MICROSOFT APPLICATIONS ON MICROSOFT PRIVATE CLOUD ENABLED BY VCE VBLOCK SYSTEM 340

Deploying Microsoft Messaging and Collaborations as a service on Microsoft Private Cloud with VCE Vblock Converged Infrastructure Architecture

- Skype for Business 2015
- Exchange 2016
- SharePoint 2013

EMC Solutions

Abstract
This guide describes the reference architecture for using VCE™ Vblock® System 340 to enable Microsoft messaging and collaboration applications, such as, Exchange Server, SharePoint Server and Skype for business, as-a-service in Microsoft private cloud. Automation and orchestration achieved by leveraging Microsoft Windows Azure Pack and System Center.

March 2016
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Executive summary

Document purpose
EMC provides this reference architecture to help IT departments transform the way they offer business applications to their customers. This reference architecture will help organizations reduce the risks associated with creating application deployment services while being agile enough to respond to the data needs of the business. The hybrid cloud model uses an agile infrastructure to scale up or down on demand for Microsoft business applications.

This guide provides the reference architecture for a private cloud using a Microsoft System Center management platform for automation to deliver Applications as a Service on a Microsoft virtualization platform, namely VCE™ Vblock®.

In this reference architecture, Microsoft applications such as Microsoft Exchange, Microsoft Skype for Business and Microsoft SharePoint are provisioned and deployed using a self-service portal to streamline management. For more information, refer to Microsoft Private Cloud on VCE Vblock 340: Foundation.

Applications as a Service is based on the Microsoft private cloud infrastructure, which is composed of Hyper-V, System Center components, and Windows Azure Pack (WAP). For more information, refer to Microsoft Private Cloud on VCE Vblock 340: Foundation.

Use this reference architecture to design a system that will enable your organization to respond faster to business opportunities by incorporating a cloud architecture into your Microsoft application deployment designs. Moving your Microsoft applications to a highly available, secure cloud configuration will help you to future-proof your business IT needs.

Scope
This reference architecture guide provides a technical overview of an EMC on-premises data center solution using VCE Vblock Converged Infrastructure Architecture (CIA) and EMC and Microsoft technologies for a private cloud infrastructure. The solution shows how IT organizations can deliver Microsoft server applications that are provisioned using a self-service portal.

Audience
This guide is intended for technical engineering staff, managers, cloud administrators, solution architects, and storage administrators responsible for analyzing, designing, and managing virtualized infrastructure solutions, cloud solutions, and application platforms.

Business challenge
Organizations are increasingly seeking to do more with less. One way to achieve this objective is by implementing a fully virtualized cloud infrastructure to deliver IT as a Service (ITaaS) with increased performance, agility, and flexibility.

Many customers are seeking to transform their existing virtualized environment into a managed and orchestrated solution. Microsoft System Center with Windows Azure Pack (WAP) provides a toolset to manage infrastructure and applications across private, hosted, and Microsoft Azure cloud solutions.
With VCE vBlock, EMC provides an industry-leading converged infrastructure to give your business applications the capacity to operate more efficiently and with greater agility.

To minimize overhead, Microsoft business applications such as Skype for Business, Server 2012 R2, SharePoint Server 2013, and Exchange Server must be easy to implement. Administrators can easily deploy Microsoft applications on this EMC storage platform to optimize performance.

Technology solution

To help cloud tenants deploy applications such as Skype for Business, Exchange, and SharePoint as a service with minimal administrator intervention, this solution demonstrates how to integrate the following EMC and Microsoft technologies:

- Microsoft Hyper-V for Windows Server 2012 R2
- Microsoft Windows Server Failover Clustering (WSFC)
- Microsoft System Center 2012 R2
- Microsoft Windows Azure Pack
- VCE Vblock System 340
- EMC ViPR

Terminology

Table 1 provides definitions for some of the terms used in this reference architecture guide.

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applications as a Service</td>
<td>Applications as a Service refers to the delivery of computer software applications as a service via the Internet.</td>
</tr>
<tr>
<td>IT as a Service (ITaaS)</td>
<td>ITaaS is an operational model where the IT organization of an enterprise is run much like business, acting and operating as a distinct business entity creating services for other organizations within the enterprise.</td>
</tr>
<tr>
<td>SCOM</td>
<td>Microsoft System Center Operations Manager</td>
</tr>
<tr>
<td>SCVMM</td>
<td>Microsoft System Center Virtual Machine Manager</td>
</tr>
<tr>
<td>SMA</td>
<td>Microsoft Service Management Automation</td>
</tr>
<tr>
<td>SPF</td>
<td>Microsoft Service Provider Foundation</td>
</tr>
<tr>
<td>WAP</td>
<td>Microsoft Windows Azure Pack</td>
</tr>
<tr>
<td>WSFC</td>
<td>Microsoft Windows Server Failover Clustering</td>
</tr>
</tbody>
</table>

We value your feedback!

EMC and the authors of this document welcome your feedback on the solution and the solution documentation. Contact EMC.Solution.Feedback@emc.com with your comments.

Authors: Wensheng Liu, Traci Morrison.
Technology components

Overview

This section describes the key components of this solution, which include VCE Vblock Converged Infrastructure Appliance (CIA), ViPR for storage provisioning, and the Microsoft applications used in Applications as a Service. For information on the additional solution components, such as System Center and WAP, refer to *Microsoft Private Cloud on VCE Vblock 340: Foundation* and *Microsoft Cloud Reference Architecture: Foundation*.

VCE Vblock

Vblock Systems from VCE simplify all aspects of IT and enable organizations to achieve better business outcomes faster. Seamlessly integrating best-in-class compute, network, and storage technologies from industry leaders Cisco, EMC, and VMware, Vblock Systems provide dynamic pools of resources that can be intelligently provisioned and managed to address changing demands and rapidly shifting business opportunities.

Vblock System 340 components

Figure 1 provides a high-level overview of the components in the Vblock System 340 architecture.

![Vblock System 340 components diagram](image)

Figure 1. Vblock System 340 components

**Compute components**

The VCE Vblock 300 series data center platform combines x86-based servers (Cisco UCS B series) and rack servers with networking and storage access into a single system. The platform innovations include:

- Standards-based, unified network fabric
Technology components

- Cisco Virtual Interface Card (VIC)
- Cisco UCS extended-memory technology

Network components

The Nexus series switches in the network layer provide 10-GbE or 40-GbE IP connectivity between the Vblock System 340 and the external network.

In the segregated architecture, the Cisco MDS 9000 Series switches in the network layer provide FC links between the fabric interconnects and EMC® VNX® storage. These FC connections provide access to block-level storage from the blades in the compute layer.

The Vblock System 340 contains two Cisco Nexus 3048 switches to provide management network connectivity to the different components of the Vblock System. These connections include the VNX service processors, UCS fabric interconnects, Cisco Nexus 5500UP or Cisco Nexus 9396PX switches, and power output unit (POU) management interfaces.

Storage components

The VNX series systems are fourth-generation storage platforms that offer a unique combination of flexible, scalable hardware design, and advanced software capabilities that enable them to meet the diverse needs of today’s organizations.

VNX series platforms support block storage and unified storage. The platforms are optimized for virtualized applications. They feature flash drives for extendable cache and high performance in the virtual storage pools. Automation features include self-optimized storage tiering and application-centric replication.

For this solution, the Vblock System 340 includes the VNX5600™ storage platform as primary storage for the Microsoft applications.

VCE bare metal support policy

Since many applications cannot be virtualized due to technical and commercial reasons, VCE Systems support bare metal deployments, such as non-virtualized operating systems and applications. While it is possible for VCE Systems to support these workloads (with caveats noted below), due to the nature of bare metal deployments, VCE is able to provide only “reasonable effort” support for systems that comply with the following requirements:

1 VCE reasonable effort support includes VCE acceptance of customer calls, a determination of whether a VCE System is operating correctly, and assistance in problem resolution to the extent possible. VCE is unable to reproduce problems or provide support on the operating systems and applications installed on bare metal deployments. In addition, VCE does not provide updates to or test those operating systems or applications. The OEM support vendor should be contacted directly for issues and patches.
Technology components

- VCE Systems contain only VCE published, tested, and validated hardware and software components. The VCE Release Certification Matrix provides a list of the certified versions of components for VCE Systems.

- The operating systems used on bare-metal deployments for compute and storage components must comply with the published hardware and software compatibility guides from Cisco and EMC.

- For bare metal configurations that include other hypervisor technologies (Hyper-V, KVM, etc.), those hypervisor technologies are not supported by VCE. VCE Support is provided only on VMware Hypervisors.

**Note:** Refer to *Converged Infrastructure Solution for Microsoft SharePoint, Lync, and Exchange on VCE Vblock System 340* for more information on Microsoft applications performance results, as well as solution architecture designs based on Vblock system.

### EMC technology

#### EMC ViPR

The storage services and controller layers of the ViPR software platform are shown in Figure 2.

![Figure 2. ViPR software-defined storage: controller and storage services](image)

ViPR software-defined storage delivers value to enterprise IT departments and service providers by virtualizing the physical storage infrastructure of a data center into shared pools of storage. By separating storage from the underlying hardware arrays, access and management of heterogeneous storage infrastructures can be centrally executed in the software.

**EMC ViPR Add-in for Microsoft SCVMM**

The EMC ViPR Add-in for SCVMM integrates prepackaged services with SCVMM for allocating and managing EMC ViPR storage with the SCVMM hypervisors and hosts through the System Center Virtual Machine Manager console (VMM console).
This solution uses the ViPR add-in for SCVMM to:

- Provision a volume and present it to hosts
- Extend an existing volume
- Delete a volume

The ViPR add-in for SCVMM is shown in Figure 3.

![ViPR add-in capabilities in SCVMM](image)

ViPR storage services, requested from the ViPR console add-in for SCVMM, simplify the provisioning of block storage. When provisioning storage in this hybrid cloud solution, a user only needs to know the tier of storage required, and does not have to specify detailed storage parameters. Infrastructure and cloud administrators are familiar with this information and can present it to the appropriate line of business for provisioning volumes.

This solution offers different functionality to different users, depending on their role. Through the ViPR portal:

- Through the ViPR portal, ViPR administrators can manage the creation of new tiers of storage
- Through the ViPR add-in for SCVMM, SCVMM administrators can provision new storage for their group

After that, the line of business administrators can provision storage from virtual pools of storage made available to them by a cloud or system administrator. The user need only select which storage service level is required and it is automatically configured and provisioned to the appropriate Hyper-V cluster or standalone Hyper-V host in line with the configuration standards used in this solution. Post-deployment operations are also executed, which enables SCVMM to discover and allocate the new storage resources to the relevant VMM clouds.
The self-service end-to-end provisioning offered by this solution is a result of the pre-packaged services within the ViPR add-in for SCVMM.

For information about how to define storage service levels and configure storage for applications in this solution, refer to Configure storage service levels for applications. For detailed information about ViPR, refer to the ViPR Concepts Guide.

This solution uses Microsoft private cloud technology with EMC storage platform and integration technologies to provide a self-service application-provisioning feature for cloud tenants. This guide uses three Microsoft applications for illustration: Skype for Business, SharePoint, and Exchange.

**Microsoft Exchange 2016**

Microsoft Exchange Server 2016 is an enterprise email and communication system that allows businesses and customers to collaborate and share information. EMC enhances Exchange Server 2016 with the industry’s broadest choice of storage platforms, software, and services.

**Microsoft SharePoint 2013**

Microsoft SharePoint Server 2013 provides a business-collaboration platform for enterprise and commercial organizations. SharePoint enables organizations to share content and information through websites, blogs, wikis, and document libraries, and to manage this content and information collectively from start to finish.

**Microsoft Skype for Business 2015**

Microsoft Skype for Business 2015 is a communications and collaboration platform that brings together a client experience inspired by Skype with the enterprise-grade security, compliance, and control of Lync. It offers features including presence, instant messaging, voice and video calls, and online meetings. It provides a new client experience, a new server release, and updates to the service in Office 365. Skype for Business Server provides new features to improve manageability of on-premises servers and hybrid solutions.

**Solution architecture**

Figure 4 shows how self-service is managed in this reference architecture.
In this solution:

- Vblock 340 is used to provide the physical infrastructure, which contains compute, network and storage resources. Windows Server 2012 R2 is deployed on hosts, with Hyper-V and the cluster failover feature enabled to provide virtualization and a failover service for the whole base environment.

- The System Center components, active directory, SQL server, and ViPR as virtual machines reside on cluster shared volumes (CSVs), which are presented by VNX storage.

- Storage service is provided by ViPR to provision different service level storage for tenant.
- WAP provides an administrator portal for cloud administrators to manage resources for each tenant. WAP also provides a self-service portal for tenants to request application services and manage provisioned virtual machines.

- Skype for Business, Exchange, and SharePoint applications are packaged as a service by the cloud administrator.

## Hardware resources

Table 2 lists the hardware resources used in this solution.

**Table 2. Hardware resources**

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Configuration</th>
<th>Description</th>
</tr>
</thead>
</table>
| Compute   | VCE Vblock System 15 blade servers with:  
  • 2 x 16 CPU cores  
  • 256 GB RAM | Hosts Microsoft Windows Server 2012 R2 and Microsoft System Center Virtual Machine 2012 R2 on blade servers to host Microsoft application virtual machines and management infrastructure |
| Storage   | • EMC VNX5600  
  • 5 x 200 GB flash disks  
  • 90 x 600 GB SAS disks  
  • 50 x 2 TB NL-SAS disks | Provides storage resources to hypervisor, management infrastructure, and application virtual machines |
| Network   | Segregated network architecture:  
  • 4 LAN switches  
  • 2 multilayer SAN fabric switches | • LAN switching  
  • SAN switching |

## Software resources

Table 3 lists the software resources used in this solution.

**Table 3. Software resources**

<table>
<thead>
<tr>
<th>Software</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>VCE Release Certification Matrix for Vblock System 340</td>
<td>5.0.8</td>
</tr>
<tr>
<td>Microsoft Windows Server</td>
<td>2012 R2</td>
</tr>
<tr>
<td>Microsoft System Center components (Virtual Machine Manager, Service Manager, Orchestrator)</td>
<td>2012 R2 UR8</td>
</tr>
<tr>
<td>Microsoft Windows Azure Pack</td>
<td>UR8</td>
</tr>
<tr>
<td>Microsoft Exchange</td>
<td>2016</td>
</tr>
</tbody>
</table>
Solution features

In this solution, the following applications are verified and delivered to cloud customers as Applications as a service on the Microsoft private cloud enabled by VCE Vblock CIA:

- Skype as a service
- SharePoint as a service
- Exchange as a service

User roles

WAP is built to work with existing infrastructures. It supports the different requirements of the many business units in an enterprise and integrates with a wide variety of existing IT systems and best practices.

User roles and responsibilities are defined and used in the structure of WAP. The WAP administration of users and compute resources is managed through the administrative portal. The primary groups, users, and roles that this solution focuses on are summarized Table 4.

Table 4. Description of user roles

<table>
<thead>
<tr>
<th>Role</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCVMM administrator (Cloud administrator)</td>
<td>Performs administrative tasks within SCVMM console:</td>
</tr>
<tr>
<td></td>
<td>• Configures host groups, clouds, network, virtual machine templates</td>
</tr>
<tr>
<td></td>
<td>• Subscribes storage through ViPR add-in for SCVMM</td>
</tr>
<tr>
<td>WAP administrator (Cloud administrator)</td>
<td>Performs administrative tasks within WAP admin portal:</td>
</tr>
<tr>
<td></td>
<td>• Configures and manage resource in clouds, user accounts and tenant offers</td>
</tr>
<tr>
<td>Exchange administrator (Tenant)</td>
<td>As a tenant user, subscribes Exchange as a Service within WAP tenant portal.</td>
</tr>
<tr>
<td></td>
<td>As an Exchange administrator, performs Exchange administrative tasks within Exchange server.</td>
</tr>
</tbody>
</table>
### Solution features

<table>
<thead>
<tr>
<th>Role</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SharePoint administrator (Tenant)</td>
<td>As a tenant user, subscribes SharePoint as a service within WAP tenant portal. As a SharePoint administrator, performs SharePoint administrative tasks within Exchange server.</td>
</tr>
<tr>
<td>Skype administrator (Tenant)</td>
<td>As a tenant user, subscribes Skype as a service within WAP tenant portal. As a Skype administrator, performs Skype administrative tasks within Exchange server.</td>
</tr>
</tbody>
</table>

#### Exchange as a service

This solution offers the Exchange administrator several Exchange Server 2016 templates, each with a different storage service level defined in SCVMM.

When Exchange virtual machine provisioning is complete:

- The Exchange administrator can log in to the Exchange administration center to manage Exchange server.
- The Exchange user can start using the email service immediately.

**Note:** The Mailbox server in Exchange 2016 includes all of the server components from the Exchange 2013 Mailbox and Client Access server roles. For more information, refer to *What’s new in Exchange 2016* in Microsoft TechNet.

Figure 5 shows several Exchange virtual machine templates, along with different storage service levels. Gold means high performance storage, Silver means performance storage, and Bronze means capacity storage.

![Figure 5. Exchange template with different storage service levels in SCVMM](image)

**Managing Exchange as a service**

The WAP administrator can configure and manage Exchange as a service in the WAP admin portal. After configuring and managing Exchange as a service, the administrator provides the service to each tenant.

Figure 6 shows Exchange Server 2016 template management in the WAP plan.
Solution features

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Figure 6. Exchange templates in the WAP administrator portal

Subscribing to Exchange as a service

The Exchange administrator of each tenant can log in to the WAP tenant portal to subscribe to Exchange as a service after the WAP administrator configures the service.

Figure 7 shows an example of the Exchange administrator subscribing to an Exchange 2016 service in the WAP tenant portal.

Figure 7. Exchange template example in the WAP tenant portal

The Exchange administrator can log in remotely to verify that the Exchange application is operational.
Figure 8 shows an Exchange administrator logged in to the Exchange Server 2016 administrator center. The server appears in the Exchange servers list.

**Exchange admin center**

<table>
<thead>
<tr>
<th>servers</th>
<th>databases</th>
<th>database availability groups</th>
<th>virtual directories</th>
<th>certificates</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>NAME</th>
<th>SERVER ROLES</th>
<th>VERSION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALPHAERGOLDEN</td>
<td>Mailbox, Client Access</td>
<td>Version 15.1 (Build 225.49)</td>
</tr>
</tbody>
</table>

**Figure 8.  Exchange admin center showing a new Exchange Server**

**SharePoint as a service**

This solution offers SharePoint administrators several sample SharePoint templates. These templates have standalone SharePoint features and different compute resources, each with different storage resources.

When SharePoint virtual machine provisioning is complete:

- Users can access a provisioned web application, web site, and a central location for collaboration.
- Tenants can browse the SharePoint website and upload or download documents.
- SharePoint administrators can log in to the central administration site to manage the SharePoint site.

Figure 9 shows an example of different SharePoint templates with different storage service levels.

**Figure 9.  SharePoint template with different storage services in SCVMM**
Managing SharePoint as a service

The WAP administrator can configure and manage Exchange as a service in the WAP administrator portal. After configuring and managing Exchange as a service, the administrator provides the service to each tenant.

Figure 10 shows SharePoint templates in a WAP plan.

<table>
<thead>
<tr>
<th>NAME</th>
<th>OPERATING SYSTEM</th>
<th>VM TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SharePoint2013_Silver</td>
<td>Windows Server 2012 R2 Datacenter</td>
<td>Generation 1</td>
</tr>
<tr>
<td>SharePoint2013_Gold</td>
<td>Windows Server 2012 R2 Datacenter</td>
<td>Generation 1</td>
</tr>
<tr>
<td>SharePoint2013_Bronze</td>
<td>Windows Server 2012 R2 Datacenter</td>
<td>Generation 1</td>
</tr>
</tbody>
</table>

Figure 10. SharePoint templates in a WAP Service Management Portal

Subscribing to SharePoint as a service

The SharePoint administrator of each tenant can log in to the WAP tenant portal to subscribe to Exchange as a service when the service is ready.

Figure 11 shows a SharePoint administrator subscribing to the SharePoint service in the WAP tenant portal.

CREATE VIRTUAL MACHINE

Virtual Machine configuration

Figure 11. SharePoint template in the WAP tenant portal

Finally, the SharePoint administrator can log in remotely to verify that the SharePoint application is operational.

Figure 12 shows the Central Administration home page after a SharePoint administrator has logged in.
Solution features

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SharePoint

Central Administration

Application Management
System Settings
Monitoring
Backup and Restore
Security
Upgrade and Migration
General Application Settings
Apps
Office 365
Configuration Wizards

Office 365

Figure 12. SharePoint Central Administration home page

Skype as a service

This solution provides an example Skype template for use by Skype administrators.

When Skype for Business virtual machine provisioning is complete:

- Skype administrators can log in to the Skype for Business Server 2015 Control Panel to do administration work.
- Users can use Skype clients to communicate with other desktops in the same domain.

Figure 13 shows an example of a Skype template.

Managing Skype as a service

The WAP administrator can configure and manage Skype as a service in WAP admin portal. After configuring and managing Skype as a service, the administrator provides the service to each tenant.

Figure 14 shows a Skype for Business template in a WAP administrator portal.
Figure 14. Skype for Business template in WAP administrator portal

Subscribing to Skype as a service

After the WAP administrator has configured the service, the Skype administrator of each tenant can log in to the WAP tenant portal to subscribe to the service.

Figure 15 shows a Skype administrator subscribing to a Skype template in the WAP tenant portal.

Figure 15. Skype for Business template in WAP tenant portal

The Skype administrator can log in remotely to verify that the Skype service is operational.

Figure 16 shows the Skype for Business 2015 Control Panel after a Skype administrator has logged in to the Skype server.
Configure Microsoft Applications as a Service

Overview

Figure 17 illustrates the general Microsoft applications virtual machine provisioning workflow on both the administrator and tenant side. The SCVMM administrator should prepare the virtual machine template with the operating system and prerequisites installed in the template. The WAP administrator will import the template to the WAP plan before the tenant user (Exchange, SharePoint and Skype administrator) can subscribe and use it.
Figure 17. Workflow for Microsoft applications services configuration and requests

**Configuring applications as a service**

The SCVMM administrator can build Applications as a Service using these high-level steps:

2. Install all prerequisites on the virtual machines.

**Note:** For SharePoint, when preparing prerequisites in step 2, make sure to install the SharePoint setup.exe, and close the post-configuration wizard.

3. Build virtual machine templates with these virtual machines.
4. Configure virtual machine templates to allow tenants to choose different hardware profiles (such as storage, CPU, and memory) by selecting different templates.

The WAP administrator can build Applications as a Service using these high-level steps:

1. Create a plan for the application in the WAP administrator portal.
2. Configure the plan in the WAP administrator portal by entering the target parameters and virtual machine templates.

**Subscribing to applications as a service**

As an Exchange, SharePoint or Skype administrator in a tenant, you can subscribe to Applications as a Service through the WAP tenant portal using these high-level steps:

1. Log in to the WAP tenant portal.
Configure storage service levels for applications

With ViPR and SCVMM, this solution enables tenants to choose different storage service levels for their applications. We created several storage service levels from ViPR and bound them with the SCVMM storage classification. Cloud administrators can use this method to create different templates with different storage service levels, and tenants can choose templates based on their business requirements.

To provide storage service for applications, we first defined different storage service levels in ViPR, and then linked the storage service levels to block virtual pools in ViPR in a one-to-one mapping relationship. For example, we created a block virtual pool in ViPR with all the solid-state drives (SSDs) in the back end and named it a “High Performance” pool.

Table 5 provides an example of storage service level definitions in ViPR block virtual pools.

Table 5. Storage service levels defined in ViPR block virtual pools

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>High performance</td>
<td>Gold level storage</td>
</tr>
<tr>
<td>Performance</td>
<td>Silver level storage</td>
</tr>
<tr>
<td>Capacity</td>
<td>Bronze level storage</td>
</tr>
</tbody>
</table>

To choose different storage service levels for your templates, you must create the storage classifications under Fabric Management in SCVMM, as shown in Figure 18. To align with the storage service in ViPR, we recommend giving names that align with the storage service levels defined in ViPR.

Figure 18. Storage classifications in SCVMM
After the configuration on both ViPR and SCVMM storage classifications is complete, the final step is to bind the two together. By selecting the classification in storage under the Hyper-V cluster node’s properties, you can bind the cluster volume to the SCVMM classification.

Figure 19 shows the location of storage settings in SCVMM.

![Figure 19. Storage settings in SCVMM](image)

Windows Failover Cluster Manager creates the cluster volume, where we bound ViPR with the cluster storage. Each cluster shared volume represents a virtual pool in ViPR.

Figure 20 shows the cluster storage in Failover Cluster Manager.

![Figure 20. Cluster shared volume with storage service in Failover Cluster Manager](image)

You can now select a storage service level in the virtual machine template, as shown in Figure 21.

![Figure 21. Selecting storage classification in the virtual machine template](image)
Conclusion

This reference architecture streamlines the provisioning of Microsoft messaging and collaboration services in the Microsoft private cloud on VCE Vblock System 340. This Microsoft-based private cloud solution provides the following key benefits:

- **Self-service**—Tenants can use the self-service portal to provision the Microsoft application server by deploying selected virtual machine templates. Self-service provisioning encompasses all necessary compute resources, including CPUs, memory, storage, network, and other preconfigured application components such as different versions and editions, in an automated manner.

- **Storage service level**—Tenants can choose different storage services associated with virtual machine templates. The storage service levels might include the performance tier, high performance tier, and capacity tier.

- **Rapid provisioning**—IT departments can create reusable application virtual machine templates that tenants can subscribe to over and over again. The reusable virtual machine templates reduce the cost and burden for IT departments of supporting application provisioning.

- **User-defined**—Application virtual machine templates are highly customizable in terms of allocating computing resources such as the number of CPUs, memory size, storage tier, network, and OS configuration. Additionally, the virtual machine templates enable administrators to add customized scripts that make this solution much more effective and flexible in meeting the needs of tenants.

- **Consistent user experience**—Microsoft private cloud provides the capabilities and required integration points for a consistent user experience when provisioning Microsoft Skype for Business, Exchange, and SharePoint servers.

This solution enables customers to accelerate the implementation and management of Microsoft applications over the Microsoft private cloud on VCE Vblock System 340, which provides an agile and highly scalable converged infrastructure for rapid deployment or expansion of virtualized business applications in the data center, cloud, and service provider implementations.

References

The following documentation on EMC.com or EMC Online Support provides additional relevant information. Access to these documents depends on your login credentials. If you do not have access to a document, contact your EMC representative.

- [Microsoft Private Cloud on VCE Vblock 340: Foundation](#)
- [Microsoft Cloud Reference Architecture: Foundation](#)
- [Converged Infrastructure Solution for Microsoft SharePoint, Lync, and Exchange on VCE Vblock System 340](#)
Sample configuration scripts

Microsoft documentation

The following documentation on the Microsoft TechNet website provides additional relevant information:

- Microsoft Exchange Server 2016
- Microsoft SharePoint Server 2013
- Microsoft Skype for Business Server 2015

Sample configuration scripts

This section provides sample configuration scripts used for SharePoint, Exchange, and Skype for Business applications after they are configured as a service.

SharePoint

This is a post-configuration script for the SharePoint standalone server. Once the script starts to run, it will perform ten post-configuration steps to prepare the server.

Add-PsSnapin Microsoft.SharePoint.PowerShell -ErrorAction SilentlyContinue
cd "C:\Program Files\Common Files\microsoft shared\Web Server Extensions\15\BIN"
psconfig -cmd standaloneconfig

Exchange

This is an unattended installation script that performs a Mailbox role in Exchange server installation with certain organization names.


$OName=(Get-ADDomain).Name
cd c:\software\exchange
./setup.exe /PrepareSchema /IAcceptExchangeServerLicenseTerms
./setup.exe /PrepareAD /OrganizationName:$OName
/IAcceptExchangeServerLicenseTerms
./setup.exe /mode:Install /role:Mailbox /OrganizationName:alpha
/IAcceptExchangeServerLicenseTerms

Restart-Computer

Skype for Business

This is an unattended installation script that performs installation and configuration for Skype server.

#install skype
Start-Process "C:\software\skype\Setup\amd64\vcredist_x64.exe" /q -Wait
Sample configuration scripts

Start-Process "C:\software\skype\Setup\amd64\SQLSysClrTypes.msi" /q -Wait
Start-Process "C:\software\skype\Setup\amd64\SharedManagementObjects.msi" /q -Wait
Start-Process "C:\software\skype\Setup\amd64\Setup\ocscore.msi" /q -Wait
Start-Process "C:\software\skype\Setup\amd64\Setup\admintools.msi" /q -Wait

#Module Import
Import-Module 'C:\Program Files\Common Files\Skype for Business Server 2015\Modules\SkypeForBusiness\SkypeForBusiness.psd1'
Import-Module ActiveDirectory

## Variables ##
$Domain = Get-ADDomain
$Computer = $env:computername + '.'+$Domain.DNSRoot
$DC = Get-ADDomainController
$Sbase = "CN=Configuration,"+$Domain.DistinguishedName
$fileshare = "share"
$filesharepath = "c:\"+$fileshare

#Create folder c:\LYNCST\logs
New-Item -Name LYNCST -Path c:\ -ItemType Directory
New-Item -Name logs -Path c:\LYNCST -ItemType directory

Install-CSAdServerSchema -Confirm:$false -Verbose -Report "C:\LYNCST\logs\Install-CSAdServerSchema.html"
Enable-CSAdForest -Verbose -Confirm:$false -Report "C:\LYNCST\logs\Enable-CSAdForest.html"
Enable-CSAdDomain -Verbose -Confirm:$false -Report "C:\LYNCST\logs\Enable-CSAdDomain.html"
Add-ADGroupMember -Identity CSAdministrator -Members "Domain Admins"
Add-ADGroupMember -Identity RTCUniversalServerAdmins -Members "Domain Admins"

& 'C:\Program Files\Skype for Business Server 2015\Deployment\Bootstrapper.exe' /BootstrapSqlExpress /SourceDirectory:"C:\software\skype\Setup\amd64"

& 'C:\Program Files\Skype for Business Server 2015\Deployment\Bootstrapper.exe' /Bootstraplocalmgmt /SourceDirectory:"C:\software\skype\Setup\amd64"
Install-CsDatabase -CentralManagementDatabase -SqlServerFqdn $Computer -SqlInstanceName rtc

_set-CsConfigurationStoreLocation -SqlServerFqdn $Computer -SqlInstanceName rtc -Force

## Create File Share
New-Item $filesharepath -type directory
New-SmbShare -Name FileShare $filesharepath
Get-smbshare -name FileShare | Grant-SmbShareAccess -AccessRight Full -AccountName Everyone -Force

## Build and Publish Lync Topology
$xml = New-Object XML
$xml.Load("C:\software\skypetopology\DefaultTopology.xml")
$xml.Topology.InternalDomains.DefaultDomain = $domain.DNSRoot
$xml.Topology.InternalDomains.InternalDomain.name = $domain.DNSRoot
$xml.Topology.Clusters.cluster.fqn = $Computer
$xml.Topology.Clusters.cluster.machine.UpgradeDomain = $Computer
$xml.Save("C:\software\skypetopology\DefaultTopology.xml")
Publish-CSTopology -Filename
C:\software\skypetopology\DefaultTopology.xml -Force
Enable-CSTopology
Enable-Csreplica
Start-CSWindowsService Replica
$CSConfigExp = Export-csconfiguration -asbytes
Import-CsConfiguration -Byteinput $CSConfigExp -Localstore
& "C:\Program Files\Skype for Business Server 2015\Deployment\Bootstrapper.exe"
/Sourcedirectory:"C:\software\skype\Setup\amd64"
## DNS Records ##
$lyncIP = Get-NetAdapter | Get-NetIPAddress -AddressFamily IPv4
Add-DnsServerResourceRecordA -IPv4Address $lyncIP.IPv4Address -Name sip -ZoneName $Domain.DNSRoot -ComputerName $DC.HostName
Add-DnsServerResourceRecordA -IPv4Address $lyncIP.IPv4Address -Name meet -ZoneName $Domain.DNSRoot -ComputerName $DC.HostName
Add-DnsServerResourceRecordA -IPv4Address $lyncIP.IPv4Address -Name admin -ZoneName $Domain.DNSRoot -ComputerName $DC.HostName
Add-DnsServerResourceRecordA -IPv4Address $lyncIP.IPv4Address -Name dialin -ZoneName $Domain.DNSRoot -ComputerName $DC.HostName
Add-DnsServerResourceRecord -ZoneName $domain.DNSRoot -Name "_sipinternals._tcp" -DomainName $Computer -Weight 0 -Priority 0 -Port 5061 -ComputerName $DC.HostName -Srv
## Certificates ##
$CA = Get-Adobject -LDAPFilter "(&(objectClass=pKIEnrollmentService)(cn=*))" -SearchBase $Sbase
$CAName = $DC.Hostname + "" + $CA.Name
$certOAuth = Request-CsCertificate -New -Type OAuthTokenIssuer -ComputerFqdn $Computer -CA $CAName -FriendlyName "OathCert" -PrivateKeyExportable $True -DomainName $Computer
Set-CsCertificate -Reference $certServer -Type Default,WebServicesInternal,WebServicesExternal
Set-CsCertificate -Reference $certOAuth -Type OAuthTokenIssuer
Start-CSWindowsService -NoWait
Start-CSWindowsService Replica