OpenStack and BMC Cloud Lifecycle Management

Complementary solutions for
hybrid cloud computing

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Executive Summary

Many customers using OpenStack® for their private clouds are questioning whether they need cloud management platforms (CMPs) such as BMC Cloud Lifecycle Management (CLM). As enterprise cloud strategies evolve from ad hoc and opportunistic to managed and optimized, there is a clear need for advanced cloud management capabilities like those available in BMC CLM to augment OpenStack for private clouds. While OpenStack addresses the underlying resource management functions for compute, storage, and networking, BMC CLM fills key gaps in OpenStack to ensure a successful, long-term enterprise cloud computing strategy. Essential cloud management capabilities provided by BMC CLM include:

- Service catalog for offering configurable, customized, cloud services
- Automated governance and compliance
- Advanced automation
- Intelligent service delivery across multi-site, multi-data center, multi-cloud, and multi-platform infrastructure through a single pane of glass
- Heterogeneous platform support
- Capacity optimization and chargeback
- Ability to evolve to a hybrid cloud platform using public clouds

CHALLENGES OF USING OPENSTACK WITHOUT A CMP

Many customers are attracted by the fact that OpenStack is freely available and wonder about the need for a CMP. However, market experience and a number of cloud false starts have shown that cloud computing—at least the successful kind—is not easy. Heterogeneous infrastructure and multiple platforms are the reality for most enterprises today and, combined with increasing levels of IT security threats, make cloud management a complex and sometimes daunting task. Enterprises struggle to manage this complexity with OpenStack alone. To explain why, this paper analyzes the challenges of running a private cloud with OpenStack without an accompanying CMP.

Challenge 1: Breadth of functionality

Building a cloud solution takes more than just the technical infrastructure functions and management tools that OpenStack provides. It involves implementing a set of business, architectural, and functional requirements. Table 1 compares BMC CLM and OpenStack against a set of critical capabilities for delivering a private cloud.

Capability	BMC CLM	OpenStack
End-user self-service cloud web portal service awareness.	Flexible user portal, service offerings, entitlements, service awareness in addition to server views	Web portal historically geared towards administrators Server views, no service awareness
Full-stack multi-tier application deployment	Out-of-the-box (OOTB) management of servers, network devices, databases, application servers Service design: Graphical designer to model server, network, database, storage volume, and application components of business services	Can provide OpenStack open source database as a service (with Trove)
Policy-driven dynamic virtual machine placement	Ability to optimize your cloud with intelligent workload placement via a policy-based engine	Lack of depth in functionality in some key CMP areas (e.g., governance and policy)
Cloud platform grounded in ITIL / ITSM principles	OOTB integration with BMC Remedy and BMC Atrium CMDB (both market-leading products) to deliver automated change approvals and CMDB updates across hybrid clouds. Framework available to integrate with other ITSM solutions.	Will need to integrate with third-party ITSM / CMDB solutions
Public cloud support	Support for Amazon Web Services™, Microsoft® Azure™, OpenStack, Savvis®, Terremark™, VCloud® Director™, vCloud® AIR™, Cisco™ HCS, IBM® softlayer®, HP® CloudSystem Matrix™	OpenStack APIs are compatible with Amazon EC2 and Amazon S3. Some of the examples on OpenStack documentation had a CMP on top of OpenStack and Amazon.
Multi-hypervisor support	Support for Citrix® XenServer/VDI®, VMware vSphere®, VMware® vCloud Director®, vBlock™, LPAR, Oracle® LDOM, Oracle Zone, OpenStack, IBM pSeries, Microsoft® Hyper-V®, KVM, bare-metal Vblock	Support for KVM, XCP/XenServer, vSphere (vCenter™ and ESXi™), Hyper-V, LXC, Docker™, bare-metal Vblock
PaaS support	Support for Pivotal® Cloud Foundry®, Microsoft SQL (DBaas), Docker, EC2 container service	Support for DBaaS/Trove™
Governance	Reclamation of resources, quota management, change approval integration	Quota management only

Capability	BMC CLM	OpenStack
Patching / compliance / configuration management	OOTB compliance content (PCI DSS, SOX, HIPAA) as well as OOTB patching content for automated configuration management	Will use Chef™ or Puppet™ for post-boot image hardening that can provide the "ability to produce a consistent image as well as track compliance of your base image to its respective hardening guidelines over time"
Multi-data center support	Can handle multiple logical data centers such as multiple OpenStack private and public clouds	No
Advanced automation	Market-leading orchestration engine to define automation workflows	No
Advanced networking	Full capability to manage complex on-premises networks including LB, FW, VPN, IPAM support.	Limited
Enterprise-lass features	Yes	Lacks features such as resiliency and rolling upgrades
Ease of use	Yes	A project/framework, not a product

Table 1. Detailed comparison of BMC CLM and OpenStack regarding critical cloud capabilities

As seen from this table, there are gaps between what OpenStack provides and the management capabilities needed to effectively run a governed, compliant, and automated cloud environment for the long term.

Challenge 2: When is "free" really free?

Although OpenStack is marketed as free software, industry experience so far has been quite the contrary because there are hidden costs to implement, operate, and support OpenStack. Each year there is increasing agreement among customers that a skilled engineering team is needed to develop missing capabilities and then customize, integrate, and maintain OpenStack to make it usable in enterprises. Most deployments require five to ten engineers to do development, customizations, integrations, and operations using OpenStack. The development team typically enhances OpenStack with needed cloud management capabilities such as governance, UI enhancements, compliance, automation, and policies. With BMC CLM, this additional development effort would not be needed. Of course, both BMC CLM and OpenStack require integrations to enterprise systems as well as day to day operations for these systems.

Challenge 3: Depth of functionality

Governance, policies, and pooling of resources

OpenStack does not have deep and flexible functionality in governance, policies, and pooling of resources into higher-level logical constructs, such as logical data centers and configurable user-extensible policies to map workloads to logical data centers. BMC CLM offers an extensive mechanism to group resources into pools and logical data centers and mark them as shared or private, and has flexible, configurable policies for workload placement based on tenants, tags, or custom workflows. It also has deep governance ranging from reclamation of resources, quota management (OpenStack has this capability), change management, and CMDB integration.

Platform support

Even though there is a good breadth of platform support in OpenStack, the deep functionality required for enterprise cloud management is lacking at times in many of the drivers. OpenStack Nova™ provides full support for KVM/QEMU but limited support for Microsoft Hyper-V, Citrix XenServer, and VMware vSphere (which are fully supported by BMC CLM). Hence, if the deployment is using KVM, OpenStack has full functionality, but for others it is better to use platform support that BMC CLM provides directly to these hypervisors.

Service catalog

While BMC CLM has a very extensive service catalog to allow administrators to define offerings and entitlements per tenant, OpenStack lacks this level of flexibility.

Challenge 4: Managing risk

We have all heard about the huge increase in IT security threats that have emerged over the last year or so. Hacking incidents, viruses, and vulnerabilities such as Heartbleed, Ghost and ShellShock have hit many companies hard. No IT organization can afford to ignore risk management for both legacy and new cloud infrastructures. Compliance, security, patching, governance, and policies are not built into OpenStack. Again, additional effort is required to integrate OpenStack to Chef, Puppet or some other tool to provide these policies, such as server hardening, server compliance, and server patching. BMC CLM can perform automated compliance and patching on services across all legacy data center infrastructure as well as public and private cloud infrastructure, including OpenStack private clouds, in a consistent manner to reduce risk from provisioning and throughout the lifecycle of the service.

Challenge 5: Heterogeneous platforms and hybrid cloud infrastructure are a reality

If an organization has a single OpenStack infrastructure; does not have any other infrastructures such as VMware vCenter, Microsoft Hyper-V, or public clouds; and has little governance or automation requirements, then the need for a CMP is questionable. However, most enterprises have a hybrid infrastructure with multiple platforms such as Hyper-V, vCenter, and KVM; multiple private clouds; and possibly even multiple public clouds. Sourcing policies seeking to avoid vendor lock-in, as well as mergers and acquisitions, dictate that heterogeneous infrastructure is the new reality. Managing across all of these different platforms becomes very complex: with different people, processes, and technologies required to manage each infrastructure, IT costs can quickly skyrocket. To provision agile services while ensuring costs are kept under control and risk is minimized, IT organizations require a management platform that can abstract the complexity of provisioning and managing across heterogeneous infrastructures and provide a single pane of glass for users as well as administrators. BMC CLM orchestrates the agile delivery and ongoing management of IT services across hybrid cloud and legacy infrastructures to reduce costs while applying consistent compliance and governance policies across all platforms.

DETAILED BUSINESS COMPARISON OF BMC CLM AND OPENSTACK

Business criteria comparisons of BMC CLM and OpenStack are presented in Table 2.

Business Criteria	BMC CLM	OpenStack
Cost	Moderate/low No development work is required. CLM provides enterprise-grade cloud capabilities.	High/moderate Additional staffing is needed to develop enterprise-grade cloud capabilities in OpenStack if it is used standalone without BMC CLM.
Agility	High OOTB integration is ready to use. No additional dev work on OpenStack is needed. Time to operationalize BMC CLM is anywhere from a week to three months.	Low initially/high eventually Significant development work required, at least initially, to bring it on par with CMPs like BMC CLM. Time to operationalize an OpenStack deployment is three to six months for dev setups.
Risk	Low Security scans, compliance available. Content packs are available for compliance and patching. Governance and change control is available OOTB.	High Lack of compliance/security scanning is a major risk. External solutions require integration. Production usage, server hardening, automation tool integration, governance, and change control are all missing in OpenStack and must be built out separately to reduce risks.
Team Skillset	Administrators and business analysts. No developers required.	Deep development experience in Python™ and XML. Linux™ system administrators needed to operate this.

Table 2. Evaluation of BMC CLM and OpenStack regarding business criteria

ARCHITECTURE OF BMC CLM WITH OPENSTACK

BMC CLM has a very broad and heterogeneous platform, with private and public cloud support for solutions including OpenStack, VMware vCenter, Citrix XenServer, IBM LPAR, RHEV, Microsoft Hyper-V, VMWare vCloud Director, VMware vCloud Air, Amazon EC2, and Microsoft Azure. As shown in Figure 1, the BMC solution is layered above resource providers such as OpenStack and provides enterprise-grade cloud capabilities that are missing in OpenStack. BMC CLM provides higher-level capabilities such as service-aware user and admin portals, service catalog, policy management, automation, compliance, and governance uniformly and consistently across multiple resource providers. This architecture is also recommended by Gartner. BMC CLM can provision IaaS (such as servers) and PaaS infrastructures (such as DBaaS), as well as applications (such as three-tier and microservices-based services) across all resource managers including OpenStack, Hyper-V, and vCenter or public clouds such as Azure and EC2.
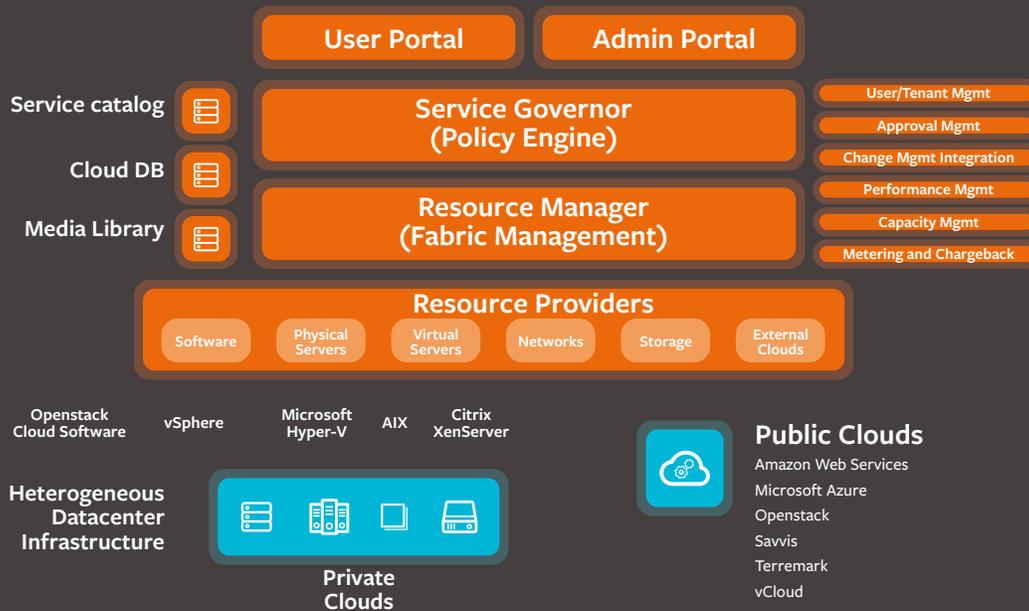
Figure 1. BMC CLM architecture

With the OpenStack and BMC CLM integration, most BMC CLM cloud capabilities work seamlessly with OpenStack as a resource provider:

- OpenStack service offerings for users can be created in the BMC CLM service catalog. These offerings can be single- or multi-tier, and use OpenStack instance flavors, images and networks defined in OpenStack. Images and network resources are onboarded automatically into BMC CLM from OpenStack. Providing users with optional service offerings for flavors, for example, can simplify management of offerings and avoid sprawl.

- OpenStack service offerings and server requests can be easily configured within BMC CLM to provide change approvals that integrate with corporate ITSM systems.

- Server provisioning on OpenStack also includes most common day 2 actions such as start, stop, decommission, and add more CPU or memory or disk.

- Administrators can use BMC CLM tags to provide fine-grained, intelligent placement policies, such as placing VMs on different OpenStack clouds or other private clouds, or on specific networks, based on tags.

- Integration with BMC Capacity Optimization for capacity planning of OpenStack VMs is possible.

- Tenants and quotas can be managed from BMC CLM.

- Advanced automation can be used with OpenStack resources to provide easy extensibility of capabilities. Also, new BMC CLM PaaS resource providers can be quickly written to add developed OpenStack services such as DBaaS Trove or Swift™ as offerings to users.

- Many customers have multiple OpenStack cloud implementations, such as perlocation or to assign one cloud for development and another for test. Multiple cloud management cannot be done in OpenStack and requires multiple consoles for users and administrators. As shown in Figure 2, BMC CLM can easily support multiple OpenStack data centers by providing not only a single pane of glass for users and administrators but also intelligent placement of services across these clouds.
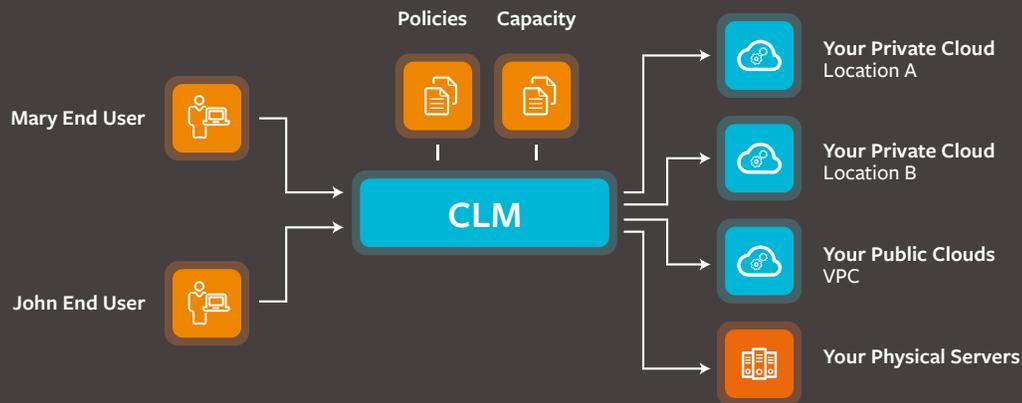
Intelligent = compliance, load, performance, service levels, user info, location.

Figure 2: BMC CLM intelligent placement across OpenStack and other resources

DETAILED TECHNICAL COMPARISON OF BMC CLM AND OPENSTACK

Table 1 shows a detailed technical comparison of CLM vs. OpenStack capabilities. A few of these comparisons are highlighted below.

Service catalog and blueprint for easy-to-design services

BMC CLM is based on service- and application-centric modeling, while OpenStack isn't. An available blueprint graphical designer UI can be used to drag and drop components such as servers, applications, PaaS resources, firewalls, and load balancers to declaratively specify the complete application and service definition. OpenStack blueprinting capabilities include HEAT similar to Amazon AWS CloudFormation templates, and a textual editor is required to define and maintain blueprints. As changes are made to BMC CLM blueprints, versioning and audit control are also performed. BMC CLM also offers options that allow a cloud administrator to reuse the same blueprint for multiple infrastructure configurations, limiting the proliferation of such blueprints and templates.

Full-stack, multi-tier application deployments

BMC CLM allows IT to provision full-stack, multi-tier applications across IaaS, PaaS, and SaaS. Advanced capabilities to specify complex topologies are greatly simplified for administrators defining new services, as well as for users requesting these services. Regulatory and corporate standards such as server hardening can be uniformly applied to all applications and servers across all public and private clouds. OpenStack only provides HEAT-based template provisioning that lacks the above capabilities.

Policy-driven placements

BMC CLM intelligent policy-driven placement allows the administrator to control the placement of workloads based on configurable parameters such as tenants and tags, and is extensible using callouts. It is also integrated with capacity management and change management systems for easily configured approvals. OpenStack lacks this depth of functionality in policy management and change integration and requires additional tools or development work to achieve intelligent placement.

Extensibility, integration with third-party tools, and advanced automation

BMC CLM provides extensive capabilities for adding new plug-ins and providers for new cloud or platform support, very similar to the capabilities to add new drivers and plug-ins available on OpenStack Marketplace. In addition to these capabilities, BMC CLM offers a call-out mechanism to allow any workflow to be executed during API calls. BMC CLM offers many OOTB integrations to ITSM systems like BMC Remedy and BMC RemedyForce for change management and CMDB. New providers can be easily added to achieve these integration with other ITSM systems.

Compliance

Compliance with regulatory or custom policies, security, patching, and governance are not built into OpenStack and require additional development effort to integrate. BMC CLM can be used to perform automated compliance, patching, and policy updates across all legacy data center infrastructure, as well as public and private cloud infrastructure including OpenStack private clouds, in a consistent manner to reduce provisioning risk throughout the lifecycle of the service.

CONCLUSION

Running OpenStack without a cloud management platform is sufficient only in basic cloud use cases. OpenStack has a number of gaps that preclude it from being a complete enterprise grade cloud solution. OpenStack and CMPs such as BMC CLM are not competitive but complementary. Using them together will make private clouds truly enterprise grade.

(i) **FOR MORE INFORMATION**

For more information on BMC Cloud Lifecycle Management, visit **www.bmc.com/clm**

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