

# CT 320: Network and System Administration

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**CHAPTER 12: SOFTWARE INSTALLATION**

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## Topics

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1. The Problem of Software Installation
2. Package Management Systems
3. Using RPM
4. Finding RPMs
5. Building RPMs

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## Software Installation

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1. **Customization**
  - Select options like language.
  - Select file set.
2. **Install new files in appropriate locations.**
3. **Modify existing configuration files.**
4. **Make software available to user.**
  - Shell configuration (PATH, etc.)
  - GUI configuration (menu, icons, etc.)

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## What's the problem?

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- **What prerequisites does your software have?**
  - What prereqs do your prereq packages have?
- **How do you handle conflicts?**
  - What if two programs install/modify same file?
- **How do you handle upgrades?**
  - What if user has customized configuration?
  - What if ownerships/permissions have changed?
  - What if user needs old and new versions?
- **How do you uninstall software?**

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## Package Manager Features

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- Build management.
- Dependency tracking.
- Querying.
- Reversibility.
- Verification.
- Version control.

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## UNIX Package Management Systems

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- **Debian:** **dpkg** and APT (advanced package tool)
- **Ubuntu:** same as above, same packages to
- **Solaris:** **pkg-add** packaging system
- **GentooL portage** with emerge command
- **Slackware:** **installpkg** manages **.tgz** files
- **FreeBSD:** BSD **ports** and packages collection
- **RedHat:** **rpm** packaging system.
  - **up2date:** RHEL interface to RPM
  - **urpmi:** Mandriva interface to RPM
  - **yast:** SuSE interface to RPM
  - **yum:** Fedora interface to RPM

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## RPM Package Names

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`<name>-<version>-<release>.<arch>.rpm`

**Name:** name of the software package.

**Version:** version of the software package.

**Release:** release version of the RPM.

**Arch:** architecture (`i386`, `noarch`, `ppc`, etc.)

If Arch is `src`, RPM contains source code for building the package.

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## RPM Package Contents

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- **Identification**
  - Identifies package and RPM version.
- **Signature**
  - Checksum and digital signature.
- **Header**
  - Package and version information.
  - Specifies dependencies on other packages.
- **Payload**
  - Actual files to install.
  - Stored as `cpio` archive compressed with `gzip`.
  - Use `rpm2cpio` to obtain `cpio` archive.

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## Using RPM

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1. Install
2. Uninstall
3. Upgrade
4. Query
5. Verify

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## Installing a Package (rpm)

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1. Check the package and the files it wants to install.
2. Perform preinstallation tasks.
3. Uncompress the files and copy them in the proper locations
4. Perform post-processing tasks
5. Update the RPM Database

```
> rpm -Uvh foo-1.0-1.i386.rpm
Preparing... ##### [100%]
1:foo      ##### [100%]
```

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## Upgrading a Package (rpm)

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- Uninstall + install, retaining configuration files.
  - Will install a package if no older version.
  - Will remove all older versions.

```
> rpm -Uvh foo-1.0-1.i386.rpm
Preparing... ##### [100%]
1:foo      ##### [100%]
```

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## Uninstalling a Package (rpm)

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- Completely removes package from system.

```
> rpm -e foo-1.0-1
> rpm -q foo
package foo is not installed.
```

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## Dependencies

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- Prevent install/removal if unfulfilled.

```
# rpm -e setup
error: Failed dependencies:
setup is needed by (installed) baselayout-8.0-1
setup >= 2.0.3 is needed by (installed)
  initscripts-6.95-1
setup >= 2.5.4-1 is needed by (installed)
  filesystem-2.1.6-5
setup is needed by (installed) xinetd-2.3.7-2
setup is needed by (installed) dump-0.4b28-4
# rpm -q setup
setup-2.5.20-1
```

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## Dependency Resolution

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- Higher level tools handle dependencies
  - `up2date`, `yum`
- Automatic resolution + downloading.
  1. Find dependencies in RPM headers.
  2. Download dependencies, check their headers.
  3. Repeat.
  4. Install after all RPMs downloaded.

Download sites:

```
rpm: /etc/sysconfig/rhn/sources
yum: /var/cache/yum
```

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## RPM Options

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- Specify multiple RPMs at once.
  - RPM will order them to resolve dependencies.
- Prefix: install in new location.
  - `rpm --prefix /usr/local -Uvh *.rpm`
- Oldpackage: revert to an older version
  - `rpm --oldpackage -Uvh foo-0.9-2.i386.rpm`
- Forcing install, upgrade, or removal
  - `--force` allows overwriting of files/packages.
  - `--nodeps` allows install w/o dependency check.

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## Just Testing

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- Testing (`--test`) discovers common errors:
  - Package already installed.
  - Package needs dependencies.
- Root (`--root /tmp`) changes fs root.
  - Performs installs in `chroot()` environment.
  - Allows you to test software installs without impacting your running RPM database/pkgs.

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## Querying the RPM Database

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```
# rpm -q telnet
telnet-0.17-31.EL4.3
# rpm -ql telnet
/usr/bin/telnet
/usr/share/man/man1/telnet.1.gz
# rpm -qi telnet
Name       : telnet                Relocations: (not)
Version    : 0.17                 Vendor: CentOS
Release    : 31.EL4.3           Build Date: Tue 14 Jun 2005
Install Date: Sat 11 Feb 2006   Build Host: build5
Group      : Applications/Internet Src RPM: telnet-0.17.src.rpm
Size       : 87254               License: BSD
Signature  : DSA/SHA1, Tue 14 Jun 2005, Key ID a53d0bab443e1821
Packager   : Johnny Hughes <johnny@centos.org>
Summary    : Client program for telnet remote login protocol.
Description:
Telnet is a popular protocol for logging into remote systems
over the Internet. The telnet package provides a command line
telnet client.
```

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## Querying the RPM Database

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```
# rpm -qc bash
/etc/skel/.bash_logout
/etc/skel/.bash_profile
/etc/skel/.bashrc
# rpm -qd sendmail
/usr/share/man/man1/mailq.sendmail.1.gz
/usr/share/man/man1/newaliases.sendmail.1.gz
/usr/share/man/man5/aliases.sendmail.5.gz
/usr/share/man/man8/mailstats.8.gz
/usr/share/man/man8/makemap.8.gz
/usr/share/man/man8/praliases.8.gz
/usr/share/man/man8/rmail.8.gz
/usr/share/man/man8/sendmail.sendmail.8.gz
/usr/share/man/man8/smrsh.8.gz
```

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## Searching all Packages

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```
# rpm -qa | grep telnet
telnet-0.17-31.EL4.3
# rpm -qa | grep py
python-2.3.4-14.1
pyOpenSSL-0.6-1.p23
rpm-python-4.3.3-11_nonpt1
pygtk2-2.4.0-1
python-devel-2.3.4-14.1
python-ldap-2.0.1-2
pyxf86config-0.3.19-1
libxml2-python-2.6.16-6
python-elementtree-1.2.6-4
python-sqlite-1.1.6-1
dbus-python-0.22-12.EL5
pyparted-1.6.8-2
python-urlgrabber-2.9.6-2
```

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## Querying Files and Packages

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- Finding owners
  - # rpm -qf /usr/bin/telnet
  - telnet-0.17-31.EL4.3
  - # rpm -qf /etc/security/limits.conf
  - pam-0.77-66.11
- Querying packages
  - Add `-p` to any query to apply it to a `.rpm` file instead of to an installed package.

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## Verifying Packages

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- Verifying a package returns nothing if ok
  - # rpm -V telnet
- Returns errors if package has problems
  - # rpm -V telnet-server
  - missing c /etc/xinetd.d/telnet
  - missing /usr/sbin/in.telnetd
  - missing d /usr/share/man/man5/issue.5.gz

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## Finding RPMs

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1. The Red Hat Enterprise Linux CD-ROMs
2. The Red Hat Errata Page available at <http://www.redhat.com/apps/support/errata/>
3. A Red Hat FTP Mirror Site available at <http://www.redhat.com/download/mirror.html>
4. Dag RPM Repository at <http://dag.wieers.com/home-made/apt/>
5. Search for RPMs at [www.rpmfind.net](http://www.rpmfind.net).
6. Search for RPMs at rpm.pbone.net.

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## Building from Source

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- Most free software uses autoconf:
  - tar xzf *software\_package*
  - cd *software\_package*
  - patch <./package.patch
  - ./configure
  - make
  - su
  - make install

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## Building Source RPMs

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1. Install the source RPM.  
`rpm -ivh foo-1.0-2.src.rpm`
2. Move to the build directory.  
`cd /usr/src/redhat`  
SOURCES: Contains archive of sources + patches.  
SPEC: SPEC files describe how to build RPMs.  
BUILD: The actual build takes place here.  
RPMS: Binary RPMs stored under arch subdirs.  
SRPMS: Source RPMs stored here.

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## Building Source RPMs

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### 3. Use rpmbuild to build the RPMs.

```
rpmbuild -ba SPECS/foo.spec
```

### 4. Copy or install RPMs.

```
ls -l RPMS  
ls -l SRPMS
```

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## The SPEC File

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### • Introduction

- Descriptions that `rpm -qi` shows you.
- One desc/pkg, as one SRPM may build multiple binary RPMs.

### • Prep

- Extracting the source code and patching it.

### • Build

- Configures package and runs `make`.

### • Install

- Copies files to right locations, sets owner+perms.

### • Clean

- Removes files created by build that are no longer needed.

### • Files

- Lists files to go into each RPM.

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## Why build Source RPMs?

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### 1. No binary RPM exists for your Linux.

### 2. Features

RPM exists, but feature you want disabled.

### 3. Optimization

Modify SPEC file to optimize for your arch.

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## yum Package Installation

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```
# yum install postgresql.x86_64  
Resolving Dependencies  
Install      2 Package(s)  
Is this ok [y/N]: y  
  
Package(s) data still to download: 3.0 M  
(1/2): postgresql-9.0.4-5.fc15.x86_64.rpm | 2.8 MB 00:11  
(2/2): postgresql-libs-9.0.4-5.fc15.x86_64.rpm | 203 kB 00:00  
-----  
Total                                          241 kB/s | 3.0 MB    00:12  
  
Running Transaction  
  Installing : postgresql-libs-9.0.4-5.fc15.x86_64      1/2  
  Installing : postgresql-9.0.4-5.fc15.x86_64          2/2
```

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## yum Package Removal

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```
# yum remove postgresql.x86_64
Resolving Dependencies
--> Package postgresql.x86_64 0:9.0.4-5.fc15 will be erased

Is this ok [y/N]: y

Running Transaction
Erasing   : postgresql-9.0.4-5.fc15.x86_64      1/1

Removed:
  postgresql.x86_64 0:9.0.4-5.fc15
```

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## yum Package Info

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```
# yum info samba-common.i686
Available Packages
Name       : samba-common
Arch       : i686
Epoch     : 1
Version    : 3.5.11
Release    : 71.fc15.1
Size       : 9.9 M
Repo       : updates
Summary    : Files used by Samba servers and clients
URL        : http://www.samba.org/
License    : GPLv3+ and LGPLv3+
Description: Samba-common provides files necessary for both the
server and client packages of Samba.
```

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## yum Other Commands

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```
# yum update postgresql.x86_64 // update package
# yum list | less // list packages
# yum search firefox // search packages
Loaded plugins: langpacks, presto, refresh-packagekit
===== N/S Matched: firefox =====
firefox.x86_64 : Mozilla Firefox Web browser
gnome-do-plugins-firefox.x86_64 : gnome plugins for firefox
mozilla-firetray-firefox.x86_64 : System tray for firefox
mozilla-adblockplus.noarch : Adblocking extension for Firefox
mozilla-noscript.noarch : JavaScript list extension for Firefox

Name and summary matches only, use "search all" for everything.
```

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## References

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