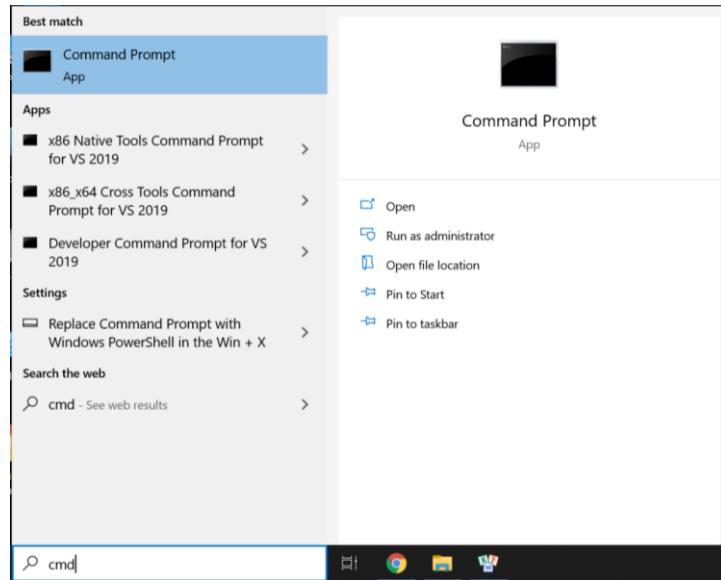


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Practical 1 : Command Line Interface (CLI)

In this lab, you will use Windows CLI commands to manage folders, files and programs. Thus, you need to have a computer running Windows as the main Operating System.

Navigate to “Run” or go to windows search section and typed in “cmd”.



The command line interface (CLI) windows is opened as below.

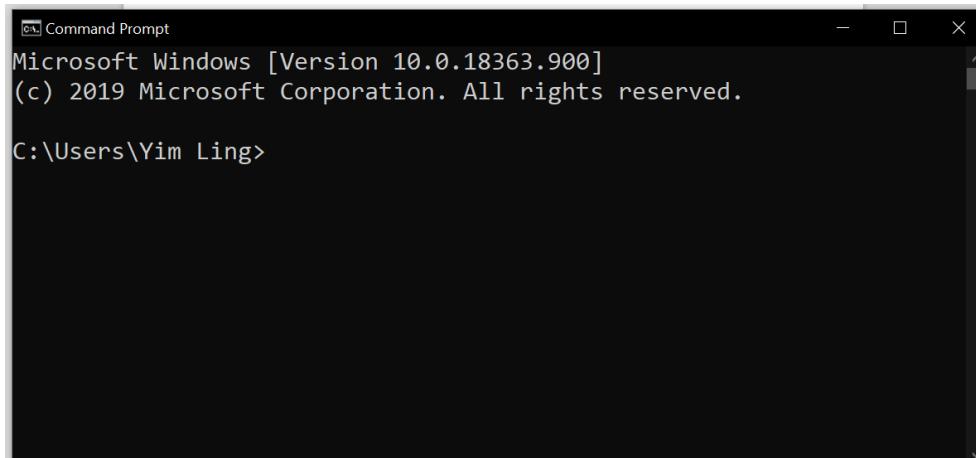


Figure 1: CLI

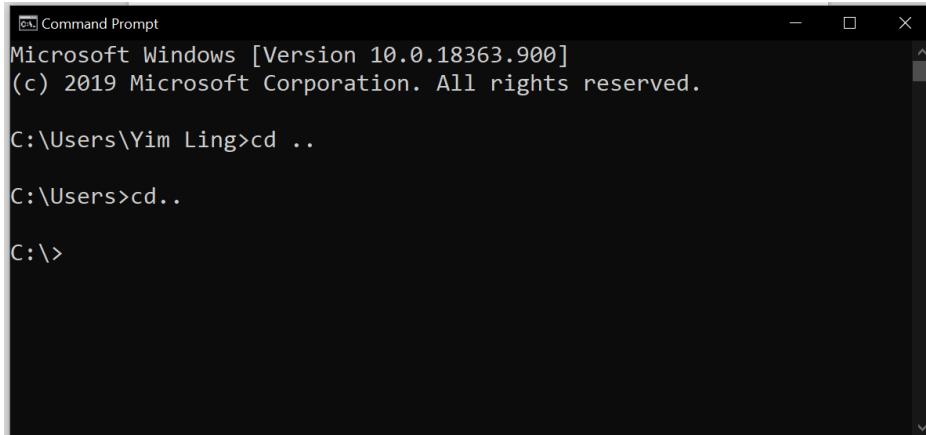
Based on your CLI, which directory / path are you at?
For Figure 1, it's simply Yim Ling / C:\Users\Yim Ling

Now, change the directory/path to root directory / C:\

Just need to type “cd ..” then press “Enter”.

Repeat it and you'll find yourself redirected to the root directory as shown in Figure 2.

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```
Command Prompt
Microsoft Windows [Version 10.0.18363.900]
(c) 2019 Microsoft Corporation. All rights reserved.

C:\Users\Yim Ling>cd ..

C:\Users>cd..

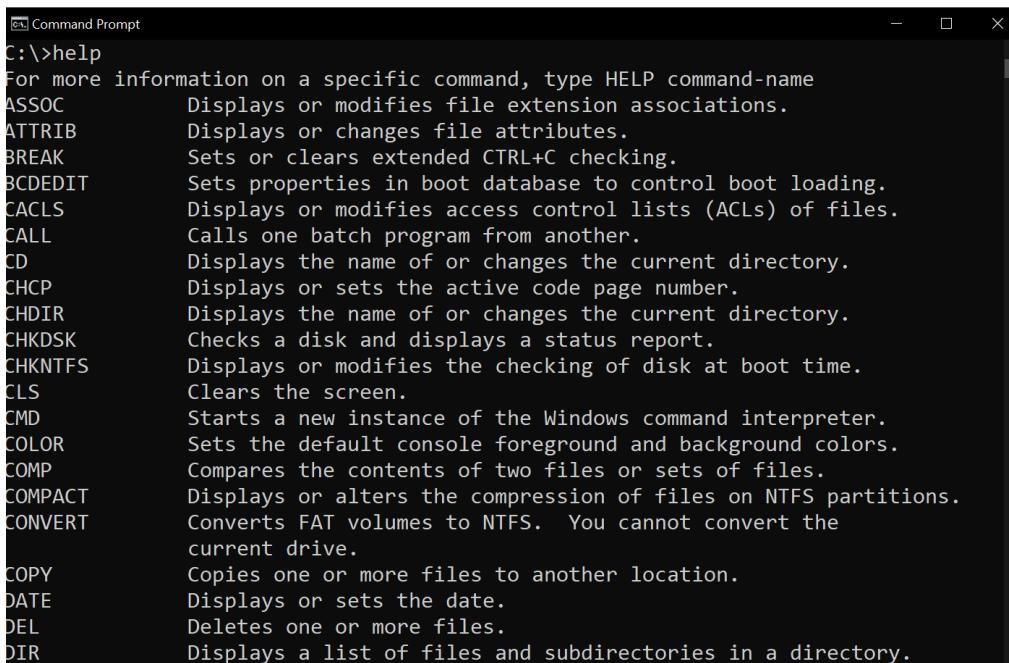
C:\>
```

Figure 2: redirect to root directory.

CD or change (your working) directory simply means you can navigate between directories within a path.

Another way of changing directory straight to root directory is simply typing “**cd/**”, then press “Enter”.

In order to know the whole list executions you can do with CLI, you may type in “**help**” then press “Enter”



```
Command Prompt
C:\>help
For more information on a specific command, type HELP command-name
ASSOC      Displays or modifies file extension associations.
ATTRIB     Displays or changes file attributes.
BREAK      Sets or clears extended CTRL+C checking.
BCDEDIT    Sets properties in boot database to control boot loading.
CACLS      Displays or modifies access control lists (ACLs) of files.
CALL       Calls one batch program from another.
CD         Displays the name of or changes the current directory.
CHCP      Displays or sets the active code page number.
CHDIR     Displays the name of or changes the current directory.
CHKDSK    Checks a disk and displays a status report.
CHKNTFS   Displays or modifies the checking of disk at boot time.
CLS        Clears the screen.
CMD        Starts a new instance of the Windows command interpreter.
COLOR     Sets the default console foreground and background colors.
COMP      Compares the contents of two files or sets of files.
COMPACT   Displays or alters the compression of files on NTFS partitions.
CONVERT   Converts FAT volumes to NTFS. You cannot convert the
          current drive.
COPY      Copies one or more files to another location.
DATE      Displays or sets the date.
DEL       Deletes one or more files.
DIR       Displays a list of files and subdirectories in a directory.
```

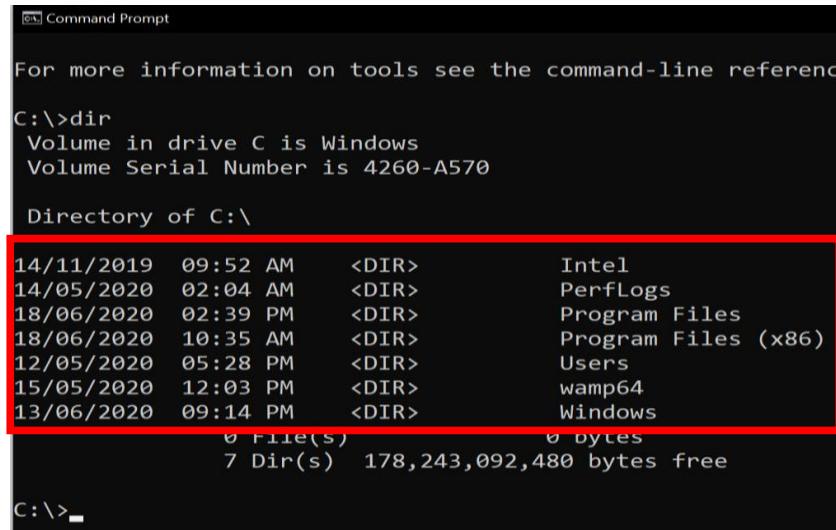
Figure 3: List of commands in CLI.

Now let's visit the basic commands of exploring different directories and files in a Windows system.

While in the root directory, type “**dir**” then press “Enter”

While looking at the listed Directory of C:\ in the CLI, navigate using Windows GUI to C:\ Directory. What could be derived between these two opened windows?

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```
[C:\] Command Prompt

For more information on tools see the command-line reference manual.

C:\>dir
Volume in drive C is Windows
Volume Serial Number is 4260-A570

Directory of C:\

14/11/2019  09:52 AM    <DIR>        Intel
14/05/2020  02:04 AM    <DIR>        PerfLogs
18/06/2020  02:39 PM    <DIR>        Program Files
18/06/2020  10:35 AM    <DIR>        Program Files (x86)
12/05/2020  05:28 PM    <DIR>        Users
15/05/2020  12:03 PM    <DIR>        wamp64
13/06/2020  09:14 PM    <DIR>        Windows

               0 File(s)          0 bytes
               7 Dir(s)  178,243,092,480 bytes free

C:\>
```

Figure 4: Details of directory C: in CLI

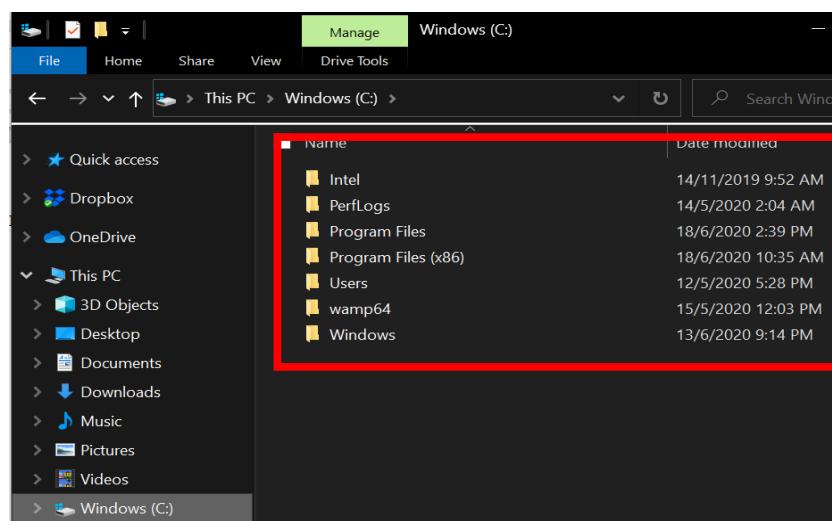
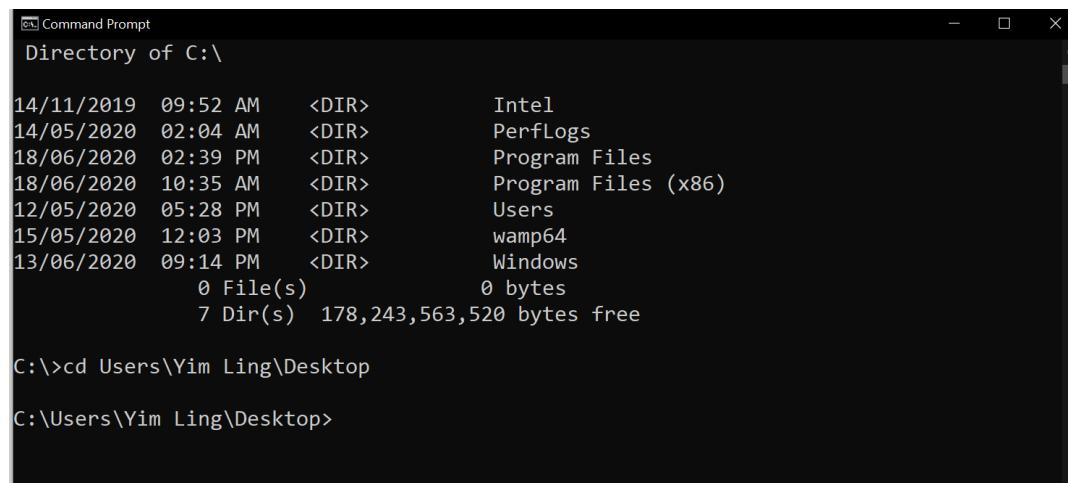


Figure 5: Details of directory C: in GUI

Now, using Windows CLI, let's navigate to Desktop\ directory and use the basic commands to create new directories and files.



```
[C:\] Command Prompt

Directory of C:\

14/11/2019  09:52 AM    <DIR>        Intel
14/05/2020  02:04 AM    <DIR>        PerfLogs
18/06/2020  02:39 PM    <DIR>        Program Files
18/06/2020  10:35 AM    <DIR>        Program Files (x86)
12/05/2020  05:28 PM    <DIR>        Users
15/05/2020  12:03 PM    <DIR>        wamp64
13/06/2020  09:14 PM    <DIR>        Windows

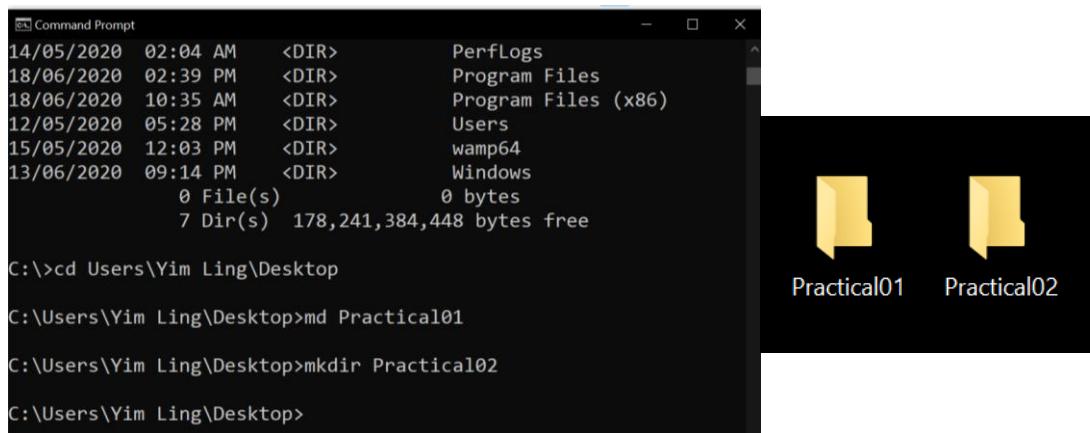
               0 File(s)          0 bytes
               7 Dir(s)  178,243,563,520 bytes free

C:\>cd Users\Yim Ling\Desktop
C:\Users\Yim Ling\Desktop>
```

Figure 6: Navigate to Desktop directory.

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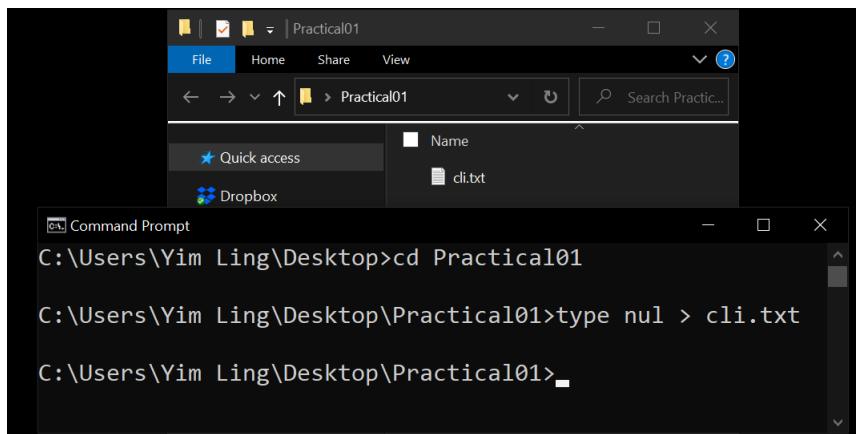
Create a new directory using “**md**” and “**mkdir**” command.



```
14/05/2020 02:04 AM <DIR> PerfLogs  
18/06/2020 02:39 PM <DIR> Program Files  
18/06/2020 10:35 AM <DIR> Program Files (x86)  
12/05/2020 05:28 PM <DIR> Users  
15/05/2020 12:03 PM <DIR> wamp64  
13/06/2020 09:14 PM <DIR> Windows  
          0 File(s)      0 bytes  
         7 Dir(s) 178,241,384,448 bytes free  
  
C:\>cd Users\Yim Ling\Desktop  
C:\Users\Yim Ling\Desktop>md Practical01  
C:\Users\Yim Ling\Desktop>mkdir Practical02  
C:\Users\Yim Ling\Desktop>
```

Figure 7: Creation of Practical01 and Practical02 in Desktop directory

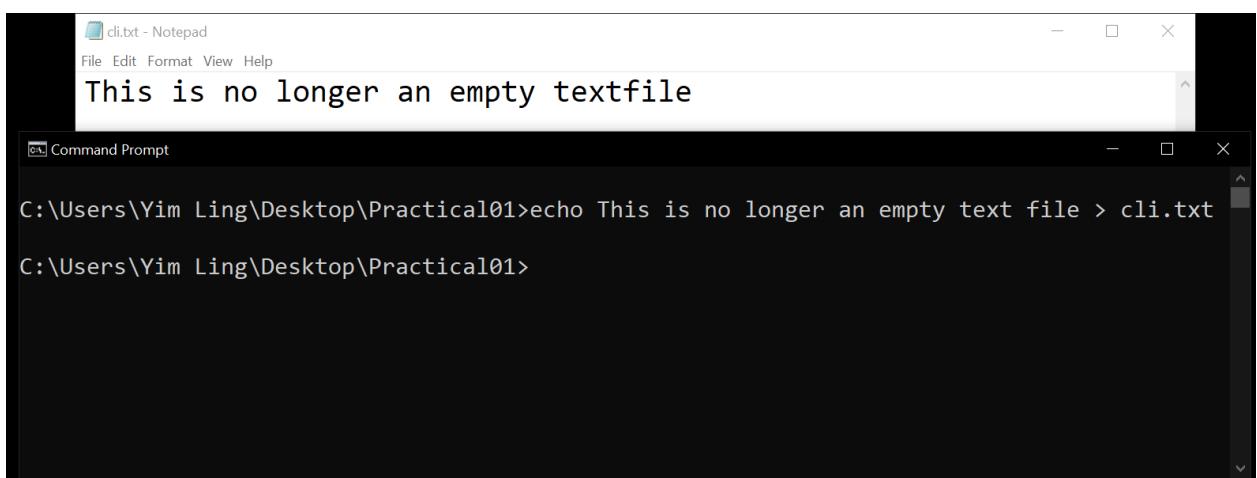
Create an empty textfile in Practical01 using “**type**” command in CLI.



```
File Home Share View  
← → ↑ ↓ Practical01  
Quick access Name  
Dropbox cli.txt  
  
C:\>cd Practical01  
C:\Users\Yim Ling\Desktop\Practical01>type nul > cli.txt  
C:\Users\Yim Ling\Desktop\Practical01>
```

Figure 8: Creation of empty textfile in Practical01 directory.

Now, add some texts into the empty texfile using “**echo**” command.



```
This is no longer an empty textfile  
  
C:\>echo This is no longer an empty text file > cli.txt  
C:\>
```

Figure 9: Add texts into an empty text file.

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Exercises:

Make changes to the directories where eventually Figure 10 is achieved.

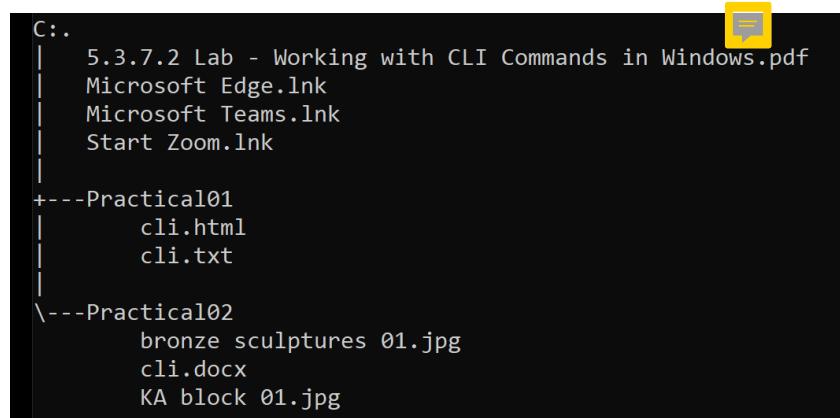


Figure 10: Graphical view of desktop directory.

Detailed requirements;

- 1) An additional file “cli.html” shall be created in Practical01 directory. Using CLI command **evoke an editor** to edit “cli.html” so that the file generate webpage as shown in Figure 11.

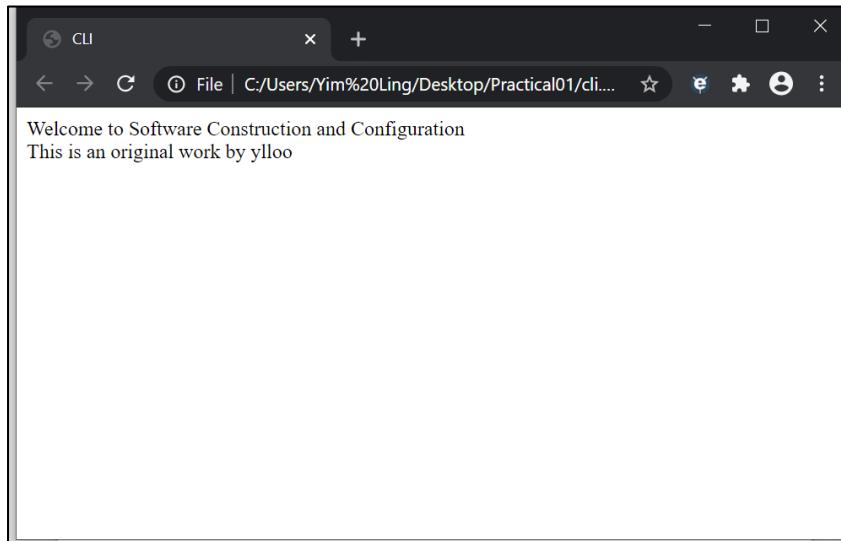


Figure 11: cli.html

- 2) Create an empty .docx document file in Practical02 directory.
- 3) **Copy** all files from Pictures folder (download some pictures first) into Practical02 directory.
- 4) Using CLI command, generate a **graphical view of your desktop directory**; similar to Figure 10.

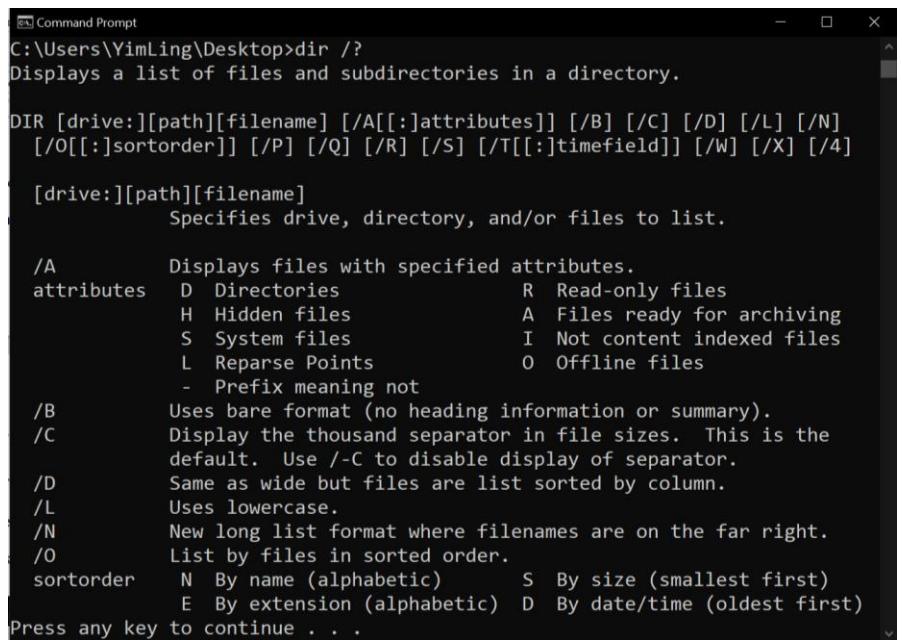
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Things to remember:

1. The first thing you type into the CLI is actually just the name of a command.
2. The things that come after the command being called are called “arguments”, and they are passed to the command being called.
3. CLI is very sensitive to spaces.

Commands with Appropriate Arguments.

Using a combination of [command] [/?] in CLI, you get to know what are the arguments available for the command.



```
Command Prompt
C:\Users\YimLing\Desktop>dir /?
Displays a list of files and subdirectories in a directory.

DIR [drive:][path][filename] [/A[[:attributes]]] [/B] [/C] [/D] [/L] [/N]
    [/O[[:sortorder]]] [/P] [/Q] [/R] [/S] [/T[[:timefield]]] [/W] [/X] [/4]

[drive:][path][filename]
    Specifies drive, directory, and/or files to list.

/A      Displays files with specified attributes.
attributes   D Directories          R Read-only files
              H Hidden files        A Files ready for archiving
              S System files         I Not content indexed files
              L Reparse Points       O Offline files
              - Prefix meaning not
/B      Uses bare format (no heading information or summary).
/C      Display the thousand separator in file sizes. This is the
        default. Use /-C to disable display of separator.
/D      Same as wide but files are list sorted by column.
/L      Uses lowercase.
/N      New long list format where filenames are on the far right.
/O      List by files in sorted order.
sortorder   N By name (alphabetic)   S By size (smallest first)
              E By extension (alphabetic) D By date/time (oldest first)

Press any key to continue . . .
```

Figure 12: Displaying lists of arguments for a function.

1. Displaying the directory with specific attributes will need to type “dir /a:[attribute]” then press “Enter”



```
Command Prompt
C:\Users\YimLing\Desktop>dir /ah
Volume in drive C is Windows
Volume Serial Number is 4260-A570

Directory of C:\Users\YimLing\Desktop

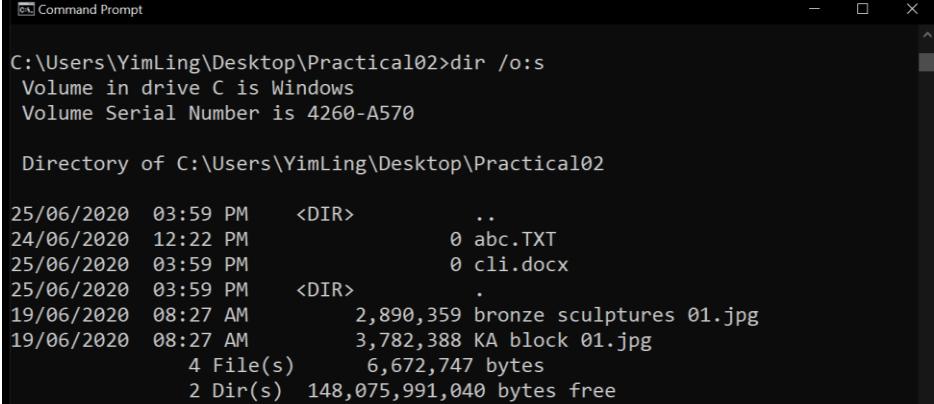
24/06/2020  10:23 PM           282 desktop.ini
                  1 File(s)      282 bytes
                   0 Dir(s)  148,079,116,288 bytes free
```

Figure 13: An example of displaying files with specific attribute.

Q: What was the command and argument used in Figure 13? What was implicated?

2. Displaying the directory with specific sorting mechanism will need to type “dir /o:[attribute]” then press “Enter”

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```
C:\Users\YimLing\Desktop\Practical02>dir /o:s
Volume in drive C is Windows
Volume Serial Number is 4260-A570

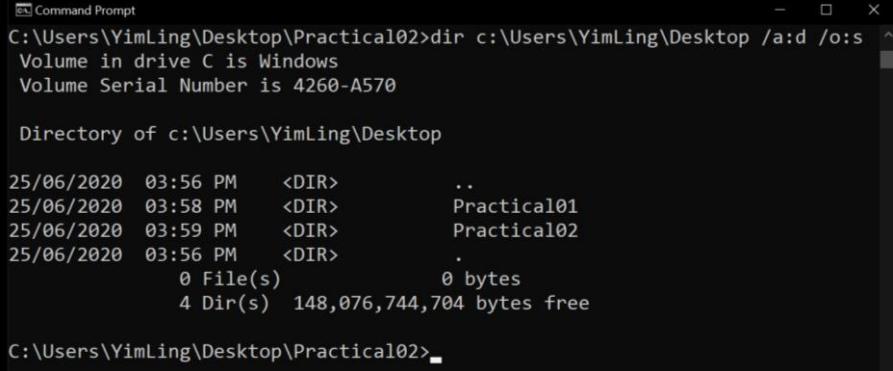
Directory of C:\Users\YimLing\Desktop\Practical02

25/06/2020  03:59 PM    <DIR>          ..
24/06/2020  12:22 PM          0 abc.TXT
25/06/2020  03:59 PM          0 cli.docx
25/06/2020  03:59 PM    <DIR>          .
19/06/2020  08:27 AM      2,890,359 bronze sculptures 01.jpg
19/06/2020  08:27 AM      3,782,388 KA block 01.jpg
              4 File(s)   6,672,747 bytes
              2 Dir(s)  148,075,991,040 bytes free
```

Figure 14: An example of displaying files with specific sorting mechanism.

Q: What was the command and argument used in Figure 14? What was implicated?

3. Displaying a directory may contain multiple arguments for display customization.



```
C:\Users\YimLing\Desktop\Practical02>dir c:\Users\YimLing\Desktop /a:d /o:s
Volume in drive C is Windows
Volume Serial Number is 4260-A570

Directory of c:\Users\YimLing\Desktop

25/06/2020  03:56 PM    <DIR>          ..
25/06/2020  03:58 PM    <DIR>          Practical01
25/06/2020  03:59 PM    <DIR>          Practical02
25/06/2020  03:56 PM    <DIR>          .
              0 File(s)   0 bytes
              4 Dir(s)  148,076,744,704 bytes free

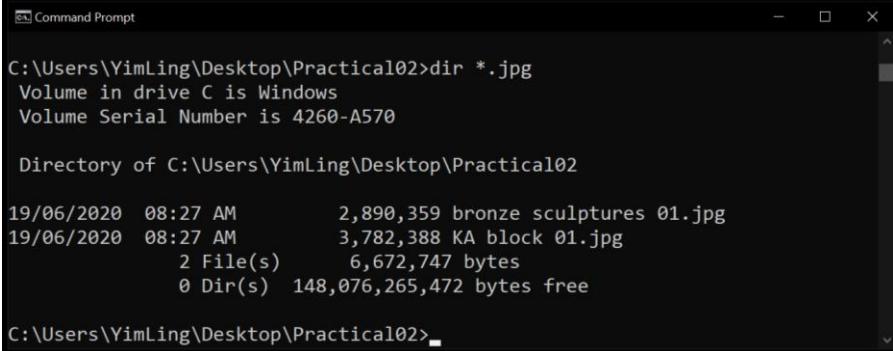
C:\Users\YimLing\Desktop\Practical02>
```

Figure 15: Displaying a directory with combination of arguments.

Q: What was the command and arguments used in Figure 15? What was implicated?

Wildcards.

1. The usage of wildcards are inevitable especially in command line programs.



```
C:\Users\YimLing\Desktop\Practical02>dir *.jpg
Volume in drive C is Windows
Volume Serial Number is 4260-A570

Directory of C:\Users\YimLing\Desktop\Practical02

19/06/2020  08:27 AM      2,890,359 bronze sculptures 01.jpg
19/06/2020  08:27 AM      3,782,388 KA block 01.jpg
              2 File(s)   6,672,747 bytes
              0 Dir(s)  148,076,265,472 bytes free

C:\Users\YimLing\Desktop\Practical02>
```

Figure 16: Use of wildcards to display files 1.

Q: What was the command and argument used in Figure 16? What was implicated?

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2. Create an empty textfile in Practical01 using “type” command in CLI.

```
C:\Users\YimLing\Desktop\Practical01>dir *cli*
Volume in drive C is Windows
Volume Serial Number is 4260-A570

Directory of C:\Users\YimLing\Desktop\Practical01

25/06/2020  03:58 PM      114 cli.html
25/06/2020  03:57 PM          0 cli.txt
                2 File(s)       114 bytes
                0 Dir(s)  148,075,020,288 bytes free

C:\Users\YimLing\Desktop\Practical01>
```

Figure 17: Use of wildcards to display files 2.

Q: What was the command and argument used in Figure 17? What was implicated?

Piping.

1. Echo the “dir” command

Before we explore piping in CLI, let us explore an additional use of “dir” command. Rather than listing the current working directory in CLI, “dir” is able to save the listing in a specified text file. Type “dir > cli2.txt” and press “Enter”.

```
cl2 - Notepad
File Edit Format View Help
Volume in drive C is Windows
Volume Serial Number is 4260-A570

Directory of C:\Users\looyi\Desktop\Practical01

28/06/2020  01:55 PM      <DIR>      .
28/06/2020  01:55 PM      <DIR>      ..
28/06/2020  01:49 PM          129 cli.html
25/06/2020  03:57 PM          0 cli.txt
28/06/2020  01:55 PM          0 cli2.txt
                3 File(s)       129 bytes
                2 Dir(s)  208,305,106,944 bytes free

C:\Users\looyi\Desktop\Practical01>dir > cli2.txt

C:\Users\looyi\Desktop\Practical01>
```

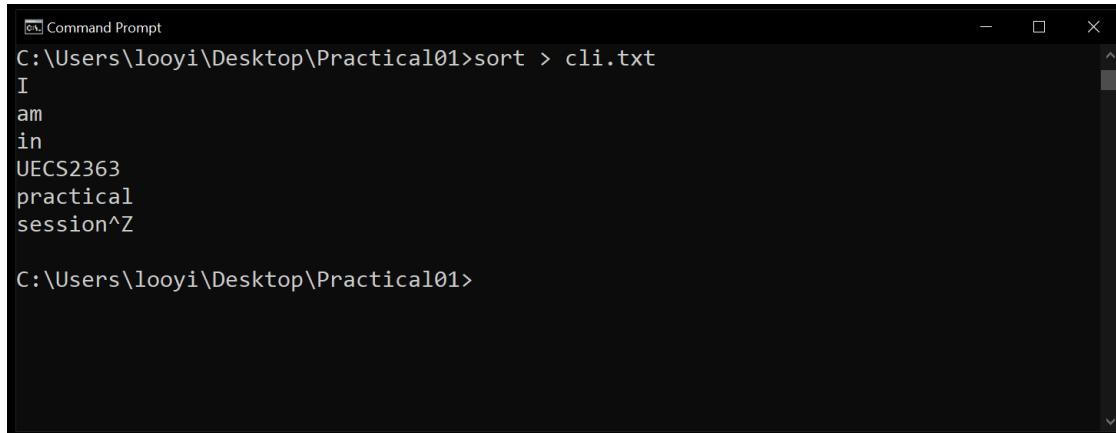
Figure 18: Echo directory details into a file.

Q: What was the command used in Figure 18? What was implicated?

2. The “sort” command.

Now, explore the “sort” command in CLI. Type “sort < cli.txt” and press “Enter”. Press “Enter” after each line. When you are done, press “Ctrl+Z” then press “Enter” again. Ctrl+Z is a special key that tells the CLI to stop sending keyboard input to the program.

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```
Command Prompt
C:\Users\looyi\Desktop\Practical01>sort > cli.txt
I
am
in
UECS2363
practical
session^Z

C:\Users\looyi\Desktop\Practical01>
```

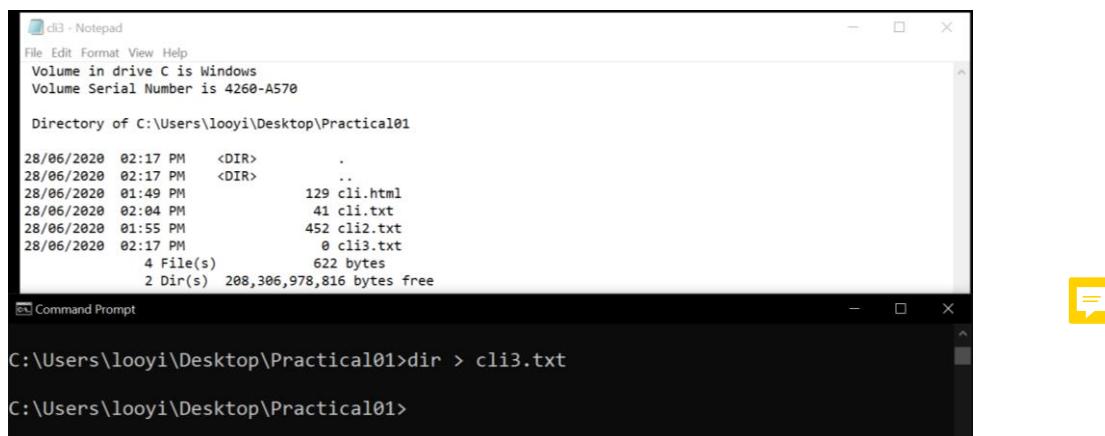
Figure 19: Using sort command.

Q: What was implicated after executing similar steps in Figure 19?

3. Use of piping in CLI.

Commands “dir” listed out details of the current directory while “sort” is used for sorting (usually ascending). What if combining both commands in a command line? This will be called piping. Pipe or “|” on the keyboard, allows combination of both commands be done in CLI.

Type “dir > cli3.txt” and press “Enter” to echo the details of the current working directory into “cli3.txt” as shown in Figure 20.



```
cl3 - Notepad
File Edit Format View Help
Volume in drive C is Windows
Volume Serial Number is 4260-A570

Directory of C:\Users\looyi\Desktop\Practical01

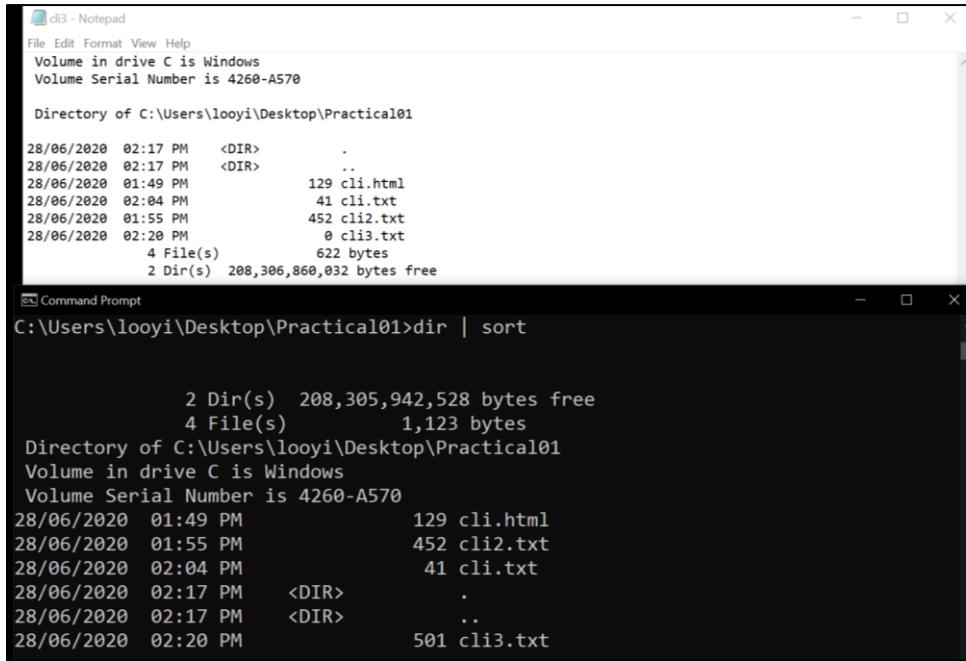
28/06/2020  02:17 PM    <DIR>      .
28/06/2020  02:17 PM    <DIR>      ..
28/06/2020  01:49 PM            129 cli.html
28/06/2020  02:04 PM            41 cli.txt
28/06/2020  01:55 PM            452 cli2.txt
28/06/2020  02:17 PM            0 cli3.txt
                           4 File(s)       622 bytes
                           2 Dir(s)  208,306,978,816 bytes free

Command Prompt
C:\Users\looyi\Desktop\Practical01>dir > cli3.txt
C:\Users\looyi\Desktop\Practical01>
```

Figure 20: Echo directory details into cli3.txt.

Now, type “dir | sort” and compare the output in CLI with “cli3.txt” as shown in Figure 21.

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```
cl3 - Notepad
File Edit Format View Help
Volume in drive C is Windows
Volume Serial Number is 4260-A570

Directory of C:\Users\looyi\Desktop\Practical01

28/06/2020  02:17 PM    <DIR>      .
28/06/2020  02:17 PM    <DIR>      ..
28/06/2020  01:49 PM            129 cli.html
28/06/2020  02:04 PM            41 cli.txt
28/06/2020  01:55 PM            452 cli2.txt
28/06/2020  02:20 PM            0 cli3.txt
28/06/2020                4 File(s)   622 bytes
28/06/2020              2 Dir(s)  208,306,860,032 bytes free

Command Prompt
C:\Users\looyi\Desktop\Practical01>dir | sort

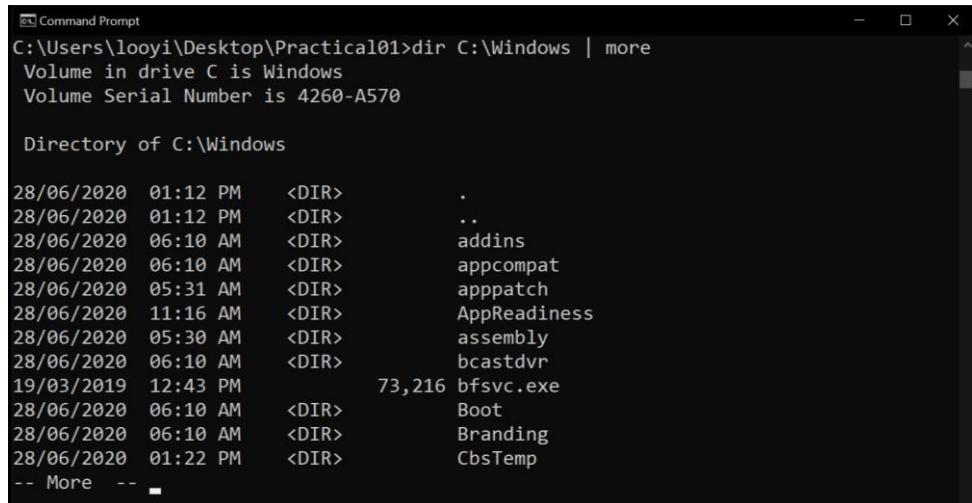
2 Dir(s)  208,305,942,528 bytes free
4 File(s)  1,123 bytes
Directory of C:\Users\looyi\Desktop\Practical01
Volume in drive C is Windows
Volume Serial Number is 4260-A570
28/06/2020  01:49 PM            129 cli.html
28/06/2020  01:55 PM            452 cli2.txt
28/06/2020  02:04 PM            41 cli.txt
28/06/2020  02:17 PM    <DIR>      .
28/06/2020  02:17 PM    <DIR>      ..
28/06/2020  02:20 PM            501 cli3.txt
```

Figure 21: Piping in CLI.

Q: What was implicated after execution of the command line as shown in Figure 21?

4. Use of “more” command.

Another useful command for list of display on CLI is “more” command. Try by typing “`dir C:\Windows | more`” and press “Enter”.



```
Command Prompt
C:\Users\looyi\Desktop\Practical01>dir C:\Windows | more
Volume in drive C is Windows
Volume Serial Number is 4260-A570

Directory of C:\Windows

28/06/2020  01:12 PM    <DIR>      .
28/06/2020  01:12 PM    <DIR>      ..
28/06/2020  06:10 AM    <DIR>      addins
28/06/2020  06:10 AM    <DIR>      appcompat
28/06/2020  05:31 AM    <DIR>      apppatch
28/06/2020  11:16 AM    <DIR>      AppReadiness
28/06/2020  05:30 AM    <DIR>      assembly
28/06/2020  06:10 AM    <DIR>      bcastdvr
19/03/2019  12:43 PM            73,216 bfcsvc.exe
28/06/2020  06:10 AM    <DIR>      Boot
28/06/2020  06:10 AM    <DIR>      Branding
28/06/2020  01:22 PM    <DIR>      CbsTemp
-- More --
```

Figure 22: Piping “more” to “dir” in CLI.

Q: What was implicated after execution of the command line as shown in Figure 22?

Batch Files.

Submission of a software project / assignment by email usually use a common way of zipping up all files and send or upload to an email address or a cloud storage. Normally one would use a program such as WinZip for this task. We all know what are the steps; click on the WinZip icon. Click, click,

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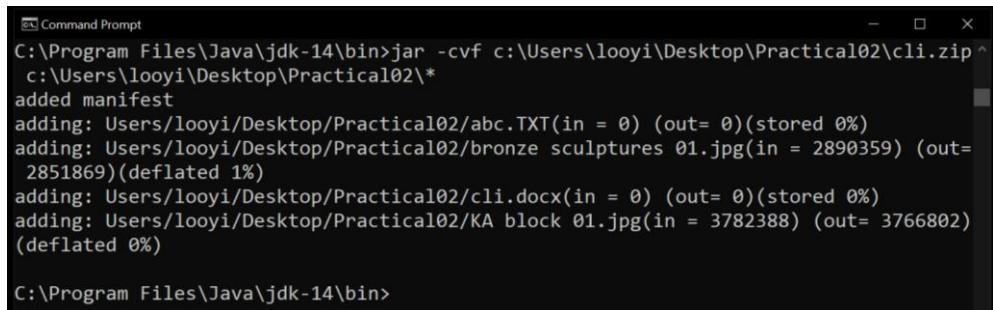
click, until each file is added. Click, click, click, type the zip file name, click, click, and it is done. If a last-minute change is needed to be made? Do it all over again. And again...

1. Using the “jar” command

Before we explore batch files, let's explore the basic command, “jar” to create zip  in CLI. In order to use this command a JDK need to be installed in the machine. “jar” command could only work in the folder where “java.exe” is, which normally is in the “C:\Program Files\Java\jdk-14\bin\”.

CD to the directory containing “java.exe” Type “`jar -cvf %destinationpath%\cli.zip * %destinationpath%`” and press “Enter”.

Note: “-cf” denotes compression to a file, while v option in “-cvf” produces verbose output, which lists all the actions that “jar” command takes.



```
Command Prompt
C:\Program Files\Java\jdk-14\bin>jar -cvf c:\Users\looyi\Desktop\Practical02\cli.zip ^
c:\Users\looyi\Desktop\Practical02\*
added manifest
adding: Users/looyi/Desktop/Practical02/abc.TXT(in = 0) (out= 0)(stored 0%)
adding: Users/looyi/Desktop/Practical02/bronze sculptures 01.jpg(in = 2890359) (out=
2851869)(deflated 1%)
adding: Users/looyi/Desktop/Practical02/cli.docx(in = 0) (out= 0)(stored 0%)
adding: Users/looyi/Desktop/Practical02/KA block 01.jpg(in = 3782388) (out= 3766802)
(deflated 0%)
C:\Program Files\Java\jdk-14\bin>
```

Figure 23: Create a zip file.

Q: What was implicated in Figure 23?

2. Using batch files.

Rather than typing the command every time, you can place it into a batch file, and run the batch file as a single command. We will start with a simple version of such a batch file.

Start the Notepad program and save the file as “clizipbatch.bat” with texts entered into the file as shown in Figure 24.

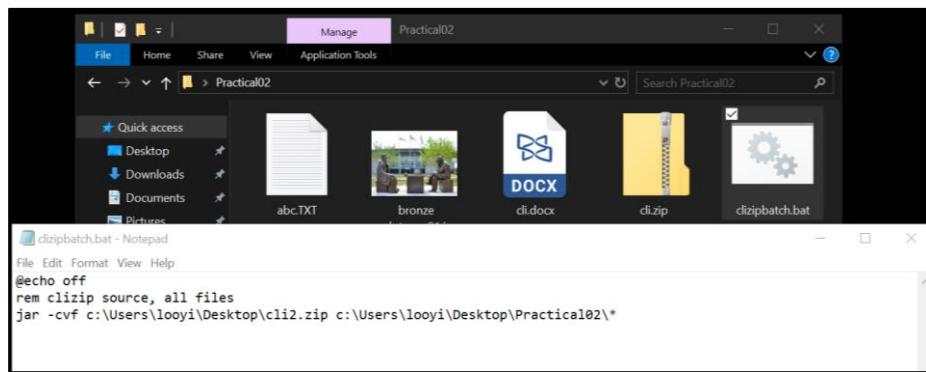
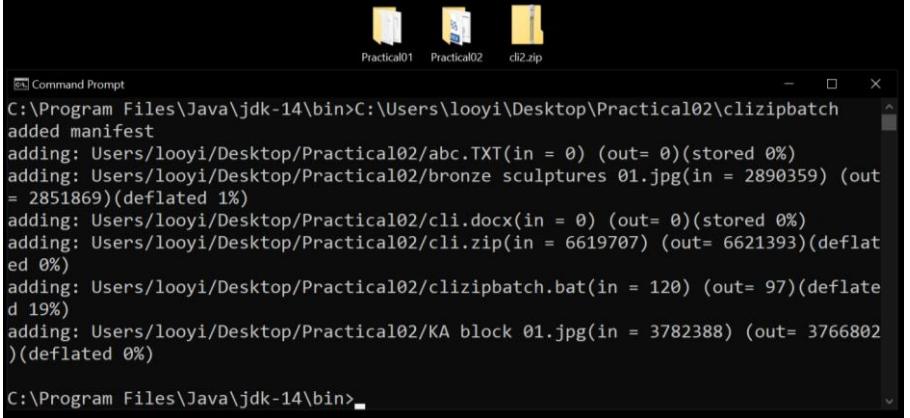


Figure 24: Create a batch file for zip function.

Now launch clizipbatch.bat file in the CLI as shown in Figure 25.

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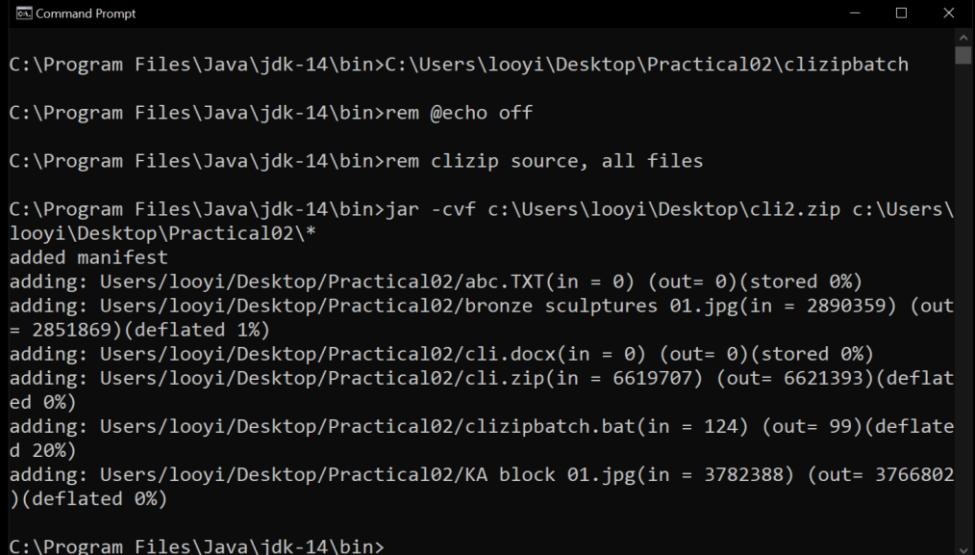


```
C:\Program Files\Java\jdk-14\bin>C:\Users\looyi\Desktop\Practical02\clizipbatch
added manifest
adding: Users/looyi/Desktop/Practical02/abc.TXT(in = 0) (out= 0)(stored 0%)
adding: Users/looyi/Desktop/Practical02/bronze sculptures 01.jpg(in = 2890359) (out
= 2851869)(deflated 1%)
adding: Users/looyi/Desktop/Practical02/cli.docx(in = 0) (out= 0)(stored 0%)
adding: Users/looyi/Desktop/Practical02/cli.zip(in = 6619707) (out= 6621393)(deflat
ed 0%)
adding: Users/looyi/Desktop/Practical02/clizipbatch.bat(in = 120) (out= 97)(deflate
d 19%)
adding: Users/looyi/Desktop/Practical02/KA block 01.jpg(in = 3782388) (out= 3766802
)(deflated 0%)
C:\Program Files\Java\jdk-14\bin>
```

Figure 25: Run clizipbatch.bat in CLI.

Q: What was implicated in Figure 25?

Now edit the clizipbatch.bat file. The first two commands of the start batch file are new commands. “@echo off” suppresses the display of each command on the screen as it is executed. A line starting with “rem” contains comments that are ignored by CLI. Try adding “rem” before “@echo off” in the first line of clizipbatch.bat file. Then execute the file once again in CLI as shown in Figure 26.



```
C:\Program Files\Java\jdk-14\bin>C:\Users\looyi\Desktop\Practical02\clizipbatch
C:\Program Files\Java\jdk-14\bin>rem @echo off
C:\Program Files\Java\jdk-14\bin>rem clizip source, all files
C:\Program Files\Java\jdk-14\bin>jar -cvf c:\Users\looyi\Desktop\cli2.zip c:\Users\looyi\Desktop\Practical02\
added manifest
adding: Users/looyi/Desktop/Practical02/abc.TXT(in = 0) (out= 0)(stored 0%)
adding: Users/looyi/Desktop/Practical02/bronze sculptures 01.jpg(in = 2890359) (out
= 2851869)(deflated 1%)
adding: Users/looyi/Desktop/Practical02/cli.docx(in = 0) (out= 0)(stored 0%)
adding: Users/looyi/Desktop/Practical02/cli.zip(in = 6619707) (out= 6621393)(deflat
ed 0%)
adding: Users/looyi/Desktop/Practical02/clizipbatch.bat(in = 124) (out= 99)(deflate
d 20%)
adding: Users/looyi/Desktop/Practical02/KA block 01.jpg(in = 3782388) (out= 3766802
)(deflated 0%)
C:\Program Files\Java\jdk-14\bin>
```

Figure 26: Run edited clizipbatch.bat in CLI.

Q: What was implicated in Figure 26?

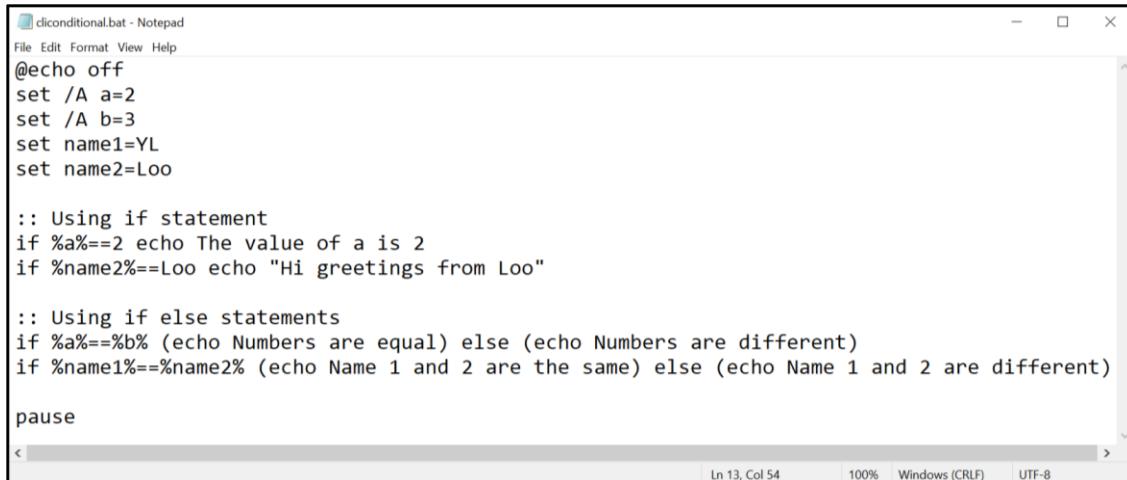
UECS2363 SOFTWARE CONSTRUCTION AND CONFIGURATION

Simple Programming.

Simple programming can be done in batch files such as conditional or loop statements.

1. Conditional statements

In batch files, we may write simple programming for conditional statements to be executed. Create a batch file as shown in Figure 27 in Practical01 folder. Execute the batch file in CLI.



```
diconditional.bat - Notepad
File Edit Format View Help
@echo off
set /A a=2
set /A b=3
set name1=YL
set name2=Loo

:: Using if statement
if %a%==2 echo The value of a is 2
if %name2%==Loo echo "Hi greetings from Loo"

:: Using if else statements
if %a%==%b% (echo Numbers are equal) else (echo Numbers are different)
if %name1%==%name2% (echo Name 1 and 2 are the same) else (echo Name 1 and 2 are different)

pause

```

Ln 13, Col 54 100% Windows (CRLF) UTF-8

Figure 27: Create a batch file that contains conditional statements.

Q: What was implicated after executing batch file of Figure 27? What will be implicated if “@echo off” is removed?

2. Loop statements

Now, let's look into having loop or repeating statements in batch files. Create a batch file as shown in Figure 28 in Practical01 folder. Then execute the batch file in CLI.



```
clioop.bat - Notepad
File Edit Format View Help
@echo off
for %%y in (C:\Users\looyi\Desktop\Practical01\*.* ) do @echo %%y

pause

```

Figure 28: Create a batch file that contains loop/repeating statements.

Q: What was implicated after executing batch file of Figure 28? How to loop through directories instead of files?

