloads according to their bottom-line impact. You can define key jobs in the Tivoli Workload Scheduler production plan, and then manage those jobs and job streams from the

line-of-business views you have defined in the Tivoli Business Systems Manager interface.

Key buying criteria

When compared against key buying criteria, Tivoli Workload Scheduler is designed to fulfill these critical requirements:

Key buying criteria	Tivoli Workload Scheduler
Incorporation of network fault tolerance	Introduces additional security and reliability in the e-business application scheduling environment by allowing network processing to continue before, during and after a node or network failure
Ability to handle workloads from multiple applications, platforms and operating systems	Based on open Java management technology, supports batch processing requirements of many major applications (SAP R/3, Oracle) and platforms (OS/390, z/OS, Linux, UNIX, Windows, AS/400)
Ability to handle rapid increases in batch workload volume	Scalable architecture capable of managing hundreds—or even thousands—of jobs per minute during peak demand periods
Automation to enhance productivity	Automates many batch workload preparation tasks; automatically tracks job contingencies to help reduce idle time; automatically recovers and restarts failed jobs without operator intervention
Ability to enhance business value	Integrates with other management software products to allow workloads to be managed in the context of important business processes
Ability to implement sophisticated scheduling features to other application environments	Integrates with premier business solutions such as SAP R/3, PeopleSoft, Oracle and other mainframe schedulers

Tivoli Workload Scheduler provides a solution for managing the daily production workloads in your data processing centers. You can use the software to help you maximize job throughput, optimize the utilization of your resources and retain manual control over the job stream plan if circumstances change. Tivoli Workload Scheduler also integrates with various other systems management software products, which can help you enhance the business value your company can derive from its data processing operations.



IBM software integrated solutions

Tivoli Workload Scheduler supports a wealth of other offerings from IBM software. IBM software solutions can give you the power to achieve your priority business and IT goals.

- *DB2® software helps you leverage information with solutions for data enablement, data management and data distribution.*
- *Lotus® software helps your staff be productive with solutions for authoring, managing, communicating and sharing knowledge.*
- *Tivoli software helps you manage the technology that runs your e-business infrastructure.*
- *WebSphere® software helps you extend your existing business-critical processes to the Web.*

To learn more

For information on IBM Tivoli Workload Scheduler and integrated solutions from IBM, contact your IBM sales representative or visit info.tivoli.com/operationalsuccess

Tivoli software from IBM

An integral part of the comprehensive IBM e-business infrastructure solution, Tivoli technology management software helps traditional enterprises, emerging e-businesses and Internet businesses worldwide maximize their existing and future technology investments. Backed by world-class IBM services, support and research, Tivoli software provides a seamlessly integrated and flexible e-business infrastructure management solution that uses robust security to connect employees, business partners and customers.

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