Proxmox Cookbook

Proxmox VE's intuitive interface, High Availability, and unique central management system puts it on par with the world's best virtualization platforms and makes it the foremost choice for most system administrators.

Starting with a step-by-step installation of Proxmox nodes along with an illustrated tour of the Proxmox graphical user interface, this book will get you up and running with the mechanisms of Proxmox VE. Various entities such as cluster, storage, and firewall are also covered in an easy-to-understand format. You will then explore various backup solutions and restore mechanisms. Finally, we will walk through some advanced configurations for VM followed by a list of commands used for the Proxmox and Ceph clusters through the CLI.

What this book will do for you...

- Install and configure an enterprise grade, cluster-based virtual environment using Proxmox
- Manage a cluster with the graphical user interface using datacenter, node, KVM, and OpenVZ menus among others
- Configure and manage the built-in Proxmox firewall to protect your virtual environment
- Integrate storage systems such as Ceph, Gluster, and ZFS for virtual machine management to suit your business needs
- Upgrade a Proxmox node with new releases and apply update patches through the GUI or CLI
- Monitor the resources and virtual machines to maintain performance and uptime

Inside the Cookbook...

- A straightforward and easy-to-follow format
- A selection of the most important tasks and problems
- Carefully organized instructions to solve problems efficiently
- Clear explanations of what you did
- Solutions that can be applied to solve real-world problems

Proxmox Cookbook

Over 60 hands-on recipes to perform server virtualization and manage virtualized server solutions with Proxmox

Wasim Ahmed

In this package, you will find:

- The author biography
- A preview chapter from the book, Chapter 1 'Installing Proxmox'
- A synopsis of the book’s content
- More information on Proxmox Cookbook
About the Author

Wasim Ahmed, born in Bangladesh, is now a citizen of Canada and a veteran of the IT world. He first came into contact with computers in 1992, and since then, he's never looked back. Over the years, he has acquired an in-depth knowledge and understanding of network, virtualization, big data storage, and network security. By profession, Wasim is the CEO of an IT support and cloud service provider company based out of Calgary, Alberta. He provides his services to many companies and organizations on a daily basis. His strength is his experience, which he's gained from learning and serving clients regularly. He strives to find the most effective solution for a problem at the most competitive prices. He has built over 20 enterprise production virtual infrastructures from scratch using Proxmox and the Ceph storage system.

Wasim is well known for his reluctance to accept a technology based on its description alone, and putting it through rigorous tests to check its validity. Any new technology that his company provides goes through months of continuous testing before it is accepted. Proxmox has made the cut superbly.
Preface

Proxmox is one of the biggest kept secrets in the world of virtualization. It stands tall with other major virtualization players, such as VMWare, Xen, Hyper-V, and so on. Since the first release of Proxmox in 2005, it has become the standard for open source hypervisors. It is loaded with great features, such as clustering, High Availability, major storage plugins, firewalls, full KVM/OpenVZ support, and a price that cannot be beaten by any other virtualization product in the industry. Proxmox provides a rock solid platform to build virtual environments that are scalable to any size and can be managed entirely from a single GUI. In a matter of minutes, a standard Proxmox cluster can be raised and brought into production without any licensing costs.

This book is written to get you familiar with Proxmox by following step-by-step procedures. The steps are broken down in as simple manner as possible, thereby allowing you to cook up a Proxmox cluster with minimal effort. This book can also be used as a quick reference to fall back on when working with a Proxmox hypervisor. Illustrations have been used wherever possible along with a hands-on approach that enables you to retain the knowledge you've acquired for a longer period of time. Different topics and features are categorized in different chapters, making this book an easy read.

Often, we lack a book that is a reference point to get things done quickly. Although there are other books on Proxmox written in greater detail, a book, such as this one, was needed so that you could be brought on board with regard to Proxmox in the least amount of time. Each chapter is written with the aim of doing more and reading less.

What this book covers

Chapter 1, Installing Proxmox, introduces Proxmox and its features. It also shows the types of hardware needed for a Proxmox node, the required repository, and how to install Proxmox in a few steps. At the end of the chapter, you will have a very basic Proxmox cluster up and running, which can be used throughout the book to practice the knowledge you've acquired.
Chapter 2, Getting to Know the Proxmox GUI, introduces the Proxmox graphical user interface (GUI) through illustrations and guides you through the entire menu system of Proxmox. Explanations of the functions of different categories of menus are also provided. Each menu item of different categories has been presented with visual figures along with a description of their functions.

Chapter 3, Cluster and VM Management, shows you how to create and configure a Proxmox cluster from the ground up. Topics such as virtual machine creation, migration, and cloning are also covered in this chapter. At the end of the chapter, you will be capable enough to manage virtual machines in a Proxmox cluster.

Chapter 4, Network Configurations, shows different network components and how to configure them in Proxmox. In this chapter, you will have a good understanding of how to create a virtual network within a Proxmox cluster and how all the components come together to form a complex network.

Chapter 5, Firewall Configurations, shows how to utilize the Firewall feature of Proxmox. Firewall is a fairly new feature that has enhanced Proxmox significantly. In this chapter, you will learn how to enable and configure a firewall for different entities, such as a data center, node, and VM.

Chapter 6, Storage Configurations, shows different storage plugin options that are available and how to attach them to a Proxmox cluster. Proxmox provides built-in plugins for a major storage type. In this chapter, you will learn how to attach a shared storage with Proxmox and configure it.

Chapter 7, Backup and Restore, shows you how to perform the backup and restore of a virtual machine in a Proxmox cluster. Backup is an important requirement of any network. This chapter shows you how to schedule regular backups, snapshots, and restore data in the event of a disaster.

Chapter 8, Updating and Upgrading Proxmox, shows you the upgrade process to keep a Proxmox node up to date at all times. Keeping a Proxmox node updated is important for an issue-free environment. In this chapter, you will learn the proper procedure to commit updates on a Proxmox node.

Chapter 9, Monitoring Proxmox, shows you the ways in which you can monitor Proxmox and Ceph clusters using the Zabbix and Ceph dashboards. The steps involved in configuring a host or virtual machine that needs to be monitored, are covered along with installation of the Ceph dashboard. At the end of this chapter, you will know how to monitor and configure notifications.
Chapter 10, Advanced Configurations for VMs, shows advanced configuration steps to add features such as sound, PCI passthrough, and more. Advanced configuration extends the ability of a VM beyond just the basics. This chapter shows steps to make this advanced configuration work seamlessly.

Chapter 11, The CLI Command Reference, shows you several lists of the most commonly used commands to manage different aspects of Proxmox, such as a cluster, storage, and so on. This is a reference chapter for quickly finding the most commonly used commands. Commands have been listed in different categories for an easy find.
In this chapter, we are going to cover the following Proxmox basics:

- Hardware requirements
- Preparing for installation
- Installing Proxmox on a bare metal node
- Installing Proxmox on a Debian system
- A Proxmox subscription
- Disabling a Proxmox subscription
- Applying a Proxmox subscription
- Setting up a Proxmox package repository
- Seeking support

**Introduction**

The Proxmox Virtual Environment (VE) is an open source multinode clustered hypervisor built on Debian Linux, and is able to run on commodity hardware, thus eliminating any vendor lock ins. Proxmox is freely available without any features locked. However, a subscription type license is available to enable an enterprise repository to receive well-tested patches and updates. Subscriptions are recommended for a production-level Proxmox environment.

A hypervisor is a software or firmware that creates a layer between native hardware and an operating system to form a virtual environment to create and run virtual machines. A hypervisor emulates the functions of physical hardware to enable virtual machines to see them as physical resources.
Proxmox can be configured to run a virtual environment of just a few nodes with virtual machines or an environment with thousands of nodes. Supporting both KVM and OpenVZ container-based virtual machines, Proxmox VE is a leading hypervisor today. Proxmox has an extremely vibrant community ready to provide help to any free Proxmox users. Also, the expert technical support team of Proxmox is equally capable of handling all corporate users with their mission critical virtual environment.

As mentioned earlier, Proxmox is a multinode environment, meaning that many nodes can form a single cluster where a virtual machine can be moved around to any node within the cluster, thereby allowing a redundant virtual environment. Through a robust Graphical User Interface (GUI), the entire Proxmox cluster can be managed. As of Proxmox VE 3.4, only one cluster is manageable through the GUI.

Here are some of the notable features of the Proxmox VE:

- It provides a multinode cluster environment for virtualization. No single node acts as a master, thus eliminating single points of failure.
- It provides High Availability (HA) of virtual machines.
- It gives centralized web-based management and a single interface to manage an entire cluster.
- A console can be accessed through secured VNC, SPICE, and HTML5-based noVNC.
- It provides support for multiple authentication sources, such as local using Pluggable Authentication Module (PAM), Microsoft ADS, and LDAP.
- A Proxmox cluster file system (pmxcfs) can be used to store configuration files for real-time replication on all nodes using corosync (http://en.wikipedia.org/wiki/Corosync_%28project%29).
- It provides role-based permission management for objects VMs, storages, nodes, pools, and so on.
- Unlike SOAP, REST is not a protocol but combination of various standards such as HTTP, JSON, URI and XML. Visit http://www.restapitutorial.com for information on REST based APIs.
- It provides a built-in powerful firewall for host nodes and virtual machines.
- It provides migration of VMs between physical hosts with or without shared storage.
- It supports mainstream storage types, such as Ceph, NFS, ZFS, Gluster, and iSCSI.
- It provides cluster-wide logging.
Hardware requirements

Proxmox can be installed on just about any commodity hardware, but in order to have a stable platform, some attention is required when selecting nodes. A setup selected for Proxmox learning can be underpowered and less expansive. While this setup is acceptable for very small environments and home usage, it will not be adequate for production-level setups where stability and redundancy is the minimum requirement.

Minimum hardware

Here are the minimum requirements to install Proxmox on a hardware node:

- **Processor**: Intel or AMD 64-bit
- **Motherboard**: Intel VT or AMD-V capable (not required for OpenVZ)
- **Memory**: 1 GB RAM
- **Network Interface Card (NIC)**: 1

Based on the minimum requirement of Proxmox, here are examples of Intel and AMD-based hardware configurations that are suitable for learning:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Intel</th>
<th>AMD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processor/CPU</td>
<td>i3-4160 3.0 GHz</td>
<td>FX-4300 3.8 GHz</td>
</tr>
<tr>
<td>Motherboard</td>
<td>Asus B85M-D Plus 6 x SATA</td>
<td>Asus M5A78L-M/USB3 6 x SATA</td>
</tr>
<tr>
<td>Memory</td>
<td>Corsair 1 x 4 GB DDR3</td>
<td>Corsair 1 x 4 GB DDR3</td>
</tr>
</tbody>
</table>

Recommended hardware

To have a stable performing Proxmox cluster, here are the hardware configurations that are recommended:

- An Intel or AMD 64-bit processor
- An Intel VT or AMD-V capable Dual or Quad CPU motherboard
- 16 GB RAM memory
- Two Network Interface Card (NIC)
- RAID controller with **Battery Backup Unit (BBU)**
- **Solid State Drives (SSD)** for operating system or SSD for shared storage node
- Fencing hardware only if HA is needed
Installing Proxmox

For more details on fencing and HA visit https://pve.proxmox.com/wiki/Fencing.

The following table lists the configurations of a server node that can be used in a production environment:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Hardware</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processor/CPU</td>
<td>Intel Xeon E5-2630 v3 2.4 GHz</td>
</tr>
<tr>
<td>Motherboard</td>
<td>Intel S2600CP2 Dual LGA2011</td>
</tr>
<tr>
<td>Memory</td>
<td>Kingston 16 GB DDR3 Registered ECC</td>
</tr>
<tr>
<td>Power supply</td>
<td>Redundant</td>
</tr>
</tbody>
</table>

Note that the example configurations are for reference only. Your requirement will vary depending on the work load and expected performance. Adjust the hardware requirements accordingly by keeping in mind that in a hypervisor more core counts will increase performance of virtual machines rather than higher clock counts of a processor that is used. With a higher core count, more threads can be distributed among processors.

It is worth mentioning here that it is better to select a CPU with a higher cache amount for a node with large amount of memory to minimize the main memory access and maximize the performance for each CPU cores.

Proxmox is a clustered hypervisor. In order to set up a cluster, a minimum of two nodes are required. For the purpose of following through this book, when selecting hardware, be sure to have enough components to set up two nodes.

For more details on Proxmox, please visit http://www.proxmox.com/.

Although a Proxmox cluster can be set up with just two nodes, a minimum of three nodes are recommended for a production environment.
In a cluster, a quorum is established with a minimum of three votes. Each node is counted as single vote. The cluster health depends on this democratic system where the majority vote wins. So, in a two node cluster, when one node fails the other node can only cast one vote, creating an unresolved situation. With a three node cluster, when one node fails, the total vote from the remaining nodes is two out of possible three votes. Thus, the cluster operation continues. By any means, a two node cluster is not recommended for a production cluster. However, it is still possible to create using instructions by visiting https://pve.proxmox.com/wiki/Two-Node_High_Availability_Cluster.

Preparing for installation

Once the necessary hardware is assembled, in this recipe, we are going to see how to prepare ourselves before installing Proxmox.

Getting ready

We are going to use the Proxmox VE installation disk to install Proxmox. First, we need to prepare a disk with the Proxmox installation ISO image.

How to do it...

Here are the steps to install Proxmox:

2. Use a burning software to copy the ISO image on to a DVD disk.
3. Boot the physical node from the disk prepared from ISO to start the installation process.
Installing Proxmox

**There’s more...**

Some nodes may not have a ROM drive available to install from a disk. In such cases, it is possible to install Proxmox by transferring an ISO image onto a USB flash drive. Note that in order to boot from USB media, your motherboard must support the USB boot option. Check from the motherboard BIOS before proceeding to the following steps. If the motherboard does not support USB boot option, it may not also support an external USB ROM Drive. In this case, the best way to proceed is to install an ROM drive in the computer or use a newer motherboard if possible. Here are the instructions to transfer an ISO image to a USB and use it as bootable drive:

Use the following steps to do this on Windows:

2. Rename the file extension of the downloaded ISO from `.iso` to `.raw`.

   In some Windows 7 versions, the preceding writer may not work. In such scenarios, download and install the **ImageUSB** from [http://www.osforensics.com/tools/write-usb-images.html](http://www.osforensics.com/tools/write-usb-images.html).

4. Using the preceding applications, copy the ISO image onto a USB drive.
5. Insert the USB media into the USB port of the physical node and boot from the USB media.

Use the following steps to do this on Linux:

2. Insert the USB media into the USB port of the node and find out the device name of the drive using `#fdisk`. The name should be in the `/dev/XXX` format.
3. Use the following command to copy the ISO onto USB media. Use extra caution when using a device name in the following command. The wrong device name will destroy all the data on the device:
   ```bash
   #dd if=<Proxmox ISO file> of=/dev/XXX bs=1M
   ```
4. Reboot the node from the USB media to start the installation.
Installing Proxmox on a bare metal node

The Proxmox installation process is guided by a fully graphical interface through various prompts. In this recipe, we are going to follow through creating our first Proxmox node.

Getting ready

Power up and boot the physical node using the installation disk or the USB media we created in the preceding recipe. The following screenshot is how the screen looks after the boot:

How to do it...

1. At the main installation window after the booting process press Enter to start the installation.
2. On the End User License Agreement (EULA) screen click on Agree.
3. In this step, we have chosen the drive to install the hypervisor on. From Proxmox VE 3.4, a new feature to change the filesystem has been added. After selecting **Target Harddisk** from the drop-down menu, select **Options** to open the **Filesystem** selection dialog box. The following screenshot shows the drive selection screen with the **Filesystem** dialog box open:
4. From the **Filesystem** drop-down menu, select the desired filesystem. Select the desired filesystem size in **hdsize**. In version 3.3, support for the **ext3**, **ext4**, and **ZFS** filesystems have been added. Add additional information, such as the **swapsize**, **maxroot**, **minfree**, and **maxvz** values as required or leave them blank to continue with default, then click on **Next**. The following table shows the functions of these four options. These values are usually alternatives to each other, meaning if values are entered for one of these options, values for other options are automatically calculated:

<table>
<thead>
<tr>
<th>Option</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>swapsize</strong></td>
<td>This defines the size of a swap partition. There are complex formulas to calculate this value. However, it is generally left as the default value.</td>
</tr>
<tr>
<td><strong>maxroot</strong></td>
<td>This refers to the maximum size the root partition should be.</td>
</tr>
<tr>
<td><strong>minfree</strong></td>
<td>This refers to the minimum free space to allocate for a pve partition.</td>
</tr>
<tr>
<td><strong>maxvz</strong></td>
<td>This refers to the maximum space to allocate to locally store VMs. The default path for local VM storage is <strong>/var/lib/vz</strong>.</td>
</tr>
</tbody>
</table>

The following screenshot shows the filesystem that is supported after clicking on the drop-down menu:

![Filesystem Options](image)

- **Filesystem** options: **ext3**, **ext4**, **zfs (RAID0)**, **zfs (RAID1)**, **zfs (RAID10)**, **zfs (RAIDZ-1)**, **zfs (RAIDZ-2)**, **zfs (RAIDZ-3)**.
5. After selecting the drive for installation, we now have to select localization information, such as Country, Time Zone, and Keyboard Layout based on the desired language. Then, click on Next. The following screenshot displays the localization screen:

![Localization Screen]

- **Country**: The selected country is used to choose nearby mirror servers. This will speed up downloads and make updates more reliable.
- **Time Zone**: Automatically adjust daylight saving time.
- **Keyboard Layout**: Choose your keyboard layout.

6. Type in and confirm the password for the root login. Then, enter an e-mail address where all the Proxmox cluster notifications will go to. Click on Next.
7. In this step, we need to enter the hostname and network information, such as IP Address, Gateway, DNS Server, and so on. Enter the necessary information for your environment, then click on Next. The following screenshot shows the network information screen:

![Network Configuration Screen]

8. At this point, all the necessary information has been collected and the main installation has been started. After the installation is completed, eject the installation disk or the USB media, then click on Reboot.

There's more...

Follow steps 1 to 7 to set up the second node. A minimum of two nodes are required to form a Proxmox cluster. More information on cluster configurations is available in Chapter 3, Cluster and VM Management.
Installing Proxmox on a Debian system

Although installation of Proxmox on a native bare metal node is recommended, at times, it may be necessary to install Proxmox on an existing Debian node. In this recipe, we will see how to install the Proxmox VE on Debian. Note that Proxmox can only be installed on 64-bit hardware and a 64-bit operating system.

Getting ready

Install Debian from instructions from the official Debian site at http://www.debian.org.
Prior to installing Proxmox on the Debian node, ensure that the hostname can be resolved. Check the hostname using the following command:

```
# nano /etc/hosts
```

It should have these entries:

```
127.0.0.1 localhost.localdomain localhost
172.16.0.71 pmx1.domain.com pmx1 pvelocalhost
```

If the entries are missing, type in the proper IP address associated with the hostname of the node. The `pvelocalhost` entry must be present at the end of the line.

How to do it...

Use the following steps to install Proxmox on a Debian system:

1. Add the Proxmox VE repository in the source list as follows:
   ```
   # nano /etc/apt/sources.list
   deb http://ftp.ca.debian.org/debian wheezy main contrib
   
   #PVE repository for installation
   deb http://download.proxmox.com/debian wheezy pve
   
   #PVE security updates
   deb http://security.debian.org/ wheezy/updates main contrib
   ```
Due to a bug in the Debian OS, `apt-get` may display an error of not finding `/binary-i386` with a `Unable to find expected entry 'pve/binary-i386/packages'` error message. The error may occur even though it is a 64-bit Debian installed operating system. In such cases, change the PVE repository entry to the following:

```
deb [arch=amd64] http://download.proxmox.com/debian wheezy pve
```

2. Add the Proxmox VE repository key using the following command:

```
# wget -O http://download.proxmox.com/debian/key.asc | apt-key add -
```

3. Update the repository using the following command:

```
# apt-get update
```

4. Update the operating system using the following command:

```
# apt-get dist-upgrade
```

5. Install the Proxmox VE Kernel:

```
# apt-get install pve-firmware pve-kernel-2.6.32-37-pve
```

6. Install Kernel headers:

```
# apt-get install pve-header-2.6.32-37-pve
```

7. Be sure to select the Proxmox VE Kernel on the boot loader grub2.

8. Reboot the node to activate the new Proxmox VE Kernel.

9. Verify the running kernel to ensure that the proper Proxmox VE Kernel is loaded:

```
# uname -a
```

10. Check the grub2 config using following command:

```
# update-grub
```

11. Install the Proxmox VE packages:

```
# apt-get install Proxmox-ve-2.6.32 ntp ssh lvm2 postfix ksm-control-daemon vzprocps open-iscsi bootlogd
```

12. During installation, accept suggestions to remove Exim and set up Postfix. Exim can be installed later if required.

13. Reboot the node after the Proxmox VE installation is done.
There's more...

Follow steps 1 to 13 to set up a second node. A minimum of two nodes are required to form a Proxmox cluster. We will take a good look at the Proxmox GUI in Chapter 2, Getting to know the Proxmox GUI.

A Proxmox subscription

The Proxmox VE itself is free. There are absolutely no costs involved in simply downloading the ISO image and installing a fully-functional Proxmox cluster without paying for a license or subscription. However, there is a Proxmox subscription option available to support the project, which enables enterprise repository. There are no feature differences between the Free and Subscription versions of Proxmox. Both are exactly the same. The difference is between the type of releases, updates, and patches they receive.

Packages from the enterprise repository go through an extra layer of scrutiny and testing. Thus, a subscription is recommended for a production-level Proxmox VE.

This not to be confused with the fact that a Proxmox cluster is built with no subscription and is not stable enough to use. New packages are usually released through a no-subscription repository first. Same packages are pushed through the Enterprise repository at a later time. This delay allows the Proxmox team to pin point and fix any lingering bugs or defects in the package. In a cluster running mission critical virtual machines may face unacceptable downtime due to the bug, which will not affect a smaller environment that is able to sustain downtime.

There are four levels of subscription at various price points, such as COMMUNITY, BASIC, STANDARD, and PREMIUM. For more information on the Proxmox subscription, visit https://www.proxmox.com/proxmox-ve/pricing.

Disabling a Proxmox subscription

A fresh installation of the Proxmox VE without subscriptions will display a message upon login to Proxmox GUI, as shown in the following screenshot:
This is because an enterprise repository is enabled by default. If you decide not to get any Proxmox subscriptions and continue using the fully Free version, you will have to disable the enterprise repository.

**Getting ready**

Login to the Proxmox node through a console or SSH. An enterprise repository can only be disabled through CLI.

**How to do it...**

The enterprise repository is listed in `/etc/apt/sources.list.d/pve-enterprise.list`. We have to comment out the line to disable the repository:

```bash
# nano /etc/apt/sources.list.d/pve-enterprise.list
#deb https://enterprise.proxmox.com/debian wheezy pve-enterprise
```

Add the Proxmox No-Subscription repository as follows:

```bash
# nano /etc/apt/sources.list
deb http://download.proxmox.com/debian wheezy pve-no-subscription
```

**How it works...**

No restart of services or reboot is required to apply the changes. Log out from the Proxmox GUI and log back in to see if the changes were applied correctly. The "no subscription" message box should not pop-up after login. Subscriptions can be managed from the Proxmox GUI under the **Subscription** tab. Here is a screenshot of a nonsubscribed Proxmox node:
Installing Proxmox

Applying a Proxmox subscription

If you choose to get a Proxmox subscription of any type, a subscription key must be uploaded into the Proxmox node to activate it. The subscription key is sent by e-mail after successful payment. The key can be uploaded through the Proxmox GUI.

Getting ready

Login to the Proxmox GUI by accessing the link through a browser and enter the admin login credentials. The default username is root and the password is the same as was entered during installation: https://<pmx_node_IP>:8006.

How to do it...

1. After logging into the Proxmox GUI, click on the node that the subscription is going to be applied to.
2. Click on the Subscription tab.
3. Click on the Upload Subscription Key button to open the key dialog box, as shown in the following screenshot:

   ![upload subscription key screenshot]

4. Copy/paste the subscription key from the e-mail received from Proxmox in the key box, then click on Ok.
5. Click on **Check**. At this moment, the key will be verified with Proxmox to check the validity. After the activation is completed, it should look like the following screenshot:

![Subscription Key Verification](image)

**There's more...**

If a wrong subscription key has been entered, then the display should resemble the following screenshot:

![Invalid Subscription Key](image)

In such cases, simply upload the correct key to activate again. You may also see the key invalid notice when the key has already been activated for another node, which is no longer in service. In such cases, contact Proxmox or other third-party license providers that the license was purchased from to request reissuing of the same license. Then, simply click on the **Check** button to reactivate the key. Each key is hard coded to each server ID. The key needs to be reissued by Proxmox in order to use it.

[Please keep in mind that once a key is reissued, it will no longer work on the previous node it was activated for. If you have asked for reissue a license by mistake, request to reissue again and click on the **Check** button on the previous node.]
Setting up a Proxmox package repository

The Proxmox VE offers three main repositories:

<table>
<thead>
<tr>
<th>Repository</th>
<th>Subscription</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enterprise</td>
<td>Required</td>
<td>This is primarily used in the production of the Proxmox node. Packages in this repository go through additional scrutiny, bug fixes, and testing.</td>
</tr>
<tr>
<td>No-Subscription</td>
<td>Not required</td>
<td>This is used in learning, training, and home Proxmox cluster nodes. Packages in this repository go through initial bug fixes and are stable enough to be referred as the final release.</td>
</tr>
<tr>
<td>Test</td>
<td>Not required</td>
<td>This is used for the testing and development of Proxmox only. Packages in this repository are usually the very latest and are still going through final phases of the release cycle, such as beta testing and release candidate. Packages in this repository may contain a number of bugs and issues. Users of this repository are encouraged to share bug reports with developers.</td>
</tr>
</tbody>
</table>

The location and content of the **Enterprise Repository** source file is as follows:

```bash
# cat /etc/apt/sources.list.d/pve-enterprise.list
deb https://enterprise.proxmox.com/debian wheezy pve-enterprise
```

The location and content of the **No-Subscription Repository** source file is as follows:

```bash
# cat /etc/apt/sources.list
deb http://ftp.ca.debian.org/debian wheezy main contrib
deb http://download.proxmox.com/debian wheezy pve-no-subscription
deb http://security.debian.org / wheezy/updates main contrib
```

Proxmox offers a **Test Repository** to allow users to try out new features or packages. As the name implies, the Test Repository should only be used for testing. All the new features of Proxmox are released in the Test Repository before they are available for the No-Subscription and Enterprise repositories. Packages in the Test Repository are not well-tested and may contain bugs. For this reason, the repository should never be used in a production-level cluster. The Test Repository is not enabled by default.
Chapter 1

Getting ready

Log in to the Proxmox node through a console or SSH. The repository source file needs to be edited through CLI to enable the Test Repository.

How to do it...

Use the following steps to set up the Proxmox package repository:

1. Open the repository source file using any favorite text editor:
   
   ```
   #nano /etc/apt/sources.list
   ```

2. Make the necessary changes to make the entries look similar to the following:
   
   ```
   deb http://ftp.debian.org/debian wheezy main contrib
   deb http://download.proxmox.com/debian wheezy pvetest
   deb http://security.debian.org/ wheezy/updates main contrib
   ```

3. Save the file and exit the editor.

4. Run the following command to update the repositories:
   
   ```
   #apt-get update
   ```

How it works...

Usually, the announcement of the availability of a new package is made on the official Proxmox forum (http://forum.proxmox.com). The name of the package or the version information is included in the announcement. If you want to find information on a package, simply ask for it on the forum. Once you have the information, simply run the `apt-get` command to install it through CLI:

```
#apt-get install <package_name>
```

There's more...

Besides Enterprise, No-Subscription, and Test repositories there are two repositories that are outdated and are no longer supported or updated:

- **Outdated stable repository (pve):** This repository has stopped receiving updates after the initial release of Proxmox VE 3.1:
  
  ```
  /etc/apt/sources.list
  deb http://ftp.debian.org/debian wheezy main contrib
  deb http://download.proxmox.com/debian wheezy pve
  deb http://security.debian.org/ wheezy/updates main contrib
  ```
Installing Proxmox

If you're upgrading from Proxmox VE 2.x to 3.x, the second entry in /etc/apt/sources.list needs to be changed from wheezy pve to wheezy pve-no-subscription.

- **Outdated Proxmox VE 2.x stable repository (squeeze pve):** In order to have a stable Proxmox node, it is highly recommended to upgrade and update to the latest stable release of the Proxmox VE.

  `/etc/apt/sources.list`
  ```
  deb http://ftp.debian.org/debian squeeze main contrib
  deb http://download.proxmox.com/debian squeeze pve
  deb http://security.debian.org/ squeeze/updates main contrib
  ```

Seeking support

As mentioned in the beginning of this chapter, Proxmox has a vibrant community of users ready to provide help to anybody in need. There are several ways that a new Proxmox user can seek help and support to learn and extend knowledge of the Proxmox VE:

<table>
<thead>
<tr>
<th>Help and support</th>
<th>Free/subscription</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forum</td>
<td>Free</td>
</tr>
<tr>
<td>Wiki/Documentation</td>
<td>Free</td>
</tr>
<tr>
<td>Customer portal and tickets</td>
<td>Requires subscription</td>
</tr>
<tr>
<td>Proxmox Mailing list</td>
<td>Free</td>
</tr>
<tr>
<td>Proxmox Bug tracker</td>
<td>Free</td>
</tr>
</tbody>
</table>

The forum

The official forum of Proxmox is a gathering place for newbies or experts alike to receive or provide help from the Proxmox community. It is also a vast information resource of past issues and solutions to many problems. A few of the Proxmox staff also spend a significant amount of time in this forum to offer help outside their job responsibilities. There is an array of Proxmox experts willing to help out without expecting anything in return. This is the only place for Free and Community-level subscriptions for Proxmox users to seek support. Visit [http://forum.proxmox.com](http://forum.proxmox.com) to access the official Proxmox forum.
Wiki/Documentation

The Proxmox Wiki site contains a wealth of information on installation, configuration, and the management of Proxmox clusters. All documentation is written in a very easy to understand form with as many illustrations as possible. The use of the Proxmox Wiki page is completely free and requires no registration. Visit https://pve.proxmox.com/wiki/Main_Page for the official Proxmox documentation.

Customer portals and tickets

A customer portal is only available for basic, standard, and premium subscription-level users. Supports tickets must be opened through a customer portal by visiting https://my.proxmox.com/ to receive technical support directly from the Proxmox staff.

Depending on the subscription level, a number of tickets that can be opened varies. Responses are guaranteed within one business day. See the different support levels for subscriptions by visiting https://www.proxmox.com/proxmox-ve/pricing.

Proxmox mailing lists

There are two different mailing lists available from Proxmox:

- **User mailing list**: This mailing list is targeted at general Proxmox users to ask technical questions (http://pve.proxmox.com/cgi-bin/mailman/listinfo/pve-user).
- **Developer mailing list**: This mailing list is for developers who are interested in participating in code-related commits and developmental related questions (http://pve.proxmox.com/cgi-bin/mailman/listinfo/pve-devel).

The Proxmox bug tracker

The Proxmox bug tracker is available to submit and review any bugs found in Proxmox during day-to-day use (https://bugzilla.proxmox.com/). It can also be used to submit new feature requests. Not all features get added to Proxmox, but developers of Proxmox are very forward thinking and apply time appropriate and main stream features to make the Proxmox VE even better.

The Proxmox bug tracker is NOT to be used to ask technical questions or to seek any sort of support.
Where to buy this book

You can buy Proxmox Cookbook from the Packt Publishing website.

Alternatively, you can buy the book from Amazon, BN.com, Computer Manuals and most internet book retailers.

Click here for ordering and shipping details.