



TASK

The Command Line

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Introduction

WELCOME TO THE COMMAND LINE TASK!

As a software engineer, it is essential that you are able to use libraries and frameworks to be able to build applications. However, to do this, it becomes important to familiarise yourself with the command line. The command line is a tool that you will use often as a software engineer. You will use the command line for many subsequent tasks.

WHAT IS THE COMMAND LINE AND WHY DO YOU NEED IT?

The command line is a means of interacting with a computer program where the user issues commands to the program in the form of successive lines of text. With the command line, you can quickly issue instructions to your computer getting it to do precisely what you want it to do. The command line is rarely used by most end users since the advent of the Graphical User Interface (a more visual way of interacting with a computer using items such as windows, icons, menus, etc.).

For software engineering, you will find it helpful to use the command line when interacting with your files, especially those created using frameworks and libraries, such as Django. You will also need to be familiar with the command line to work with version control systems like Git. Hence, this task will allow you to acquaint yourself with some of the basics of the command line.

FINDING THE COMMAND LINE



In Windows, you can simply click the Start menu and type **cmd** in the search box to locate the command line. Alternatively, the command line should be one of the options under 'Programs' and you can simply click on the application to open it.



With Mac OS, open the command line by opening the terminal. This can be done by opening the Applications folder, navigating to Utilities and then launching Terminal. Alternatively, you can search for "terminal" to find the application to launch.

COMMON WINDOWS COMMANDS

All commands that you will use with the command line have three parts: the utility, the flags, and the arguments. The utility will always appear first. The other two parts have different rules. Depending on which command you are using you may not have to use any flags or arguments. For example, the following frequently used commands can be utilised without flags or arguments:

cd	Displays the name of or changes the current directory.
date	Displays or sets the date.
del	Deletes one or more files.
dir	Displays a list of files and subdirectories in a directory.
exit	Quits the cmd.exe (command line) program.
help	Provides help for Windows commands.
mkdir	Creates a directory.
ren	Renames a file.
rmdir	Removes an empty directory.
shutdown	Allows a proper local or remote shutdown of a machine.
type	Displays the contents of a text file.
ver	Displays the version of Windows you currently have installed.

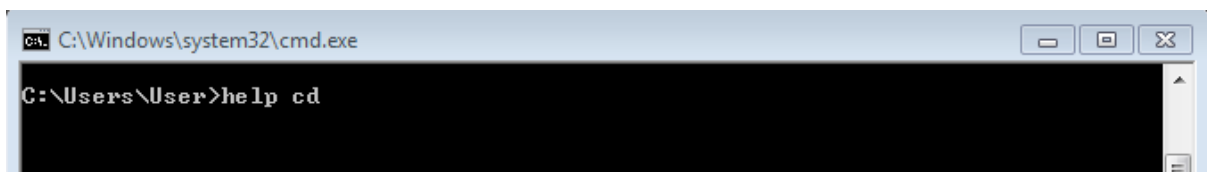
COMMON MAC OS/UNIX COMMANDS

Notice some of the most commonly used terminal commands below:

pwd	Print working directory. Displays the directory you are currently in.
cd	Change directory to the path specified.
touch	Creates an empty new file.
rm	Removes a file.
rmdir	Removes an empty directory.

ls	Displays a list of files and subdirectories in a directory.
q	Quits the terminal.
mkdir	Creates a directory.
mv	Moves/renames a file.
man	Show the help manual for a command.
whatis	Provides a one-line description of what a command does.

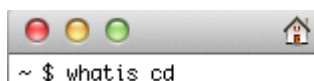
As you can see, the command line has the built-in **help** (Windows) or **man** (Mac OS/Linux) command. This can be used to view all the commands that are executable. At this point, why not type the **help/man** command into the command line of your computer and hit Enter to find out more about all the commands? To get help on a specific command, you have to type **help** followed by the command in Windows like so:



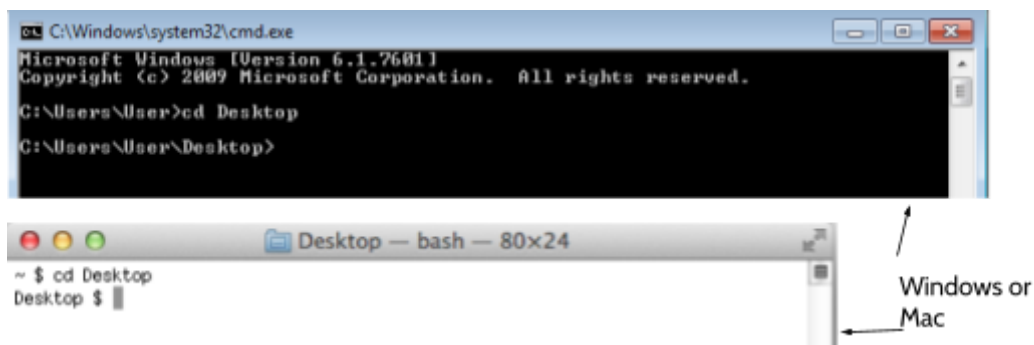
Or type **man** followed by the command in Mac OS/Linux:



You could also type **whatis** followed by the command in Mac OS/Linux to get help. Compare the output you get with the **whatis** command with the output from the **man** command:

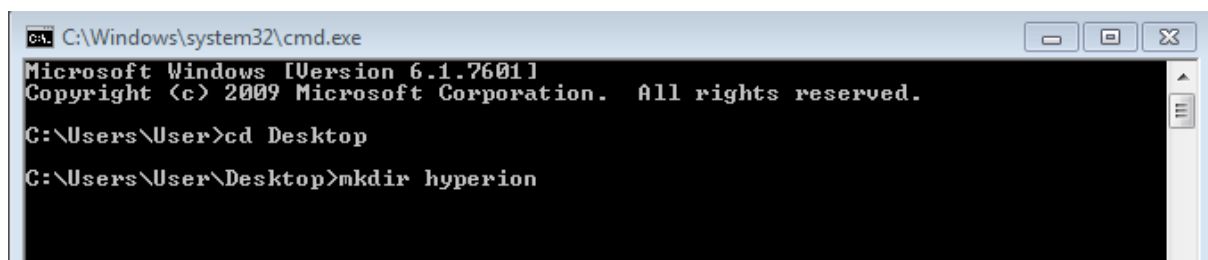


The command (in the images above) will give you the information about the **cd** command. As will be noted by the information provided by the command line, the **cd** command is used for navigation. It takes you from one directory to the next. For example, say you want to perform some command on a folder that is on your Desktop, you would have to type **cd** to change directory to your Desktop as shown in the images below:

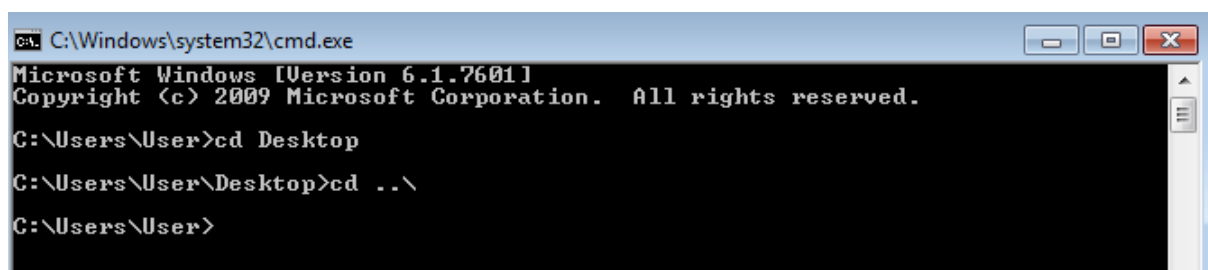


From here, we can now perform operations on the files or folders in our Desktop, since we have navigated into it. But, what if we have forgotten the name of the file or folder that we wanted to operate on? Well, you can simply use the **dir** (Windows) or **ls** (macOS/Linux) command to get a list of all the files or folders saved on the Desktop.

But let's not alter any file or folder on the Desktop; instead, let's create a new folder. Do you recall the command to use to make a new folder? That's right, it's: **mkdir**.

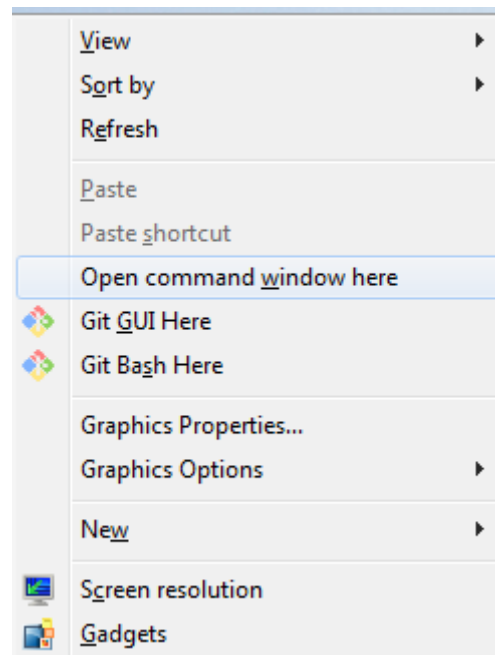


Notice that we have made a new folder on the Desktop called 'hyperion'. It's that simple! So, now that we have done what we wanted to do on our Desktop, how do we get back to where we were i.e. how do we navigate **backwards**?



To navigate two directories back, we would have to type, **cd ..\..**. However, navigating back and forth may seem tedious to do. Wouldn't it be nice if we could figure out a way in which we could open a Command Window in any directory with minimal effort? Fortunately, you can with Windows! Simply hold shift and

right-click on a folder or empty space to open a Command Window in that directory:



Your computer may display “Open PowerShell window here”. PowerShell is similar to the command window and will accept most of the same commands.

SCRIPT FILES

As you advance in your skills as a software engineer, you may at times find that there are certain commands that you use repeatedly. Instead of retyping these commands into the command line repeatedly, you can create a script file that contains these sets of commands and that can be executed as needed. Often such files will be executed periodically, e.g. daily, weekly, monthly etc. In Windows, we can create batch files and in Mac and Linux systems, we create shell scripts.

Batch files

A batch file is a kind of script file in DOS, OS/2, and Windows. Batch files are normally used by individuals who run the same commands frequently. Instead of typing out the commands each time, the commands are simply placed in a batch file. To execute the commands contained within a batch file, you can simply double-click it.

The batch file consists of a series of commands to be executed by the command line, stored in a plain text file. To create a batch file, you have to open a plain text

editor (e.g. Notepad) and navigate to File > Save As, and in the “Save As” window, input the name for your batch file and then add a “.bat” extension, e.g. *mybatch.bat*.

Shell scripts

To create a shell script:

1. Open a text editor (e.g. gedit).
2. Add the following instruction: `#!/bin/bash` to the first line of the script file.
3. On the following lines enter the instructions that you would usually type into the terminal, one line per instruction.
4. Save the file. It is not a requirement but it is common practice to save your file with a .sh extension. To save the file properly you may need to specify that the file is a plain text file. Do this by selecting Format > Make plain text.
5. Make this file executable by typing the following into the command line: `chmod +x myscript.sh` where `myscript.sh` is the name of the script file.
6. To run the script type: `sh myscript.sh` where `myscript.sh` is the name of the script file.

SPOT CHECK 1

Let's see what you can remember from this section.

1. What are the two benefits of using the command line as a software engineer?
2. What is the command to display the name of or change the current directory?
3. What is the command to display a list of files and subdirectories in a directory?

Instructions

- The directory called “Examples” contains examples of a batch file (if you are using Windows) and a shell script called “MacExample.sh” (if you are using Mac OS). Please read through the comments in the example file that is **relevant to you** (based on the operating system you are running on your PC) before attempting this task.
- The additional reading (Yang & Tamuri, 2015) is optional reading. However, we do recommend that you consult this brief guide for further information if you get stuck.

Compulsory Task 1

Follow these steps:

- Create a script file called **file_cd**. (Remember to save this file with a .bat extension if you are using Windows)
 - Inside **file_cd**, insert commands to create three new folders (directories). Name your folder as you wish.
 - Next, insert commands to navigate inside one of the folders you created and create three new folders inside this folder. Also, insert commands to remove two of the folders you created.
- Create a batch file called **ifExample** (again, remember to save this file with a .bat extension if you are using Windows). Inside it, add an if statement to make a new folder called **if_folder** if one of the folders you created is named **new_folder**.
- Next, add an if-else statement that makes a new folder called **hyperionDev** if an **if_folder** exists, or else make a new folder called **new-projects** if it does not.

You will need to employ the following syntax for these conditional statements:

If exist *filename* *command*

If exist *filename* (*command*) else (*command*)



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SPOT CHECK 1 ANSWERS

1. For software engineers, it is helpful to use the command line when interacting with files, especially those created using libraries and frameworks, such as Django. It also allows you to work with version control systems like Git.
2. `cd`
3. `ls` (MAC OS/UNIX) or `dir` (Windows)

REFERENCES

Yang, Z. & Tamuri, A. (2015). *Getting Started with Mac OS X/Linux Command Terminal*.
<http://abacus.gene.ucl.ac.uk/software/CommandLine.MACosx.pdf>