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姓名：郭紘安　　　　　　　　Email：andy8766kuo@gmail.com
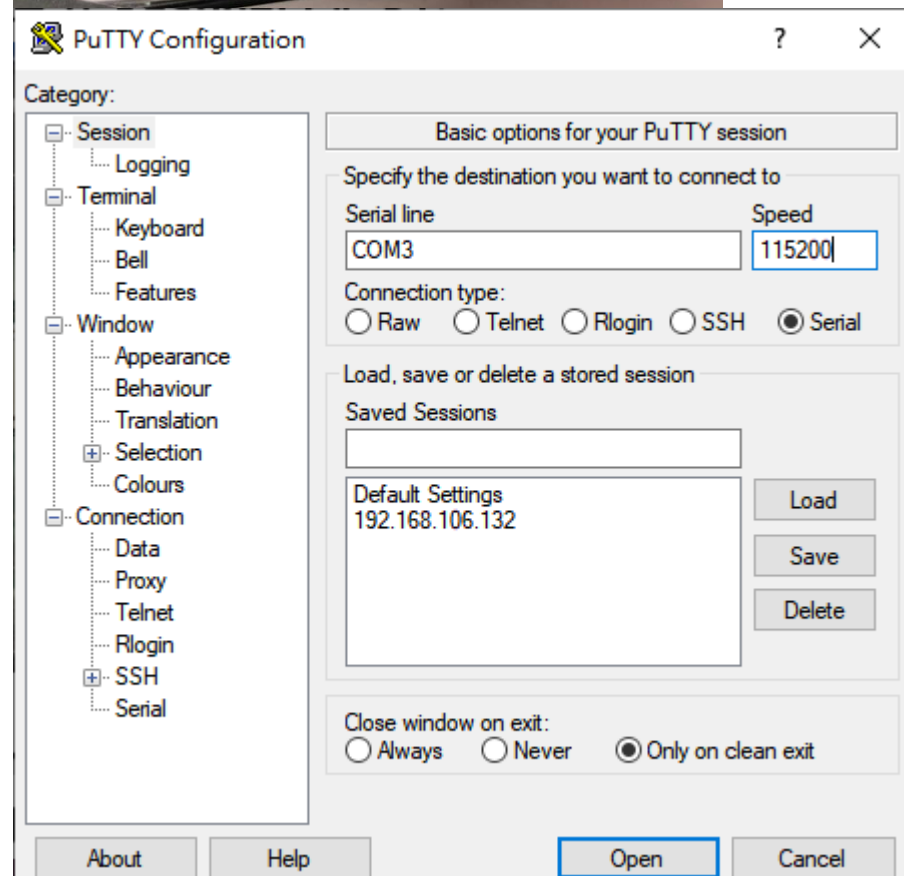
實驗名稱：System backup

實驗目的：

- 從序列埠登入 Raspberry Pi
- 擷取 image file 裡的檔案
- 備份系統 dd

實驗步驟：

> ### 從序列埠登入 Raspberry Pi

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➢ Mount Image File

1.獲取分割資訊

```
andy@ubuntu:~/disk/buildroot/output/images$ fdisk sdcard.img

Welcome to fdisk (util-linux 2.27.1).
Changes will remain in memory only, until you decide to write them.
Be careful before using the write command.


Command (m for help): p
Disk sdcard.img: 152 MiB, 159384064 bytes, 311297 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disklabel type: dos
Disk identifier: 0x00000000

Device     Boot Start    End Sectors  Size Id Type
sdcard.img1 *        1  65536   65536   32M  c W95 FAT32 (LBA)
sdcard.img2      65537 311296  245760  120M 83 Linux

Command (m for help):
```
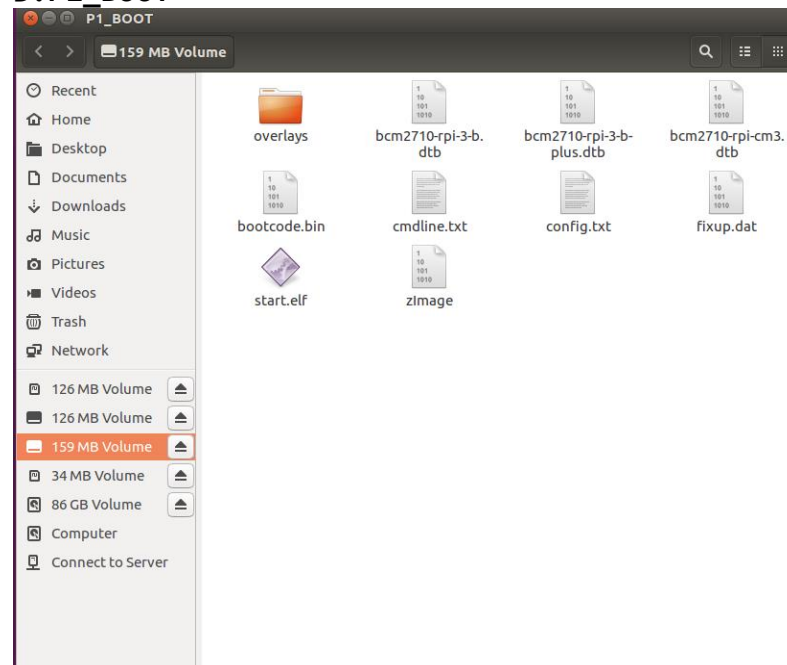
2.Mount First Partition to P1_BOOT
Mout Second Partition to P2_ROOTFS

```
andy@ubuntu:~/disk/buildroot/output/images$ sudo mount -o loop,offset=$((1*512))
 sdcard.img P1_BOOT
andy@ubuntu:~/disk/buildroot/output/images$ sudo mount -o loop,offset=$((65537*5
12)) sdcard.img P2_ROOTFS
```
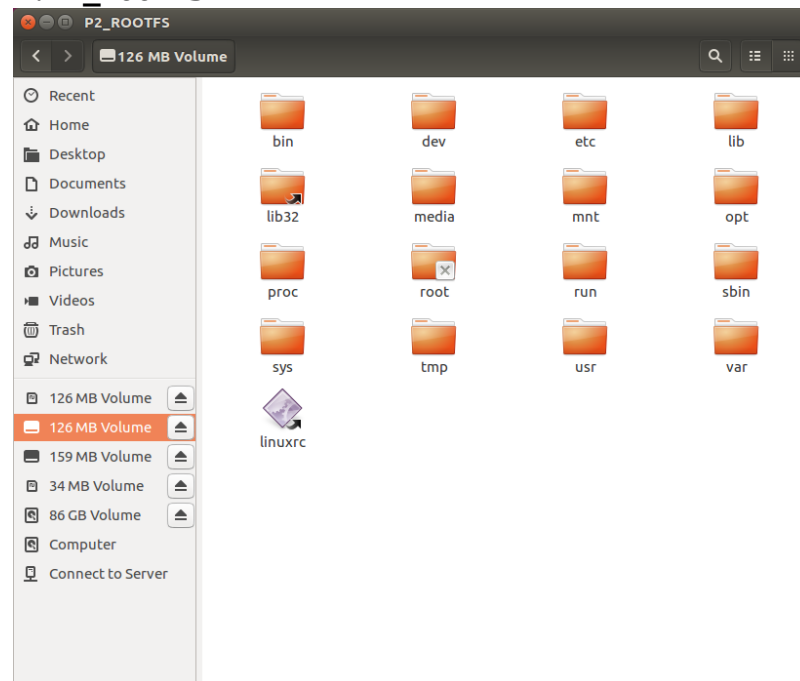
3.P1_BOOT

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4.P2_ROOTFS

➢ 備份 SD card

1.Backup SD card

```
andy@ubuntu:~/disk$ sudo -s
root@ubuntu:~/disk# dd if=/dev/sdc of=backup.img
31116288+0 records in
31116288+0 records out
15931539456 bytes (16 GB, 15 GiB) copied, 1184.04 s, 13.5 MB/s
```

2.Backup BOOT Part

```
root@ubuntu:~/disk# dd if=/dev/sdc1 of=boot_part.img
65536+0 records in
65536+0 records out
33554432 bytes (34 MB, 32 MiB) copied, 0.193731 s, 173 MB/s
```

3.Backup ROOTFS Part

```
root@ubuntu:~/disk# dd if=/dev/sdc2 of=filesys_part.img
245760+0 records in
245760+0 records out
125829120 bytes (126 MB, 120 MiB) copied, 12.6067 s, 10.0 MB/s
```

4.Result

```
andy@ubuntu:~/disk/Backup$ ll
total 15713804
drwxrwxr-x 2 andy andy        4096 May 15 11:26 ./
drwxr-xr-x 8 andy andy        4096 May 15 11:28 ../
-rw-r--r-- 1 andy andy 15931539456 May 15 11:26 backup.img
-rw-r--r-- 1 andy andy    33554432 May 15 11:26 boot_part.img
-rw-r--r-- 1 andy andy   125829120 May 15 11:26 filesys_part.img
```

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> ## 備份系統:使用 rsync

1.利用 dd 建立 image file

2.透過 fdisk 分割 partition

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3．透過 losetup 連結 image file 中的 partition

```
root@ubuntu:~/disk/rsync# losetup --offset=$((2048*512)) --sizelimit=$((489472*512)) /dev/loop0 filesystem.img
root@ubuntu:~/disk/rsync#
```

4．format image file 中的 partition

```
root@ubuntu:~/disk/rsync# mkfs.ext4 /dev/loop0
mke2fs 1.42.13 (17-May-2015)
Discarding device blocks: done
Creating filesystem with 244736 1k blocks and 61200 inodes
Filesystem UUID: aee416ba-0dfa-4902-a89f-752132ad943d
Superblock backups stored on blocks:
        8193, 24577, 40961, 57345, 73729, 204801, 221185

Allocating group tables: done
Writing inode tables: done
Creating journal (4096 blocks): done
Writing superblocks and filesystem accounting information: done
```

5．Mount the partition

```
root@ubuntu:~/disk/rsync# mkdir /mnt/sys_backup
root@ubuntu:~/disk/rsync# mount /dev/loop0 /mnt/sys_backup
root@ubuntu:~/disk/rsync#
```

6．rsync

```
mmc2/usr/sbin/partprobe -> ../../bin/busybox
mmc2/usr/sbin/rdate -> ../../bin/busybox
mmc2/usr/sbin/readprofile -> ../../bin/busybox
mmc2/usr/sbin/setlogcons -> ../../bin/busybox
mmc2/usr/sbin/ubirename -> ../../bin/busybox
mmc2/usr/share/
mmc2/usr/share/udhcpc/
mmc2/usr/share/udhcpc/default.script
mmc2/usr/share/udhcpc/default.script.d/
mmc2/var/
mmc2/var/cache -> ../tmp
mmc2/var/lock -> ../tmp
mmc2/var/log -> ../tmp
mmc2/var/run -> ../run
mmc2/var/spool -> ../tmp
mmc2/var/tmp -> ../tmp
mmc2/var/lib/
mmc2/var/lib/misc -> ../../tmp
mmc2/var/lib/random-seed
mmc2/var/www/

sent 62,645,165 bytes  received 35,211 bytes  4,642,990.81 bytes/sec
total size is 62,520,578  speedup is 1.00
root@ubuntu:~/disk/rsync#
```

6．移除 pseudo device

```
root@ubuntu:~/disk/rsync# losetup -d /dev/loop0
root@ubuntu:~/disk/rsync#
```

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問題與討論：

● **What is loop device?**

Loop device 是一種偽設備(pseudo-device),也可以說是模擬設備.

在使用之前,一個 loop device 必須要和一個檔進行 mount.

這種結合方式給使用者提供了一個替代塊特殊檔的介面.

因此,如果這個檔包含有一個完整的檔案系統，那麼這個檔就可以像一個磁片設備一樣被 mount 起來.

● **請說明下面 rsync 使用的各個參數的意義：**

$ rsync -axvH --delete /mnt/mmc2 /mnt/sys_backup/

-a: archive mode

-x: don't cross filesystem boundaries

-v: increase verbosity

-H: preserve hard links

--delete: delete extraneous files from dest dirs

/mnt/mmc2: SRC

/mnt/sys_backup/:DEST

心得：

這次的實驗讓我了解如何使用 TTL 連接樹梅派,以及如何備分樹梅派 SD 卡上的資料,跟如何使用 rsync 來備份資料.