

# 虛擬機房 CentOS 7 硬碟擴充教學

## 一、確認現有磁碟規畫：

- (1) 先至 CentOS 查看硬碟大小及規畫(範例中只有一顆 60GB 硬碟)，  
輸入指令 `df -h`

```
CentOS Linux 7 (Core)
Kernel 3.10.0-957.el7.x86_64 on an x86_64

S019998-N61 login: root
Password:
Login incorrect

S019998-N61 login: root
Password:
Last failed login: Tue May 21 04:42:36 EDT 2019 on tty1
There was 1 failed login attempt since the last successful login.
Last login: Sat May 4 04:56:33 on tty1
[root@S019998-N61 ~]# df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/mapper/centos-root 54G  1.3G   52G   3% /
devtmpfs        908M   0  908M   0% /dev
tmpfs           920M   0  920M   0% /dev/shm
tmpfs           920M  8.8M  911M   1% /run
tmpfs           920M   0  920M   0% /sys/fs/cgroup
/dev/sda1       1014M  148M  867M  15% /boot
tmpfs          184M   0  184M   0% /run/user/0
[root@S019998-N61 ~]#
```

- (2) 檢查硬碟切割及大小，輸入指令 `fdisk -l`，如下圖可看見，只有一顆硬碟 sda，需要擴充的是系統的磁碟裝置檔，此例為 `/dev/mapper/centos-root` (系統不同，磁碟裝置檔名稱也可能會不同)

```
[root@S019998-N61 ~]# fdisk -l

Disk /dev/sda: 64.4 GB, 64424509440 bytes, 125829120 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
Disk label type: dos
Disk identifier: 0x000b2a83

   Device Boot      Start         End      Blocks   Id  System
   /dev/sda1 *        2048     2099199     1048576   83  Linux
   /dev/sda2          2099200    117645311    57773056   8e  Linux LVM

Disk /dev/mapper/centos-root: 57.0 GB, 57000591360 bytes, 111329280 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

Disk /dev/mapper/centos-swap: 2147 MB, 2147483648 bytes, 4194304 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

[root@S019998-N61 ~]#
```

二、擴大虛擬硬碟容量：至虛擬機房管理 Portal 網頁內更改主機配置，將硬碟直接擴展到需要的容量，此例將 60G 擴展到 125G，擴展完後系統將自動重新開機。

調整設定

\* 別名 rogetest

\* 用途 rogetest

處理器(顆) 2

記憶體(GB) 2

第一硬碟(GB) 60

第二硬碟(GB) (新增)

調整設定

\* 別名 rogetest

\* 用途 rogetest

處理器(顆) 2

記憶體(GB) 2

第一硬碟(GB) 125

第二硬碟(GB) (新增)

三、確認硬碟擴充：以 root 登入後再次輸入 `fdisk -l`，可以看見硬碟容量增加了，但是磁碟裝置檔沒有，所以需要下列步驟來增加磁碟裝置檔容量。

```
[root@S019998-N61 ~]# fdisk -l
Disk /dev/sda 134.2 GB, 134217728000 bytes, 262144000 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
Disk label type: dos
Disk identifier: 0x000b2a83

   Device Boot      Start         End      Blocks   Id  System
/dev/sda1  *           2048        2099199       1048576   83   Linux
/dev/sda2                2099200    117645311       57773056   8e   Linux LVM

Disk /dev/mapper/centos-root: 57.0 GB, 57000591360 bytes, 111329280 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

Disk /dev/mapper/centos-swap: 2147 MB, 2147483648 bytes, 4194384 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

[root@S019998-N61 ~]#
```

四、建立分割區：指令 `fdisk /dev/sda`，之後針對提示輸入，選項解釋如下

n //新增新分割槽  
p //建立主分割槽  
3 //分割槽號 3(1、2 已經有了)  
按 Enter //起始扇區選擇預設  
Enter 預設 //結束扇區選擇預設，不浪費空間  
t //更改分割區格式  
3 //選擇分割區  
8e //更改分割區格式為 Linux LVM  
p //檢視弄好的分割區 (blocks 為分割槽大小 單位為 kb)  
w //儲存分割區並退出

```
Changes will remain in memory only, until you decide to write them.
Be careful before using the write command.

Command (m for help): n
Partition type:
   p   primary (2 primary, 0 extended, 2 free)
   e   extended
Select (default p): p
Partition number (3,4, default 3): 3
First sector (117645312-262143999, default 117645312):
Using default value 117645312
Last sector, +sectors or +size(K,M,G) (117645312-262143999, default 262143999):
Using default value 262143999
Partition 3 of type Linux and of size 68.9 GiB is set

Command (m for help): t
Partition number (1-3, default 3): 3
Hex code (type L to list all codes): 8e
Changed type of partition 'Linux' to 'Linux LVM'

Command (m for help): p

Disk /dev/sda: 134.2 GB, 134217728000 bytes, 262144000 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
Disk label type: dos
Disk identifier: 0x000b2a83

   Device Boot      Start         End      Blocks   Id  System
/dev/sda1 *          2048       2099199       1048576   83   Linux
/dev/sda2            2099200    117645311       57773056   8e   Linux LVM
/dev/sda3            117645312  262143999       72249344   8e   Linux LVM

Command (m for help): w
```

五、重新開機：

建立後，還需要重新啟動才能生效，

指令：`reboot`

## 六、轉換分割區格式：

(1)轉換分割磁區為物理區(PV)，`pvcreat /dev/sda3`

```
[root@S019998-N61 ~]# pvcreate /dev/sda3
Physical volume "/dev/sda3" successfully created.
[root@S019998-N61 ~]#
```

## 七、檢視現有 VG 名稱：

指令：`vgdisplay` (請記住名稱 centos，後續需要將 sda3 擴充其下)

```
[root@S019998-N61 ~]# vgdisplay
--- Volume group ---
UG Name          centos
System ID
Format           lvm2
Metadata Areas   1
Metadata Sequence No 3
UG Access        read/write
UG Status        resizable
MAX LU           0
Cur LU          2
Open LU          2
Max PU           0
Cur PU          1
Act PU           1
UG Size          55.09 GiB
PE Size          4.00 MiB
Total PE         14104
Alloc PE / Size  14102 / <55.09 GiB
Free PE / Size   2 / 8.00 MiB
UG UUID          ET1tJm-hrrg-P3qX-7Ida-fL3g-0DQv-0nMnf j

[root@S019998-N61 ~]#
```

## 八、擴充 VG：

將/dev/sda3 加入名為 centos 的 VG，指令：`vgextend centos /dev/sda3`

```
[root@S019998-N61 ~]# vgdisplay
--- Volume group ---
UG Name          centos
System ID
Format           lvm2
Metadata Areas   1
Metadata Sequence No 3
UG Access        read/write
UG Status        resizable
MAX LU           0
Cur LU          2
Open LU          2
Max PU           0
Cur PU          1
Act PU           1
UG Size          55.09 GiB
PE Size          4.00 MiB
Total PE         14104
Alloc PE / Size  14102 / <55.09 GiB
Free PE / Size   2 / 8.00 MiB
UG UUID          ET1tJm-hrrg-P3qX-7Ida-fL3g-0DQv-0nMnf j

[root@S019998-N61 ~]# vgextend centos /dev/sda3
Volume group "centos" successfully extended
[root@S019998-N61 ~]#
```

### 九、確認 VG 已擴充：

指令：`vgdisplay`，確認 centos 容量已擴大

```
[root@S019998-N61 ~]# vgdisplay
--- Volume group ---
UG Name                centos
System ID
Format                 lvm2
Metadata Areas        2
Metadata Sequence No  4
UG Access              read/write
UG Status              resizable
MAX LU                 0
Cur LU                2
Open LU                2
Max PU                 0
Cur PU                2
Act PU                 2
UG Size                123.99 GiB
PE Size                4.00 MiB
Total PE               31742
Alloc PE / Size       14102 / <55.09 GiB
Free PE / Size        17640 / <68.91 GiB
UG UUID                ET1tJm-hrrg-P3qX-7Ida-fL3g-8DQv-0nMnf j

[root@S019998-N61 ~]#
```

### 十、檢視邏輯磁區(LV)：`lvdisplay`，此例的 LV 路徑為 `/dev/centos/root`

```
[root@S019998-N61 ~]# lvdisplay
--- Logical volume ---
LU Path                /dev/centos/swap
LU Name                swap
UG Name                centos
LU UUID                oi2Dkp-sYEO-2o6l-nv3l-Uo8U-LZv9-G5WkrR
LU Write Access        read/write
LU Creation host, time localhost, 2019-04-01 01:46:05 -0400
LU Status              available
# open                 2
LU Size                2.00 GiB
Current LE             512
Segments               1
Allocation             inherit
Read ahead sectors    auto
- currently set to    8192
Block device           253:1

--- Logical volume ---
LU Path                /dev/centos/root
LU Name                root
UG Name                centos
LU UUID                2qr8EU-aq9N-Up0t-3Yjo-q07M-eYuL-YALgbr
LU Write Access        read/write
LU Creation host, time localhost, 2019-04-01 01:46:05 -0400
LU Status              available
# open                 1
LU Size                <53.09 GiB
Current LE             13590
Segments               1
Allocation             inherit
Read ahead sectors    auto
- currently set to    8192
Block device           253:0

[root@S019998-N61 ~]#
```

十一、擴充邏輯磁區：`lvextend /dev/centos/root /dev/sda3`

```
LU Name                swap
VG Name                centos
LU UUID                oi2Dkp-sYEO-2o6l-nv3l-Uo8U-LZu9-G5WkrR
LU Write Access       read/write
LU Creation host, time localhost, 2019-04-01 01:46:05 -0400
LU Status              available
# open                 2
LU Size                2.00 GiB
Current LE             512
Segments              1
Allocation             inherit
Read ahead sectors    auto
- currently set to    8192
Block device           253:1

--- Logical volume ---
LU Path                /dev/centos/root
LU Name                root
VG Name                centos
LU UUID                2qr8EU-aq9N-Up0t-3Yjo-q07M-eYuL-YALgbR
LU Write Access       read/write
LU Creation host, time localhost, 2019-04-01 01:46:05 -0400
LU Status              available
# open                 1
LU Size                <53.09 GiB
Current LE             13590
Segments              1
Allocation             inherit
Read ahead sectors    auto
- currently set to    8192
Block device           253:0

[root@S019998-N61 ~]# lvextend /dev/centos/root /dev/sda3
Size of logical volume centos/root changed from <53.09 GiB (13590 extents) to 121.98 GiB (31977472 extents).
Logical volume centos/root successfully resized.
[root@S019998-N61 ~]# _
```

十二、擴展 xfs 檔案系統：`xfs_growfs /dev/mapper/centos-root`

(`/dev/mapper/centos-root` 為步驟一中磁碟裝置檔名稱)

```
[root@S019998-N61 ~]# xfs_growfs /dev/mapper/centos-root
meta-data=/dev/mapper/centos-root isize=512    agcount=4, agsize=3479040 blks
=                               sectsz=512   attr=2, projid32bit=1
=                               crc=1      finobt=0 spinodes=0
data     =                       bsize=4096 blocks=13916160, imaxpct=25
=                       sunit=0      swidth=0 blks
naming   =version 2              bsize=4096  ascii-ci=0 ftype=1
log      =internal              bsize=4096  blocks=6795, version=2
=                       sectsz=512   sunit=0 blks, lazy-count=1
realtime =none                  extsz=4096  blocks=0, rtextents=0
data blocks changed from 13916160 to 31977472
[root@S019998-N61 ~]# _
```

十三、確認容量已擴充：`df -h`

```
[root@S019998-N61 ~]# df -h
Filesystem                Size  Used Avail Use% Mounted on
/dev/mapper/centos-root  122G  1.3G  121G   1% /
devtmpfs                  908M   0  908M   0% /dev
tmpfs                     920M   0  920M   0% /dev/shm
tmpfs                     920M  8.8M  911M   1% /run
tmpfs                     920M   0  920M   0% /sys/fs/cgroup
/dev/sda1                 1014M  148M  867M  15% /boot
tmpfs                     184M   0  184M   0% /run/user/0
[root@S019998-N61 ~]# _
```