



ACTIVATE BUSINESS WITH THE POWER OF I.T.™



From Batch Processing to IT Workload Automation

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Executive Summary

Imagine a major, four-way intersection that has four traffic officers directing traffic. Each is responsible for one of the four streets that converge at the intersection, but each is operating independently, unaware of what the other three are doing. Obviously, the result would be chaos.

Many IT organizations run job scheduling in a similar manner. They employ multiple, siloed scheduling groups, with each one responsible for scheduling a different part of the IT infrastructure. Like a busy intersection with multiple traffic officers controlling the traffic flow, this siloed scheduling creates a number of problems.

Job scheduling, originally called “batch scheduling,” was introduced decades ago. It involved scheduling multiple jobs to run on a single machine, typically a mainframe, at a specific time of day. Each job consisted of processing a group or batch of similar work, such as sales orders or payroll checks.

Today, job scheduling plays an expanded and far more complex and demanding role, enabling the automation of a broad range of IT workloads. For this automation to succeed, asynchronous and interdependent real-time and batch IT processes must be orchestrated across multiple, disparate IT platforms. These processes can be triggered by any number of factors, including time of day and specific events. In addition, business applications can directly trigger these processes.

The old approach to job scheduling—using multiple, siloed scheduling teams and multiple scheduling tools—cannot meet the increased demands of IT. Because it requires large numbers of people to coordinate it, the traditional approach is expensive and does not scale cost-effectively to accommodate business growth. Coordination becomes extremely difficult and introduces the risk of errors that affect service levels negatively as well as the risk of non-compliance with company internal policies and government regulations. In addition, rolling out new, multi-tier applications takes more time and effort.

What’s required is a new approach to scheduling, one that can meet the demands of IT. This is known as *IT workload automation*. IT workload automation is analogous to replacing the four traffic officers in the scenario described above with a single traffic light that automatically synchronizes the flow of traffic. The resulting benefits are compelling: lower costs, improved service levels, less risk, and increased integration with the business.

This paper:

- > Examines the factors that drive the need for a new approach to job scheduling that enables IT workload automation
- > Discusses the criteria a scheduling solution should meet to support the new approach
- > Describes the resulting business benefits
- > Presents examples of benefits realized by companies that have implemented IT workload automation

The Role of Job Scheduling Evolves

Job scheduling has been around for decades. Its original role was to support batch processing, which involved accumulating a number of similar types of work. The work was grouped into batches because it was more efficient to process it that way rather than one at a time. The batch process was typically scheduled to run a specific task at a particular time, such as cutting checks for invoice payments on Thursdays at midnight.

Today, the role of job scheduling has evolved into one of supporting the automation of IT workloads. Below are key characteristics of this evolved role.

Orchestrates Multiple Interdependent Business Processes

IT workload automation involves the *orchestration of multiple IT processes* to automate an overall business service. These asynchronous and interdependent IT processes typically run on different platforms. They also may include linkages to other business processes. The flow of these jobs is controlled by a variety of types of events — such as completion of a specific job, time of day, number of pieces of work to be processed, inventory levels, service level agreements, and so on.

For example, an online book retailer might have a web application running in a Windows virtualized environment connected to a Linux database server. The book orders are collected, and their titles are compared against the warehouse location of the titles. When at least 25 titles are ordered from the same warehouse location or more than 5 hours have elapsed since the earliest order, a robot is dispatched to pick the titles from the warehouse shelves and start the shipping process.

Schedules Both Real-time and Batch Processes

IT workload automation includes the *scheduling of real-time processes as well as batch processes*. Online ordering, for example, may involve two real-time processes: sending an email confirmation to the customer, and reducing the inventory count by the number of items ordered. Online ordering may also involve a batch process, such as accumulating orders from multiple customers and scheduling them for fulfillment later that day.

The Need for a New Approach to Traditional Scheduling

The evolved role of job scheduling has resulted in the scheduler's need to accommodate greater complexity today than ever before. In addition, scheduling is far more deeply embedded in — and critical to — business processes and

is now an integral part of almost all businesses. In many cases, job scheduling is literally the facilitator of the business. This increased complexity results in a number of challenges, as described below.

A processing, or batch, window is a period of time a system is expected to have light real-time requirements, when it makes sense to run large batches. With the Internet and the requirement of 24/7 availability, these processing windows have become considerably smaller. Now, there is no allowance for delays, and no time to re-run a job. Batch jobs are scheduled at a specifically-defined time and must be run within that time frame.

At the same time, workload volumes are growing rapidly. What's more, the margin for error is greatly reduced, so scheduling errors now have a ripple effect with serious business consequences. For example, the failure of an online ordering system to execute all required processes in the correct sequence and in the allotted time frame can result in delayed, incorrectly filled, or lost orders, resulting in dissatisfied customers and loss of revenue.

As a result, most organizations have attempted to meet these challenges by implementing an approach that is an extension of traditional batch scheduling, augmenting it with integration brokers. In this approach, jobs are managed in two separate groups: batch jobs are managed by a batch scheduler, and real-time jobs are managed by integration brokers. The two types of jobs are usually cobbled together through file transfers and homegrown scripts. This approach of using integration brokers for real-time jobs does not meet the increased demands of IT workload automation. Its shortcomings include:

- > **Cost.** This approach usually involves multiple scheduling teams that are using multiple tools. It requires costly IT staff resources, and it requires IT organizations to maintain multiple skill sets, driving up training costs. In addition, multiple tools require multiple software licenses and support contracts, further increasing costs.
- > **Inefficient and error prone.** Too many people are involved, and the scheduling teams are usually siloed. In addition, the many disparate scheduling tools do not work well together. As a result, it is difficult for scheduling teams to coordinate effectively, reducing efficiency and increasing the risk of error.
- > **Lack of integration of IT with the business.** Scheduling teams typically do not have visibility into the overall business processes and the business services they support. As a result, they cannot establish priorities based on business impact.

- > **Reduced agility.** Changing existing IT processes to meet changing business demands is difficult. Implementing new processes is cumbersome and usually results in long development timelines. Consequently, IT cannot adapt quickly to changing business conditions.
- > **Limited scalability.** Existing scheduling tools may not be able to absorb increased workloads, so IT may have to implement multiple instances of the same tool to achieve acceptable performance. What's more, IT may have to hire additional staff to handle the increased workloads. Multiple tool instances and increased staff mean higher expense and increased coordination problems, limiting growth.
- > **Increased risk of non-compliance.** The loose integration of IT groups and scheduling tools exposes the organization to the risk of non-compliance with internal policies and external government regulations.

Five Criteria for an Effective Scheduling Solution

To meet the requirements of IT workload automation, IT needs a new approach to job scheduling—a unified, holistic, centralized, and automated approach. Then, IT can manage scheduling from a single point, with a single team, using a single tool set. Such a holistic approach allows independent batch processes to be integrated, thus reducing the risk of human error.

Today, scheduling solutions are available that support this new approach to workload automation. Because effective scheduling of IT processes is essential to business success, the scheduling solution should meet five important criteria:

1. Enables Orchestration

An effective scheduling solution must integrate batch and real-time processes into a single, orchestrated, and automated job flow. This requires the ability to integrate traditional batch jobs with Java applications, Web services, and Message-Oriented Middleware.

Integration also requires that the scheduling solution communicate directly and bi-directionally with the various IT processes that support the overall business process. Message transfer provides the vehicle for this communication. Through message transfer, the solution can trigger, manipulate, and coordinate job flows. To meet this communication criterion, the solution must support popular messaging standards such as JMS and WebSphere MQ Messages.

2. Supports Heterogeneous Environment

Today's IT infrastructures are typically made up of many disparate components that may include Windows servers,

Linux servers, Oracle servers, UNIX machines, and mainframes. To accommodate such heterogeneity, a scheduling solution must provide a single set of tools that:

- > Supports all popular platforms
- > Supports all popular industry standards, such as J2EE, Web Services, Message-Oriented Middleware, and .NET
- > Supports Agentless Scheduling

3. Facilitates Scalability

A single instance of the solution must accommodate business growth without degrading performance. That includes enabling growth in two dimensions: the number of automated processes to be scheduled, and the workload that processes handle. Scalability is especially important in large enterprises where the number of processes and workload volumes is already extremely large and rapidly growing.

4. Manages Scheduling from a Business Perspective

The solution must support managing scheduling from a business perspective by providing a single, holistic, and comprehensive view of business services. This view should show the relationships of the overall business service to both the underlying IT services and infrastructure components that support it. The solution should also enable IT to assign, monitor, and manage service levels from a business service perspective, one that spans multiple IT services and infrastructure components.

5. Supports Scheduling in a Service-Oriented Architecture

Because of the many advantages in streamlining application development, the use of service-oriented architectures is rapidly growing. The scheduling solution should support scheduling in a service-oriented architecture environment. At a minimum, it must support web services, which has emerged as the predominant approach to service-oriented architecture.

Resulting Business Benefits

Transitioning from traditional job scheduling to a solution that enables IT workload automation delivers substantial benefits to both IT and the business.

Reduces Cost

Consolidating scheduling into a single scheduling team and automating IT workload processing frees up a considerable number of highly-skilled IT people to address other pressing tasks. As a result, IT can do more without increasing current staff levels. In addition, managing all scheduling with a single tool set reduces software licensing and support costs. A single team using a single tool set also reduces training expenses because IT has to train fewer people on fewer tools.

Mitigates Risk

Consolidating all scheduling into a single team, using a single tool set, also reduces the risk of people and process errors that might result in service disruption and regulatory non-compliance. A single tool set eliminates problems caused by the lack of tight integration across multiple, disparate tool sets, or across multiple instances of the same tool set. The result is improved service and greater assurance of regulatory compliance.

Increases Agility

IT can increase its agility in responding to changing business conditions. That's because application developers can more easily automate complex business processes by externalizing defined processes to an IT workload automation engine, invoking the scheduler to perform the coordination between processes. As a result, developers no longer have to create homegrown patches and write arcane scripts to tie different processes together. This also permits developers to reuse defined and proven processes. As a result, developers can now deploy new applications faster and with greater confidence, and they have an easier job maintaining them.

IT can leverage the advantages of service-oriented architecture to further accelerate application development. These advantages include the ability to reuse services in multiple applications, and to augment in-house expertise with externally supplied services.

Enables Integration of IT with the Business

By understanding the relationships between IT infrastructure components and the business services they deliver, IT can better communicate with business users and prioritize activities that deliver the highest business value. This approach to managing IT from the perspective of the business is known as Business Service Management (BSM).

IT Workload Automation in the Real World

Many companies are already taking advantage of new and innovative scheduling solutions to achieve IT workload automation, and are reaping the business benefits. Here are a few examples:

- > A leading telecommunications company consolidated the monitoring of over 100,000 jobs per day. As a result, the company has realized a 30 percent savings on elapsed times for billing runs, a 75 percent reduction in headcount (from 400 to 100), and a five percent aggregated CPU resource savings.
- > A major government agency realized a 60 percent savings in staff, a three hour savings in elapsed run times, significant reduction in run time errors, and 100 percent compliance with mission-critical service level agreements.

- > A large energy provider achieved complete automation of workload elements and integrated SAP scheduled processes with the production batch environment. The results include a 25 percent reduction of the job scheduling staff and saved SAP basis administrators three to four hours per day.

Conclusion

In the past, IT has coped with the demands of job scheduling by using a traditional approach derived from batch scheduling. The demands of today's businesses, however, have outgrown the capabilities of the traditional approach. The role of job scheduling has evolved to become the heart of IT workload automation, which is essential for success in today's fast-moving business environment.

To meet the challenge of supporting this approach, IT organizations need a single scheduling team to automate and manage scheduling across the enterprise, using a single set of tools. Fortunately, scheduling solutions that enable this approach are now available.

Implementing the right scheduling solution can transform businesses to a whole new level of business automation. In so doing, organizations can reduce costs, improve service, increase agility, achieve greater integration with the business, and ensure compliance with internal policies and external regulations.

For more information about BMC solutions, visit www.bmc.com/control.



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