**How to expand Linux OS Disk**

First let’s understand the 3 different roles of disk i.e. the data disk, the OS disk, and the temporary disk.

* A data disk is a managed disk that's attached to a virtual machine to store application data, or other data you need to keep.
* OS disk has pre-installed OS and contain boot volume.
* Every VM contains a temporary disk, which is not a managed disk. The temporary disk provides short-term storage for applications and processes and is intended to only store data such as page or swap files. Data on the temporary disk may be lost during a [maintenance event](https://docs.microsoft.com/en-us/azure/virtual-machines/windows/manage-availability?toc=/azure/virtual-machines/windows/toc.json#understand-vm-reboots---maintenance-vs-downtime) event or when you [redeploy a VM](https://docs.microsoft.com/en-us/azure/virtual-machines/troubleshooting/redeploy-to-new-node-windows?toc=/azure/virtual-machines/windows/toc.json). This is the reason temporary disk is not recommended to be used for application or other data storage. During a successful standard reboot of the VM, the data on the temporary disk will persist. On Azure Linux VMs, the temporary disk is typically /dev/sdb and on Windows VMs the temporary disk is D: by default.

Example on Azure Cloud Linux OS disk size has default 32G. Now if you expand OS disk from azure portal, it will actually not reflect in Guest OS. This works perfectly with windows VM. Although Azure recommend to use Data disk to store application data or other data. But in case if you require to update OS disk this document will help you.

**Scenario:**Expanded OS disk from 32G to 50G on Azure Platform

**Environment:**Red Hat Enterprise Linux Server release 7.6 (Maipo) / Linux version 3.10.0-957.el7.x86\_64

WARNING: Before performing any change to the disk, please [take a Snapshot](https://docs.microsoft.com/en-us/azure/virtual-machines/linux/snapshot-copy-managed-disk#use-azure-portal) to backup the disk.

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| **[root@redhat76 hasi]#** | | **df -h** |  |  | // verify that “sda2” is to be expanded | | | |
| Filesystem | Size | Used Avail Use% | | | | | Mounted on | |
| /dev/sda2 | 32G | 2.2G | | 30G | | 7% | / |  |
| devtmpfs | 948M | 0 |  | 948M | | 0% | /dev | |
| tmpfs | 959M | 0 |  | 959M | | 0% | /dev/shm | |
| tmpfs | 959M | 9.0M | | 950M | | 1% | /run | |
| tmpfs | 959M | 0 |  | 959M | | 0% | /sys/fs/cgroup | |
| /dev/sda1 | 497M | 73M | | 425M | | 15% | /boot | |
| /dev/sdb1 | 3.9G | 2.1G | | 1.7G | | 56% | /mnt/resource | |
| tmpfs | 192M | 0 |  | 192M | | 0% | /run/user/1000 | |

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| --- | --- | --- | --- | --- | --- | --- | --- |
| **[root@redhat76 hasi]#** | **sudo fdisk /dev/sda** | | |  | // enter | fdisk |  |
| The device presents a logical sector size | | | | that is smaller than | | | |
| the physical sector size. Aligning | | to | a physical sector (or optimal | | | | |
| I/O) size boundary is recommended, | | or | performance may | | | be impacted. | |

Welcome to fdisk (util-linux 2.23.2).

Changes will remain in memory only, until you decide to write them.

Be careful before using the write command.

**Command (m for help): print**// list all partition, enter “u” to change display unit to sector

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Disk /dev/sda: | | 53.7 GB | , 53687091200 bytes, 104857600 | | | | | | | | sectors | |  |  | // verify the new disk size |
| Units = sectors of 1 \* 512 = 512 bytes | | | | | | |  |  |  |  |  |  |  |  |  |
| Sector size (logical/physical): 512 bytes / 4096 bytes | | | | | | | | | | | |  |  |  |  |
| I/O size (minimum/optimal): 4096 bytes / 4096 bytes | | | | | | | | | |  |  |  |  |  |  |
| Disk label type: dos | | | | |  |  |  |  |  |  |  |  |  |  |  |
| Disk identifier: 0x000ae42d | | | | |  |  |  |  |  |  |  |  |  |  |  |
| Device | Boot | Start | | | End | | Blocks | | | Id | | System | | |  |
| /dev/sda1 | \* | 2048 | | | 1026047 | | 512000 | |  | 83 | | Linux | | |  |
| /dev/sda2 |  | 1026048 | | | 67108863 | | 33041408 | |  | 83 | | Linux | |  |  |
|  | |  | | |  |  | |  |  |  |  |  |  |  |  |
| **Command (m for** | | **help): d** | |  | // delete partition | | |  |  |  |  |  |  |  |  |
| **Partition** | **number (1,2, default 2): 2** | | | | |  | // select partition 2 | | | | | | |  |  |
| Partition | 2 is | deleted | | |  |  |  |  |  |  |  |  |  |  |  |
|  | |  | | |  | | | |  |  |  |  |  |  |  |
| **Command (m for** | | **help): n** | |  | // create new partition | | | |  |  |  |  |  |  |  |
| Partition | type: |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

pprimary (1 primary, 0 extended, 3 free) e extended

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Select (default p): p** |  |  | **// select primary** | | | | | |  |  |  |  |  |  |  |  |
| **Partition number (2-4, default 2): 2** | | | | | |  |  | **// set partition number as 2 which was deleted** | | | | | | | |  |
| **First sector (1026048-104857599, default 1026048):** | | | | | | | | | |  | **// use default value** | |  |  |  |  |
| **Using default value 1026048** | | | | |  |  |  |  |  |  |  |  |  |  |  |  |
| **Last sector, +sectors or +size{K,M,G}** | | | | | | | **(1026048-104857599, default 104857599):** | | | | | | |  | **// use default value** | |
| **Using default value 104857599** | | | | |  |  |  |  |  |  |  |  |  |  |  |  |
|  | | | | | **of size** | | **49.5 GiB is set** | | | |  |  |  |  |  |  |
|  | | |  |  |  | | | | | | |  | | |  |  |
| **Command (m for help): p** | |  |  | **//** | **verify new partition is created** | | | | | | |  | | |  |  |

Disk /dev/sda: 53.7 GB, 53687091200 bytes, 104857600 sectors

Units = sectors of 1 \* 512 = 512 bytes

Sector size (logical/physical): 512 bytes / 4096 bytes

I/O size (minimum/optimal): 4096 bytes / 4096 bytes

Disk label type: dos

Disk identifier: 0x000ae42d

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Device Boot | | Start | End | Blocks | Id | System | |
| /dev/sda1 | \* | 2048 | 1026047 | 512000 | 83 | Linux | |
| /dev/sda2 |  | 1026048 | 104857599 | 51915776 | 83 | Linux |  |

**Command (m for help): w**// save the change, it will be applied after a reboot The partition table has been altered!

Calling ioctl() to re-read partition table.

WARNING: Re-reading the partition table failed with error 16: Device or resource busy. The kernel still uses the old table. The new table will be used at

the next reboot or after you run partprobe(8) or kpartx(8)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Syncing disks.** |  |  |  |  |  |  |
| **[root@redhat76 hasi]# reboot** | |  | **// reboot** | | |  |
|  |  | | |  |  | |
| **[hasi@redhat76** | **~]$ cat /etc/fstab** | | |  | **// verify the root filesystem type is xfs** | |

#

#/etc/fstab

#Created by anaconda on Wed Oct 31 08:36:45 2018

#Accessible filesystems, by reference, are maintained under '/dev/disk'

#See man pages fstab(5), findfs(8), mount(8) and/or blkid(8) for more info

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| UUID=437f5efe-afcb-4d8f-99e0-a44d73dda2f9 / | | | | | | | | | | |  |  |  | xfs |  | defaults | 0 0 |
| UUID=f7f27132-9ca2-4de3-9a55-4a90d35fc73d /boot | | | | | | | | | | | | | xfs | | | defaults | 0 0 |
|  | | | |  | |  | |  |  |  | | |  | | |  |  |
| **[root@redhat76 hasi]# sudo xfs\_growfs** | | | | | | | | **/dev/sda2** | | | |  | // expand the partition | | |  |  |
| meta-data=/dev/sda2 | | |  |  |  |  | isize=512 | | | | agcount=4, agsize=2065088 blks | | | | | |  |
|  | = |  |  |  |  |  | sectsz=512 | | | | attr=2, projid32bit=1 | | | | |  |  |
|  | = |  |  |  |  |  | crc=1 |  |  |  | finobt=0 spinodes=0 | | | | |  |  |
| data | = |  |  |  |  |  | bsize=4096 | | | | blocks=8260352, imaxpct=25 | | | | |  |  |
|  | = |  |  |  |  |  | sunit=0 | | | | swidth=0 blks | | | | |  |  |
| naming | =version 2 | |  |  |  |  | bsize=4096 | | | | ascii-ci=0 ftype=1 | | | | |  |  |
| log | =internal | |  |  |  |  | bsize=4096 | | | | blocks=4033, version=2 | | | | |  |  |
|  | = |  |  |  |  |  | sectsz=512 | | | | sunit=0 blks, lazy-count=1 | | | | |  |  |
| realtime =none | |  |  |  |  |  | extsz=4096 | | | | blocks=0, rtextents=0 | | | | |  |  |
| data blocks changed from 8260352 | | | | | | | to 12978944 | | |  |  |  |  |  |  |  |  |
|  | | | | |  |  | | |  | | | |  |  |  |  |  |
| **[root@redhat76 hasi]# df -h** | | | |  |  | // verify the change | | | | | | |  |  |  |  |  |
| Filesystem | | Size | Used Avail Use% | | | | | Mounted on | | | | |  |  |  |  |  |
| /dev/sda2 |  | 50G | 2.2G | | 48G | | 5% | / |  |  |  |  |  |  |  |  |  |
| devtmpfs |  | 948M | 0 |  | 948M | | 0% | /dev | | |  |  |  |  |  |  |  |
| tmpfs |  | 959M | 0 |  | 959M | | 0% | /dev/shm | | |  |  |  |  |  |  |  |
| tmpfs |  | 959M | 9.0M | | 950M | | 1% | /run | | |  |  |  |  |  |  |  |
| tmpfs |  | 959M | 0 |  | 959M | | 0% | /sys/fs/cgroup | | | | | | | |  |  |
| /dev/sda1 |  | 497M | 73M | | 425M | | 15% | /boot | | |  |  |  |  |  |  |  |
| /dev/sdb1 |  | 3.9G | 2.1G | | 1.7G | | 56% | /mnt/resource | | | | |  |  |  |  |  |
| tmpfs |  | 192M | 0 |  | 192M | | 0% | /run/user/1000 | | | | | | | |  |  |

**[NOTE]**

If the filesystem type is ext4, use the following command to expand the partition:

**[root@redhat76 hasi]# sudo resize2fs /dev/sda2**    // expand the partition