# Lab Exercise 8: **Creating and Inspecting Drives**

- **Part A:** In this exercise, you will create two new drives for your Ubuntu Desktop VM (Btrfs and FAT32)

- **Part B:** In this exercise, you will inspect the new drives created on the Ubuntu Desktop VM as well as the existing drives.
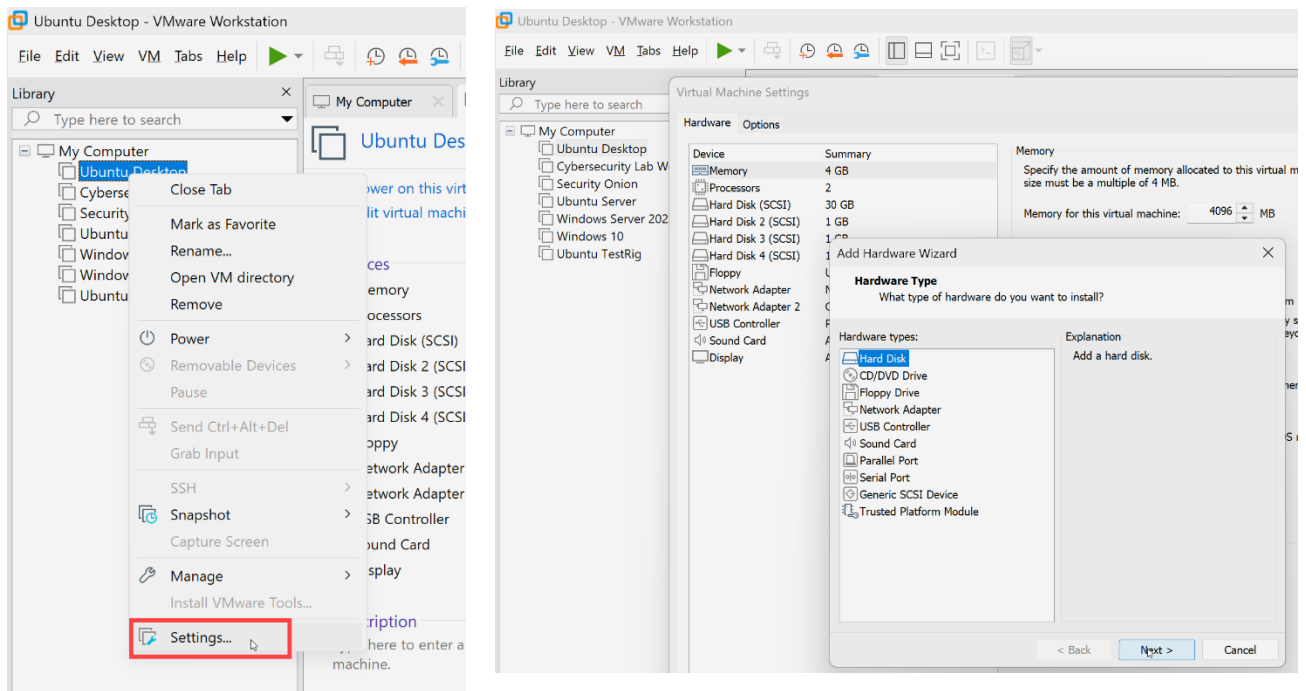
PART A

Create Btrfs and FAT32 volumes.

Steps:

1. In **VMware Workstation Pro** or **VMware Fusion**, make sure your **Ubuntu Desktop** VM is powered <u>off</u>.
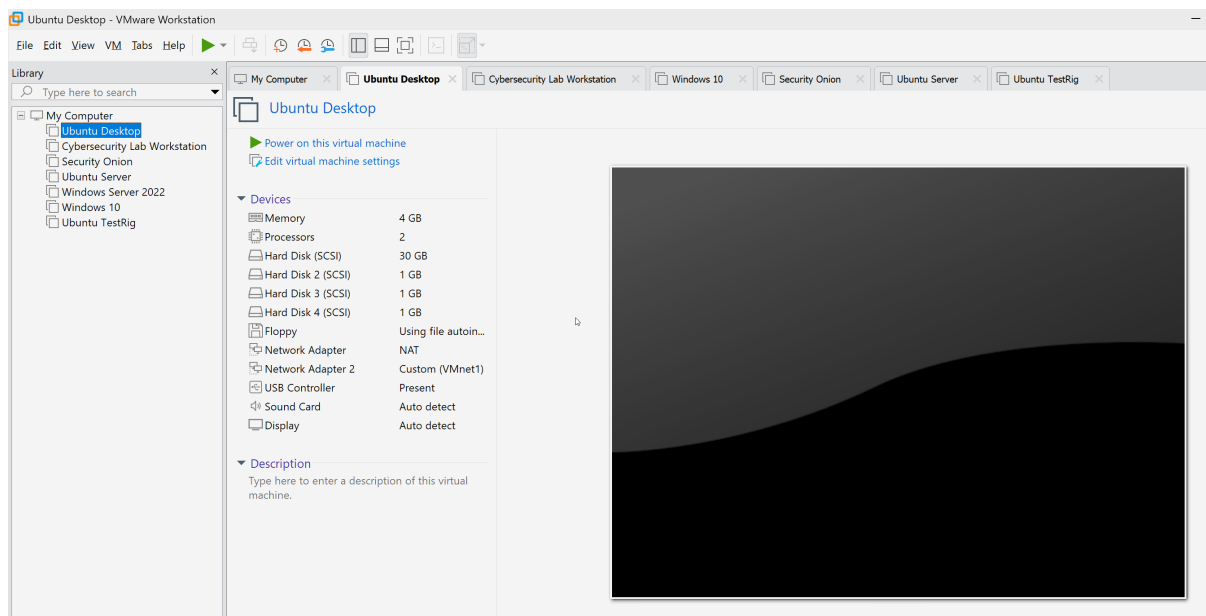
2. Using the settings for the Ubuntu Desktop VM, create two new **Hard Disks**:
   - **Virtual disk type**: SCSI (Windows laptops) or NVMe (macOS laptops).
   - **Disk**: Create a new virtual disk
   - Maximum disk size: 1 GB
   - Split virtual disk into multiple files
   - **Disk file**: Browse and place it inside your Ubuntu Desktop VM folder (typically this is in `/Documents/Virtual Machines/Ubuntu Desktop/`

   - Repeat for the second Hard Disk.

3. Start your Ubuntu Desktop VM.
   Login and open the **Terminal** app.

4. Type `sudo lsblk -o NAME,SIZE,FSTYPE,MOUNTPOINT`
   to confirm that the two new disks are present.
   The disks should be `sdb` and `sdc` and will have no file system yet or mount point.

   (*It's not mandatory that the new disks are sdb and sdc, your OS will assign the next available letters*).

Create the Btrfs drive:

5. Install the tools you'll need to create the Btrfs drive:
   ```
   sudo apt update
   sudo apt install btrfs-progs -y
   ```

6. The first drive you'll create will be formatted with the Btrfs file system.
   - Ensure that the disk has a fresh partition table:
     ```
     sudo parted /dev/sdb --script mklabel gpt
     ```

   - Create single Btrfs partition occupying the entire disk:
     ```
     sudo parted /dev/sdb --script mkpart primary btrfs 0% 100%
     ```

7. Format the Partition as Btrfs:
   ```
   sudo mkfs.btrfs -f -L btrfs_data /dev/sdb
   ```

   Notes: Use `-f` because Btrfs refuses to format a disk with existing data without it.

8. Type `sudo lsblk -o NAME,SIZE,FSTYPE,MOUNTPOINT` to confirm that the drive at `/dev/sdb` has been created and formatted as Btrfs file system.

   - Now the drive needs to be mounted. Create a directory from the `/mnt` folder:
     ```
     sudo mkdir -p /mnt/btrfs_data
     sudo mount /dev/sdb1 /mnt/btrfs_data
     ```

9. Confirm the drive was created. Open the **Files** app and navigate to /mnt
   You should see the drive:
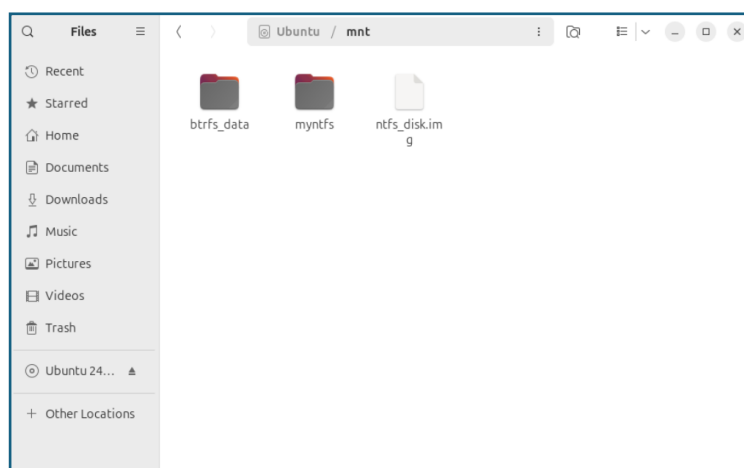
Create the FAT32 drive:

10. Check that you've selected the correct drive first:
    ```
    sudo lsblk -o NAME,SIZE,FSTYPE,MOUNTPOINT
    ```

    Make sure /dev/sdc is the intended unformatted device.

11. Create a New Partition Table:
    ```
    sudo parted /dev/sdc --script mklabel gpt
    sudo parted /dev/sdc --script mkpart primary fat32 0% 100%
    ```

    This creates: A GPT partition table. One FAT32 partition using the entire disk.

12. Format the Partition as FAT32:
    ```
    sudo mkfs.vfat -F 32 -n FAT32_VOL /dev/sdc1
    ```

    -F 32 → forces FAT32 format
    -n FAT32_VOL → assigns a volume label

13. Verify the Filesystem:
    ```
    sudo blkid /dev/sdc1
    ```

14. Create a mount point and mount the new FAT32 volume:
    ```
    sudo mkdir -p /mnt/fat32_vol
    sudo mount /dev/sdc1 /mnt/fat32_vol
    ```

15. Check:
    ```
    df -hT /mnt/fat32_vol
    ```

    ```
    rodhaan@ubuntutestrig:~$ df -hT /mnt/fat32_vol
    Filesystem     Type  Size  Used Avail Use% Mounted on
    /dev/sdc1      vfat 1020M  4.0K 1020M   1% /mnt/fat32_vol
    rodhaan@ubuntutestrig:~$
    ```

PART B

Inspect all volumes on Ubuntu Desktop VM.

Steps:

1. In your **Ubuntu Desktop** VM open a **Terminal** app.

2. Use the lecture slide deck to inspect the drives created in **Part A**. You should have the following drives to inspect:

   - **Ext4** maintains superblocks and inodes explicitly, uses journaling for data integrity, and stores metadata in well-defined structures.
   - **Btrfs** is a copy-on-write (CoW) filesystem. students should notice the absence of traditional inodes and journaling, replaced by B-trees and metadata checksums.
   - **FAT32** is simple and legacy. There is no journaling, no inodes, no advanced metadata structures; relies entirely on FAT tables and directory entries.

   You are required to inspect the file systems on the drives using the commands outlined in the **lecture slide deck (slides 30 to 37)**.

   You will need to find the information that will confirm the features of each of the file systems as described in the 3 bullet-points above (ext4, Btrfs, FAT32).