备份与恢复

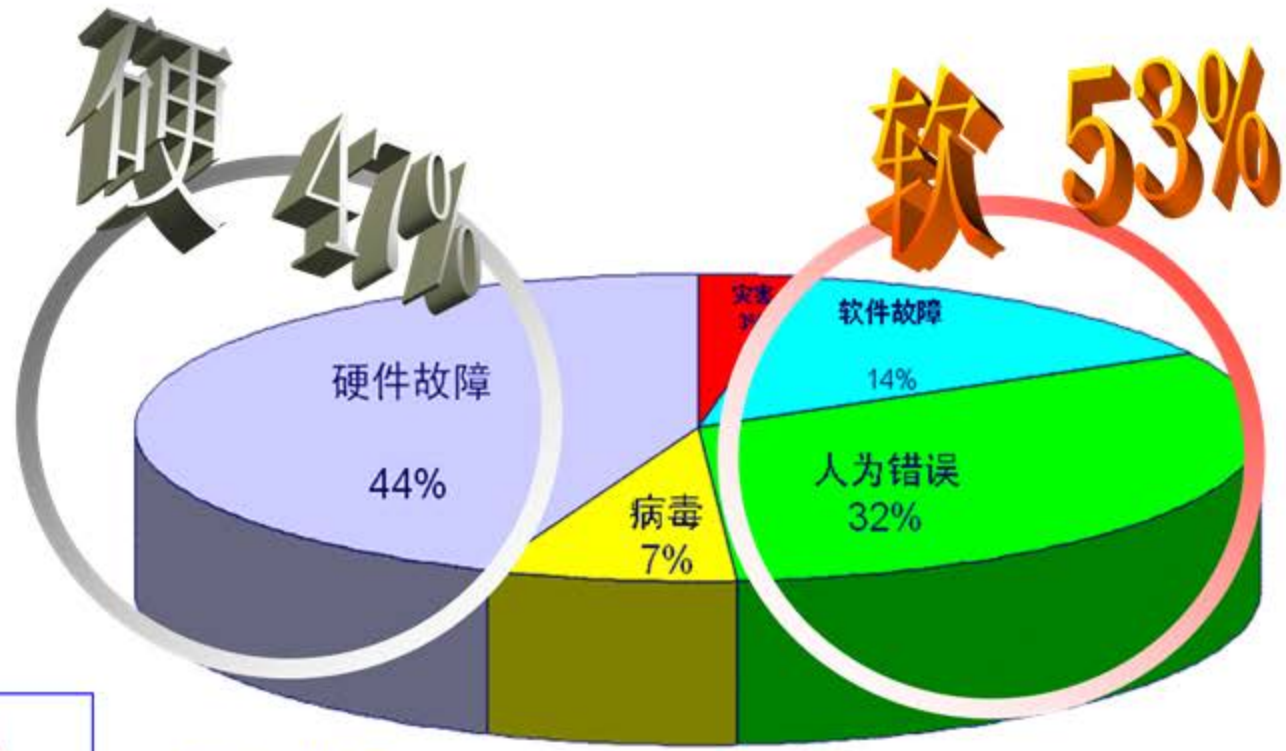
概述

- 备份恢复概述
- 虚拟机快照概述
- KVM快照管理
- KVM备份与恢复
- 备份脚本实现

备份恢复概述

- 数据损坏风险分析
- 备份策略评估参数

数据损坏风险分析



3%灾难
97%故障

53%逻辑故障

53% “软” Error
(人为过失 + 数据库崩溃 + 系统崩溃 + 打补丁出错 + 病毒 + 黑客…)

47% “硬” Error
(硬件故障 + 共享阵列故障 + 自然灾害…)

数据来源：Progress Smart, Storageworld Conference, June 2006

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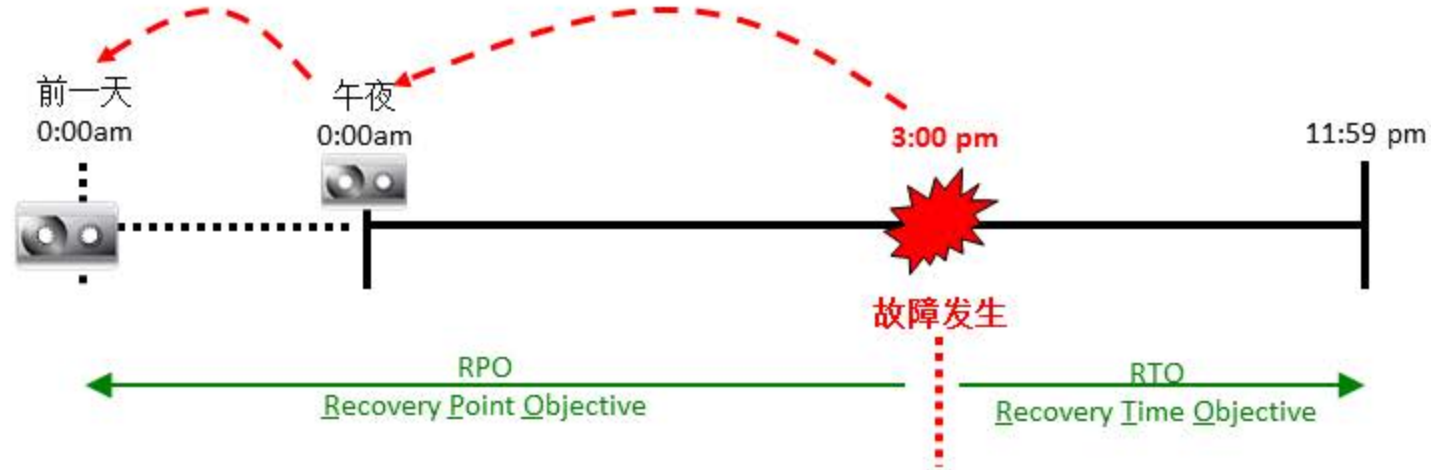
备份策略评估参数：RPO、RTO……



Recovery Point + Recovery Time = 您 真正的 宕机时间

- 在3pm发生故障
- 恢复数据是什么时候的数据? **15 小时?**
- 备份的数据是否可用正常运转? **39 小时?**

这是您的 恢复点 Recovery Point

- 多长时间可以解决问题?
- 多长时间可以从Tape上恢复数据?
- 多长时间可以让用户可以正常使用?

这是您的 恢复时间Recovery Time

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虚拟机快照概述

- 磁盘I/O栈的快照
- KVM快照分类

磁盘I/O栈的快照

可以在磁盘I/O栈中不同的级别上实现

- QEMU快照
  - QCOW2, QED
- LVM
- 文件系统快照
  - btrfs
- 企业级存储上的快照
  - NetApp、EMC等

** 本章重点是在QEMU快照*

KVM快照分类

- 磁盘快照
  - 根据快照信息保存位置
    - 内置快照
    - 外置快照
  - 根据虚拟机状态
    - 关机态快照
    - 运行态快照
  - 根据磁盘数量
    - 单盘
    - 多盘
- 内存快照
- 检查点快照

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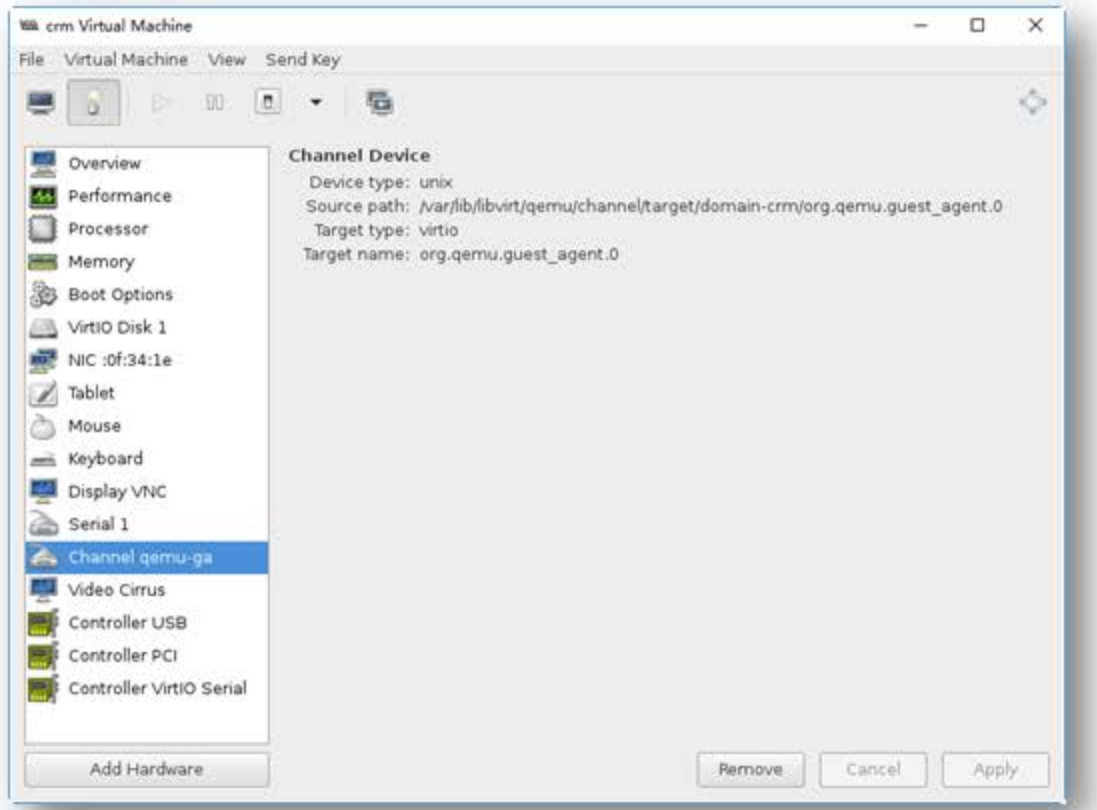
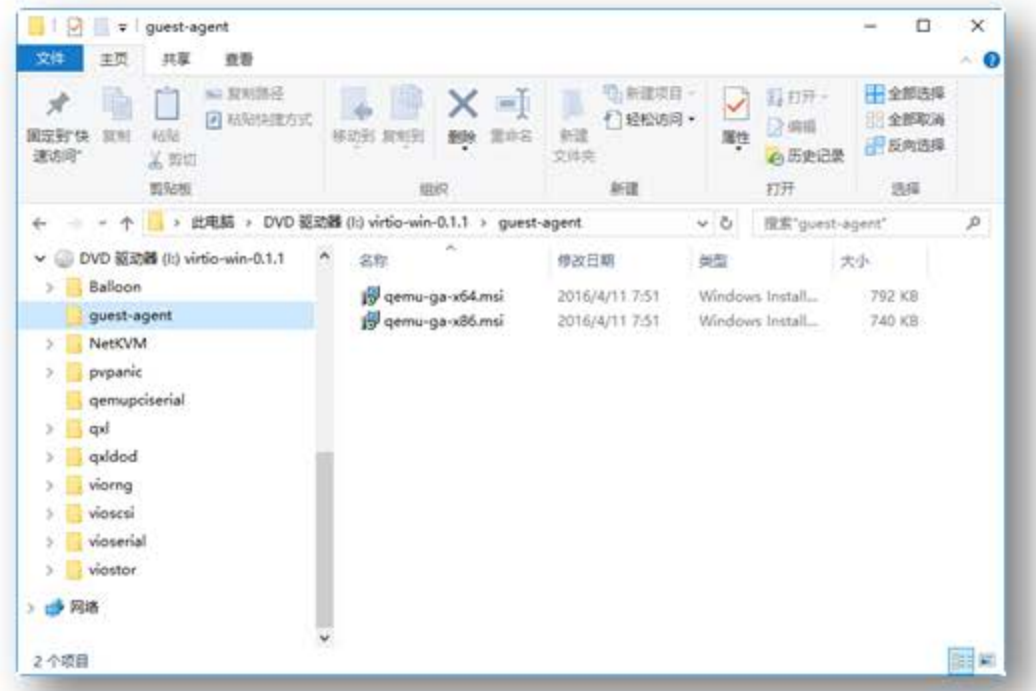
KVM快照管理

- Qemu guest agent
- 通过qemu-img管理磁盘的快照
- 通过virt-manger管理快照
- 通过virsh管理快照

Qemu guest agent




```
# yum -y install qemu-guest-agent
......
Installed:
  qemu-guest-agent.x86_64 10:2.5.0-3.el7
```



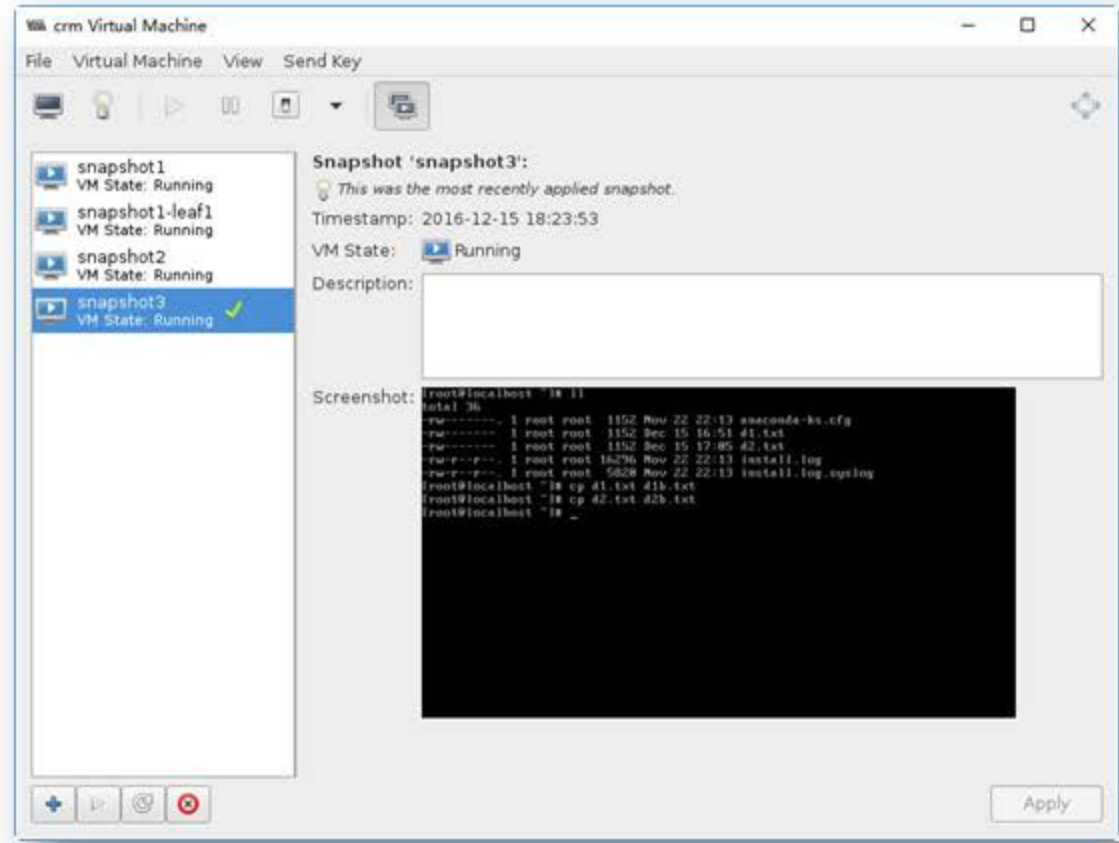
http://wiki.libvirt.org/page/Qemu_guest_agent
http://wiki.qemu.org/Features/QAPI/GuestAgent

通过qemu-img管理磁盘的快照

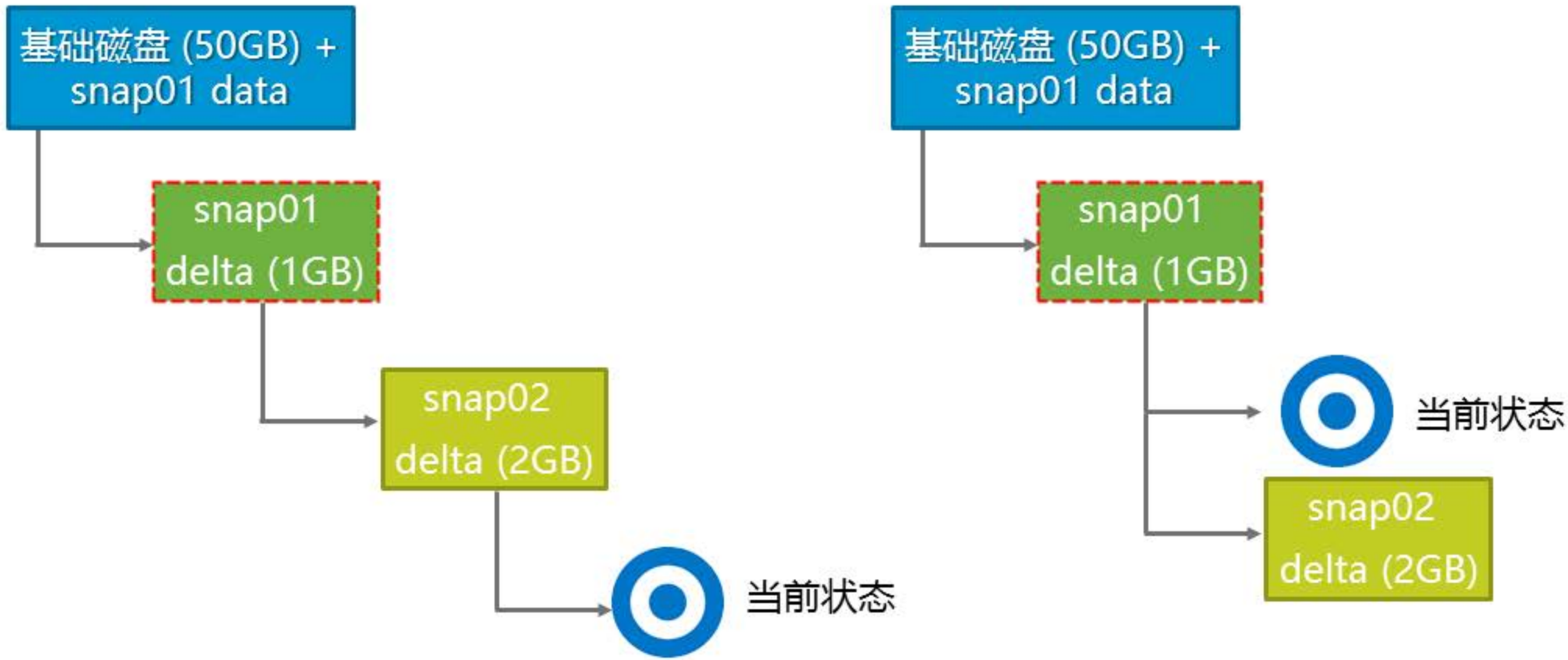
```
# qemu-img snapshot [--object objectdef] [--image-opts] [-q] \
  [-l | -a snapshot | -c snapshot | -d snapshot] filename

Parameters to snapshot subcommand:
  'snapshot' is the name of the snapshot to create, apply or delete
  '-a' applies a snapshot (revert disk to saved state)
  '-c' creates a snapshot
  '-d' deletes a snapshot
  '-l' lists all snapshots in the given image
```

通过virt-manger管理快照

- 创建快照
- 恢复快照
- 删除快照
- 获得快照信息



快照的依赖关系



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通过virsh管理快照

```
# virsh # help snapshot
Snapshot (help keyword 'snapshot'):
snapshot-create                  Create a snapshot from XML
snapshot-create-as               Create a snapshot from a set of args
snapshot-current                 Get or set the current snapshot
snapshot-delete                  Delete a domain snapshot
snapshot-dumpxml                 Dump XML for a domain snapshot
snapshot-edit                    edit XML for a snapshot
snapshot-info                    snapshot information
snapshot-list                    List snapshots for a domain
snapshot-parent                  Get the name of the parent of a snapshot
snapshot-revert                  Revert a domain to a snapshot
```

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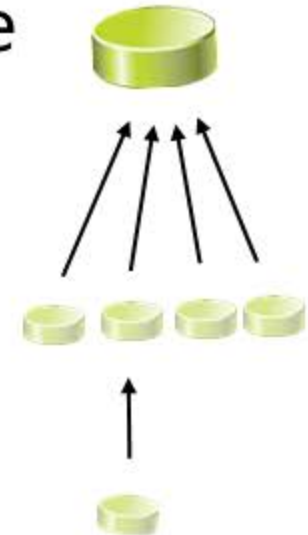
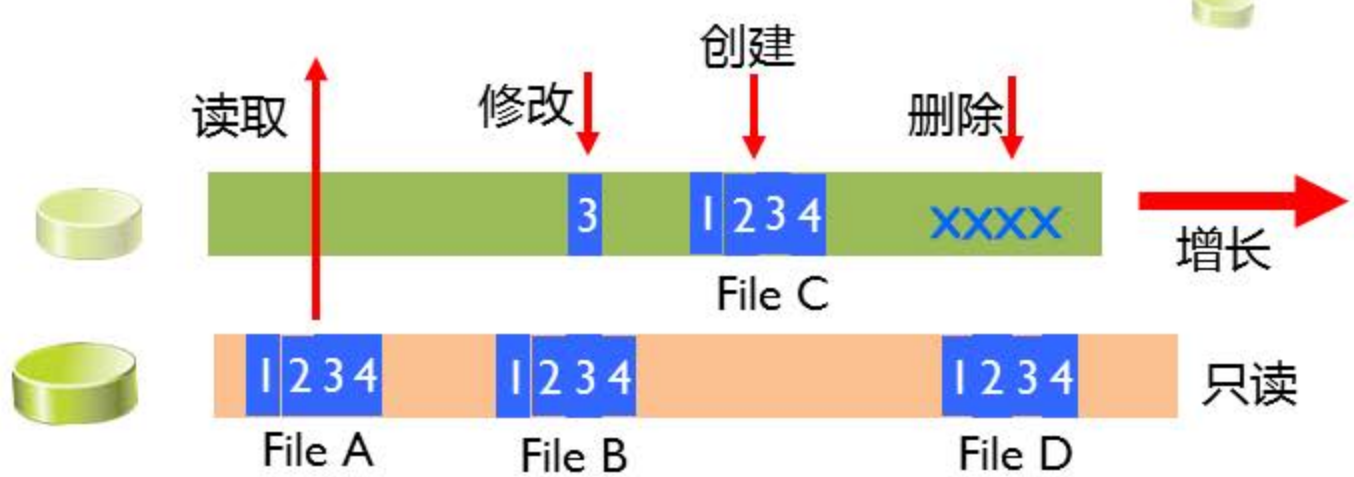
backing_file基本原理

- 创建磁盘时使用backing_file来指定基础镜像 base image
- 差异磁盘与基础镜像的变化
  - 后备磁盘不会改变
  - 差异磁盘隔离变化
  - 多个差异磁盘可以使用相同的后备磁盘
  - 增加了开销，较差的性能
- 可用于标准化基础镜像
  - 避免在高磁盘IO环境中使用





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KVM备份与恢复

- 冷备vs.热备
- 基于虚拟磁盘文件的KVM备份

冷备vs.热备

- 冷备份(cold backup)，也被称为离线备份
  - 关闭虚拟机并且不更新的状况下进行的备份
  - 简单，低维护，高度安全
  - 备份虚拟机配置文件、所有虚拟机磁盘文件/LVM卷
  - 备份时，业务不可用
- 热备份，也移为在线备份
  - 在虚拟机正常正常运时，进行的的备份
  - 通过创建外部快照文件

基于虚拟磁盘文件的KVM备份

- 创建临时外部磁盘快照

```
# virsh snapshot-create-as --domain crm guest-state1 \
 --diskspec vda,file=/export/images/crm-overlay1.qcow2 \
 --disk-only --atomic

有可能需要升级: error: Operation not supported: live disk snapshot not supported with
this QEMU binary
# yum -y install centos-release-qemu-ev
# yum -y install qemu-kvm-ev
```

- 备份磁盘文件

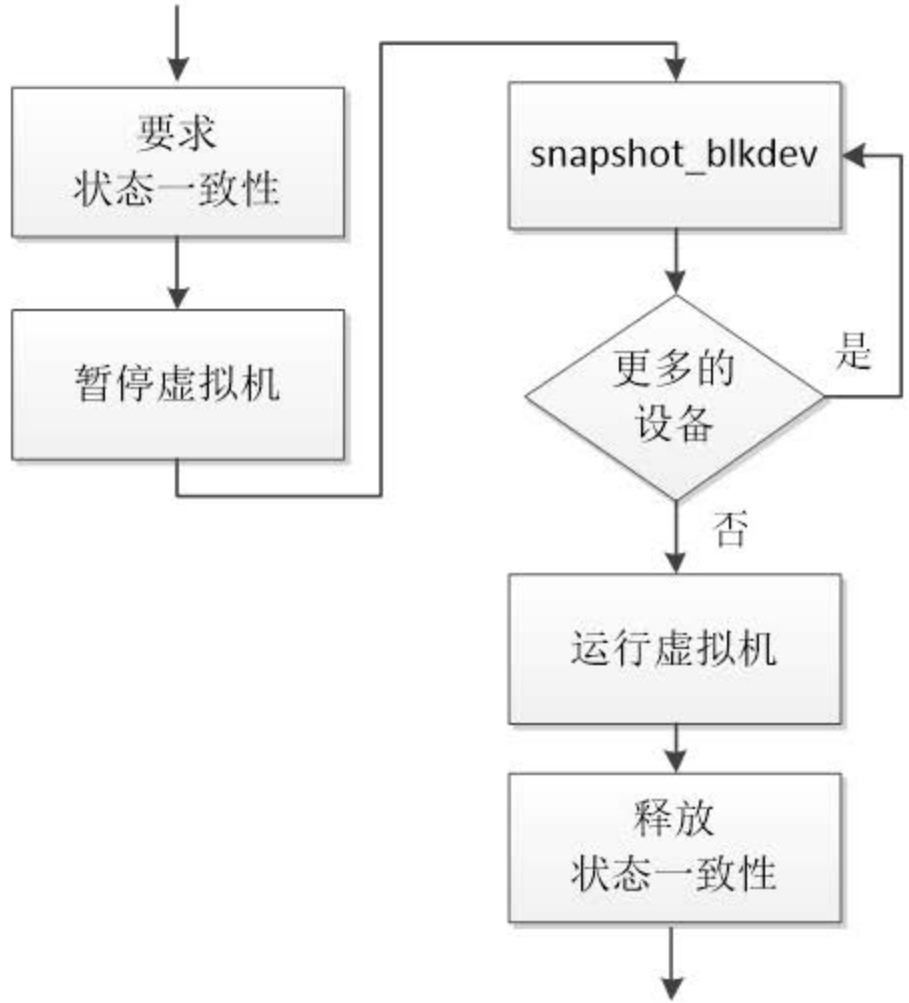
```
# tar zcvf 201612182100-crm.tar.gz /vm/crm-disk0.qcow2
```

- 恢复虚拟机配置及回写数据、删除临时快照

```
# virsh blockcommit crm vda --active --verbose -pivot
# virsh snapshot-delete crm guest-state1
```

?

快照的基本流程



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备份脚本实现

- 基于LVM虚拟机的示例
  - http://repo.firewall-services.com/misc/virt/virt-backup.pl
    - virt-backup.pl --pre --vm=machine1 --backupdir=/mnt/remotenas/ --privatedir --compress --snapsize=5G --debug
  - http://sandilands.info/sgordon/automatic-backup-of-running-kvm-virtual-machines
- KVM Live Backup项目
  - •git://github.com/jagane/qemu-livebackup.git
  - •git://github.com/jagane/qemu-kvm-livebackup.git

KVM Live Backup项目

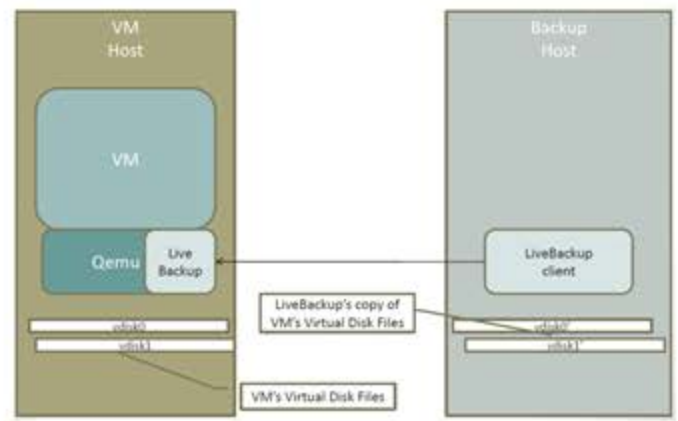
- Create Full and Incremental Backups of running VMs
- Must work with all types of virtual disk types, qcow, qcow2, LVM volumes, etc.
- A System Administrator or Backup Software can use livebackup_clientto connect to the qemu process using a TCP socketand transfer dirty blocks over
- ....

Livebackup Server (built into qemu process for the VM)

```
# ./x86_64-softmmu/qemu-system-x86_64 \
-drive file=/dev/kvm_vol_group/kvm_root_part,boot=on,if=virtio,livebackup=on\
-drive file=/dev/kvm_vol_group/kvm_disk1,if=virtio,livebackup=on\
-m 512 -net nic,model=virtio,macaddr=52:54:00:00:00:01 \
-net tap,ifname=tap0,script=no,downscript=no \
-livebackup_dir /root/kvm/livebackup \
-livebackup_port7900
```

Livebackup Client (run on backup server)

```
# livebackup_client /root/kvm-backup 192.168.1.220 7900
```



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总结

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- 虚拟机快照概述
- KVM快照管理
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- 备份脚本实现