



HP Infrastructure Operating Environment for a Converged Infrastructure

Respond instantly to business demand with shared-services infrastructure management.

An HP Converged Infrastructure innovation primer

HP Infrastructure Operating Environment

HP Converged Infrastructure optimally matches the supply of IT resources with the demand for business applications. By transitioning from a component-centric approach to a shared-service management model, your organization can accelerate standardization, reduce operational costs, and improve business results. HP Infrastructure Operating Environment (IOE) manages and automates HP Converged Infrastructure so it instantly responds to business demands. It helps your business accelerate the delivery of infrastructure in a repeatable way, make the most efficient use of IT resources and staff time, and mitigate risks.

At the core of the HP Infrastructure Operating Environment is HP Insight Software—HP's comprehensive family of infrastructure management software. For the first time, HP Infrastructure Operating Environment enables your organization to simultaneously control all elements of an infrastructure needed to deliver a service. It unifies all the tools for infrastructure lifecycle management into one command center. IOE is delivered as an integral part of HP BladeSystem Matrix—HP's industry-leading Converged Infrastructure solution—and is a keystone of HP's broader vision for infrastructure management.

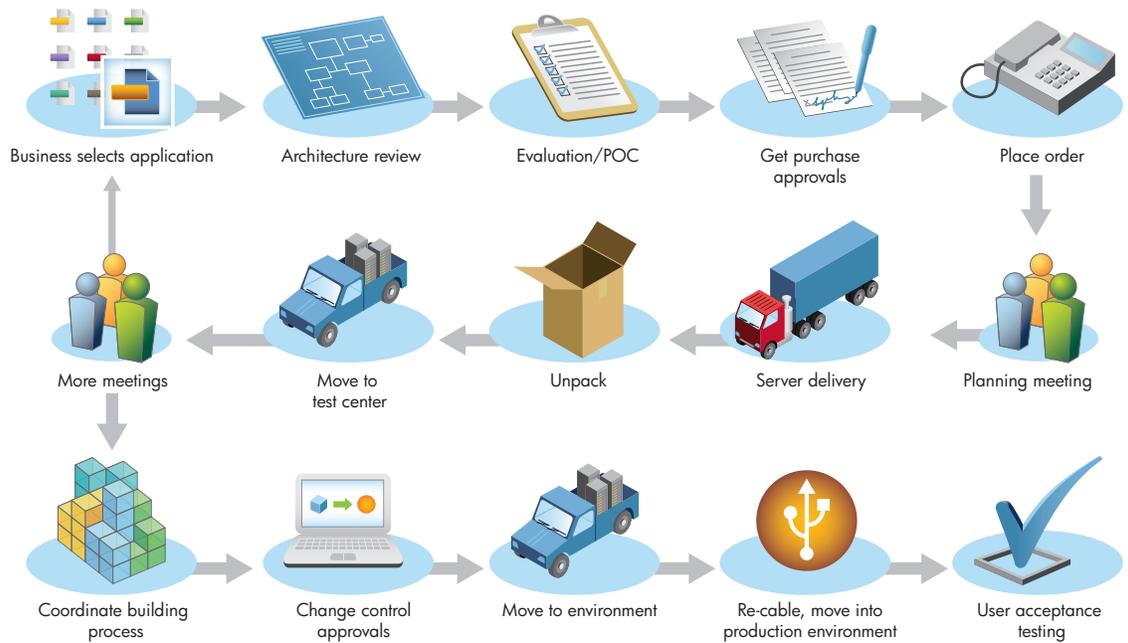
Figure 1: Problem with managing today's infrastructure

With conventional approaches, infrastructure is manually provisioned for each application. Provisioning requires many people, many steps, and many weeks, and is error-prone.

Problem with managing today's infrastructure

Manually provisioned for each application:

- Many people
- Many steps
- Many weeks
- Error prone



Too many tools and too little automation

Traditional data centers are built around an aging, siloed architecture, which limits IT's ability to improve efficiencies and enhance service levels. A lack of standardization impedes automation and governance since it typically takes many different processes to build and manage customized infrastructure. It can take weeks or months to implement new infrastructure and bring new services online. After years of data center sprawl, most organizations don't have options for accelerating the deployment of infrastructure. Instead, infrastructure is uniquely deployed for each application through a time-consuming, labor-intensive series of manual steps.

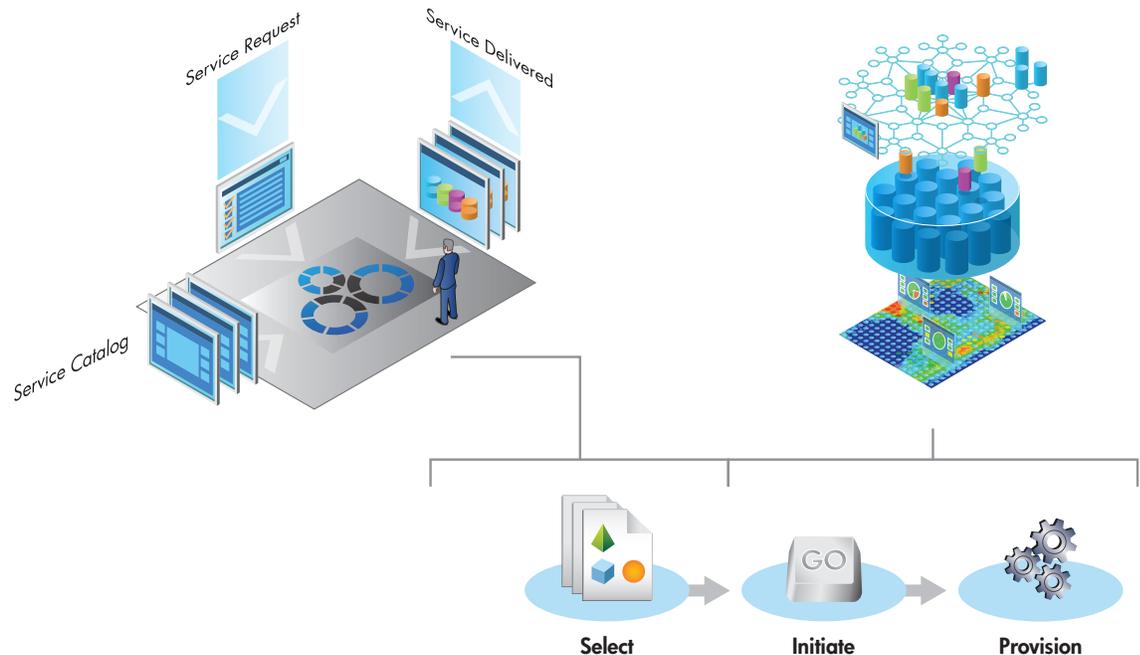
As Figure 1 illustrates, there is complexity, lost productivity, and opportunities for mistakes at every step in the process.

IT consolidation and migration have built-in delays because process steps require coordination and handoffs from one infrastructure administrative team to another. Compliance is difficult to maintain, particularly as virtualization grows—new virtual machines are added and stale ones persist unchecked. Provisioning and maintenance costs are too high, along with power and cooling expenses. CPU, memory, network, disk I/O, and power resources are under-utilized and over-provisioned for peak workloads. And in the event of failure, application recovery can be expensive and slow.

HP Infrastructure Operating Environment addresses these common challenges found across conventional data center environments to help your organization lower costs, increase productivity, and improve flexibility.

Figure 2: Transform the data center

HP Infrastructure Operating Environment transforms today's highly customized manual processes and tools into a shared, standardized environment that accelerates time to service delivery.



Enter HP Infrastructure Operating Environment

HP Infrastructure Operating Environment is a shared-services infrastructure management solution that provisions and adapts infrastructure to instantly respond to business demands. The HP approach to the Infrastructure Operating Environment focuses on the automation of infrastructure lifecycle management. It optimizes and automates the management of the resource pools and the IT roles associated with provisioning and consuming resources from these pools, while operating in compliance with core business, security, and regulatory policies. As Figure 2 illustrates, HP's approach to provisioning and operating infrastructure as a service radically changes how your organization can manage IT in a more optimized and efficient way.

The entire infrastructure for an application can easily be deployed or changed via the service catalog delivered through the IOE. A business user can quickly and easily request a service from this catalog. Approvals can happen much more rapidly, and resource allocation and provisioning are automated and integrated with core IT processes to enable proper change management and compliance.

Key benefits

It transforms today's highly customized manual processes and tools unique to each application and component into a shared, standardized environment that accelerates time-to-service delivery with high quality, while optimizing resource utilization and ongoing operations.

HP Infrastructure Operating Environment provides several important benefits. It enables your organization to:

Provision infrastructure services in minutes

HP Infrastructure Operating Environment lets you stand up a complete infrastructure environment ready for applications in minutes, not months, through automated provisioning of servers with storage and network connections. With this approach, best-practice infrastructure templates are built into the system, and governance and compliance are enforced automatically. This enables lines of business to request service provisioning through a self-service portal based on a common catalog of templates. This also helps your organization reduce human errors and variations, making common tasks standardized and repeatable.

Optimize infrastructure confidently

HP Infrastructure Operating Environment provides deep insight into your infrastructure. It enables you to quickly adjust your environment over its lifecycle so you can predictably change and optimize infrastructure without time-consuming analysis. IOE even enables the simplification of common maintenance tasks, such as firmware updates.

Protect continuity of services

HP Infrastructure Operating Environment improves the ability to maintain service levels. Depending on high availability needs, you can either use server-aware or application-aware high availability techniques. For example, IOE offers cost-effective, server-aware disaster recovery, which allows you to move workloads to other servers or sites with a simple mouse click, improving recovery time by 80 percent or more.

Integrated by design

HP Infrastructure Operating Environment takes full advantage of the flexibility delivered in the Virtual Resource Pool and the FlexFabric layer of the HP Converged Infrastructure architecture. For example, when workloads peak, it adjusts the resources dynamically—not only virtual, but also physical workloads can move as needed.

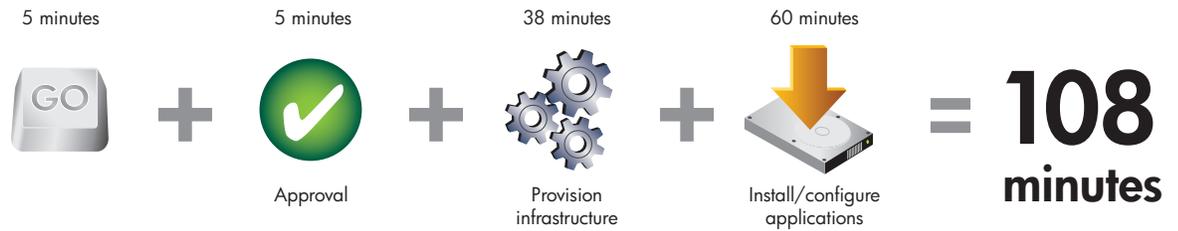
HP is the first to work with a broad set of Independent Software Vendors (ISV) to maximize the potential of the shared-service model for the industry's most popular business applications. Templates provide

click-and-configure provisioning to easily deploy application infrastructures that are standardized, repeatable and developed on best practices.

HP IOE is integrated with HP Business Technology Optimization (BTO) software. When used together, IOE and BTO are able to deliver both the infrastructure and application in minutes in a cost-efficient way and with minimum risk. HP is the only vendor that can provide end-to-end data center automation and management across the complete stack, including the infrastructure, the application, and the business service.

Another important characteristic of the IOE is its integration with other software environments. This capability permits bidirectional communication between the Infrastructure Operating Environment and other commonly used management software tools, such as VMware vCenter and Microsoft System Center, so changes can be seamlessly triggered in the HP Converged Infrastructure and reflected in third-party software.

Figure 3: Example of an e-shopping application to be provisioned in 108 minutes



Use case example

The example presented in Figure 3 is based on an e-shopping application, showing how one administrator can automatically provision this solution in as little as 108 minutes. Based on HP studies and customer sources, this same process would typically take 33 days with a traditional environment. The measured 108 minutes is from logging into the self-service portal to having an up-and-running service with configured applications. This template can then be used repeatedly for automated provisioning of this solution.

Here's a summary of each step in the provisioning process in this use case:

- 5 minutes: the time required to log into the portal, select the template and submit the actual request.
- 5 minutes: the actual approval time, which includes the creation of a ticket, the review of the ticket, and the approval, which automatically allows the provisioning process to continue. Depending on specific situations, approval times can vary.
- 38 minutes: the time to provision the infrastructure, which in this specific use case automatically provisions three blades and three virtual machines with the necessary storage and network addresses.
- 60 minutes: the time to install the application—in this case the installation and configuration of Oracle RAC and WebLogic applications using custom scripted workflows.

In this example, we show how the infrastructure got provisioned, and then how the application was deployed on top of the infrastructure. This is done via IOE's integration with HP Business Technology Optimization (BTO) software, which provides the application deployment.

Vision and future direction

HP's vision for the Infrastructure Operating Environment ties back to our overall vision for IT. Namely, IT will deliver everything as a service in order to achieve defined business outcomes. How will these services be delivered? It starts with the infrastructure. That's what HP Converged Infrastructure is all about, and the Infrastructure Operating Environment is the management software that drives it. As we move into the future, we will focus on increasing the automation of infrastructure services, enabling business transparency linked to service levels, and building a community around shared services.

Automate infrastructure services.

Building on the shared services model, our ultimate goal is to allow our customers to completely automate the provisioning, the optimization, and the protection of infrastructure delivered as a service to the business, enabling the supply of IT resources to always match the demand—for the highest degree of productivity and efficiency. As infrastructure as a service becomes more pervasive, the ability to seamlessly leverage different sourcing options will become a reality.

IOE will take advantage of the increasing flexibility in the Virtual Resource Pool and FlexFabric layer of the HP Converged Infrastructure architecture and manage the pools of resources as one integrated entity consisting of servers, storage, networking, and power and cooling for all infrastructure services. This will require even tighter integration of server, storage, and network management—for example, we see one day that once a server, storage device, or network switch has been plugged in, it should identify itself to the IOE and automatically join the appropriate resource pool. In addition, IOE needs to be able to discover the topology of the power grid, much like we can discover other elements in the infrastructure. Armed with this information, the IOE can then manage the power/cooling facilities as another resource pool and reduce power consumption.

Key to a shared services model is a comprehensive service catalog. Each service template in the catalog captures the required infrastructure characteristics needed to run the application, including the required physical and virtual servers, storage and network connections, high availability, and security policies. The result is that line-of-business IT administrators can quickly reserve the optimal infrastructure to develop, test, and run their applications—knowing that they are in compliance with the standards of the organization.

Ultimately, the goal is to match the service in an automated fashion with the appropriate sourcing option. For example, the mission-critical ERP solution gets sourced internally, while a less sensitive application, such as hosting a community portal, could be sourced externally—through outsourcing or cloud services.

Ensure business transparency linked to service levels.

When services are associated with business outcomes, the value is intuitively clear. A shared services model where IT resources are centralized and shared among business units requires a cultural shift. There needs to be agreements between IT and the lines of business for the services that they need. In order to ease this transition, HP intends to make costs and benefits transparent for both IT staff and its line-of-business partners. When users from a line of business choose infrastructure services from a service catalog, HP plans to make it transparent how the service levels for critical service characteristics—such as performance, high availability, and security—relate to cost.

In this way, users will be able to make tradeoffs between the levels of service they need against the cost they are willing to pay. As users consume these services, they will have full access to reports detailing the resources their services are consuming and how much they cost, so they can continue to compare that to the value they derive from the services. Management will also be able to review how resources are being consumed, and how that relates back to the business strategy and the intended business outcomes. Armed with this information transparency, IT managers can more easily benchmark their performance against internal or external measures and, over time, better understand the costs and benefits of internal versus external sources strategies. The next step is for the data generated by the resource meters to be integrated into billing systems so that chargeback can be performed automatically, whether the services are delivered via internal or external IT sourcing methods.

Build a community of shared services.

HP is driving standards to build a vibrant ecosystem and community around infrastructure services. We will continue to extend our partner ecosystem by enabling our partners to leverage the potential of the shared-service model, building best practices in the form of templates, workflows, and appliances. In addition, we plan to build an end-user community to exchange shared-services experiences and implementations.

HP is uniquely positioned to execute against this vision. We have a complete, integrated portfolio of software to automate and manage your IT infrastructure. Open integration is also key to this vision. With our extensive network of channel partners, software and hardware vendors, and system integrators, we are well positioned to provide solutions that work with your existing infrastructure and provide investment protection for the future. HP offers the industry's most complete and proven portfolio of servers, storage, and networking infrastructure. And HP has the expertise and in-house resources to manage your converged infrastructure on an outsourcing basis or on your site.

Your next step

To learn more about the HP vision of Converged Infrastructure and how the HP Infrastructure Operating Environment plays a key role in it, visit www.hp.com/go/convergedinfrastructure.

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