

Answers To Linux Basics

Exercise 1: Learning the basics

1-1

Read chapter 1 of Essential System Administration (or the equivalent).

1-2

Read the KDE Quick Start guide at <http://www.kde.org/documentation/>

Exercise 2: Console switching

2-1

Which virtual console displays the graphical environment?

Ctrl+Alt+F7

2-2

Which virtual consoles display a login prompt?

Ctrl+Alt+F1-F6都可以

2-3

Are the virtual consoles that are not graphical and do not display a login prompt used for anything? If not, can you think of a use for them?

Ctrl+Alt+F8、F9

Exercise 3: KDE basics

3-1

Where can you get help for KDE and KDE applications?

The user documentation on-line.

3-2

Change the background picture of KDE. How did you do it?

在桌面空白处点右键 然后点desktop setting , 然后在wallpaper 那一部分能够看到pictures的候选框, 候选框中有系统自带的图片, 点后面软盘图标, 能够自定义。

3-3

What are the rectangles labeled 1, 2, 3 and 4 in the panel used for?

3-4

What happens when you double-click the title bar of a window?

maximize the window of the application

3-5

Place the cursor over a window, hold down the Alt key, then drag the mouse while pressing the right mouse button. What happens?

show some options like “always on the top” and “always on visible workspace”

3-6

Sometimes it can be difficult to hit the title bar of a window to move it. How can you move a window without having to first move the cursor to the title bar?

alt+left

3-7

What do the various buttons in the standard window title bars do?

Exercise 4: Using konsole

4-1

Start Konsole by clicking the Konsole icon in the lower panel.

4-2

How can you create additional tabs?

4-3

How can you rename tabs?

4-4

How do you close tabs?

Exercise 5: The man command

5-1

Execute the command `man man`. What do you see?

Man的参考手册。

(a) What does the `-a` option to `man` do?

在所有的man帮助手册中搜索。

(b) What does the `-k` option to `man` do?

显示关键字数据库中包含与作为最终参数给定的字符匹配的标题的字符串的每一行。可以输入多个标题，中间用空格隔开。要使用 `-k` 标志，root 用户必须以前已输入 `catman -w` 以建立。

(c) What option should you use to just print a short description of a command?

SYNOPSIS (概要)：对于命令，正式的描述它如何运行，以及需要什么样的命令行参数。对于函数，介绍函数所需的参数，以及哪个头文件包含该函数的定义。

(d) What options shows the location of the man page rather than its contents?

Man `-w`

5-2

Display the man page for the `ls` command.

(a) What does the `ls` command do?

显示目录内容。

(b) What option to `ls` shows information about file sizes, owner, group,

permissions and so forth?

`ls -g`、`ls -l`或`ls -o`

(c) What does the `-R` option to `ls` do? (Don't forget to try it.)

递归列出所有子目录。

Exercise 6: The Unix manual

6-1

The Unix Manual is divided into nine main sections.

(a) What type of information does section 1 contain?

SYNOPSIS 概要

(b) What type of information does section 4 contain?

Defaults

(c) What type of information does section 5 contain?

Options

(d) What type of information does section 8 contain?

SEE ALSO

6-2

Every man page is divided into several parts.

(a) What information can be found in the FILES part?

命令在本机中的位置以及一些配置文件。

(b) Which part is used to describe what a command does?

Description

(c) In which part can you find details about what command-line options a command accepts?

Options

(d) Which part lists related commands?

SEE ALSO

(e) Many man pages include examples. Which part are they found in, and approximately where in the man page do you usually find it?

Examples

6-3

What does the `apropos` command do?

通过关键字查找定位命令。

示例：

要查找它们的标题中包含字 `password` 的手册节，请输入：

`apropos password`

要查找它们的标题中包含字 `editor` 的手册节，请输入：

`apropos editor`

Exercise 7: Using info

7-1

Start info without any options. What do you see? What info commands are mentioned on the page you are shown?

命令的相关文件以分段落的格式进行显示，dir

7-2

View the documentation for ls in info (using the command `info coreutils ls`).

You can find the reference to info at the bottom of the ls man page. Give at least three examples of information that is in the info manual, but not in the man page.

Ls: list directory contents

Which files are listed

Sorting the output

7-3

When browsing info, how can you search for text?

Page down 和 space 向下翻页

Page up 向上翻页

/ 在文档中查找某个词

Exercise 8: Reading package documentation

8-1

Locate the documentation for the iproute package and answer the following questions:

(a) What kernel version is required to run the Debian iproute package?

(b) Is DECNET name resolution supported in iproute?

Yes

Exercise 9: Absolute and relative path names

9-1

In the example above:

(a) What is the absolute path name of mplayer?

/home/rijag112/bin/mplayer

(b) What is the absolute path name of ssh?

/usr/bin/ssh

9-2

In the example above name at least one relative path name indicating ssh if

(a) The current working directory is /usr/bin.

cd ssh

(b) The current working directory is /usr/local/bin.

cd ../

cd ../

cd /bin/ssh

(c) The current working directory is /home/rijag112/bin.

```
cd ../
```

```
cd ../
```

```
cd /usr/bin/ssh
```

Exercise 10: Long format chmod

10-1

It is possible to set individual permissions for user, group and others using chmod.

Review the documentation and answer the following questions:

(a) How can you set the permission string to user read/write, group read, others read using chmod in long format?

```
chmod u=w/r, go=r file
```

(b) How can you revoke group write permissions on a file without changing any other permissions?

```
chmod g-w file
```

(c) How can you grant user and group execute permissions without changing any other permissions?

```
chmod ug+x file
```

Exercise 11: Numeric file modes

11-1

What do the following numeric file modes represent:

(a) 666

Read and write rights to all.

(b) 770

Read,write and execute rights to user and group.

(c) 640

Read right to user and group,write right to user.

(d) 444

Read right to all.

11-2

The claim that there are only nine permission bits (three each for user, group and others) is not quite true. There are more permission bits. What are they?

第一个字符一般用来区分文件和目录：

d：表示是一个目录，事实上在ext2fs中，目录是一个特殊的文件。

-：表示这是一个普通的文件。

l：表示这是一个符号链接文件，实际上它指向另一个文件。

b、c：分别表示区块设备和其他的外围设备，是特殊类型的文件。

s、p：这些文件关系到系统的数据结构和管道，通常很少见到。

11-3

What command-line argument to chmod allows you to alter the permissions of an entire directory tree?

`chmod -R r/w/x file`

11-4

A user wants to set the permissions of a directory tree rooted in dir so that the user and group can read and write files, but nobody else has any access. Which of the following commands is most appropriate? Why?

(a) `chmod -R 660 dir`

(b) `chmod -R 770 dir`

(c) `chmod -R u+rw,g+rw,o-rwx dir`

a is most appropriate ;

b user and group have execution right;

c other users have rights.

Exercise 12: Owner and group manipulation

12-1

How can you change the owner and group of an entire directory tree (a directory, its subdirectories and all the files they contain) with a single command?

`chown -R owner:group dir`

Exercise 13: File manipulation commands

13-1

What does `cd ..` do?

转至目录树的上一级

13-2

What does `cd ../../` do?

返回上两级目录

13-3

If you do `cd /` followed by `pwd`, what will happen?

由当前目录切换到根目录

13-4

What information about a file is shown by `ls -laF`?

用长格式列出某个目录下所有的文件（包括隐藏文件）。

13-5

In the following example, explain the fields of the output from `ls -laFd dir dsp`:

```
drwxr-xr-x 22 dave staff 4096 Jan 12 2001 dir/
```

```
crw-rw— 1 root audio 14, 3 Jan 22 2001 dsp
```

(1) 该文件是一个目录，文件所有者拥有读写和执行的权限，所在组成员和其他人有读和执行权限，文件所有者为dave,所在组为staff.文件建立日期为2001年1月12，目录名为dir.

(2) 该文件是一个字符设备驱动程序，文件所有者和所在组成员有读写权限，其他人没有任何权限，文件所有者为root用户，所在组为audio，文件建立日期为2001年1月22日，文件名称为dsp。

13-6

If you have two files, a and b, and you issue the command `mv a b`, what happens? Is there an option to `mv` that will issue a warning in this situation?

a文件被移动到b目录中，

`mv -E warn`

13-7

What is the command to duplicate the contents of `/dir1` to `/dir2`, preserving modification times, ownership and permissions of all files?

`cp /dir1 /dir2`

13-8

How do you make the file `secret` readable and writable by root, readable by the group `wheel` and inaccessible to everybody else?

`chmod 640 -R file`

13-9

How can you remove a directory, including its contents, with a single command?

`rm -R file`

13-10

What does `chown -R user.user /path/to/directory/` do?

将/path/to/directory/目录下的所有文件的所有者和所在组改成user.

13-11

How can you recognize symbolic links when using `ls`?

->表示从前者指向后者。

13-12

How can you see what a symbolic link points to?

`readlink` 或者 `ls -l` ->后面指向的文件

13-13

What happens if you attempt to create a symbolic link to a file that doesn't exist?

会产生权限错误。

Exercise 14: Shell init files

14-1

Run `echo $SHELL` to find out what shell you are using.

`/bin/bash`

14-2

What init files does your shell use, and when are they used?

bash的几个初始化文件 - [Ubuntu]:

(1) `/etc/profile`

全局（公有）配置，不管是哪个用户，登录时都会读取该文件。

(2) `/ect/bashrc`

Ubuntu没有此文件，与之对应的是`/ect/bash.bashrc`

它也是全局（公有）的

bash执行时，不管是何种方式，都会读取此文件。

(3) `~/profile`

若bash是以login方式执行时，读取`~/bash_profile`，若它不存在，则读取`~/bash_login`，若前两者不存在，读取`~/profile`。

另外，图形模式登录时，此文件将被读取，即使存在`~/bash_profile`和`~/bash_login`。

(4) `~/bash_login`

若bash是以login方式执行时，读取`~/bash_profile`，若它不存在，则读取`~/bash_login`，若前两者不存在，读取`~/profile`。

(5) `~/bash_profile`

Unbutu默认没有此文件，可新建。

只有bash是以login形式执行时，才会读取此文件。通常该配置文件还会配置成去读取`~/bashrc`。

(6) `~/bashrc`

当bash是以non-login形式执行时，读取此文件。若是以login形式执行，则不会读取此文件。

(7) `~/bash_logout`

注销时，且是longin形式，此文件才会读取。也就是说，在文本模式注销时，此文件会被读取，图形模式注销时，此文件不会被读取。

Exercise 15: Tab completion

15-1

Create the following files by using the touch command: `READFIRST`, `READSECOND`, `README`, `READMEORE`, and `GUGGENHEIM`.

`sudo touch READFIRST/READSECOND /README/ READMEORE/ GUGGENHEIM.`

15-2

What happens if you type `cat R` and then hit tab?

自动补全文件名

15-3

What happens if you hit tab twice more?

询问是否显示所有可能的文件

15-4

What happens if you type an M, then hit tab? If you hit tab again?

不显示

显示MAKEDEV和ModemManager

15-5

What happens if you delete the M, then type an S, then hit tab?

没有任何反应

15-6

Abort the current command by typing vC. Make sure you are at an empty prompt.

没有任何反应

15-7

What happens if you type au, then hit tab twice? What is going on here?

没有任何反应

Exercise 16: Manipulating environment variables

16-1

Use the env command to display all environment variables. What is PATH set to (you might want to use grep to find it)? What is this variable used for (the man pages for your shell might be helpful in answering this question)?

env | grep PATH 可以查看所有的环境变量

16-2

Use echo to display the value of HOME. What does the HOME variable normally contain?

echo \$HOME

/home/Jameszhjj

16-3

Set the variable TEST to the string "This is a test". Note that you will have to quote the string since it contains space characters.

TEST = "this is a test"

16-4

Output the value of TEST.

Command : echo \$TEST

Output:this is a test

16-5

Prepend /home/TDDI05/bin to the variable PATH. The easiest way to accomplish this is to use variable expansion in the right-hand side of the assignment.

```
PATH=/home/TDDI05/bin
```

```
echo $PATH
```

Exercise 17: Using the script utility

17-1

Set the value of TEST to the string “noscript”.

```
TEST="noscript"
```

17-2

Run script ~/typescript to start the script utility.

script started, file is ...

17-3

Execute ifconfig -a in the command shell.

```
jameszhjj@jameszhjj-Lenovo-G450: ~
collisions:0 txqueuelen:0
RX bytes:28981 (28.9 KB) TX bytes:28981 (28.9 KB)

jameszhjj@jameszhjj-Lenovo-G450:~$ ifconfig -a
eth0      Link encap:Ethernet  HWaddr 70:5a:b6:6a:07:28
          inet addr:192.168.2.116  Bcast:192.168.2.255  Mask:255.255.255.0
          inet6 addr: fe80::725a:b6ff:fe6a:728/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:116441 errors:0 dropped:0 overruns:0 frame:0
          TX packets:4125 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:13439424 (13.4 MB)  TX bytes:386629 (386.6 KB)
          Interrupt:17

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:298 errors:0 dropped:0 overruns:0 frame:0
          TX packets:298 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:28981 (28.9 KB)  TX bytes:28981 (28.9 KB)

jameszhjj@jameszhjj-Lenovo-G450:~$
```

17-4

Set the value of TEST to the string “script”.

```
TEST="script"
```

17-5

Terminate the script utility by typing exit.

exit 退出

17-6

Check the value of TEST. Explain why it is set to “noscript” and not “script”.

因为所有的输入输出都在script创建的shell中，exit之后的shell和之前的并非同一个

17-7

View the file ~/typescript and compare with the commands you ran.

Exercise 18: Redirecting output

18-1

Where will stdout and stderr be redirected in the following examples? If you want to test your theories, use /home/TDDI05/bin/stdio for command. This program outputs a series of E:s to stderr (file descriptor 2) and a series of O:s to stdout (file descriptor 1).

(a) command >file1

stdout重定向为file1

(b) command 2>&1 >file1

stderr重定向为stdout的位置,stdout定向为file1

(c) command >file1 2>&1

stderr和stdout融合并输出到file1

Exercise 19: Pipelines

19-1

What do the following commands do?

(a) ls | grep -i doc

显示当前目录下名字中有大写或小写“doc”的文件

(b) command 2>&1 | grep -i fail

stderr定向为stdout的位置,并将command的stdout作为grep的输入,在屏幕上显示command stdout中含有“fail”的行

(c) command 2>&1 >/dev/null | grep -i fail

stderr定向为stdout的位置,并将stdout定向为/dev/null,通道没有起作用

19-2 Write composite commands to perform the following tasks:

(a) Output a recursive listing (using ls) of your home directory, including invisible files, to the file /tmp/HOMEFILES.

(b) Find any files (using find) on the system that are world-writable. Error messages should be discarded (redirected to /dev/null).

ls -ar >/tmp/HOMEFILES

(c) Find all files in /etc that contain either the string “10.17.1” or the string “130.236.189” and output their names to /tmp/FILES. Any error messages should be discarded. For this exercise you may want to use egrep and a regexp containing the infix operator “|”.

find /home/jameszhjj/ -perm -u=r,-g=r,-o=r 2>/dev/null

(d) Output a recursive listing (using ls) of your home directory, including invisible files, to the file /tmp/HOMEFILES and to the screen. You may find the tee command useful here.

find /etc/* | grep -rE 10.17.1|130.236.189 -l >/tmp/FILES

19-3 Output the contents of the first file found in /etc that contains the string “10.17.1” or the string “130.236.189”. You can combine find, grep, head, xargs and cat to get the job done. Read the man pages for the commands you aren’t familiar with.

```
find /etc/* | grep -rE 10.17.1|130.236.189 -l | head -1 | xargs cat -
```

Exercise 20: Processes and jobs

20-1 Create a long running process by typing ping 127.0.0.1. Suspend it with vZ and bring it to the foreground with fg. Terminate it with vC.

```
jameszhjj@jameszhjj-Lenovo-G450: ~
jameszhjj@jameszhjj-Lenovo-G450:~$ ping 127.0.0.1
PING 127.0.0.1 (127.0.0.1) 56(84) bytes of data.
64 bytes from 127.0.0.1: icmp_seq=1 ttl=64 time=0.038 ms
64 bytes from 127.0.0.1: icmp_seq=2 ttl=64 time=0.029 ms
64 bytes from 127.0.0.1: icmp_seq=3 ttl=64 time=0.029 ms
64 bytes from 127.0.0.1: icmp_seq=4 ttl=64 time=0.030 ms
^Z
[1]+  Stopped                  ping 127.0.0.1
jameszhjj@jameszhjj-Lenovo-G450:~$ fg
ping 127.0.0.1
64 bytes from 127.0.0.1: icmp_seq=5 ttl=64 time=0.037 ms
64 bytes from 127.0.0.1: icmp_seq=6 ttl=64 time=0.027 ms
64 bytes from 127.0.0.1: icmp_seq=7 ttl=64 time=0.030 ms
^C
--- 127.0.0.1 ping statistics ---
7 packets transmitted, 7 received, 0% packet loss, time 10370ms
rtt min/avg/max/mdev = 0.027/0.031/0.038/0.006 ms
jameszhjj@jameszhjj-Lenovo-G450:~$
```

20-2

Create a long running process in the background by typing ping 127.0.0.1

```
/dev/null&. Find out its process id using ps and kill it using kill.
[1]3267
ps aux|grep 3267
Kill 3267
```

20-3

Sometimes ps aux truncates the process name. How can you get ps to display the full process name and its arguments?

```
ps -auxf
```

20-4

What does the command kill -9 pid do, where pid is the number of a process? Are there other options than -9 that might be useful? What does kill -9 -1 do?

kill -9 pid : 强制终止pid的进程

杀死进程最安全的方法是单纯使用kill命令，不加修饰符，不带标志。

例如：# kill -pid

kill -9 -1 : 杀死所有能杀死的进程

Exercise 21: Using the full-screen text editor

21-1

Open the file `/home/TDDI05/lxb/nano-tutorial` in nano and follow the instructions in the file.

nano 路径+文件名

如果改文件存在，上面的命令将打开这个文件；如果文件不存在则将会创建一个新文件并打开。

21-2

Run `/home/TDDI05/bin/vilearn` to start an extensive vi tutorial and follow the instructions. Go through as much or as little as you want.

21-3

Modify your shell init files so `/home/TDDI05/bin` is included in the PATH environment variable. Ensure that “.” (the current directory) is not included in PATH.

```
$set
```

```
PATH=/home/TDDI05/bin
```

21-4

Create a configuration file for nano that disables automatic line breaking.

```
nano -w /etc/fstab
```

Exercise 22: Using the pager less... eh, using the pager named less

22-1

What keystroke in less moves to the beginning of the file?

g

22-2

What keystroke in less moves to the end of the file?

G

22-3

What would you type in less to start searching for “baloney”?

/baloney

22-4

What would you type in less to move to the next match for “baloney”?

n

22-5

How can you use less to monitor a log file, so less keeps displaying new lines in the file as they are written to the end of the file?

F

22-6

How would you read the compressed file `README.Debian.gz` in less?

```
zcat README.Debian.gz|less
```

22-7

Locate the package documentation for the ssh package and answer the following questions by reading the README.Debian.gz file:

(a) What is the default setting for ForwardX11?

Yes

(b) If you want X11 forwarding to work, what other package(s) need to be installed on the server?

X11 forwarding 依赖“xorg-x11-xauth”软件包，所以必须先安装“xorg-x11-xauth”软件包。

Exercise 23: Using non-interactive text editors

23-1

Use sed to change all occurrences of “/bin/tcsh” to “/bin/sh” in /etc/passwd (output to a different file).

```
sed -e 's/\bin\tcsh/\bin\tcsh/g' ~/Tempfile
```

23-2

Examine the files ~/TDDI05/lxb/passwd and ~/TDDI05/lxb/shadow. Use paste and awk to output a file where each line consists of column one from passwd and column two from the corresponding line in shadow. The printf function in awk is helpful here. This exercise is optional since it goes beyond the basics.

```
paste -d " " ~/TDDI05/lxb/passwd ~/TDDI05/lxb/shadow >~/Tempfile
```

```
awk: awk 'NR==FNR{a[i]=0;i++}NR>FNR{print a[i]" "0;j++}' ~/TDDI05/lxb/passwd  
~/TDDI05/lxb/shadow >~/Tempfile
```

Exercise 24: Log files

24-1 What does less -F /var/log/syslog do?

查看所有的系统日志

24-2 If you want to extract the last ten lines in /var/log/syslog that are related to the service cron, what command would you use?

```
grep cron /var/log/syslog | tail -10
```

Exercise 25: Mostly hard stuff

25-1 Where will stdout and stderr be redirected in the following examples

(a) command 2>&1 >file1

stdout:file1 stderr:screen

(b) command >file1 2>&1

stdout:file1 stderr:file1

25-2 Write a command that lists, for the last ten unique users to log in to the system, the last

time they logged in using ssh (users can be found using last, and ssh logins in /var/log/auth.log, which is typically only readable by root).

25-3 Explain the following fairly contrived code, in particular all the I/O redirections:

```
#!/bin/sh
exec 23<&0 24>&1 <&__EOG > /tmp/RECORD
find / -name "*.bak" -print
__EOG
while read f; do
echo -n "Record $f" >&24
read ans <&23
[ "ans" = "y" ] && echo f
done
```

i.将标注输入的内容输入文件标识符23

ii.将文件描述符为24重定向到stdout中

iii.找到 / 下名字以.bak结尾的文件并打印

iv.输出重定向到 /tmp/RECORD

v.读取每一行到变量f

☐ echo内容"Record" + 读入行的内容，删除自动添加的换行符，并输出到文件标识符24(此时即为标准输出)

☐ 从标识符23(现在为标准输入)中读入数据，并赋值给ans

☐ 如果ans的值为"y"，则echo出的内容

25-4 I/O redirection in the shell is somewhat limited. In particular, you can't handle programs

that write directly to the terminal device rather than use the file descriptors. For situations like that, there's socat. Since you're an advanced user, you really should learn about socat.

(a) Use socat so you can log in and execute commands on a host non-interactively using the password authentication method. Essentially, you should be able to do the equivalent of `cat commandfile | ssh user@remote.host`, where `commandfile` contains the stuff you would normally type interactively.

(b) Do something else with socat that's neat. Come up with something on your own, perhaps using the network.

25-5 Using only `ps`, `grep` and `kill`, write a command that kills any process with "linux" in the name. Note that you must avoid killing the `grep` process itself!

25-6 For each file on the system with a `.bak` suffix, where there either is no corresponding file

without the `.bak` suffix, or the corresponding file is older than the `.bak` file, ask the user whether to rename the `.bak` file to remove the suffix. If the answer begins with `Y` or `y`, rename the file appropriately. You must handle file names containing single spaces correctly.

25-7 Write a command or short script that replaces all occurrences of "10.17.1" with "130.236.189" in all files in `/etc` or a subdirectory thereof. The only output from the command must be a list of the files that were changed.

25-8 Examine the files `~/TDDI05/lxb/passwd` and `~/TDDI05/lxb/shadow`. Use `paste` and `awk` to output a file where each line consists of column one from `passwd` and column two from the corresponding line in `shadow`. The `printf` function in `awk` is helpful here.

25-9 Write a command that renames a bunch of files to be all lowercase (e.g. `BOFH.GIF` is renamed to `bofh.gif`). If there already is a file with the all-lowercase name, do not rename, print an error message and proceed with the next file. You do not have to worry about spaces (but you should, just on general principle).