Research Report

IBM Workload Automation: Major Improvements in Hybrid Cloud Workload Management, Predictive Analytics and User Experience

Executive Summary

Imagine the challenges involved in trying to manage application workflow across dozens (if not hundreds) of disparate server environments (z/OS, Unix, Windows and Linux) and across hundreds of application environments (SAP, the Oracle E-Business Suite, Oracle PeopleSoft, Salesforce.com, IBM WebSphere MQ, IBM InfoSphere Big Insights, Microsoft SQL Server, Hadoop, Netezza and many, many more) . In this type of environment, applications need to be easily connected with one another in order to flow work; workloads need to be scheduled and executed in timeframes that meet expected service levels; and patching/updates change management procedures need to be automated in order to minimize performance impact.

In the past, application developers needed to manually plan, coordinate and track scheduling activities – and should a problem arise, these developers worked with system managers in order to identify the root cause of the problem and take corrective action in order to meet required service levels. Users and vendors manually built "connectors" using complex scripting to integrate applications and databases. And tools and utilities were developed to simplify the update and patch management processes.

The arrival of cloud computing presented users with new, more flexible information technology consumption models (Platform-as-a-Service [Paas], Software-as-a-Service [SaaS], Infrastructure-as-a-Service [IaaS], and so on) – but also introduced new complexities such as managing different services across public/private (hybrid) cloud environments.

To help application developers and systems managers address these complex challenges, IBM has, over many years, developed a suite of workload automation and performance management products that simplify application connection and integration; automate patching and upgrades; and simplify resource scheduling. These products include IBM Workload Scheduler, IBM Workload Scheduler for z/OS, IBM Workload Automation on Cloud (for SaaS management) and IBMWorkload Scheduler for Bluemix (for PaaS management). We described several of these products in depth in this report written in April, 2014.

Since our last report, IBM has introduced several major improvements in its Workload Automation product suite. IBM's recently introduced IBM Workload Automation v9.3 includes several improvements that include simplified scheduling, predictive analytics (a major step forward in workload modeling and analysis) and additional connectors. In this *Research Report*, *Clabby Analytics* takes a closer look at some of these improvements.

IBM and Workload Automation: Decades of Development and Commitment

IBM has been very active in workload automation since the early days of job scheduling over five decades ago. In the mid 1960s and 1970s, computing jobs (workloads) were scheduled to run (usually in batch mode driven by date/time dependencies) across a static infrastructure (consistent operating environments, middleware, programmatic interfaces, and over a common system architecture – the mainframe). In those days, workload automation was primarily about scheduling jobs.

The 1980s and 1990s saw workloads spread to distributed systems (usually proprietary-OS, Unix-based and Window-based servers). And the nature of computing jobs changed to include batch (serial), interactive and parallel workloads. Additionally, computing programming/infrastructure models changed (with the arrival of the JAVA programming model, service-oriented architecture, and other approaches). Further, systems/software reporting and management facilities improved greatly. Unfortunately, management silos developed – with workloads in centralized environments being managed by one set of tools, and workloads in distributed environments being managed by multiple, diverse, different tools.

In the 2000s, IBM aggressively attacked this separate silos problem by introducing products that managed the integration of workloads across mainframe (z/OS) and distributed environments. Further, IBM built tools to help improve performance management across these environments.

The 2010s brought virtualization and cloud computing to the data center – making it possible to dramatically increase resource utilization by pooling unused resources, while introducing new consumption models (PaaS, SaaS, etc.). But with these new models, new challenges presented themselves – such as how to manage workflow across hybrid computing environments.

> ***Over the years, the nature of job scheduling changed from a batch processing orientation designed to serve a static system/infrastructure environment, to a broader batch/interactive/parallel scheduling model designed to unite multiple types of applications across various operating environments and middleware, across diverse centralized and distributed systems.***

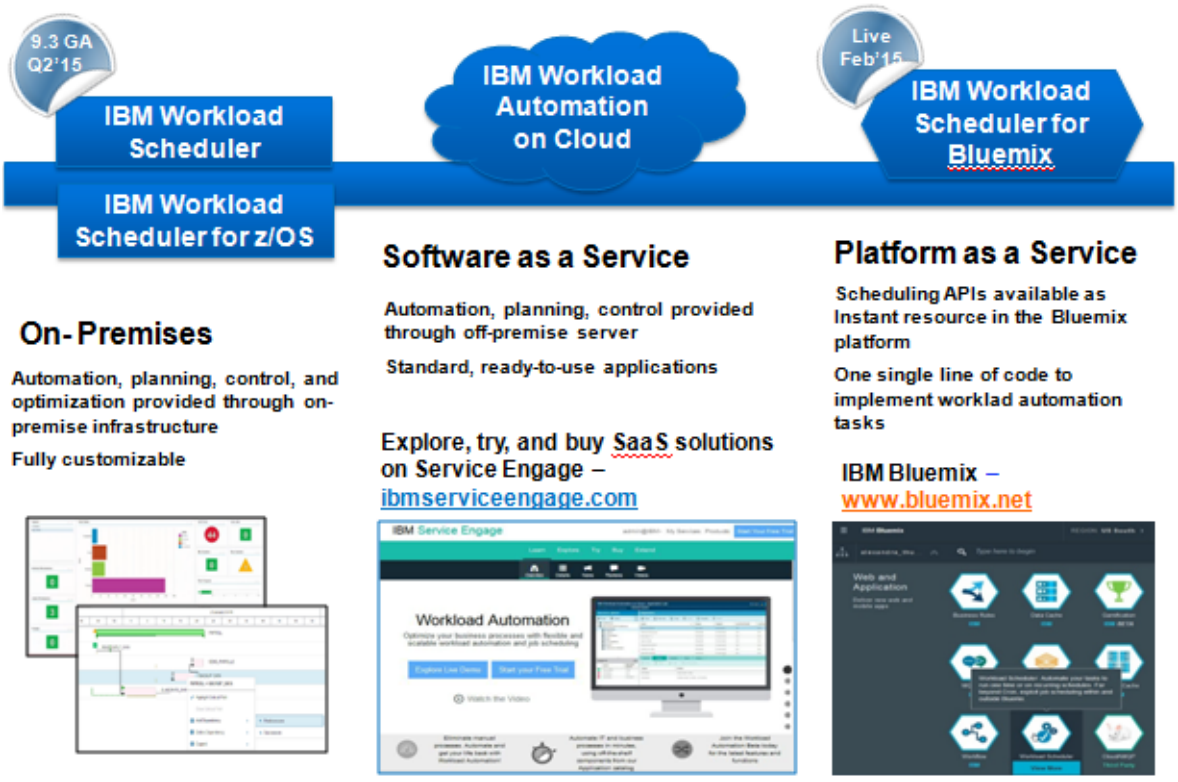
IBM's Workload Automation Product Offerings

Traditionally IBM's Workload Automation product offerings consisted of workload scheduler and workload automation components designed to service *on-premise* mainframe and distributed computing environments. The scheduler and automation components are used to connect applications and streamline application integration.

With the arrival of cloud architecture, IBM has extended those on premise services to include connection and interoperation with public cloud computing environments. What this means is that IBM Workload Scheduler (formerly Tivoli Workload Scheduler – a distributed system workload scheduler), and IBM Workload Scheduler for z/OS (formerly

Tivoli Workload Scheduler for z/OS - a mainframe workload scheduler offering) can now work seamlessly with external SaaS and PaaS environments. In addition, IBM offers IBM Workload Automation on Cloud, which is a SaaS delivery itself. For workload scheduling across a PaaS environment IBM offers its Workload Scheduler for Bluemix (see Figure 1).

Figure 1: IBM's Workload Automation/Scheduler Offerings



Source: IBM Corporation – July, 2015

IBM's Traditional On-Premise Workload Automation Offerings: Some Important Changes

IBM's on-premise workload automation components are IBM Workload Scheduler (for distributed environments) and IBM Workload Scheduler for z/OS (for mainframe environments). These two environments are functionally equivalent and evolve together (except for a few special features designed to exploit features unique to distributed systems or mainframes). Common functionality across these environments includes:

- ***Predictive analysis*** – new analytics tools that help schedulers and administrators model system behavior and help identify potential problems;
- ***Additional connectors to new business applications*** – providing more integration with a wider scope of application environments;
- ***Simplified business integration with SAP scheduling***;
- ***Individual dashboard design*** (schedulers can build custom dashboards); and,
- ***Automatic patching and upgrades for fault-tolerant/dynamic agent environments*** (these patches/upgrades can be issued from a single control point) – for IBM Workload Scheduler;

Some unique features specific to IBM's z/OS workload automation offering include:

- ***Automatic version upgrade facility*** – for IBM Workload Scheduler for z/OS
- ***Integration with IBM Business Service Manager*** for business impact scenarios – for IBM Workload Scheduler for z/OS; and
- ***A new programming language*** to help unify and simplify the existing programmatic interface – for IBM Workload Scheduler for z/OS.

> ***At Clabby Analytics, we are especially impressed with the new predictive analytics aspects of these product offerings. With predictive analytics, schedulers can easily analyze historical data and derive predictive forecasts that can model system/application behavior. With this facility, schedulers can more accurately predict how applications will behave – and thus have a better understanding of how to schedule work to achieve required service levels.***
>
> ***More precisely, with predictive analytics schedulers can model how manual maintenance and schedule-related actions will impact the time it takes to run jobs (job durations). With this type of tool, it becomes possible to better optimize workload performance and thus improve service delivery.***
>
> ***Finally, it is important to note that predictive analytics can also be used to anticipate possible scheduling issues and take appropriate recover action before problems occur.***

IBM Workload Automation on Cloud

IBM Workload Automation on Cloud enables IBM customers to implement a workload automation solution that is hosted by IBM in the cloud. Like the on-premise environment described in the previous subsection, this solution uses IBM Workload Scheduler to model and orchestrate business flows and run jobs. IBM Workload Automation is also used as part of this solution in order to provide connections between applications/databases and to enable smooth process flow.

IBM Workload Automation also offers various preconfigured application templates and connectors, such as an application template that provides access to an inventory management application that includes embedded SAP integration. To take advantage of pre-built templates and connectors, users can access IBM's Application Catalog. Further, workload definitions can be imported from different sources such as Crontab and Microsoft Windows Task Scheduler.

As for integration with on-premise Workload Scheduler workloads, these workloads can be imported using an intuitive wizard that guides the user through the import process. A find and replace feature helps to adapt the on-premises workload to the external SaaS environment.

It is important to note that, as part of its strategy to offer Service Management suite as a service, IBM has introduced an innovative approach known as IBM Service Engage (www.ibmserviceengage.com) that allows its customers and business partners to explore, try and buy SaaS solutions.

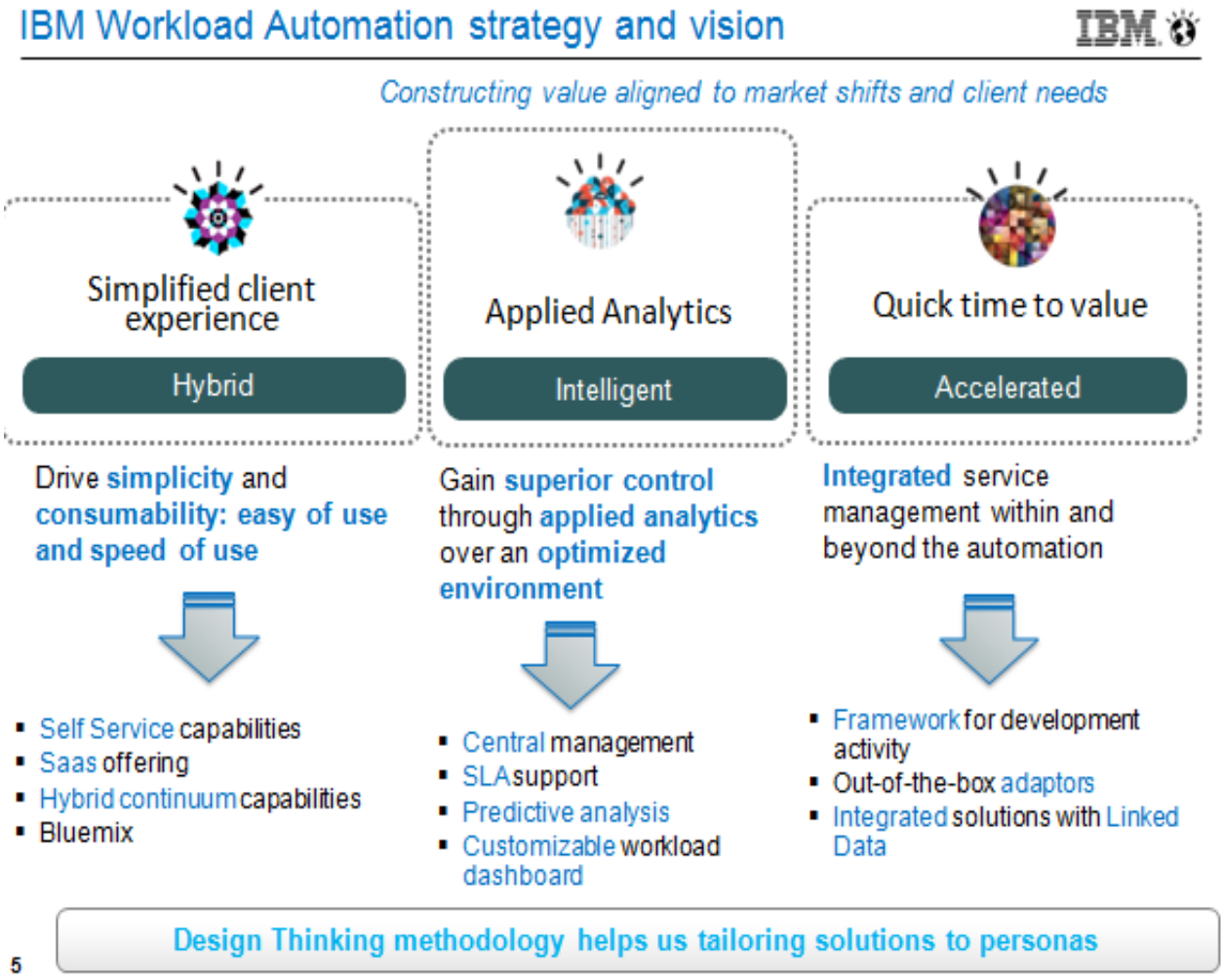
IBM Workload Scheduler for Bluemix
IBM's Bluemix environment contains numerous connectors to applications and underlying infrastructure. Workload Scheduler for Bluemix adds a scheduling facility to Bluemix.

IBM's Workload Automation Strategy
Since our last report on IBM's Workload Optimization strategy (April, 2014), we have seen a big shift in IBM's approach to workload optimization. This shift includes:

1. A stronger emphasis on helping manage workloads across hybrid clouds;
2. The integration of predictive analytics as part of its product offerings; and,
3. Faster time to value with out-of-the-box connectors/adapters and with an IBM hosted Workload Automation cloud-based service.

IBM's new approach is illustrated in Figure 2.

Figure 2: IBM's Workload Automation Strategy and Vision



Source: IBM Corporation – July, 2015

Figure 2 indicates that IBM's Workload Automation strategy is now focused on driving:

1. Simplicity, ease of use and speed of use;
2. On helping schedulers gain greater control through analytics; and,
3. On accelerating deployment using integrated service management beyond automation.

By simplifying its client's workload automation experiences, IBM hopes that its workload automation offerings will help differentiate the company when it comes to hybrid cloud integration. Given IBM's strong position in traditional on-premise data centers – and its tighter linkage to public SaaS services, IBM's goal to simplify its client experience appears to be well underway.

In applied analytics, IBM is looking to differentiate itself by offering superior analytics facilities that enable centralized management of an entire mainframe/distributed computing environment – and that improve scheduler insight into application/system behaviors. IBM has invested billions of dollars into analytics acquisitions as well as in analytics development – and can very clearly differentiate its workload automation offerings based on the strength of its analytics and reporting capabilities.

As for quick time to value, what IBM is describing is all of the activities that it has undertaken to make it possible for developers to more quickly deploy applications – and for systems administrators to more quickly integrate applications and databases. These include a framework for developers, out-of-the-box adapters/connectors and integrated solutions with linked data.

It can also include IBM's Workload Automation on Cloud SaaS offering which simplifies scheduling by enabling customers to use IBM-hosted workload scheduling services.

We see these three strategic foci as clear differentiators for IBM in workload optimization. We see little competition in the hybrid cloud space (very few competitors offer an integrated mainframe/distributed environment that can easily be linked to external public clouds. We see analytics as a major differentiator for IBM as a whole in the general marketplace – and clearly for IBM in the workload automation market. And IBM's effort to accelerate time to value should win it several new engagements. In other words, we see IBM's new workload optimization strategy as well-founded.

Also note in Figure 2 that IBM emphasizes a commitment to a new "design thinking" methodology. In the past, much emphasis has been placed on enabling developers and administrators to manage applications using customizable dashboards. IBM's new design thinking approach is a philosophy that IBM has embraced in the development cycle of the V9.3 release. This philosophy starts observing the behavior of users as they do their jobs – leading to a better understanding of key developer/administrator problems. These problems are explored in greater depth – and users as well as IBM work together to develop new models of what a more efficient management solution might be, drawing wireframes and prototypes, in a continuous feedback process. IBM has invested heavily in design thinking philosophy in order to deliver improved usability and a richer user experience.

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Summary Observations

With new versions of its workload automation and scheduling products that include integrated analytics facilities, combined with a hosted cloud offering and linkage to IBM's Bluemix application development environment, IBM is looking to clearly differentiate itself from its competitors when it comes to workload automation and optimization facilities. We see no other competitors that offer the breadth and depth of IBM in this marketplace. We are glad to see IBM's new emphasis on workload optimization across hybrid cloud environments. When we first studied cloud architecture (almost 8 years ago), we had major concerns about how workloads would be managed as workloads and process flows traversed multi-platform cloud environments. IBM's focus on building integrated, hybrid cloud environments where workflows can be managed seamlessly across on-premise and public clouds has done much to assuage our initial concerns.

We especially like the embedded analytics that have been worked into IBM's workload automation offerings. Before the arrival of analytics, humans have been placed in a position where they have had to analyze volumes of data in order to model workload/system behavior. Machines can do this work much faster – leading to better, faster analysis that can very positively affect service level delivery. IBM's focus on analytics as part of its workload automation strategy will separate IBM from many of its competitors.

When all is said and done, IBM has raised the competitive bar in workload automation. IBM's competitors will be hard-pressed to keep up with IBM in workload automation across multi-platform hybrid cloud environments – and even harder pressed to keep up with IBM in workload automation analytics and reporting.

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