RPM and Yum
How to manage your packages without UPS

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What is RPM?

What is a Package?

Why should I have packages? Why not just zip files or something?

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Some Things to Read

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What is RPM?

- RPM stands for The RPM Package Manager.
  - It used to stand for Red Hat Package Manager
- It is used to manage packages.
  - “Oh, I see.”
  - ... no I don’t...
What is an RPM Package?

- It’s a piece of software, all put in one RPM file.
- For example, I am using the... let’s see...
  
  ```bash
  $ rpm -q evince
  evince-0.5.1-3
  ```
  ...software package to display these notes.
- The **name** of the package is `evince`.
- The **version** of the package is `0.5.1`.
- The **release** is `3`. 
An RPM Package usually contains files

▶ **My evince package has files inside:**

```bash
$ rpm -ql evince
/etc/gconf/schemas/evince-thumbnailer.schemas
/etc/gconf/schemas/evince.schemas
/usr/bin/evince
...
/usr/share/omf/evince/evince-sr.omf
/usr/share/omf/evince/evince-uk.omf
```
Why should I have packages? Why not just zip files or something?

- We could just have zip files, or tar balls, or something like that, with just the files inside?
- It could work.
- So why have RPM packages?
Advantages of RPM packages

- You can install a new package easily with one operation
- You can uninstall a package just as easily
- The package can contain information about what else it needs to work properly
- RPM won’t clobber configuration files, and does sensible things with them
- The RPM system includes a database with lots of information about how the files should be installed, their size, owner, type,…
RPM Commands

There are seven main RPM operations:

- For installing software packages:
  - *update, install, freshen*
- For making *queries*
- For *erasing* packages
- For *verifying* that a software package is correctly installed
- For *checking signatures* — verifying that an RPM package file is really from the people you trust, and not from Joe Trojan Cracker
Queries

- You saw above that I can list the files with
  \$ rpm -ql evince

- I can also see information about the package with
  \$ rpm -qi evince

- Try it now!
Install

- This will install a software package, regardless of whether there is a previous version installed.
- This is always the right thing to do for kernels.
Update

- Install a package if it is not installed, or
- install a newer version if there is a newer version available...
- ... otherwise, do nothing.
- Let's use this command to install the wonderful Planet Penguin Racer game:
  - `cd ~/mnt`
  - `ls -l`
  - `$ sudo rpm -Uhv $(ls|grep -v kernel)`
Freshen

- Install a new version of a package only if an older one is already installed, otherwise do nothing.
Erasing

- Remove a package:
  
  ```bash
  $ sudo rpm -e ppracer
  ```
Verifying

- Checking the files in a package all match the original data
- If it doesn’t match, then flags show this:

<table>
<thead>
<tr>
<th>flag</th>
<th>what it means</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>file Size differs</td>
</tr>
<tr>
<td>M</td>
<td>Mode differs (includes permissions and file type)</td>
</tr>
<tr>
<td>5</td>
<td>MD5 sum differs</td>
</tr>
<tr>
<td>D</td>
<td>Device major/minor number mismatch</td>
</tr>
<tr>
<td>L</td>
<td>symbolic Link points to wrong place</td>
</tr>
<tr>
<td>U</td>
<td>User ownership differs</td>
</tr>
<tr>
<td>G</td>
<td>Group ownership differs</td>
</tr>
<tr>
<td>T</td>
<td>Time differs</td>
</tr>
<tr>
<td>C</td>
<td>selinux security Context differs</td>
</tr>
</tbody>
</table>

$ rpm -V setup
S.5....T. c /etc/aliases
S.5....TC c /etc/bashrc
........C c /etc/exports
S.5....T. c /etc/printcap
S.5....TC c /etc/profile
S.?....T. c /etc/securetty
First, you need to *import* the public keys that are provided by Fedora:

```bash
$ sudo rpm --import /etc/pki/rpm-gpg/RPM-GPG-KEY*
```

```bash
$ rpm -K ⟨package-file.rpm⟩
```
## RPM Command Examples

<table>
<thead>
<tr>
<th>Command</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>rpm -qa</td>
<td>less</td>
</tr>
<tr>
<td>rpm -q httpd</td>
<td>show the version of the httpd package, if it is installed</td>
</tr>
<tr>
<td>rpm -qa</td>
<td>grep httpd</td>
</tr>
<tr>
<td>rpm -ql httpd</td>
<td>list all files in the httpd package</td>
</tr>
<tr>
<td>rpm -qd httpd</td>
<td>list all documentation files in the httpd package</td>
</tr>
<tr>
<td>rpm -qc httpd</td>
<td>list all configuration files in the httpd package</td>
</tr>
<tr>
<td>rpm -qi httpd</td>
<td>display information about the package</td>
</tr>
<tr>
<td>rpm -V httpd</td>
<td>verify that the httpd package is correctly installed</td>
</tr>
<tr>
<td>rpm -qf /etc/passwd</td>
<td>determine which package the /etc/passwd file belongs to</td>
</tr>
</tbody>
</table>
A quick comparison with `dpkg`

<table>
<thead>
<tr>
<th>command</th>
<th>effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>`dpkg -list</td>
<td>less`</td>
</tr>
<tr>
<td><code>dpkg -l httpd</code></td>
<td>show the version of the <code>httpd</code> package, if it is installed</td>
</tr>
<tr>
<td>`dpkg -list</td>
<td>grep httpd`</td>
</tr>
<tr>
<td><code>dpkg -listfiles httpd</code></td>
<td>list all files in the <code>httpd</code> package</td>
</tr>
<tr>
<td><code>dpkg -print-avail httpd</code></td>
<td>display information about the package</td>
</tr>
<tr>
<td><code>dpkg -S /etc/passwd</code></td>
<td>determine which package the <code>/etc/passwd</code> file belongs to</td>
</tr>
</tbody>
</table>
Yum

- Yum is a high level wrapper for RPM
- Uses the information in the RPM packages to figure out what things to install
- downloads the files you need, and installs them, lovingly taking care of which packages depend on what.
Why not stick with RPM?

- RPM is good, but it’s too low level to easily manage all the packages on the system
- Yum uses the information in the RPM database, and the RPM files themselves to make sure that each software package has everything it needs.
What’s all this primitive text stuff?

- There are many GUI programs that use yum as their backend
- I have never used any of them, so your exercise is to Google for them!
Updates

- Software has bugs
- Fedora particularly has many new versions of software that are being made available, since it aims to provide the current version of most pieces of software.
- Fedora has more updates than any other stable distribution I know of.
- Only a few are for security reasons, most are for updates.
Why update? Why not update?

Why update?
- The easiest systems to crack have no updates.

Why not update?
- Updating can break a working system
- But that doesn’t stop me from keeping my systems updated!
- ... but not good if your business loses thousands of dollars per second of downtime.
  - In such cases, you have a test system where you test the updates first, check they don’t stop your applications from working
How to update

Do this once only:

- Ensure your own account is in the `sudoers` file
  - see the `sudo` handout
- set your `http_proxy` environment variable
  - See the next section: 39 on the following page

Do this for each update:

- then do:
  
  `sudo yum -y update` ←

- and watch it go.
Setting `http_proxy`

If access to web servers on the Internet is blocked by a firewall, and a proxy server is required, such as here in the TAFE:

- You need to set the `http_proxy` environment variable.
- The proxy server here has the DNS name “gw”, and listens on port 5865...
- ... so set the `http_proxy` like this:
  ```
  export http_proxy=http://gw:5865/
  ```
- The best thing to do is to edit your login script `~/.bash_profile` and add it at the end:
  ```
  emacs ~/.bash_profile &
  ```
- Then log out and log in...
- You should be able to see the value now:
  ```
  $ echo $http_proxy
  http://gw:5865/
  ```
The “repos”: repositories

- In the `/etc/yum.repos.d` directory are some files that end with “.repo”
- You can change these, add other repos (such as dag, freshrpms, atrpms, livna)
- You can also change the `baseurl` to a local Australian mirror (see http://fedora.redhat.com/Download/mirrors.html for a list of Australian mirrors)
Adding extras

- Well, the fedora extras repository is already enabled, so nothing to do here.
If you add the `dag`, `freshrpms`, `atrpms` or `livna` repositories, you should import their public keys, and enable checking the GPG signatures of the packages.

For example, here is my 

`/etc/yum.repos.d/dag.repo` file:

```ini
[dag]
name=Dag RPM Repository for Fedora Core
enabled=1
gpgcheck=1
```
Dr. Peter Salus.  
_The Daemon, the GNU & the Penguin._  
Grocklaw 2006.  

Eric Foster-Johnson.  
_RPM Guide._  

_The RPM Package Manager._  
http://rpm.org/

Wikipedia entry.  
_Yellow dog Updater, Modified._  
http://en.wikipedia.org/wiki/Yellow_dog_Updater,_Modified
Topics Covered

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- How to update
  - Setting `http_proxy`

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- Adding extras
- Digital signatures

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