

SUSE Linux Enterprise Server 15 SP2

Xen 到 KVM 的迁移指南

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随着服务器管理员越来越广泛地使用 KVM 虚拟化解决方案，他们中的许多人都需要有一个途径将其基于 Xen 的现有环境迁移到 KVM。目前还没有成熟的工具可自动将 Xen VM 转换为 KVM。不过，有一个技术解决方案有助于将 Xen 虚拟机转换为 KVM。下面的信息和过程可帮助您执行这样的迁移。

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重要：不支持迁移过程

SUSE 不完全支持本文档中所述的迁移过程。我们提供的说明仅作为指导。

1 使用 **virt-v2v** 迁移到 KVM

本章包含可帮助您将虚拟机从外部超级管理程序（例如 Xen）导入到 libvirt 所管理的 KVM 的信息。

提示：Microsoft Windows Guest

本章重点介绍如何转换 Linux Guest。使用 **virt-v2v** 转换 Microsoft Windows Guest 与转换 Linux Guest 的过程相同，只不过对虚拟机驱动程序包 (VMDP) 的处理有所不同。[虚拟机驱动程序包文档 \(https://documentation.suse.com/sle-vmdp/\)](https://documentation.suse.com/sle-vmdp/)  中提供了有关转换使用 VMDP 的 Windows Guest 的更多细节。

1.1 **virt-v2v** 简介

virt-v2v 是一个命令行工具，可将外部超级管理程序中的 VM Guest 转换为在 libvirt 管理的 KVM 上运行。如果可能，它会在转换的虚拟机中启用半虚拟化 virtio 驱动程序。下面是支持的操作系统和超级管理程序列表：

支持的 GUEST 操作系统

- SUSE Linux Enterprise Server
- openSUSE
- Red Hat Enterprise Linux
- Fedora
- Microsoft Windows Server 2003 和 2008

支持的源超级管理程序

- Xen

- KVM (由 libvirt 管理)

1.2 安装 **virt-v2v**

安装 **virt-v2v** 的过程很简单：

```
tux > sudo zypper install virt-v2v
```

请记住，**virt-v2v** 需要 root 特权，因此您需要以 root 身份或通过 sudo 运行该工具。

1.3 准备虚拟机



注意：跳过此步骤的条件

如果在 SLES 12 SP1 或之前的版本上运行 **virt-v2v**，可以放心跳过此步骤。如果虚拟机已完全虚拟化或者在 SLES 12 SP2 或更高版本上运行，也可以忽略此步骤。

Xen 虚拟机必须安装默认内核。要确保已执行此操作，请在虚拟机上运行 **zypper in kernel-default**。

1.4 将虚拟机转换为在 libvirt 管理的 KVM 下运行

virt-v2v 可将 Xen 超级管理程序中的虚拟机转换为在 libvirt 管理的 KVM 下运行。要了解有关 libvirt 和 virsh 的详细信息，请参见《虚拟化指南》。此外，**virt-v2v** 手册页 (**man 1 virt-v2v**) 中也对所有 **virt-v2v** 命令行选项进行了说明。

转换虚拟机之前，请务必完成以下步骤：

过程 1：准备转换环境

1. 创建新的本地储存池。

virt-v2v 会将源虚拟机的储存复制到 **libvirt** 所管理的本地储存池（原始磁盘映像保持不变）。您可以使用虚拟机管理器或 **virsh** 创建该池。有关详细信息，请参见《虚拟化指南》，第 12 章“管理储存”，第 12.1 节“使用虚拟机管理器管理储存”和《虚拟化指南》，第 12 章“管理储存”，第 12.2 节“使用 **virsh** 管理储存”。

2. 准备本地网络接口。

检查转换的虚拟机能否使用 VM 主机服务器上的本地网络接口。该接口通常是一个网桥。如果尚未定义接口，请单击 YaST > 系统 > 网络设置 > 添加 > 网桥创建。



注意：网络设备的映射

在转换过程中，可能会将源 Xen 主机上的网络设备映射到 KVM 目标主机上的相应网络设备。例如，可能会将 Xen 网桥 `br0` 映射到 KVM 网络 `default`。`/etc/virt-v2v.conf` 中提供了一些示例映射。要启用这些映射，请根据需要修改 XML 规则，并确保未以 `<!--` 和 `-->` 标记注释相应部分。例如：

```
<network type='bridge' name='br0'>
  <network type='network' name='default' />
</network>
```



提示：无网桥

如果没有可用的网桥，虚拟机管理器可以选择性创建一个。

virt-v2v 的基本命令语法如下：

```
virt-v2v -i INPUT_METHOD -os STORAGE_POOL SOURCE_VM
```

input_method

输入方法有以下两种：`libvirt` 或 `libvirtxml`。有关详细信息，请参见 `SOURCE_VM` 参数。

storage_pool

您已为目标虚拟机准备好的储存池。

source_vm

要转换的源虚拟机。其值取决于 `INPUT_METHOD` 参数：如果输入方法为 `libvirt`，需指定 `libvirt` 域的名称。如果输入方法为 `libvirtxml`，需指定包含 `libvirt` 域规范的 XML 文件的路径。



注意：转换时间

转换虚拟机时会占用大量系统资源，主要用于复制虚拟机的整个磁盘映像。转换单个虚拟机一般最多需要 10 分钟时间，但如果虚拟机使用的磁盘映像非常大，转换时间可能会很长。

1.4.1 基于 libvirt XML 描述文件的转换

本节说明如何使用 `libvirt` XML 配置文件转换本地 Xen 虚拟机。如果主机已在运行 KVM 超级管理程序，则适合使用此方法。确保在本地主机上可以使用源虚拟机的 `libvirt` XML 文件以及其中引用的 `libvirt` 储存池。

1. 获取源虚拟机的 `libvirt` XML 描述。



提示：获取 XML 文件

要获取源虚拟机的 `libvirt` XML 文件，您必须在 Xen 内核下运行主机操作系统。如果您已将主机重引导至启用了 KVM 的环境，请将其重引导回 Xen 内核，转储 `libvirt` XML 文件，然后再重引导回 KVM 环境。

首先，识别 `virsh` 下的源虚拟机：

```
root # virsh list
Id      Name                                State
-----
[...]
  2      sles12_xen                        running
[...]
```

`sles12_xen` 是要转换的源虚拟机。现在，导出其 XML 并保存到 `sles12_xen.xml`：

```
root # virsh dumpxml sles12_xen > sles12_xen.xml
```

2. 从 KVM 主机的角度校验所有磁盘映像路径是否正确。在一台计算机上转换时，路径正确与否不会产生问题，但使用 XML 转储从其他主机进行转换时，可能需要手动更改路径。

```
<source file='/var/lib/libvirt/images/XenPool/SLES.qcow2' />
```



提示：复制映像

为避免将映像复制两次，请直接手动将磁盘映像复制到 `libvirt` 储存池。更新 XML 描述文件中的源文件项。`virt-v2v` 进程将检测到现有磁盘，并就地转换这些磁盘。

3. 运行 `virt-v2v` 以转换为 KVM 虚拟机：

```
root # virt-v2v sles12_xen.xml ❶ \  
-i LIBVIRTXML ❷ \  
-os remote_host.example.com:/exported_dir ❸ \  
--bridge br0 ❹ \  
-on sles12_kvm ❺
```

- ❶ 基于 Xen 的源虚拟机的 XML 描述。
- ❷ `virt-v2v` 将从 `libvirt` XML 文件中读取有关源虚拟机的信息。
- ❸ 将放置目标虚拟机磁盘映像的储存池。在此示例中，映像将放置在 `remote_host.example.com` 服务器的 NFS 共享 `/exported_dir` 上。
- ❹ 基于 KVM 的目标虚拟机将使用主机上的网桥 `br0`。
- ❺ 目标虚拟机将重命名为 `sles12_kvm`，以防与同名的现有虚拟机发生名称冲突。

1.4.2 基于 `libvirt` 域名的转换

如果您仍在 Xen 下运行 `libvirt`，打算稍后重引导到 KVM 超级管理程序，则此方法很有用。

1. 确定您要转换的虚拟机的 `libvirt` 域名。

```
root # virsh list
Id      Name                                State
-----
[...]
  2      sles12_xen                        running
[...]
```

`sles12_xen` 是要转换的源虚拟机。

2. 运行 `virt-v2v` 以转换为 KVM 虚拟机：

```
root # virt-v2v sles12_xen① \
-i libvirt② \
-os storage_pool③ \
--network eth0④ \
-of qcow2⑤ \
-oa sparse⑥ \
-on sles12_kvm
```

- ① 基于 Xen 的虚拟机的域名。
- ② `virt-v2v` 将直接通过活动的 `libvirt` 连接读取有关源虚拟机的信息。
- ③ 目标磁盘映像将放置在本地 `libvirt` 储存池中。
- ④ 所有 Guest 网桥（或网络）都将连接到本地管理的网络。
- ⑤ 目标虚拟机的磁盘映像的格式。支持的选项为 `raw` 或 `qcow2`。
- ⑥ 转换的 Guest 磁盘空间将采用 `稀疏` 模式还是 `预分配` 模式。

1.4.3 转换远程 Xen 虚拟机

如果您需要转换在远程主机上运行的 Xen 虚拟机，此方法非常有用。因为 `virt-v2v` 通过 `ssh` 连接到远程主机，需确保主机上在运行 SSH 服务。



注意：无口令 SSH 访问

从 SLES 12 SP2 开始，**virt-v2v** 要求通过无口令 SSH 方式连接到远程主机。这意味着需向 `ssh-agent` 添加一个使用 SSH 密钥的连接。有关这方面的细节，请参见 `man ssh-keygen` 和 `man ssh-add`。《安全指南》，第 18 章“SSH：安全性网络操作”上也提供了详细信息。

要连接到远程 `libvirt` 连接，请构建远程主机的相关有效连接 URI。在下面的示例中，远程主机名为 `remote_host.example.com`，连接的用户名为 `root`。连接 URI 的格式如下所示：

```
xen+ssh://root@remote_host.example.com/
```

有关 `libvirt` 连接 URI 的详细信息，请参见 <http://libvirt.org/uri.html>。

1. 确定您要转换的远程虚拟机的 `libvirt` 域名。

```
root # virsh -c xen+ssh://root@remote_host.example.com/ list
Id      Name                                State
-----
1       sles12_xen                          running
[...]
```

`sles12_xen` 是要转换的源虚拟机。

2. 远程连接的 **virt-v2v** 命令如下所示：

```
root # virt-v2v sles12_xen \
-i libvirt \
-ic xen+ssh://root@remote_host.example.com/ \
-os local_storage_pool \
--bridge br0
```


1.5 运行转换的虚拟机

virt-v2v 成功完成之后，将采用 `-on` 选项指定的名称创建一个新的 **libvirt** 域。如果您未指定 `-on`，将使用与源虚拟机相同的名称。您可以使用 **virsh** 或虚拟机管理器等标准 **libvirt** 工具管理新 Guest。



提示：重引导计算机

如果您已按第 1.4.2 节“基于 **libvirt** 域名的转换”中所述在 Xen 下完成转换，可能需要重引导主机，并使用非 Xen 内核进行引导。

2 Xen 到 KVM 的手动迁移

2.1 一般概述

首选的虚拟机管理解决方案是在 **libvirt** 上进行管理；有关详细信息，请参见 <http://libvirt.org/>。与手动定义和运行虚拟机的方式相比，它具有多项优势 — **libvirt** 可以跨平台，支持许多超级管理程序，具有安全的远程管理功能以及虚拟网络功能，最重要的是，它可提供统一的抽象层来管理虚拟机。因此，本文着重于介绍 **libvirt** 解决方案。

通常，进行 Xen 到 KVM 的迁移需执行以下基本步骤：

1. 创建原始 Xen VM Guest 的备份副本。
2. 可选：实施特定于半虚拟化 Guest 的更改。
3. 获取有关 Xen VM Guest 的信息，并将其更新为 KVM 对等项。
4. 关闭 Xen 主机上的 Guest，然后在 KVM 超级管理程序下运行新 Guest。



警告：无法实时迁移

当源 VM Guest 正在运行时，无法将 Xen 实时迁移到 KVM。运行新的 KVM 就绪 VM Guest 之前，建议您关闭原始 Xen VM Guest。

2.2 备份 Xen VM Guest

要备份 Xen VM Guest，请执行以下步骤：

1. 识别您要迁移的相关 Xen Guest 并记住其 ID/名称。

```
tux > sudo virsh list --all
Id Name                               State
-----
 0 Domain-0                           running
 1 SLES11SP3                           running
[...]
```

2. 关闭 Guest。您可以通过关闭 Guest 操作系统或使用 **virsh** 执行此操作：

```
tux > sudo virsh shutdown SLES11SP3
```

3. 将其配置备份到 XML 文件。

```
tux > sudo virsh dumpxml SLES11SP3 > sles11sp3.xml
```

4. 备份其磁盘映像文件。使用 **cp** 或 **rsync** 命令创建备份副本。请记住，比较好的做法始终是使用 **md5sum** 命令检查副本。
5. 备份映像文件之后，您可以使用以下命令再次启动 Guest

```
tux > sudo virsh start SLES11SP3
```

2.3 特定于半虚拟化 Guest 的更改

如果您从半虚拟化 Xen Guest 进行迁移，请实施以下更改。您可以使用 **guestfs-tools** 在运行中的 Guest 或已停止的 Guest 上执行此操作。

重要

实施本节中所述的更改后，与迁移的 VM Guest 有关的映像文件将无法继续在 Xen 下使用。

2.3.1 安装默认内核



警告：无法引导

安装默认内核之后，请不要尝试使用该内核引导 Xen Guest，系统将不会引导。

克隆 Xen Guest 磁盘映像以在 KVM 超级管理程序下使用之前，请确保该映像可在没有 Xen 超级管理程序的情况下引导。这一点对于半虚拟化 Xen Guest 非常重要，因为它们通常包含一个特殊的 Xen 内核，并且通常未安装完整的 GRUB 2 引导加载程序。

1. 如果是 SLES 11，请更新 `/etc/sysconfig/kernel` 文件。更改 `INITRD_MODULES` 参数，具体做法是去除所有 Xen 驱动程序并以 virtio 驱动程序替换这些驱动程序。将

```
INITRD_MODULES="xenblk xenet"
```

替换为

```
INITRD_MODULES="virtio_blk virtio_pci virtio_net virtio_balloon"
```

如果是 SLES 12，请在 `/etc/dracut.conf.d/*.conf` 中搜索 `xenblk xenet`，并将它们替换为 `virtio_blk virtio_pci virtio_net virtio_balloon`

2. 半虚拟化 Xen Guest 运行的是特定的 Xen 内核。要在 KVM 下运行 Guest，您需要安装默认内核。



注意：默认内核已安装

对于全虚拟化 Guest，您无需安装默认内核，因为它已安装。

在 Xen Guest 上输入 `rpm -q kernel-default`，以确认默认内核是否已安装。如果未安装，请使用 `zypper in kernel-default` 进行安装。

我们将用于在 KVM 下引导 Guest 的内核必须有可用的 virtio（半虚拟化）驱动程序。请运行以下命令确认是否如此。不要忘记将 `5.3.18-8` 替换为您的内核版本：

```
tux > sudo find /lib/modules/5.3.18-8-default/kernel/drivers/ -name virtio*
```

```
/lib/modules/5.3.18-8-default/kernel/drivers/block/virtio_blk.ko
/lib/modules/5.3.18-8-default/kernel/drivers/char/hw_random/virtio-rng.ko
/lib/modules/5.3.18-8-default/kernel/drivers/char/virtio_console.ko
/lib/modules/5.3.18-8-default/kernel/drivers/crypto/virtio
...
```

3. 更新 `/etc/fstab`。将所有储存设备从 `xvda` 更改为 `vda`。

4. 更新引导加载程序配置。在 Xen Guest 上输入 `rpm -q grub2`，以确认 GRUB 2 是否已安装。如果未安装，请使用 `zypper in grub2` 进行安装。

现在，将新安装的默认内核设为默认的操作系统的引导项。此外，去除/更新可能会引用特定于 Xen 的设备的内核命令行选项。您可以使用 YaST（系统 > 引导加载程序）或手动执行此操作。

- 列出所有 Linux 引导菜单项，以确定首选引导菜单项：

```
tux > cat /boot/grub2/grub.cfg | grep 'menuentry '
```

请记住您新安装的项目的序号（从零开始计数）。

- 将其设为默认引导菜单项：

```
tux > sudo grub2-set-default N
```

将 `N` 替换为之前查明的引导菜单项编号。

- 打开 `/etc/default/grub` 进行编辑，并查找 `GRUB_CMDLINE_LINUX_DEFAULT` 和 `GRUB_CMDLINE_LINUX_RECOVERY` 选项。去除/更新对特定于 Xen 的设备的所有引用。在下面的示例中，您可以将

```
root=/dev/xvda1 disk=/dev/xvda console=xvc
```

替换为

```
root=/dev/vda1 disk=/dev/vda
```

请注意，您需要去除对 `xvc` 类型控制台（例如 `xvc0`）的所有引用。

5. 更新 `/boot/grub2` 或 `/boot/grub2-efi` 其中一个目录中的 `device.map`。将所有储存设备从 `xvda` 更改为 `vda`。
6. 要导入新的默认设置，请运行

```
grub2-mkconfig -o /boot/grub2/grub.cfg
```

2.3.2 更新 Guest 以在 KVM 下引导

1. 更新系统以使用默认串行控制台。列出配置的控制台，并去除 `xvc?` 控制台的符号链接。

```
tux > sudo ls -l /etc/systemd/system/getty.target.wants/  
getty@tty1.service -> /usr/lib/systemd/system/getty@.service  
getty@xvc0.service -> /usr/lib/systemd/system/getty@xvc0.service  
getty@xvc1.service -> /usr/lib/systemd/system/getty@xvc1.service  
  
# rm /etc/systemd/system/getty.target.wants/getty@xvc?.service
```

2. 更新 `/etc/securetty` 文件。将 `xvc0` 替换为 `ttys0`。

2.4 更新 Xen VM Guest 配置

本节介绍如何导出原始 Xen VM Guest 的配置，以及为了能够将该 Guest 作为 KVM Guest 导入到 `libvirt` 中需对其实施的特定更改。

2.4.1 导出 Xen VM Guest 配置

首先导出 Guest 的配置并保存到某个文件中。典型的导出如下所示：

```
tux > sudo virsh dumpxml SLES11SP3  
<domain type='xen'>  
  <name>SLES11SP3</name>  
  <uuid>fa9ea4d7-8f95-30c0-bce9-9e58ffcabeb2</uuid>  
  <memory>524288</memory>  
  <currentMemory>524288</currentMemory>
```

```

<vcpu>1</vcpu>
<bootloader>/usr/bin/pygrub</bootloader>
<os>
  <type>linux</type>
</os>
<clock offset='utc' />
<on_poweroff>destroy</on_poweroff>
<on_reboot>restart</on_reboot>
<on_crash>restart</on_crash>
<devices>
  <emulator>/usr/lib/xen/bin/qemu-dm</emulator>
  <disk type='file' device='disk'>
    <driver name='file' />
    <source file='/var/lib/libvirt/images/
SLES_11_SP2_JeOS.x86_64-0.0.2_para.raw' />
    <target dev='xvda' bus='xen' />
  </disk>
  <interface type='bridge'>
    <mac address='00:16:3e:2d:91:c3' />
    <source bridge='br0' />
    <script path='vif-bridge' />
  </interface>
  <console type='pty'>
    <target type='xen' port='0' />
  </console>
  <input type='mouse' bus='xen' />
  <graphics type='vnc' port='-1' autoport='yes' keymap='en-us' />
</devices>
</domain>

```

<http://libvirt.org/formatdomain.html> 上提供了有关 VM Guest 描述的 libvirt XML 格式的详细信息。

2.4.2 对 Guest 配置的一般更改

您需要对导出的 Xen Guest XML 配置进行一些一般性更改，方可使其在 KVM 超级管理程序下运行。以下规则对全虚拟化和半虚拟化 Guest 均适用。请注意，您的具体配置中并不需要包含下列所有 XML 元素。



提示：使用的约定

为了表示 XML 配置文件中的节点，整个文档中将使用 XPath 语法。例如，如要表示 `<domain>` 标记中的 `<name>`，

```
<domain>
  <name>sles11sp3</name>
</domain>
```

将使用 XPath 对等项 `/domain/name`。

1. 将 `/domain` 元素的 `type` 属性从 `xen` 更改为 `kvm`。
2. 去除 `/domain/bootloader` 元素部分。
3. 去除 `/domain/bootloader_args` 元素部分。
4. 将 `/domain/os/type` 元素值从 `linux` 更改为 `hvm`。
5. 在 `/domain/os` 元素下添加 `<boot dev="hd"/>`。
6. 在 `/domain/os/type` 元素中添加 `arch` 属性。可接受的值为 `arch="x86_64"` 或 `arch="i686"`。
7. 将 `/domain/devices/emulator` 元素从 `/usr/lib/xen/bin/qemu-dm'` 更改为 `/usr/bin/qemu-kvm`。
8. 对与半虚拟化 (PV) Guest 关联的每个磁盘进行以下更改：
 - 将 `/domain/devices/disk/driver` 的 `name` 属性从 `file` 更改为 `qemu`，然后添加 `type` 属性以指定磁盘类型。例如，有效选项包括 `raw` 或 `qcow2`。
 - 将 `/domain/devices/disk/target` 元素的 `dev` 属性从 `xvda` 更改为 `vda`。
 - 将 `/domain/devices/disk/target` 元素的 `bus` 属性从 `xen` 更改为 `virtio`。
9. 对每个网络接口卡进行以下更改：

- 如果 `/domain/devices/interface` 中定义了 `model`，请将其 `type` 属性值更改为 `virtio`

```
<model type="virtio">
```

- 删除所有 `/domain/devices/interface/script` 部分。
- 删除 `dev` 属性以 `vif`、`vnet` 或 `veth` 开头的所有 `/domain/devices/interface/target` 元素。如果使用的是自定义网络，请将 `dev` 值更改为该目标。

10. 去除 `/domain/devices/console` 元素部分（如果存在）。

11. 去除 `/domain/devices/serial` 元素部分（如果存在）。

12. 将 `/domain/devices/input` 元素的 `bus` 属性从 `xen` 更改为 `ps2`。

13. 在 `/domain/devices` 元素下添加以下有关内存气球功能的元素。

```
<memballoon model="virtio"/>
```



提示：设备名

`<target dev='hda' bus='ide' />` 控制在哪个设备下向 Guest 操作系统公开磁盘。`dev` 属性指示“逻辑”设备名称。我们无法保证实际指定的设备名称与 Guest 操作系统中的设备名称对应。因此，您可能需要更改引导加载程序命令行上的磁盘映射。例如，如果引导加载程序预期根磁盘为 `hda2`，但 KVM 仍将其视为 `sda2`，请将引导加载程序命令行从

```
[...] root=/dev/hda2 resume=/dev/hda1 [...]
```

更改为

```
[...] root=/dev/sda2 resume=/dev/sda1 [...]
```

如果是半虚拟化 `xvda` 设备，请将其更改为

```
[...] root=/dev/vda2 resume=/dev/vda1 [...]
```


否则，VM Guest 将拒绝在 KVM 环境中引导。

2.4.3 目标 KVM Guest 配置

实施上述所有修改后，您的 KVM Guest 的最终配置如下所示：

```
<domain type='kvm'>
  <name>SLES11SP3</name>
  <uuid>fa9ea4d7-8f95-30c0-bce9-9e58ffcabeb2</uuid>
  <memory>524288</memory>
  <currentMemory>524288</currentMemory>
  <vcpu cpuset='0-3'>1</vcpu>
  <os>
    <type arch="x86_64">hvm</type>
    <boot dev="hd"/>
  </os>
  <clock offset='utc' />
  <on_poweroff>destroy</on_poweroff>
  <on_reboot>restart</on_reboot>
  <on_crash>restart</on_crash>
  <devices>
    <emulator>/usr/bin/qemu-kvm</emulator>
    <disk type='file' device='disk'>
      <driver name='qemu' type="raw"/>
      <source file='/var/lib/libvirt/images/
SLES_11_SP2_JeOS.x86_64-0.0.2_para.raw' />
      <target dev='vda' bus='virtio' />
    </disk>
    <interface type='bridge'>
      <mac address='00:16:3e:2d:91:c3' />
      <source bridge='br0' />
    </interface>
    <input type='mouse' bus='usb' />
    <graphics type='vnc' port='5900' autoport='yes' keymap='en-us' />
    <memballoon model="virtio" />
  </devices>
```

```
</domain>
```

将配置保存到主目录中的某个文件。您稍后将其导入之后，它会复制到默认的 `/etc/libvirt/qemu` 中。假设您将文件保存为 `SLES11SP3.xml`。

2.5 迁移 VM Guest

更新 VM Guest 配置并对 Guest 操作系统实施必要的更改之后，请关闭原始 Xen Guest 并在 KVM 超级管理程序下运行其克隆版本。

1. 以 `root` 身份从控制台运行 `shutdown -h now`，以关闭 Xen 主机上的 Guest。
2. 根据需要复制与 VM Guest 关联的磁盘文件。默认配置要求将 Xen 磁盘文件从 `/var/lib/xen/images` 复制到 `/var/lib/kvm/images`。如果您之前未创建 VM Guest，则可能需要以 `root` 身份创建 `/var/lib/kvm/images` 目录。
3. 创建新域，然后将其注册到 `libvirt` 中：

```
tux > sudo virsh define SLES11SP3.xml
Domain SLES11SP3 defined from SLES11SP3.xml
```

4. 校验新 Guest 是否包含在 KVM 配置中。

```
tux > virsh list --all
```

5. 创建域之后，您可以将其启动：

```
tux > sudo virsh start SLES11SP3
Domain SLES11SP3 started
```

3 更多信息

有关 libvirt 的详细信息，请参见 <http://libvirt.org>。


<http://libvirt.org/formatdomain.html> 上提供了有关 `libvirt` XML 格式的更多细节。

<https://documentation.suse.com/> 上的 SUSE Linux Enterprise Server 文档中提供了有关 Xen 和 KVM 虚拟化的详细信息。

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