The Business Case for Private Cloud
Building a Business Case to Help Ensure the Success of Your Private-Cloud Initiative

The success of cloud-native companies, such as Uber, Netflix, and Lending Club, has awoken an awareness of new business innovation and practices that create a need to accelerate delivery of digital services. In industries such as finance, telecommunications, retail, and logistics, remaining competitive requires IT to transform and become more responsive to the business.

Private clouds powered by the open-source OpenStack* project have emerged as one of the fastest ways to deliver the IT agility needed for transformation. Implementing a private-cloud solution can be expensive though, both in terms of technology cost and organizational impact. IT and business leaders must approach a private cloud as a transformational business initiative, not just an evolutionary technology upgrade; without a broader perspective on how the cloud can drive digital innovation across the business, organizations run the risk of putting their private-cloud investments in jeopardy and losing market share to more agile competitors.

This paper assumes that you are considering a private cloud, and it provides an overview of the following topics to help you maximize the value delivered by your OpenStack deployment and to avoid some of the potential pitfalls in deploying a private cloud:

- The business value of a private cloud
- Creating a business case for a successful OpenStack project
- Validating OpenStack ROI

“As the automotive industry shifts to the service economy, Volkswagen is poised for agile software innovation. Mirantis enables us to drive cloud transformation, helping our developers build and deliver software faster.”

— Mario Müller
Volkswagen Vice President of IT Infrastructure
The Business Value of a Private Cloud

As shown by Netflix and Uber, business in the cloud can dramatically change the pace of innovation. IT departments, however, have traditionally had a mandate to provide stable, high-performance systems to the organizations that they serve. Meeting this mandate has often meant that IT departments have been slow or reluctant to respond to the urgent need to modernize digital services.

Because of the delays caused by IT, many business managers see IT as a hindrance instead of an enabler of business agility. These business managers increasingly turn to public-cloud offerings to meet the agility requirements that their internal IT organizations do not meet, which can pose difficult questions for IT leadership:

1. Must speed and agility come at the cost of reduced stability and security of their legacy applications?
2. How do IT organizations remain compliant with company and government regulations when sensitive data moves to public clouds?
3. Where is the balance point between stability, security, and disruptive transformation?
4. What if the organization gets locked into a single-vendor solution that results in inflexibility and makes it difficult to take advantage of existing IT resources?

A New Approach to IT Business Value

Recently, Gartner introduced a new way of thinking about IT that addresses these questions. In Gartner’s definition of the Bimodal IT model, it “is the practice of managing two separate, coherent modes of IT delivery, one focused on stability and the other on agility. Mode 1 is traditional and sequential, emphasizing safety and accuracy. Mode 2 is exploratory and nonlinear, emphasizing agility and speed.”

In the Bimodal IT model, Mode 1 (Traditional IT) focuses on accurate and predictable deployment, often at the expense of deployment speed. Systems of record are often based on Mode 1 processes and infrastructure. Mode 2 (Agile IT) defines a faster delivery model in which services can be deployed quickly and with greater agility, and where IT has tighter alignment with business units. Companies can think of Mode 2 processes and infrastructure as “systems of innovation.”

Mode 1 has served IT organizations well for decades, but as the pace of digital change continues to increase, organizations increasingly realize that relying on traditional IT can lead to structural disadvantages against more nimble competitors.

Companies that align their product-development strategies with an agile IT infrastructure and modern development models, such as DevOps, can avoid the velocity disadvantages of a traditional IT infrastructure. A software-defined private cloud, where aspects of the infrastructure are entirely under the control of software, enables agile IT and DevOps due to its inherent flexibility and API accessibility, especially when used with development and automation tools such as Git and Jenkins. A private cloud lets development and operations teams create or tear down virtual infrastructure as needed, while private cloud APIs let developers directly integrate virtual infrastructure and configuration with their applications.

Combining a private cloud’s infrastructure-as-service (IaaS) and platform-as-a-service (PaaS) capabilities with continuous integration (CI) can lead to faster service-delivery times, shorter development-rework times, and reduced wait times. To realize the best value from agile IT and DevOps, development and infrastructure should be combined to the point where the entire software-development provisioning and deployment process is automated.

Figure 1. A private cloud can help increase application uptime to 99.99 percent while decreasing time-to-market for digital services by 5.88 times
Combining these private cloud capabilities and modern development practices can let organizations rapidly evolve new customer experiences and services.

Specific benefits of adopting a private-cloud solution to deliver agile IT include:

- Reduce time-to-market for new digital services by 5.88 times, enabling a dramatic increase in overall business agility.
- Ensure application reliability with 99.99 percent uptime by adopting a cloud-native application architecture rather than depending on the reliability of a single physical server.
- Lower the cost of deployment through better capacity and resource management.
- Provide on-demand scale-out capabilities.

Private clouds can transform not just the efficiency of IT organizations, but also the overall ability of the business to innovate and provide new digital services through a more flexible, agile business model. This business model can eliminate the need for business managers to turn to public-cloud offerings to meet their needs for rapid innovation of business services.

**OpenStack** Enables Private-Cloud Value

The key to enabling an agile IT infrastructure is to build an IaaS foundation using extensible cloud technologies, such as OpenStack. OpenStack is an open-source data-center-management platform that runs on hardware powered by Intel® technologies. OpenStack provides a single, unified view for automating and orchestrating the entire data center, including compute, networking, and storage resources.

The OpenStack project is managed by the non-profit OpenStack Foundation, and it is continuously enhanced by tens of thousands of open-source community members worldwide. The project is also supported by hundreds of technology companies, such as Intel and Mirantis.

OpenStack contains modules for managing all aspects of data-center infrastructure. It also provides:

- Cloud-lifecycle-management tools, such as the Fuel* module originally developed by Mirantis, which gives enterprises flexibility in cloud deployment, management, and operations.
- Cloud-management and troubleshooting tools that provide monitoring and alerting to help ensure reliable operations.

**AT&T Bets Big on OpenStack**

AT&T has deployed OpenStack to 74 locations worldwide running mission-critical virtual-network functions. As part of this initiative, AT&T realized the following business value:

**Simplified operations**: AT&T uses the same code base for both internal IT and customer-facing cloud applications, which has helped increase operational flexibility.

**Increased reliability**: With 74 locations, AT&T can place facilities closer to where customers are and can better contain security threats. Hardware problems and other issues that occur in a single location do not impact the other locations.

**Added regional flexibility**: AT&T has multiple private clouds, which enables business flexibility to meet regional regulations and requirements. Global distribution enables different cloud-zone configurations based on regulations and requirements of individual countries and regions where AT&T operates.

- Cloud-development and CI tools, such as Murano*, that automate the provisioning of developer environments and DevOps workflows.

With OpenStack, the infrastructure components—compute, network, and storage—are programmable using common tools and APIs, which gives companies flexibility in creating, utilizing, and tearing down development and test environments when an application moves from development to production. With an OpenStack cloud, applications can move through development and testing to production more quickly than with traditional tools and development environments.

OpenStack continues to gain traction in the marketplace because it fills gaps that traditional virtualization products cannot. A recent Forrester survey highlights three primary reasons that organizations of all sizes are adopting OpenStack:

- **Operational-efficiency gains**: Companies can realize reduced operational costs through more efficient use of infrastructure-management staff; the ability to automate around hardware failures; and lower data-center power and cooling costs.
- **Ability to innovate**: When combined with DevOps automation, OpenStack can help organizations move products and services to market faster by shortening development cycles. Shorter cycles mean that developers can focus more on innovation and accelerate the transition from idea to marketable product.
• **Cost savings:** Organizations can avoid expensive vendor lock-in by bringing best-of-breed hardware, software, and cloud solutions under one umbrella with OpenStack. For example, organizations can use OpenStack to manage infrastructure from VMware, Microsoft, Red Hat, and Citrix. This integration capability gives cloud administrators a single management console from which to manage their entire IT infrastructure. In addition, OpenStack lets organizations build infrastructure on industry-standard hardware powered by the Intel® Xeon® processor family.

**Intel and Mirantis Help Enable the OpenStack Project**

Intel and Mirantis can help companies succeed with their private-cloud deployments both from technological and organizational perspectives. Both are leading contributors to the OpenStack community, and together they help drive the OpenStack community roadmap. Intel and Mirantis provide products and services that help organizations realize business value from private-cloud investments.

Intel is also a member of the OpenStack Foundation board, and it provides investments and collaboration through the OpenStack project to help businesses adopt open cloud technologies. In 2015, Intel announced the Intel® Cloud for All initiative, which seeks to accelerate cloud adoption by making cloud solutions easier to deploy. As part of the Cloud for All initiative, Intel is committed to three focus areas to help businesses get the most out of their cloud initiatives:

1. Investing in and collaborating within the cloud ecosystem to create enterprise-ready, easy-to-deploy software-defined-infrastructure (SDI) solutions
2. Optimizing SDI solutions to take advantage of Intel platform capabilities and deliver highly efficient clouds across a range of workloads
3. Aligning the industry towards open industry standards and a focus on accelerated cloud deployment

The collaboration between Intel and the OpenStack community has resulted in a number of enterprise-grade improvements to OpenStack. These improvements include high-availability features, security enhancements that take advantage of Intel platform technologies, and flexible networking capabilities that build upon the faster packet processing capabilities of the Intel architecture.

Mirantis, also a member of the OpenStack Foundation board, is a “pure-play” OpenStack vendor that provides vendor-neutral solutions and consulting services to help businesses get the most value from their cloud deployments. Mirantis’ sole focus on open standards lets it help accelerate organizations’ private-cloud time-to-value when using OpenStack combined with proven deployment models.

The Mirantis solution for accelerating the software-development process includes three core elements:

- **Mirantis® OpenStack:** An OpenStack solution that provides a private-cloud foundation for automating the provisioning of full-stack computing environments. Mirantis

![Figure 2. An OpenStack® cloud can help accelerate the development cycle by providing application catalogs and tools for automating the development pipeline](image-url)
OpenStack supports multiple Linux distributions, and allows migration from one distribution to another without having to replace the underlying IaaS and PaaS layers.

- **Murano Application Catalog**: Initially developed by Mirantis and now an OpenStack project, Murano automates the deployment of software-pipeline tools, such as Git and Jenkins, in addition to software build modules, such as Apache Tomcat®, Docker®, and Kubernetes®.

- **Mirantis® StackLight Monitoring**: A Fuel plugin that automates monitoring of private clouds and alerting for cloud issues.

Mirantis also provides considerable technical expertise and guidance to the OpenStack community. Projects such as Fuel, which was originally developed by Mirantis and is now an official OpenStack project, help accelerate and simplify OpenStack deployments using an intuitive graphical interface, which increases the time-to-value for an OpenStack implementation.

**Creating a Business Case for a Successful OpenStack Project**

A clear set of business deliverables and key performance indicators are critical to realizing the value from a private cloud initiative. As a leading OpenStack provider of software and consulting services, Mirantis has identified that successful OpenStack cloud implementations also require two clearly defined, full-time roles:

- **A full-time cloud champion**, who is not only responsible for building and operating the cloud, but also for on-boarding new tenants to the cloud. Specifically, this means creating relationships with development teams who are typically the primary users of a private cloud. The champion is also responsible for working closely with DevOps and development-environment teams to make sure that key development tools are available to onboard workloads into the cloud.

- **An initial “anchor-tenant” developer**, who partners with the cloud champion to provide feedback and to ensure that the cloud meets developers’ needs. Accelerating the software-development lifecycle through DevOps automation is a key contributor to private-cloud value. By demonstrating the impact of an accelerated development and go-live process for application development, the anchor-tenant developer can validate the value of the private cloud.

Successful private-cloud initiatives set realistic technical goals that deliver concrete business value, going beyond basic operational goals such as provisioning generic virtual machines. For example, an enterprise may want to provide measurable improvements to the software-development lifecycle. An OpenStack implementation that does not provide enough capacity or that focuses on small, incremental changes might only end up frustrating users and developers and hindering private-cloud validation.

A private-cloud pilot can start small, as long as a cloud champion and anchor tenant are identified and have clear requirements for onboarding an application to the private cloud. Once that goal is achieved, the initiative should have a clear path to investing in an OpenStack implementation of at least 100 nodes, which should provide sufficient business impact to justify further investments in private-cloud transformation.

Organizations should also consider combining their private-cloud-transformation strategies with DevOps and developing cloud-native applications for the following reasons:

- Adoption of a DevOps culture and architecture can lead to fewer failures in a production environment,
quicker recovery from failures, and a faster software-development release cadence. These attributes provide the means for releasing digital services at a faster pace while avoiding the risks associated with large, monolithic development strategies.

- Cloud-native applications enable greater agility, scalability, and resiliency, but require different development requirements over standalone applications. These new requirements can be introduced at the same time as a private-cloud transformation.

When evaluating which initial applications should move to the cloud, organizations should keep in mind that workloads don’t exist in a vacuum, but have owners who rely on the value that the workloads provide. It is best to choose initial workloads based on the value that an increased release frequency and rate of change could provide. An application that requires frequent releases and a high rate of development activity might be an ideal candidate for moving to the cloud.

### A Multi-Phase Approach to Success

A successful OpenStack private-cloud deployment requires that the right people be involved early with defining key success metrics and aligning value with results.

<table>
<thead>
<tr>
<th>Phase 1: Continuous Integration (CI) Cloud</th>
<th>Phase 2: Highly Available Cloud for Cloud Integration and Deployment</th>
<th>Phase 3: Scalable Cloud for Multi-tenant CI and Deployment</th>
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<tr>
<td><strong>Goal</strong>: Deploy the OpenStack® cloud infrastructure and onboard an application and CI pipeline to the cloud.</td>
<td><strong>Goal</strong>: Identify and onboard additional applications for the OpenStack cloud.</td>
<td><strong>Goal</strong>: Automate the entire go-live process from code check-in to deployment.</td>
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<td><strong>Infrastructure and tools</strong>: 25 nodes, DevOps toolchain (Git and Jenkins), and anchor-tenant application</td>
<td><strong>Infrastructure and tools</strong>: 50 additional nodes, high-availability features, and development/test/stage/production clouds for continuous deployment of anchor-tenant application</td>
<td><strong>Infrastructure and tools</strong>: 125 additional nodes, multi-tenant, billing, and security features</td>
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<tr>
<td><strong>Success metric</strong>: Deliver self-service provisioning that reduces developer wait time for a full virtual machine to less than 30 minutes. Implement CI processes that are triggered by developer code check-in.</td>
<td><strong>Success metric</strong>: Implement continuous delivery from code check-in to production and confirm four-times acceleration of the software-delivery pipeline.</td>
<td><strong>Success metric</strong>: Scale the cloud to support multiple software-pipeline-acceleration tenants with 99.99 percent uptime.</td>
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</table>

In addition to the cloud champion and anchor tenants, a cloud initiative should include support from an executive sponsor, such as a CIO or CTO. An executive sponsor can help guide the adoption of a cloud-technology strategy across an organization while helping create the next important success category: metrics and milestones.

Any private-cloud evaluation must be measured to determine the business value of the project. As part of the planning process, an organization should define key performance metrics and milestones that define the success of the project. Once the metrics, cloud champion, anchor tenant, and executive sponsor are identified, the next step is to define three implementation and investment phases with clearly delineated success metrics. Table 1 provides an overview of these phases and their requirements.

### Building an OpenStack Success Plan

Once organizations understand that a cloud strategy involves more than a few line items on the annual budget, they can develop a proof-of-concept strategy around OpenStack. Mirantis provides detailed reference architectures running on servers powered by the Intel Xeon processor family that can serve as a proof-of-concept starting point for clouds of any size and complexity. Once infrastructure and operations teams
have familiarized themselves with the basics of an OpenStack cloud infrastructure, they can then move to building a high-availability proof-of-concept pilot that can provide 99.99 percent uptime for the private cloud’s core interfaces, which can be used by the anchor tenant to architect robust and highly resilient business applications. For more information, see docs.mirantis.com/openstack/fuel/fuel-8.0/reference-architecture.html.

Best Practices for Managing an OpenStack Infrastructure

Once an organization has built an OpenStack proof-of-concept infrastructure, operational teams should follow best practices to maintain 99.99 percent uptime and reliability. While an in-depth discussion of these practices is beyond the scope of this paper, the following are basic areas of operational focus:

- **Security:** Securing an OpenStack implementation is crucial to a successful proof-of-concept, let alone a production system. Topics such as understanding common threats, threat modelling techniques, and threat mitigation are discussed in the “Mirantis Security Guide,” available at docs.mirantis.com/openstack/fuel/fuel-8.0/MirantisSecurityBestPractices.pdf.
- **Logging:** Proper logging is important for troubleshooting problems that might arise in a proof-of-concept environment. OpenStack manages logging by using standard Linux* syslog and rsyslog capabilities, while Fuel provides log viewing capabilities within its web interface. Logging information can be found in the “Fuel Operations Guide,” available at docs.mirantis.com/openstack/fuel/fuel-8.0/operations.html#troubleshooting.
- **Monitoring and alerting:** In addition to logging, monitoring provides insights into the health of an OpenStack infrastructure and its host services. Monitoring helps administrators and engineers react to disruptions by alerting them in near real-time to systems or operational issues. A robust monitoring system can also reduce manual-configuration errors by providing automated discovery and configuration management. For more information, see the Mirantis “Monitoring Guide,” available at docs.mirantis.com/openstack/fuel/fuel-8.0/monitoring-guide.html.
- **Troubleshooting:** An OpenStack deployment contains a large number of technologies all working together to provide cloud services. Troubleshooting issues reported by a monitoring and alerting system can be difficult. Fortunately, the OpenStack foundation provides comprehensive sections on common issues experienced in real-world implementations. For more information, see “Chapter 11: Maintenance, Failures, and Debugging” and “Chapter 12: Network Troubleshooting” in the OpenStack Operations Manual at docs.openstack.org/openstack-ops/content/.
- **Runbook validation:** Runbooks provide detailed instructions for deploying technologies within a specific environment. Mirantis provides the Mirantis OpenStack certification program to show technology partners how to certify their solutions within the context of a Mirantis OpenStack infrastructure, in addition to outlining deployment and operational instructions for those solutions. For more information on certified partner solutions, see mirantis.com/partners.

By following operational best practices, cloud-operations teams can better ensure that the benefits from a reliable, always available private cloud are realized, and that a maximum ROI can be achieved.

Validating OpenStack ROI

Once you’ve tested the capabilities of an OpenStack proof-of-concept, you will need to evaluate the metrics that you’ve gathered to determine ROI and the viability of building a production OpenStack business case. Measuring the ROI of any IT project can be challenging, but Mirantis can help organizations determine the value of an OpenStack implementation.

The first step in evaluating the ROI of an OpenStack proof-of-concept is to determine what business value your organization is trying to achieve. Your ROI calculation should be based on the tangible financial benefits that you receive.
from implementing an OpenStack private cloud. For example, does the OpenStack proof-of-concept provide any of the following financial benefits?

- Cost reductions through increased application reliability, operational automation, and greater development speed
- Revenue enhancements through faster time-to-market or increased application uptime

Table 2 shows some potential key OpenStack ROI metrics.

Understanding the answers to these questions and organizing data around cost, speed, agility, and operational efficiency is a good starting point for determining proof-of-concept ROI. Mirantis StackLight can help provide the operational data to help determine ROI. With StackLight, companies can create custom dashboards that determine the value of an OpenStack implementation, capturing metrics such as usage trends, IT operational savings, revenue acceleration, and developer-productivity value.

By determining the ROI of your OpenStack implementation, you will be able to better determine where an OpenStack private cloud can provide the most tangible benefits within your organization.

Overstock Realizes Productivity Gains with OpenStack

Overstock, a global retailer, found that OpenStack gave the company greater business agility in managing a portfolio of more than 400 Java* applications. Prior to deploying an OpenStack private cloud, Overstock’s 350 developers required three months to provision a full end-to-end development environment. OpenStack cut that provisioning time to 15 minutes. OpenStack also improved IT-operations productivity by letting Overstock system administrators spend less time on repetitive provisioning tasks and more time on finding innovative solutions.6

Table 2. Key OpenStack ROI metrics

<table>
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<tr>
<th>Increased revenue from accelerating software-development cycles</th>
<th>Decreased IT operation costs through automated CI provisioning</th>
<th>Increased developer productivity through CI automation</th>
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<tbody>
<tr>
<td>The value of accelerated software-development cycles can be measured by determining the number of CI builds versus the revenue increase per additional release.</td>
<td>IT operation-costs savings can be demonstrated by measuring the number of virtual machines deployed versus the amount of time saved per virtual machine.</td>
<td>Developer-productivity increases can be determined by measuring the number of virtual machines deployed multiplied by the amount of developer time and the associated costs saved.</td>
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See Where OpenStack Can Take Your Enterprise

An OpenStack private cloud running on servers powered by the Intel Xeon processor family can provide many benefits in today’s fast-paced, always-on business environment, including:

• Increased IT agility from automating the software-development cycle, allowing developers to release customer applications faster
• Improved IT productivity from automating IT provisioning, which helps eliminate developer wait time
• Increased IT resource utilization while reducing costs with open standards

OpenStack, the leading open-source cloud solution, can provide organizations with a cloud foundation that accelerates product development and time-to-market. Intel and Mirantis can provide guidance through proof-of-concept development and ROI analysis to determine where an OpenStack private cloud can help your enterprise.

For more information, contact your Intel or Mirantis sales representative, or visit mirantis.com.

Additional Information

Mirantis OpenStack reference architectures: docs.mirantis.com/openstack/fuel/fuel-8.0/reference-architecture.html

OpenStack best practices:

• Operations: docs.mirantis.com/openstack/fuel/fuel-8.0/operations.html#operations-guide
• Logging: docs.mirantis.com/openstack/fuel/fuel-8.0/operations.html#troubleshooting
• Monitoring and alerting: docs.mirantis.com/openstack/fuel/fuel-8.0/monitoring-guide.html

Intel OpenStack contributions: intel.com/openstack

Intel Cloud for All: intel.com/content/www/us/en/cloud-for-all/cloud-for-all.html


Intel Xeon E5 processor: intel.com/content/www/us/en-processors/xeon/xeon-processor-e5-family.html

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4 Forrester Consulting. “The Total Economic Impact™ Of OpenStack.” July 2015. https://www.openstack.org/assets/pdf-downloads/ForresterOpenStackTEIStudy-20150701.pdf. Operational efficiency gains can come from higher hardware utilization rates, which can reduce the physical server footprint within the data center. A smaller physical hardware footprint requires less power and cooling, which results in lower operating costs.
5 Source: Mirantis. The human resources company has 250 developers and estimates a savings of $15,000 per developer per year. The cloud implementation contained 50 nodes running OpenStack Liberty* and a continuous integration (CI) workload.

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