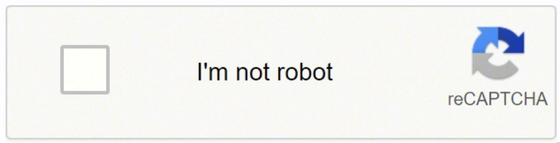


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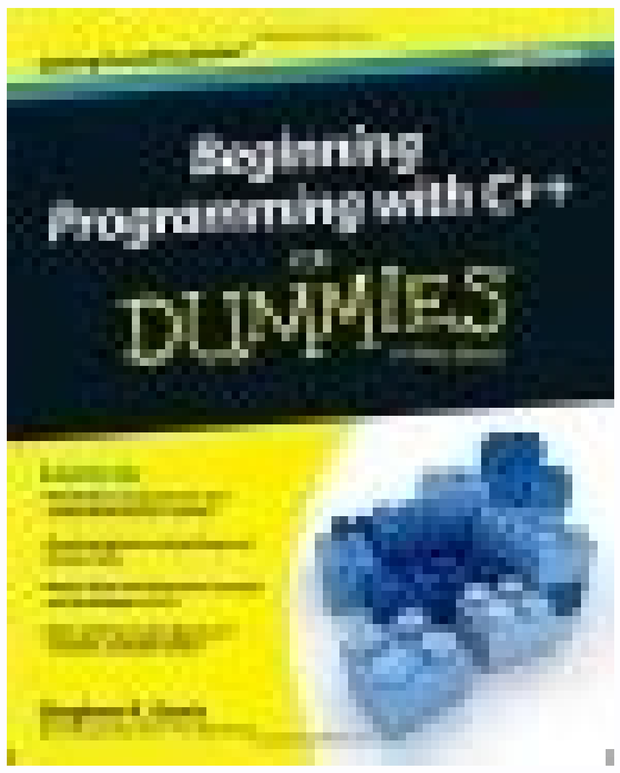


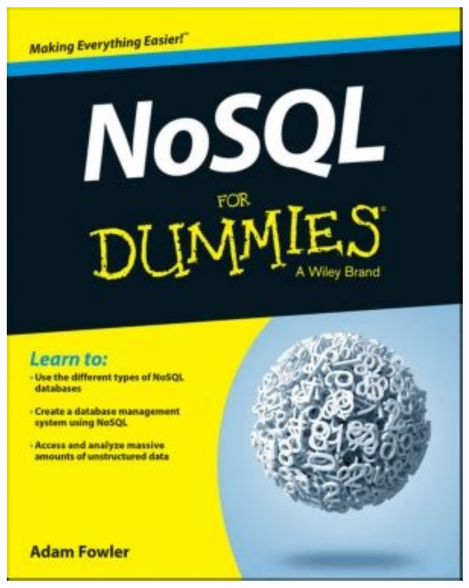


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# UNIX

## UNIX INTRODUCTION

The UNIX operating system is a multi-user computing environment designed to provide access to a range of computer applications, tools and utilities to the users of the system. It was designed and developed by Bell Laboratories in the late 60s and 70s for scientists at Bell Labs to help with research, such as writing and publishing technical papers, storing and manipulating data, communicating ideas and working with fellow colleagues.

Universities and colleges obtained UNIX from Bell Labs for research into operating system design. In particular, one university – UC Berkeley – made a variety of improvements and changes to UNIX and released its own version under the Berkeley Software Distribution (BSD) label. Bell Labs also improved its own version of UNIX under the System V name. Each variant provided similar functionality, but BSD always remained a research-oriented tool under the Berkeley umbrella until its last release (BSD 4.4) in the mid-90s. Companies who used UNIX as the primary operating system for their high-end servers and workstations licensed earlier releases of BSD and System V.

The Internet explosion has provided an immense collaborative environment, which has produced a widely popular UNIX clone (in that it was not based on the original UNIX source code) called Linux. Linux provides the same functionality of BSD or SYSV UNIX, but is a completely new design from the ground up which runs on the Intel x86 platforms, as well as other hardware architectures. Other variants of the original BSD UNIX include FreeBSD, OpenBSD and NetBSD.

- **UNIX Applications.** X Window System, Compilers, Mail, Word Processing.
- **UNIX Tools.** Bourne/C/KSH Shell, Utilities (vi, troff, man, lp, who, sort).
- **UNIX Kernel.** Device Drivers, Resource/Process/Memory Management.
- **Hardware.** CPU, Memory, Modem, Hard Drives, Network, Video, I/O.

## LOGGING IN/OUT

### Logging In

Every UNIX user has a UNIX login username and password. This allows UNIX to keep track of the different people and provide a separate working space for each person within the same system. Users can obtain their UNIX username and password from their system administrator. UNIX is a case-sensitive environment, so take careful note of the upper and lowercase in the username and password.

Once the username and password is obtained, enter them at the login prompt:

```
Login: jsmith
Password: florida
Welcome to SunOS 4.1.4 (GENERIC Kernel)
$
```

The "$" is the UNIX Shell prompt. It may vary, depending on the specific system (the most common variant is "%"). The Shell is where the work will be completed for most of the session.

### Changing the Password

After logging in, change the password to something other than what was initially given. It is a good idea to not use common words; instead, use a combination of numbers and letters. A good example is to use the first letters from a verse of a favorite poem, followed by two numerals. For example: *Twinkle, Twinkle, Little Star* becomes *ttls42*.

It is possible to change the password with the **passwd** command:

```
$ passwd
Enter your old password: florida
Enter your new password: ttls42
Reenter your new password: ttls42
Password changed.
$
```

### Logging Out

Since UNIX is a multi-user system, it is very important to log out of the session after the work is completed. This releases the terminal back to the login: prompt so that the next user may login. Logging out can be accomplished by typing "exit" at the shell prompt:

```
$ exit
```

Depending on the shell, it is possible to use "logout" or "^D" (*Control-D*).

## UNIX SHELLS & COMMAND LINE

Shells provide a command line interface to the UNIX environment and wrap access to files, applications and other tools (thus, the term "shell"). Shells are also known as command interpreters, since they accept commands from the user and interpret them to the UNIX system. The shell allows the user to create simple commands to execute certain tasks or develop complex *scripts*, which can be entire programs within themselves. Depending on the system administrator, the user may have one of the following shells:

- **/bin/sh** - Bourne Shell – the most common shell available on all UNIX systems.
- **/bin/csh** - C Shell – another popular shell designed with shell programming in mind.
- **/bin/ksh** - Korn Shell – an advanced version of the Bourne Shell, which incorporated many of the features of the C Shell.
- **/bin/bash** - Bourne Again Shell – a freely available shell similar to ksh but with more advanced features. Available from http://www.gnu.org.
- **/bin/tcsh** - Tag C Shell – another freely available shell similar to csh. Available from ftp://ftp.gw.com/pub/unix/tcsh.

To find out which shell is in use, type the following command after logging in:

```
$ echo $SHELL
/bin/tcsh
$
```

Instructions to run programs are run from the command line prompt of the shell. The command syntax takes the following common form:

***command [options] [parameters]***

The *options* control how the command executes and are usually preceded with the dash sign, "-." The *parameters* (also known as arguments) are the data that the command will be processing. These can be numbers, words or even filenames:

- **ps –ef** - list all the processes running on the current system.
- **wc –l /etc/passwd** - count the number of lines in the file named /etc/passwd.
- **echo $SHELL** - print the value of the SHELL environment variable.

The semi-colon, ";", can be used to specify multiple commands on one line:

```
ls -l ; pwd ; who
```

## THE UNIX FILESYSTEM

Once logged into the account, the most common tasks will be reading e-mail, editing, running applications, writing and compiling programs, using databases, etc. All of these involve working with files. UNIX uses a hierarchical system to store and retrieve files using what are known as directories. The figure below shows an example of how typical UNIX systems directories are arranged.




The tree-like arrangement starts from the root, "/," directory on downwards. Each branch (i.e., directory) can have sub-branches (sub-directories). Finally, a directory can have individual files (similar to leaves on branches). The forward slash (or divide) sign, "/," is used to delimit each sub-directory. The combination of the directories and files comprise the UNIX file system.

### Directories

When logging in to a UNIX system ocours, the user is left in what is known as the HOME directory, which is usually somewhere underneath several levels of sub-directories all starting from the root, "/," directory. With this **pwd** command, the user can tell where the home directory is located.

```
$ pwd
/home/staff/jsmith
$
```

In the previous box, the home directory of the user is the sub-directory named "jsmith," which also happens to be the login user id (this is normal UNIX convention). The "jsmith" sub-directory is underneath the "staff" sub-directory, which is underneath the "home" sub-directory, which itself is underneath the top-most "root" directory. All files that belong to "jsmith" should be created inside /home/staff/jsmith.

### Files

A file is a collection of data, such as an email message, information from a database, images, source code, etc. The files reside underneath the user's HOME directory. UNIX allows creation of sub-directories so that the user can arrange the data in an orderly fashion for faster retrieval (it is much easier to have five sub-directories with 10 files in each of them than one sub-directory with 50 files). When referencing files, do so in one of three ways:

- **Simple.** Just the filename, which needs to reside in the current directory.
  *Example: taxes.txt*
- **Absolute.** Specify the entire path to a file starting from the root "/" directory.
  *Example: /home/staff/jsmith/finance/taxes.txt*
- **Relative.** Specify the path to a file relative to the current sub-directory.
  *Example: finance/taxes.txt*

### Working with Directories

UNIX provides the ability to move swiftly within the UNIX filesystem:

- **pwd** - print the current working directory (CWD).
- **cd** - return to HOME directory.
- **cd *dirname*** - change into the directory named *dir*.
- **cd /** - change into the root directory.
- **cd ..** - change one directory up.
- **cd ../..** - change two directories up from the current directory.
- **cd /usr/local** - change into the directory named /usr/local (absolute path).
- **cd ../tmp** - change into the tmp directory, which exists one level higher.

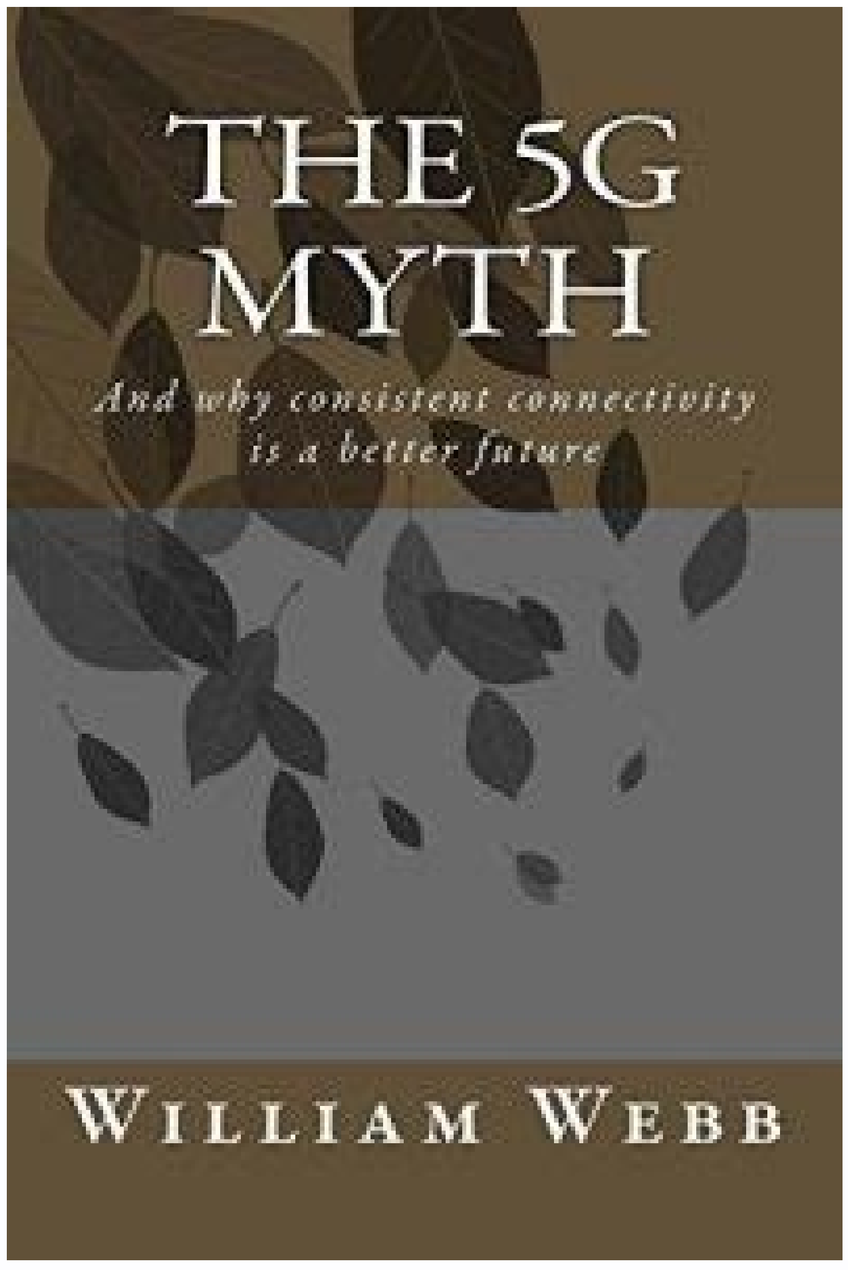
Creating and removing directories are done with two basic commands:

- **mkdir *dirname*** - create a directory named dirname in the current directory.
- **rmdir *dirname*** - remove the directory named dirname in the current directory. The directory must be empty (i.e., no sub-directories or files within).

### Listing Files & Directories

The ls command is used to list the contents of directories and the files within them. It can take a variety of options, as shown below:

- **ls** - list contents of the current directory (only shows the names of files and directories).
- **ls –a** - list all files in the current directory, including those that begin with "." (hidden files).
- **ls –b** - force printing of non-printable characters, using octal (base-8) notation. This is useful when there are hidden characters in filenames.
- **ls –F** - append a slash, "/," after directory, an asterisk, "*," after each executable file (including shell scripts) and an at-sign, "@," after each symbolic link.

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Sean McManus is also the author of CODER Academy, Cool Scratch Projects in Easy Steps, iPad for the Older and WISER (A #1 Amazon Bestselling Hardware Book), Web Design A Short Steps (A #1 Amazon Bestseller in Web Design), and Microsoft Office for the Older and Older wise. She has worked as a hardware team leader at Pace Micro Technology, and was Technical Editor of Micro User and Contributing Editor of ACORN User Magazines. However, we assume that you have used a Windows or Mac computer before doing things like searching the web and writing letters. It also includes the table of contents and table of contents, to give you a good overview of the contents of the book. He has written for a wide range of business and technology magazines and learned to program in the 1980s on an Amtrad CPC 464 video. Video: Watch Minecraft Maze Maker in action One of the chapters in the book shows you how to use Python to build worlds in Minecraft. Free PDF Sampler You can download the sample files of the book as a zip file here. I’m posting links to my Raspberry Pi blog posts here too, so you can find them easily. You can also learn how to use Scratch on Raspberry Pi in Raspberry Pi for Dummies. In addition to showing you how to add and remove blocks in the Minecraft world, the chapter shows you how to create a program that generates random messages that you can explore in Minecraft. Minecraft.

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