

NASA Homework 2

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Classmates consulted

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1. 那傢伙竟然敢無視窗

1. pacman -S ntfs-3g to install ntfs util for creating ntfs.
2. mkfs.ntfs /dev/vdi2 to creat ntfs on vdi2 .
3. lsblk -f to find the UUID of the new file system.
4. Edit fstab and add an entry for /dev/vdi2 . (Note: we should use the name ntfs3 in fstab to successfully automount without needing the ntfs-3g package)
5. reboot .

Screenshots:

```
[root@archlinux balu]# lsblk; df -hT
NAME          MAJ:MIN RM  SIZE RO TYPE MOUNTPOINTS
fd0            2:0    1   4K  0 disk
sda            8:0    0  32G  0 disk
└─sda1         8:1    0 200M  0 part /boot
└─sda2         8:2    0 31.8G  0 part /
sr0           11:0    1 1024M  0 rom
zram0          253:0   0  983M  0 disk [SWAP]
vda            254:0   0   1G  0 disk
└─vda1         254:1   0 1022M  0 part
  └─nasahw2--main-course 252:0   0  500M  0 lvm  /home/balu/course
vdb            254:16   0   1G  0 disk
└─vdb1         254:17   0 1022M  0 part
vdc            254:32   0   2G  0 disk
└─vdc1         254:33   0   2G  0 part
vdd            254:48   0   16G 0 disk
└─vdd1         254:49   0   16G 0 part
vde            254:64   0   512M 0 disk
└─vde1         254:65   0   510M 0 part
  └─nasahw2--secondary-videos 252:1   0 508M 0 lvm  /home/balu/videos
vdf            254:80   0    7G 0 disk
└─vdf1         254:81   0   2G 0 part
└─vdf2         254:82   0   2G 0 part
└─vdf3         254:83   0   2G 0 part
vdg            254:96   0    7G 0 disk
└─vdg1         254:97   0   2G 0 part
└─vdg2         254:98   0   2G 0 part
└─vdg3         254:99   0   2G 0 part
vdh            254:112   0    7G 0 disk
└─vdh1         254:113   0   2G 0 part
└─vdh2         254:114   0   2G 0 part
└─vdh3         254:115   0   2G 0 part
vdi            254:128   0    6G 0 disk
```

vdi1	254:129	0	2G	0	part
vdi2	254:130	0	4G	0	part /mnt/myusb
Filesystem					
dev		Type	Size	Used	Avail Use% Mounted on
run		devtmpfs	976M	0	976M 0% /dev
/dev/sda2		tmpfs	984M	744K	983M 1% /run
tmpfs		ext4	32G	3.3G	27G 11% /
tmpfs		tmpfs	984M	0	984M 0% /dev/shm
tmpfs		tmpfs	1.0M	0	1.0M 0% /run/credentials/systemd-journald.service
tmpfs		tmpfs	1.0M	0	1.0M 0% /run/credentials/systemd-resolved.service
tmpfs		tmpfs	1.0M	0	1.0M 0% /run/credentials/systemd-networkd.service
tmpfs		tmpfs	984M	0	984M 0% /tmp
/dev/vdi2		ntfs3	4.0G	22M	4.0G 1% /mnt/myusb
/dev/sda1		vfat	197M	69M	129M 35% /boot
/dev/mapper/nasahw2--main-course		ext4	459M	4.5M	425M 2% /home/balu/course
/dev/mapper/nasahw2--secondary-videos		ext4	466M	66M	371M 16% /home/balu/videos
tmpfs		tmpfs	1.0M	0	1.0M 0% /run/credentials/getty@tty1.service
tmpfs		tmpfs	197M	4.0K	197M 1% /run/user/1000

```
[root@archlinux balu]# cat /etc/fstab
# Static information about the filesystems.
# See fstab(5) for details.

# <file system> <dir> <type> <options> <dump> <pass>
# /dev/sda2
UUID=d1daff5a-54da-43b8-a88e-83fa4e94a0b1      /          ext4        rw,relatime     0 1

# /dev/sda1
UUID=711C-6167      /boot        vfat        rw,relatime,fmask=0022,dmask=0022,codepage=437,iocharset=ascii,shortname=mixed,utf8,errors=remount-ro 0 2

/dev/nasahw2-main/course   /home/balu/course    ext4        defaults     0 2
/dev/nasahw2-secondary/videos /home/balu/videos  ext4        defaults     0 2

# /dev/vdi2
UUID=0AF2AE32054D3BFC   /mnt/myusb      ntfs3       defaults     0 2
```

Reference:

https://wiki.archlinux.org/title/File_systems

<https://wiki.archlinux.org/title/NTFS>

2. 因為要換到新的 SWAP

1. `mkswap --size 4G --file /newswap` to make a swap file.
2. `swapon /newswap` to activate.

Screenshots:

	total	used	free	shared	buff/cache	available
Mem:	1.9Gi	199Mi	1.8Gi	4.1Mi	71Mi	1.7Gi
Swap:	5.0Gi	8.0Mi	5.0Gi			

Reference:

<https://wiki.archlinux.org/title/Swap>

3. 為資料創造新的棲身之處

1. lvresize -L 1G nasahw2-main/course to resize lv.
2. resize2fs /dev/nasahw2-main/course to expand the file system.

Screenshots:

```
[root@archlinux ~]# lsblk; df -hT
NAME          MAJ:MIN RM  SIZE RO TYPE MOUNTPOINTS
fd0            2:0    1   4K  0 disk
sda            8:0    0  32G  0 disk
└─sda1         8:1    0 200M  0 part /boot
└─sda2         8:2    0 31.8G  0 part /
sr0           11:0    1 1024M  0 rom
zram0        253:0    0  983M  0 disk [SWAP]
vda           254:0    0   1G  0 disk
└─vda1         254:1    0 1022M  0 part
  └─nasahw2--main-course 252:0    0   1G  0 lvm  /home/balu/course
vdb           254:16   0   1G  0 disk
└─vdb1         254:17    0 1022M  0 part
  └─nasahw2--main-course 252:0    0   1G  0 lvm  /home/balu/course
vdc           254:32   0   2G  0 disk
└─vdc1         254:33    0   2G  0 part
vdd           254:48   0  16G  0 disk
└─vdd1         254:49    0  16G  0 part
vde           254:64   0  512M 0 disk
└─vde1         254:65    0  510M 0 part
  └─nasahw2--secondary-videos 252:1    0 508M 0 lvm  /home/balu/videos
vdf           254:80   0   7G  0 disk
└─vdf1         254:81    0   2G  0 part
└─vdf2         254:82    0   2G  0 part
└─vdf3         254:83    0   2G  0 part
vdg           254:96   0   7G  0 disk
└─vgd1         254:97    0   2G  0 part
└─vgd2         254:98    0   2G  0 part
└─vgd3         254:99    0   2G  0 part
vdh           254:112  0   7G  0 disk
└─vh1          254:113   0   2G  0 part
└─vh2          254:114   0   2G  0 part
└─vh3          254:115   0   2G  0 part
vdi           254:128  0   6G  0 disk
└─vdi1         254:129   0   2G  0 part
└─vdi2         254:130   0   4G  0 part
Filesystem      Type  Size  Used Avail Use% Mounted on
dev            devtmpfs 976M    0  976M  0% /dev
run            tmpfs   984M  740K 983M  1% /run
/dev/sda2       ext4   32G   7.3G 23G  25% /
tmpfs          tmpfs   984M    0  984M  0% /dev/shm
tmpfs          tmpfs   1.0M    0  1.0M  0% /run/credentials/systemd-journald.service
tmpfs          tmpfs   1.0M    0  1.0M  0% /run/credentials/systemd-resolved.service
tmpfs          tmpfs   1.0M    0  1.0M  0% /run/credentials/systemd-networkd.service
tmpfs          tmpfs   984M    0  984M  0% /tmp
/dev/sda1       vfat   197M   69M 129M 35% /boot
/dev/mapper/nasahw2--main-course ext4   950M  4.5M 896M  1% /home/balu/course
/dev/mapper/nasahw2--secondary-videos ext4   466M  66M 371M 16% /home/balu/videos
tmpfs          tmpfs   1.0M    0  1.0M  0% /run/credentials/getty@tty1.service
tmpfs          tmpfs   197M  4.0K 197M  1% /run/user/1000
```

Reference:

<https://wiki.archlinux.org/title/LVM>

4. 我有拜託妳別把我的作業告訴其他人了吧

1. lvcreate -L 800M nasahw2-main -n homework to create lv.
2. cryptsetup luksFormat /dev/nasahw2-main/homework --key-file /home/balu/lvm_key to initialize LUKS with a key file.
3. cryptsetup open /dev/nasahw2-main/homework homework --key-file=/home/balu/lvm_key to open the LUKS device.
4. mkfs.ext4 /dev/mapper/homework to make file system.
5. lsblk -f to get UUID.
6. Edit /etc/crypttab and add an entry:

```
homework    UUID=bf8e6be1-b71f-4587-9d96-4e1188285a3d    /home/balu/lvm_key    luks
```
7. Edit /etc/fstab and add an entry:

```
UUID=7e016873-6d79-415f-8715-b555933f21bb    /home/balu/homework ext4    defaults 0 2
```
8. reboot to test.

Screenshots:

```
[root@archlinux balu]# lsblk; df -hT
NAME          MAJ:MIN RM  SIZE RO TYPE  MOUNTPOINTS
fd0            2:0    1   4K  0 disk
sda            8:0    0  32G  0 disk
└─sda1         8:1    0 200M  0 part  /boot
└─sda2         8:2    0 31.8G  0 part  /
sr0           11:0    1 1024M  0 rom
zram0          253:0   0  983M  0 disk [SWAP]
vda           254:0    0   1G  0 disk
└─vda1         254:1   0 1022M  0 part
  └─nasahw2--main-course 252:0    0   1G  0 lvm   /home/balu/course
vdb           254:16   0   1G  0 disk
└─vdb1         254:17   0 1022M  0 part
  └─nasahw2--main-course 252:0    0   1G  0 lvm   /home/balu/course
  └─nasahw2--main-homework 252:2    0 800M  0 lvm
    └─homework        252:3    0 784M  0 crypt /home/balu/homework
vdc           254:32   0   2G  0 disk
└─vdc1         254:33   0   2G  0 part
vdd           254:48   0  16G  0 disk
└─vdd1         254:49   0  16G  0 part
vde           254:64   0  512M  0 disk
└─vde1         254:65   0 510M  0 part
  └─nasahw2--secondary-videos 252:1    0 508M  0 lvm   /home/balu/videos
vdf           254:80   0   7G  0 disk
└─vdf1         254:81   0   2G  0 part
└─vdf2         254:82   0   2G  0 part
└─vdf3         254:83   0   2G  0 part
vdg           254:96   0   7G  0 disk
└─vdg1         254:97   0   2G  0 part
└─vdg2         254:98   0   2G  0 part
└─vdg3         254:99   0   2G  0 part
vdh           254:112  0   7G  0 disk
└─vdh1         254:113  0   2G  0 part
└─vdh2         254:114  0   2G  0 part
└─vdh3         254:115  0   2G  0 part
vdi           254:128  0   6G  0 disk
└─vdi1         254:129  0   2G  0 part
└─vdi2         254:130  0   4G  0 part  /mnt/myusb
Filesystem      Type     Size  Used Avail Use% Mo
united on
dev            devtmpfs  976M    0  976M  0% /dev
run            tmpfs    984M  764K  983M  1% /run
/dev/sda2       ext4     32G  7.3G  23G  25% /
tmpfs          tmpfs    984M    0  984M  0% /dev/shm
```

tmpfs	tmpfs	1.0M	0	1.0M	0%	/run/credentials/systemd-journald.service
tmpfs	tmpfs	1.0M	0	1.0M	0%	/run/credentials/systemd-resolved.service
tmpfs	tmpfs	1.0M	0	1.0M	0%	/run/credentials/systemd-networkd.service
/dev/vdi2	fuseblk	984M	0	984M	0%	/tmp
/dev/sda1	vfat	197M	69M	129M	35%	/boot
tmpfs	tmpfs	1.0M	0	1.0M	0%	/run/credentials/systemd-cryptsetup@homework.service
/dev/mapper/nasahw2--main-course	ext4	950M	4.5M	896M	1%	/home/balu/course
/dev/mapper/nasahw2--secondary-videos	ext4	466M	66M	371M	16%	/home/balu/videos
/dev/mapper/homework	ext4	755M	220K	700M	1%	/home/balu/homework
tmpfs	tmpfs	1.0M	0	1.0M	0%	/run/credentials/getty@tty1.service
tmpfs	tmpfs	197M	4.0K	197M	1%	/run/user/1000

Reference:

<https://wiki.archlinux.org/title/LVM>

https://wiki.archlinux.org/title/Dm-crypt/Encrypting_an_entire_system

https://wiki.archlinux.org/title/Dm-crypt/Device_encryption

<https://man7.org/linux/man-pages/man5/crypttab.5.html>

5. 快照真的好難喔

1. vgextend nasahw2-main /dev/vdc1 to add /dev/vdc1 to volume group nasahw2-main .
2. lvcreate --size 1G --snapshot --name backup /dev/nasahw2-main/course and
mount -m /dev/nasahw2-main/backup /mnt/backup to create a snapshot lv for course , and mount it on /mnt/backup .
3. tar --zstd -cf backup.tar.zst /mnt/backup to create tar archive.
4. umount /mnt/backup and lvremove nasahw2-main/backup to unmount lv and remove it.

Screenshots:

NAME	MAJ:MIN	RM	SIZE	RO	TYPE	MOUNTPOINTS
fd0	2:0	1	4K	0	disk	
sda	8:0	0	32G	0	disk	
└─sda1	8:1	0	200M	0	part	/boot
└─sda2	8:2	0	31.8G	0	part	/
sr0	11:0	1	1024M	0	rom	
zram0	253:0	0	983M	0	disk	[SWAP]
vda	254:0	0	1G	0	disk	
└─vda1	254:1	0	1022M	0	part	
└─nasahw2--main-course-real	252:4	0	1G	0	lvm	
└─nasahw2--main-course	252:0	0	1G	0	lvm	/home/balu/course
└─nasahw2--main-backup	252:6	0	1G	0	lvm	/mnt/backup
vdb	254:16	0	16	0	disk	
└─vdb1	254:17	0	1022M	0	part	
└─nasahw2--main-homework	252:2	0	800M	0	lvm	
└─homework	252:3	0	784M	0	crypt	/home/balu/homework
└─nasahw2--main-course-real	252:4	0	1G	0	lvm	
└─nasahw2--main-course	252:0	0	1G	0	lvm	/home/balu/course
└─nasahw2--main-backup	252:6	0	1G	0	lvm	/mnt/backup
vdc	254:32	0	2G	0	disk	
└─vdc1	254:33	0	2G	0	part	
└─nasahw2--main-backup-cow	252:5	0	16	0	lvm	
└─nasahw2--main-backup	252:6	0	16	0	lvm	/mnt/backup
vdd	254:48	0	16G	0	disk	
└─vdd1	254:49	0	16G	0	part	
vde	254:64	0	512M	0	disk	
└─vde1	254:65	0	510M	0	part	
└─nasahw2--secondary-videos	252:1	0	508M	0	lvm	/home/balu/videos
vdf	254:80	0	7G	0	disk	
└─vdf1	254:81	0	2G	0	part	

vdf1	254:81	0	2G	0	part
vdf2	254:82	0	2G	0	part
vdf3	254:83	0	2G	0	part
vdg	254:96	0	7G	0	disk
vdg1	254:97	0	2G	0	part
vdg2	254:98	0	2G	0	part
vdg3	254:99	0	2G	0	part
vdh	254:112	0	7G	0	disk
vdh1	254:113	0	2G	0	part
vdh2	254:114	0	2G	0	part
vdh3	254:115	0	2G	0	part
vdi	254:128	0	6G	0	disk
vdi1	254:129	0	2G	0	part
vdi2	254:130	0	4G	0	part /mnt/myusb

[root@archlinux balu]# lsblk; df -hT						
NAME	MAJ:MIN	RM	SIZE	RO	TYPE	MOUNTPOINTS
fd0	2:0	1	4K	0	disk	
sda	8:0	0	32G	0	disk	
└─sda1	8:1	0	200M	0	part	/boot
└─sda2	8:2	0	31.8G	0	part	/
sr0	11:0	1	1024M	0	rom	
zram0	253:0	0	983M	0	disk	[SWAP]
vda	254:0	0	1G	0	disk	
└─vda1	254:1	0	1022M	0	part	
└─nasahw2--main-course	252:0	0	1G	0	lvm	/home/balu/course
vdb	254:16	0	1G	0	disk	
└─vdb1	254:17	0	1022M	0	part	
└─nasahw2--main-course	252:0	0	1G	0	lvm	/home/balu/course
└─nasahw2--main-homework	252:2	0	800M	0	lvm	
└─homework	252:3	0	784M	0	crypt	/home/balu/homework
vdc	254:32	0	2G	0	disk	
└─vdc1	254:33	0	2G	0	part	
vdd	254:48	0	16G	0	disk	
└─vdd1	254:49	0	16G	0	part	
vde	254:64	0	512M	0	disk	
└─vde1	254:65	0	510M	0	part	
└─nasahw2--secondary-videos	252:1	0	508M	0	lvm	/home/balu/videos
vdf	254:80	0	7G	0	disk	
└─vdf1	254:81	0	2G	0	part	
└─vdf2	254:82	0	2G	0	part	
└─vdf3	254:83	0	2G	0	part	
vdg	254:96	0	7G	0	disk	
└─vdg1	254:97	0	2G	0	part	
└─vdg2	254:98	0	2G	0	part	
└─vdg3	254:99	0	2G	0	part	
vdh	254:112	0	7G	0	disk	
└─vdh1	254:113	0	2G	0	part	
└─vdh2	254:114	0	2G	0	part	
└─vdh3	254:115	0	2G	0	part	
vdi	254:128	0	6G	0	disk	
└─vdi1	254:129	0	2G	0	part	
└─vdi2	254:130	0	4G	0	part	/mnt/myusb
Filesystem	Type	Size	Used	Avail	Use%	Mounted on
dev	devtmpfs	976M	0	976M	0%	/dev
run	tmpfs	984M	772K	983M	1%	/run
/dev/sda2	ext4	32G	7.3G	23G	25%	/
tmpfs	tmpfs	984M	0	984M	0%	/dev/shm
tmpfs	tmpfs	1.0M	0	1.0M	0%	/run/credentials/systemd-journald.service
tmpfs	tmpfs	1.0M	0	1.0M	0%	/run/credentials/systemd-resolved.service
tmpfs	tmpfs	1.0M	0	1.0M	0%	/run/credentials/systemd-networkd.service
tmpfs	tmpfs	984M	0	984M	0%	/tmp
/dev/vdi2	fuseblk	4.0G	22M	4.0G	1%	/mnt/myusb
/dev/sda1	vfat	197M	69M	129M	35%	/boot
tmpfs	tmpfs	1.0M	0	1.0M	0%	/run/credentials/systemd-cryptsetup@homework.service
/dev/mapper/nasahw2--main-course	ext4	950M	4.5M	896M	1%	/home/balu/course
/dev/mapper/nasahw2--secondary-videos	ext4	466M	66M	371M	16%	/home/balu/videos
/dev/mapper/homework	ext4	755M	220K	700M	1%	/home/balu/homework
tmpfs	tmpfs	1.0M	0	1.0M	0%	/run/credentials/getty@tty1.service
tmpfs	tmpfs	197M	4.0K	197M	1%	/run/user/1000

Reference:

<https://wiki.archlinux.org/title/LVM>

<https://www.cyberciti.biz/faq/how-to-tar-a-file-in-linux-using-command-line/>

<https://man7.org/linux/man-pages/man1/tar.1.html>

6. 好老舊喔

1. vgextend nasahw2-secondary /dev/vdd1 to add /dev/vdd1 to nasahw2-secondary .
2. pvmove /dev/vde1 to move the data from /dev/vde1
3. vgreduce nasahw2-secondary /dev/vde1 to remove /dev/vde1 from nasahw2-secondary .

Screenshots:

```
[root@archlinux balu]# pvs
```

PV	VG	Fmt	Attr	PSize	PFree
/dev/vda1	nasahw2-main	lvm2	a--	1020.00m	0
/dev/vdb1	nasahw2-main	lvm2	a--	1020.00m	216.00m
/dev/vdc1	nasahw2-main	lvm2	a--	<2.00g	<2.00g
/dev/vdd1	nasahw2-secondary	lvm2	a--	<16.00g	15.50g
/dev/vde1		lvm2	---	510.00m	510.00m

```
[root@archlinux balu]# vgs
```

VG	#PV	#LV	#SN	Attr	VSize	VFree
nasahw2-main	3	2	0	wz--n-	<3.99g	<2.21g
nasahw2-secondary	1	1	0	wz--n-	<16.00g	15.50g

Reference:

<https://wiki.archlinux.org/title/LVM>

7. 我看還是再來合一次吧

1. umount /home/balu/videos to unmount the lv on nasahw2-secondary .
2. vgchange -a n nasahw2-secondary to deactivate vg.
3. vgmerge nasahw2-main nasahw2-secondary to merge nasahw2-secondary into nasahw2-main .
4. Modify fstab, change the line:

```
/dev/nasahw2-secondary/videos /home/balu/videos ext4 defaults 0 2 to
/dev/nasahw2-main/videos /home/balu/videos ext4 defaults 0 2
```

Screenshots:

```
[root@archlinux balu]# vgs
  VG          #PV #LV #SN Attr   VSize   VFree
nasahw2-main    4    3    0 wz--n- 19.98g <17.71g
```

```
[root@archlinux balu]# lvs
  LV      VG          Attr       LSize   Pool Origin Data%  Meta%  Move Log Cpy%Sync Convert
course   nasahw2-main -wi-ao----  1.00g
homework nasahw2-main -wi-ao---- 800.00m
videos    nasahw2-main -wi----- 508.00m
```

```
[root@archlinux balu]# cat /etc/fstab
# Static information about the filesystems.
# See fstab(5) for details.

# <file system> <dir> <type> <options> <dump> <pass>
# /dev/sda2
UUID=d1daff5a-54da-43b8-a88e-83fa4e94a0b1      /           ext4        rw,relatime     0  1

# /dev/sda1
UUID=711C-6167        /boot        vfat        rw,relatime,fmask=0022,dmask=0022,codepage=437,i
ocharset=ascii,shortname=mixed,utf8,errors=remount-ro    0  2

/dev/nasahw2-main/course      /home/balu/course      ext4        defaults      0  2
/dev/nasahw2-main/videos      /home/balu/videos      ext4        defaults      0  2

# /dev/vdi2
UUID=787E092F613C3A29    /mnt/myusb      ntfs        defaults      0  2

# /dev/nasahw2-main/homework
UUID=7e016873-6d79-415f-8715-b555933f21bb      /home/balu/homework      ext4        defaults 0  2
```

Reference:

https://docs.redhat.com/en/documentation/red_hat_enterprise_linux/6/html/

[logical_volume_manager_administration/vg_combine#VG_combine](#)

https://docs.redhat.com/en/documentation/red_hat_enterprise_linux/4/html/cluster_logical_volume_manager/vg_activate#VG_activate

8.等一下，妳還沒回答我

1. zfs does not support growing and shrinking while unmounted, whereas btrfs supports both while unmounted.

Reference:

https://en.wikipedia.org/wiki/Comparison_of_file_systems#Features

2. FUSE as the name implies, is a filesystem implemented in userspace, with a kernel module that only acts as a bridge between the userspace code and other kernel interfaces.

Advantages:

Faster development and distribution, as it is not integrated to the kernel.

Disadvantages:

Less robust, for example, since the filesystem is implemented as processes, there is a chance that it is accidentally killed.

References:

https://en.wikipedia.org/wiki/Filesystem_in_Userspace

<https://www.linuxtoday.com/blog/user-space-file-systems/>

3. MBR: Master Boot Record, GPT: GUID Partition Table

- i. MBR has a maximum partition size of 2TB whereas GPT supports up to 64ZiB (depending on sector size).

- ii. MBR only supports 4 partitions whereas GPT supports at least 128 partitions.

References:

https://en.wikipedia.org/wiki/Master_boot_record

https://en.wikipedia.org/wiki/GUID_Partition_Table

4. By SI & IEC definition, $1\text{MB} = 1000^2 \text{ bytes}$, $\text{MiB} = 1024^2 \text{ bytes}$.

For a 4096 byte file, with `ls -l`, we see that it is 4096 bytes, but with `ls -lh`, it is 4.0K, thus the K means KiB, and `ls -lh` uses binary prefixes by default.

Reference:

<https://en.wikipedia.org/wiki/Megabyte>

5. i. RAID 0:

RAID 0 does stripping, which increases read/write throughput, but it does not provide mirroring or parity, thus losing 1 drive would typically mean all data are lost.

ii. RAID 1:

RAID 1 does mirroring, which decreases write throughput, but since all data are mirrored, as long as one drive is functional, no data is lost. RAID 1 does not provide parities or striping.

iii. RAID 5:

RAID 5 does striping with distributed parities, parities are distributed among the drives, such that if one drive fails, data can still be rebuilt, if more than one fails, data would be lost.

iv. RAID 10:

Also known as RAID 1+0, is a RAID 0 of RAID 1s, meaning it does stripping on mirrors.

Reference:

<https://en.wikipedia.org/wiki/RAID>

https://en.wikipedia.org/wiki/Standard_RAID_levels

https://en.wikipedia.org/wiki/Nested_RAID_levels#RAID_10