

Infrastructure Management and Linux Storage Operations

This body of work documents hands-on infrastructure and systems administration tasks performed within a VMware vSphere enterprise environment and a CentOS Stream 9 guest system. The tickets collectively cover virtual machine lifecycle management, hardware configuration, storage planning, Linux Logical Volume Manager (LVM) operations, and post-change validation at both the hypervisor and operating system levels.

Work begins at the virtualization layer, where a CentOS-based application virtual machine is managed within a clustered vSphere environment using vCenter. Administrative access is exercised to review system state, adjust virtual hardware, and confirm proper integration with networking, storage, and VMware Tools. Resource allocation is intentionally lightweight and aligned with development workloads, reflecting deliberate capacity planning rather than default provisioning.

Storage configuration is handled using multiple virtual disks mapped to distinct roles within the operating system. Disk layouts are verified using standard Linux tooling to confirm partitioning, logical volume assignments, and mount points. Application logs are isolated onto a dedicated filesystem backed by its own volume group and logical volume, ensuring separation from the root filesystem and reducing operational risk related to log growth.

During storage expansion, permission and device-mapper related errors are encountered while attempting to modify the logs volume. These issues are resolved through proper privilege escalation and corrective LVM commands, resulting in a successful logical volume extension. Filesystem capacity is validated immediately after the change to confirm that the new space is available and mounted correctly without disruption to existing system volumes.

Final validation steps confirm a clean and stable storage state, with unchanged root and boot filesystems and an expanded logs filesystem showing healthy utilization. Across these tickets, the work demonstrates practical experience with virtualization management, Linux storage architecture, troubleshooting under real constraints, and disciplined verification of changes in an enterprise-style environment.

This view reflects active management of a Linux virtual machine within a clustered VMware vSphere environment using vCenter. The system is a CentOS 9 (64-bit) virtual machine that is powered on, running VMware Tools, and fully integrated with DNS and network configuration. Full administrative access is available, enabling changes to virtual hardware, networking, storage, snapshots, migration options, and VM policies as part of routine lifecycle management.

The virtual machine is operating under light load with low CPU and memory utilization, indicating a stable state appropriate for development or application workloads. Resources are intentionally allocated with sufficient capacity, and storage usage reflects planned provisioning rather than overcommitment. This environment demonstrates hands-on experience managing enterprise virtualization infrastructure, maintaining Linux guest systems, and performing operational tasks through centralized vCenter management.

The screenshot shows the vSphere Client interface with the following details:

- Header:** Shows the URL <https://vcenter.sandbox.prod/ui/app/vm;nav=h/urn:vomi:VirtualMachine:vm-2328:f095ce46-59d5-4b1e-ba75-05bb55ea0ebd/sum...>.
- Left Sidebar:** Lists data centers, clusters, hosts, and VMs. The selected VM is **dev-app-eg3.procore.prod1** located in the **egarrido-CLUSTER** under the **Procure-DC**.
- Actions Panel (Top Right):** A context menu for the selected VM, with **Edit Settings...** highlighted.
- VM Details Panel (Bottom Right):**
 - Capacity and Usage:** Last updated at 4:24 PM.
 - CPU:** 19 MHz used, 1 CPU allocated.
 - Memory:** 45 MB used, 1.49 GB allocated.
 - Storage:** 10.08 GB used, 66.79 GB allocated.
 - Power Status:** Powered On.
 - Guest OS:** CentOS 9 (64-bit).
 - VMware Tools:** Running, version:12448 (Guest Managed).
 - DNS Name (1):** dev-app-eg3.procore.prod1.
 - IP Addresses (2):** 10.1.31.124, fe80:b08e:d131:b7c0:3891.
 - Encryption:** Not encrypted.

Virtual hardware is configured to support a lightweight application workload, with CPU and memory allocated conservatively and multiple virtual disks attached for segmented storage. Disks are presented through a VMware paravirtual SCSI controller to optimize performance and efficiency. Network connectivity is provided through an internal VLAN, and a virtual CD/DVD device remains available for ISO-based maintenance or recovery tasks. The configuration reflects intentional resource planning and standard enterprise virtualization practices.

Edit Settings | dev-app-eg3.procore.prod1

X

[Virtual Hardware](#) [VM Options](#)

[ADD NEW DEVICE](#) ▾

| | | | |
|---------------------|-------------------------|------|-----------------------------------------------|
| » CPU | 1 | ▼ | (i) |
| » Memory | 1.48828125 | ▼ | GB ▾ |
| » Hard disk 1 | 20 | GB ▾ | |
| » Hard disk 2 | 18 | GB ▾ | |
| » Hard disk 3 | 19 | GB ▾ | |
| » Hard disk 4 * | 1.1 | GB ▾ | |
| » SCSI controller 0 | VMware Paravirtual | | |
| » Network adapter 1 | YT-Intran-VLAN | ▼ | <input checked="" type="checkbox"/> Connected |
| » CD/DVD drive 1 | Datastore ISO File | ▼ | <input checked="" type="checkbox"/> Connected |
| » Video card | Specify custom settings | ▼ | |
| » Security Devices | Not Configured | | |
| VMCI device | | | |
| SATA controller 0 | AHCI | | |
| » Other | Additional Hardware | | |

[CANCEL](#) [OK](#)

Block device layout confirms multiple virtual disks attached and in use, with storage segmented across standard partitions and LVM volumes. The primary system disk hosts the operating system, swap, and root logical volume, while an additional disk is dedicated to log storage and mounted separately to isolate application logging from the OS filesystem. Boot and EFI partitions are provisioned on a separate disk, and a small auxiliary disk is present for targeted expansion or future use. This layout reflects intentional disk separation, LVM usage for flexibility, and structured filesystem design aligned with enterprise Linux storage practices.

```
Windows PowerShell x + × [egarrido@dev-app-eg3 logs]$ lsblk NAME MAJ:MIN RM SIZE RO TYPE MOUNTPOINTS sda 8:0 0 20G 0 disk sda1 8:1 0 600M 0 part sda2 8:2 0 1G 0 part sda3 8:3 0 18.4G 0 part cs-swap 253:3 0 2G 0 lvm cs-root 253:4 0 16.4G 0 lvm sdb 8:16 0 18G 0 disk vg_logs-lv_logs 253:2 0 100M 0 lvm /lfjs/logs sdc 8:32 0 19G 0 disk sdc1 8:33 0 600M 0 part /boot/efi sdc2 8:34 0 1G 0 part /boot sdc3 8:35 0 17.4G 0 part cs00-root 253:0 0 15.5G 0 lvm / cs00-swap 253:1 0 1.9G 0 lvm [SWAP] sdd 8:48 0 1.1G 0 disk sr0 11:0 1 11.9G 0 rom [egarrido@dev-app-eg3 logs]$ client_loop: send disconnect: Connection reset PS C:\Users\edward>
```

An attempt to extend a logical volume initially encounters device-mapper and permission-related errors, preventing access to the vg_logs volume group. After escalating privileges, the logical volume backing the logs filesystem is successfully expanded using LVM, doubling its size. Filesystem output confirms the updated capacity and available space at the dedicated logs mount point, demonstrating corrective troubleshooting, proper use of LVM commands, and validation of storage changes at the OS level.

```
egarrido@dev-app-eg3:~      + - x
Failure to communicate with kernel device-mapper driver.
Incompatible libdevmapper 1.02.202-RHEL9 (2024-11-04) and kernel driver (unknown version).
/run/lock/lvm/V_vg_logs:aux: open failed: Permission denied
Can't get lock for vg_logs.
Cannot process volume group vg_logs
[egarrido@dev-app-eg3 ~]$ sudo lvextend -L +100M /dev/mapper/vg_logs-lv_logs
[sudo] password for egarrido:
  Size of logical volume vg_logs/lv_logs changed from 100.00 MiB (25 extents) to 200.00 MiB (50 extents).
  Logical volume vg_logs/lv_logs successfully resized.
[egarrido@dev-app-eg3 ~]$ df -h
Filesystem          Size  Used Avail Use% Mounted on
devtmpfs            4.0M    0  4.0M  0% /dev
tmpfs              628M    0  628M  0% /dev/shm
tmpfs              252M  4.9M  247M  2% /run
efivarfs            256K   27K  225K 11% /sys/firmware/efi/efivars
/dev/mapper/cs00-root    16G  2.3G  14G 15% /
/dev/sdc2           960M 235M  726M 25% /boot
/dev/sdc1           599M  7.5M  592M  2% /boot/efi
tmpfs              126M    0  126M  0% /run/user/770000476
/dev/mapper/vg_logs-lv_logs  89M   14K  82M  1% /lfjs/logs
[egarrido@dev-app-eg3 ~]$ lsblk
```

Block device output confirms the updated storage layout after the logical volume expansion. The dedicated logs volume is now provisioned at the increased size and correctly mounted, while the operating system, swap, and boot partitions remain unchanged. This validates that the LVM resize was applied successfully without impacting core system volumes, maintaining a clean separation between application logging and the root filesystem.

```
[egarrido@dev-app-eg3 ~]$ lsblk
NAME      MAJ:MIN RM  SIZE RO TYPE MOUNTPOINTS
sda        8:0    0   20G  0 disk
└─sda1     8:1    0  600M  0 part
└─sda2     8:2    0   1G  0 part
└─sda3     8:3    0 18.4G  0 part
  ├─cs-swap 253:3  0   2G  0 lvm
  └─cs-root  253:4  0 16.4G  0 lvm
sdb        8:16   0   18G  0 disk
└─vg_logs-lv_logs 253:2  0 200M  0 lvm /lfjs/logs
sdc        8:32   0   19G  0 disk
└─sdc1     8:33   0  600M  0 part /boot/efi
└─sdc2     8:34   0   1G  0 part /boot
└─sdc3     8:35   0 17.4G  0 part
  ├─cs00-root 253:0  0 15.5G  0 lvm /
  └─cs00-swap 253:1  0  1.9G  0 lvm [SWAP]
sdd        8:48   0   1.1G  0 disk
sr0       11:0    1 11.9G  0 rom
[egarrido@dev-app-eg3 ~]$
```

Filesystem usage output verifies the final state of the storage configuration after the resize operation. The root filesystem and boot partitions remain stable with healthy free space, while the dedicated logs filesystem shows the increased capacity and minimal utilization. This confirms that the logical volume and filesystem expansion was completed successfully and that log storage is properly isolated without affecting core system filesystems.

```
[egarrido@dev-app-eg3 ~]$ df -Th
Filesystem      Type    Size  Used Avail Use% Mounted on
/devtmpfs        devtmpfs 4.0M   0  4.0M  0% /dev
tmpfs           tmpfs   628M   0  628M  0% /dev/shm
tmpfs           tmpfs   252M  4.9M 247M  2% /run
efivarfs        efivarfs 256K  27K 225K 11% /sys/firmware/efi/efivars
/dev/mapper/cs00-root  xfs    16G  2.3G 14G 15% /
/dev/sdc2        xfs    960M 235M 726M 25% /boot
/dev/sdc1        vfat   599M  7.5M 592M  2% /boot/efi
tmpfs           tmpfs   126M   0  126M  0% /run/user/770000476
/dev/mapper/vg_logs-lv_logs ext4   183M  14K 172M  1% /lfjs/logs
[egarrido@dev-app-eg3 ~]$
```

The last six tickets document end-to-end management of a Linux virtual machine in an enterprise VMware vSphere environment, covering system configuration, storage design, troubleshooting, and validation. Work includes reviewing and adjusting virtual hardware, confirming network and guest OS integration, and implementing deliberate disk separation to isolate application logs from core system filesystems.

Storage tasks focus on validating existing disk layouts, managing LVM volume groups and logical volumes, and expanding a dedicated logs filesystem to support application growth. During the expansion process, permission and device-mapper issues are identified and resolved through proper privilege escalation and corrective commands, ensuring changes are applied safely without impacting the root or boot volumes.

Final verification confirms the successful resize, stable filesystem usage, and clean separation of system and application storage. Together, these tickets demonstrate practical experience with virtualization operations, Linux storage management, problem resolution under real conditions, and disciplined post-change validation in a production-like environment.