Software Management

Linux Fundamentals

Welcome to Software Management.

What you will learn

At the core of the lesson

You will learn to:

- Describe how package managers support software management

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Managing software

Linux distributions have different approaches for managing software:

Red Hat method:	• Red Hat Package Manager (**RPM**) is used to manage software. • Software packages have an .rpm file extension. • The **YUM** utility is a commonly used front-end interface to RPM. • Amazon Linux 2, Red Hat Linux, and CentOS use this method.
Debian method:	• The **dpkg** package manager is used to manage software. • Software packages have a .deb file extension. • Advanced Package Tool (**APT**) is often used as a front end. • Debian and Ubuntu use this method.
Install from source code:	• A GNU Compiler Collection (**GCC**) compiler is used to compile the code. • Compiler turns human-readable code into machine-readable code. • Compiled package can then be installed.

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The approach for managing software varies depending on the Linux distribution type. Features such as the software package format and the utility tools used to install, update, and delete packages are different depending on the source of the distribution.

For a distribution based on Red Hat Linux, software packages are managed using the Red Hat Package Manager (RPM) tool and stored in files with an .rpm extension. A utility called YUM (Yellow Dog Updater, Modified) is commonly used as a front end to RPM. It includes additional features, such as the ability to track package dependencies and configure automatic updates. Note that the Amazon Linux 2 operating system uses this approach for software management.

For a Debian distribution and its derivatives, the dpkg package management tool is used to manage packages that have a .deb file name extension. These distributions also typically provide higher-level tools such as Advanced Package Tool (APT) as a front end to dpkg.

You can also install or update software using a package provided in source code format. To do so, you compile the source code using a compiler, such as an open-source GNU Compiler Collection (GCC) compiler. A GCC provides compilers for various

programming languages, including C, C++, Objective-C, and Go. After the package is compiled, you can install it.

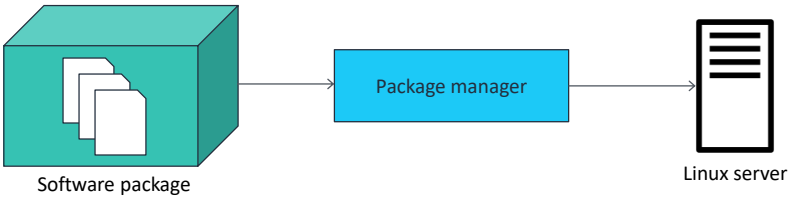
Package managers and packages

Package managers maintain the software through its lifecycle:

- Install
- Update
- Inventory
- Uninstall

Packages contain everything that is needed to install the software:

- Precompiled code
- Documentation
- Installation instructions



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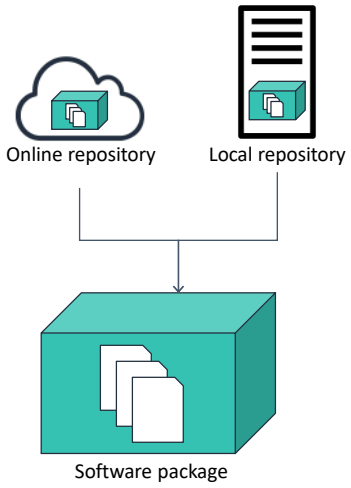
Software in a Linux system is maintained using a package manager such as YUM or RPM. A package manager installs, updates, and deletes software that is bundled in a package. A package contains everything that is needed to install the software, including the precompiled code, documentation, and installation instructions.

The Red Hat and Debian software management methods rely on repositories of software packages.

Repositories

Repositories are servers that contain software packages.

- Repositories can be:
  - Online at a vendor site, which the vendor manages
  - On an internal server, which your administrators manage
  - On the local hard disk drive of the system
- Repositories available to a package manager are typically defined in a configuration file.
- The following are examples of Amazon Linux 2 repositories managed by AWS:
  - amzn2-core
  - amzn2extra-docker



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Software packages are retrieved from a repository that can be hosted in an online or local system. When you use a package manager, you define the location of the repositories that contain the software packages that the manager can access. This repository information is typically defined in a package manager configuration file. For example, for the YUM package manager, the repository information is stored in the **/etc/yum.conf** file.

AWS provides online repositories from which you can download software packages. For example, for Amazon Linux 2, the following repositories are available:

- **amzn2-core**: The main repository containing the latest software packages for the core operating system components
- **amzn2extra-docker**: The repository containing extra software packages specifically for Docker-related components

Using the YUM package manager

```
]$ yum [options] [command] [list of package names]
```

- Install software: `yum -y install <package name>`
  - `-y` = Assume that *yes* is the answer to any confirmation prompt
- Update software: `yum update <package name>`
- Inventory installed software: `yum list installed`
- Uninstall software: `yum remove <package name>`

```
[root@server00 ~]# yum -y install zsh
Loaded plugins: fastestmirror, langpacks
Determining fastest mirrors
epel/x86_64/metalink
 * base: mirrordenver.fdcservers.net
 * epel: mirror.compevo.com
 * extras: mirrors.advancedhosters.com
```


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The YUM package manager can be used to install, update, and remove software packages on Linux distributions based on Red Hat Linux. It also includes commands to list the installed software packages and manage repositories.

The screen capture example shows how to install the Z shell package using the yum command. Z shell is another Linux shell based on the Bourne shell.

Example: View installed software with yum

Combine yum and grep to display specific installed packages.

```
[root@server00 ~]# yum list installed | grep ssh
kssshaskpass.x86_64                          0.5.3-7.el7
libssh2.x86_64                               1.4.3-10.el7_2.1
openssh.x86_64                               7.4p1-16.el7
openssh-clients.x86_64                       7.4p1-16.el7
openssh-server.x86_64                        7.4p1-16.el7
```


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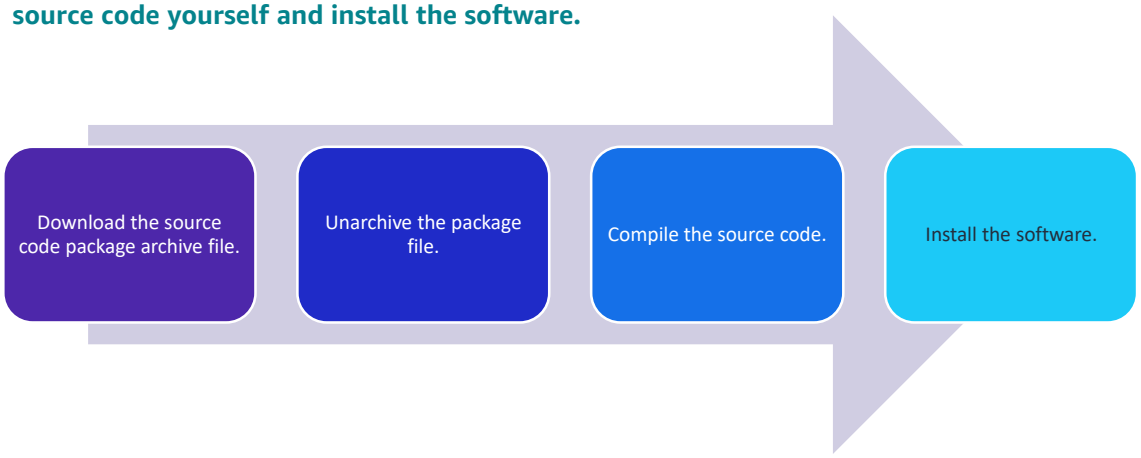
This example shows how to list the software packages installed in the system using the yum command. The grep command filters the resulting output to list only packages related to the Secure Shell (SSH) utility.

Install software from source code

Because Linux programs are usually open source, you can compile the software from source code yourself and install the software.



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The following are the typical steps involved in installing software from source code:

1. **Download the source code package**: Software source code packages are typically compressed archive files called a tarball.
2. **Unarchive the package file**: Tarballs usually have the .**tar.gz** file extension and can be unarchived and decompressed using the **tar** command.
3. **Compile the source code**: A **GCC** compiler can be used to compile the source code into binary code.
4. **Install the software**: Once the source code has been compiled, install the software by following the instructions that are typically included in the package.

File retrieval utilities

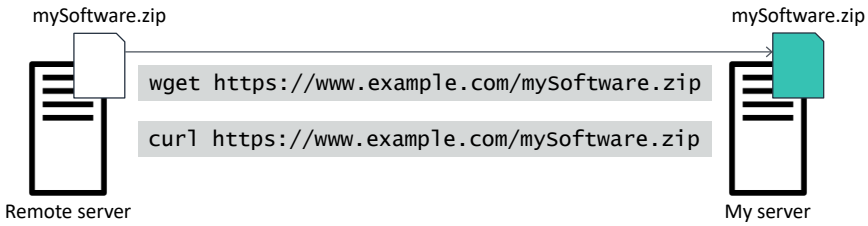
wget and curl are commonly used utilities for retrieving files from other servers.

wget

- Can do a recursive download
- Supports HTTP, HTTPS, and FTP protocols
- Performs retries over an unreliable connection

curl

- Downloads a single resource only
- Supports HTTP, HTTPS, FTP, and many other additional protocols (for example: FTPS and FILE)
- Runs on more platforms than wget



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Two popular utilities, **wget** and **curl**, are commonly used to download files to a server. Both support the HTTP, HTTPS, and File Transfer Protocol (FTP) protocols and provide additional capabilities of their own.

Note the following:

- With wget, you can download a single resource or multiple resources recursively that reside under a given uniform resource locator (URL). It also automatically tries to resume a download if the network connection is broken.
- curl can download only a single resource at a time. But it supports more protocols and runs on more platforms than wget. For example, curl supports the FILE protocol, which you can use to retrieve a file from the local file system.

CURL example: Installing the AWS CLI

1. Download the AWS Command Line Interface (CLI) installation file using the `curl` command.

```
curl "https://awscli.amazonaws.com/awscli-exe-linux-x86_64.zip" -o "awscliv2.zip"
```

2. Unzip the installation file.

```
unzip awscliv2.zip
```

3. Run the installation program.

```
sudo ./aws/install
```


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This slide shows the steps for installing the AWS Command Line Interface (CLI) on a Linux system and provides an example of how the **curl** command can be used:

1. Download the AWS CLI installation file using the **curl** command. The **-o** option specifies the file name that the downloaded package is written to (in this case, **awscliv2.zip**).
2. Unzip the installation file. When the file is unzipped, a directory named **aws** is created under the current directory.
3. Run the installation program. The installation command uses a file named **install** in the newly unzipped **aws** directory.

Checkpoint questions

1. How is the software installed by a package manager provided?
2. What is another way to install software on a Linux system besides using a package manager?
3. Which of the file retrieval utilities—**wget** or **curl**—automatically tries to resume a download operation if the network connection is temporarily interrupted and then restored?

Answers:

1. The software installed by a package manager is provided in a software package.
2. You can also install software on a Linux system from source code.
3. wget automatically attempts to resume a download operation if a network connection is temporarily lost and then restored.

Key takeaways

- **Package managers** are used to install, update, inventory, and remove software on a Linux system.
- The software to be installed is bundled in a **software package**, which contains everything that is needed for the installation.
- Software packages are stored in **repositories**, which can be on a remote or local system.
- **YUM** is the package manager used to manage software on Amazon Linux systems.
- **wget** and **curl** are useful utilities for downloading files from a server.

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Some key takeaways from this lesson include the following:

- **Package managers** are used to install, update, inventory, and remove software on a Linux system.
- The software to be installed is bundled in a **software package,** which contains everything that is needed for the installation.
- Software packages are stored in **repositories,** which can be on a remote or local system.
- **YUM** is the package manager used to manage software on Amazon Linux systems.
- **wget** and **curl** are useful utilities for downloading files from a server.

Thank you

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