**Log in as linuxuser to do this exercise.**

**Using dpkg:**

Let’s list all installed packages:

|  |
| --- |
| **sudo dpkg --list sudo dpkg -l** |

\*\* Note how you have long form and short forms for the same command \*\*

If you want to list information about a specific package:

|  |
| --- |
| **sudo dpkg --list bash** |

Desired=Unknown/Install/Remove/Purge/Hold  
| Status=Not/Inst/Conf-files/Unpacked/halF-conf/Half-inst/trig-aWait/Trig-pend  
|/ Err?=(none)/Reinst-required (Status,Err: uppercase=bad)  
||/ Name Version Architecture Description  
+++-================-=============-=============-=====================================  
ii bash 4.3-14ubuntu1 amd64 GNU Bourne Again SHell

Note the first three columns. The ii status indicates that the bash package is desired to be installed and is currently installed. If there was an error with the package, there would be a value in the third column

You can also list multiple packages at once:

|  |
| --- |
| **sudo dpkg --list ninvaders tree python3** |

ii ninvaders 0.1.1-3build1 amd64 A space invaders-like game using ncur  
ii python3 3.5.1-3 amd64 interactive high-level object-oriente  
ii tree 1.7.0-3 amd64 displays an indented directory tree,

You can get more information about a package by checking its status:

|  |
| --- |
| **sudo dpkg --status ninvaders** |

Package: ninvaders  
Status: install ok installed  
Priority: optional  
Section: games  
Installed-Size: 48  
Maintainer: Ubuntu Developers <ubuntu-devel-discuss@lists.ubuntu.com>  
Architecture: amd64  
Version: 0.1.1-3build1  
Depends: libc6 (>= 2.4), libncurses5 (>= 6), libtinfo5 (>= 6)  
Description: A space invaders-like game using ncurses  
Get a list of all the files that make up a package:

|  |
| --- |
| **sudo dpkg --listfiles ninvaders** |

/.  
/usr  
/usr/share  
/usr/share/menu  
/usr/share/menu/ninvaders  
/usr/share/doc  
/usr/share/doc/ninvaders

---- more files listed ----  
  
If you’re not sure what package a file in your filesystem belongs to, you can search the packages for the matching file:

|  |
| --- |
| **sudo dpkg --search /usr/share/doc/ninvaders** |

ninvaders: /usr/share/doc/ninvaders  
  
The highlighted text above shows that the file /usr/share/doc/ninvaders belongs to the ninvaders package.

Let’s copy a package file so that we can install from a file:

|  |
| --- |
| **cp /scripts/moon-buggy\_1.0.51-9.1\_amd64.deb ./** |

Let’s view the contents of the .deb file:

|  |
| --- |
| **sudo dpkg --contents ./moon-buggy\_1.0.51-9.1\_amd64.deb** |

drwxr-xr-x root/root 0 2012-05-02 07:01 ./  
drwxr-xr-x root/root 0 2012-05-02 07:01 ./usr/  
drwxr-xr-x root/root 0 2012-05-02 07:01 ./usr/games/  
-rwxr-sr-x root/games 77184 2012-05-02 07:01 ./usr/games/moon-buggy

---- more files listed ----

Install the .deb package:

|  |
| --- |
| **sudo dpkg -i ./moon-buggy\_1.0.51-9.1\_amd64.deb** |

(Reading database ... 133995 files and directories currently installed.)  
Preparing to unpack moon-buggy\_1.0.51-9.1\_amd64.deb ...  
Unpacking moon-buggy (1.0.51-9.1) over (1.0.51-10build1) ...  
Setting up moon-buggy (1.0.51-9.1) ...  
Processing triggers for install-info (6.1.0.dfsg.1-5) ...  
Processing triggers for man-db (2.7.5-1) ...

Now that we’ve installed the package, we can check its status:

|  |
| --- |
| **sudo dpkg --status moon-buggy** |

Package: moon-buggy  
Status: install ok installed  
Priority: optional  
Section: games  
Installed-Size: 328

---- more lines below ----  
  
We’ve installed all the moon-buggy files and created a new entry in the **local** database for the moon-buggy software.

Ubuntu will update this software if there is a new version available or if you download a newer file.

To delete a package:

|  |
| --- |
| **sudo dpkg --purge moon-buggy sudo dpkg --remove ninvaders** |

--purge remove all package files including configuration files

--remove remove all package files, but retain configuration files

If we list the packages, we can see that there are configuration files left behind:

|  |
| --- |
| **sudo dpkg --list ninvaders moon-buggy** |

Desired=Unknown/Install/Remove/Purge/Hold  
| Status=Not/Inst/Conf-files/Unpacked/halF-conf/Half-inst/trig-aWait/Trig-pend  
|/ Err?=(none)/Reinst-required (Status,Err: uppercase=bad)  
||/ Name Version Architecture Description  
+++-================-=============-=============-=====================================  
rc ninvaders 0.1.1-3build1 amd64 A space invaders-like game using ncur  
dpkg-query: no packages found matching moon-buggy

Note the first three columns. The rc status indicates that the ninvaders package is removed and has configuration files. If there was an error with the package, there would be a value in the third column  
  
**Using apt (Advanced Packaging Tools)**

Instead of using dpkg, we’ll use apt to get a list of our packages:

|  |
| --- |
| **sudo apt list ninvaders moon-buggy bash** |

bash/xenial-updates,xenial-security,now 4.3-14ubuntu1.2 amd64 [installed]  
moon-buggy/xenial 1.0.51-10build1 amd64  
ninvaders/xenial,now 0.1.1-3build1 amd64 [residual-config]

Notice how we can tell whether or not the package is installed (bash), not installed (moon-buggy), or has been removed but still has config files (ninvaders)  
  
If we want to see the details of a package using apt:

|  |
| --- |
| **sudo apt show ninvaders** |

Package: ninvaders  
Version: 0.1.1-3build1  
Priority: optional  
Section: universe/games  
Origin: Ubuntu

---- more lines below ----

To see what dependencies ninvaders has (ie. things that need to be installed before it will work):

|  |
| --- |
| **sudo apt-cache depends ninvaders** |

ninvaders  
 Depends: libc6  
 Depends: libncurses5  
 Depends: libtinfo5

And to see what depends on ninvaders to be installed before it can run:

|  |
| --- |
| **sudo apt-cache rdepends ninvaders** |

ninvaders  
Reverse Depends:  
 games-console

To install our games using apt:

|  |
| --- |
| **sudo apt install ninvaders moon-buggy** |

eading package lists... Done  
Building dependency tree   
Reading state information... Done  
The following NEW packages will be installed:  
 moon-buggy ninvaders  
0 upgraded, 2 newly installed, 0 to remove and 52 not upgraded.  
Need to get 214 kB of archives.

---- more lines below ----

Apt would install any needed dependencies when it installs new software since it has access to the repository of all packages. Dpkg cannot do that since it is installing from a local file.  
  
To remove and purge like we did with dpkg:

|  |
| --- |
| **sudo apt remove ninvaders sudo apt purge moon-buggy** |

remove will leave configuration files

purge will remove everything including configuration files

Upgrading your system

First, you need an updated list of packages from your repository:

|  |
| --- |
| **sudo apt update** |

Hit:1 http://us-central1.gce.archive.ubuntu.com/ubuntu xenial InRelease  
Get:2 http://us-central1.gce.archive.ubuntu.com/ubuntu xenial-updates InRelease [102 kB]  
Get:3 http://us-central1.gce.archive.ubuntu.com/ubuntu xenial-backports InRelease [102 kB]  
Get:4 http://us-central1.gce.archive.ubuntu.com/ubuntu xenial-updates/main amd64 Packages [734 kB]  
Get:5 http://us-central1.gce.archive.ubuntu.com/ubuntu xenial-updates/universe amd64 Packages [591 kB]  
Hit:6 http://archive.canonical.com/ubuntu xenial InRelease   
Hit:7 http://ppa.launchpad.net/tmate.io/archive/ubuntu xenial InRelease   
Get:8 http://security.ubuntu.com/ubuntu xenial-security InRelease [102 kB]   
Fetched 1,632 kB in 1s (979 kB/s)   
Reading package lists... Done  
Building dependency tree   
Reading state information... Done  
52 packages can be upgraded. Run 'apt list --upgradable' to see them.

This is the important line. It tells you how many packages can be upgraded.

If you want to see a list of package that would be upgraded:

|  |
| --- |
| **sudo apt list --upgradable** |

libsmartcols1/xenial-updates 2.27.1-6ubuntu3.4 amd64 [upgradable from: 2.27.1-6ubuntu3.3]  
libuuid1/xenial-updates 2.27.1-6ubuntu3.4 amd64 [upgradable from: 2.27.1-6ubuntu3.3]  
linux-gcp/xenial-updates,xenial-security 4.13.0.1011.13 amd64 [upgradable from: 4.13.0.1008.10]

---- more lines listed ----

If you want to execute the upgrade:

|  |
| --- |
| **sudo apt upgrade** |

---- lines omitted ----

52 upgraded, 3 newly installed, 0 to remove and 0 not upgraded.  
Need to get 27.2 MB/60.3 MB of archives.  
After this operation, 160 MB of additional disk space will be used.  
Do you want to continue? [Y/n]

****