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Integrating Cloud Management Platforms, PaaS and DevOps for Business Effectiveness

Practical steps towards scaling and accelerating innovation, using DevOps best practices and the Common Cloud Core (C3) architecture

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DevOps with C3: Cloud Management, Automation, and PaaS

We have reached a tipping point in IT delivery. Business and IT leaders looking to innovate more quickly are increasingly turning to Hybrid Cloud and Platform as a Service (PaaS) architectures as a basis for delivering digitally enabled services. As more forward-thinking organizations base their success on what we are calling the 'Common Cloud Core' (C3), comprising Cloud Management Platforms (CMP), Automation Frameworks, and PaaS.
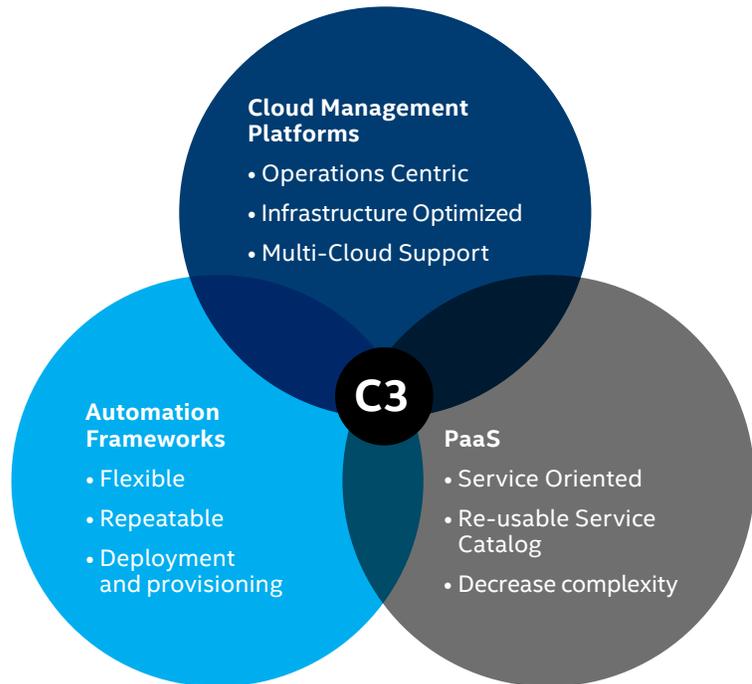

Cloud Management Platforms

• Operations Centric

• Infrastructure Optimized

• Multi-Cloud Support

C3

Automation Frameworks

• Flexible

• Repeatable

• Deployment and provisioning

PaaS

• Service Oriented

• Re-usable Service Catalog

• Decrease complexity

Figure 1. Common Cloud Core (C3): Cloud Management Platforms (CMP), Automation Frameworks, and Platform as a Service (PaaS)
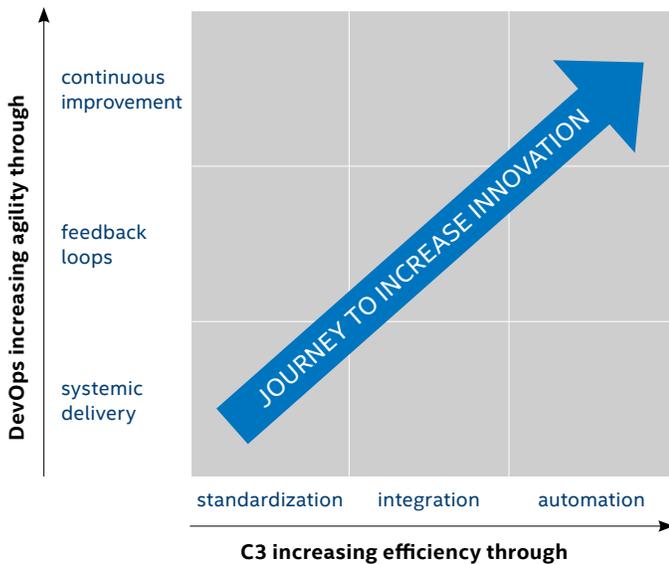
Figure 2. Mapping DevOps against Common Cloud Core (C3)

Based around what people want to do with technology – stakeholder use cases – the C3 achitecture delivers dynamism and scalability from infrastructure, delivering a comprehensive foundation for innovation. Its elements are constantly evolving, for example:

- CMPs now encompass containers and advanced orchestration mechanisms

- PaaS is incorporating microservices, and looking towards functions as a service models

- Automation frameworks are adding governance layers onto continuous integration/deployment.

This increasingly mature, hybrid technology foundation, built on both public and private cloud, is becoming the technology foundation to deliver the speed and agility the business requires. Alongside mobile, social and other technologies, hybrid cloud is now accepted as a central component of the innovation to drive new business value.

The de-facto availability of a massively scalable, orchestrated foundation such as C3 is driving interest in agile delivery and deployment approaches such as DevOps. C3 enables DevOps, increasing developer autonomy and deployment flexibility; and the efficiency of C3 is unlocked by DevOps automation. The converse is also true: friction between C3 and DevOps causes bottlenecks to delivery, reducing deployment and innovation speed.

In response, this paper looks at how the enabling context of C3 can help drive the benefits of DevOps, and vice versa. As shown in figure 2, accepted stages of DevOps maturity to deliver **increasing agility** are about systemic delivery, feedback loops, and continuous improvement. Meanwhile, C3 best practice gives us three stages of **increasing efficiency** through standardization, integration, and automation.

By looking at DevOps and C3 together, organizations can proceed further, more quickly and with less risk towards the goal of delivering new business value through technology innovation.

DevOps as evolving best practice

DevOps is centered on a single principle – that delivery of usable functionality should be prioritized above other success measures. There is solid business and financial proof of this principle. For example, Net Present Value (NPV) calculations show how delivering a small number of functions to a reasonable standard can start enabling business value, offsetting further development costs. If developers deliver 20 percent of the functionality (at much reduced cost and timescales) and meet 80 percent of a requirement, the organization can innovate faster as well as learning from what is delivered.

From rapid application development, through to extreme programming and agile development, each generation of software developers has had an alternative to slow and onerous waterfall methodologies. Agile methodologies create frequent releases of incremental functionality, based on highly disciplined continuous integration, and continuous delivery. As a result, rather than an application taking years to go from idea to action, the goal is to take months, weeks or even days.

Such advances were not being felt by operations staff who were responsible for keeping applications and services running post-delivery. Historically it was true that once an application stack is deployed, it would stay deployed for many years. The advent of virtualization, followed by cloud and now containers, microservices and so on, has changed this, enabling IT infrastructure to be operated and orchestrated flexibly and dynamically.

Whereas cloud-first organizations have felt immediate benefit from dynamic IT operations models, many organizations have experienced a bottleneck between development and operations. Traditional software development and operations processes involve multiple transfers between teams—from the business to developers, then to quality assurance and finally to operations: inertia leads to issues with deployment speed and other overheads, which are no longer justifiable in organizations looking to deliver innovation.

DevOps extends agile best practices across development and operations, minimizing or removing the bottleneck between the two functions. As such it is **fundamental to any organization that wants to innovate based on technology: digital transformation and DevOps go hand in hand,** delivering increasing business agility through:

- **Systemic delivery** – The organization should be able to move quickly from new ideas to new applications and services in production, in a consistent, and continuous fashion.

- **Feedback loops** – Success criteria and metrics enable the development and operations process to be monitored, plus the lessons learned from new ideas that do not hit the mark.

- **Continuous improvement** – The goal of successful DevOps is to move faster, delivering more through improving effectiveness (increasing results) and efficiency (reducing overheads).

At the outset, DevOps requires high-level buy in. It is not enough to set up a DevOps team or simply expect lines of business, development and operations to communicate better without support from the top. Businesses can take the following actions to on-board DevOps into their organization:

- **Create and empower executive responsibility for DevOps** – If DevOps is the exception to corporate strategy rather than the norm, it is less likely to succeed. It needs senior buy-in and performance measurement to assure its adoption.

- **Look at satellite business unit adoption** – If it is not possible to roll DevOps out across the entire organization, consider first delivering it across a single business unit, or in one geography.

- **Recruit DevOps skills and experience** – Traditional developers can learn DevOps approaches but it is worth injecting programmers that come from a DevOps background and who see it as the norm.

How PaaS makes DevOps a necessity

Today's cloud-first start-ups do not have the same silo-based approach as traditional development organizations, as they are already building on a shared platform. In the same vein, C3 has taken DevOps from an evolution of best practice, to an indispensable element of digitally enabled innovation.

PaaS abstracts application infrastructure, operating system, middleware, and configuration details, all provides developer teams with the ability to provision, develop, build, test, and stage applications without operational IT assistance, moving deployment decisions into the domain of the development team. Meanwhile CMPs and automation enable IT operations to deliver a stable, scalable and secure platform of infrastructure and services.

Working together with DevOps, PaaS increases developer effectiveness by reducing complexity, increasing automation, and enabling component reuse across traditional PaaS, microservices and container-based models. As a result, it brings numerous benefits to DevOps approaches:

- Standardization and extensibility, enabling portability across platforms and devices

- Improved resource utilization, delivering capacity without needing to overestimate

- Integration with legacy solutions, offering a shared and scalable layer

- Security compliance and business continuity through platform-enabled features

- Control and visibility, reducing time and facilitating cloud-aware development.

The result is to unleash fresh creativity in your developer community to produce new, innovative, and differentiating business services that can help derive greater business value. However, this puts further pressure on innovation-based approaches: **PaaS without DevOps cannot scale, nor can DevOps without PaaS.** Those looking to onboard PaaS into their organization should consider the following actions:

- **Learn about PaaS and containers** – Understand features and benefits PaaS brings to the organization.

- **Consult with developer and operations organizations** – Determine interest and readiness to adopt PaaS.

- **Define the type of applications to target** – For example mobile applications, line of business applications and web-based applications all have different needs.

With PaaS, applications can be programmed and deployed more easily without developers having to worry about the supporting systems—only the application design. Developers gain a new approach for addressing design challenges and enables them to do what they do best—create applications. To maximize the benefits of PaaS-enabled DevOps you will require flexibility in the infrastructure, which brings us to automation and C3.
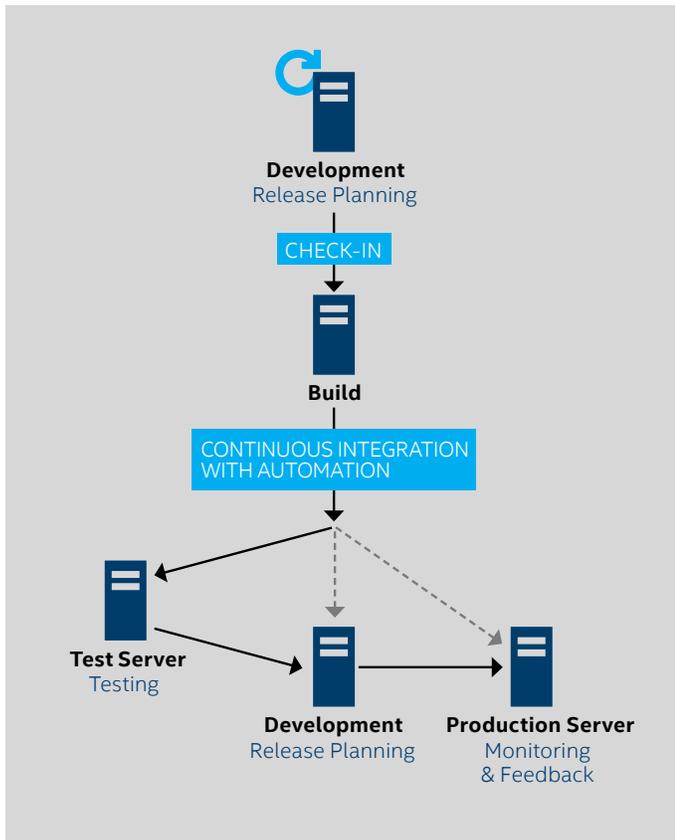
Development
Release Planning

CHECK-IN

Build

CONTINUOUS INTEGRATION
WITH AUTOMATION

Test Server
Testing

Development
Release Planning

Production Server
Monitoring
& Feedback

Figure 3. Shows how tasks have been arranged to meet Intel's own software development needs

Increasing efficiency and effectiveness with C3

Automation can also take place vertically, using application needs to drive configuration. The C3 architecture represents the next evolution of the data center, incorporating high-performance computing and cloud orchestration technologies to enable the automatic provisioning and management of infrastructure resources such as server processing, storage and networking. In addition to scaling capabilities, C3 automation offers high availability, automatic configuration, load balancing, and management tools.

These benefits can be further accelerated by automating the tasks involved, across the development process and into operations. These tasks include the following:

- **Release planning** – Through automation, business developers can define much smaller, more frequent releases. This practice can also improve the final product because end users can try out smaller portions of the system and provide feedback for future releases.

- **Smart container deployment** – Tools can automatically analyze an application, and then deploy it to a runtime container that matches its resource requirements.

- **Continuous integration and delivery** – Continuous delivery builds on continuous integration by extending the automated build process across the stages required for deployment. This means software is production-ready throughout its life cycle.

- **Continuous testing** – Adoption of continuous integration means that working increments of the product are available for testing on a repeating cycle. By moving testing to as early as possible in the development life cycle, developers can shorten testing cycles and provide rapid feedback on quality.

- **Continuous monitoring and feedback** – Continuous monitoring helps keep applications performing at optimum levels. With the use of system monitoring tools, developers gain access to application performance and usage data.

For C3-enabled DevOps, the primary benefit is through automated provisioning of resources, enabling agile access to a massively scalable infrastructure. Consider the following actions to deliver automation of C3-enabled DevOps:

- **Decide whether automation should lead or follow** – Development organizations can short-cut straight to automation, if tool-based best practices can be 'imposed' on developers.

- **Understand the benefits of automation** – Build a picture of how deployment models work with operational practices.

- **Utilize infrastructure modernization** – Consider how C3 features can be part of data center rationalization and transformation.

- **Define the scope and scale of private PaaS** – Define a C3-based private PaaS environment to meet the specific needs of certain workloads (e.g. security).

- **Learn about vendor C3 offerings** – Understand the benefits brought by public, hosted and private cloud infrastructure and PaaS providers.

Seizing the DevOps initiative through C3

As organizations turn toward digital technologies as a source of business opportunity and advantage, they need to organize their resources. Organizations can benefit from a dynamic platform of infrastructure and software resources to drive innovation, such as that offered by a C3 architecture. In parallel, success will be dictated by the ability to deliver a dynamic development and operational process with minimal overhead: for organizations looking to innovate, the answer is DevOps or bust.

However, this does not mean that organizations should rip up their existing models and start again. In this paper, we have offered several actions which, together, can help an organization move C3-enabled DevOps to the center of its mission. In summary:

- Create and empower executive responsibility for DevOps
- Learn about C3, PaaS and containers
- Look at satellite business unit adoption
- Recruit DevOps skills and experience
- Consult with the developer and operations organizations
- Define what type of applications to target
- Decide whether automation should lead or follow
- Utilize infrastructure modernizatio;
- Define the scope and scale of private PaaS
- Learn about vendor offerings.

We will no doubt continue to see vendors and tool providers move towards a Unified Hybrid Cloud vision. As capabilities mature, converge and consolidate, the goal is to decide what can be achieved for the organization, and treat this as strategic. Whether rolling out DevOps across the whole organization or a specific line of business, the key is to seize it with both hands. With C3-enabled DevOps, there is no need for "try".

Intel Resources

What Is PaaS? How Offering Platform as a Service Can Increase Cloud Adoption

Utilizing PaaS for Business Agility and IT Efficiency

How Software-Defined Infrastructure is Evolving at Intel

Overview of the Common Cloud Architecture - GitHub

Intel can help simplify delivery of cloud services with guidance and resources for building and buying services for private and hybrid cloud environments, including PaaS. Learn more by visiting intel.com/cloud.

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