

Processes and Job Control

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What You Will Learn

- List running processes.
- Foreground vs background processes.
- Launch background processes.
- Kill processes.

Listing Processes and Information:

ps Display process status.

ps Options:

-e # Everything, all processes.

-f # Full format listing.

-u username # Display username's processes.

-p pid # Display information for PID.

Common ps Commands:

ps	-e	# Display all processes.
ps	-ef	# Display all processes, full.
ps	-eH	# Display a process tree.
ps	-e --forest	# Display a process tree.
ps	aux	# Display user's processes.

Other ways to view processes:

- pstree # Display processes in a tree format.
- Top # Interactive process viewer.
- Htop # Interactive process viewer.

Background and Foreground Processes:

command &

Start command in background.

Ctrl-c

Kill the foreground process.

Ctrl-z

Suspend the foreground process.

Bg [%num]

Background a suspended process.

Fg [%num]

Foreground a background process.

Kill

Kill a process by job number or PID.

jobs [%num]

List jobs.

Killing Processes:

- Ctrl-c # Kills the foreground proc.
- kill [-sig] pid # Send a signal to a process.
 - Kill –kill %job_no
- kill -l # Display a list of signals.
- kill 123
- kill -15 123
- kill -TERM 123
- kill -9 123

Summary:

- ps
- Ctrl-c
- Ctrl-Z
- bg
- fg
- jobs
- kill

Scheduling Repeated Jobs with Cron

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What You Will Learn:

- Cron service
- Crontab format
- Crontab command

Cron:

- cron - A time based job scheduling service.
- crontab - A program to create, read, update, and delete your job schedules.
- Use cron to schedule and automate tasks.

Crontab Format:

* * * * * command

| | | | |

					Day of the Week	(0-6)
				---	Month of the Year	(1-12)
		-----	Day of the Month	(1-31)		
	-----	Hour		(0-23)		
-----	-----	Minute			(0-59)	

Example Crontab Entry:

```
# Run every Monday at 07:00.  
0 7 * * 1 /opt/sales/bin/weekly-report
```

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| | | | |  
| | | | +-- Day of the Week      (0-6)  
| | | +--- Month of the Year   (1-12)  
| | +----- Day of the Month    (1-31)  
| +----- Hour                  (0-23)  
+----- Minute                 (0-59)
```

Redirecting Output:

Run at 02:00 every day and send output to a log file.

```
0 2 * * * /root/backupdb > /tmp/db.log 2>&1
```

Crontab Shortcuts:

@yearly 0 0 1 1 *

@annually 0 0 1 1 *

@monthly 0 0 1 * *

@weekly 0 0 * * 0

@daily 0 0 * * *

@midnight 0 0 * * *

@hourly 0 * * * *

Using the Crontab Command:

crontab file

Install a new crontab from file.

crontab -l

List your cron jobs.

crontab -e

Edit your cron jobs.

crontab -r

Remove all of your cron jobs.

Switching Users and Running Commands as Others

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The su Command:

```
$ su [username]          # Change user ID or become superuser
```

su Options:

- A hyphen is used to provide an environment similar to what the user would expect had the user logged in directly.
- c command Specify a command to be executed.

Sudo - Super User Do:

```
$ sudo      # Execute a command as another user, typically the  
           superuser.
```

Using sudo:

sudo	-l		List available commands.
sudo	command		Run command as root.
sudo	-u root	command	Same as above.
sudo	-u user	command	Run as user.

Using sudo:

sudo su Switch to the superuser account.

sudo su - Switch to the superuser account with root's environment.

sudo su - username Switch to the username account.

Using sudo:

sudo	-s		Start a shell
sudo	-u	root -s	Same as sudo -s
sudo	-u	user -s	Start a shell as user

Changing the sudo Configuration:

\$ visudo Edit the /etc/sudoers file

Sudoers File Format:

user host=(users) [NOPASSWD:]commands

adminuser ALL=(ALL) NOPASSWD:ALL

oracle linuxsvr=(root) /etc/init.d/oracle

Summary:

- Use su to switch users.
- The sudo command allows you to run programs as others.
- To switch users with sudo, use sudo -s or sudo su.
- Use visudo to edit the sudoers file.

Shell History and Autocompletion

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What You Will Learn:

- Shell History
- Exclamation Mark Syntax
- Autocompletion

Shell History:

- Executed commands are added to the history.
- Shell history can be displayed and recalled.
- Shell history is stored in memory and on disk.

`~/.bash_history`

`~/.history`

`~/.histfile`

history Command:

```
$ history          # Displays the shell history.
```



```
$ HISTSIZE        # Controls the number of commands to retain in  
                   history.
```



```
$ export HISTSIZE=1000
```

! Syntax:

!N

Repeat command line number N.

!!

Repeat the previous command line.

!string

Repeat the most recent command starting with "string."

Searching Shell History:

-- Ctrl - r	# Reverse shell history search
-- Enter	# Execute the command
-- Arrows	# Change the command
-- Ctrl - g	# Cancel the search

Tab Completion:

Tab autocompletion

- Commands
- Files, directories, paths,
- Environment Variables
- Usernames (~)

Installing and Managing Software

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What You Will Learn

- Packages
- Package Managers
- Managing software for RPM based distros
- Managing software for DEB based distros

Package:

- A collection of files
- Data / Metadata
 - Package description
 - Version
 - Dependencies

Package Manager:

- Installs, upgrades, and removes packages
- Manages dependencies
- Keeps track of what is installed

Installing Software on RPM Distros:

- RedHat
- CentOS
- Fedora
- Oracle Linux
- Scientific Linux

Yum (Yellow Dog Update Manager):

yum search string

Search forstring

yum info [package]

Display info

yum install [-y] package

Install package

yum remove package

Remove package

Rpm:

\$ rpm -qa

List all installed packages.

\$ rpm -qf /path/to/file

List the file's package.

rpm:

rpm -ql package

List package's files.

rpm -ivh package.rpm

Install package.

rpm -e package

Erase (uninstall) package.

Installing Software on DEB Distros:

- Debian
- Linux Mint
- Ubuntu

APT - Advanced Packaging Tool:

\$ apt-cache search string

Search for string.

\$ apt-get install [-y] package

Install package.

\$ apt-get remove package

Remove package, leaving configuration.

APT - Advanced Packaging Tool:

\$ apt-get purge package

Remove package, deleting configuration.

\$ apt-cache show package

Display information about package.

Dpkg:

\$ dpkg -l

List installed packages.

\$ dpkg -S /path/to/file

List file's package.

Dpkg:

\$ dpkg -L package

List all files in package.

\$ dpkg -i package.deb

Install package.

Summary:

- Package
- Package Manager
- RPM
 - yum
 - rpm
- DEB
 - apt
 - dpkg

Managing Users and Groups

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What You Will Learn

- How to manage users and groups.
- Where user and group information lives.
- How to add, delete, and change users and groups.

User Account have a:

- Username (or login ID).
- UID (user ID). This is a unique number.
- Default group.
- Comments.
- Shell.
- Home directory location.

/etc/passwd

The format of the /etc/passwd:

username:password:UID:GID:comments: home_dir:shell

Example:

root:x:0:0:root:/root:/bin/bash

vagrant:x:1000:1000:vagrant:/home/vagrant:/bin/bash

Usernames

- Less than 8 characters in length by convention.
- Case sensitive.
- In all lowercase by convention.
- Numbers are allowed in usernames.
- Do not use special characters.

Passwords are stored in /etc/shadow

- Encrypted password used to be stored in /etc/passwd.
- /etc/passwd is readable by everyone.
- Now, encrypted passwords are stored in /etc/shadow.
- /etc/shadow is only readable by root.
- Prevents users trying to crack passwords.

UIDs:

- The root account is always UID 0.
- UIDs are unique numbers.
- System accounts have UIDs < 1000.
 - Configured in /etc/login.defs

GID:

- The GID listed in the /etc/passwd for is the default group for an account.
- New files belong to a user's default group.
- Users can switch groups by using the **newgrp** cmd.

Comment Field:

- Typically contains the user's full name.
- In the case of a system or application account, it often contains what the account is used for.
- May contain additional information like a phone number.

Home Directory:

- Upon login the user is placed in their home directory.
- If that directory doesn't exist, they are placed in "/".

Shell:

- The shell will be executed when a user logs in.
- A list of available shells are in /etc/shells.
- The shell doesn't have to be a shell.
- To prevent interactive use of an account, use **/usr/sbin/nologin** or **/bin/false** as the shell.
- Shells can be command line applications.

/etc/shadow:

root:\$6\$9g1IC8AYzqoZP21:16502:0:99999:7:::

- 1.Username** : It is your login name.
- 2.Password** : It is your encrypted password.
- 3.Last password change (lastchanged)** : Days since Jan 1, 1970 that password was last changed
- 4.Minimum** : The minimum number of days required between password changes
- 5.Maximum** : The maximum number of days the password is valid
- 6.Warn** : The number of days before password is to expire
- 7.Inactive** : The number of days after password expires that account is disabled
- 8.Expire** : days since Jan 1, 1970 that account is disabled

Managing Users:

Useradd	# Add a user to the system.
userdel	# Delete a user from the system, optionally deleting their home directory as well.
usermod	# Change a user's information, add it to secondary groups like moving its home directory
passwd	# Change or expire a user's password.
chsh	# Change the shell for a user (also possible via usermod)

useradd:

useradd[options] username

-c "COMMENT" # Comments for the account.

-m # Create the home directory.

-s /shell/path # The path to the user's shell.

-g GROUP Specify the default group.

-G GROUP1,GROUPN Additional groups.

\$ useradd -c "RNS User 1" -m -s /bin/bash rns1

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Create a password using passwd:

```
# passwd rns1
```

Enter new UNIX password:

Retype new UNIX password:

```
passwd: password updated successfully
```

```
#
```

Account information for "rns1"

```
# tail -1 /etc/passwd
```

```
rns1:x:1000:1000:RNS User 1:/home/rns1:/bin/bash
```

```
# tail -1 /etc/shadow
```

```
rns1:$6$iDDsgsPYtR8c2Uc.:16507:0:99999:7:::
```

Useradd with Group:

```
$ useradd -c "RNS User 2" -m -s /bin/bash -g citi -G icici  
rns2
```

```
# passwd rns2
```

Enter new UNIX password:

Retype new UNIX password:

```
passwd: password updated successfully
```

```
#
```

System or Application Accounts

```
# useradd -c "Apache Web Server User" -d /opt/apache -r -s  
/usr/sbin/nologin apache
```

```
# tail -1 /etc/passwd apache:x:999:999:Apache Web Server  
User:/opt/apache:/usr/sbin/nologin
```

```
#
```

/etc/skel:

- When using -m the home directory for the account is created.
- The contents of /etc/skel are copied into the home directory.
- /etc/skel typically contains shell configuration files (.profile, .bashrc, etc)

More useradd options:

-r	# Create a system account.
-u	# to specify the UID
-d /home/dir	# Specify the home directory.

```
# useradd -c "MySQL Server" -d /opt/mysql -u 97 -s  
/usr/sbin/nologin mysql
```

```
# tail -1 /etc/passwd mysql:x:97:1003:MySQL  
Server:/opt/mysql:/usr/sbin/nologin
```

```
#
```

userdel [-r]username:

```
# ls /home  
rns1 rns2  
  
# userdel rns1  
  
# ls /home  
rns1 rns2  
  
# userdel -r rns2  
  
# ls /home  
rns1
```

Usermod:

usermod [options] username

-c "COMMENT"

Comments account.

-g GROUP

Specify the default group.

-G GROUP1,GROUPN

Additional groups.

-s /shell/path

Path to the user's shell.

Usermod:

```
# grep mysql /etc/passwd mysql:x:97:1003:MySQL Server:  
/opt/mysql:/usr/sbin/nologin
```

```
# usermod -c "MySQL User" mysql  
# grep mysql /etc/passwd  
mysql:x:97:1003:MySQL User:/opt/mysql:/usr/sbin/nologin
```

/etc/group:

The format of the /etc/group file:

group_name:password:GID:account1,account

root:x:0: citi:x:1001:rns1,rns2

```
# groups root  
root
```

groupadd [options] group name:

```
# groupadd web
```

```
# tail -1 /etc/group web:x:1003:
```

```
# groupadd -g 2500 db
```

```
# tail -1 /etc/group db:x:2500:
```

groupdel group name:

```
# groupdel db
```

```
#
```

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Groupmod:

```
$ groupmod [options] group_name
  -g GID          # Change the group ID to GID.
  -n GROUP        # Rename the group to GROUP.
```

```
# grep web /etc/group
web:x:1003:
# groupmod -g 1234 web
# grep web /etc/group  web:x:1234:
# groupmod -n http web
# grep http /etc/group http:x:1234:
```

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Summary:

- Account information is stored in:
 - /etc/passwd
 - /etc/shadow
- Accounts have the following attributes:
 - username
 - UID
 - GID (default group)
 - Comment
 - home directory
 - shell

Summary:

- Create accounts with useradd.
 - Delete accounts with userdel.
 - Modify accounts with usermod.
 - Change the passwords of account passwd.
-
- Group information is stored in /etc/group.
 - Create groups with groupadd.
 - Delete groups with groupdel.
 - Modify groups with groupmod.
 - To view group memberships use groups.