

1、实现下表 dump 备份场景，观察并分别对比不同备份设备下的 Full backup 性能并记录过程与结果：

From	To
var	Linear LV
etc	Stripe LV
boot	Mirror LV
lib	RAID5 Vol

1.1 创建线型 LV1

```
[root@server ~]# pvcreate /dev/vdc /dev/vdg
Physical volume "/dev/vdc" successfully created.
Physical volume "/dev/vdg" successfully created.
[root@server ~]# vgcreate VG1 /dev/vdc /dev/vdg
Volume group "VG1" successfully created
[root@server ~]# lvcreate -L 40G -n LV1 VG1
Volume group "VG1" has insufficient free space (10238 extents): 10240 required.
[root@server ~]# lvdisplay
[root@server ~]# vgs
VG #PV #LV #SN Attr VSize VFree
VG1 2 0 0 wz--n- 39.99g 39.99g
[root@server ~]# lvcreate -l 100%FREE -n LV1 VG1
Logical volume "LV1" created.
```

1.2 条带型 LV2

```
[root@server ~]# lvcreate -l 100%FREE -i 2 -n LV2 VG2
Using default stripesize 64.00 KiB.
Logical volume "LV2" created.
```

1.3 镜像型 LV3

```
Volume group "VG3" successfully created
[root@server ~]# lvcreate -l 50%FREE -m 1 -n LV3 VG3
Logical volume "LV3" created.
```

1.4 查看

```
cannot process volume group 'vgdevices'
[root@server ~]# lvs -a -o +devices
LV VG Attr LSize Pool Origin Data% Meta% Move Log Cpy%Sync Convert Devices
LV1 VG1 -wi-a----- 39.99g /dev/vdc(0)
LV1 VG1 -wi-a----- 39.99g /dev/vdg(0)
LV2 VG2 -wi-a----- 39.99g /dev/vdh(0),/dev/vdi(0)
LV3 VG3 rwi-a-r--- <10.00g 100.00 LV3_rimage_0(0),LV3_rimage_1(0)
[LV3_rimage_0] VG3 iwi-aor--- <10.00g /dev/vdj(1)
[LV3_rimage_1] VG3 iwi-aor--- <10.00g /dev/vdk(1)
[LV3_rmeta_0] VG3 ewi-aor--- 4.00m /dev/vdj(0)
[LV3_rmeta_1] VG3 ewi-aor--- 4.00m /dev/vdk(0)
[root@server ~]#
```

1.5 备份 var 到/dev/VG1/LV1

```
root@server /]# dump -0f /dev/VG1/LV1 /var
DUMP: Date of this level 0 dump: Fri Sep 14 10:41:31 2018
DUMP: Dumping /dev/vda2 (/ (dir var)) to /dev/VG1/LV1
DUMP: Label: none
DUMP: Writing 10 Kilobyte records
DUMP: mapping (Pass I) [regular files]
DUMP: mapping (Pass II) [directories]
DUMP: estimated 168567 blocks.
DUMP: Volume 1 started with block 1 at: Fri Sep 14 10:41:31 2018
DUMP: dumping (Pass III) [directories]
DUMP: dumping (Pass IV) [regular files]
DUMP: Closing /dev/VG1/LV1
DUMP: Volume 1 completed at: Fri Sep 14 10:41:45 2018
DUMP: Volume 1 170440 blocks (166.45MB)
DUMP: Volume 1 took 0:00:14
DUMP: Volume 1 transfer rate: 12174 kB/s
DUMP: 170440 blocks (166.45MB) on 1 volume(s)
DUMP: finished in 14 seconds, throughput 12174 kBytes/sec
DUMP: Date of this level 0 dump: Fri Sep 14 10:41:31 2018
DUMP: Date this dump completed: Fri Sep 14 10:41:45 2018
DUMP: Average transfer rate: 12174 kB/s
DUMP: DUMP IS DONE
```

1.6 查看备份结果

```
restore -x [-acdenHtMMOUVVy] [-A file] [-b blocksize] [-C file] [-d device] [-f file] [-F script] [-Q file] [-s start] [-t stop] [-v] [-w file] [-x file]
[root@server /]# restore -if /dev/VG1/LV1
restore > ls
.:
var/

restore > q
```

1.7 备份etc到/dev/VG2/LV2

```
[root@server /]# dump -0f /dev/VG2/LV2 /etc
DUMP: Date of this level 0 dump: Fri Sep 14 10:47:18 2018
DUMP: Dumping /dev/vda2 (/ (dir etc)) to /dev/VG2/LV2
DUMP: Label: none
DUMP: Writing 10 Kilobyte records
DUMP: mapping (Pass I) [regular files]
DUMP: mapping (Pass II) [directories]
DUMP: estimated 35659 blocks.
DUMP: Volume 1 started with block 1 at: Fri Sep 14 10:47:18 2018
DUMP: dumping (Pass III) [directories]
DUMP: dumping (Pass IV) [regular files]
DUMP: Closing /dev/VG2/LV2
DUMP: Volume 1 completed at: Fri Sep 14 10:47:19 2018
DUMP: Volume 1 39700 blocks (38.77MB)
DUMP: Volume 1 took 0:00:01
DUMP: Volume 1 transfer rate: 39700 kB/s
DUMP: 39700 blocks (38.77MB) on 1 volume(s)
DUMP: finished in 1 seconds, throughput 39700 kBytes/sec
DUMP: Date of this level 0 dump: Fri Sep 14 10:47:18 2018
DUMP: Date this dump completed: Fri Sep 14 10:47:19 2018
DUMP: Average transfer rate: 39700 kB/s
DUMP: DUMP IS DONE
```

查看备份目录

```
[root@server /]# restore [-f file] [-F script] [-Q file]
[root@server /]# restore -if /dev/VG2/LV2
restore > ls
.:
etc/

restore > █
```

1.8 备份 boot 到/dev/VG3/LV3

```
[root@server boot]# dump -0f /dev/VG3/LV3 /boot
DUMP: Date of this level 0 dump: Fri Sep 14 11:38:09 2018
DUMP: Dumping /dev/vdl (/boot) to /dev/VG3/LV3
DUMP: Label: none
DUMP: Writing 10 Kilobyte records
DUMP: mapping (Pass I) [regular files]
DUMP: mapping (Pass II) [directories]
DUMP: estimated 90128 blocks.
DUMP: Volume 1 started with block 1 at: Fri Sep 14 11:38:09 2018
DUMP: dumping (Pass III) [directories]
DUMP: dumping (Pass IV) [regular files]
DUMP: Closing /dev/VG3/LV3
DUMP: Volume 1 completed at: Fri Sep 14 11:38:12 2018
DUMP: Volume 1 90070 blocks (87.96MB)
DUMP: Volume 1 took 0:00:03
DUMP: Volume 1 transfer rate: 30023 kB/s
DUMP: 90070 blocks (87.96MB) on 1 volume(s)
DUMP: finished in 2 seconds, throughput 45035 kBytes/sec
DUMP: Date of this level 0 dump: Fri Sep 14 11:38:09 2018
DUMP: Date this dump completed: Fri Sep 14 11:38:12 2018
DUMP: Average transfer rate: 30023 kB/s
DUMP: DUMP IS DONE
```

1.9 查看结果

```
DUMP: DUMP IS DONE
[root@server /]# restore -if /dev/VG3/LV3
restore > ls
.:
System.map-3.10.0-693.el7.x86_64
config-3.10.0-693.el7.x86_64
efi/
grub/
grub2/
initramfs-0-rescue-47b99ec655f14ad79581ced5a859a2fc.img
initramfs-3.10.0-693.el7.x86_64.img
initrd-plymouth.img
lost+found/
symvers-3.10.0-693.el7.x86_64.gz
vmlinuz-0-rescue-47b99ec655f14ad79581ced5a859a2fc
vmlinuz-3.10.0-693.el7.x86_64
restore >
```

1.9.1 移动 lib 到/dev/md5

```
[root@server /]# dump -0f /dev/md5 /lib
DUMP: Date of this level 0 dump: Fri Sep 14 17:35:53 2018
DUMP: Dumping /dev/vda2 (/ (dir usr/lib)) to /dev/md5
DUMP: Label: none
DUMP: Writing 10 Kilobyte records
DUMP: mapping (Pass I) [regular files]
DUMP: mapping (Pass II) [directories]
DUMP: estimated 397120 blocks.
DUMP: Volume 1 started with block 1 at: Fri Sep 14 17:35:53 2018
DUMP: dumping (Pass III) [directories]
DUMP: dumping (Pass IV) [regular files]
DUMP: Closing /dev/md5
DUMP: Volume 1 completed at: Fri Sep 14 17:36:14 2018
DUMP: Volume 1 411050 blocks (401.42MB)
DUMP: Volume 1 took 0:00:21
DUMP: Volume 1 transfer rate: 19573 kB/s
DUMP: 411050 blocks (401.42MB) on 1 volume(s)
DUMP: finished in 20 seconds, throughput 20552 kBytes/sec
DUMP: Date of this level 0 dump: Fri Sep 14 17:35:53 2018
DUMP: Date this dump completed: Fri Sep 14 17:36:14 2018
DUMP: Average transfer rate: 19573 kB/s
DUMP: DUMP IS DONE
```

1.9.2 查看结果

```
[root@server lib]# restore -if /dev/md5
restore > ls
.:
usr/
```

2、完全解开/boot/initramfs-x.xxx.img 文件内容并放置到/boot/test 目录内，将/boot/test/bin 下所有文件标纪为 nodump，依据上表备份结果对 boot 目录进行增量备份，记录过程与结果。

2.1 在/boot 目录下创建新的 test 目录，复制要解压的文件到 test 目录下，查看解压文件的文件类型，更改后缀为 gz，用 gunzip 解压，再用 cpio 解压

```
[root@server boot]# cp initramfs-3.10.0-693.el7.x86_64.img /boot/test
[root@server boot]# cd ../test
[root@server test]# ls
initramfs-3.10.0-693.el7.x86_64.img
[root@server test]# file initramfs-3.10.0-693.el7.x86_64.img
initramfs-3.10.0-693.el7.x86_64.img: gzip compressed data, from Unix, last modified: Tue Jul 10 12:05:02 2018, max compression
[root@server test]# mv initramfs-3.10.0-693.el7.x86_64.img initramfs-3.10.0-693.el7.x86_64.gz
[root@server test]# ls
initramfs-3.10.0-693.el7.x86_64.gz
[root@server test]# gunzip initramfs-3.10.0-693.el7.x86_64.gz
[root@server test]# ls
initramfs-3.10.0-693.el7.x86_64
[root@server test]# cpio -l < initramfs-3.10.0-693.el7.x86_64
75536 块
[root@server test]# ls
bin dev etc init initramfs-3.10.0-693.el7.x86_64 lib lib64 proc root run sbin shutdown sys sysroot tmp usr var
```

2.2 给/boot/test/bin 里的文件目录添加不备份属性

```
[root@server test]# chattr -R +d ./bin/*
chattr: 不支持的操作 while reading flags on ./bin/awk
chattr: 不支持的操作 while reading flags on ./bin/loginctl
chattr: 不支持的操作 while reading flags on ./bin/sh
```

2.3 增量备份并查看

```
[root@server /]# dump -1f /dev/VG3/LV3 /boot
DUMP: Date of this level 1 dump: Fri Sep 14 15:07:11 2018
DUMP: Date of last level 0 dump: Fri Sep 14 11:50:11 2018
DUMP: Dumping /dev/vdl (/boot) to /dev/VG3/LV3
DUMP: Label: none
DUMP: Writing 10 Kilobyte records
DUMP: mapping (Pass I) [regular files]
DUMP: mapping (Pass II) [directories]
DUMP: estimated 162865 blocks.
DUMP: Volume 1 started with block 1 at: Fri Sep 14 15:07:12 2018
DUMP: dumping (Pass III) [directories]
DUMP: dumping (Pass IV) [regular files]
DUMP: Closing /dev/VG3/LV3
DUMP: Volume 1 completed at: Fri Sep 14 15:07:17 2018
DUMP: Volume 1 162750 blocks (158.94MB)
DUMP: Volume 1 took 0:00:05
DUMP: Volume 1 transfer rate: 32550 kB/s
DUMP: 162750 blocks (158.94MB) on 1 volume(s)
DUMP: finished in 5 seconds, throughput 32550 kBytes/sec
DUMP: Date of this level 1 dump: Fri Sep 14 15:07:11 2018
DUMP: Date this dump completed: Fri Sep 14 15:07:17 2018
DUMP: Average transfer rate: 32550 kB/s
DUMP: DUMP IS DONE
[root@server /]# restore -if dev/VG3/LV3
restore > ls
.:
System.map-3.10.0-693.el7.x86_64
config-3.10.0-693.el7.x86_64
efi/
grub/
grub2/
initramfs-0-rescue-47b99ec655f14ad79581ced5a859a2fc.img
initramfs-3.10.0-693.el7.x86_64.img
initrd-plymouth.img
lost+found/
symvers-3.10.0-693.el7.x86_64.gz
test/
vmlinuz-0-rescue-47b99ec655f14ad79581ced5a859a2fc
vmlinuz-3.10.0-693.el7.x86_64
```


3、删除/boot/test 目录，然后将所有 boot 目录的备份还原至当前 boot 目录，记录过程与结果。

```
[root@server boot]# rm -rf test
[root@server boot]# ls
config-3.10.0-693.el7.x86_64          lost+found
efi                                     restoresymtable
grub                                   symvers-3.10.0-693.el7.x86_64.gz
grub2                                 System.map-3.10.0-693.el7.x86_64
initramfs-0-rescue-47b99ec655f14ad79581ced5a859a2fc.img  vmlinuz-0-rescue-47b99ec655f14ad79581ced5a859a2fc
initramfs-3.10.0-693.el7.x86_64.img  vmlinuz-3.10.0-693.el7.x86_64
initrd-plymouth.img
```

```
[root@server boot]# restore -rf /dev/VG4/LV4
restore: ./lost+found: File exists
restore: ./efi: File exists
restore: ./efi/EFI: File exists
restore: ./efi/EFI/centos: File exists
restore: ./grub: File exists
restore: ./grub2: File exists
restore: ./grub2/i386-pc: File exists
restore: ./grub2/locale: File exists
restore: ./grub2/fonts: File exists
[root@server boot]# ls
config-3.10.0-693.el7.x86_64          lost+found
efi                                     restoresymtable
grub                                   symvers-3.10.0-693.el7.x86_64.gz
grub2                                 System.map-3.10.0-693.el7.x86_64
initramfs-0-rescue-47b99ec655f14ad79581ced5a859a2fc.img  test
initramfs-3.10.0-693.el7.x86_64.img  vmlinuz-0-rescue-47b99ec655f14ad79581ced5a859a2fc
initrd-plymouth.img                 vmlinuz-3.10.0-693.el7.x86_64
```

4、将 boot 目录增量备份内容中/boot/test/lib 所有内容还原至/root/test 目录，记录过程与结果。

4.1 创建/root/test

```
root@server ~]# mkdir test
root@server ~]# ls
anaconda-ks.cfg  bwm-ng-0.6.1  bwm-ng-0.6.1.tar.gz  cinder.conf  __MACOSX  tangshi  tangshi.zip  test
root@server ~]# cd test
root@server test]# restore -if /dev/VG4/LV4
```

4.2 还原并查看

```
[root@server test]# restore -xf /dev/VG4/LV4 /test/lib
You have not read any volumes yet.
Unless you know which volume your file(s) are on you should start
with the last volume and work towards the first.
Specify next volume # (none if no more volumes): 1
set owner/mode for '.'? [yn] y
[root@server test]# ls
test
[root@server test]# cd test
[root@server test]# ls
lib
[root@server test]# ll lib
lrwxrwxrwx 1 root root 7 Sep 14 20:25 lib -> usr/lib
[root@server test]# restore -xf /dev/VG4/LV4 /test/usr/lib
You have not read any volumes yet.
Unless you know which volume your file(s) are on you should start
with the last volume and work towards the first.
Specify next volume # (none if no more volumes): 1
set owner/mode for '.'? [yn] y
[root@server test]# ls
lib  test
[root@server test]# cd test
[root@server test]# ls
usr
[root@server test]# cd user
-bash: cd: user: 没有那个文件或目录
[root@server test]# cd usr
[root@server usr]# ls
lib
[root@server usr]# ls lib
dracut dracut-lib.sh fs-lib.sh kbd modprobe.d modules net-lib.sh sysctl.d systemd tmpfiles.d udev
[root@server usr]#
```