Building an Agile Infrastructure for DevOps

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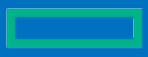
November, 2015



Hewlett Packard Enterprise

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Introduction

Enterprise IT is in the throes of a fundamental transformation from a careful builder of infrastructure that supports core enterprise applications to a lean and lively developer of business-enabling applications powered by infrastructure—this is referred to as bi-modal IT. This metamorphosis of IT is made possible by leveraging software-based automation and programmable units of infrastructure.

While this transformation may not be apparent to all, it's happening in most organizations. In the coming months and years, enterprise IT must seek to understand this transformation fully, gain insight into how to better meet the needs of the business, and make plans for the future of their IT organization.

But why is this change happening at all, and why now?

About The Authors

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Challenges in IT–Infrastructure Transformation

Each decade, IT goes through some kind of fundamental transformation. Roughly 10 years ago it was server virtualization that changed IT organizations. With server virtualization, IT organizations were disrupted while smart adopters found new opportunity and tremendous efficiency. Today, those IT organizations are more efficient and agile than ever, thanks to the benefits virtualization has brought them. Likewise, the transformation brought by the DevOps movement will undoubtedly follow a similar revolutionary and disruptive path.

Today's transformation toward DevOps is driven by challenges affecting all businesses.

Just as Meg Whitman implied, individuals and businesses alike are being defined by their innovation. You may have heard of the book "It's Not the BIG That Eat the SMALL… It's the FAST That Eat the SLOW" by Jason Jennings. While the book was published quite a few years back, the title of the book applies more and more to businesses today, where the difference between success and failure lies in the ability of a business to quickly turn ideas into reality.

> *"We're now living in an idea economy where success is defined by the ability to turn ideas into value faster than your competition."*
>
> **- HPE CEO Meg Whitman**

The "idea economy" demands that IT become part of the rapid innovation process used for products and services at every company. IT must keep up, even lead, if the business is to remain competitive.

This innovation pressure has led to the rise of the DevOps culture currently sweeping the IT landscape. For organizations that seek to embrace this movement, collaboration is the cultural norm. Development and operations are no longer separated by different chains of command. In a DevOps environment, development and operations staff work side-by-side to support software across its entire life cycle, from initial idea to production support.

To provide DevOps groups with the IT infrastructure they demand at the rate they need, enterprise IT must increase their speed, agility, and flexibility. After all, enterprise IT is not without competition. If enterprise IT cannot improve in these areas, then DevOps groups may go directly to the public cloud (already happening in many cases) which undermines the leadership of IT in the provision of infrastructure.

Savvy IT Leaders aren't going to lose their IT infrastructure control and security to the public cloud. Savvy IT organizations are either preparing for or beginning to address the requirements of the DevOps movement, or for what Gartner calls bi-modal IT.

Meeting IT Challenges By Treating Infrastructure as Code

You are likely familiar with the variety of vendor initiatives around the Software-Defined Data Center, or SDDC. For many, these endeavors have been fractured, resulting in multiple software layers, application programming interfaces (APIs), and administrative paradigms. What is needed is a fast, common policy-based automation of applications and infrastructure across development, testing, and production.

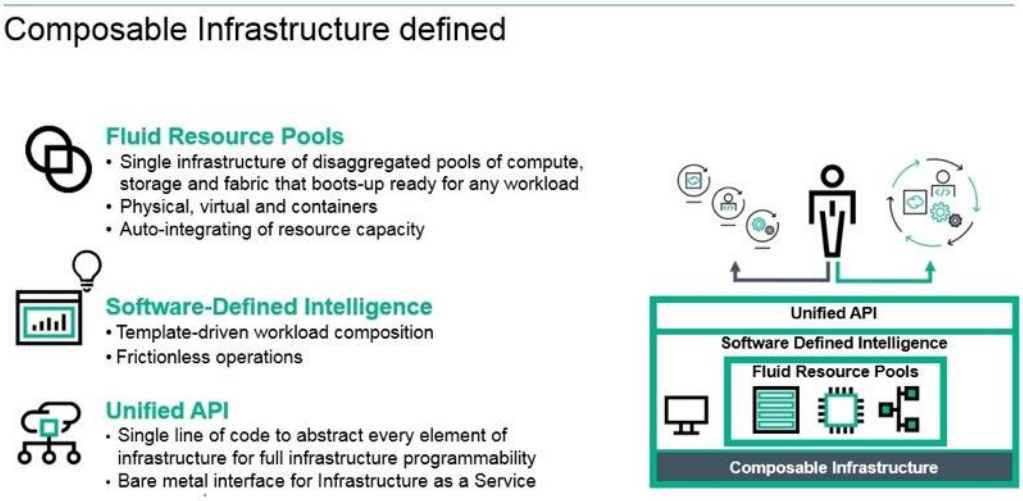
To deploy infrastructure quickly, DevOps practitioners look to treat infrastructure as code. This allows them to deploy it, version control it, and bring it down in the same way they manage the application software they've developed. This powerful common software layer then becomes a complete, configurable, and programmable abstraction layer for all resources in the data center.

Abstraction is the very basis of virtualization, so the ubiquitous compute hypervisor has an important role to play. However, when deployed comprehensively, all resources—compute, storage, and networking—are brought into the fray. With all resources controlled virtually as software elements, DevOps practitioners gain control over their infrastructure and can actually accelerate business in ways that were not possible just a few years ago. The various infrastructure elements simply become an extension of the software layer and are themselves treated as code.

This desire to control the infrastructure as code via software begs the question, "Why wouldn't enterprise IT simply adopt public cloud?" While there are many virtues to using the public cloud, there are strong reasons for businesses to build their own private cloud environments. Perhaps the most significant concern is data security. Compliance is much easier to maintain with on-premises infrastructure. When moving to a public cloud, there is inevitably less control, and that is simply not tolerable for many companies.

HPE Composable Infrastructure

In order to assist enterprise IT in adopting DevOps-based principles, Hewlett Packard Enterprise has created an approach called *Composable Infrastructure*, and is developing suites of tools and server hardware around this concept.



Source: Hewlett Packard Enterprise

Composable Infrastructure fully aligns to the needs of the DevOps community by enabling myriad operational benefits, including:

Shortened and Simplified Development Cycles

By eliminating the need to manually rebuild environments after writing new code and performing testing, development time is significantly reduced. In fact, simplification is becoming a meta-trend across most areas of IT because it lowers costs and enables agility.

For example, with Composable Infrastructure, if developers have an idea for a new application at lunch, they can have a new development environment (even a clone of production, if desired) up and running when they get back to their desks. They can immediately start developing their new application.

A multi-tiered and complex environment can potentially be created on demand by executing a single line of code. This infrastructure environment is not just made up of a few virtual machines, but real server, network, and storage hardware that allows developers to leverage a fluid pool of compute, storage, and fast flexible fabric, disaggregated so that they can be quickly composed, decomposed, and then recomposed back into different pools, when needed. The composable pools of infrastructure can be formed and reformed, as many times as needed based on business priorities.

Accelerated and Automated Builds and Integrations

Development requires constant builds and consistent configuration in order for testing to be effective. As organizations perform development, there is a need to continuously build and rebuild the underlying operational environment for development, testing, and production. Further, most applications require multiple underlying infrastructure elements in order to function. These elements might include database servers, web servers, networking devices, load balancers, and more. HPE Composable Infrastructure allows DevOps teams to fully automate the creation of all of these items, thereby enabling focus on the code, not the infrastructure.

With Composable Infrastructure, costly and complex development cycles can be reduced thanks to the dynamic, adaptable nature of the underlying infrastructure. No longer will infrastructure be the barrier to development progress or innovation.

Accelerated Day-to-Day Updating

Daily builds are common in software development projects. Without automation, it would be impractical to rebuild software every day. Composable Infrastructure allows organizations to accelerate these processes and improve the daily build process.

With Composable Infrastructure, day-to-day development updates can be expedited because infrastructure resources can be dynamically added to the pool when needed (and dynamically removed when no longer needed). Thus, the infrastructure can adjust to the needs of the developers.

Accelerated and Automated Testing

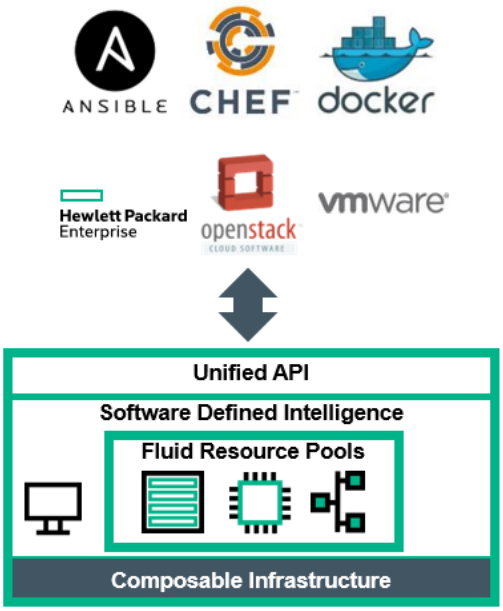
Quality assurance and testing teams should always work with the latest code so that they can have the most impact.

With Composable Infrastructure, testing can be done using the same infrastructure as production. Plus, that infrastructure can dynamically allocate to testing when testing occurs and de-allocate when testing is complete.

The Future of Composable

What if applications themselves could actually manage their own infrastructure and be able to compose, decompose, and recompose resources as needed? With Composable infrastructure, this capacity isn't as far off as you might imagine. With more intelligently designed applications that can manage their infrastructure as needed, it's possible that the role of today's infrastructure administrator could be re-tasked to work on technology projects that help the business to be more innovative and competitive.

Infrastructure-as-Code vs Composable Infrastructure



Infrastructure as code is a centerpiece of HPE's Composable Infrastructure strategy. Composable Infrastructure uses flexible pools of compute, storage, and fabric, and a template-based approach to facilitate the move to continuous delivery. By using open and unified RESTful API together with repeatable templates native to HPE OneView, Composable Infrastructure provides a programmatic interface for higher-level orchestration tools and paves the way to DevOps. This continuous delivery provides speed, agility, and a competitive advantage for the business.

With infrastructure-as-code, the infrastructure elements, both physical and virtual, consist of fluid resource pools that enable composition, decomposition, and rebuilding of the granular resource elements. Resource elements include compute, storage and network/storage fabric.

The core of the approach is the Unified API, which provides the ability to abstract any infrastructure element with just a single line of code. When coupled with the right infrastructure, the unified API enables abstraction and automation of any physical or virtual resource.

How Is HPE Meeting the Needs of the DevOps Community?

There are a number of initiatives that can be used by both Development and Operations to help address the operational challenges of DevOps, such as Chef, Docker, and OpenStack. These initiatives work to enable significant automation capabilities while also providing an infrastructure environment that is fully API-driven. At the core of all such initiatives is the concept of treating the data center infrastructure environment as code, thereby enabling comprehensive infrastructure fluidity.

It's now possible to spin up and tear down infrastructure using APIs, which makes it easier to deploy applications into development, staging, and production environments. Developers no longer have to manually create separate environments for each software iteration. Neither do they have to await the services of a systems administrator. The code that they write can be designed in such a way that it provisions its own resources on demand.

In this world, Chef competes to win the minds of those who seek to enable configuration automation and provisioning, whereas OpenStack provides a private cloud-based infrastructure-as-a-service (IaaS) platform. Docker makes it easy for applications to be developed and then moved into production without changes—build, run, and ship anywhere.

Together, these tools (and others) enable much shorter development cycles, which lead to faster time-to-value for new application development. As developers build applications, they can simply capture the deployment process into, for example, a Chef recipe and automate deployment into a multi-tiered, continuous deployment process.

Composable Infrastructure Enablers

What Is Chef?

Chef's mission is to turn infrastructure into code by enabling complete automation of the creation and removal of discreet infrastructure elements that include compute, storage, networking storage fabric, and load balancing devices. This is accomplished through the use of Chef *Recipes* (i.e., Ruby scripts, each of which is responsible for installing or configuring an infrastructure element) and *cookbooks* which are collections of recipes and other elements that carry out multiple instructions.

What Is Docker?

Docker is an open platform for building, shipping and running distributed apps. Docker containers spin up fast and provide a layer of isolation from other services running in containers. Docker also provides the ability to package an application with all its dependencies into a standardized unit for software development, guaranteeing that applications will always run the same, regardless of the environment. Docker containers wrap up a piece of software in a complete file system that contains everything it needs to run: code, runtime, system tools, system libraries – anything you that can be installed on a server. This guarantees that it will always run the same, regardless of the environment it is running in. It gives programmers, development teams and operations engineers the common toolbox they need to take advantage of the distributed and networked nature of modern applications.

What Is OpenStack?

OpenStack is open-source software for creating public and private clouds. Used primarily to deploy infrastructure-as-a-service (IaaS), OpenStack is made up of a series of projects that manage different resources, have a web-based interface, and can all be controlled through a RESTful API. More than 500 companies, including HPE, have joined and supported the OpenStack project. OpenStack has grown quickly in popularity for its flexibility and has a growing ecosystem and community.

HPE is collaborating with leading DevOps companies—including Chef Software, Docker, and OpenStack—to turn the Composable Infrastructure vision into reality. For example, Chef Software is a leading configuration and management tool that provides fast, scalable, flexible end-to-end automation of applications. By integrating HPE OneView and Chef, HPE enables customers to use Chef recipes to automatically provision entire application stacks from bare metal through application in minutes.

Docker's approach to containers lets companies "build, ship, and run anywhere." But what if "anywhere" is the local private cloud with bare-metal servers? Using Docker and HPE OneView, customers can start from bare-metal servers and automate the entire deployment process so applications can be deployed quickly and easily.

Finally, OpenStack is a point of integration with HPE OneView's Automation Hub, allowing enterprises to fully automate their infrastructure deployments across public and private clouds leveraging OpenStack.

HPE OneView

HPE OneView is a management tool that automates the delivery and operation of server, storage, and network resources in physical and virtual environments. By converging management of HPE server, storage, and networking resources, HPE OneView improves IT administrator efficiency. Through automation, HPE OneView also helps to prevent downtime caused by human error. It interoperates closely with HPE CloudSystem, HPE Business Service Management, VMware® vCenter, and Microsoft® System Center, as well as Chef, Docker, and OpenStack.

HPE OneView is the unifying API that brings together hardware resources and enables them to be managed and consumed as software-based elements of the data center.

The Business Benefits of Composable Infrastructure

HPE Composable Infrastructure enables a number of important outcomes:

Faster Time to Value

By fully eliminating the tedious manual purchase and build process, developers and operators can focus on development, completing their projects in far less time than ever before. Faster time-to-value means that the operational and economic benefits of the development process can be realized much sooner.

Increased Staff Productivity

DevOps is a cultural mindset with productivity as a key outcome. Without the need to manually build infrastructure, developers and operators can be far more productive than before. Infrastructure that aligns with the way teams work together creates a synergy that cannot be achieved with other architectures.

Flexibility and Agility

Through the use of Composable Infrastructure, organizations gain the ability to allow software to build its own operating environment based on current needs. DevOps and Composable Infrastructure aren't just about development, they're also focused on what happens in a production environment. Imagine a scenario in which a production application can detect that the web server farm is approaching capacity, proactively deploy more web servers, and reconfigure the load balancer to aggregate these new resources, all without a developer or an operator being involved. That's the magic of Composable Infrastructure fully realized.

Reduced Costs

There are a number of ways by which Composable Infrastructure can have a positive impact on an organization's cost structure:

- **Reduced or redirected staffing costs.** Even if there is no staff reduction through the DevOps model, efforts are far more focused on value-adding features rather than tedious manual tasks.
- **Enhanced infrastructure utilization.** It is no longer necessary to over-provision resources. Companies can enable the software environment to fully utilize existing infrastructure to its maximum potential. The silos that used to separate infrastructure elements can be erased.
- **Reduced defects.** Defects in software can be tremendously expensive. Traditional development environments and processes are very manual and prone to error. Through automation, companies can reduce and proactively prevent errors from taking place, thus reducing the impact of potential defects.

Ultimately, composable infrastructure is well-suited to the needs of the DevOps community. It enables you to:

- **Run anything**: Optimize any app and store all data
- **Move faster**: Accelerate app and service delivery
- **Work efficiently**: Reduce operational effort and cost
- **Unlock value**: Increase productivity and control

HPE provides a variety of tools and services to get you started on your journey towards a Composable Infrastructure. With global, enterprise-grade technical expertise, HPE can help you design the right solution, integrate your solution into your existing environment, proactively support your environment, and further automate your infrastructure.

Get details on how to bridge from a traditional IT environment to Composable Infrastructure.

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About ActualTech Media

ActualTech Media delivers authoritative content services and assets for top IT companies across the globe. Leading IT industry influencers Scott D. Lowe, David M. Davis and partners develop trusted, 3rd-party content designed to educate, convince and convert IT buyers. ActualTech Media helps its clients reaching the right technical and business audiences with content that resonates and leads to results.

About HPE

HPE creates new possibilities for technology to have a meaningful impact on people, businesses, governments and society. With the broadest technology portfolio spanning, software, services, and IT infrastructure, HPE delivers solutions for customers' most complex challenges in every region of the world. More information about HPE (NYSE: HPE) is available at http://www.hpe.com/info/composable.