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docfeedback@vmware.com
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About vCloud NFV Platform Upgrade Guide

The vCloud NFV Platform Upgrade Guide provides information for upgrading the VMware vCloud NFV® platform from earlier versions based on the design introduced in the vCloud NFV Reference Architecture. The procedures mentioned in the current vCloud NFV Platform Upgrade Guide are validated in the VMware labs.

Intended Audience

This guide is intended for users who want to upgrade the vCloud NFV platform from version 2.1 or 3.0 to version 3.2.

To upgrade the vCloud NFV platform, you must:

- Have knowledge about the deployment and configuration of the vCloud NFV platform product components.
- Be familiar with the vCloud NFV Reference Architecture.
Overview of the vCloud NFV Platform Upgrade

The vCloud NFV Platform Upgrade Guide provides the high-level upgrade steps that are essential to upgrade a platform. The vCloud NFV Platform Upgrade Guide is best used together with the product documentation of each vCloud NFV component.

Note

- This document also provides information about vCenter Server and migrating external PSCs to embedded PSC.
- NSX controllers and their upgrades are applicable only for VMware NSX® Data Center for vSphere® and not for VMware NSX-T™ Data Center.
- For more information about the vCloud NFV reference architecture and design, consult with your VMware account manager or support team.

This vCloud NFV Platform Upgrade guide supports the following upgrade path:

- vCloud NFV 2.1 to vCloud NFV 3.2.1: vCloud NFV 2.1 release is based on NSX for vSphere. With this upgrade path, customers can upgrade NSX for vSphere to its latest version that is available as part of the release bundle.
- You can integrate NSX-T Data Center in vCloud NFV 3.2.1. See Integrating NSX-T Data Center with vCloud NFV 3.2.1.

This chapter includes the following topics:

- Acronyms and Definitions
- vCloud NFV Platform Topology
- Upgrade Sequence
- Upgrade Checklist

Acronyms and Definitions

VMware vCloud NFV Platform uses a specific set of abbreviations that apply to the NFV technology and the Telco industry.
NFV Acronyms

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NFVI</td>
<td>Network Functions Virtualization Infrastructure</td>
</tr>
<tr>
<td>N-VDS (E)</td>
<td>Enhanced mode when using the N-VDS logical switch of VMware NSX-T™ Data Center. This mode enables DPDK for workload acceleration.</td>
</tr>
<tr>
<td>N-VDS (S)</td>
<td>Standard mode when using the N-VDS logical switch of VMware NSX-T™ Data Center</td>
</tr>
<tr>
<td>VIM</td>
<td>Virtualized Infrastructure Manager</td>
</tr>
<tr>
<td>VNF</td>
<td>Virtual Network Function, running in a virtual machine</td>
</tr>
</tbody>
</table>

vCloud NFV Platform Topology

The vCloud NFV 3.x platform topology is based on the vCloud NFV Reference architecture. It includes improved support for High Availability of respective management components.

vCloud NFV is based on the 3-Pod design, which consists of Management Pod, Edge Pod, and Resource Pod. Management Pod contains all Management components such as vCenter Server, NSX Manager, vCloud Director (VIM), and Operation and Analytics.

![Figure 2-1. Layered Abstractions of the NFV Environment](image-url)
Upgrade Sequence

The vCloud NFV platform architecture components have interdependencies. When upgrading components, you must follow a particular upgrade sequence for the minimal impact to the running workloads and to ensure that there are no interoperability issues during the platform upgrade process.

**Note**

- NSX Controller upgrade is applicable only for the deployment of NSX Data Center for vSphere and not for NSX-T Data Center.
- This upgrade sequence applies to both 2-Pod and 3-Pod design.

### Upgrade Sequence

<table>
<thead>
<tr>
<th>NFV RA components</th>
<th>Management Cluster</th>
<th>Resource and Edge Cluster</th>
<th>DR Cluster</th>
</tr>
</thead>
<tbody>
<tr>
<td>VMware vCloud Director® - Database</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VMware vCloud Director® Cells</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NSX Manager/Controllers</td>
<td>3</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>NSX Fabric (Host VIBs for ESXi)</td>
<td>4</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>VMware vCenter™ Server/VUM</td>
<td>5</td>
<td>14</td>
<td>5</td>
</tr>
<tr>
<td>NSX Edge</td>
<td>6</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>VMware vRealize® Log Insight™</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VMware vRealize® Operations™</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VMware vRealize® Orchestrator</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VMware vRealize® Network Insight</td>
<td>16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VMware vSphere® Replication™</td>
<td>8</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>VMware Site Recovery Manager™</td>
<td>9</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>VMware ESXi™ /VSAN</td>
<td>10</td>
<td>17</td>
<td>17</td>
</tr>
</tbody>
</table>

### Upgrade Checklist

vCloud NFV Platform products follow strict product upgrade guidelines. You must adhere to the checklist before performing an upgrade.

1. Ensure that the vCloud NFV 2.1 or vCloud NFV 3.0 bundle is configured properly and is functional.
2. Ensure that the vCloud NFV 3.2 bundle is downloaded and available.
3. Ensure that you have enough storage capacity for backups and snapshots.
4. Take a snapshot and backup of each management component before upgrade.
5. Ensure that all components in your current production network are patch current. For the list of components, see Upgrade Sequence.
6 Develop an upgrade sequence plan for the solution deployed in your production network, based on the components identified in the previous step.
Currently, two paths are supported for the vCloud NFV 3.2 platform upgrade: vCloud NFV 2.1 to 3.2 and vCloud NFV 3.0 to 3.2.

This chapter includes the following topics:
- vCloud NFV 2.1 to vCloud NFV 3.2
- vCloud NFV 3.0 to vCloud NFV 3.2

vCloud NFV 2.1 to vCloud NFV 3.2

vCloud NFV 2.1 is a purpose-built carrier grade cloud services platform, with significant NFV-focused features that are designed to support CSP requirements. This section provides details about the platform components and network topology for the release.

Platform Components for vCloud NFV 2.1 Upgrade

vCloud NFV includes required and recommended components. The required components are mandatory for the solution to function and the recommended components provide useful additional capabilities.
**Figure 3-2. Virtual Building Blocks NFV 3.x**

![Diagram showing the components of a virtual building block for NFV 3.x]

**Note** You can use alternative or third-party components for recommended components as appropriate. Based on the upgrade path, check appropriate VMware products for required in solution.

<table>
<thead>
<tr>
<th>Component</th>
<th>vCloud NFV 2.1</th>
<th>vCloud NFV 3.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>VMware ESXi™</td>
<td>6.5 U1</td>
<td>6.7 U2</td>
</tr>
<tr>
<td>VMware vCenter™ Server Appliance™</td>
<td>6.5 U1</td>
<td>6.7 U2</td>
</tr>
<tr>
<td>VMware vSphere® Replication™</td>
<td>6.5.1</td>
<td>8.1.2</td>
</tr>
<tr>
<td>VMware Virtual SAN™</td>
<td>6.5</td>
<td>6.7</td>
</tr>
<tr>
<td>VMware vRealize® Operations™</td>
<td>6.7.0</td>
<td>7.5.0</td>
</tr>
<tr>
<td>VMware vRealize® Log Insight™</td>
<td>4.6.0</td>
<td>4.8.0</td>
</tr>
<tr>
<td>VMware vRealize® Orchestrator Appliance</td>
<td>7.4.0</td>
<td>7.6.0</td>
</tr>
<tr>
<td>VMware Site Recovery Manager™</td>
<td>6.5.1</td>
<td>8.1.2</td>
</tr>
<tr>
<td>VMware vCloud Director® for Service Providers</td>
<td>9.1</td>
<td>9.7</td>
</tr>
</tbody>
</table>
Network Topology

The vCloud NFV platform consists of various network segments. These network segments are primarily divided into infrastructure networks and tenant networks.

The infrastructure network traffic includes traffic from VMware vSphere® vMotion®, VMware Virtual SAN™, VMware vSphere® Replication™, and host management. Tenant networks (physical VLAN networks) such as Management VLAN, to connect management virtual machines (VMs) to the hypervisor.

All ESXi hosts in the vCloud NFV platform are configured with VMware vSphere® Distributed Switch™ (VDS) devices, which provide consistent network configuration across multiple hosts as required by NSX Data Center for vSphere. The hypervisor VMkernel networks are configured on an infrastructure VDS, and the tenant networks are configured on a tenant VDS on each of the ESXi hosts.

Infrastructure Networks

Each ESXi host has multiple VMkernel port groups configured for each infrastructure network. The infrastructure networks are:

- vMotion Network - For the vSphere vMotion traffic.
- Virtual SAN Network - For the Virtual SAN shared storage traffic.
- ESXi Management - For the ESXi host management traffic.
- Replication Network - For communication between hosts at the protected and recovery sites.

Tenant Networks

Tenant networks are used to interconnect the VMs of the vCloud NFV platform. These networks are configured on a dedicated tenant VDS in each of the clusters. The tenant networks are:

- VNF Network - VXLAN-based network for VNF to VNF communication.
- Management VLAN - VLAN-based network for management component communication.

Management, Edge, and Resource Clusters

The vCloud NFV infrastructure platform contains a Management cluster, a Resource cluster, and an Edge cluster.

A separate vCenter and NSX Manager instance is used to manage the Management cluster. The NSX Manager in the Management cluster is leveraged to provide network services such as load balancing to vCloud Director Cells.
Figure 3-3. The vCloud NFV 2.1 Host Network Design
vCloud NFV 3.0 to vCloud NFV 3.2

vCloud NFV 3.0 is a purpose-built carrier grade cloud services platform, with significant NFV-focused features that are designed to support CSP requirements. This section provides details about the platform components and network topology for the release.

Platform Components for vCloud NFV 3.0 Upgrade

vCloud NFV includes required and recommended components. The required components are mandatory for the solution to function and the recommended components provide useful additional capabilities.

---

**Note**  NSX controllers and their upgrades are applicable only for NSX Data Center for vSphere and not for NSX-T Data Center.
Figure 3-5. Virtual Building Blocks for NFV 3.x

<table>
<thead>
<tr>
<th>Component</th>
<th>vCloud NFV 3.0</th>
<th>vCloud NFV 3.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>VMware ESXi™</td>
<td>6.7 U1</td>
<td>6.7 U2</td>
</tr>
<tr>
<td>VMware vCenter™ Server Appliance™</td>
<td>6.7 U1</td>
<td>6.7 U2</td>
</tr>
<tr>
<td>VMware vSphere® Replication™</td>
<td>8.1.1</td>
<td>8.1.2</td>
</tr>
<tr>
<td>VMware Virtual SAN™</td>
<td>6.7</td>
<td>6.7</td>
</tr>
<tr>
<td>VMware vRealize® Operations™</td>
<td>7.0.0</td>
<td>7.5.0</td>
</tr>
<tr>
<td>VMware vRealize® Log Insight™</td>
<td>4.7.0</td>
<td>4.8.0</td>
</tr>
<tr>
<td>VMware vRealize® Orchestrator Appliance</td>
<td>7.5.0</td>
<td>7.6.0</td>
</tr>
<tr>
<td>VMware Site Recovery Manager™</td>
<td>8.1.1</td>
<td>8.1.2</td>
</tr>
<tr>
<td>VMware vCloud Director® for Service Providers</td>
<td>9.5</td>
<td>9.7</td>
</tr>
<tr>
<td>VMware vRealize® Network Insight</td>
<td>3.9.0</td>
<td>4.1.0</td>
</tr>
<tr>
<td>VMware NSX® Data Center for vSphere®</td>
<td>6.4.3</td>
<td>6.4.4</td>
</tr>
<tr>
<td>VMware NSX-T™ Data Center</td>
<td>2.3.0</td>
<td>2.4.0</td>
</tr>
</tbody>
</table>
Network Topology

The vCloud NFV platform consists of various network segments. These network segments are primarily divided into the infrastructure networks and the tenant networks.

Figure 3-6. The vCloud NFV 3.x Host Network Design
Upgrading vCloud NFV Platform

Upgrading NFV includes upgrading vCloud Director, NSX Data Center for vSphere, NSX-T Data Center, the required NSX components, vCenter Server, vRealize Suite of products, vSphere Site Recovery Manager, and ESXi hosts.

This chapter includes the following topics:

- Upgrading vCloud Director
- Upgrading VMware NSX Data Center for vSphere
- Upgrading VMware NSX-T Data Center
- Upgrading vCenter Server
- Upgrading vRealize Products for vCloud NFV
- Upgrading vSphere Replication
- Upgrading vSphere Site Recovery Manager
- Upgrading ESXi Hosts
- Upgrading the vSAN Cluster
- Post Upgrade Checklist

Upgrading vCloud Director

This section provides instructions for upgrading the vCloud Director software to version 9.7. The vCloud Director installer verifies that the target server meets all upgrade prerequisites and upgrades the vCloud Director software on the server.

Prerequisites

- Take a backup/snapshot of the VCD cells before attempting to upgrade them.
- Back up your existing database before you upgrade it. Use the procedures that your database software vendor recommends.
- If your existing vCloud Director installation uses an Oracle database, verify that you migrated to a PostgreSQL database from vCloud Director version 9.1. See the Workflow for Upgrading a vCloud Director Installation with an Oracle Database.
If you are using VCD 8.20, you must upgrade VCD from version 8.20 to version 9.1 first.

**Procedure**

1. Shut down the vCloud Director services on each cell using the `[root@cell1 /opt/vmware/vclouddirector/bin]#./cell-management-tool -u administrator cell --shutdown` command.

2. If your current database is Microsoft SQL Server 2012, upgrade the database to Microsoft SQL Server 2017. Follow the below prerequisite to perform the database upgrade:
   a. Install Windows Server 2012 R2 Update 1 (Microsoft KB2919355).
      
      **Important**
      - If you have issues when installing, see KB42153.
   
   
   c. Install latest SQL Server Management Studio (SSMS).

3. Upgrade the vCloud Director Cells.
   
   For the instructions to upgrade, see [Upgrade a vCloud Director Cell](#).

4. Upgrade the vCloud Director software on the remaining cells in the group.

5. Start the vCloud Director services on all cells using the command `service vmware-vcd start`.

### Upgrading VMware NSX Data Center for vSphere

Upgrading VMware NSX® Data Center for vSphere® to version 6.4.4 involves upgrading NSX Manager Appliance, NSX Controller cluster, NSX host clusters, and NSX Edge, in the order specified.

**Prerequisites**

- Ensure to refer to these topics in the NSX Upgrade guide:
  - System Requirements for NSX
  - Preparing for the NSX Upgrade
  - Take a backup of the NSX components before starting any upgrade. For more information, see the [NSX Backup and Restore](#) section.

**Note** The upgrade process is managed by NSX Manager. If the upgrade of a component fails or is interrupted and you have to repeat or restart the upgrade, the process begins from the point at which it stopped. The upgrade process does not start over from the beginning.

**Procedure**

1. Upgrade the NSX Manager Appliance using the instructions at Upgrade NSX Manager.
2 Upgrade NSX controllers using the instructions at Upgrade the NSX Controller Cluster.

3 Upgrade the NSX host configuration using the instructions at Upgrade Host Clusters.

4 Upgrade the NSX Edge appliance using the instructions at Upgrade NSX Edge.
   
   Edge Services Gateway instances can be upgraded at any time after the NSX Manager upgrade. However, logical routers cannot be upgraded until the NSX Controller cluster and host clusters have been upgraded. See the Operational Impacts of NSX Upgrades section of the NSX Upgrade Guide for more information about upgrade dependencies.

Upgrading VMware NSX-T Data Center

Upgrading VMware NSX-T™ Data Center to version 2.4 involves upgrading NSX Manager Appliance, NSX Controller cluster, NSX host clusters, and NSX Edge, in the order specified.

Prerequisites

- Take a backup of the NSX Manager before starting any upgrade. For more information, see NSX Backup and Restore.
- Refer to these topics in the NSX Upgrade guide:
  - NSX-T Data Center Upgrade Checklist
  - Preparing to Upgrade NSX-T Data Center

Procedure

- To upgrade NSX-T Data Center, see the instructions at Upgrading NSX-T Data Center.
  
  Before upgrading NSX-T Data Center from version 2.3 to version 2.4, you must upgrade ESXi to vSphere 6.7 EP6 patch. For more information, see Upgrade ESXi Host.

Upgrading vCenter Server

This section describes upgrading vCenter Server to version 6.7. It also provides information about migrating external PSC to Embedded PSC that has replaced the complexity of external load balanced PSCs.

Procedure

1 Upgrade PSC and vCenter Server from 6.x to 6.7. For more information, see vCenter Server upgrade guide.
2 Use the convergence tool to migrate PSC from external to embedded PSC.

For more information, see *VMware Documentation on the basics of convergence tool* and the *VMware KB How to migrate external PSCs with NSX LB to be embedded using VMware Convergence tool*.

**Note**  After the migration completes, the decommission process shuts down the external PSC and removes it from the SSO domain.

3 Power off second external PSC and delete it from VMware vSphere.

### Upgrading vRealize Products for vCloud NFV

You must follow a specific sequence to upgrade vRealize Log Insight, vRealize Operations Manager, vRealize Orchestrator, vRealize Network Insight.

**Procedure**

1 Upgrade vRealize Log Insight. For more information, see *Upgrading to vRealize Log Insight 4.8*.

   You must upgrade agents in required VMs to capture data appropriately. Example: DNS, VRO, VRO DB, VCD Cells, VCD DB, SRM

2 Upgrade vRealize Operations Manager. For more information, see *vRealize Operations Manager Software Updates 7.5*.

   **Important** Before upgrading, ensure to refer *Before Upgrading to vRealize Operations Manager 7.5*.

3 Upgrade vRealize Orchestrator. For more information, see *Migrating External vRealize Orchestrator 7.6*.

   Starting with vRealize Orchestrator 7.5, you can no longer upgrade your Orchestrator environments. To move Orchestrator environments to the latest version, you must migrate them.

   **Important** Before upgrading, ensure to refer *Before Upgrading to vRealize Operations Manager 7.5*.

4 Upgrade vRealize Network Insight. For more information, see *Upgrading vRealize Network Insight*.

   **Note**  *KB 60368* article provides information on how to fix an issue that prevents from logging in to VMware vRealize Network Insight (vRNI) from Chrome Browser.
Upgrading vSphere Replication

To upgrade vSphere Replication, you must upgrade the required components in your vSphere environment in a specific order.

**Note** Before upgrading the components on the recovery site, you must upgrade all components on the protected site. If you have issues preventing you to use the protected site while completing the upgrade, you can use the recovery site to restore the protected site to its original state. The ESXi host can be upgraded any time.

To upgrade vSphere Replication, see Upgrading vSphere Replication.

Upgrading vSphere Site Recovery Manager

To upgrade Site Recovery Manager, you must perform several tasks in order. You must complete all the upgrade tasks on the protected site first, then complete the tasks on the recovery site.

**Note**
- During upgrade, SRM is unavailable until you upgrade SRM and VR to the latest version 8.1.2.
- You can no longer upgrade your VR and SRM VMs directly. To move SRM environments to the latest version, you must migrate them.

For information about prerequisites, best practices, and steps for upgrading Site Recovery Manager, see Upgrade Site Recovery Manager.

Upgrading ESXi Hosts

When upgrading ESXi on a host, you must also install new NSX VIBs on the host to be compatible with the new ESXi version.

For instructions to upgrade ESXi hosts in the NSX Data Center for vSphere environment, see Upgrading ESXi 6.7 in an NSX Environment.

For instructions to upgrade ESXi hosts in the NSX-T Data Center environment, see Upgrade ESXi Host.

Upgrading the vSAN Cluster

Upgrading vSAN is a multistage process and you must perform the upgrade in a specific sequence.

**Note** The disk format upgrade is optional. If you use a previous disk format version, your vSAN cluster continues to run smoothly. For best results, upgrade the objects to use the latest on-disk format. The latest on-disk format provides the complete feature set of vSAN. To understand the vSAN upgrade process, see About the Virtual SAN Disk Format.

To upgrade vSAN Cluster, see Upgrading the vSAN Cluster.
# Post Upgrade Checklist

After upgrading the vCloud NFV platform, you must verify that all components work as expected.

<table>
<thead>
<tr>
<th>Check</th>
<th>Component</th>
<th>Verify</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Infrastructure</td>
<td>Network</td>
<td>Both switches are reachable.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All VLAN communication is working properly.</td>
</tr>
<tr>
<td></td>
<td>Compute</td>
<td>In a browser window, open https://esxi_host</td>
</tr>
<tr>
<td></td>
<td>Storage</td>
<td>vSAN is accessible and is in a healthy state.</td>
</tr>
<tr>
<td>NFVI and VIM</td>
<td>Management and Resource vCenter Server</td>
<td>Management and Resource vCenter Servers are accessible.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All cluster properties are correct.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All vSphere Distributed Switches are working properly.</td>
</tr>
<tr>
<td>vCloud Director</td>
<td>vCloud Director</td>
<td>vCloud Director is accessible using its load balancer and using individual Cell FQDN.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>vCloud Director is successfully upgraded, registered with vCenter Server, and configured to work with NSX Data Center for vSphere or NSX-T Data Center.</td>
</tr>
<tr>
<td>Site Recovery Manager</td>
<td>Site Recovery Manager</td>
<td>Site Recovery Manager is successfully upgraded on the protected (the Management Pod) and recovery sites and the sites are paired.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The protected and recovery sites are connected and the pair appears on the home page of the Site Recovery user interface.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Both Site recovery Managers from protected and recovery site are accessible.</td>
</tr>
<tr>
<td>vSphere Replication</td>
<td>vSphere Replication appliance</td>
<td>The vSphere Replication appliance is successfully upgraded on the protected (Management Pod) and recovery sites and sites are paired.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>vSphere Replication servers are registered with respective vCenter Server for both protected and recovery site.</td>
</tr>
<tr>
<td>NSX Data Center for vSphere or NSX-T Data Center</td>
<td>NSX Manager and its component connection status must be up and in Green color.</td>
<td></td>
</tr>
<tr>
<td>Check</td>
<td>Component</td>
<td>Verify</td>
</tr>
<tr>
<td>------------------------------</td>
<td>--------------------------------</td>
<td>------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Operations Management        | vRealize Log Insight           | - vRealize Log Insight is accessible and the network data is actively collected and stored.  
|                              |                                | - All configured content pack components are accessible.                |
| vRealize Operations Manager  |                                | - vRealize Operations Manager is accessible.                           |
|                              |                                | - All configured management components are accessible.                  |
| vRealize Network Insight     |                                | - vRealize Network Insight is accessible and the syslog data is actively received and stored. |
| vRealize Orchestrator        |                                | - vRealize Orchestrator is accessible.                                 |
| Delete Snapshots             | All Management Components      | - Delete the Snapshots that you took before upgrade as a prerequisite. |
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- Ramesh Tammana, Senior Manager Solutions Engineering - Telecommunications, VMware.
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