**Standard Operating Procedure: Setting Up a VMware Cluster with Three ESXi Hosts and vCenter Server**

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**Revision History and Document Management**

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Summary of the Policy/Purpose of this SOP

**Why We’re Doing This**

This SOP is your guide to building a test VMware cluster with three ESXi hosts and a vCenter Server Appliance (VCSA) using VMware Workstation 17. We’re setting this up to mimic Electric-Petrol’s first data centre, so you can test a realistic setup with cool features like High Availability and Distributed Resource Scheduler. I’ve pulled inspiration from class demos, and GitBook by John O’Raw (<https://johnoraw.gitbook.io/vmware>), and some VMware best practices to make sure you’ve got everything you need.

Scope of this SOP

**What’s Covered**

This guide is for IT students or techs like you who need to whip up a test cluster that feels like a mini enterprise data centre. We’ll cover creating three ESXi hosts, setting up a VCSA, hooking everything together, and testing it to make sure it’s all working smoothly.

Actors

**Who’s Involved**

* **You (Infrastructure Technician)**: Building and configuring the cluster.
* **Senior Systems Engineer**: They’re the boss, making sure everything’s up to snuff.
* **Network Administrator**: Your go to for network setup or fixing connectivity hiccups.
* **IT Manager**: They want to know when it’s all done and working.

Resources and Prerequisites

**What You’ll Need**

Before we start, let’s make sure you’ve got everything ready:

* **Hardware**: A Windows PC with VMware Workstation 17 Pro, at least 16GB RAM, 4 CPU cores, and 200GB free disk space.
* **Software**:
  + VMware Workstation 17 Pro.
  + VMware ESXi 7.0U3 ISO (grab it from VMware’s site, e.g., VMware-VMvisor-Installer-7.0U3-latest.iso).
  + VMware vCenter Server Appliance 7.0U3 ISO (e.g., VMware-VCSA-all-7.0U3-latest.iso).
  + Optional: CentOS ISO for a test VM, like in the GitBook (<https://johnoraw.gitbook.io/vmware>).
* **Network**: We’re using NAT networking (VMNet8, 192.168.146.0/24) to keep things simple and isolated.
* **DNS/NTP**: Access to a DNS server (like 8.8.8.8) and NTP server (like pool.ntp.org). You can set up a Windows Server VM for local DNS if you want.
* **Docs**: Have your class notes, the GitBook (<https://johnoraw.gitbook.io/vmware>), and VMware’s website (<https://docs.vmware.com>) handy.

Inputs - Guest OS Specification

**Cluster Specs**

Here’s what we’re building:

* **Three ESXi Hosts**:
  + Each with 2 vCPUs, 4GB RAM, 40GB disk.
  + Names: ESXi-Host-01, ESXi-Host-02, ESXi-Host-03.
  + IPs: 192.168.146.101–103/24, Gateway: 192.168.146.2, DNS: 8.8.8.8.
* **vCenter Server**:
  + 4 vCPUs, 8GB RAM, 100GB disk.
  + Name: vCenter-Server, IP: 192.168.146.100/24.
* **Network**: NAT (VMNet8) for all VMs.
* **Storage**: Local VMFS datastores for each host, with optional shared NFS or iSCSI.
* **Credentials**:
  + ESXi: Username: root, Password: root (or whatever you choose).
  + VCSA: Username: [administrator@vsphere.local](mailto:administrator@vsphere.local), Password: Admin!123.

Actions

**Let’s Get to Work**

**1. Create ESXi Virtual Machines**

Alright, let’s fire up those ESXi hosts!

1.1 **Open VMware Workstation**:

* Launch VMware Workstation 17 Pro and click *File > New Virtual Machine > Custom (advanced)*.

1.2 **Set Up Each ESXi VM** (do this for ESXi-Host-01, ESXi-Host-02, ESXi-Host-03):

* Pick *Workstation 17.x* for compatibility and hit *Next*.
* Choose *I will install the operating system later* (we’ll attach the ISO soon).
* For Guest OS, select *VMware ESXi* and version *ESXi 7.0* or later.
* Name the VM (e.g., ESXi-Host-01) and choose a save location (e.g., D:\VMware\ESXi-Host-01).
* Set Processors to 1 CPU with 2 cores, Memory to 4GB, and Network to *NAT (VMNet8)*.
* Create a 40GB disk and select *Store virtual disk as a single file*.
* For *CD/DVD*, pick *Use ISO image file* and point to the ESXi 7.0U3 ISO.
* Click *Finish* and repeat for the other two hosts (use unique names and locations).

1.3 **Install ESXi**:

* Power on ESXi-Host-01 and watch the installer boot up.
* Follow these steps:
  + Hit *Enter* to start the installation.
  + Press *F11* to accept the EULA (yep, it’s a long read, but just agree).
  + Select the 40GB disk and press *Enter*.
  + Set a root password (e.g., root) and hit *Enter*.
  + Press *F11* to kick off the install.
* Once it’s done, reboot the VM.
* Now, set up the management network:
  + Press *F2*, log in with your root password.
  + Go to *Configure Management Network* and set a static IP (e.g., 192.168.146.101/24 for ESXi-Host-01, Gateway: 192.168.146.2, DNS: 8.8.8.8).
  + Set the hostname e.g esxi-host-01.local.
  + Optionally, enable SSH under *Troubleshooting Options* for debugging.
* Do the same for ESXi-Host-02 (IP: 192.168.146.102, hostname: esxi-host-02.local) and ESXi-Host-03 (IP: 192.168.146.103, hostname: esxi-host-03.local).

**2. Set Up the vCenter Server**

Time to get the VCSA up and running—it’s the brain of our cluster!

2.1 **Create the VCSA VM**:

* In VMware Workstation, go to *File > New Virtual Machine > Custom (advanced)*.
* Select *Workstation 17.x* compatibility.
* Choose *I will install the operating system later*.
* Pick *Linux > Other Linux 64-bit* as the Guest OS.
* Name it vCenter-Server and save it to C:\VMware\vCenter-Server.
* Set Processors to 2 CPUs with 2 cores each, Memory to 8GB (8192MB), and Network to *NAT*.
* Create a 100GB disk, select *Store virtual disk as a single file*.
* For *CD/DVD*, choose *Use ISO image file* and select the VCSA 7.0U3 ISO.
* Hit *Finish*.

2.2 **Deploy the VCSA**:

* On your Windows host, mount the VCSA ISO and run the installer (e.g., C:\vcsa-ui-installer\win32\installer.exe).
* Choose *Install* and select *vCenter Server with an Embedded Platform Services Controller*.
* Follow the wizard:
  + Accept the EULA.
  + Connect to ESXi-Host-01 (IP: 192.168.146.101, Username: root, Password: root).
  + Name the VM vCenter-Server.
  + Set the VCSA root password (e.g., Admin!123).
  + Pick *Small* deployment size (perfect for our test setup).
  + Select the 40GB datastore on ESXi-Host-01.
  + Set network details: Static IP (192.168.146.100/24), Gateway (192.168.146.2), DNS (8.8.8.8), Hostname (vcenter-server.local).
  + Set SSO domain to vsphere.local and SSO password to Admin!123.
* Run through Stage 1 (deployment) and Stage 2 (setup)—this takes about 15–30 minutes, so grab a coffee!
* Once done, log in to vCenter at https://192.168.146.100/ui with administrator@vsphere.local and Admin!123.

**3. Get the Network Sorted**

Let’s make sure all our VMs can talk to each other.

3.1 **Check Network Settings**:

* Double-check that all VMs (three ESXi hosts and VCSA) are on VMNet8 (NAT) in VMware Workstation.
* From each ESXi host console, ping the VCSA (192.168.146.100) and other hosts to confirm they’re chatting. If not, check your host’s firewall or VMware’s *Virtual Network Editor* to ensure VMNet8 is active.

3.2 **Set Up DNS and NTP**:

* On each ESXi host, go to *Configure Management Network > DNS Configuration* and set DNS to 8.8.8.8. For NTP, go to *Time Configuration* and use pool.ntp.org.
* For VCSA, check DNS and NTP in the vSphere Client under *Administration > System Configuration*.

3.3 **Enable SSH (If Needed)**:

* On each ESXi host, turn on SSH for troubleshooting (*F2 > Troubleshooting Options > Enable SSH*).
* For VCSA, enable SSH via the VAMI interface at https://192.168.146.100:5480.

**4. Hook Up the Hosts to vCenter**

Now, let’s bring everyone together in vCenter.

4.1 **Log In to vSphere Client**:

* Open a browser, go to https://192.168.146.100/ui, and log in with administrator@vsphere.local and Admin!123.

4.2 **Create Datacenter and Cluster**:

* In the vSphere Client, click *Menu > Hosts and Clusters*.
* Right-click the vCenter inventory, choose *New Datacenter*, and name it ElectricPetrol-DC.
* Right-click ElectricPetrol-DC, select *New Cluster*, and name it ElectricPetrol-Cluster.
* Turn on *DRS* and *HA* in the cluster settings to make it fancy.

4.3 **Add ESXi Hosts**:

* Right-click ElectricPetrol-Cluster and pick *Add Host*.
* Enter the IP (e.g., 192.168.146.101) or hostname (esxi-host-01.local) for ESXi-Host-01, and use root credentials.
* Accept the host’s certificate and finish the wizard.
* Repeat for ESXi-Host-02 and ESXi-Host-03.

**5. Set Up Shared Storage (Optional)**

If you need shared storage for vMotion or HA, here’s how to do it.

5.1 **NFS Shared Storage**:

* Set up a Windows Server VM with a shared folder (e.g., \\192.168.146.10\nfs\_share).
* On each ESXi host, add the NFS datastore:
  + In vSphere Client, go to the host > *Configure > Storage > New Datastore*.
  + Select *NFS*, enter the share path (e.g., 192.168.146.10:/nfs\_share), and name it Shared-NFS.
* Check that the datastore shows up on all hosts.

5.2 **iSCSI (Alternative)**:

* Configure an iSCSI target on a Windows Server VM.
* On each ESXi host, add the iSCSI datastore via *Configure > Storage Adapters > Add iSCSI* and create a VMFS datastore.

Acceptance Tests

**Testing It Out**

Let’s make sure everything’s working like a charm.

1. **Power Up and Check Connectivity**:
   * Fire up all VMs (three ESXi hosts and VCSA).
   * In vSphere Client, check that all hosts show as *Connected* under ElectricPetrol-Cluster.
2. **Spin Up a Test VM**:
   * Create a CentOS VM, inspired by the GitBook (<https://johnoraw.gitbook.io/vmware>):
     + Right-click ElectricPetrol-Cluster > *New Virtual Machine*.
     + Pick *Linux > CentOS 64-bit*, give it 2 vCPUs, 4GB RAM, 20GB disk, and NAT networking.
     + Attach the CentOS ISO and install it.
   * Power it on and make sure it runs on one of the hosts.
3. **Test the Cluster**:
   * If you set up shared storage, try vMotion by moving the test VM between hosts.
   * Test HA by shutting down one ESXi host and checking if the test VM restarts on another.
   * Look for any alerts in vSphere Client (*Monitor > Events*).
4. **Check Services**:
   * Confirm DRS and HA are running in the cluster settings.
   * Ping between VMs to ensure network connectivity.

Output

**What You’ll Get**

* A fully functional VMware vSphere cluster with three ESXi hosts and a VCSA.
* A neat configuration table:

| **VM Name** | **IP Address** | **Hostname** | **Username** | **Password** |
| --- | --- | --- | --- | --- |
| ESXi-Host-01 | 192.168.146.101 | esxi-host-01.local | root | root |
| ESXi-Host-02 | 192.168.146.102 | esxi-host-02.local | root | root |
| ESXi-Host-03 | 192.168.146.103 | esxi-host-03.local | root | root |
| vCenter | 192.168.146.100 | vcenter-server.local | [administrator@vsphere.local](mailto:administrator@vsphere.local) | Admin!123 |

* Snapshots of all VMs in VMware Workstation for easy recovery.
* Screenshots of the vSphere Client dashboard and cluster setup for your records.

**Stay Safe**

* Keep your host PC cool—it’s working hard with all these VMs!
* Check that you’ve got enough RAM and disk space before starting to avoid crashes.
* Save your work and take snapshots before tweaking anything, just in case.
* Use strong passwords for ESXi and VCSA to keep things secure.
* Turn off SSH when you’re done troubleshooting to lock things down.

**If Things Go Wrong**

* **VCSA Can’t Connect to a Host**: Double-check the host’s IP or hostname, ensure SSH is on, and look at your host’s firewall settings for VMNet8.
* **Network Issues**: Make sure all VMs are on VMNet8. Open VMware’s *Virtual Network Editor* to confirm NAT is enabled.
* **HA/DRS Not Working**: Verify shared storage is set up for vMotion and HA. Check cluster settings for errors.
* **VM Won’t Start**: Ensure your ISO isn’t corrupted and you’ve allocated enough resources.

**References**

* VMware vSphere 7.0 Documentation: <https://techdocs.broadcom.com/us/en/vmware-cis/vsphere/vsphere/7-0.html>
* VMware Workstation 17 Pro Documentation: <https://techdocs.broadcom.com/us/en/vmware-cis/desktop-hypervisors/workstation-pro/17-0.html>
* John O’Raw GitBook: <https://johnoraw.gitbook.io/vmware> (helped with VM creation steps like picking NAT networking and setting resources)
* Your class notes and the lecturer’s sample SOP