WHITE PAPER

Closing the Gap Between Apps and Ops

Leveraging Application Virtualization and Cloud Computing to Accelerate Business Value

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Overview

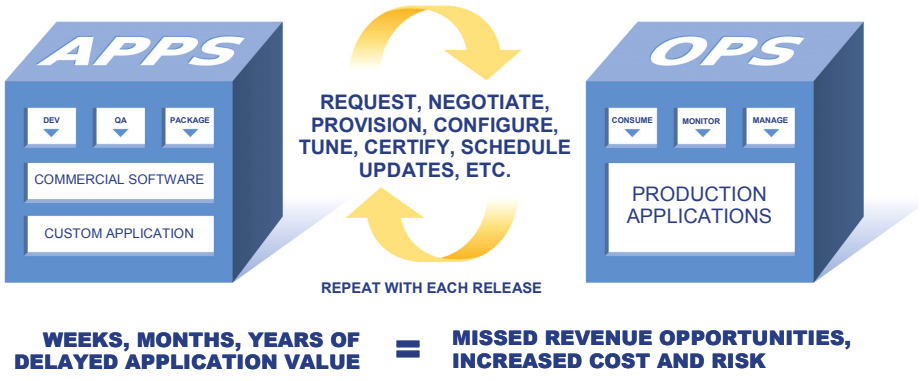
Application deployment and maintenance is far too slow and expensive due to a gap that has long existed between application development and production operations. This gap is the result of competing objectives. "Apps" is about delivering value to the lines of business (LOB) as rapidly as possible through innovative new application features. By contrast, "ops" is about ensuring operating stability, compliance, and cost control through standardization and stringent change management.

This gap can inhibit business responsiveness, delaying deployments and causing organizations to miss opportunities. While organizations have made great progress in promoting agility in application development, far less progress has been made in extending this agility to deployment and operations—where application value is experienced and realized. What enterprises want is a frictionless relationship between apps and ops, closing this deployment gap to accelerate application value.

The Deployment Gap

The space between quality assurance (QA) and deployment is perhaps the most significant bottleneck in the delivery of enterprise applications. Once an application is unit test complete, a release manager or deployment specialist within the application development group begins what is often a painful and protracted negotiation with the operations team. Once capacity, charge backs and service levels are negotiated, the ops group must schedule time to provision hardware, install the operating environment, and spin up the application. What follows is an inherently manual process of configuration, tuning, tweaking, validating, and finally certifying the application.

The deployment gap stands in the way of application value, slowing delivery of new functionality. Months and months can pass—and so can business opportunity.



Months and months can pass. In the meantime, the lines of business miss revenue opportunities and incur unnecessary costs and risks. Much of the time, these development projects are funded in direct response to dynamic market conditions—competitive assaults, new regulations, emerging market opportunities, etc. There's often great urgency to deploy an application—not now, but yesterday. As a result of this urgency, organizations are looking for ways to accelerate delivery and consumption of application functionality.

Taking the Friction Out of Application Deployment

One of the most notable recent solutions to the pain of this deployment gap is software-as-a-service (SaaS), which shelters organizations from the cost and complexity of installing commercial software and its operating environment by delivering functionality as a service over the web. This closes the deployment gap by entirely eliminating the interaction between apps and ops, allowing LOB to take advantage of application functionality on demand on a pay-as-you-go basis. SaaS can be liberating for SMBs, departments and workgroups, but it often has difficulty crossing over into enterprise computing. This is due to a one-size-fits-all approach that lacks the flexibility of on-premise commercial and custom software and the reality that multi-tenancy still raises questions about security, privacy and compliance. To be sure, SaaS has a role, but it's not a substitute for enterprise software.

What enterprises are looking for is the simplicity and zero-latency consumption of the SaaS model, together with the flexibility and control of traditional software models—a combination of custom and commercial software, deployed into production without the onerous delay of today's deployment gap.

Closing the Deployment Gap with Application Virtualization

Application virtualization decouples applications from their operating infrastructure, compressing deployment cycles from months to minutes by transforming applications into self-contained images that can run on any virtualization platform. Once the application is unit test complete, a basic configuration process specifies the bits of operating system and related system software—just enough operating system (JeOS)—along with requirements for database connectivity and other network-based services. These bits travel with the application package and allow it to run as an image on any virtualized infrastructure without any manual setup, tuning, configuration or certification. Suddenly, the deployment gap disappears and applications are set free.

Additionally, when these virtual machine images are further optimized to eliminate unnecessary operating system and middleware components, the lifecycle management and maintenance of deployed applications becomes dramatically less complex and expensive and the operational risks associated with security related patches are greatly reduced.

Some commercial software vendors are beginning to package and deliver their products as "virtual appliances," making them easier to deploy on top of virtualized hypervisor-based infrastructure or in cloud computing environments. But for enterprises, the application pipeline is a blend of both custom and commercial software, which means they must look beyond their software vendors to enable virtualized and cloud-ready enterprise applications.

Today's enterprises must define their own application architecture to create and manage virtual applications for faster, simplified deployment and as a basis for deploying applications in the cloud.

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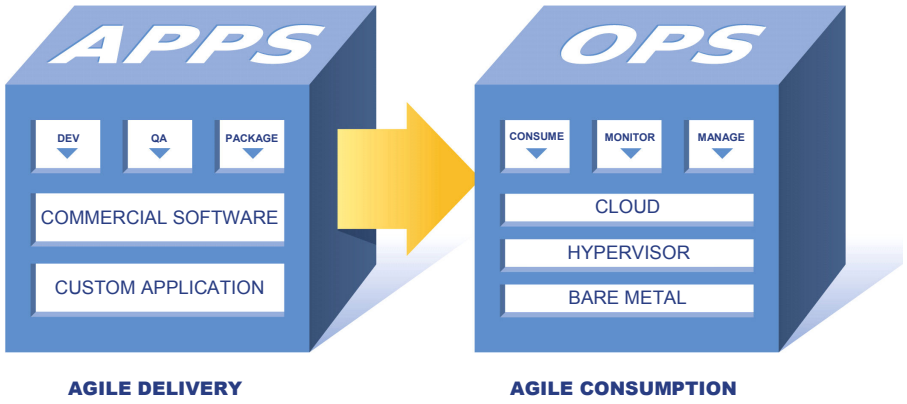
Virtualization allows both commercial and custom applications to run in any virtual or cloud computing environment, internally or externally. This closes the deployment gap, freeing users to realize application value without delay, while laying the foundation for cloud computing.



The Path to the Cloud

Cloud computing has emerged to bring together virtualization and SaaS—along with the notions of grid and utility computing—to create a flexible and scalable environment for the deployment of both custom and commercial applications for on-demand, pay-as-you-go access. In this context, compute capacity becomes elastic, allowing lines of business to align the cost of application consumption to actual demand. Ultimately, a combination of internal and external clouds replaces the traditional data center, providing infinitely scalable capacity and the ability to seamlessly rationalize application workloads.

Key to cloud computing is the notion of application virtualization, which allows applications to run in virtually any compute environment without any manual set up, configuration or tuning—just plug it in and it works. Releasing applications in this manner opens the door to embrace cloud computing by enabling applications to scale seamlessly from the internal datacenter to the external service provider—without any additional rework or certification.

Some organizations will pursue cloud immediately as a way to sidestep the process bottlenecks and political resistance of IT operations. Others will leverage Amazon EC2 or another third-party cloud as a strategic test bed for experimentation and planning toward their own internal cloud. In either case, application virtualization is the onramp to cloud computing.

Enterprise Application Virtualization: Combining Agility and Control

The reality is that new IT flexibility for one group always yields a loss of control for another. This is equally true for virtualization and cloud, which provides great flexibility for application development and lines of business, but often creates anxiety for the IT operations personnel responsible for quality of service and compliance and the architects responsible for the definition and enforcement of standards.

Like any emerging technology, newer approaches like virtualization and cloud typically begin with ad hoc, informal processes. This may be suitable for early experimentation, but it quickly cascades into patterns of inefficiency and accrued risk as organizations attempt to scale. These inefficiencies are why new approaches to computing like virtualization and cloud require operations and architecture groups to think about repeatable practices, definition of corporate standards and policies for virtual machine consistency and quality,

and patterns for collaboration between apps and ops. This requires an integrated lifecycle approach and new application architectures to support it.

When implemented correctly—together with virtual infrastructure or clouds as the compute environment—this new approach provides the deployment speed applications groups seek, while allowing operations to enforce control through the definition and enforcement of policies. It's a win for both apps and ops.

The New Application Architecture

The new architecture for virtualized applications sits between the traditional worlds of application lifecycle management (ALM) and enterprise system management (ESM), providing a bridge that dramatically accelerates production deployment. This approach helps control the chaotic, unmanaged proliferation of virtual machines by ensuring efficient reuse, quality, transparency, management and maintenance in production. By facilitating seamless collaboration between apps and ops, this architecture provides application development with the speed and flexibility they want, while ensuring IT operations has the control and predictability they need. In doing so, it allows organizations to dramatically grow the volume of virtual machines they're bringing on line, while mitigating the risk of chaos and untenable maintenance burdens that always accompany unmanaged growth.

Defining and enforcing both design- and run-time policies is essential for creating this balance between agility and control. In this context, policy becomes the binding contract and the basis for trust between apps and ops, ensuring that virtual applications conform to design, quality and operating standards. Once these policies are codified, they can be consistently and automatically enforced as virtual applications are released and changed. Allowing users to release virtual applications without a model for policy enforcement creates serious risk, making virtualization an enabler for chaos rather than empowerment.

This architecture includes the following integrated platform capabilities:

This lifecycle approach addresses the chaotic, unmanaged proliferation of virtual machines, allowing organizations to scale a virtual application pipeline with control, transparency and predictability.

Define Policies – Must include a library of standards-based policies and the flexibility to define custom policies that govern the quality, conformance and completeness of virtual applications before they're put into production. These policies must be defined with the cooperation of IT operations, which is the ultimate arbiter of deployment readiness and must have a role in policy definition.

Enforce Policies – Once policies are codified, conformance checks are run automatically as part of the build process, ensuring that a virtual application meets all of the design and run time standards and other preconditions for deployment. With these policies enforced, operations can fully certify the application with no additional work.

Build Image – A simple configuration process should allow a build manager to transform working software into a self-contained image that includes all of the operating bits to run in any virtual or cloud environment. It is important to ensure that the build system supports virtual applications that can run in any cloud- and hypervisor-based environment to mitigate the risk of infrastructure lock-in and enable the flexibility of deployment in disparate environments over time.

Orchestrate – This automates the "handshake" with the deployment management system to ensure that the virtual application conforms to run time standards and that both server capacity and network services are available for a successful deployment. Once the handshake is successfully completed, the application is automatically deployed.

Maintain – Unlike traditional enterprise applications, these application images can proliferate very rapidly to accommodate growing demand and scaling requirements. This makes the traditional manual maintenance model for deploying updates and patches impractical and cost prohibitive. As such, the lifecycle platform must have a scalable maintenance system that deploys updates to the virtual application in production, enabling rapid response to security requirements and feature updates.

Lifecycle management – There's a tendency to think of application images as disposable, fungible commodities. The reality is that—like any other application—virtual apps have a lifecycle that must be managed to mitigate the risk of chaos and sprawl. Companies must be able to manage versions, state changes, approval steps, history, ownership, applied policies, service level and charge-back agreements, etc., as part of the metadata package (the "paperwork") that travels with the virtual application. They must be able to understand relationships to analyze impact and dependencies, and to capture run time data to create a single view of the complete virtual application lifecycle. Without a way to manage this lifecycle, organizations will see duplicate efforts, reliability and service level issues, and even noncompliance with IT and regulatory policy.

This type of application architecture is foundational to virtualization and cloud initiatives—it has crosscutting implications that must be addressed in the earliest stages of implementations. The reality is that those who delay an architectural approach to application virtualization will put initiatives at risk, finding themselves unable to contain the sprawl and manage the chaos as demand and scale compound. The lesson is that you can't simply "back into" this sort of management foundation over time—organizations who delay a lifecycle approach will find it too late to take corrective action once issues start to appear.

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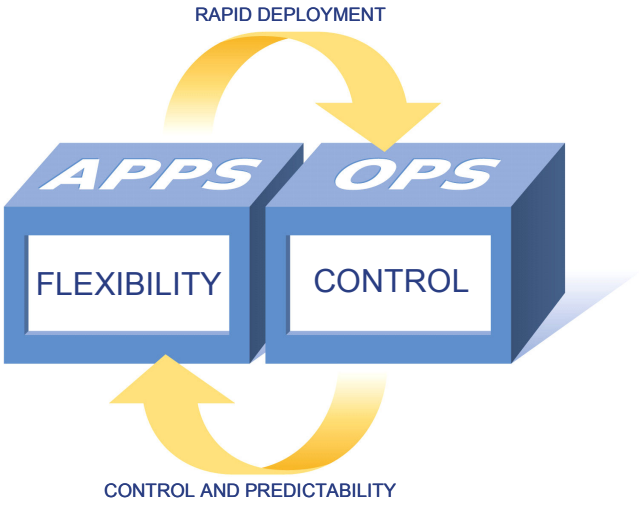
Enterprise application virtualization as a complete lifecycle approach creates alignment between apps and ops by combining agility and control in a way that satisfies what were once competing and conflicting interests.



Aligning Apps and Ops

Inconsistent and ad hoc processes and practices invariably lead to chaos and risk as implementations mature. This is why it is critical organizations embrace a consistent and integrated managed approach as a foundation to their virtualization and cloud computing strategies. A lifecycle approach to enterprise application virtualization aligns apps and ops, providing the speed and efficiency application development groups and LOB wants, together with the control and predictability IT ops requires. With the appropriate application architecture in place, IT operations can be sure that what goes into production is high quality, consistent and fully conforming to the policies they dictate. This becomes the bridge between apps and ops, combining agility and control and accelerating the realization of application value by finally closing the deployment gap.

About rPath

rPath® is the pioneer and leader in enabling technology for virtualizing software applications and managing the complete lifecycle of virtual appliances and application images. ISVs and enterprises rely on rBuilder® and the rPath Lifecycle Management Platform™ to automate the creation, configuration, conformance, management and maintenance of application images for virtualized and cloud computing environments. By producing application images that are optimized for any hypervisor, rPath frees the application from the underlying hardware, and enables a more efficient, lower cost model for development, maintenance and support and dramatically accelerates application deployments. rPath's end-to-end technology simplifies the entire range of lifecycle management activities for application images, while promoting scalability in response to dynamic demand.

Define Your Path for Cloud Computing

To help organizations realize the promise and avoid the perils of cloud computing, rPath has defined the Cloud Computing Adoption Model, which provides a pragmatic, actionable, step-by-step framework for achieving measurable benefits now, while laying the foundation for the strategic benefits of a cloud infrastructure over time. The five levels of cloud computing adoption include:

- **Level 1: Virtualization.** The first level of cloud adoption employs hypervisor-based infrastructure and application virtualization technologies for seamless portability of applications and shared server infrastructure.
- **Level 2: Cloud Experimentation.** Virtualization is taken to a cloud model, either internally or externally, based on controlled and bounded deployments utilizing Amazon Elastic Compute Cloud (EC2) for compute capacity and as the reference architecture.
- **Level 3: Cloud Foundations.** Governance, controls, procedures, policies, and best practices begin to form around the development and deployment of cloud applications. Initially, level 3 efforts will focus on internal, non-mission critical applications.
- **Level 4: Cloud Advancement.** Governance foundations allow organizations to scale up the volume of cloud applications through broad-based deployments in the cloud
- **Level 5: Cloud Actualization.** Dynamic workload balancing across multiple utility clouds. Applications are distributed based on cloud capacity, cost, proximity to user, and other criteria.

To learn more about rPath for Enterprise Application Virtualization or to download the Cloud Computing Adoption Model, visit www.rpath.com.

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