IBM OpenPower Linux

- ?? RedHat Linux for Power
- ??????????
- ???????????
- ????-StorCLI

?? RedHat Linux for Power

???IBM Power System S822LC (8001-22C) for big data
?????RedHat 7.3 for POWER8 Little Endian (NOTE: ??????? Little Endian
??????????????????????:Quick Start Guide for installing Linux on IBM Power System LCservers)

?????

1. ???? Linux ??????????????????????????????????????
2. ????????????????
   NOTE: ???? storcli ????????????????? Linux ????????
3. ????? Megaraid ????????????????? Raid?
   NOTE: ?? storcli ???? raid ???????: Resource already in use

?? RedHat Linux

> ❝ NOTE: ???????? RedHat 7.2??????????????????????????

????????

????? USB ??????? RedHat ????

?????? > Petitboot

???????????? RedHat ???????

* *Install Red Hat Enterprise Linux 7.3 (64-bit kernel)*

???????????? Enter ????????

> ❝ TIP: ?????????????: Quick Start Guide for installing Linux on IBM Power System LCservers

?? Raid ??

???????? Raid Adapter????? RedHat ? Software Raird??????????? x86 ??????????????????

- RedHat for Power ???????????: BIOS > sda1: PPC PReP Boot > sda2: /boot (GRUB2) > sda3: /
- PPC PReP Boot ????????? Software Raid (??: ????????????????????????: ???????????
- /boot ? / ???? Software Raid
- ??????: ?? 5 ??? sda, sdb, sdc, sdd, sde
  1. sda1 = PPC PReP Boot (Power ??)
  2. sda2 = raid1 /boot (GRUB2 ??)
  3. sda3 = raid6 /
  4. sdb1 = PPC PReP Boot (Power ??)
  5. sdb2 = raid1 /boot (GRUB2 ??)
  6. sdb3 = raid6 /
  7. sdc1 = raid6 /
  8. sdd1 = raid6 /
  9. sde1 = raid6 /
     ???????????
- raid6 ? / ?? LVM ?????? VG ??? rhel?LV ??? rhel-<????>??? rhel-swap
- ?? raid level 6 ??size policy ???? As large as possible?

> TIP:
>
> size policy:
> ?? Automatic - ? raid ? size ????????????????? raid ??? PV ? VG ????????? 0 - 1 %?
> As large as possible - ? raid ? size ??? raid ?????????????? Raid Rebuild ??????????
>
> ??????
> ??? - ????????????? prepboot(sda), prepboot(sdb), /boot, SWAP, /?
> ??? - ??????????? PPC PReP Boot ????????????(Anaconda) ????????????????????????????????? fdisk ??????????????? ??? - ??????? prepboot ????????????????????????????????????? Summary of Changes?
> ??? - ??????: boot loader stage2 device boot is on a multi-disk array but boot loader stage1 sevice sda1 is not ....?????????? Done ?????????? ????????????????? ??????????? ????

??????

?? SELinux

```
sed -i 's/SELINUX=.*$/SELINUX=disabled/' /etc/selinux/config
setenforce 0
```

?????

```
systemctl stop firewalld.service
systemctl disable firewalld.service
```

??????

?? IPMI (BMC) ??

?????????? IPMI Network Port
?????? > Petitboot > Exit to Shell

```
ipmitool lan print 1
ipmitool lan set 1 ipsrc static
ipmitool lan set 1 ipaddr <ipmi-ip-address>
ipmitool lan set 1 netmask <ipmi-ip-netmask>
ipmitool lan set 1 defgw ipaddr <ipmi-ip-gateway>
ipmitool lan print 1
```

BMC ?????

> http://ipmi-ip-address/ , ????: ADMIN / ADMIN
> NOTE: ??????????????????
>
> Java ??? 1.6.0.45 32-bit, Windows 7 64-bit?????? Java ???

IPMITools ????? ipmitool ? Desktop PC

Ubuntu

```
sudo apt-get update
sudo apt-get install ipmitool
```

? source ????

```
wget https://sourceforge.net/projects/ipmitool/files/latest/download
bzip2 -d ipmitool-1.8.15.tar.bz2
tar xvf ipmitool-1.8.15.tar
cd ipmitool-1.8.15
./configure
```

????

顯示所有裝置的 FRU 資訊

```
ipmitool -I lanplus -H ipmi-ip-address -U ADMIN -P ADMIN fru
```

???????????

sdb	EMPTY	NVMe	EMPTY
sde	sdc	EMPTY	EMPTY
sda	sdd	EMPTY	NVMe

??????????

(https://www.ibm.com/support/knowledgecenter/en/SST55W_4.3.0/liaca/liaca_config_os_yum_repos.html)

???? FTP/NFS/WWW ??????????????????????????????????

```
mount -o loop rhel-server-7.3-ppc64le-dvd.iso /mnt/DVD
cp -r /mnt/DVD/* /mnt/tpeitpfs02_nas/redhat_7.3_ppc64_le/
```

??????????????

?? Linux ????????????? /etc/yum.repos.d/rhel-media.repo

```
[rhel-media]
name=name=Red Hat Enterprise Linux $releasever - Media
baseurl=ftp://10.10.1.115/LINUX_REPO/redhat_7.3_ppc64_le/
gpgcheck=1
enabled=1
gpgkey=file:///etc/pki/rpm-gpg/RPM-GPG-KEY-redhat-beta,file:///etc/pki/rpm-gpg/RPM-GPG-KEY-redhat-release
```

????

```
yum repolist
```

??: ??????????

???????????????

```
mkdir /mnt/tpeitpfs02_nas/redhat_7.3_ppc64_le/optional/Packages
cp your-packages.rpm /mnt/tpeitpfs02_nas/redhat_7.3_ppc64_le/optional/Packages
createrepo /mnt/tpeitpfs02_nas/redhat_7.3_ppc64_le/optional
```

???????????

???OpenPOWER Linux ?????????????? PPC PReP Boot ????? Software Raid ???

????????????????????????????

> ❝ TIP: PPC PReP Boot ???? IBM Power ???????????? x86 ???? MBR?

???????https://access.redhat.com/discussions/2158911

?????

????????????????????????

```
# fdisk -l /dev/sda

Disk /dev/sda: 960.2 GB, 960197124096 bytes, 1875385008 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 4096 bytes
I/O size (minimum/optimal): 4096 bytes / 4096 bytes
Disk label type: dos
Disk identifier: 0x000e7231

   Device Boot      Start         End      Blocks   Id  System
/dev/sda1   *        2048       22527       10240   41  PPC PReP Boot
/dev/sda2           22528     2121727     1049600   fd  Linux raid autodetect
/dev/sda3         2121728  1875384319   936631296   fd  Linux raid autodetect
```

> ❝ sda1 Power ???? (????????????)
>
> sda2 Linux ???? /boot (?? Raid 1)

> sda3 LVM ?? (?? Raid6)

?? Power ?????????? /sdb1

```
dd if=/dev/sda1 of=/dev/sdb1 bs=512 conv=noerror,sync
```

/dev/sdb ????

```
# fdisk -l /dev/sdb

Disk /dev/sdb: 960.2 GB, 960197124096 bytes, 1875385008 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 4096 bytes
I/O size (minimum/optimal): 4096 bytes / 4096 bytes
Disk label type: dos
Disk identifier: 0x0003819f

   Device Boot      Start         End      Blocks   Id  System
/dev/sdb1            2048       22527       10240   41  PPC PReP Boot
/dev/sdb2           22528     2121727     1049600   fd  Linux raid autodetect
/dev/sdb3         2121728  1875384319   936631296   fd  Linux raid autodetect
```

> “ sdb ? sda ??????????????????????????????

????????

????? sda ? sdb ????????????????????? raid ???

? /dev/sda ??

```
fdisk /dev/sda

□□□□
n > p > 1(default) > 2048(default) > 22527
n > p > 2 (default) > 22528 (default) > 2121727
n > p > 3 (default) > 2121728 (default) > 1875385007 (default)
```

設定磁區格式

```
t > 1 > 41       PPC PReP Boot
t > 2 > fd        Linux raid
t > 3 > fd        Linux raid
```

設定磁區#1 為開機磁區

```
a > 1
```

檢查磁區清單

```
p
```

寫入後離開

```
w
```

??????? sdb ? sda

```
dd if=/dev/sdb1 of=/dev/sda1 bs=512 conv=noerror,sync
```

?? Raid

```
# cat /proc/mdstat
Personalities : [raid1] [raid6] [raid5] [raid4]
md126 : active raid1 sdb2[1]
      1049536 blocks super 1.0 [2/1] [_U]
      bitmap: 1/1 pages [64KB], 65536KB chunk

md127 : active raid6 sdb3[1] sdd1[3] sde1[4] sdc[5]
      2809500672 blocks super 1.2 level 6, 512k chunk, algorithm 2 [5/4] [_UUUU]
      bitmap: 1/1 pages [64KB], 65536KB chunk

unused devices: <none>

# mdadm --detail /dev/md126
/dev/md126:
        Version : 1.0
  Creation Time : Mon Feb 20 23:30:01 2017
     Raid Level : raid1
     Array Size : 1049536 (1024.94 MiB 1074.72 MB)
  Used Dev Size : 1049536 (1024.94 MiB 1074.72 MB)
   Raid Devices : 2
```

```
  Total Devices : 1
    Persistence : Superblock is persistent

  Intent Bitmap : Internal

    Update Time : Fri Feb 24 19:55:16 2017
          State : clean, degraded
 Active Devices : 1
Working Devices : 1
 Failed Devices : 0
  Spare Devices : 0

           Name : localhost.localdomain:boot
           UUID : 1b78d1ea:f5380532:4fe25553:20ef8396
         Events : 44

    Number   Major   Minor   RaidDevice State
       -       0        0        0      removed
       1       8       18        1      active sync   /dev/sdb2

# mdadm --detail /dev/md127
/dev/md127:
        Version : 1.2
  Creation Time : Mon Feb 20 23:30:10 2017
     Raid Level : raid6
     Array Size : 2809500672 (2679.35 GiB 2876.93 GB)
  Used Dev Size : 936500224 (893.12 GiB 958.98 GB)
   Raid Devices : 5
  Total Devices : 4
    Persistence : Superblock is persistent

  Intent Bitmap : Internal

    Update Time : Fri Feb 24 14:42:10 2017
          State : clean, degraded
 Active Devices : 4
Working Devices : 4
 Failed Devices : 0
  Spare Devices : 0
```

```
         Layout : left-symmetric
     Chunk Size : 512K

           Name : localhost.localdomain:pv00
           UUID : f7a62cb2:b269daa9:29f8025f:6fcef40f
         Events : 4769

    Number   Major   Minor   RaidDevice State
       -       0        0        0      removed
       1       8       19        1      active sync   /dev/sdb3
       5       8       32        2      active sync   /dev/sdc
       3       8       49        3      active sync   /dev/sdd1
       4       8       65        4      active sync   /dev/sde1
```

?? Raid

```
# fdisk -l /dev/sda

Disk /dev/sda: 960.2 GB, 960197124096 bytes, 1875385008 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 4096 bytes
I/O size (minimum/optimal): 4096 bytes / 4096 bytes
Disk label type: dos
Disk identifier: 0x000e7231

   Device Boot      Start         End      Blocks   Id  System
/dev/sda1   *        2048       22527       10240   41  PPC PReP Boot
/dev/sda2           22528     2121727     1049600   fd  Linux raid autodetect
/dev/sda3         2121728  1875385007   936631640   fd  Linux raid autodetect

# mdadm /dev/md126 --add /dev/sda2
# mdadm /dev/md127 --add /dev/sda3
```

????-StorCLI

????? Local Disks ??????? MegaRAID (MegaRAID SAS-3 3108) ????????????? Linux ??????? lshw ?????????

> ??? Raid ??????? Raid?? Petitboot ???????? storcli ???? Raid ??? ????: Resources already in use

???? StorCLI

?????https://www.broadcom.com/support/download-search/?pg=&pf=&pn=&po=&pa=&dk=storcli

StorCLI for Linux ???????????? storcli (storcli64 for 64-bit)???????????? RPM ? DEB ????????????????????????????????????? PPC64LE for RedHat????? PPC64LE for Ubuntu (*.deb)????????? Windows ? Linux ??? *.deb ?????????? `storcli64` ?

????????????? RedHat Linux ?????

> storcli64 ???? Petitboot???? scp ? wget ????????

? Linux ??? MegaRAID ??

```
# lshw


...
*-raid
   description: RAID bus controller
   product: MegaRAID SAS-3 3108 [Invader]
   vendor: LSI Logic / Symbios Logic
   physical id: 0
   bus info: pci@0001:03:00.0
   logical name: scsi0
   version: 02
   width: 64 bits
```

```
   clock: 33MHz
   capabilities: raid pm pciexpress vpd msi msix bus_master cap_list rom
   configuration: driver=megaraid_sas latency=0
   resources: irq:507 memory:3fe080200000-3fe08020ffff memory:3fe080000000-3fe0800fffff
memory:3fe080100000-3fe0801fffff
 *-enclosure UNCLAIMED
      description: SCSI Enclosure
      product: SAS3x28
      vendor: LSI
      physical id: 0.8.0
      bus info: scsi@0:0.8.0
      version: 0601
      configuration: ansiversion=5
 *-disk:0
      description: ATA Disk
      product: SDLF1DAR-960G-1H
      physical id: 0.9.0
      bus info: scsi@0:0.9.0
      logical name: /dev/sda
      version: ZH06
      serial: A008676A
      size: 894GiB (960GB)
      capacity: 894GiB (960GB)
      capabilities: 15000rpm partitioned partitioned:dos
      configuration: ansiversion=6 logicalsectorsize=512 sectorsize=4096 signature=000e7231
    *-volume:0
         description: PPC PReP Boot partition
         physical id: 1
         bus info: scsi@0:0.9.0,1
         logical name: /dev/sda1
         capacity: 10MiB
         capabilities: primary bootable boot
    *-volume:1
         description: Linux raid autodetect partition
         physical id: 2
         bus info: scsi@0:0.9.0,2
         logical name: /dev/sda2
         capacity: 1025MiB
         capabilities: primary multi
    *-volume:2
```

```
         description: Linux raid autodetect partition
         physical id: 3
         bus info: scsi@0:0.9.0,3
         logical name: /dev/sda3
         capacity: 893GiB
         capabilities: primary multi
 *-disk:1
      description: ATA Disk
      product: SDLF1DAR-960G-1H
      physical id: 0.a.0
      bus info: scsi@0:0.10.0
      logical name: /dev/sdb
      version: ZH06
      serial: A0086638
      size: 894GiB (960GB)
      capacity: 894GiB (960GB)
      capabilities: 15000rpm partitioned partitioned:dos
      configuration: ansiversion=6 logicalsectorsize=512 sectorsize=4096 signature=0003819f
    *-volume:0
         description: PPC PReP Boot partition
         physical id: 1
         bus info: scsi@0:0.10.0,1
         logical name: /dev/sdb1
...
```