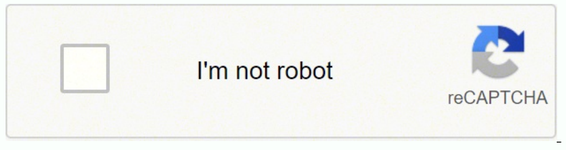

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If you give permission for a group to take some action (such as modify a file), then all members of that group can take it. They don’t. Every shell has a current working directory, and when you run commands in that shell, they operate relative to that directory. 168 | Linux Pocket Guide groupdel stdin stdout - file -- opt --help --version groupdel group The groupdel command deletes an existing group: → sudo groupdel friends Before doing this, it’s a good idea to identify all files that have their group ID set to the given group, so you can deal with them later: → sudo find / -group friends -print because groupdel does not change the group ownership of any files. Group Management | 169 Host Information uname Print basic system information. Useful options -o Copy the ownership of the files. For viewing or editing graphics, Linux has handy tools with tons of options. -v Verbose mode: print debugging information. -c addresses CC the message to the given addresses, a comma-separated list. Programming with Shell Scripts | 233 (setting variables, changing directory, etc.), it can be run in the current shell with the source or “.” command: → . Here’s an example command that counts lines of text in a file, myfile: wc -l myfile We’ll cover the most important Linux commands for the aver- age user, such as ls (list files), grep (search for text), mplayer (play audio and video files), and df (measure free disk space). As we’ve said, Linux files are col- lected into directories. Careful Linuxx users should run thier favorite spelling checker on this file. /tmp/sample Group Management | 167 To add users to a group, edit /etc/group as root.20 To change the group ownership of a file, recall the chgrp commands from “File Properties” on page 69. While the publisher and the author have used good faith efforts to ensure that the information and instructions contained in this work are accurate, the publisher and the author disclaim all responsibility for errors or omissions, including without limitation responsibility for damages resulting from the use of or reliance on this work. chfn stdin stdout - file -- opt --help --version chfn [options] [username] The chfn (change finger) command updates a few pieces of personal information maintained by the system: real name, home telephone, office telephone, and office location, as dis- played by the finger command. or to change all vowels into asterisks: → cat wonderfulfile | tr aeiouAEIOU '*' Th*s *s * v*ry w*nd*rf*l f*l*. Copy and Paste | 205 -b Use the clipboard selection. cd dir Change your remote directory to be dir. If they lurk in your shell scripts, they are bugs waiting to happen. Likewise, you can sort on the city (third value) with: → sort -k3 -t, people John Adams,39 Tremont Street,Boston File Text Manipulation | 103 George Washington,123 Main Street,New York Abraham Lincoln,54 First Avenue,San Francisco and see that Boston comes up first alphabetically. The Filesystem | 17 We refer to files and directories using a “names and slashes” syntax called a path. See the manpage for details. A full discussion is beyond the scope of this book: see man sudo and for full details. • Shell wildcards do not match a leading period. chfn Change a user’s personal information. -v Produce verbose output. Users and Their Environment | 157 -r Print login values instead of effective values. tar -czf tarfile dir Pack directory dir into a gzipped tar file. If you’re getting started along the exciting path of hacking, cybersecurity, and pentesting, Linux Basics for … book Software Engineering at Google by Titus Winters, Tom Manshreck, Hyrum Wright Today, software engineers need to know not only how to program effectively but also how to … book Data Science from Scratch, 2nd Edition by Joel Grus To really learn data science, you should not only master the tools—data science libraries, frameworks, modules, … book Linux Command Line and Shell Scripting Bible, 3rd Edition by Christine Bresnahan, Richard Blum Talk directly to your system for a faster workflow with automation capability Linux Command Line and … © 1996-2015, Amazon.com, Inc. Lynx has over 100 command-line options, so the manpage is well worth exploring. compress stdin stdout - file -- opt --help --version compress [options] [files] uncompress [options] [files] zcat [options] [files] compress and uncompress compress and uncompress files in standard Unix compression format (Lempel Ziv). → crontab -e Edit your crontab file in your default editor ($VISUAL). (Compare to the -source option.) -source Print the HTML source to standard output and exit. rm rmdir rnano Count the number of visible items in your home directory (represented here by a special variable HOME that we’ll discuss later): → ls $HOME | wc -l 8 See how much space is used on a partition of your hard disk: → df -h / Filesystem /dev/sdb1 6 | Size Used Avail Use% Mounted on 78G 30G 48G 61% / Linux Pocket Guide Watch the processes running on your computer (type “q” to quit): → top -d1 Print the file /etc/hosts, which contains names and addresses of computers, on your default printer if you have one set up: → lpr /etc/hosts See how long you’ve been logged in: → last -1 $USER smith pts/7 :0 Tue Nov 10 20:12 still logged in Download a file sample.pdf from this book’s website to your current directory, without needing a web browser: → wget Display information about your computer’s IP address: → ip addr show eth0 … Actually, Linux has three different clipboards, which are called selections. diff is just one member of a family of programs that operate on file differences. -q Don’t report changes, just say whether the files differ. What’s a Distro? -p Only the processor type. Works like m. More Powerful Manipulations We’ve just touched the tip of the iceberg for Linux text filtering. -l Be verbose: display information in a longer format. d Delete the current message. Much like the -q users command, but it adds a count. Viewing Processes List process. ^ Exponentiation (second-to-top value is the base, top value is the exponent). With the process substitution opera- tor, /tmp/jpegs → ls *.txt | cut -d. MP3 to WAV OGG to MP3 FLAC to OGG sox has many other uses, including combining audio files and adding special effects; it’s often called the “Swiss Army knife” of audio commands. In the past, installing a printer on Linux required editing a cryptic configuration file, such as /etc/cups/printers.conf or /etc/ 124 | Linux Pocket Guide printcap. This technique is incredibly useful. PageDown Scroll down one pageful of messages. If it finds who (say, /usr/bin/who), it runs the command. User Account Management | 161 useradd stdin stdout - file -- opt --help --version useradd [options] username The useradd command lets the superuser create a user account: → sudo useradd smith Its defaults are not very useful (run useradd -D to see them), so be sure to supply all desired options. If you’re an old-school Linux user, you might be using telnet for connecting in this way to arbitrary TCP ports. For example, files for the text editor emacs, version 24, are likely found (depending on distro) in /usr/ share/doc/emacs24. \{n \} {n } Exactly n repetitions of a regular expression. --progress=dot Print dots to show the download progress. Nowadays this is done automatically with attach- ments and MIME tools, but we’ll cover the munpack program, which can do this from the command line. Useful arithmetic operations +, -, *, / Addition, subtraction, multiplication, and division, respectively. As a result, sometimes they are called “hidden files.” Wildcards never match two characters: a leading period, and the directory slash (/). Getting Help | 11 Run the man command The man command displays an online manual page, or manpage, for a given program. Use -cvjf to print filenames as they are processed. We focus on bash (the Bourne-Again Shell), located in /bin/bash, which is usually the default in Linux distros. Additional commands are always available: Keystroke Meaning ? We’ll focus on command-line tools from a package called ImageMagick ( ). 100 | Linux Pocket Guide Form Meaning [: class :] The same character classes ([:alnum:], [:digit:], etc.) accepted by grep. For more information, contact our corporate/institu- tional sales department: 800-998-9938 or Editor: Nan Barber Production Editor: Nicholas Adams Copyeditor: Jasmine Kwityn Proofreader: Susan Moritz Indexer: Daniel Barrett Interior Designer: David Futato Cover Designer: Karen Montgomery Illustrator: Rebecca Demarest June 2016: Third Edition Revision History for the Third Edition 2016-11-11: Third Release 2017-01-20: Fourth Release 2017-05-26: Fifth Release See details. The files in /proc provide views into the running kernel and have special properties. Suppose we delete the first line, change “brown” to “blue” on the second line, and add a final line, creating a file fileB: The quick blue fox jumped over the lazy dogs. 24 | Linux Pocket Guide /proc/nnn Information about the Linux process with ID nnn, where nnn is a positive integer. userdel Delete an account. → spell badwords naturaly Linuxx thier Disks and Filesystems df Display available space on mounted filesystems. ip monitor Begin monitoring your network devices; type ^C to stop. stdin stdout -file -- opt --help --version mplayer [options] video_files... After the scope and category (say, /usr/ local/doc), a program may have its own subdirectory (say, /usr/ local/doc/myprogram) containing files it needs. tty Print your terminal device name. Totally! Yow! [#test] /quit Selected commands /help List the available commands. -t If charset1 is longer than charset2, make them the same length by truncating charset1. This can be the name of any file or directory, which flock treats as a unique marker to prevent any other commands from running. -s title Set the song title. Running a Shell If you connect to a Linux machine over a network, you will immediately see a shell, waiting for you to type a command. -s string Set the system date and/or time to be string; only the superuser can do this. It is very powerful, with many commands and options. #else ... $HOME/.bash_profile Aliases The built-in command alias defines a convenient shorthand for a longer command, to save typing. Patterns may contain the same wildcards as the shell. Barrett Linux Pocket Guide by Daniel J. You’ll also see this set of users called the world or simply other. -a Mount all filesystems listed in /etc/fstab. To burn the contents of a Linux directory onto a disc readable on Linux, Windows, and Mac OS X systems: Backups and Remote Storage | 137 1. -B N Display sizes in blocks of N bytes. Useful options Ignore case. → bash myscript Run in current shell with “.” or source The preceding methods run your script as an independent entity that has no effect on your current shell.24 If you want your script to make changes to your current shell 24 That’s because the script runs in a separate shell (a subshell or child shell) that cannot alter the original shell. An undefined variable, or a variable with spaces in its value, will evaluate to something unexpected if not surroun- ded by quotes, causing your script to malfunction: 234 | Linux Pocket Guide → FILENAME="My Document" Space in the name → ls $FILENAME Try to list it ls: My: No such file or directory ls saw 2 arguments ls: Document: No such file or directory → ls -l "$FILENAME" List it properly My Document ls saw only 1 argument If a variable name is evaluated adjacent to another string, sur- round it with curly braces to prevent unexpected behavior: → HAT="fedora" → echo "The plural of $HAT is $HATs" The plural of fedora is No variable "HATs" → echo "The plural of $HAT is ${HAT}s" The plural of fedora is fedoras What we wanted Input and Output Script output is provided by the echo and printf commands, which we described in “Screen Output” on page 198: → echo "Hello world" Hello world → printf "I am %d years old" `expr 20 + 20` I am 40 years old Input is provided by the read command, which reads one line from standard input and stores it in a variable: → read name Sandy Smith → echo "I read the name $name" I read the name Sandy Smith Booleans and Return Codes Before we can describe conditionals and loops, we need to explain the concept of a Boolean (true/false) test. -l List all permissible shells. To invoke it, type: → mutt When the main screen appears, any messages in your mailbox are listed briefly, one per line, and the following commands are available: Keystroke Meaning Up arrow Move to the previous message. r Reply to current message. For Boolean expressions, the number 0 and the empty string are considered false; any other value is true. Error messages are treated specially and displayed on standard error, which also is usually your screen but kept separate from standard output.2 Later, we’ll see how to redirect standard input, output, and error to and from files or pipes. Linux Pocket Guide – If you use Linux in your day-to-day work, this popular pocket guide is the perfect on-the-job reference. 0 → grep aardvark myfile → echo $? bunzip2 -c file.bz2 Uncompress the data on standard output. who stdin stdout - file -- opt --help --version who [options] [filename] The who command lists all logged-in users, one user shell per line: → who smith barrett jones jones pts/0 pts/1 pts/2 pts/4 Sep Sep Sep Sep 6 6 8 3 17:09 17:10 20:58 05:11 (:0) (10.24.19.240) (192.168.13.7) (192.168.13.7) Normally, who gets its data from the file /var/run/utmp. Both systems use commands with the same names: lpr, lpq, and lprm. Because the “keywords” of this programming language are actually commands evaluated by the shell, you need to sep- arate arguments with whitespace. Installing Software You will probably want to add further software to your Linux system from time to time. Also, you can count duplicate lines instead of eliminating them: → sort letters2 | uniq -c 1 a 3 b 1 c Useful options -c Count adjacent duplicate lines. What’s a Command? It prevents a command, such as a backup script, from running concurrently with itself. You should rarely need superuser privileges; and in fact, you should use them only when absolutely necessary, to avoid accidentally harming your Linux system. Follow the conventions we present here and you should be fine. -t Add a totals row at the bottom. -f Don’t print the FROM column. Paths don’t have to be absolute: they can be relative to some directory other than the root. -y year Set the year. /help /connect Log in. Project: Enhance world peace Plan: Mistrust first impulses; they are always right. Linux has a rich set of tools for working with PDF and PostScript files, even if you’re working in the shell and can’t view the files graphically. [-n "hello"] echo $? Hereâ€™s an example command that counts lines of text in a file, myfile:wc -l myfileWeâ€™ll cover the most important Linux commands for the average user, such as ls (list files), grep (search for text), mplayer (play audio and video files), and df (measure free disk space). zcat file.Z 112 | Linux Pocket Guide Uncompress the data on standard output. Run info sort for full technical details. Every file and directory has an owner who has permission to do anything with it. ogginfo View information about an OGG file. Weâ€™ve replaced these commands with new ones that youâ€™ll find immediately practical on a modern Linux system.Runnable examplesYou can now download a set of files from the bookâ€™s website and run the bookâ€™s example commands as you read them.Goodbye, GUI applicationsWe no longer cover applications that have graphical user interfaces, such as photo editors and web browsers, in order to focus purely on commands. It can copy data from one file to another, say, from file1 to file2: → dd if=fileA of=fileC 7+1 records in 7+1 records out 3816 bytes (3.8 kB) copied, 0.000356028 s, 10.7 MB/s and it can even perform data conversions while it copies. And on OS X, a text file might end its lines with newlines or carriage returns alone. The special notation %d stands for the extracted page number. Back up your com- puter and keep a Linux “live” DVD on hand (see “What’s in This Book?” on page 1) before playing around with dd as the superuser. seek=N Discard N blocks of output before starting the copy. O’Reilly’s Pocket Guides have earned a reputation as inexpensive, comprehensive, and compact guides that have the stuff but not the fluff. You must learn which package type is used by your Linux system. -vikeys Make Lynx obey keystrokes reminiscent of the vim (or vi) editor. -u Append new/changed files to an existing archive. You can see this value in the special variable $?: → cat myfile My name is Sandy Smith and I really like Ubuntu Linux → grep Smith myfile My name is Sandy Smith and → echo $? It’s particularly good for checking out a suspicious URL, as Lynx doesn’t run JavaScript and won’t even accept a cookie without asking you first. • You can manually retrieve messages from your mail server at the command line with the fetchmail com- mand. This is usually the user’s full name, but it can be any string. --remove-tag name Remove all occurrences of the given tag (title, artist, etc.) from the FLAC file. Yes, it does Here are common test arguments for checking properties of integers, strings, and files: File tests -d name File name is a directory -f name File name is a regular file -L name File name is a symbolic link 236 | Linux Pocket Guide -r name File name exists and is readable -w name File name exists and is writable -x name File name exists and is executable -s name File name exists and its size is nonzero f1 -nt f2 File f1 is newer than file f2 f1 -ot f2 File f1 is older than file f2 String tests s1 = s2 String s1 equals string s2 s1 != s2 String s1 does not equal string s2 -z s1 String s1 has zero length -n s1 String s1 has nonzero length Numeric tests a -eq b Integers a and b are equal a -ne b Integers a and b are not equal a -gt b Integer a is greater than integer b a -ge b Integer a is greater than or equal to integer b a -lt b Integer a is less than integer b a -le b Integer a is less than or equal to integer b Combining and negating tests t1 -a t2 And: Both tests t1 and t2 are true t1 -o t2 Or: Either test t1 or t2 is true ! your_test Negate the test (i.e., your_test is false) \(your_test \) Parentheses are used for grouping, as in algebra test has an unusual alias, “[” (left square bracket), as a short- hand for use with conditionals and loops. For example, if your shell is “in” the directory /usr, and you run a command that refers to a relative path bin, you’re really referring to /usr/ bin. Investigate and experiment! Web Browsing lynx Text-only web browser. All rights reserved. compress -c file Produce compressed data on standard output. If your script doesn’t call exit, the return code is automatically 0: → cat script-exit #!/bin/bash if [$# -lt 2] then echo "$0 error: you must supply two arguments" exit 1 Programming with Shell Scripts | 245 else echo "My name is $1 and I come from $2" fi exit 0 → ./script-exit Bob ./script-exit error: you must supply two arguments → echo $? Commands can be more interesting than just a single program with options: • Commands can run several programs at a time, either in sequence (one program after another) or in a “pipeline” with the output of one command becoming the input of the next. One special user, called the superuser or root, has full access to the machine and can do anything on it. -s text Send a subject line along with your message. The ability to list outgoing email messages with mailq is just one example. HOME variable The environment variable HOME (see “Shell variables” on page 30) contains the name of your home directory: → echo $HOME /home/smith The echo command prints its arguments ~ When used in place of a directory, a lone tilde is expanded by the shell to the name of your home directory. Here are some useful ones: Decimal integer %d %ld Long decimal integer 200 | Linux Pocket Guide %o Octal integer %x Hexadecimal integer %f Floating point %lf Double-precision floating point %c A single character %s String %q String with any shell metacharacters escaped %% A percent sign by itself Just after the leading percent sign, you can insert a numeric expression for the minimum width of the output. -o Write the selection contents to standard output. Figure 2 illustrates this difference. USER PRI smith 10 root 0 www 0 NI SIZE SHARE STAT 0 1092 840 R 0 540 472 S 0 0 0 SW %CPU 4.7 0.0 0.0 %MEM 0.2 0.1 0.0 TIME 0:00 0:07 0:00 CMD top init httpd While top is running, you can press keys to change its behavior, such as setting the update speed (s), hiding idle processes (i), or killing processes (k). A full tutorial on chatting with IRC is beyond the scope of this book: see and for more infor- mation. Each variety is called a distro (short for “distri- bution”). Then we explain each command in turn, briefly presenting its common uses and options.We assume you have access to a Linux system and know how to log in with your username and password. wget Yes, you’ve constructed the text of 100 commands. gzip stdin gzip [options] [files] gunzip [options] [files] zcat [options] [files] 110 | Linux Pocket Guide stdout - file -- opt --help --version gzip and gunzip compress and uncompress files in GNU Zip format. \+ + One or more repetitions of a regular expression. -backdrop Display the image on a backdrop of solid color that covers the rest of your screen. That “somewhere” is called the shell, which is Linux’s command-line user interface: you type a com- 26 | Linux Pocket Guide mand and press Enter, and the shell runs whatever program (or programs) you’ve requested. printenv Print your environment. cat file.bz2 | bunzip2 Uncompress the data on standard output. Linux is a popular, open source operating system that competes with Microsoft Windows and Mac OS X. To include a ^ or ! symbol liter- ally, don’t put it first. -s N Skip the first N characters on each line when detecting duplicates. Start a service listening on port 55555: → netcat -l 55555 Now in another window, run a client that talks to that same port, and type a message: → netcat localhost 55555 Hello world, how are you? Run the uptime command for a more human-readable result. Want to get rid of an annoying “Are you SURE you want to do that?” message? Filesystems can also be unmounted to make them inaccessible via the filesystem, say, for maintenance. Locate your disc writer’s device by running: → more /proc/sys/dev/cdrom/info CD-ROM information, Id: cdrom.c 3.20 2003/12/17 drive name: drive speed: drive # of slots: Can close tray: Can open tray: ... For similar programs to monitor your system’s I/O and network bandwidth, try iotop and iftop. Use sftp instead if your remote server supports it. So “next year” means one year from right now, “thursday” means the upcoming Thursday at the current clock time, “december 25” means the next upcoming December 25, and “4:30pm” means the very next occurrence of 4:30 p.m. in the future. fgrep stdin stdout - file -- opt --help --version fgrep [options] [fixed_strings] [files] The fgrep command is just like grep, but instead of accepting a regular expression, it accepts a list of fixed strings, separated by 96 | Linux Pocket Guide newlines. Though it might seem useless at first glance, yes can be perfect for turning interactive commands into batch commands. Simultaneously, however, it also copies that same standard input to one or more files. This means you can construct commands as strings and send them to bash for execution: → echo wc -l myfile wc -l myfile → echo wc -l myfile | bash 18 myfile Bash Warning Piping commands into bash is powerful but can also be danger- ous. The original file may be deleted in some cases, as shown. It is likely more reliable than md5sum. Who owns them? Note that these commands work only if your shell is running in a graphical environment such as GNOME or KDE. -v Only the kernel version. You’ll need to boot first on a Linux CD, DVD, or other rescue media. (On US keyboards, you can find this symbol just above the Enter key.) For example: → who | sort sends the output of who into the sort program, printing an alphabetically sorted list of logged-in users. metaflac View and edit information about a FLAC file. Screen Output echo Print simple text on standard output. xargs, 88 backward slash (\) escaping special characters, 37 line continuation, 10, 234 basename command, 53 bash (Bourne-Again Shell), 14, 27 command-line editing, 37 printf command, 200 programming with shell scripts, 232 type command, 82, 91 bc command, 208 bg command, 42 jobs command and, 40 bin directory, 21 Booleans in shell scripts, 207, 235 /boot directory, 24 Bourne-Again Shell (see bash), 27 252 | Index braces expansion on command line, 30 grep regular expressions, 95 shell variables, 235 browsing the Web, 188 bunzip2 command, 111 burning CDs and DVDs, 137 bzcat command, 112 bzip2 command, 111 software installation and, 224 tar –j command and, 110 C C and C++ languages, 248 cal command, 211 calculator programs, 206 calendar printing, 211 carriage returns, 96 case statement, 240 cat command, 2, 56, 102 revealing end-of-line charac- ters, 96 tee command and, 106 CD (compact discs) burning, 137 ripping audio, 218 cd 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usage, and a full explanation is at http:// imagemagick.org/script/command-line-processing.php. Typical build instructions are: 1. Whether youâ??re a novice who needs to get up to speed on Linux or an experienced user who wants a concise and functional reference, this guide provides quick answers.Selected topics include:The filesystem and shellFile creation and editingText manipulation and pipelinesBackups and remote storageViewing and controlling processesUser account managementBecoming the superuserNetwork connectionsAudio and videoInstalling softwareProgramming with shell scripts View/Submit Errata Download Example Code book Linux Basics for Hackers by OccupyTheWeb . You “move” your shell from one directory to another using the cd command: → cd /usr/local/bin 18 | Linux Pocket Guide More technically, this command changes your shell’s current working directory to be /usr/local/bin. Home Move to the first message. cut stdin stdout - file -- opt --help --version cut -(b|c|f)range [options] [files] The cut command extracts columns of text from files. Users and Their Environment logname Print your login name. Display a calendar for April 2017: → cal apr 2017 April 2017 Su Mo Tu We Th Fr Sa 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 List the contents of the /bin directory, which contains many commands: → ls /bin bash less bunzip2 lessecho busybox lessfile ... -G group1,group2,... The chfn command can also set this information. -g number Set the genre number. If you don’t know the PID of a process, run ps and examine the output: → ps -uax | grep emacs or even better, try the pidof command, which looks up and prints the PID of a process by its name: → pidof emacs 8374 Now you can kill a process knowing only its program name in a single line, using shell backquotes to execute pidof: → kill `pidof emacs` Or use the killall command to kill all processes for a given program: → killall emacs 144 | Linux Pocket Guide In addition to the kill program in the filesystem (usually /bin/ kill), most shells have built-in kill commands, but their syntax and behavior differ. pdftk stdin stdout - file -- opt --help --version pdftk [arguments] 14 At press time, the manpage for ps2ascii says that the PDF file can- not come from standard input, but in practice it seems to work fine: cat sample.pdf | ps2ascii. /proc/ uptime System uptime (i.e., seconds elapsed since the system was last booted). Unlike most other Linux compression commands, zip does not delete the original files. -a title Set the album title. Every account is a potential avenue for an intruder to enter your sys- tem, so every user should have a strong, hard-to-guess pass- word. -f On reboot, skip the usual filesystem check performed by the fsck program (described in “Disks and Filesystems” on page 128). groupadd Create a group. Dot Files Filenames with a leading period, called dot files, are special in Linux. To terminate process 13243, for example, run: → kill 13243 If this does not work—some programs catch this signal without terminating—add the -KILL or (equivalently) -9 option: → kill -KILL 13243 which is virtually guaranteed to work. systemctl stdin stdout - file -- opt --help --version systemctl [options] command [arguments] In some Linux distros, the shutdown command is a symbolic link to systemctl, a multipurpose command for starting and stopping services, including the entire host. Normally, cmp starts its comparison at the beginning of each file, but it will start elsewhere if you provide offsets: → cmp myfile yourfile 10 20 This begins the comparison at the tenth character of myfile and the twentieth of yourfile. By tradition, scripts should return 0 for success and 1 (or other nonzero value) on failure. ogginfo stdin stdout - file -- opt --help --version ogginfo [options] [files] ogginfo is a simple command that displays information about an OGG Vorbis audio file: → ogginfo guitar.ogg Processing file "guitar.ogg"... The most common package types are: Installing Software | 223 *.deb files Debian packages, used by Debian, Ubuntu, and other dis- tros. The third edition features new commands for processing image files and audio files, running and killing programs, reading and modifying the system clipboard, and manipulating PDF files, as well as other commands requested by readers. ^ Exponentiation, as in 10^5 for “ten to the fifth power.” sqrt(N) Square root of N. First make sure you know exactly which commands will be executed. -htmlmeta Generate HTML rather than plain text. Compressed files have the extension .bz2. A-Z The range of characters from A to Z. Shell Features | 27 regular shell). To change the owner, group ownership, or permissions of a file, use the chown, chgrp, and chmod commands, respectively, as described in “File Properties” on page 69. -N Print a description of the checking that would be done, but exit without performing any checking. All lines that appear in both files. The Filesystem | 19 cd With no arguments, the cd command returns you (i.e., sets the shell’s working directory) to your home directory. To log out using GNOME or KDE, choose Logout from the main menu. -y Print your host’s NIS or YP domain name. seq Print a sequence of numbers on standard output. Simply type “sudo” followed by the com- mand. If your username is smith, your Jabber server is jabber.example.com, and your password is wQVY6LC/8pCH, the older file format is: wQVY6LC/8pCH and the newer format is: username: smith jserver: jabber.example.com password: wQVY6LC/8pCH Once this setup is complete, you can send a message to a friend on Jabber with: → echo "Hello world" | sendxmpp Many Jabber servers use secure connections, so you will proba- bly need to add the option -t (for TLS connections) or -e (for SSL connections) for your command to work. aspell dump master Print aspell’s master dictionary on standard output. If a user has two shells running, like the user “silver” in our example, he’ll have two lines of output from who. This works only if the PDF contains actual text, not images that look like text (say, a magazine article that’s been scanned on a graphical scanner). unzip myfile.zip Unpack. -g Print the effective group ID and exit. -k Kidding: don’t really perform a shutdown, just broadcast warning messages to all users as if the system were going down. -12 Show only common lines. Any time you see an example command in this book, simply visit this new directory: → cd ~/linuxpocketguide and run the example command. cat file | bzip2 Produce compressed data on standard output. growisofs Burn a DVD or Blu-ray disc. --version The option --version makes the command print its ver- sion information and exit. Display only the processes with PID N, M, ..., up to 20 processes. Programs like munpack were created to work with attachments directly on the command line, appending or extracting them to and from mail messages. If you prefer to copy from a different directory, add the -k option (-k dirname). symbolic, 51 links command, 190 Linux, components of, 13 linuxpocketguide directory (see examples, running) ln command, 50 load average, 140 locate command, 89 locating files, 89 lock directory, 22 log directory, 22 logging into remote machines, 179 logname command, 156 whoami and, 157 LOGNAME environment vari- able, 31, 156 logout command, 154 long command lines, 10, 234 look command, 126 loops in shell scripts, 242 /lost+found directory, 24 lpq command, 125 lpr command, 124 lprm command, 126 LPRng printing system, 124 ls command, 8, 47 displaying file attributes, 69 file protections and, 26 lsattr command, 81 lynx web browser, 189 M m4 macro-processing language, 107 mail (see email) mail command, 186 mail directory, 22, 31 MAIL environment variable, 31 mailq command, 187 make command, 232 man command, 12, 21 man directory, 21 masks and protection modes, 79 math commands, 206 md5sum command, 114, 118, 120 /media directory, 22 memory usage, displaying, 143 mesg command, 158, 194 metaflac command, 221 Microsoft Excel documents, 64 Microsoft Word documents, 64 MIDI, 218 MIME attachments, 113 types, identifying, 73 mkdir command, 54 mkfs command, 129 mkisofs command, 138 mlocate command, 89 /mnt directory, 22 mogrify command, 217 mono command, 248 montage command, 217 mount command, 130 MP3 files create from WAV, 219 ID3 tags, 219, 220 mplayer command, 223 music (see audio) mv command, 49 N nameserver (see domain name service) nc command, 182 .NET, 248 netcat command, 182 network connections, establish- ing, 179 network interface, displaying information about, 172, 173 nice command, 146 nl command, 58 cat command and, 56 nslookup command, 176 ntfs filesystems, 129 ntp daemon, 215 ntpdate command, 214 O od command, 2, 62, 102 ogginfo command, 220 okular command, 120 OLDPWD environment variable, 31 operating system directories, 24 operating system name, 171 options for commands, 3 output in shell scripts, 235 ownership of files, 25, 48 P package managers, 223 PackageKit, 226 parted command, 129 partitioning disks, 128, 129 passwd command, 164 paste command, 99 patch command, context diff, 116 PATH environment variable, 31 path, search, 32 PDF files, 120 displaying, 120 manipulating, 123 PostScript conversion, 124 splitting, 122 text extraction, 121, 121 pdf2ps command, 120, 124 pdfseparate command, 120, 122 pdftk command, 120, 123 pdftotext command, 120, 121 Index | 257 Perl language, 248 permissions, file, 25, 48, 76 photos, 215 PHP language, 248 pidgin, 193 pidof command, 144 ping command, 177 pipe (|) operator, 34 postfix mail server, 188 PostScript files, 120 PDF conversion, 124 text extraction, 121 printenv command, 161 at command and, 151 printf command, 200 script output, 235 -printf option (find command), 85 printing, 124 /proc directory, 22, 24 process substitution, 34 processes, 144 controlling, 144 shell jobs vs., 139 viewing, 139 processor type, 171 procmail command, 188 profanity command, 193, 196 prompt, 5 ps command, 139, 144 ps2ascii command, 120, 121 ps2pdf command, 120, 124 public_html directory, 22 pwd command, 17, 53 PWD environment variable, 31 Python language, 248 Q quoting in shell scripts, 234 on command line, 36 258 | Index R rc.d directory, 21 rcsdiff command, 115 read command, 235 readlink command, 52 redirecting input/output, 33 regular expressions awk command, 107 egrep command, 94 find –regex command, 83 grep command, 92, 94 less command, 57 line numbering, 59 locate –r command, 90 relative path, 18 remote machines file transfers, 180, 181 hostname lookup, 174 logging in with ssh, 179 sending ICMP packets to, 177 traceroute command, 177 renice command, 147 reset command, 45 reset-lpg command, 11 restore command, 134 resuming jobs with fg command, 42 return codes of Linux commands, 236, 245 ripping CD tracks, 218 rm command, 50 rmdir command, 55 root directory (/), 17 /root home directory for super- user, 19 root user, 5, 16, 166 rpm command, 224, 228 RPM Package Manager files, 224, 225, 226, 228 rsnapshot command, 135 rsync command, 135 Ruby language, 248 run directory, 22 S sbin directory, 21 scheduling jobs, 150, 152 scp command, 180 screen shell (ssh) program, 179 sed command, 107 vs. Partitions are rep- resented on Linux systems as special files in (usually) the direc- tory /dev. Enter “Click” the current link, or finish the current form field. If you’re accustomed to graphical spellcheckers, you might find Linux’s text-based ones fairly primitive, but they can be used in pipelines, which is quite powerful. -J name Set the job name that prints on the cover page (if your system is set up to print cover pages). There are no options except displaying a help message and the program version: → id3info guitar.mp3 *** Tag information for guitar.mp3 *** TYER (Year): 2004 === TCON (Content type): Genre ID3 === TPE1 (Lead performer(s)/Soloist(s)): Gentle Giant === TIT2 (Title/songname): Guitar Solo === TALB (Album/Movie/Show title): Scraping the Barrel Audio and Video | 219 *** mp3 info MPEG1/layer III Bitrate: 256KBps Frequency: 44KHz id3tag stdin stdout - file -- opt --help --version id3tag [options] files The id3tag command adds or modifies ID3 tags in an MP3 file. Compressed files have the

for a list of servers. bunzip2 Uncompress BZip files. Invoked without a username, chsh affects your account; invoked with a username (by root), it affects that user. Here's a command that redirects the output of the who program to become the input of the wc program, which counts lines of text in a file; the result is the number of lines in the output of who: → who | wc -l 4 telling you how many users are logged in.6 The vertical bar, called a pipe, makes the connection between who and wc. -homepage=URL Set your home page URL to be URL. This example dis- tinguishes whoami from logname: → logname smith → sudo logname smith → whoami smith → sudo whoami root id stdin stdout - file -- opt --help --version id [options] [username] Every user has a unique, numeric user ID, and a default group with a unique, numeric group ID. Useful options -nN Perform N updates, then quit. groupdel Delete a group. The columns indicate the user's terminal, originating host or X display (if applicable), login time, idle time, two measures of the CPU time (run man w for details), and the current process. A filesystem defines how files are represented; examples are ext3 (a Linux journaling filesystem) and ntfs 128 | Linux Pocket Guide (Microsoft Windows NT filesystem). It can also find out much more: 174 | Linux Pocket Guide → host -a www.ubuntu.org Trying "www.ubuntu.org" ;; ->>HEADER ls README file1 file2 file3 sftp> get file2 Fetching /home/smith/MyFiles/file2 to file2 sftp> quit If your username on the remote system is different from your local one, use the argument: → sftp Command Meaning help View a list of available commands. → cdparanoia 2-4 Rip tracks 2, 3, and 4 into a single file. -t Copy the file timestamps. renice Change a process's priority as it runs. tr also understands the escape characters "\a" (^G = alert by ringing bell), "\b" (^H = backspace), "\f " (^L = formfeed), "" (^J = newline), "\r" (^M = return), "\t" (^I = tab), and "\v" (^K = vertical tab) accepted by printf (see "Screen Output" on page 198), as well as the notation nn to mean the character with octal value nnn. 3. Another way to become the superuser is the su command, which also creates a superuser shell, but you'll need a different password, called the root password, to use it. This power comes with complicated syntax, unfortunately, but with a little effort you can learn a few useful tricks. Original file.gz is deleted. passwd Change a password. To maintain privacy and security, most users can access only some files on the system, not all. ^A Go to top of page. For example, to count lines in a protected file called /etc/ shadow, with and without sudo, you could run this command: → wc -l /etc/shadow wc: /etc/shadow: Permission denied → sudo wc -l /etc/shadow This will fail Now with sudo What's in This Book? Some users prefer cpio for its flexibility, and some longtime administrators swear by dump and restore as the only reli- able way to back up every type of file. Barrett has been immersed in Internet technology since 1985. For example: /help /join /connect server Connect to an IRC server. The critical variable PATH tells the shell where to look. For example: → sudo useradd -d /home/smith -s /bin/bash \ -g users smith Useful options -d dir Set the user's home directory to be dir. Shell variables You can define variables and their values by assigning them: → MYVAR=3 To refer to a value, simply place a dollar sign in front of the variable name: → echo $MYVAR 3 30 | Linux Pocket Guide Some variables are standard and commonly defined by your shell upon login: Variable Meaning DISPLAY The name of your X window display HOME Your home directory, such as /home/smith LOGNAME Your login name, such as smith MAIL Your incoming mailbox, such as /var/spool/mail/smith OLDPWD Your shell's previous directory, prior to the last cd command PATH Your shell search path: directories separated by colons PWD Your shell's current directory SHELL The path to your shell (e.g., /bin/bash) TERM The type of your terminal (e.g., xterm or vt100) USER Your login name The scope of the variable (i.e., which programs know about it) is, by default, the shell in which it's defined. In general, unmount a device before checking it, so no other programs are operating on it at the same time: → sudo umount /dev/sda10 → sudo fsck -f /dev/sda10 Pass 1: Checking inodes, blocks, and sizes Pass 2: Checking directory structure Pass 3: Checking directory connectivity Pass 4: Checking reference counts 16 Notice the spelling is "umount," not "unmount." 132 | Linux Pocket Guide Pass 5: Checking group summary information /home: 172/1281696 files (11.6% non-contiguous), ... → display photo.jpg The command is very powerful, with more than 100 options listed on its manpage. hostname stdin stdout - file -- opt --help --version hostname [options] [name] The hostname command prints the name of your computer. Now you can mount /dev/sda8 on /usr with either of these commands: → sudo mount /dev/sda8 → sudo mount /usr By device By directory mount is run typically by the superuser, but common removable devices like USB keys and DVDs often can be mounted and unmounted by any user. Installing Software | 231 → tar xvf /package.tar.gz → tar xvf /package.tar.bz2 gzip bzip2 3. N =0 means try forever. P Pop (remove) the topmost value from the stack. But with great power comes a great 106 | Linux Pocket Guide learning curve, too much for a short book. Scheduling Jobs | 149 Useful options -n seconds Set the time between executions, in seconds. This is sometimes necessary to work with a file whose name begins with a dash, which otherwise would be (mistakenly) treated as an option. -x Swap (exchange) the contents of the primary and secondary selection. -d Print your host's DNS domain name. traceroute View the network path to a remote host. tee is most often found in the middle of pipelines, writing some intermediate data to a file while also passing it to the next com- mand in the pipeline: → who | tee original_who | sort barrett pts/1 Sep 22 21:15 byrnes pts/0 Sep 15 13:51 silver :0 Sep 23 20:44 silver pts/2 Sep 22 21:18 This command line produces the sorted output of who on screen, but also writes the original, unsorted output of who to the file original_who: → cat original_who silver :0 byrnes pts/0 barrett pts/1 silver pts/2 Sep Sep Sep Sep 23 15 22 22 20:44 13:51 21:15 21:18 and then passes along that same output to the rest of the pipe- line (sort), producing sorted output on screen. Effectively, dot files are hidden unless you explicitly ask to see them. Directory scope, category, and application Directory path part 1: category A category tells you the types of files found in a directory. If you have too many arguments, the extras are ignored, and if you have too few, printf assumes default values (0 for numeric formats, an empty string for string formats). → crontab myfile Install the file myfile as your crontab file. For example, to help you view the contents of a file, we introduce many file-viewing commands together: cat for short text files, less for longer ones, od for binary files, and so on. test -n "hello" echo $? So instead of a com- mand saying "run this program," it might say, "run this program, write its output to a file of my choosing, and if any errors occur, send me an email with the results." Shell prompts Before you can type a command, you must wait for the shell to display a special symbol, called a prompt. c Set the CC list. The first prints literally and the second makes a beep. For novices who need to get up to speed on Linux use, and experienced users who want a concise and functional reference, this guide provides quick answers. It also is perfectly suitable for comparing binary files, as opposed to diff, which operates best on text files. -g group Set the user's initial (default) group to group, which can either be a numeric group ID or a group name, and which must already exist. The second is modern instant messaging, with commands such as sendxmpp. Only certain types of filesystems are supported; you can list them with the com- mand: → ls /sbin/fsck.* | cut -d. (If used with -c for checking sorted files, fail if any consecutive lines are identical.) 102 | Linux Pocket Guide -c Don't sort, just check if the input is already sorted. For example, if you have a dictionary file full of strings, one per line: → cat my_dictionary_file aardvark aback abandon ... These are not hard-and-fast rules but typical cases. There are three kinds of specification arguments: A single number: an upper limit seq begins at 1 and counts up to the number: → seq 3 1 2 3 Two numbers: lower and upper limit seq begins at the first number and counts as far as it can without passing the second number: → seq 2 5 2 3 4 5 Three numbers: lower limit, increment, and upper limit seq begins at the first number, increments by the second number, and stops at (or before) the third number: 202 | Linux Pocket Guide → seq 1 .3 2 1 1.3 1.6 1.9 You can also go backward with a negative increment: → seq 5 -1 2 5 4 3 2 Useful options -w Print leading zeros, as necessary, to give all lines the same width: → seq -w 8 10 08 09 10 -f format Format the output lines with a printf-like format string, which must include either %g (the default), %e, or %f: → seq -f '**%g**' 3 **1** **2** **3** -s string Use the given string as a separator between the numbers. In general, you cannot (or should not) mix package types like Debian and RPM. munpack stdin stdout - file --opt --help --version munpack [options] mail_file mpack [options] files Modern email programs can send and receive attachments so easily we rarely think about it, but this was not always the case. File Compression and Packaging | 111 bunzip2 file.bz2 Uncompress file.bz2 to create file. Some common categories are as follows: Categories for programs bin Programs (usually binary files) sbin Programs (usually binary files) intended to be run by the superuser lib Libraries of code used by programs Categories for documentation doc Documentation info Documentation files for emacs's built-in help system man Documentation files (manual pages) displayed by the man program; the files are often compressed and are sprinkled with typesetting commands for man to interpret share Program-specific files, such as examples and installation instructions Categories for configuration etc Configuration files for the system (and other miscellaneous stuff) init.d Configuration files for booting Linux rc.d Configuration files for booting Linux; also rc1.d, rc2.d, ... Usually the INSTALL or README file will tell you to run a script called configure in the current directory, then run make, then run make install. For full docu- mentation, run info bash, search the Web, or pick up a more in-depth O'Reilly book like Learning the bash Shell or Bash Pocket Reference. mput file* Copy multiple local files to the remote machine using wildcards * and ?. For example, watch -n 60 date executes the date command once a minute, sort of a poor man's clock. 1 Piping to bash Bash is not just a shell; it's also a command, bash, that reads from standard input. Assure yourself that each file, when extracted, won't overwrite something precious on your system, either accidentally or mali- ciously:23 → tar tvf package.tar.gz | less → tar tvf package.tar.bz2 | less gzip bzip2 2. [:graph:] Any graphic character. -n Sort numerically (i.e., 9 comes before 10) instead of alphabetically (10 comes before 9 because it begins with a "1"). -e Create an ed script that would change fileA into fileB if run. | 7 mand; Figure 1 shows one for the ls (list files) command. (Or other codes if the comparison fails.) md5sum stdin stdout - file -- opt --help --version md5sum files | --check file The md5sum command works with checksums to verify that files are unchanged. Network Connections | 183 Get help. -u Print unique lines only. -w N Time out after N seconds. -G Print the IDs of all other groups to which the user belongs. To make it perma- nent, modify the PATH variable in your startup file ~/.bash_pro- 32 | Linux Pocket Guide file, as explained in "Tailoring Shell Behavior" on page 46. Your distro might perform installations on the com- mand line, with one or more GUI tools, or both. → shasum myfile SHA-1 algorithm 253c9c5836261859a77f83dc296168b35c1230ac myfile → shasum -a 256 myfile SHA-256 algorithm e8183aaa23aa9b74c7033cbc843041fcf1d1e9e93724b7ef63c94d 4c50a15df8 myfile → shasum myfile > mysum File Comparison | 119 → shasum --check mysum myfile: OK Avoid older, weaker programs such as sum and cksum which produce much smaller, unreliable checksums. q The official Mutt site is . Use lpq to learn the ID of the desired print jobs (say, 61 and 78), then type: → lprm -P printername 61 78 If you don't supply any job IDs, your current print job is can- celed. If you provide a username to su: → su -l sophia Password: ******* sophia's password you can become that user (provided you know her password). Options, which usually begin with a dash, affect the behavior of the program. Group Management groups Print the group membership of a user. For operations on local files, which yum does not provide, we use the rpm command directly: Action yum command Search for a package that meets your needs (supports wildcards * and ?) yum search command_name Check if a package is installed yum list installed package_name Download a package but don't install it. Unlike most other calcula- tors, bc can handle numbers of unlimited size and any number of decimal places: → bc 1+2+3+4+5 15 scale=2 (1 + 2 * 3 / 4) - 5 -2.50 2^100 1267650600228229401496703205376 ^D Programmers may enjoy the ability to switch bases to perform calculations and conversions in binary, octal, hexadecimal, or even custom bases: → bc obase=2 999 1111100111 obase=16 999 3E7 Display results in base 2 Or base 16 But bc doesn't stop there. Useful options -f N Begin with page N of the PDF file. Additionally, a predefined group of users may have per- mission to access a file. See the manpages for these programs if you are interested in them. Unlike yum, rpm works locally on your com- puter: it does not search software archives on the Internet for new packages. -n Print names (for users and groups) rather than numeric IDs. Must be combined with -u, -g, or -G. mailq View the outgoing mail queue on your system. inet 192.168.1.47 See who owns the domain name oreilly.com (press the space bar to move forward page by page, and type "q" to quit): → whois oreilly.com | less Domain Name: OREILLY.COM Registrar: GODADDY.COM, LLC ... i View the contents of your mailbox. TX packets:1314765 errors:0 dropped:0 overruns:0 ... Practicing with This Book This book comes with a collection of files for practicing with Linux. [:lower:] Any lowercase letter. Users and Their Environment | 159 The user argument can be a local username or a remote user in the form Remote hosts will respond to finger requests only if they are configured to do so. v View your bookmark list. whois Look up the registrants of Internet domains. spell stdin stdout -file --opt --help --version spell [files] The spell command prints all words in the given files that are misspelled, according to its dictionary (it is not interactive): → cat badwords This Linux file has some spelling errors. ... On Linux, each line in a text file ends with a new- line character (ASCII 10). -p N Use port N as the source port. \? Most people want a more powerful program for regular use, but for quick messages from the command line or in scripts, mail is really handy. A "col- umn" is defined by character offsets (e.g., the nineteenth char- acter of each line): → cut -c19 myfile File Text Manipulation | 97 or by byte offsets (which are different from characters if your language has multibyte characters): → cut -b19 myfile or by delimited fields (e.g., the fifth field in each line of a comma-delimited file, data.csv): → cat data.csv one,two,three,four,five,six,seven ONE,TWO,THREE,FOUR,FIVE,SIX,SEVEN 1,2,3,4,5,6,7 → cut -f5 -d, data.csv five FIVE 5 You aren't limited to printing a single column: you can provide a range (3-16), a comma-separated sequence (3,4,5,6,8,16), or both (3,4,8-16). The second edition has expanded from Fedora-only coverage to distro-neutral, with practical information on a wider range of commands requested by readers. → tar -czf myarchive.tar.gz mydir Create → ls -lG myarchive.tar.gz -rw-r--r-- 1 smith 350 Nov 7 14:09 myarchive.tar.gz → tar -tf myarchive.tar.gz List contents mydir/ mydir/dir/ mydir/dir/file10 mydir/file1 mydir/file2 ... Their names often contain three parts, as shown in Figure 4. Look in your system's main menu or start menu for an application called Terminal, Konsole, xterm, gnome-terminal, uxterm, or something similar. -y Side-by-side format; use -W to adjust the width of the output. -c Cancel a shutdown in progress (omit the time argument). All of these programs are available on the command line. (Only the superuser can cancel other users' jobs.) The -P option specifies which print queue contains the job. If you come across a format we don't cover, such as Mac OS X sit files, Arc, Zoo, rar, and others, learn more at dia.org/wiki/List_of_archive_formats. Then run it like any other command: → myscript If the script is in your current directory, but the current directory "." is not in your search path, you'll need to pre- pend "./" so the shell finds the script: → ./myscript The current directory is generally not in your search path for security reasons. /proc/ cpuinfo Information about your computer's processors. Once processes are started, they can be stopped, restarted, kil- led, and reprioritized. Only the system knows for sure. Linux Pocket Guide, the cover image, and related trade dress are trademarks of O'Reilly Media, Inc. yes stdin stdout - file -- opt --help --version yes [string] The yes command prints the given string (or "y" by default) forever, one string per line: → yes again again again Screen Output | 201 again ... To make sense of a relative path, you need to know "where you are" in the Linux filesystem. -d Diff (compare) the archive against the filesystem. This book focuses on the second and third parts: supplied pro- grams and the shell. id3info stdin stdout - file -- opt --help --version id3info [options] [files] The id3info command displays information about an MP3 audio file, such as the song title, recording artist, album name, and year. shutdown stdin stdout - file -- opt --help --version shutdown [options] time [message] The shutdown command halts or reboots a Linux system; only the superuser may run it. To make bash your default shell, see chsh on page 165. Using a simple configuration file, this command can reach out to IMAP and POP servers and download mail in batch. mplayer also plays audio files. ps2ascii Extract text from PostScript or PDF files. rsync stdin stdout - file -- opt --help --version rsync [options] source destination The rsync command copies a set of files. Original file.bz2 is deleted. pdftk Split, join, rotate, and otherwise manipulate PDF files. To learn how to navi- gate the info system, type info info. k List all keystrokes and their meanings. -identify Print information about the image's format, size, and other statistics to standard output. The following table lists common operations with dnf: Action dnf command Search for a package that meets your needs (supports wildcards * and ?) dnf search command_name Check if a package is installed dnf list installed package_name Download a package but don't install it dnf download package_name Download and install a package sudo dnf install package_name Install a package file sudo dnf install file.rpm Learn about a package dnf info package_name List the contents of a package rpm -ql package_name Discover which package an installed file belongs to dnf provides /path/to/file Update an installed package sudo dnf upgrade package_name Installing Software | 225 Action dnf command Remove an installed package sudo dnf remove package_name List all packages installed on the system dnf list installed | less Check for updates for all packages on the system dnf check-update Update all packages on the system sudo dnf upgrade yum stdin stdout - file -- opt --help --version yum [options] [packages] yum is a popular package manager for RPM packages (.rpm files) found on Red Hat Enterprise Linux, Fedora, CentOS, and other distros. 196 | Linux Pocket Guide irssi stdin stdout - file -- opt --help --version irssi [options] The irssi command is a fully functional IRC (Internet Relay Chat) client that is text-based, so it runs in a shell window. Command to execute Any shell command, which will be executed in your login environment, so you can refer to environment variables like $HOME and expect them to work. Instead of typing 100 wget commands by hand, con- struct the commands with a loop, using seq to construct the list of integers from 1 to 100: 246 | Linux Pocket Guide → for i in `seq 1 100` do echo wget i.jpg done wget wget ... File owners, groups, and the world may each have permis- sion to read, write (modify), and execute (run) particular files. -fill Set the solid color used by the -backdrop option. or only specified variables: → printenv HOME SHELL /home/smith /bin/bash User Account Management useradd Create an account. -g group Change the user's initial (default) group to group, which can either be a numeric group ID or a group name, and which must already exist. To display information, run: → metaflac --list guitar.flac ... last stdin stdout - file -- opt --help --version last [options] [users] [ttys] The last command displays a history of logins, in reverse chronological order: → last bob pts/3 localhost Mon Sep 8 21:07 - 21:08 (00:01) sue pts/6 :0 Mon Sep 8 20:25 - 20:56 (00:31) bob pts/4 myhost Sun Sep 7 22:19 still logged in ... A running program comprises one or more processes; a job consists of one or more programs exe- cuted as a shell command. Action APT command Search for a package that meets your needs apt-file search package_name Check if a package is installed dpkg -s package_name Download a package but don't install it apt-get -d package_name Download and install a package sudo apt-get install package_name Install a package file dpkg -i package_file.deb Learn about a package apt-cache show package_name List the contents of a package dpkg -L package_name Discover which package an installed file belongs to dpkg -S /path/to/file Update an installed package sudo apt-get upgrade package_name Remove an installed package sudo apt-get remove package_name List all packages installed on the system dpkg -l Check for updates for all packages on the system sudo apt-get -u upgrade Installing Software | 229 Action APT command Update all packages on the system (to include kernel packages, replace upgrade by dist-upgrade) aptitude stdin stdout sudo apt-get upgrade - file -- opt --help --version aptitude [options] [packages] aptitude is another package manager for the command line that manipulates Debian (.deb) packages. -a Print your host's alias name. Do you ever need to ensure that only one copy of a program runs at a time on your computer? Try: → wc --help 12 | Linux Pocket Guide If the output is longer than the screen, pipe it into the less program to display it in pages (press q to quit): → wc --help | less Examine the directory /usr/share/doc This directory contains supporting documents for many programs, usually organized by program name and ver- sion. 160 | Linux Pocket Guide printenv stdin stdout - file -- opt --help --version printenv [environment_variables] The printenv command prints all environment variables known to your shell and their values: → printenv HOME=/home/smith MAIL=/var/spool/mail/smith NAME=Sandy Smith SHELL=/bin/bash ... It can make an exact copy, including file permissions and other attributes (called mirroring), or it can just copy the data. Just display what would be done. eject Eject a CD, DVD, or other removable disk. The manpage has many more exam- ples and full syntax. ...so return code is "failure" The return codes of a command are usually documented on its manpage. However, they all support the following usage: → kill -N PID → kill -NAME PID where N is a signal number, and NAME is a signal name without its leading "SIG" (e.g., use -HUP to send the SIGHUP signal). inet6 fe80::21e:8cff:fe53:41e4/64 ... Linux has various shells: the Bourne shell, Korn shell, C shell, and others. Ignores entries that include the noauto option. -u Unified format, which merges the files and prepends "-" for deletion and "+" for addition. Inode mode. In other words, any command that reads from stan- dard input can have its input come from a file instead with the shell's < operator: → any command < infile 7 Some setups use ~/.bashrc for this purpose. -h phone Change the home phone number to phone. groupmod Modify a group. -i Case-insensitive operation. mogrify Modify a graphics file. Most users rarely notice the kernel. It doesn't dis- play pictures, play audio or video, or even respond to your mouse. Other common formats include Zip files from Windows systems (.zip extension), xz 108 | Linux Pocket Guide files (.xz and .lzma extensions), and occasionally, classic Unix compression (.Z extension). For instance, this path: /one/two/three/four refers to the root directory /, which contains a directory called one, which contains a directory two, which contains a directory three, which contains a final file or directory, four. File Text Manipulation | 95 Regular expression Plain Extended Meaning The literal character c, even if c is a special regular expression character. -nd Retrieve all files into the current directory, even if remotely they are in a more complex directory tree. expr stdin stdout - file -- opt --help --version expr expression The expr command does simple math (and other expression evaluation) on the command line: → expr 10 → expr 140 → expr 7 → expr 0 7 + 3 '(' 7 + 3 ')' '*' 14 Shell characters are quoted length ABCDEFG 15 '>' 16 Meaning false Each argument must be separated by whitespace. The -h option uses powers of 1024, whereas -H uses powers of 1000. If your system passes the test, however, rpm installs the requested package. groupmod stdin stdout - file -- opt --help --version groupmod [options] group The groupmod command modifies the given group, changing its name or group ID: → sudo groupmod -n newname friends groupmod does not affect any files owned by this group: it sim- ply changes the ID or name in the system's records. The skeleton directory traditionally contains minimal (skeletal) versions of initialization files, like ~/.bash_profile, to get new users started. c Delete (clear) the entire stack. To log out from a remote shell, just close the shell (type exit or logout). -n -w N Fail after waiting N seconds, if another command is already running. Be careful when changing the ID, or these files will have group ownership by a nonexistent group. Controlling Processes kill Terminate a process (or send it a signal). As a practical example, delete all carriage returns from a DOS text file so it's more compatible with Linux text utilities like grep: → tr -d '\r' < dosfile.txt > linuxfile.txt tr translates the first character in charset1 into the first char- acter in charset2, the second into the second, the third into the third, and so on. X A graphical system that provides windows, menus, icons, mouse support, and other familiar GUI elements. Available escape characters are: \a Alert (play a beep) \b Backspace \c Don't print the final newline (same effect as -n) \f Form feed Line feed (newline) \r Carriage return \t Horizontal tab \v Vertical tab \\ A backslash \' Single quote \" Double quote nn The character whose ASCII value is nnn in octal printf stdin stdout - file -- opt --help --version printf format_string [arguments] The printf command is an enhanced echo: it prints formatted strings on standard output. More context is needed. -p Download all necessary files to make a page display completely, such as stylesheets and images. Normal processes (run without nice) run at level zero, which you can see by run- ning nice with no arguments: → nice 0 The superuser can also lower the nice level, increasing a proc- ess's priority: → sudo nice -n -10 myprogram To see the nice levels of your jobs, use ps and look at the "NI" column: → ps -o pid,user,args,nice renice stdin stdout - file -- opt --help --version renice [-n N] [options] PID While the nice command can invoke a program at a given nice level, renice changes the nice level of an already-running pro- 17 This is called "nicing" the process. -l username Change the user's login name to username. Selected topics include: The filesystem and shell File creation and editing Text manipulation and pipelines Backups and remote storage Viewing and controlling processes User account management Becoming the superuser Network connections Audio and video Installing software Programming with shell scripts What people are saying – Write a review Great book for understanding how to run programs on the Linux operating system. Additionally, you may use three-letter abbreviations (jan, feb, mar, ...), but not in ranges or sequences. ip maddr Display multicast addresses of your network devices. In the preceding command, the -l option tells wc to count lines and not words. Math and Calculations expr Do simple math on the command line. Instant Messaging | 197 /names List the users connected on the current channel. /join channel Join a given IRC channel. unzip Uncompress Windows Zip files. -E Don't interpret escape characters: the opposite of -e. Directory path part 3: application The application part of a directory path, if present, is usually the name of a program. of=file Specify an output file or device. Unless you know what you're doing, omit this option and accept the default. See "Beyond Shell Scripting" on page 248 for references. Be aware that rpm sometimes requires a filename argument (like emacs-23.1-17.i386.rpm) and other times just the package name (like emacs). sr1 48 1 1 1 sr0 12 1 1 1 The available devices here are /dev/sr1 and /dev/sr0. It clearly explains how to get up to speed quickly on day-to-day Linux use. To view your processes: → ps -ux all of user "smith's" processes: → ps -U smith all occurrences of a program: → ps -C program_name processes on terminal N: Viewing Processes | 139 → ps -tN particular processes 1, 2, and 3505: → ps -p1,2,3505 all processes with command lines truncated to screen width: → ps -ef all processes with full command lines: → ps -efww and all processes in a threaded view, which indents child pro- cesses below their parents: → ps -efH Remember, you can extract information more finely from the output of ps using grep and other filter programs: → ps -ux | grep myprogram uptime stdin stdout - file -- opt --help --version uptime The uptime command tells you how long the system has been running since the last boot: → uptime 10:54pm up 8 days, 3:44, 3 users, load average: 0.89, 1.00, 2.15 This information is, from beginning to end: the current time (10:54pm), system uptime (8 days, 3 hours, 44 minutes), num- ber of users logged in (3), and system load average for three time periods: one minute (0.89), five minutes (1.00), and fifteen minutes (2.15). There are many other "show" options for other information: see the manpage. This is the default behavior. Depending on how you have things set up, this might be the fully qualified hostname: → hostname myhost.example.com or your short hostname: → hostname myhost You can also set your hostname, as root:21 → sudo hostname orange However, hostnames and nameservers are complicated topics well beyond the scope of this book. Email | 185 Keystroke Meaning Quit. If you don't know the root password on the system, you can't use su. If you'd rather have the contents of mydir copied into mydir2, append a slash onto mydir: → rsync -a mydir/ mydir2 In order to mirror directory mydir over the network to another host, server.example.com, where you have an account with user- name "smith." rsync automatically secures the connection with SSH to prevent eavesdropping: → rsync -a mydir :D2 If you like working with rsync but want to have incremental backups and manage them efficiently, look into rsnapshot (. Otherwise, you'll need to quote or escape these characters all the time. Compressed files have the extension .Z. Operators for expr include: Operator Numeric operation +, -, *, / Addition, subtraction, multiplication, and integer division, respectively % Remainder (mod) String operation = Greater than or equal Later in dictionary, or equal = Equality Equality != Inequality Inequality | Boolean "or" Boolean "or" & Boolean "and" Boolean "and" s : regexp Does the regular expression regexp match string s? To download these files for the first time, run these commands:1 → cd → wget → tar -xf LPG-stuff.tar.gz These commands create a directory named linuxpocketguide in your home directory. Web Browsing | 191 -c Continue mode: if a previous retrieval was interrupted, leaving only a partial file as a result, pick up where wget left off. For more complex handling of PDF and PostScript files, read on. Pipe the output of yes into the input of the command to answer all those prompts: → yes | my_interactive_command When my_interactive_command terminates, so will yes. tr command, 101 B background jobs, running, 40 backing up Linux files, 134 backquotes on command line, 36, 144 vs. -L Disable (lock) the account so the user cannot log in. All lines that appear in file2 but not in file1. GNU/Linux This includes the kernel name (Linux), hostname (server.example.com), kernel release (4.2.0-17-generic), kernel version (#21-Ubuntu SMP Fri Oct 23 19:56:16 UTC 2015), hardware name (x86_64), and operating system name (GNU/ Linux). To view all loaded network interfaces, run: → ifconfig -a Host Location host Look up hostnames, IP addresses, and DNS info. uname stdin stdout - file -- opt --help --version uname [options] The uname command prints fundamental information about your computer: → uname -a Linux server.example.com 4.2.0-17-generic #21-Ubuntu SMP Fri Oct 23 19:56:16 UTC 2015 x86_64 ... Categories for programming include Header files for programming src Source code for programs The Filesystem | 21 Categories for web files cgi-bin Scripts/programs that run on web pages html Web pages public_html Web pages, typically in users' home directories www Web pages Categories for hardware dev Device files for interfacing with disks and other hardware media Mount points: directories that provide access to disks mnt Mount points: directories that provide access to disks Categories for runtime files var Files specific to this computer, created and updated as the computer runs lock Lock files, created by programs to say, "I am running"; the existence of a lock file may prevent another program, or another instance of the same program, from running or performing an action log Log files that track important system events, containing error, warning, and informational messages mail Mailboxes for incoming mail run PID files, which contain the IDs of running processes; these files are often consulted to track or kill particular processes spool Files queued or in transit, such as outgoing email, print jobs, and scheduled jobs tmp Temporary storage for programs and/or people to use proc Operating system state: see "Operating System Directories" on page 24 22 | Linux Pocket Guide Directory path part 2: scope The scope of a directory path describes, at a high level, the pur- pose of an entire directory hierarchy. The filename argument can specify a different data file, such as /var/log/wtmp for past logins or /var/log/btmp for failed log- ins.19 Useful options Print a row of headings as the first line. xsel stdin stdout - file -- opt --help --version xsel [options] xsel is a more powerful version of xclip. Normally, sort would consider these lines to be in sorted order: aaaaz bbbby but if your sorting key is "the fifth character of each line," deno- ted -k1.5, then the lines are reversed because y comes before z. You can make relative moves with cd as well: → cd d Enter subdirectory d → cd ../mydir Go up to my parent, then into directory mydir File and directory names may contain most characters you expect: capital and lowercase letters,4 numbers, periods, dashes, underscores, and most symbols (but not "/", which is reserved for separating directories). See the echo command for the full list. For example, you can give full permissions for the group friends to read, write, and execute the file /tmp/sample: → groups users smith friends → chgrp friends /tmp/sample → chmod 770 /tmp/sample → ls -l /tmp/sample -rwxrwx--- 1 smith friends 2874 ... Each description begins with a standard heading about the com- What's in This Book? Use -cvZf to print filenames as they are processed. Useful options -t N Specify that one tab stop occurs every N spaces. In most common cases, mount reads the file /etc/fstab (filesys- tem table) to learn how to mount a desired disk. Unlike graphical cli- ents, profanity runs in a shell window, so you can use it over SSH, for example. The default is primary. For example: -rwxr-x--- Here's what these letters and symbols mean: Position Meaning 1 File type: - = file, d = directory, l = symbolic link, p = named pipe, c = character device, b = block device 2–4 Read, write, and execute permissions for the file's owner 5–7 Read, write, and execute permissions for the file's group 8–10 Read, write, and execute permissions for all other users So our example -rwxr-x--- means a file that can be read, writ- ten, and executed by the owner, read and executed by the group, and not accessed at all by other users. There isn't a clear distinction between / and /usr in practice, but there is a sense that / is "lower level" and closer to the operating system. Here are a few: Language Program C, C++ To get started... Useful options -a All information. If any code samples or other technology this work contains or describes is subject to open source licenses or the intellec- tual property rights of others, it is your responsibility to ensure that your use thereof complies with such licenses and/or rights. Any time you refer to a path that doesn't begin with a slash, like bin, it's called a rela- tive path. You can access the selections from the command line, sending the output of any shell command to the selection, or reading the selection like standard input. They consist of one or more page ranges with qualifiers. For example, "%5d" means to print a decimal number in a five-characterwide field, and "%6.2f " means a floating-point number in a sixcharacter-wide field with two digits after the decimal point. Windows and Mac OS X computers can be operated by com- mand line as well (Windows with its cmd and PowerShell com- mand tools, and OS X with its Terminal application), but most of their users can get along fine without typing commands. A process is a unit of work on a Linux system. (Linux also has graphical email clients, such as Thunderbird, Evolution, and KMail.) mutt stdin stdout - file -- opt --help --version mutt [options] Mutt is a text-based mailer that runs in an ordinary terminal (or terminal window), so it can be used both locally (e.g., in an X terminal window) or remotely over an SSH connection. What's New in the Third Edition? In this section, we assume an English, US-based locale. This is an absolute change (because the directory begins with "/"). If you omit the month (cal 2016), the entire year is printed. \{ n ,\} {n ,} n or more repetitions of a regular expression. For example, use * to match an asterisk or \\ to match a backslash. The installation process for your Linux distro undoubtedly prompted you to create a superuser account (root), and possi- bly also an ordinary user account (presumably for yourself). File Comparison | 115 Context diff format, as used by the patch command (man -c patch). Useful options Instantly fail if another command is already running. umount Unmount a disk partition (make it inaccessible). This can termi- nate a process (the default action), interrupt it, suspend it, crash it, and so on. 3 In Linux, all files and directories descend from the root. . -rotate N Rotate the image by N degrees. -f file Read the archive from, or write the archive to, the given file. logname stdin stdout - file -- opt --help --version logname The logname command prints your login name (it might seem trivial, but it's useful in shell scripts): → logname smith If this command does not work on your system, try instead: → echo $LOGNAME 156 | Linux Pocket Guide whoami stdin stdout - file -- opt --help --version whoami The whoami command prints the name of the current, effective user. Instant Messaging | 195 profanity stdin stdout - file -- opt --help --version profanity [options] The profanity command is a fully functional instant messag- ing client for the XMPP protocol (Jabber). We'll discuss only a few programs that open X windows to run. g Go to a URL (you'll be prompted to enter it). But if you consider each line as three comma-separated values, you can sort on the second value with: → sort -k2 -t, people George Washington,123 Main Street,New York John Adams,39 Tremont Street,Boston Abraham Lincoln,54 First Avenue,San Francisco where "123 Main Street" is first alphabetically. Works well with -t too. But if you provide different lock files, both commands will run. -F hostfile Set your hostname by reading the name from file hostfile. Let's cover some terminology. 978-1-491-92757-1 [M] Table of Contents Linux Pocket Guide What's in This Book? Besides the usual web browsers such as Chrome and Firefox, Linux offers several ways to explore the World Wide Web via the command line. Useful options -N Print only the latest N lines of output, where N is a positive integer. Email | 187 • You can process your mailboxes with any command-line tools, such as grep, because mail files are plain text. /wins List your messaging windows. If the specified group exists already, complain and exit. -c Complement: operate on all characters not found in charset1. -r Append files to an existing archive. netcat is much more flexible. Press ^D to close the connection. Here's a function that implements the quadratic formula from algebra and prints the real roots of a given equation, stored in a file called quadratic.txt:22 22 This demonstration code will fail if the roots are imaginary. /msg Open a messaging window to communicate with /msg text Send an instant message in your current messaging window. date stdin stdout - file -- opt --help --version date [options] [format] The date command prints dates and times. gzip -c file Produce compressed data on standard output. /disconnect Disconnect from the IRC server. pdf2ps, ps2pdf Convert between PDF and PostScript file formats. | 3 wc -lw myfile Same as -l -w though some programs are quirky and do not recognize com- bined options. The general form is: case string in expr1) 240 | Linux Pocket Guide body1 ;; expr2) body2 ;; ... Infinite! Another type of loop, the for loop, iterates over values from a list: for variable in list do body done For example: → cat script-for #!/bin/bash for name in Tom Jane Harry do echo "$name is my friend" done → ./script-for Tom is my friend Jane is my friend Harry is my friend The for loop is particularly handy for processing lists of files; for example, filenames with a certain extension in the current directory: → cat script-for2 #!/bin/bash for file in *.docx do Programming with Shell Scripts | 243 echo "$file is a stinky Microsoft Word file" done → ./script-for2 letter.docx is a stinky Microsoft Word file You can also use the seq command (see seq on page 202) to produce a list of consecutive integers, and then loop over those numbers: → cat script-seq #!/bin/bash for i in $(seq 1 20) Generates the numbers 1 2 3 4 ... (Compare to the wget command.) -emacskeys Make Lynx obey keystrokes reminiscent of the emacs editor. It might initially be more difficult than icons and menus, but once you're accustomed to it, the shell becomes easy to use and is very powerful. C Copy the message to a file. pdf2ps stdin stdout - file -- opt --help --version pdf2ps [options] file.pdf [file.ps] ps2pdf [options] file.ps [file.pdf] The pdf2ps command converts an Adobe PDF file into a Post- Script file (if you don't provide an output file name, the default is to use the input filename, with .pdf replaced by .ps): → pdf2ps sample.pdf converted.ps The command has a couple of options but they are rarely used. The load average is the average number of pro- cesses ready to run in that time interval. Shell Features In order to run commands on a Linux system, you'll need somewhere to type them. finger stdin stdout - file -- opt --help --version finger [options] [user[@host]] The finger command prints logged-in user information in a short form: → finger Login Name Tty Idle Login Time smith Sandy Smith :0 Sep 6 17:09 barrett Daniel Barrett :pts/1 24 Sep 6 17:10 jones Jill Jones :pts/2 Sep 8 20:58 or a long form: → finger smith Login: smith Name: Sandy Smith Directory: /home/smith Shell: /bin/bash On since Sat Sep 6 17:09 (EDT) on :0 Last login Mon Sep 8 21:07 (EDT) on pts/6 from web1 No mail. So if you mistakenly forget some whitespace: → [5 -lt 4] No space between 4 and] bash: [: missing ']' then test thinks the final argument is the string "4]" and com- plains that the final bracket is missing. In most cases, you should use the -f option to prevent duplicate groups from being created: → sudo groupadd -f friends Useful options -g gid Specify your own numeric group ID instead of letting groupadd choose one. -T Include the filesystem type (ext3, vfat, etc.) in the output. Zero or one occurrence of a regular expression. you can conveniently search for those strings in a set of input files: → fgrep -f my_dictionary_file story a little aardvark who went to visit the abbot at the abbey. seq stdin stdout - file -- opt --help --version seq [options] specification The seq command prints a sequence of integers or real num- bers, suitable for piping to other programs. nice Invoke a program at a particular priority. -c Display the command

Line, to boost your Linux skills even more. This may differ from your login name (the output of logname) if you've used the sudo command. Get help. ls List the files in the current remote directory. Useful options -s N Run continuously and update the display every N seconds. Creating users is an important job not to be taken lightly. → pdftotext sample.pdf Creates sample.txt Useful options -f N Begin with page N of the PDF file. The argument myfile specifies the file that wc should read and process. Many pages will not look quite right, especially if they use tables or frames extensively, but usually you can find your way around a site. n k Set precision of future operations to be n decimal places (default is 0, meaning integer operations). If not, get your hands on a Linux "live" DVD, such as Ubuntu, Fedora, or Knoppix, which you can boot on most computers to play around with Linux. Once a filesystem is created, you can make it available for use by mounting it on an empty directory.15 For example, if you mount a Windows filesystem on a directory /mnt/win, it becomes part of your system's directory tree, and you can cre- ate and edit files like /mnt/win/myfile. Likewise, a linebreak in the middle of a command will mislead the shell into thinking the command is incomplete. Use a shared lock instead of an exclusive lock. (So convert is a safer command when experimenting on a favorite photo.) It accepts largely the same options as convert: → mogrify -resize 25% photo.jpg montage stdin stdout - file -- opt --help --version montage infiles [options] outfile montage produces a single image file from a collection of input files. Crontab files contain one job per line. Irssi: Connection to irc.example.com established [[status]] /nick zippy You're now known as zippy [[status]] /join test Irssi: Join to #test was synced in 0 secs Hi there, zippy! Welcome back! [#test] Are we having fun yet? unzip -l myfile.zip List contents. cat file.Z | uncompress Uncompress the data from a pipeline. There are numerous Linux programs with graphical interfaces for playing and editing audio and video, but we'll focus once again on command-line tools. -l N Retrieve files at most N levels deep (5 by default). awk AWK is a pattern-matching language. r Edit the Reply-To field. It also introduces some powerful command-line idioms that you might not be familiar with, such as process substitution and piping into bash. → crontab -l Print your crontab file on standard output. Return 0 if not found. usermod Modify an account. → echo ~ /home/smith When the tilde is followed by a slash, the path is relative to HOME: → echo ~/linuxpocketguide /home/smith/linuxpocketguide When the tilde is followed by a username (as in ~fred), the shell expands this string to be the user's home directory: → cd ~fred → pwd /home/fred If there's a user "fred" on your system The "print working directory" command System Directories A typical Linux system has tens of thousands of system directo- ries. If you simply want to display PDF and PostScript files, you have a number of choices. -t List (test) the archive. timeout Kill a command that runs for too long. Useful options -d Delete the characters in charset1 from the input. For example, to capitalize everything in a file: → cat wonderfulfile This is a very wonderful file. Simply enter your distro name (e.g., "Ubuntu") into any popular search engine to find its web- site. Wildcards are "expanded" by the shell into the actual set of filenames they match. See for more information. ip stdin stdout - file -- opt --help --version ip [options] object command... -g Exit when the command produces output that is different from the previous execution. The mplayer command plays video files in many formats (MPEG, AVI, MOV, and more): → mplayer myfile.avi While the video is playing, press the space bar to pause and resume, the cursor keys to jump forward and backward in time, and Q to quit. → tar -xf myarchive.tar.gz Extract If you specify files on the command line, only those files are processed: → tar -xvf myarchive.tar myfile myfile2 myfile3 File Compression and Packaging | 109 Otherwise, the entire archive is processed. See http:// mywiki.wooledge.org/BashFAQ/031 for details. Original file.Z is deleted. Spellchecking look Look up the spelling of a word quickly. For example, to learn about counting words in a file with wc, run: → man wc To search for manpages by keyword for a particular topic, use the -k option followed by the keyword (shown here piped into the command less to display the results one screenful at a time; press the space bar to continue and q to quit): → man -k database | less Run the info command The info command is an extended, hypertext help system covering many Linux programs. The uname command prints the same information. Examples: 210 | Linux Pocket Guide → dc 4 5 + p 9 2 3 ^ p 8 10 * p 80 f 80 9 +p 89 Print the sum of 4 and 5 Raise 2 to the 3rd power and print the result Multiply the stack top by 10 and print the result Print the stack Pop the top two values and print their sum Dates and Times cal Print a calendar. Nevertheless, you should treat such mismatches as errors, even though printf is forgiving. → cat poem | xclip -i → xclip -o 204 | Linux Pocket Guide See the file Pipe file to selection Print selection Once upon a time, there was a little operating system named Linux, which everybody loved. [:digit:] Any digit. 152 | Linux Pocket Guide Hours of the day Same syntax as for minutes. You can run multiple commands simultaneously with this option, but flock will fail if you omit the option. (Does not work over SSH.) /disconnect Log out. /nick name Set your IRC nickname. F1–F10 Switch between messaging windows 1 through 10. You may commonly encounter files in Adobe PDF format, especially when exchanging files with Windows or Mac OS X computers. ps2ascii stdin stdout - file -- opt --help --version ps2ascii file.(ps|pdf)] [outfile.txt] The ps2ascii command extracts text from a PostScript file. q Postpone the message without sending it. To go in the opposite direction, converting a PostScript file to PDF format, use ps2pdf: → ps2pdf sample.ps converted.pdf Printing lpr Print a file. look stdin stdout - file -- opt --help --version look [options] prefix [dictionary_file] The look command prints (on standard output) words that begin with a given string prefix. By default, date prints the system date and time in the local timezone: → date Fri Mar 18 22:32:04 EDT 2016 You can format the output differently by supplying a format string beginning with a plus sign: → date '+%D' 03/18/16 → date '+The time is %l:%M %p on a lovely %A in %B' The time is 10:32 PM on a lovely Friday in March Here is a sampling of the date command's many formats: 212 | Linux Pocket Guide Format Meaning Example (US English) Whole dates and times: %c Full date and time, 12-hour clock Sun 28 Sep 2003, 09:01:25 PM EDT %D Numeric date, 2-digit year 09/28/03 %x Numeric date, 4-digit year 09/28/2003 %T Time, 24-hour clock 21:01:25 %X Time, 12-hour clock 09:01:25 PM %a Day of week (abbreviated) Sun %A Day of week (complete) Sunday Words: %b Month name (abbreviated) Sep %B Month name (complete) September %Z Time zone EDT %p AM or PM PM Numbers: %w Day of week (0–6, 0=Sunday) 0 %u Day of week (1–7, 1=Monday) 7 %d Day of month, leading zero 02 %e Day of month, leading blank 2 %j Day of year, leading zeros 005 %m Month number, leading zero 09 %y Year, 2 digits 03 %Y Year, 4 digits 2003 %M Minute, leading zero 09 %S Seconds, leading zero 05 %l Hour, 12-hour clock, leading blank 9 Dates and Times | 213 Format Meaning Example (US English) Hour, 12-hour clock, leading zero %I 09 %k Hour, 24-hour clock, leading blank 9 %H Hour, 24-hour clock, leading zero 09 %N Nanoseconds 737418000 %s Seconds since the beginning of Linux time: midnight January 1, 1970 1068583983 Other: %n Newline character %t Tab character %% Percent sign % Through its options, date can also display other dates and times. -h Halt the system. Practicing with This Book Getting Help Linux: A First View The Filesystem Shell Features Basic File Operations Directory Operations File Viewing File Creation and Editing File Properties File Location File Text Manipulation File Compression and Packaging File Comparison PDF and PostScript File Handling Printing Spellchecking 1 1 10 11 13 17 26 47 52 55 63 69 81 92 108 114 120 124 126 iii Disks and Filesystems Backups and Remote Storage Viewing Processes Controlling Processes Scheduling Jobs Logins, Logouts, and Shutdowns Users and Their Environment User Account Management Becoming the Superuser Group Management Host Information Host Location Network Connections Email Web Browsing Instant Messaging Screen Output Copy and Paste Math and Calculations Dates and Times Graphics Audio and Video Installing Software Programming with Shell Scripts Final Words Index iv | 128 134 138 143 148 154 156 161 166 167 170 174 179 184 188 193 198 204 206 211 215 218 223 232 248 251 Table of Contents Linux Pocket Guide Welcome to Linux! If you're a new user, this book can serve as a quick introduction, as well as a guide to common and practical commands. Input can come from files or from standard input, which is usually your keyboard. For example, if you run the same sleep command in one shell and a different command such as ls in another, with the same lock file: → flock -n /tmp/mylock ls the second will still fail. Type h to see a complete list and q to quit. substr s p n Print n characters of string s, beginning at position p (p =1 is the first character) index s chars Return the index of the first position in string s containing a character from string chars. Months of the year Integers between 1 and 12; again, you may use sequences, ranges, sequences of ranges, or an asterisk. So /bin contains more fundamental programs than /usr/bin does, such as ls and cat, and /lib contains more fundamental libraries than /usr/lib does, and so on.5 /usr/ local/bin contains programs not included in your distro. To perform a shutdown from a shell, run the shutdown or systemctl command as the superuser, as follows. uniq stdin stdout - file -- opt --help --version uniq [options] [files] The uniq command operates on consecutive, duplicate lines of text. -m 162 | Linux Pocket Guide userdel stdin stdout - file -- opt --help --version userdel [-r] username The userdel command deletes an existing user. -g gid Change the group's ID to gid (risky). ? You may provide usernames or tty names to limit the output. 1 A match was found... flock flock stdin stdout - file -- opt --help --version [options] lockfile command... The two commands needn't be identical, but they must refer to the same lockfile as the first argument. gunzip Uncompress GNU Zip files. Also, your current environment (see printenv) is preserved within each job so it executes as if you were logged in. Look for an extracted file named INSTALL or README. cdparanoia stdin stdout - file -- opt --help --version cdparanoia [options] span [outfile] The cdparanoia command reads (rips) audio data from a CD and stores it in WAV files (or other formats: see the manpage). You can get information about the default network interface (usually called eth0): → ip addr show eth0 2: eth0: ... A more powerful—but less portable—syntax for Boolean tests is the double bracket, [[, which adds regular expression match- ing and eliminates some of the quirks of test. This is usually a tar file on disk (such as myarchive.tar) but can also be a tape drive (such as /dev/tape). Compressed files have the extension .zip. For example, if you have a JPEG file, you can produce a PNG file of the same image: → convert photo.jpg newphoto.png At the same time, you can perform modifications on the copy, such as resizing or reversing it: → convert photo.jpg -resize 50% -flip newphoto.png convert accepts largely the same options as display. -R Don't display hostnames. -i Ignore interrupt signals. crontab Schedule jobs for many future times. aspell stdin stdout - file -- opt --help --version aspell [options] file | command aspell is an interactive spellchecker. Make the user a member of the additional, existing groups group1, group2, and so on. Days of the week Integers between 0 (Sunday) and 6 (Saturday); again, you may use sequences, ranges, sequences of ranges, or an asterisk. If you see a vertical bar between options or arguments, perhaps grouped by parentheses: (file | directory) this indicates choice: you may supply either a filename or directory name as an argument. or to delete all vowels: → cat wonderfulfile | tr -d aeiouAEIOU Ths s vry wndrfl fl. zip -r myfile.zip dirname Pack recursively. Linux can compress files into a variety of formats and uncom- press them. (See "Running a Shell" on page 14 to learn how to open a shell window.) For example, to see who's logged into the computer, you could execute this command in a shell: → who silver byrnes barrett silver :0 pts/0 pts/1 pts/2 Sep Sep Sep Sep 23 15 22 22 20:44 13:51 21:15 21:18 (Recall that the → symbol represents the shell prompt for us, indicating that the shell is ready to run a command.) A single command can also invoke several programs at the same time, and even connect programs together so they interact. Format specifications are described in detail on the manpage for the C function printf (see man 3 printf). Linux provides two types of instant messaging. expand stdin stdout - file -- opt --help --version expand [options] [files] unexpand [options] [files] The expand command converts tab characters to an equivalentlooking number of space characters, and unexpand does the opposite. -D macro C preprocessor format, using #ifdef macro ... Use only absolute paths to your commands (e.g., /usr/bin/who instead of who) to ensure that cron is running the right programs, as a Linux system may have several programs with the same name. Like many other Linux documents, we use the ^ sym- bol to mean "press and hold the Control (Ctrl) key," so for example, ^D (pronounced "control D") means "press and hold the Control key and type D." We also write ESC to mean "press the Escape key." Keys like Enter and the space bar should be self-explanatory. It's convenient when you just want to send a single message, which can be a 194 | Linux Pocket Guide simple "hello" or the contents of a text file, and you don't need to receive a message in return. We encourage you to continue reading, exploring, and learning the capabilities of your Linux systems. To list a shell's environment variables, run: → printenv Shell Features | 31 To provide the value of an environment variable to a specific program just once, prepend variable=value to the command line: → printenv HOME /home/smith → HOME=/home/sally printenv HOME /home/sally → printenv HOME /home/smith The original value is unaffected Search path Programs are scattered all over the Linux filesystem, in directo- ries like /bin and /usr/bin. Offsets are a plus or minus sign followed by whitespace and an amount of time: + 3 days, + 2 weeks, - 1 hour, and so on.18 If you don't specify a part of the date or time, at copies the missing information from the system date and time. Need a date? (two periods in a row). 0n Minimum width n, padded with leading zeros. -s Print in short format. spell Batch spelling checker. We'll discuss additional details in "Shell Features" on page 26, and cover more powerful constructs in "Programming with Shell Scripts" on page 232. Linux has hundreds of filters that produce ever more complex manipulations of the data. comm Line-by-line comparison of two sorted files. It matches data by regu- lar expression and then performs actions based on the data. dnf stdin stdout - file -- opt --help --version dnf [options] [packages] dnf is the newest package manager for RPM packages (.rpm files). It is still found on many Linux systems but is less powerful (some would call it obsolete). Printing | 125 lprm stdin stdout - file -- opt --help --version lprm [options] [job_IDs] The lprm (line printer remove) command cancels one or more print jobs. Sample commands compress file Compress file to create file.Z. Original file is deleted. backquotes, 88 with find command, 87 xclip command, 204, 205 xine video player, 223 XMPP, 195, 196 xpdf command, 120 xsel command, 205 xterm command, 15 Y yes command, 201 yum command, 224, 226 Z zcat command, 111, 112 zip command, 113 Index | 261 About the Author Daniel J. sdb Second block device; partitions are sdb1, sdb2, ... → sudo userdel smith It does not delete the files in the user's home directory unless you supply the -r option. Here are pointers to the programs you may need (start with their manpages): gparted, parted, fdisk, or sfdisk Partition a hard drive. Add --progress to display a numeric progress meter while files are copied. Linux provides several commands for printing messages on standard output, such as echo: → echo hello world hello world Each command has different strengths and intended purposes. A few useful com- mands are: aspell -c file Interactively check, and optionally correct, the spelling of all words in file. Linux: A First View | 13 Supplied programs Thousands of programs for file manipulation, text editing, mathematics, web browsing, audio, video, computer pro- gramming, typesetting, encryption, DVD burning…you name it. Title=Guitar Solo Artist=Gentle Giant Album=Scraping the Barrel Year=2004 Genre=Sample File Vorbis stream 1: Total data length: 102390 bytes Playback length: 0m:09.952s Average bitrate: 82.301673 kb/s Add the -h option for more detailed usage information. You can omit the -p and just provide a PID (renice -n 5 28734). If a command does not support "--", you can prepend the current direc- tory path "./" to the filename so the dash is no longer the first character: wc ./-dashfile --help The option --help makes the command print a help mes- sage explaining proper usage, then exit. -s Eliminate adjacent duplicates (found in charset1) from the input. -p phone Change the office phone number to phone. This is unlike Windows or DOS, in which different devices are accessed by drive let- ters. Try them out to see what they look like. For Controlling Processes | 147 example, this rsync command, when run with flock, will instantly fail if another instance of the same command is already running: → flock -n /tmp/mylock rsync ... Published by O'Reilly Media, Inc., 1005 Gravenstein Highway North, Sebasto- pol, CA 95472. When you run a program via a shell command, how does the shell find it? The subsequent arguments, sandy and 29, are substituted by printf into the format string and then printed. Results of division are truncated to the current scale (see below). systemctl is part of a service manager called systemd; a full treatment is beyond the scope of this book, but we'll cover a few basic uses. 20 | Linux Pocket Guide Figure 4. They usually repre- sent filenames for input or output, but they can be other things too, like directory names or regular expressions. For example, let's capture the Yahoo! home page: → wget 23:19:51 (220.84 KB/s) - 'index.html' saved [31434] which is saved to a file index.html in the current directory. What's Linux? lame stdin stdout - file -- opt --help --version lame [options] file.wav The lame command converts a WAV audio file (say, song.wav) into an MP3 file: → lame song.wav song.mp3 It has over 100 options to control bit rate, convert other for- mats, add ID3 tags, and much more. -a Fix errors automatically (use only if you really know what you're doing; if not, you can seriously mess up a filesystem). In this book, we'll use the unique symbol → to indicate a shell prompt, so you won't mistakenly type it as part of a command. -B Don't consider blank lines. File Text Manipulation | 107 → m4 -DNAME=Sandy -DAGE=25 substitutions My name is Sandy and I am 25 years old. 120 | Linux Pocket Guide pdftotext stdin stdout - file -- opt --help --version pdftotext [options] [file.pdf [outfile.txt]] The pdftotext command extracts text from a PDF file and writes it to a file. Right arrow Forward to next page, or "click" the current link. Getting Help If you need more information than this book provides, there are several things you can do. A disk is a hardware device, which may be divided into parti- tions that act as independent storage devices. ifconfig Older command to set and display network interface information. For more information, see man procmail. Assuming you installed the book's directory of examples in your home direc- tory, you can jump into it at any time by running: → cd ~/linuxpocketguide (where the tilde is a shorthand we'll cover in the next section). -a List the queue for all printers. tar stdin stdout - file -- opt --help --version tar [options] [files] The tar program packs many files and directories into a single file for easy transport, optionally compressed. That's what the nice command is for: it sets a nice level (an amount of "niceness") for a process so it gets less attention from the Linux process scheduler.17 Here's an example of setting a big job to run at nice level 7: → nice -n 7 sort hugefile > outfile If you run nice without a level, 10 is used. Who are you? -s Don't print the JCPU and PCPU columns. Useful options -a Append instead of overwriting files. We cover important, useful aspects of Linux so you can work pro- ductively. -m Only the hardware name. inet 192.168.0.21/24 brd 192.168.0.255 scope ... (... write is also useful in pipelines for quick one-off messages: → echo 'Howdy!' | write smith The related command wall sends a message to all logged-in users at once: Instant Messaging | 193 → wall The system will reboot in 1 hour mesg stdin stdout - file -- opt --help --version mesg [y|n] The mesg program controls whether write connections can reach your terminal. (a single period) and .. Most com- monly it handles disk drives (say, /dev/sda1) and removable media (e.g., USB keys), making them accessible via an existing directory (say, /mnt/mydir): 130 | Linux Pocket Guide → sudo mkdir /mnt/mydir → ls /mnt/mydir Notice it's empty → sudo mount /dev/sda1 /mnt/mydir → ls /mnt/mydir file1 file2 file3 Files on the mounted partition → df /mnt/mydir Filesystem 1K-blocks Used Avail Use% Mounted on /dev/sda1 1011928 285744 674780 30% /mnt/mydir mount has tons of options and uses; we will discuss only the most basic. sort stdin stdout - file -- opt --help --version sort [options] [files] The sort command prints lines of text in alphabetical order, or sorted by some other rule you specify. -f -t X Match the prefix only up to and including the termination character X. -O filename Write all the captured HTML to the given file, one page appended after the other. It simply removes the group name from the system's records. Useful options -dump Print the rendered page to standard output and exit. Finally, clear the window: → clear OK, that was more than 10 commands…but congratulations: you are now a Linux shell user! Reading This Book We'll describe many Linux commands in this book. -k key Choose sorting keys. mailq stdin stdout - file -- opt --help --version mailq The mailq command lists any outgoing email messages await- ing delivery, if any (mail delivery is usually so quick, however, that mailq typically has no output): → mailq …Size-- ----Arrival Time-- -Sender/Recipient--333 Tue Jan 10 21:17:14   Sent mail messages are also recorded in a log file such as /var/log/mail.log; the name may differ from distro to distro. link/ether 00:50:ba:48:4f:ba brd ff:ff:ff:... File Compression and Packaging tar Package multiple files into a single file. Host Information | 173 RX packets:1955231 errors:0 dropped:0 overruns:0 ... The root directory is at the top. For example, if you have a file named -dashfile, the command wc -dashfile will fail because -dashfile will be treated as an (invalid) option. It's great for capturing individual web pages, downloading files, or duplicating entire website hierar- chies to arbitrary depth. 222 | Linux Pocket Guide Useful options -S Show a progress meter; useful for long conversions. Final Words | 249 Index Symbols ! (shell command history), 38 $(), 36 & (ampersand), running back- ground jobs, 41 && (two ampersands), logical and, stopping execution of combined commands, 35 - (dash), standard input/output, 9 -- (two dashes), end of options, 9 --help option, 12 . else bodyN fi For example: → cat script-elif #!/bin/bash bribe=20000 Programming with Shell Scripts | 239 if [`whoami` = "root"] then echo "You are the superuser" elif ["$USER" = "root"] then echo "You might be the superuser" elif ["$bribe" -gt 10000] then echo "You can pay to be the superuser" else echo "You are still a mere mortal" fi → ./script-elif You can pay to be the superuser The case statement evaluates a single value and branches to an appropriate piece of code: → cat script-case #!/bin/bash echo -n "What would you like to do (eat, sleep)? If grep isn't matching the ends of lines properly, check for non-Linux end-of-line characters with cat -v, which displays carriage returns as ^M: → cat -v dosfile.txt Uh-oh! This file seems to end its lines with^M carriage returns before the newlines.^M To remove the carriage returns, use the tr -d command: → tr -d '\r' < dosfile.txt > linuxfile.txt → cat -v linuxfile.txt Uh-oh! This file seems to end its lines with carriage returns before the newlines. free Display free memory. Note the difference: → printf "This is a quote: %s" "\"" This is a quote: " → printf "This is a quote: %q" "\"" This is a quote: \" It is your responsibility to make sure the number of format specifications (%) equals the number of arguments supplied to printf. For example: → sudo rpm -ivh mypackage.rpm Password: ******** 224 | Linux Pocket Guide Your Linux distribution almost certainly comes with graphical programs for manipulating packages, but you may find the command-line programs to be simpler or faster depending on your needs. s Edit the subject line. Up arrow Go to the previous link or form field. quit Exit sftp. The most popular formats are GNU Zip (gzip), whose compressed files are named with the .gz extension, and BZip, which uses the .bz2 extension. For technical information about shutdowns, single-user mode, and various system states, see the manpages for init and init tab. It locates keywords within a file and substitutes values for them. For example, if you have a file myfile: → cat letters2 a b b c b then uniq would detect and process (in whatever way you spec- ify) the two consecutive b's, but not the third b: 104 | Linux Pocket Guide → uniq letters2 a b c b uniq is often used after sorting a file: → sort letters2 | uniq a b c In this case, only a single b remains because all three were made adjacent by sort, then collapsed to one by uniq. Files in /proc are used mostly by programs, but feel free to explore them. Where on the network are they located? In short, email is not limited to the features of your mailreading program. In my terminal windows, the mouse's middle button pastes from primary, but the right-button menu uses clipboard for its "Paste" command. Don't just blindly start set- ting hostnames! 21 This change might not survive a reboot. The following table lists common operations with yum. *.tar.gz files and *.tar.bz2 files Compressed tar files. My only gripe is that this book … Read full review Linux's popularity continues to grow owing to its lower cost and better security. -eol (dos | mac | unix) Write end-of-line characters in the text file for the given operating system. -i Read the selection contents from standard input. File Text Manipulation | 105 tee stdin stdout - file -- opt --help --version tee [options] files Like the cat command, the tee command copies standard input to standard output unaltered. To see flock in action, open two shell windows and run the fol- lowing command in each shell, one at a time (we'll use the sleep command as a demonstration, which does nothing but wait for a given number of seconds): → flock -n /tmp/mylock sleep 60 The first command will run, and the second will instantly ter- minate. Is 10 less than 5? gunzip -c file.gz Uncompress the data on standard output. -A pattern Accept mode: download only files whose names match a given pattern. 114 | Linux Pocket Guide The traditional output format looks like this: Indication of line numbers and the type of change < Corresponding section of file1, if any --> Corresponding section of file2, if any For example, if we start with a file fileA: Hello, this is a wonderful file. lpr stdin stdout - file -- opt --help --version lpr [options] [files] The lpr (line printer) command sends a file to a printer: → lpr -P myprinter myfile Useful options -P printername Send the file to printer printername, which you have previously set up. When finished executing commands as the superuser, type ^D or run exit to end the superuser shell and become yourself again. The first is for contacting other users on the same Linux machine, using an ancient command called write. -l Listen for connections on the given port. A more advanced feature, process substitution, lets that output masquerade as a named file. sox stdin stdout - file -- opt --help --version sox [options] infile outfile sox is the simplest command for converting from one audio file format to another. (Default = 1024) -h -H Print human-readable output, and choose the most appropriate unit for each size. Action aptitude command Search for a package that meets your needs aptitude search package_name Check if a package is installed (examine the output for "State: not installed" or "State: installed") aptitude show package_name Download a package but don't install it aptitude download package_name Download and install a package sudo aptitude install package_name Install a package file dpkg -i package_file.deb Learn about a package aptitude show package_name List the contents of a package dpkg -L package_name Discover which package an installed file belongs to dpkg -S /path/to/file 230 | Linux Pocket Guide Action aptitude command Update an installed package sudo aptitude safeupgrade package_name Remove an installed package sudo aptitude remove package_name List all packages installed on the system aptitude search '~i' | less Check for updates for all packages on the system aptitude --simulate fullupgrade Update all packages on the system sudo aptitude full-upgrade tar.gz and tar.bz2 Files Packaged software files with names ending .tar.gz and .tar.bz2 typically contain source code that you'll need to compile (build) before installation. wget Download web pages and files. m Compose a new mail message. --spider Don't download, just check existence of remote pages. 220 | Linux Pocket Guide Nominal bitrate: 112.000000 kb/s User comments section follows... Screen Output | 203 Copy and Paste xclip Copy and paste between the shell and the clipboard. aspell Interactive spelling checker. It also has powerful features to make this task easier: wildcards for match- ing filenames, a "command history" to recall previous com- mands quickly, pipes for making the output of one command become the input of another, variables for storing values for use by the shell, and more. To see if you're running bash, type: → echo $SHELL /bin/bash If you're not running bash and wish to do so, you can run the command bash directly (type exit when done to return to your 6 Actually, how many interactive shells those users are running. Processes are different from jobs (see "Shell Job Control" on page 39): processes are part of the operating system, whereas jobs are higher-level constructs known only to the shell in which they're running. Entire books have been written on shell scripting, so we'll be covering the bare minimum to get you started. While the exit status of command is 0 while command do body done For example: → cat script-while #!/bin/bash i=0 while [$i -lt 3] do echo "$i" i=`expr $i + 1` done → ./script-while 0 1 2 The until loop repeats until a condition becomes true: until command do body done While the exit status of command is nonzero For example: → cat script-until #!/bin/bash i=0 until [$i -ge 3] do echo "$i" i=`expr $i + 1` done → ./script-until 242 | Linux Pocket Guide 0 1 2 Be careful to avoid infinite loops, using while with a condition that always evaluates to 0 (true), or until with a condition that always evaluates to a nonzero value (false): i=1 while [$i -lt 10] do echo "forever" done Variable i never changes. -i Only the hardware platform. Most new software must be installed by the superuser, so you'll need to run the sudo command (or equivalent) for any installa- tion. programs, 28 shutdown command, 154 slash (/) directory separator, 18 root directory, 17 sleep command, 149 slocate command, 89 soft links, 50 software installation, 223 sort command, 102 sound (see audio) source command, 234 sox command, 222 spaces, converting to tabs, 101 spamassassin, 188 special characters, escaping, 37 spell command, 127 spelling checkers, 126 spool directory, 22 src directory, 21 ssh (secure shell) program, 179 instant messaging, 196 rsync, 135 standard output, printing mes- sages on, 198 stat command, 69 subdirectories, Linux, 17 sudo command, 5 becoming superuser, 166 software installation and, 224 whoami command and, 157 sum command, 114, 120 superusers, 5, 16 becoming, 166 suspend command, 41 symbolic links, 50 target file of, 52 sync command, 80 system directories, 20 system load, 140 Index | 259 systemctl command, 155 systemd, 155 U T Tab key, completing filenames with, 39 tabs, converting to spaces, 101 tail command, 60 tar command, 109 software installation and, 224 tar files, 224, 231 bzipped, 112 compressed, 113 gzipped, 111 tee command, 106 telnet vs. a Bookmark the current page. -s paste stdin paste [options] [files] 98 | Linux Pocket Guide stdout - file -- opt --help --version The paste command is the opposite of cut: it treats several files as vertical columns and combines them on standard output: → A B C → 1 2 3 4 5 → 1 2 3 4 5 → A B C cat letters cat numbers paste numbers letters A B C paste letters numbers 1 2 3 4 5 Useful options -d delimiters Use the given delimiters characters between columns; the default is a tab character. As a demonstration, here is a sleep command that should run for a minute but gets killed after 3 seconds: → sleep 60 → timeout 3 sleep 60 Runs for 60 seconds Killed after 3 seconds As a more practical example, play music from your MP3 collec- tion for an hour, then stop: → timeout 3600 mplayer *.mp3 Useful options -s signal Send a signal other than the default (TERM). -f2 Useful options -A Check all disks listed in /etc/fstab, in order. 2 For example, you can capture standard output in a file and still have standard error messages appear on screen. -s Silent output: don't print anything, just exit with an appropriate return code; 0 if the files match, 1 if they don't. In Figure 3, there are two differ- ent directories named bin, whose absolute paths are /bin and /usr/bin. bs=N Copy N bytes at a time, known as the "block size." (To set the block size differently for the input and the output, use ibs and obs, respectively.) skip=N Skip past N blocks of input before starting the copy. These must be given literally, as in .pro* to match .profile, or /etc/*conf to match all filenames ending in conf in the /etc directory. If the program runs longer than the limit, timeout kills it. zip Compress files in Windows Zip format. The choices are the same ones listed by kill -l. They are the options of a related program, gs, which gets invoked by ps2ascii. bzcat file.bz2 Uncompress the data on standard output. (You might need superuser privileges on the remote host.) -p Copy the file permissions. We do not, however, present every single command and every last option (our apologies if your favorite was omitted), nor delve into detail about operating system internals. Password: ******* New shell [/bin/bash]: /bin/tcsh The new shell must be listed in the file /etc/shells. printf also interprets escape characters like "" (print a new- line character) and "\a" (ring the bell). Swap: 530104K av, 0K used, 530104K free 115300K cached PID 26265 1 914 ... In general, you can specify: • A time followed by a date (not a date followed by a time) • Only a date (assumes the current clock time) • Only a time (assumes the very next occurrence, whether today or tomorrow) • A special word like now, midnight, or teatime (16:00) • Any of the preceding followed by an offset, like "+ 3 days" Dates are acceptable in many forms: december 25 2015, 25 december 2015, december 25, 25 december, 12/25/2015, 25.12.2015, 20151225, today, thursday, next thursday, next 150 | Linux Pocket Guide month, next year, and more. Useful options -c Create an archive. You can also read the fixed strings on the command line using quoting, but it's a bit trick- ier. For example, using two shells, you can cre- ate a client and a service and have them talk to each other. Suppress (don't print) lines that don't contain the delimiter character. Learn Linux today! Perl, PHP, Python, Ruby Perl, PHP, Python, and Ruby are full-fledged programming lan- guages powerful enough to build complete, robust applications. mail stdin stdout - file -- opt --help --version mail [options] recipient The mail program is a quick, simple email client. Days of the month Integers between 1 and 31; again, you may use sequences, ranges, sequences of ranges, or an asterisk. For descriptions of the signals, run man 7 signal. Does not work for compressed archives. If satisfied, extract the files into a new directory. To compare entire directory hierarchies recursively, use the -r option: → diff -r dir1 dir2 which produces a (potentially massive) report of all differences. -d Print duplicate lines only. lpwd Print the local working directory. After editing the message and exiting the editor, type y to send the message or q to postpone it. If you list such files, you'll see a numeric group ID in place of a group name. mount Make a disk partition accessible. Math and Calculations | 207 bc stdin stdout - file -- opt --help --version bc [options] [files] bc is a text-based calculator that reads arithmetic expressions, one per line, and prints the results. 18 Programmers can read the precise syntax in /usr/share/doc/at/time- spec. The topmost direc- tory is called the root directory and is denoted by a slash (/).3 Figure 3. -l Permit symbolic links to be copied (not the files they point to). You can assign values to variables, manipulate arrays, execute conditional expressions and loops, and even write scripts that prompt the user for values and run any sequence of math operations you like. Less commonly, you may encounter files in Post- Script format, or you might need to convert files to PostScript in order to print them. To troubleshoot a CUPS printer, visit to access your computer's CUPS management system. Then log out and log back in, or run your ~/.bash_profile startup file by hand in each of your open shell windows with: → . -f1 > /tmp/texts → diff /tmp/jpegs /tmp/texts 5a6 > file6 No file6.jpg was found 8d8 < file9 No file9.txt was found With process substitution, you can perform the same task with a single command and no temporary files: → diff End of a word. -s Scheduling Jobs sleep Wait a set number of seconds, doing nothing. Consult the documentation for your distro. finger Print information about users. -3 Suppress column 3. uncompress -c file.Z Uncompress the data on standard output. As another example, copy the contents of a file to a selection, and then print the selection: → cat poem Once upon a time, there was a little operating system named Linux, which everybody loved. When dealing with remote computers, you might want to know more about them. Here we sort the output of who again, extract the first column of information (using awk), and display the results one page at a time (using less): → who | sort | awk '{print $1}' | less Process substitution Pipes let you send one program's output to another program. Before upgrading packages on your system, run sudo apt-get update to retrieve the latest information on which packages are available. It also includes a small suite of image editing tools that appear if you left-click the dis- played image. To pop the top two values from the stack, perform a requested operation, and push the result: +, -, *, / Addition, subtraction, multiplication, and division, respectively. If their contents are the same, cmp reports nothing; otherwise, it lists the location of the first difference: → cmp myfile yourfile myfile yourfile differ: byte 225, line 4 By default, cmp does not tell you what the difference is, only where it is. Conditionals The if statement chooses between alternatives, each of which may have a complex test. If you use Linux without the shell, you are missing out. Web Browsing | 189 Keystroke Meaning ^E Go to end of page. For example: → printf "User %s is %d years old." sandy 29 User sandy is 29 years old. Make the user a member only of the additional, existing groups group1, group2, and so on. diff can also compare directories: → diff dir1 dir2 which compares any same-named files in those directories, and lists all files that appear in one directory but not the other. Any such path that begins with a slash, which descends all the way from the root, is called an absolute path. If not, get your hands on a Linux â€œliveâ€ DVD, such as Ubuntu, Fedora, or Knoppix, which you can boot on most computers to play around with Linux.New commandsTechnology changes quickly, and some commands that made sense to cover in the first two editions are barely used today. -A Append one archive to the end of another: for example, tar -A -f first.tar second.tar appends the contents of second.tar to first.tar. (curl has a different set of options; see its manpage.) Useful options -i filename Read URLs from the given file and retrieve them in turn. fsck is a frontend for a set of filesystem-checking programs found in /sbin, with names beginning "fsck". You'll find options for the most useful commands, grouped by functionality. Then make the file executable: → chmod +x myscript Optionally, move it into a directory in your search path. Your message gets sent to your service, which will print "Hello world, how are you?" and any subsequent lines you enter. * Zero or more repetitions of a regular expression. To join the files one.pdf and two.pdf into a single PDF file, com- bined.pdf: → pdftk one.pdf two.pdf cat output combined.pdf To extract pages 5, 7, and 10–15 from the file one.pdf and write them to new.pdf: → pdftk one.pdf cat 5 7 10-15 output new.pdf Extract the first five pages from one.pdf and the odd-numbered pages from two.pdf and combine them as combined.pdf: → pdftk A=one.pdf B=two.pdf cat A1-5 Bodd output \ combined.pdf Copy the file one.pdf to new.pdf, but with page 7 rotated by 90 degrees clockwise ("east"): → pdftk one.pdf cat 1-6 7east 8-end output new.pdf Interleave the pages of one.pdf and two.pdf, creating inter- leaved.pdf: → pdftk one.pdf two.pdf shuffle output \ interleaved.pdf You may have noticed that the page selection criteria, typically appearing before the output keyword, are very powerful. last Determine when someone last logged in. Youâ??ll also find powerful command-line idioms you might not be familiar with, such as process substitution and piping into bash.Linux Pocket Guide provides an organized learning path to help you gain mastery of the most useful and important commands. For example, the file- name emacs-23.1-17.i386.rpm indicates the emacs package, ver- sion 23.1-17, for i386 (Intel 80386 and higher) machines. The preceding command, for example, produces thumbnails of size 120x176 pixels, offset by 10 pixels horizontally and verti- cally (creating space between the thumbnails), and labeled with their input filename. Figure 2. If you have Linux experience, feel free to skip the introductory material. See man fetchmail. C Copy the current message to another mailbox. We've replaced these commands with new ones that you'll find immediately practical on a modern Linux system. Additionally, you may use three-letter abbrevia- tions (sun, mon, tue, ...), but not in ranges or sequences. Read it to learn how to build the software, for example: → cd newdir → less INSTALL 4. A plus sign means "yes," a minus sign means "no," and a question mark means "unknown." -m Display information only about yourself (i.e., the user associated with the current terminal). -g Another numerical sorting method with a different algorithm that, among other things, recognizes scientific notation (7.4e3 means "7.4 times ten to the third power," or 7400). When we say a command "reads," we mean from standard input unless we say otherwise. Useful options -r Reboot the system. This implies all of the options -ogptrlD. for release The O'Reilly logo is a registered trademark of O'Reilly Media, Inc. All lines that appear in file1 but not in file2. get file1 [file2] Copy remote file1 to local machine, optionally renamed as file2. *.rpm files RPM Package Manager files are used by Red Hat, Fedora, CentOS, and other distros. The id command prints these values along with their associated user and group names: → id uid=500(smith) gid=500(smith) groups=500(smith),6(disk),490(src),501(cdwrite) Useful options -u Print the effective user ID and exit. Use the --help option (if any) Many Linux commands respond to the option --help by printing a short help message. We'll cover the package management commands aptitude, apt-get, and dpkg for installing software in this format. [:punct:] Any punct

stdin stdout - file -- opt --help --version nice [-n level] command_line When invoking a system-intensive program, you can be nice to the other processes (and users) by lowering its priority. scale=N Set the number of significant digits after the decimal point to N. mesg has no effect on modern instant messaging programs: → mesg is y → mesg n → mesg is n tty stdin stdout - file -- opt --help --version tty The tty program prints the name of the terminal device associ- ated with the current shell (write may need this information if your recipient is logged in multiple times): → tty /dev/pts/4 sendxmpp stdin stdout - file -- opt --help --version sendxmpp [options] recipients The sendxmpp command provides a quick way to send an instant message via the XMPP protocol (Jabber). metaflac stdin stdout - file -- opt --help --version metaflac [options] [files] The metaflac command displays or changes information about a FLAC audio file. → m4 -DNAME=Sandy -DAGE=25 -DQUOTE=yes substitutions My name is Sandy and I am 25 years old. ^G Cancel the command in progress. Examine the options you may pass to the configure script: → ./configure --help Then install the software: → ./configure options → make → sudo make install Programming with Shell Scripts Earlier when we covered the shell (bash), we said it had a pro- gramming language built in. (If charset1 is longer than charset2, see the -t option.) Character sets can have the following forms: Form Meaning ABDG The sequence of characters A, B, D, G. • Spam filtering is sophisticated on Linux: check out the SpamAssassin suite of programs. -r filename Display the last-modified timestamp of the given file, formatted as you wish. See the manpage if you're interested. For example, the fol- Linux Pocket Guide lowing wc command line reads the files myfile and myfile2, then standard input, then myfile3: wc myfile myfile2 - myfile3 -- opt If you supply the command-line option "--" it means "end of options": anything appearing later on the command line is not an option. Space bar Scroll down. It's handy for debugging, learning about networking, and many other uses. xclip stdin stdout - file -- opt -help -version xclip [options] xclip reads and writes the three Linux selections (clipboards), so you can copy and paste text between the shell and graphical applications. whoami Print your current, effective username. For example, the wc command accepts input from a file and pro- Linux: A First View | 15 duces output (the number of lines, words, and characters) on the screen. -s Only the kernel name (the default). It must be the first line of the file, left-justified. Each of these commands has various options: add help on the end (e.g., ip link help) for usage. -f filename Read from some other data file than /var/run/wtmp; see the who command for more details. Try running: → ls -l /proc/self several times in a row: you'll see /proc/self changing where it points. -u Unique sort: ignore duplicate lines. ip route Display your routing table. ps uptime View the system load. Any single character [set] Any single character in the given set, most commonly a sequence of characters, like [aeiouAEIOU] for all vowels, or a range with a dash, like [A-Z] for all capital letters [^set] Any single character not in the given set, such as [^0-9] to mean any nondigit Shell Features | 29 Wildcard Meaning [!set] Same as [^set] When using character sets, if you want to include a literal dash in the set, put it first or last. There are two printf commands available in Linux: one built into the bash shell, and one in /usr/bin/printf. Online editions are also available for most titles (http:// www.oreilly.com/safari). All command-line options for xclip use single dashes, even -help and -version. 19 If your system is configured to log this information. For example, if you have an email message in a file, messagefile, and it contains a JPEG image and a PDF file as attachments, munpack can extract both attach- ments as files: File Compression and Packaging | 113 → munpack messagefile beautiful.jpg (image/jpeg) researchpaper.pdf (application/pdf) Its partner program, mpack, does the opposite, inserting one or more files as attachments into a MIME-format file. --no-clobber Don't overwrite the output file if it already exists. -t number Set the track number. You can tell the difference with the type com- mand: → type who who is /usr/bin/who → type cd cd is a shell builtin Selected Features of the bash Shell A shell does much more than simply run commands. This kind of file isn't an installable "package" but a collection of files created by tar and com- pressed with gzip (.gz) or bzip2 (.bz2). Qualifiers can remove pages from a range, like 1-100~20-25, which means "all pages from 1 to 100 except for pages 20 to 25." They can also specify only odd pages or even pages, using the keywords odd or even, and rotations using the compass direc- PDF and PostScript File Handling | 123 tions north, south, east, and west. -m Display amounts in megabytes. Never simply turn off the power to a Linux system: it needs a more graceful shutdown. Put the files you want to burn into a directory, say, dir. The Filesystem | 25 To see the ownership and permissions of a file named myfile, run: → ls -l myfile -rw-r--r-- 1 smith smith 1168 Oct 28 2015 myfile To see the ownership and permissions of a directory named mydir, add the -d option: → ls -ld mydir drwxr-x--- 3 smith smith 4096 Jan 08 15:02 mydir In the output, the file permissions are the 10 leftmost charac- ters, a string of r (read), w (write), x (execute), other letters, and dashes. The following tests are identical to the previous two: Programming with Shell Scripts | 237 → → 1 → → 0 [10 -lt 5] echo $? You'll need networking experience to understand this complex command; see the ip manpage to get started, or visit http:// lartc.org. These are installed by the pack- age managers dnf, yum, and rpm. For instance, look -t i big prints all words beginning with "bi". → cdparanoia -B Rip all tracks on the CD into separate files. /proc Describes currently running processes; for advanced users. The valid range is −20 to +20, but avoid high negative numbers or you might interfere with vital system processes. You'll hear the term used as a verb: "That process was niced to 12." 146 | Linux Pocket Guide cess. sleep stdin stdout - file -- opt --help --version sleep time_specification The sleep command simply waits a set amount of time. Then we explain each command in turn, briefly present- ing its common uses and options. dd stdin stdout - file -- opt --help --version dd [options] dd is a low-level copier of bits and bytes. The command reset-lpg, supplied in the book's examples directory, is a shell script that you can read: → less ~/linuxpocketguide/reset-lpg Like any good programming language, the shell has variables, conditionals (if-then-else), loops, input and output, and more. A surprising number of Linux users mistakenly think that programs expand their own wildcards. The Filesystem | 23 Operating System Directories Some directories support the Linux kernel, the lowest-level part of the Linux operating system: /boot Files for booting the system. -l Display only local filesystems, not networked filesystems. For example: Do nothing for 5 minutes → sleep 5m sleep is useful for delaying a command for a set amount of time: → sleep 10 && echo 'Ten seconds have passed.' (10 seconds pass) Ten seconds have passed. -l N End with page N of the PDF file. Network Connections | 181 Command Meaning put file1 [file2] Copy local file1 to remote machine, optionally renamed as file2. Display total, used, and free inodes for each filesystem, instead of disk blocks. Visit for some great advice on sophisticated uses of dd. But if you're accustomed to traditional calculators, dc may seem inscrutable. Useful options -l Long output: print all differences, byte by byte: → cmp -l myfile yourfile 225 167 127 This means at offset 225 (in decimal), myfile has a small "w" (octal 167) but yourfile has a capital "W" (octal 127). For example, if you run auto- matic backups every hour using a command like rsync, there's a slight chance that a previous backup might still be running when the next backup launches. [:upper:] Any uppercase letter. cal stdin stdout - file -- opt --help --version cal [options] [month [year]] The cal command prints a calendar—by default, the current month: → cal November Su Mo Tu 1 2 3 8 9 10 15 16 17 22 23 24 29 30 2015 We Th 4 5 11 12 18 19 25 26 Fr 6 13 20 27 Sa 7 14 21 28 Dates and Times | 211 To print a different calendar, supply a month and four-digit year: cal 8 2016. So if your current directory is /one/two/three, then . There's /bin/echo, but Linux shells typically override this with a built-in command called echo. By default it's a tab character. p Print the topmost value on the stack. This invokes your default text editor. -k Inside retrieved files, modify URLs so the files can be viewed locally in a web browser. Some useful numeric expressions are: n Minimum width n. You must have a space between the option and the number. Linux commands are very flexible with input and output. If the options seem arbitrary or inconsistent, it's because the supplied ps command (GNU ps) incorporates the features of several other Unix ps commands, attempting to be compati- ble with all of them. [:space:] Any whitespace character. Fedora, for example, makes /bin a symbolic link to /usr/bin. Linux: A First View Linux has four major parts: The kernel The low-level operating system, handling files, disks, net- working, and other necessities we take for granted. -o Don't display the "buffers/cache" row. p Save, print, or mail the current page. For example, given this file: → cat substitutions My name is NAME and I am AGE years old. For example, /dev/sda7 could be a partition on your hard drive. growisofs stdin stdout - file -- opt --help --version growisofs [options] tracks The growisofs command burns a writable CD, DVD, or Bluray disc. 2. See you later. ibase=N Treat all input numbers as base N. But let's get our vocabulary straight. We'll try to be more accurate. All provided files are concatenated, and the result is sorted and printed: → cat threeletters def xyz abc → sort threeletters abc def xyz Useful options -f Case-insensitive sorting. -b Ignore leading whitespace in lines. usermod stdin stdout - file -- opt --help --version usermod [options] username The usermod command modifies the given user's account in various ways, such as changing a home directory: → sudo usermod -d /home/another smith Useful options -d dir Change the user's home directory to dir. For help on a single command, type /help /command. This is useful for permitting a limited number of commands to run simultaneously. For example, to append /usr/sbin to your shell's search path: → PATH=$PATH:/usr/sbin → echo $PATH /usr/local/bin:/bin:/usr/bin:/usr/sbin This change affects only the current shell. Here we create the file attachment.mime containing a MIME-encoded image, photo.jpg: → mpack -o attachment.mime photo.jpg Subject: My photo File Comparison diff Line-by-line comparison of two files or directories. wc -- -dashfile works. Web search To decipher a specific Linux error message, copy and paste the message into a web search engine, verbatim, and you will likely find helpful results. Common uses are: → cdparanoia N Rip track N to a file. More complex graphical environments are built on X; the most popular are KDE and GNOME. -D Permit devices to be copied. You cannot use fsck to fix your root filesystem while your sys- tem is running normally. To exit single-user mode, either perform another shut down to halt or reboot, or type ^D to bring up the system in nor- mal, multiuser mode. The shell consults the value of PATH, which is a sequence of directories separated by colons: → echo $PATH /usr/local/bin:/bin:/usr/bin and looks for the who command in each of these directories. dd Low-level copying of data. lame Convert from WAV to MP3. Option Output format -n RCS version control format, as produced by rcsdiff (man rcsdiff). Same behavior as the C function index( ). Like these other oper- ating systems, Linux has a graphical user interface with win- dows, icons, and mouse control. It starts with general concepts like files and directories, the shell, and X windows, and then presents detailed overviews of the most essential commands, with clear examples. Wild- cards are handled completely by the shell before the associated program even runs. Requires the downloadonly plugin; to install it, run: sudo yum --downloadonly install package_name sudo yum install \ yum-downloadonly 226 | Linux Pocket Guide Action yum command Download and install a package sudo yum install package_name Install a package file rpm -ivh package.rpm Learn about a package yum info package_name List the contents of a package rpm -ql package_name Discover which package an installed file belongs to yum provides /path/to/ file Update an installed package sudo yum update package_name Remove an installed package sudo yum remove package_name List all packages installed on the system yum list installed | less Check for updates for all packages on the system yum check-update Update all packages on the system sudo yum update rpm stdin stdout - file -- opt --help --version rpm [options] [files] If you prefer to download and install RPM packages by hand, use rpm, the same package-management program that yum runs behind the scenes. Aliases, however, aren't avail- able to at jobs, so don't include them. You can even write shell scripts to download sets of files if you know their names: → for i in 1 2 3 do wget i.mpeg done Another similar command is curl, which writes to standard output by default—unlike wget, which duplicates the original page and file names by default: → curl > mypage.html wget has over 70 options, so we'll cover just a few important ones. It can clone a disk by copying from one device to another (Warning! This will DESTROY all data on the destination device!): → sudo dd if=/dev/device1 of=/dev/device2 bs=512 \ conv=noerror,sync 136 | Linux Pocket Guide dd is simple in the sense that it does one thing very well—mov- ing bits—but it's also complex because if you're not careful, you can wipe out your hard drive in seconds. User Account Management | 165 Becoming the Superuser Normal users, for the most part, can modify only the files they own. rsync has many uses and over 50 134 | Linux Pocket Guide options; we'll present just a few common cases relating to back- ups. echo stdin stdout - file -- opt --help --version echo [options] strings The echo command simply prints its arguments: → echo We are having fun We are having fun Confusingly, there are several different echo commands with slightly different behavior. cat file | compress Produce compressed data from a pipeline. Goodbye, GUI applications We no longer cover applications that have graphical user interfaces, such as photo editors and web browsers, in order to focus purely on commands. To list your at jobs, use atq ("at queue"): → atq 559 2015-09-14 07:00 a smith To delete an at job, run atrm ("at remove") with the job num- ber: → atrm 559 Useful options -f filename Read commands from the given file instead of standard input. No, it isn't Does "hello" have nonzero length? Nowadays, both GNOME and KDE have printer con- figuration tools in their system settings that generate these files. The first argument is the format string, which in our example contains two format specifications, %s and %d. flock Ensure that only one copy of a process runs at the same time, using locks. By default, a newline is printed (i.e., one number per line): → seq -s ':' 10 1:2:3:4:5:6:7:8:9:10 clear stdin stdout - file -- opt --help --version clear This command simply clears your display or shell window. montage Combine graphics files. For example, if package superstuff Installing Software | 227 requires package otherstuff that you haven't installed, rpm will not install superstuff. Useful options -n name Change the group's name to name (safe). watch stdin stdout - file -- opt --help --version watch [options] command The watch program executes a given command at regular inter- vals; the default is every two seconds. See "Input and Output" on page 15. The ip command displays and sets various aspects of your computer's network interface. The directory dir itself will not be copied to the disc, just its contents. Once you're up and running, Linux Pocket Guide provides an easy-to-use reference that you can keep by your keyboard for those times when you want a fast, useful answer, not hours in the man pages. Linux Pocket Guideis organized the way you use Linux: by function, not just alphabetically. gcc, g++ man gcc .NET mono Java javac Perl perl man perl man mono PHP php Python python man php man python Ruby ruby Final Words Although we've covered many commands and capabilities of Linux, we've just scratched the surface. | 9 Your friend, the echo command In many of our examples, we'll print information to the screen with the echo command, which we'll formally describe in "Screen Output" on page 198. For Boolean results, 0 is false and 1 is true. (See "Quoting" on page 36.) Home Directories Users' personal files are often found in the directory /home (for ordinary users) or /root (for the superuser). Smith Office [100 Barton Hall]: Office Phone [212-555-1212]: 212-555-1234 Home Phone []: Useful options -f name Change the full name to name. fsck Check a disk partition for errors. The window program (Terminal, Konsole, etc.) is not the shell. The superuser, on the other hand, can create, modify, or delete any file and run any program; we'll discuss this more in "Becoming the Super- user" on page 166. -i Display IP addresses instead of hostnames. sox Convert between audio file formats. -x type Don't display filesystems of the given type. In these cases, we'll split the command onto multiple lines that end with a backward slash character: → echo This is a long command that doesn't fit on \ one line This is a long command that doesn't fit on one line This is not merely a helpful notation: the backslash character actually serves this purpose in the Linux shell, as a "line contin- uation" character. → info ls While info is running, some useful keystrokes are: • To get help, type h • To quit, type q • To page forward and backward, use the space bar and Backspace key, respectively • To jump between hyperlinks, press Tab • To follow a hyperlink, press Enter If info has no documentation on a given program, it dis- plays the program's manpage. -d Highlight differences in the output, to emphasize what has changed from one execution to the next. Useful options -s shell Specify the new shell. " read answer case "$answer" in eat) echo "OK, have a hamburger." ;; sleep) echo "Good night then." ;; *) echo "I'm not sure what you want to do." echo "I guess I'll see you tomorrow." ;; esac → ./script-case What would you like to do (eat, sleep)? f Forward the current message to a third party. 148 | Linux Pocket Guide at Schedule a job for a single, future time. /quit Exit profanity. lpq stdin stdout - file -- opt --help --version lpq [options] The lpq (line printer queue) command lists all print jobs wait- ing to be printed. sendxmpp Send instant messages via XMPP (Jabber). lls List the files in the current local directory. df stdin stdout - file -- opt --help --version df [options] [disk devices | files | directories] The df (disk free) program shows you the size, used space, and free space on a given disk partition. -23 Show lines that appear only in the first file. Command line is not dead yet, so this is good for picking up the bare minimum to get by. w List active processes for all users. He is the author of O'Reilly's Linux Pocket Guide, and he is the coauthor of Linux Security Cook- book, and SSH, The Secure Shell: The Definitive Guide. -r Copy directories recursively (i.e., including their contents). My heartfelt thanks also go to my editor, Nan Barber, the O'Reilly production staff, the technical review team (Justin Karimi, Bill Ricker, Dan Ritter), Jay Moran at Cimpress, and as always, my beautiful family, Lisa and Sophia. y Send the message. Math and Calculations | 209 dc stdin stdout - file -- opt --help --version dc [options] [files] The dc (desk calculator) command is a reverse-polish notation (RPN), stack-based calculator that reads expressions from stan- dard input and writes results to standard output. -b Display amounts in bytes. Quick display of usernames only, and a count of users. Down arrow Move to the next message. See man soxformat for the list of types. bc Text-based calculator. Its syntax is closely related to that of vim and the line editor ed. If the length of charset1 is N, only the first N characters in charset2 are used. We discussed some of these operations as Controlling Processes | 143 handled by the shell in "Shell Job Control" on page 39. For example, you could connect to Google's web service (port 80) with: → netcat www.google.com http xxx Type some junk and press Enter HTTP/1.0 400 Bad Request Content-Type: text/html; charset=UTF-8 Content-Length: 1555 Date: Fri, 04 Mar 2016 02:17:37 GMT ... Goodbye for now. top -b -n1 > outfile saves a quick snapshot to a file. You'll use shell com- mands like cd and pwd to "move" between directories and keep track of where you are. name=value Assign a value to the variable name. Useful options -selection name Choose a selection by name, either primary, secondary, or clipboard. Nevertheless, for the true power of Linux, you must dive beneath this graphical interface, into the shell. Some Linux distros require additional steps, such as placing the hostname into a configuration file that is read at boot time. uncompress file.Z Uncompress file.Z to create file. 170 | Linux Pocket Guide -n Only the hostname, as with the hostname command. -z Use gzip compression. For example, if one.pdf is 10 pages long, then this command will create 10 PDF files named split1.pdf through split10.pdf, each containing one page: → pdfseparate one.pdf split%d.pdf The final argument is a pattern for forming the names of the individual page files. mail Minimal text-based mail client. clear Clear the screen or window. This book focuses on bash, the Bourne-Again Shell, which is often the default for user accounts. To perform a shutdown from GNOME or KDE, use the main menu. Whereas Debian and RPM packages can be installed with a single com- mand, compressed tar files usually require multiple man- ual steps. Need a calculator? Here are a few simple examples for processing a text file, myfile. passwd stdin stdout - file -- opt --help --version passwd [options] [username] The passwd command changes a login password, yours by default: → passwd or another user's password if run by the superuser: → sudo passwd smith passwd does have options, most of them related to password expiration. yes Print repeated text on standard output. While writing a message, after you exit your text editor, the fol- lowing commands are available: Keystroke Meaning a Attach a file (an attachment) to the message. Now we cover killing and reprioritizing. Invoked without a username, chfn affects your account; invoked with a username (by root), it affects that user. myscript → source myscript Whitespace and Linebreaks Bash shell scripts are very sensitive to whitespace and line- breaks. A Linux filesystem (partial). Lines 1-2 of fileA < The quick brown fox jumped over --diff separator > The quick blue fox jumped over Line 1 of fileB 4a4 Line 4 was added in fileB > Linux r00lz! The added line The leading symbols < and > are arrows indicating fileA and fileB, respectively. (two periods), parent directory, 18 .NET, 248 / (slash), root directory, 17 ; (semicolon), combine com- mands using, 35 < (input redirection), 33 (output redirection), 34 [(left square bracket), alias for test command, 237 \ (backward slash) escaping special characters, 37 line continuation, 10, 234 ^C keystroke (killing programs), 45 ^Z keystroke (suspending jobs), 41 | (pipe operator), 34 || (two pipes), logical or, stopping execution of combined com- mands, 36 ~ (tilde), denoting home directo- ries, 20 A abiword command, 64 absolute path, 18 absolute path of current directory, printing, 53 acroread command, 120 administrator, 5 alias command, 33 alphabetical order, sorting text in, 102 alpine mail program, 186 ampersand (&), running back- ground jobs, 41 apt-cache command, 229 apt-file command, 229 251 apt-get command, 224, 229 aptitude command, 224, 230 arguments for commands, 3 aspell command, 127 at command, 150 atq command, 151 atrm command, 151 attributes of files, 80 changing, 80 viewing, 81 audio, 218 compressing, 219 converting, 222 playing, 223 ripping, 218 tags, creating, 220, 221 tags, viewing, 219, 220 awk command, 107 vs. The third edition features new commands for processing image files and audio files, running and killing programs, reading and modifying the system clipboard, and manipulating PDF files, as well as other commands suggested by readers. The same option may have different meanings to different programs: in the command wc -l, the option -l means "lines of text," but in ls -l it means "longer output." Two programs also might use different options to mean the same thing, such as -q for "run quietly" versus -s for "run silently." Some options are followed by a value, such as -s 10, and space between them might not be required (-s10).

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