

Leveraging Control-M to Exploit Cloud Technology and DevOps Methodology



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Executive Summary

For continued success, enterprises need an agile IT infrastructure that adapts effortlessly to the changing demands of the business. That's why so many enterprises are embracing the cloud. Modern multi-cloud environments, which include private, public, and hybrid clouds, give enterprises the flexibility to scale up or down as needed, deliver services at a faster pace, offer ubiquitous, anytime access, and require fewer resources to manage.

The transition to cloud involves not only moving legacy applications to the cloud environment but also developing and deploying new applications that tap the power of new cloud services. In many cases, **IT organizations are turning to new DevOps practices to accelerate the delivery of these applications.**

Many business applications require integration and orchestration, which historically have been referred to as “batch.” These services present a threefold challenge in the transition to the cloud:

- Migration of legacy applications to cloud environments often necessitates the rework of hundreds, if not thousands, of workflows to meet the scheduling requirements of the cloud environment.

- Application automation workflows are a logical part of the complete application that delivers a business function. However, they frequently are not managed with the same tools and processes applied to other components, such as source code and configuration definitions. Consequently, IT can't take advantage of DevOps tools to develop, test, and deploy workflows for new applications that are developed specifically for the cloud. That seriously hampers agility.
- IT must manage workflows in both the legacy environment and the new multi-cloud environment during, and in many cases, after the transition.

Control-M addresses all three aspects of the challenge by enabling IT to develop, test, deploy, and manage jobs in both traditional and cloud environments using their favorite DevOps toolchain—all from a single platform. BMC customers are extending their use of Control-M to facilitate the transition from on-premises to cloud technology. This paper provides an overview of Control-M and describes how three BMC customers are leveraging the solution's capabilities to facilitate their move to the cloud.



CONTROL-M IN THE CLOUD

Control-M provides a single view, end-to-end enterprise application orchestration platform that automates business application workflow and file transfer management across multi-cloud and traditional infrastructures. As Figure 1 illustrates, it's easy to extend Control-M's comprehensive functionality to a broad range of cloud environments and technologies.

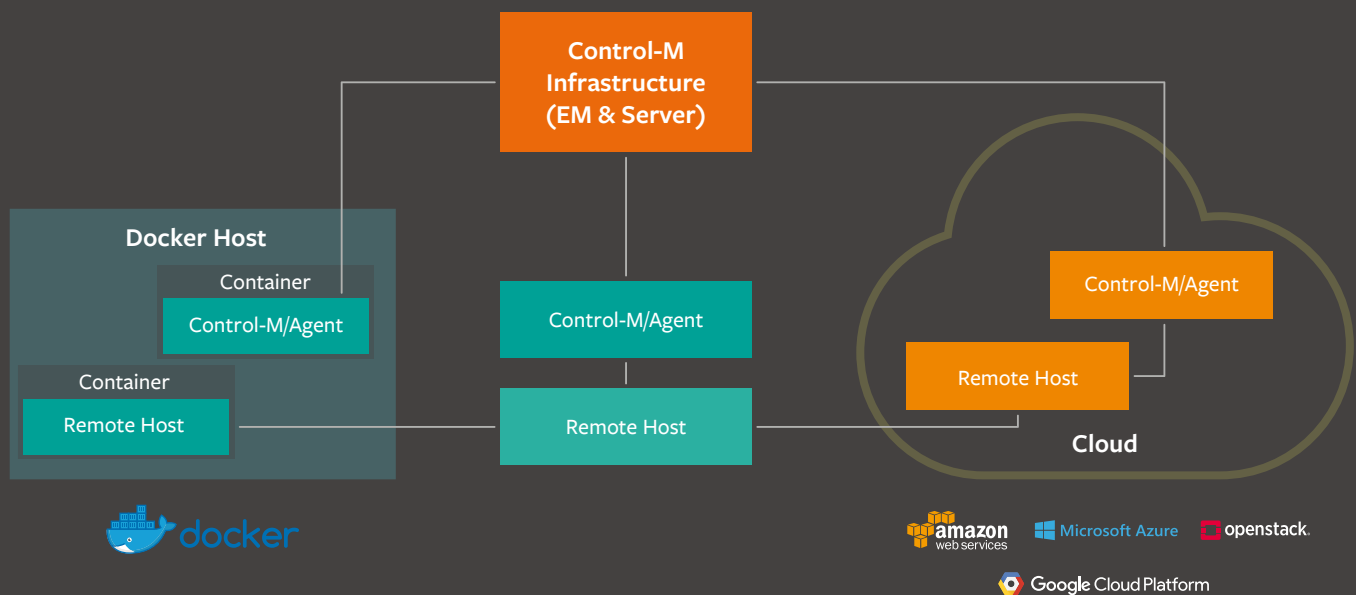


Figure 1. Control-M brings digital business automation to cloud environments

Control-M supports Amazon Web Services RDS and Microsoft Azure SQL, and is available in the AWS and Azure marketplaces. **You can easily provision, install, and configure the full Control-M stack on AWS and Azure in minutes using interactive deployment or DevOps automation tools.** You can provision through AWS Cloud Formation, Chef, or other configuration management tools, as well as take advantage of modern container technologies. **Consequently, you can move Control-M workflows from traditional to new cloud environments with no rework.** And because Control-M provides a single point of workflow automation control for both traditional and cloud-based applications, you can manage all workflows from the same platform.

The Control-M solution adds three valuable capabilities to the DevOps toolbox for developing and deploying new cloud-based applications that include workflows:

- **Control-M Automation API**

The Control-M Automation API is a set of programmatic interfaces that enable developers and DevOps engineers to create, test, and manage service workflows by applying Jobs-as-Code best practices within the agile application release process. It allows developers to include batch jobs as equal participants within the set of application artifacts.

Using JSON notation for job definitions, GIT, and RESTful APIs for validation, configuration, and deployment, developers can seamlessly integrate workflows into the enterprise's automated application release and deployment process while maintaining complete ownership of the entire application. This means developers build and manage workflows in the same way as any other artifact within the application delivery pipeline.

- **Control-M Workbench**

This standalone development sandbox enables developers to code, debug, and test job flows from their personal laptops. The Workbench, which runs in Apple macOS, Microsoft Windows, and Linux® environments, is publicly available and can be used free of charge.

- **Control-M Managed File Transfer**

Managed File Transfer is a powerful solution for data movement that is fully supported by Control-M's Jobs-as-Code approach. The solution provides comprehensive capabilities for building, scheduling, monitoring, and managing secure file transfers within automated application workflows.

Workflows built with these tools seamlessly integrate with most modern continuous integration/continuous delivery (CI/CD) automation tools that support the DevOps process.

CONTROL-M IN ACTION

This section presents three real-world examples of how BMC customers are using the advanced capabilities of Control-M to facilitate their transition to multi-cloud environments.

Amadeus Reinvents Its Operating Model

Amadeus is the global leader in air travel services, serving more than 190 countries. The company's massive IT environment comprises 7,000 servers and 220 million lines of code. The workload is enormous, with 30,000 transactions per second and 300,000 jobs, thousands of which run in parallel.

Digital technologies have completely redefined and transformed the air travel industry. Driven by mobility and internet self-service, customer transactions are growing at double-digit rates. Businesses like Amadeus face major challenges in this highly competitive environment:

- Provide instantaneous response and maintain high availability in the face of explosive transaction growth
- Quickly deliver new services as well as enhancements to existing services
- Keep costs in check

To meet these challenges, Amadeus needed to change its IT operating model—a model that had run into both technical and organizational impediments.

In the technical arena, the architecture consisted of a traditional backend based on open system standards. Scalability was hampered by the amount of time it took to deploy new hardware to accommodate growth. Consequently, it was difficult to maintain acceptable performance and availability levels in the face of rapid traffic growth. Moreover, developers needed extensive knowledge of the underlying hardware and network to build their applications.

From the organizational perspective, development teams and operations teams were scattered across the globe and separated from each other as well as from other operational teams performing tasks like integration. In addition, manual intervention was required to deploy new applications into production. These factors limited IT's ability to deliver new and updated applications at digital speeds.

Amadeus addressed the challenges by developing a new operating model based on DevOps philosophy and cloud technology. The new model comprises Amadeus Cloud Services (ACS) and DevOps. Developed by Amadeus, ACS enables IT to facilitate the development, deployment, and management of applications to any location using automation.

The new operating model enables Amadeus to tap the many advantages of cloud architecture, which:

- Separates and abstracts application, platform, and infrastructure layers
- Provides flexible management of computing resources through multi-tenancy and quota limits for various applications
- Uses standardized low-cost, low-consumption hardware
- Provides redundancy, scalability, and isolation
- Has intrinsic tolerance to system failure
- Is supported by the open-source community

The migration to cloud architecture required moving many existing batch jobs that underpin critical functions with services such as:

- Delivering passenger manifests to government security agencies before planes leave their gates
- Processing boarding pass bar codes
- Ensuring correct plane fueling
- Managing flight, hospitality, and baggage schedules

During the transition to the new dynamic cloud infrastructure, these jobs had to run in both the existing and the new environments.

Amadeus is a long-time Control-M user and has hundreds of thousands of existing jobs orchestrated by Control-M. Thus, it was a natural step to enlist Control-M support for cloud technologies. Amadeus did this by integrating Control-M into Amadeus Cloud Services. The staff used the Control-M Automation API to seamlessly extend Control-M core functionality, such as single point of control, service level management for batch workloads, and integration of file transfers into applications that are built on new technologies, including Docker, Openshift, Kubernetes, and OpenStack. Figure 2 shows the new Amadeus cloud architecture.

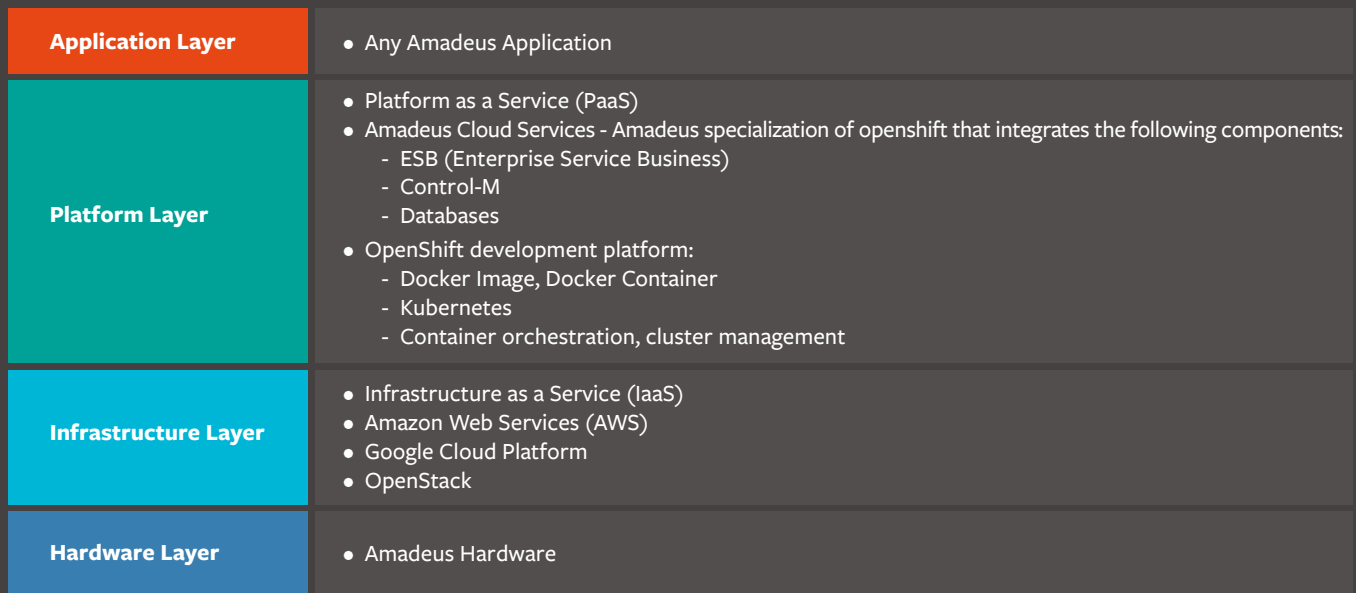


Figure 2. Amadeus cloud architecture

Control-M is delivering important benefits to Amadeus, including eliminating the need to rework jobs for migration from the traditional infrastructure to the new cloud infrastructure. Reworking a large portion of the 300,000 existing jobs before migrating them would have been cost-prohibitive and the time required for rework would have slowed the transition.

Control-M also speeds the development, testing, and deployment of workflows for new applications. **Control-M Automation API and Control-M Workbench allow developers to take advantage of DevOps tools, saving development effort and budget.** In addition, Control-M permits management of workflows in both the traditional and new cloud environment from a single point.

PayPal Supercharges Application Development

PayPal is committed to democratizing financial services and empowering people and businesses to join and thrive in the global economy. The company, which serves more than 200 markets and has 218 million active account holders around the world, enables consumers and merchants to receive money in more than 100 currencies, withdraw funds in 56 currencies, and hold balances in their PayPal accounts in 25 currencies.

The IT infrastructure processes more than \$13,538 USD in payments every second. To support its massive workload, PayPal has a huge IT environment that encompasses:

- 4,500 developers
- 50 million lines of code
- 1 million builds per month
- 2,600 applications
- 100 terabytes of application artifacts
- 42,000 batch executions per day
- 230 billion hits per day

PayPal IT was under pressure to speed its application development process to meet customer demands for new and enhanced digital services that improve and simplify financial interactions. It was taking days to create an application, weeks to deploy a test server to test the application, and months to release the application into production. Something had to change.

To accelerate application development, IT built a DevOps platform for automating all phases of the software development lifecycle (SDLC). As Figure 3 shows, the platform provides a single, self-service location for developers to use in creating new applications or modifying existing ones. Automation accelerates the development process and ensures consistency across the enterprise.

Figure 3. PayPal DevOps platform for automating the SDLC



To create an application, the developer clicks the Create Application button and selects an application framework to be used such as Java, node.js, Scala, or Python. The developer assigns a name to the application and specifies its parameters, such as:

- The hosts on which the application will run
- Service dependencies such as databases and user identity services
- Applicable test environments
- Monitoring and metering requirements
- Escalation rules in the event of an application issue

The developer then interacts with the platform to sequence the application through the entire SDLC, with the platform enforcing best practices every step of the way. The developer can also create an enterprise continuous deployment pipeline. Here, every time the developer commits an application code change, the platform builds the change into the overall application, tests it, and deploys it—all automatically.

Use of the platform has already impacted several phases of the SDLC:

- **Develop** – 1,000 applications have been developed to date. These account for more than 85 percent of front-tier traffic and more than 50 percent of mid-tier traffic
- **Build and Test** – Developers can deploy to a test host in less than 20 minutes, and there are four billion calls per day to the test cloud.
- **Provision** – Developers can self-provision production pools in minutes. The platform automatically enforces site architecture principles such as multi-data center and a minimum number of hosts in each pool.
- **Deploy** – Developers are performing 4,000 deployments to 15,000 production instances each day.
- **Monitor** – The platform automatically provides monitoring based on built-in instrumentation. Monitoring captures 440 terabytes of data each day, gathers 350,000 metrics per second, and powers 1,500 custom dashboards.

To further accelerate application development, IT has turned its attention to the scheduling phase of the lifecycle. Many applications rely on batch processes and execute 42,000 batch processes every day.

A centralized scheduling team was implementing batch scheduling after the initial application development. That presented two problems:

- The back and forth between development and scheduling teams slowed development.
- The need to bring on an increasing number of schedulers hampered the ability to scale. IT wanted to bring as many developers as possible onto the automation platform to speed development and enforce application consistency across the enterprise. However, it wouldn't be practical to bring on enough new schedulers to support the accelerated development cycles.

Control-M offered a solution. IT had been using Control-M and is extending its use to the DevOps platform. Developers can use the Automation API to code batch scheduling in their applications. In addition, IT is building tooling around Automation API to enforce best practices and implement all compliance and governance requirements.

Including workload scheduling in applications eliminates the need to defer to a centralized scheduling team, thereby speeding application development and increasing scalability. Moreover, **Control-M provides a single workload automation solution across the enterprise to handle both the traditional environment and the new automated development environment.**

Major Credit Card and Financial Services Provider Moves to the Public Cloud

Like most companies in the financial services industry, this company was under continuous pressure to give customers access to more digital services from their mobile devices. To maintain the company's leadership position, the IT organization needed to accelerate the development and deployment of new mobile applications and services. That meant shifting to mobile applications as the primary platform for financial transactions and services.

To speed the delivery of new services, IT decided to transition from its traditional datacenters to the public cloud. IT opted to move much of its workload to Amazon Web Services (AWS) and to use new technologies and processes, including DevOps, to expedite the delivery of new applications built specifically for public cloud environments. IT also wanted to leverage Docker container technology, Kubernetes, and other dynamic infrastructure technologies on AWS.

In addition to speeding application development, the move to the cloud offered another important benefit: eliminating traditional data centers would save a considerable amount of money because—as is typical in most enterprises—a large portion of the company's IT budget went to supporting routine data center operations, leaving little to invest in innovation.

To drive down costs, IT planned to reduce the number of data centers from eight to three over a four-year period. **IT estimates that reduction will cut costs by as much as 90 percent.** IT can then realign its budget to spend more on innovating with new applications and services.

The transformation involves completely reengineering the company's IT operating model over a five-year period. Figure 4 shows the changes that the reengineering will bring.



Figure 4. Five-year reengineering journey

Moving to the public cloud also presented an additional opportunity. Maintaining compliance with government regulations and industry standards is a major requirement in the financial service industry. The move to public cloud will permit the company to switch from the onerous practice of individually patching physical servers to periodically and automatically refreshing cloud servers using templates. This refresh approach offers greater assurance of compliance with considerably less effort than patching.

The move to public cloud requires IT to:

- Migrate existing application workloads from the data center environment to the new public cloud environment in as simple a manner as possible
- Bridge application and data management across data center applications and cloud-based applications

And IT must do all this while improving operational oversight and governance in the resulting hybrid infrastructure environment.

The company had been using Control-M and extended its use to the public cloud. With Control-M, IT can migrate existing batch workflows from the data center environment to the public cloud without rework. Additionally, developers can use Control-M Automation API and Workbench to develop and test batch workflows to support new applications using Docker, Kubernetes, and other dynamic infrastructure technologies on AWS. Doing so will save developer time, accelerate application delivery, and improve service quality.

In addition, operations teams can use the Control-M single point of control, service level agreement (SLA) management, and fully integrated file transfer management with any legacy or new application or database. **This single platform approach bridges from the current traditional to the new dynamic cloud infrastructure.**

CONCLUSION

For many enterprises, transitioning to a multi-cloud environment is a necessity in order to meet business requirements for rapid scalability, which accommodates growth and faster delivery of digital services to meet customer demands. Moving workloads to the cloud environment presents a particular challenge.

As the customer examples presented clearly demonstrate, Control-M enables enterprises to meet the challenge. It eliminates the need to rework workflows, speeds the development of cloud-based applications that include workflows, and it bridges workflow management from traditional to multi-cloud environments. Consequently, enterprises can leverage Control-M to exploit cloud technology and DevOps methodology and reap the resulting business benefits.



FOR MORE INFORMATION

To learn more about how Control-M enables DevOps and cloud strategy, visit bmc.com/it-solutions/control-m-devops

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