學號：405410117

姓名：郭紘安 Email：andy8766kuo@gmail.com
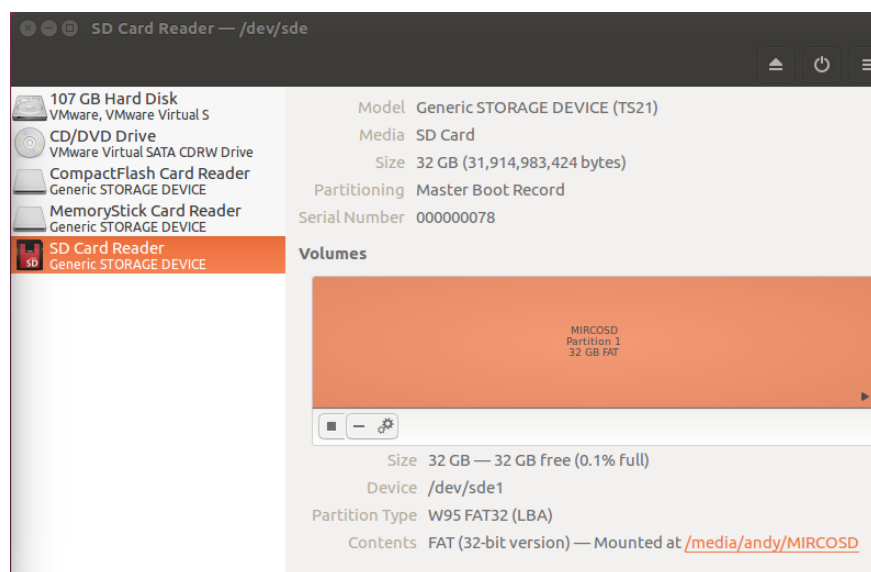
實驗名稱：SD card Partition

實驗目的：

- 建置embedded system: Raspberry Pi + Linux

- 更細部的客製化自己的embedded system

  透過fdisk調整SD card中root filesystem的partition大小

實驗步驟：

Step 1: Disks in Ubuntu

Step 2: Partition SD Card Using fdisk

Step 3: Delete the Partitions

```
Command (m for help): d
Selected partition 1
Partition 1 has been deleted.

Command (m for help): p
Disk /dev/sde: 29.7 GiB, 31914983424 bytes, 62333952 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: 0x5e95e91c

Command (m for help):
```

Step 4:Create Partition: FAT32

```
Command (m for help): n
Partition type
   p   primary (0 primary, 0 extended, 4 free)
   e   extended (container for logical partitions)
Select (default p): p
Partition number (1-4, default 1): 1
First sector (2048-62333951, default 2048):
Last sector, +sectors or +size{K,M,G,T,P} (2048-62333951, default 62333951): +64M

Created a new partition 1 of type 'Linux' and of size 64 MiB.

Command (m for help):
```

Step 5:Create Partition: Linux ext4

```
Command (m for help): n
Partition type
   p   primary (1 primary, 0 extended, 3 free)
   e   extended (container for logical partitions)
Select (default p): p
Partition number (2-4, default 2): 2
First sector (133120-62333951, default 133120):
Last sector, +sectors or +size{K,M,G,T,P} (133120-62333951, default 62333951):

Created a new partition 2 of type 'Linux' and of size 29.7 GiB.

Command (m for help):
```

Step 6:檢視目前分割狀態

```
Device     Boot   Start      End   Sectors   Size Id Type
/dev/sde1           2048   133119    131072    64M 83 Linux
/dev/sde2         133120 62333951  62200832  29.7G 83 Linux
```

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Step 7: Mark the Partition 1 Bootable

```
Command (m for help): a
Partition number (1,2, default 2): 1

The bootable flag on partition 1 is enabled now.

Command (m for help): p
Disk /dev/sde: 29.7 GiB, 31914983424 bytes, 62333952 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: 0x5e95e91c


Device     Boot   Start      End   Sectors  Size Id Type
/dev/sde1   *      2048   133119    131072   64M 83 Linux
/dev/sde2        133120 62333951  62200832 29.7G 83 Linux

Command (m for help):
```

Step 8: Change Partition Type of the Partition 1

```
Command (m for help): t
Partition number (1,2, default 2): 1
Partition type (type L to list all types): c

Changed type of partition 'Linux' to 'W95 FAT32 (LBA)'.

Command (m for help): p
Disk /dev/sde: 29.7 GiB, 31914983424 bytes, 62333952 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: 0x5e95e91c


Device     Boot   Start      End   Sectors  Size Id Type
/dev/sde1   *      2048   133119    131072   64M  c W95 FAT32 (LBA)
/dev/sde2        133120 62333951  62200832 29.7G 83 Linux

Command (m for help):
```

Step 9: Write the Partition Table

```
Command (m for help): w
The partition table has been altered.
Calling ioctl() to re-read partition table.
Re-reading the partition table failed.: Device or resource busy

The kernel still uses the old table. The new table will be used at the next reboot or afte
r you run partprobe(8) or kpartx(8).

root@ubuntu:~#
```

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Step 10: Format Partitions

```
root@ubuntu:~# mkfs.vfat -n BOOT /dev/sdc1
mkfs.fat 3.0.28 (2015-05-16)
mkfs.vfat: /dev/sdc1 contains a mounted filesystem.
root@ubuntu:~# mkfs.ext4 -L filesystem /dev/sdc
sdc    sdc1   sdc2
root@ubuntu:~# mkfs.ext4 -L filesystem /dev/sdc2
mke2fs 1.42.13 (17-May-2015)
Creating filesystem with 7775104 4k blocks and 1945888 inodes
Filesystem UUID: a3d222e6-0733-4a90-a73e-90b0a45ebe1a
Superblock backups stored on blocks:
        32768, 98304, 163840, 229376, 294912, 819200, 884736, 1605632, 2654208,
        4096000

Allocating group tables: done
Writing inode tables: done
Creating journal (32768 blocks): done
Writing superblocks and filesystem accounting information: done
```

Step 11: Mount Partitions

```
root@ubuntu:~# mkdir /mnt/mmc1
root@ubuntu:~# mount /dev/sdc1 /mnt/mmc1/
root@ubuntu:~#
```

Step 12: Copy Files for the Partition BOOT

```
root@ubuntu:~# cd ~/disk/buildroot/output/images/
root@ubuntu:~/disk/buildroot/output/images# cp *.dtb /mnt/mmc1/
root@ubuntu:~/disk/buildroot/output/images# cp zImage /mnt/mmc1/
root@ubuntu:~/disk/buildroot/output/images# cp -rf rpi-firmware/* /mnt/mmc1/
root@ubuntu:~/disk/buildroot/output/images#
```

Step 13: Copy Files for the Partition filesystem

```
root@ubuntu:~/disk/buildroot/output/images# dd if=rootfs.ext2 of=/dev/sdc2
245760+0 records in
245760+0 records out
125829120 bytes (126 MB, 120 MiB) copied, 105.531 s, 1.2 MB/s
```

Step 14: Umount

```
root@ubuntu:~/disk/buildroot/output/images# umount /dev/sdc1
root@ubuntu:~/disk/buildroot/output/images#
```

Step 15: 插入 SD 卡啟動樹梅派

```
Welcome to Buildroot
buildroot login: root
# cd ..
# ls
bin        lib        lost+found  opt        run        tmp
dev        lib32      media       proc       sbin       usr
etc        linuxrc    mnt         root       sys        var
#
```

心得：

這次的實驗讓我了解如何使用 fdisk 來將 SD 卡磁碟分割並且建立一個能讓樹梅派能夠順利地啟動運作的 SD 卡.