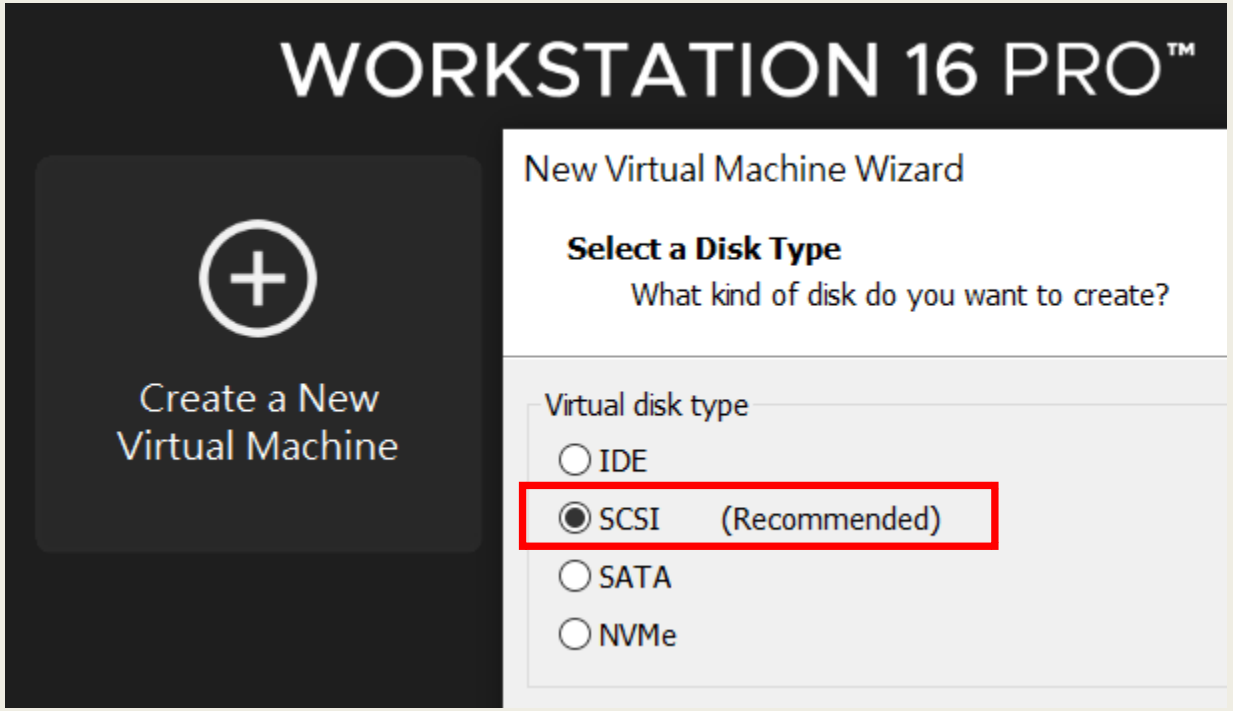
Network & Multimedia Lab

iSCSI (Internet Small Computer System Interface)

Fall 2022

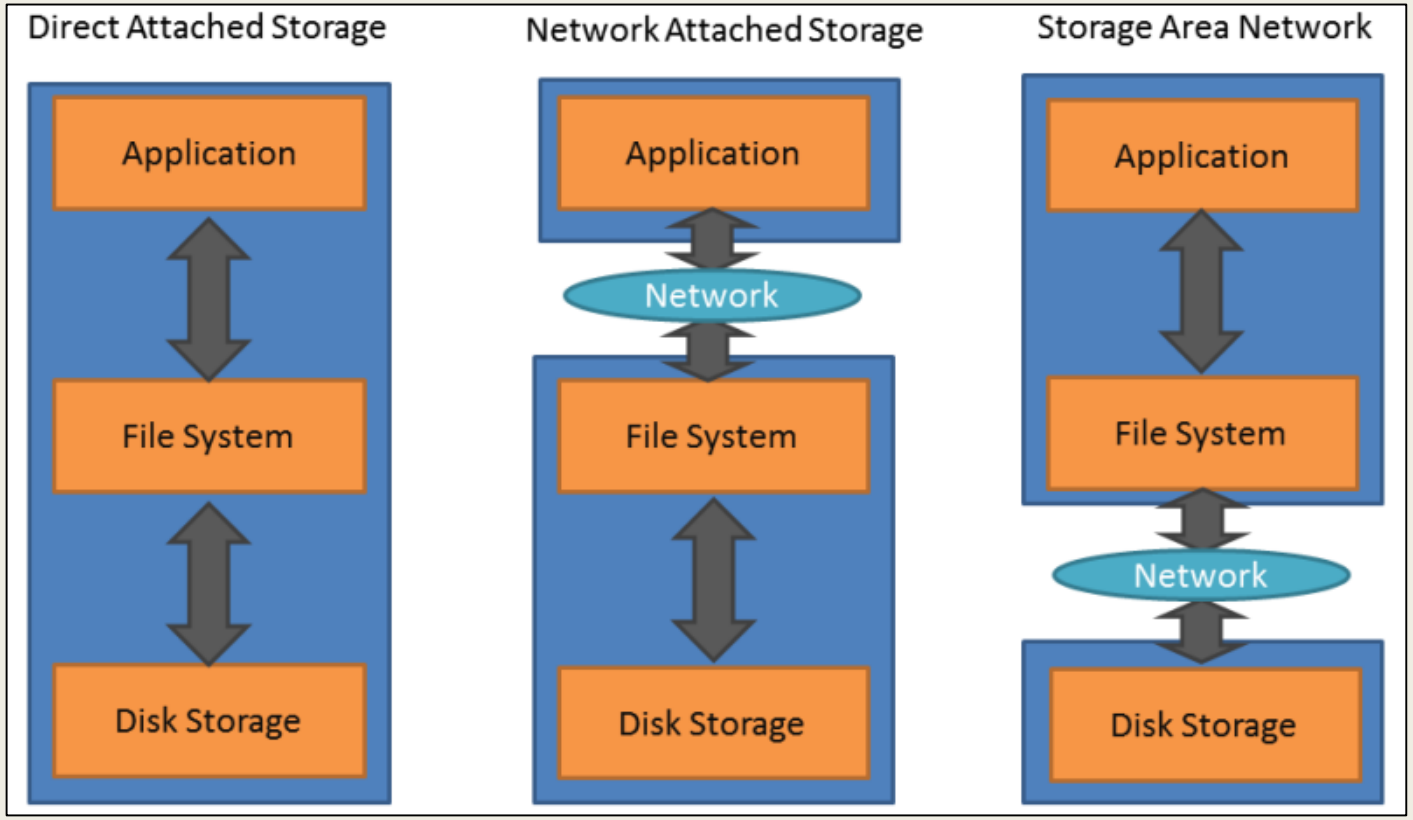
SCSI
(Small Computer System Interface)

- SCSI is a set of standards for physically connecting and transferring data between computers and peripheral devices.



iSCSI
(Internet Small Computer System Interface)

- iSCSI provides block-level access to storage devices by carrying SCSI commands over a TCP/IP network.
- This protocol allows clients (initiators) to send SCSI commands to storage devices (targets) on remote servers.



Clients (initiators)

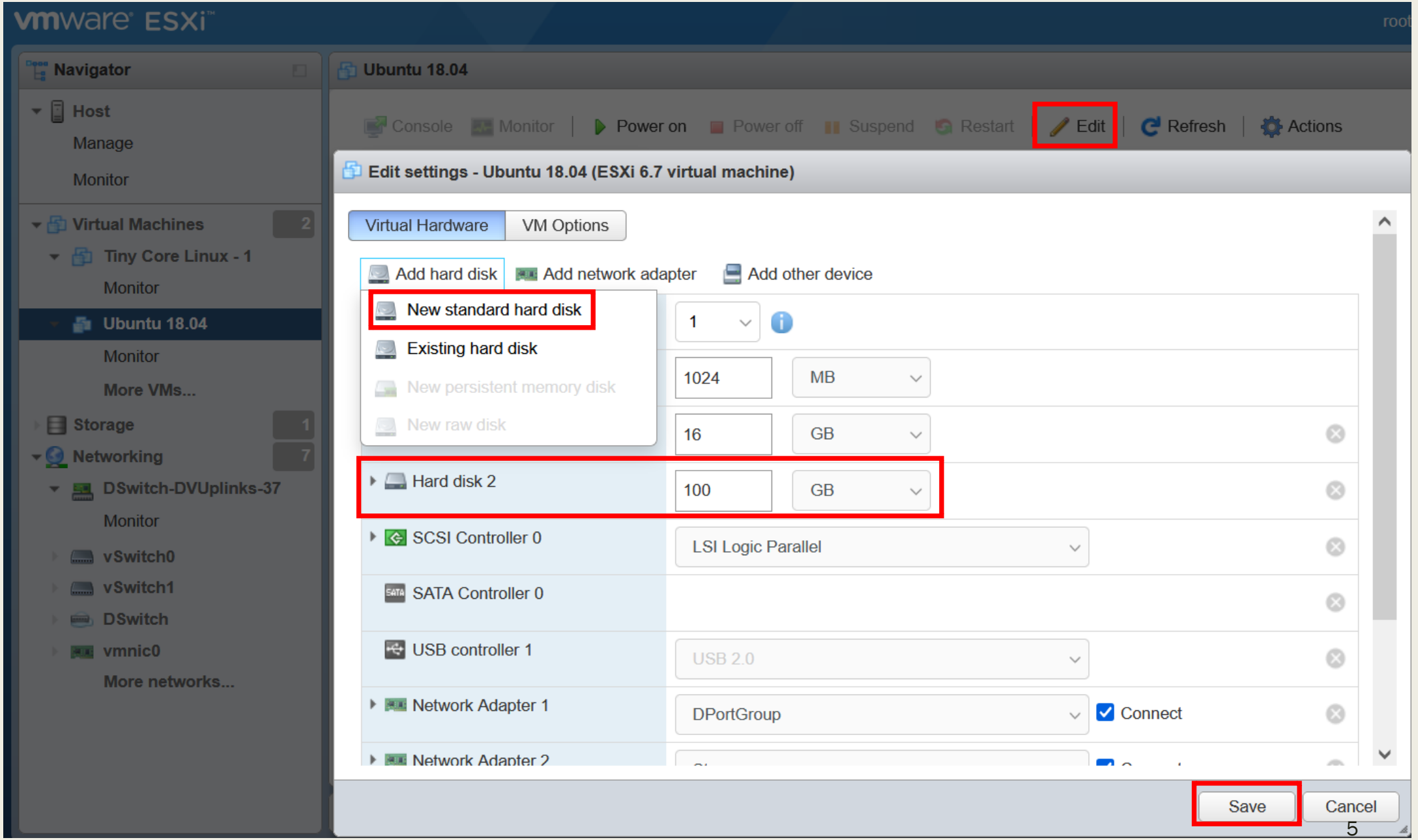
iSCSI protocol

Storage devices (targets)

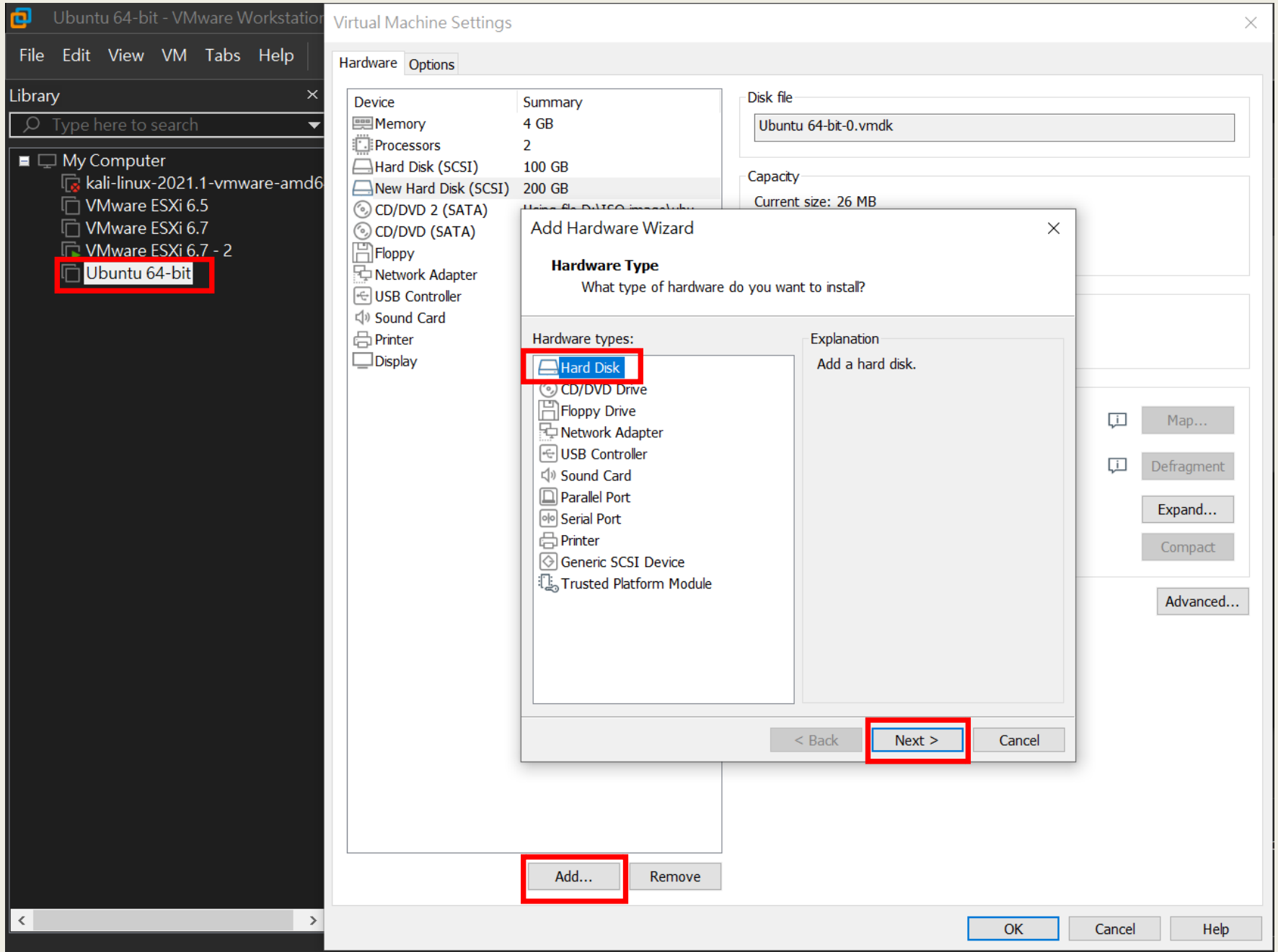
Setup an iSCSI server

on ubuntu

iSCSI server setup – Add hard disk (on ESXi)



iSCSI server setup – Add hard disk (on VMware)



iSCSI server setup – List partitions

```
yun@yun-virtual-machine:~$ sudo parted -l
[sudo] password for yun:
Model: VMware, VMware Virtual S (scsi)
Disk /dev/sda: 107GB
Sector size (logical/physical): 512B/512B
Partition Table: gpt
Disk Flags:

Number  Start   End     Size    File system  Name                  Flags
 1      1049kB  2097kB  1049kB                                     bios_grub
 2      2097kB  540MB   538MB   fat32        EFI System Partition  boot, esp
 3      540MB   107GB   107GB   ext4


Error: /dev/sdb: unrecognised disk label
Model: VMware, VMware Virtual S (scsi)
Disk /dev/sdb: 215GB
Sector size (logical/physical): 512B/512B
Partition Table: unknown
Disk Flags:
```

List Partitions

iSCSI server setup – Select new partition (/dev/sdb)

```
yun@yun-virtual-machine:~$ sudo parted
GNU Parted 3.4
Using /dev/sda
Welcome to GNU Parted! Type 'help' to view a list of commands.
(parted) select /dev/sdb
Using /dev/sdb
(parted)
```

iSCSI server setup – Make partition table

```
Using /dev/sdb
(parted) mklabel gpt
(parted) print
Model: VMware, VMware Virtual S (scsi)
Disk /dev/sdb: 215GB
Sector size (logical/physical): 512B/512B
Partition Table: gpt
Disk Flags:

Number  Start  End  Size  File system  Name  Flags

(parted)
```

Make a Partition Table with type Gpt

iSCSI server setup – Create partition

```
(parted) mkpart my_part ext4 0 -1   Create Partition
Warning: The resulting partition is not properly aligned for best performance: 34s % 2048s != 0s
Ignore/Cancel? i
(parted)
(parted) print
Model: VMware, VMware Virtual S (scsi)
Disk /dev/sdb: 215GB
Sector size (logical/physical): 512B/512B
Partition Table: gpt
Disk Flags:

Number  Start   End     Size    File system  Name     Flags
 1      17.4kB  215GB   215GB   ext4         my_part

(parted)
```

iSCSI server setup – List block devices

```
yun@yun-virtual-machine:~$ lsblk
NAME   MAJ:MIN RM   SIZE RO TYPE MOUNTPOINTS
fd0      2:0    1     4K  0 disk
loop0    7:0    0     4K  1 loop /snap/bare/5
loop1    7:1    0 238.5M  1 loop /snap/firefox/2015
loop2    7:2    0 400.8M  1 loop /snap/gnome-3-38-2004/112
loop3    7:3    0   238M  1 loop /snap/firefox/1993
loop4    7:4    0    47M  1 loop /snap/snapd/16292
loop5    7:5    0  45.9M  1 loop /snap/snap-store/599
loop6    7:6    0   284K  1 loop /snap/snapd-desktop-integration/14
loop7    7:7    0  45.9M  1 loop /snap/snap-store/582
loop8    7:8    0 346.3M  1 loop /snap/gnome-3-38-2004/119
loop9    7:9    0    48M  1 loop /snap/snapd/17336
loop10   7:10   0    62M  1 loop /snap/core20/1587
loop11   7:11   0  91.7M  1 loop /snap/gtk-common-themes/1535
loop12   7:12   0  63.2M  1 loop /snap/core20/1623
sda      8:0    0   100G  0 disk
├─sda1   8:1    0     1M  0 part
├─sda2   8:2    0   513M  0 part /boot/efi
└─sda3   8:3    0  99.5G  0 part /var/snap/firefox/common/host-hunspell
                                 /
sdb      8:16   0   200G  0 disk
└─sdb1   8:17   0   200G  0 part
sr0     11:0    1 126.7M  0 rom  /media/yun/CDROM
sr1     11:1    1   3.6G  0 rom  /media/yun/Ubuntu 22.04.1 LTS amd64
yun@yun-virtual-machine:~$
```

iSCSI server setup – Format the partition

```
yun@yun-virtual-machine:~$ sudo mkfs -t ext4 /dev/sdb1
mke2fs 1.46.5 (30-Dec-2021)
Creating filesystem with 52428551 4k blocks and 13107200 inodes
Filesystem UUID: ba810c6f-00b2-41bc-a92e-3334d1a20ac2
Superblock backups stored on blocks:
        32768, 98304, 163840, 229376, 294912, 819200, 884736, 1605632, 2654208,
        4096000, 7962624, 11239424, 20480000, 23887872

Allocating group tables: done
Writing inode tables: done
Creating journal (262144 blocks): done
Writing superblocks and filesystem accounting information: done

yun@yun-virtual-machine:~$
```

Format the partition /dev/sdb1 with ext4

iSCSI server setup – Install tgt

- Install iSCSI target framework package
  - sudo apt install tgt

- You can add individual config snippets under /etc/tgt/conf.d/ directory

```
yun@yun-virtual-machine:~$ cat /etc/tgt/targets.conf
# Empty targets configuration file -- please see the package
# documentation directory for an example.
#
# You can drop individual config snippets into /etc/tgt/conf.d
include /etc/tgt/conf.d/*.conf
yun@yun-virtual-machine:~$
```

iSCSI server setup – Add config

- Add a config file: /etc/tgt/conf.d/target01.conf
  - target01.conf
    - <target iqn.2022-11.f08921a01.nmlab.local:unique.name01>
    - backing-store /dev/sdb1
    - initiator-address 192.168.190.0/24
    - incominguser f08921a01 asdfasdfasdf
    - </target>

No capital letters!

iSCSI 命名慣例

看你VM的網路設定決定，不要複製貼上學號(要截圖)

```
yun@yun-virtual-machine:~$ cat /etc/tgt/conf.d/target01.conf
<target iqn.2022-11.f08921a01.nmlab.local:unique.name01>
  backing-store /dev/sdb1
  initiator-address 192.168.190.0/24
  incominguser f08921a01 asdfasdfasdf
</target>
yun@yun-virtual-machine:~$
```

iSCSI server setup

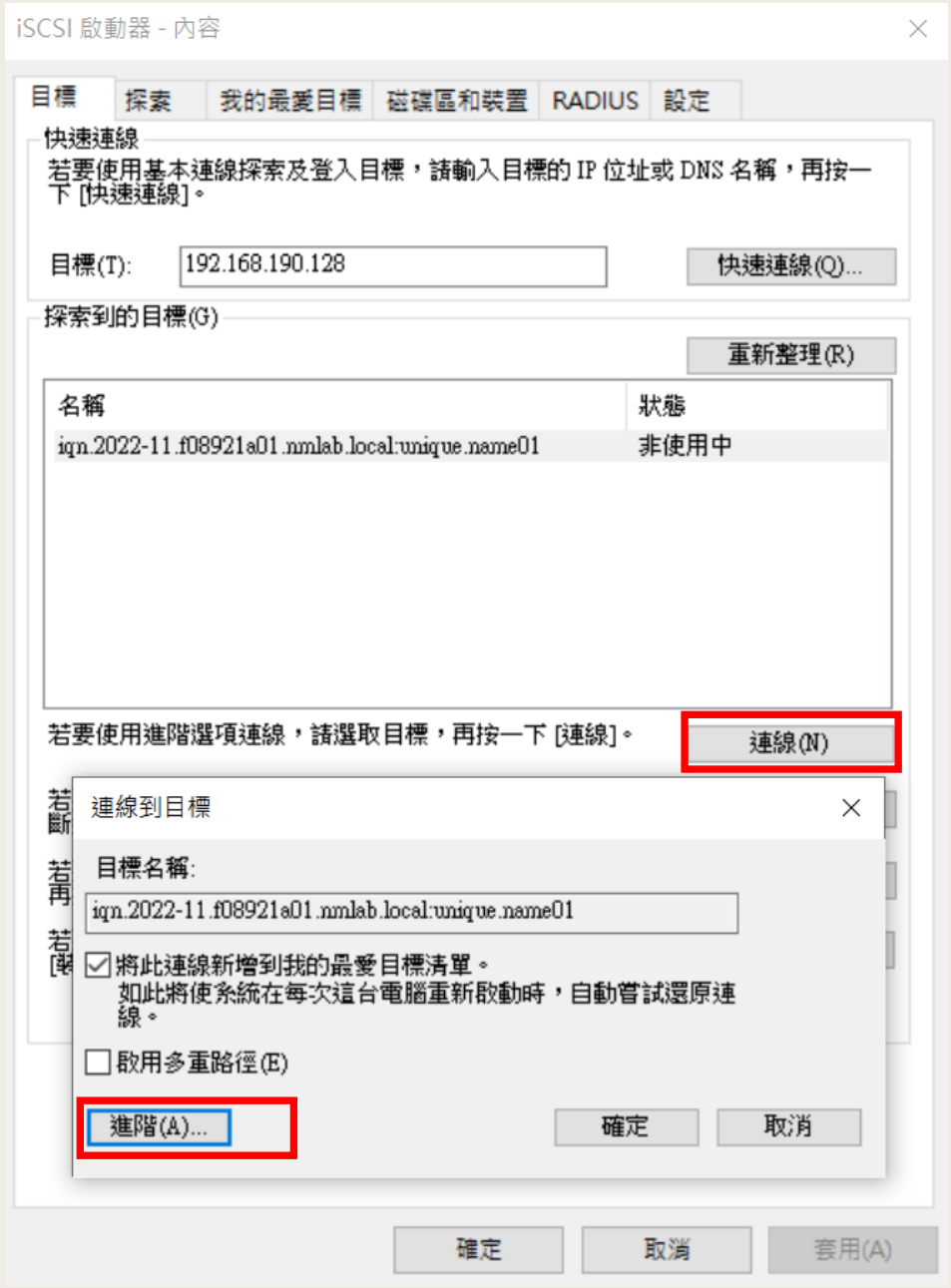
- sudo systemctl restart tgt
- sudo tgtadm --mode target --op show

```
yun@yun-virtual-machine:~$ sudo tgtadm --mode target --op show
Target 1: iqn.2022-11.f08921a01.nmlab.local:unique.name01
    System information:
        Driver: iscsi
        State: ready
    I_T nexus information:
    LUN information:
        LUN: 0
            Type: controller
            SCSI ID: IET     00010000
            SCSI SN: beaf10
            Size: 0 MB, Block size: 1
            Online: Yes
            Removable media: No
            Prevent removal: No
            Readonly: No
            SWP: No
            Thin-provisioning: No
            Backing store type: null
            Backing store path: None
            Backing store flags:
        LUN: 1
            Type: disk
            SCSI ID: IET     00010001
            SCSI SN: beaf11
            Size: 214747 MB, Block size: 512
            Online: Yes
            Removable media: No
            Prevent removal: No
            Readonly: No
            SWP: No
            Thin-provisioning: No
            Backing store type: rdwr
            Backing store path: /dev/sdb1
            Backing store flags:
    Account information:
        f08921a01
    ACL information:
        192.168.190.0/24
```

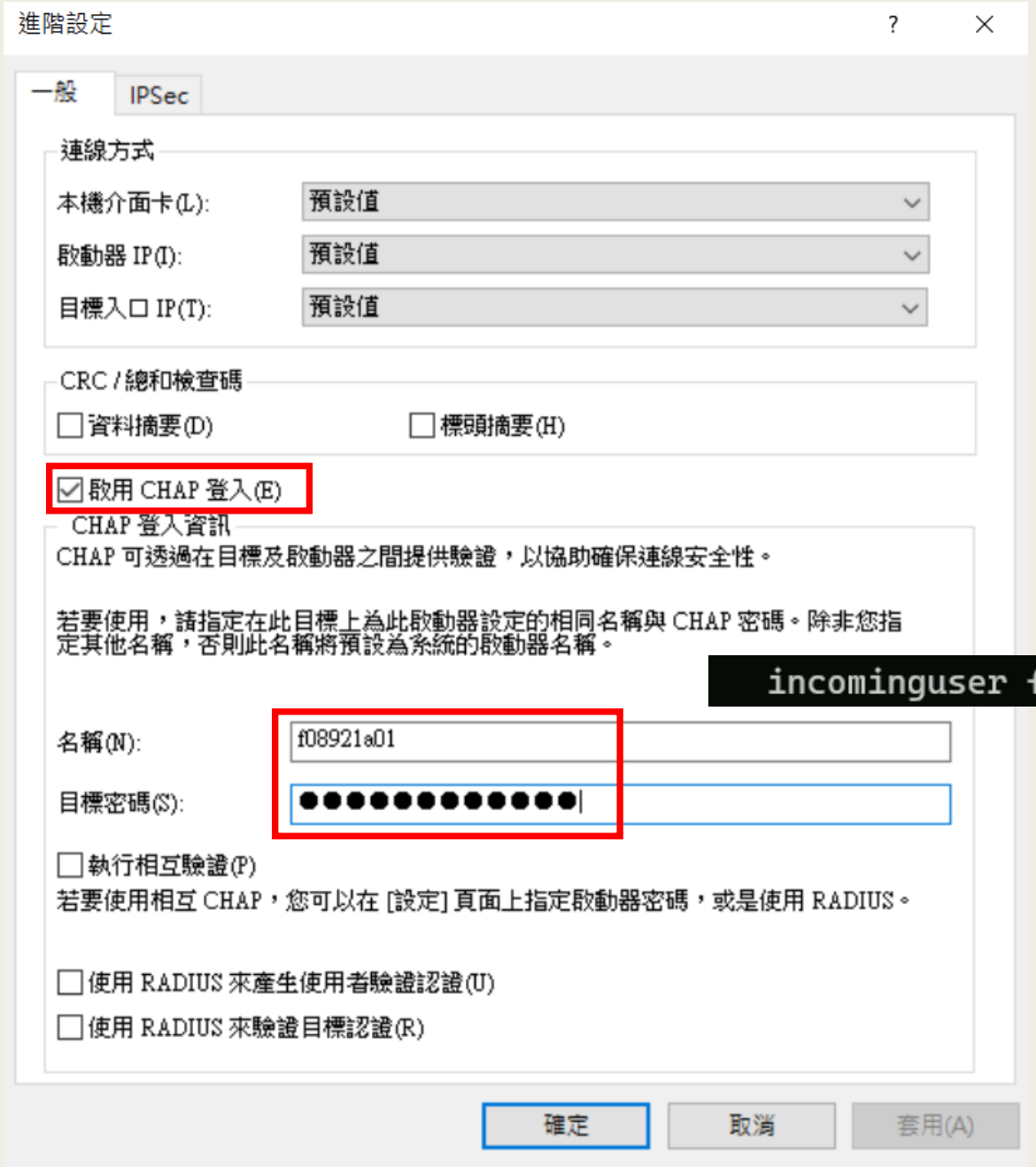
Screenshot-01

iSCSI server setup – iSCSI initiator (Windows)

iSCSI server setup – iSCSI initiator (Windows)

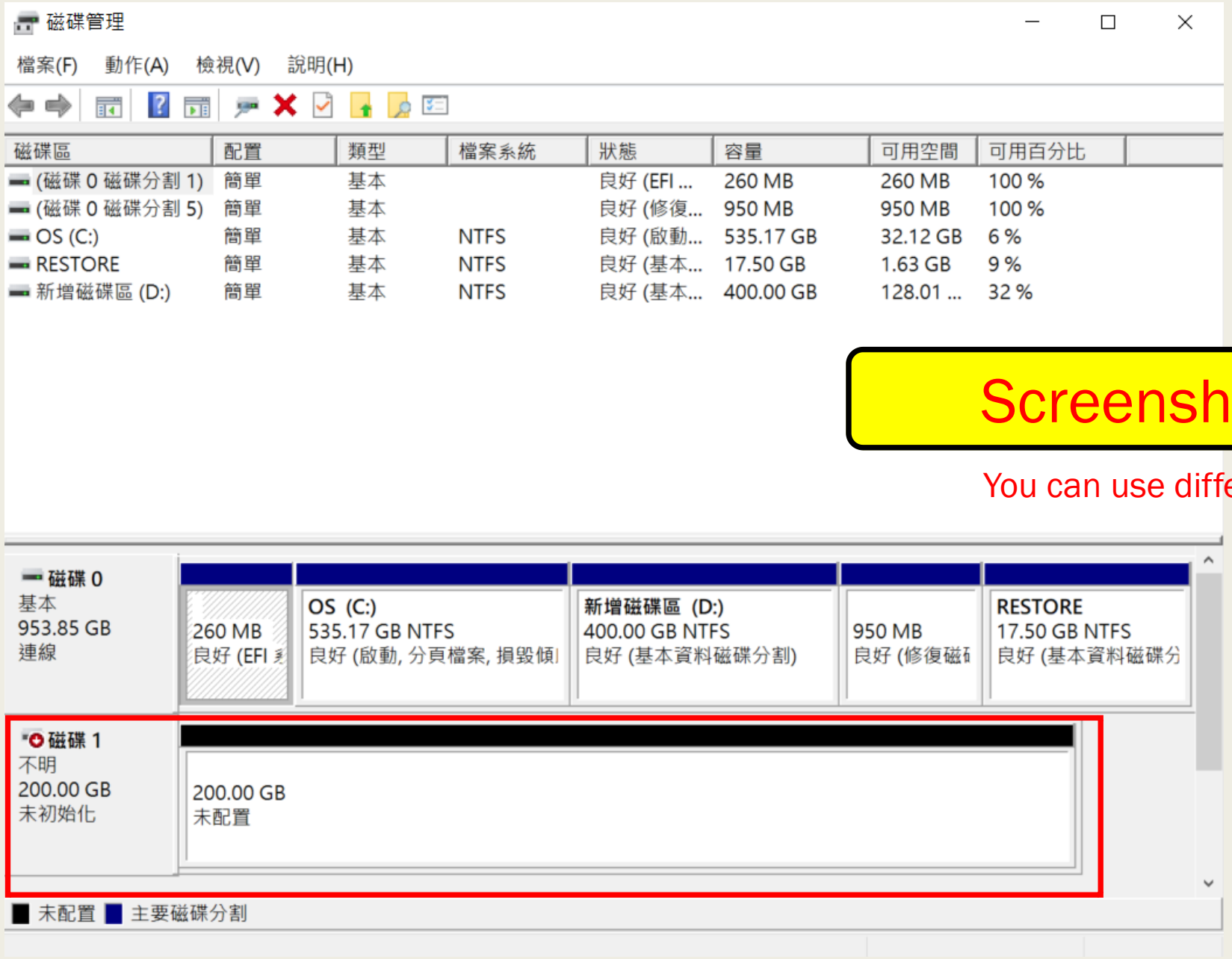


iSCSI server setup – iSCSI initiator (Windows)




```
incominguser f08921a01 asdfasdfasdf
```

iSCSI server setup – OS sees the connected virtual disk



Screenshot-02

You can use different initiator

HW

上傳 “學號”.pdf

- Screenshot-01 Account Information: 學號
- Screenshot-02 You can use different initiator (MAC, Linux)