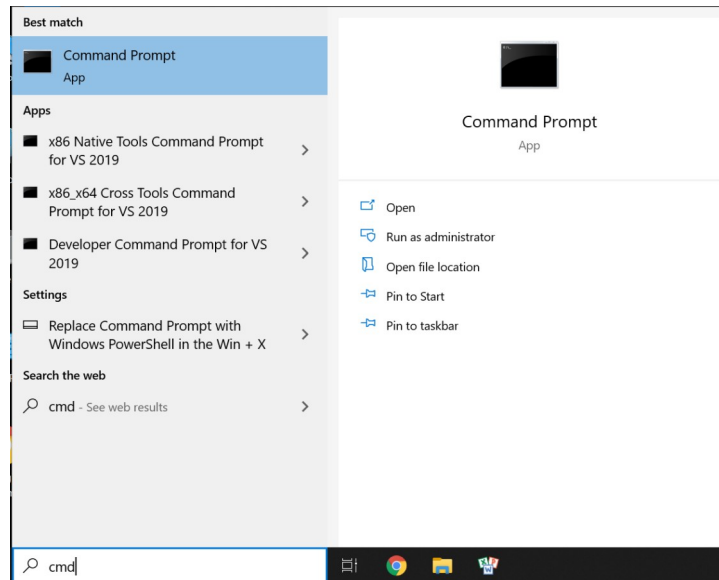


## Practical 2 : CLI in Windows and Linux (II)

This lab practical is a continuation of the previous practical on CLI in Windows and Linux systems. You may be able to recognize some patterns of command line being used. In this lab, we will expound some general principles that are used by most command line programs (like git, python, zip, ssh, etc.).

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



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

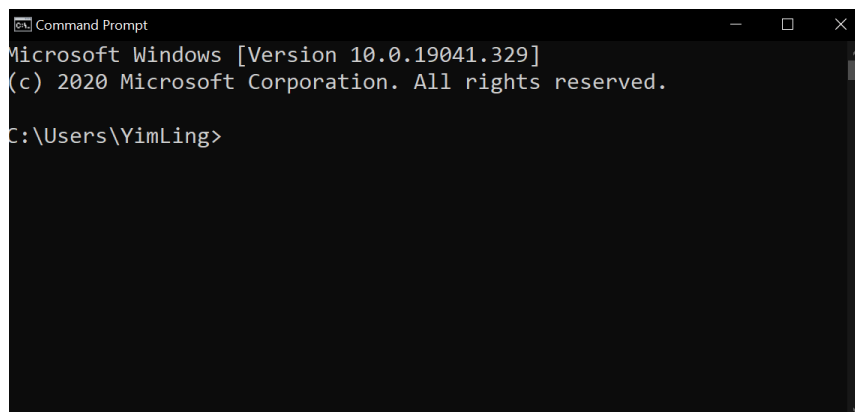


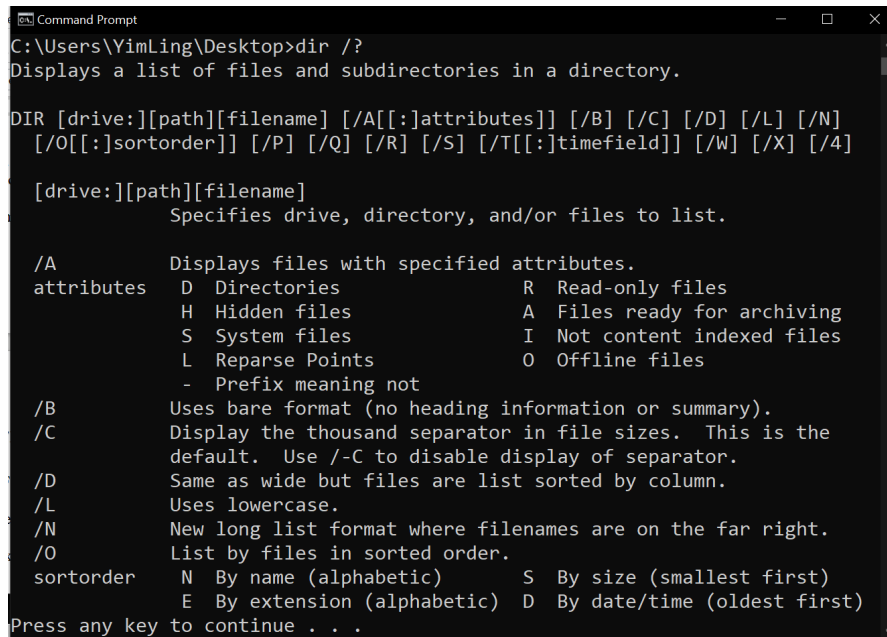
Figure 1: CLI

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.



```

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]

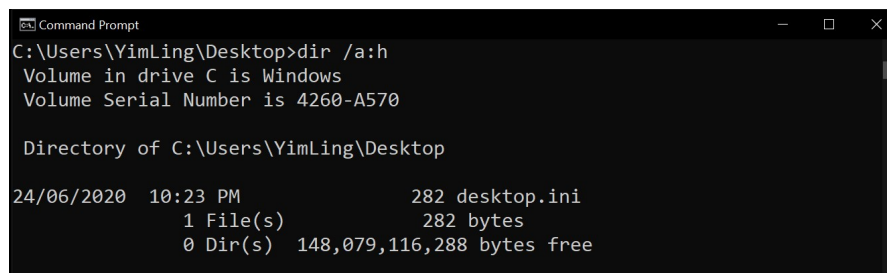
[drive:][path][filename]
    Specifies drive, directory, and/or files to list.

/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 2: Displaying lists of arguments for a function.

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



```

C:\Users\YimLing\Desktop>dir /a:h
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 3: An example of displaying files with specific attribute.

**Q: What was the command and argument used in Figure 3? What was implicated?**

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

```

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 4: An example of displaying files with specific sorting mechanism.

Q: What was the command and argument used in Figure 4? 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 5: Displaying a directory with combination of arguments.

Q: What was the command and arguments used in Figure 5? What was implicated?

## Wildcards.

1. The usage of wilcards 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

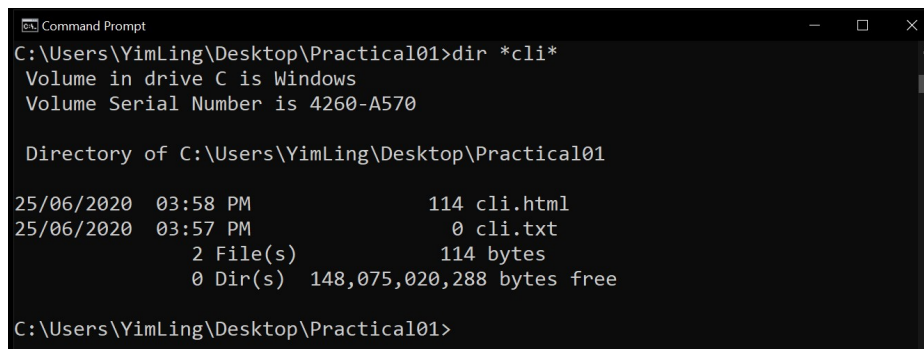
C:\Users\YimLing\Desktop\Practical02>_
    
```

Figure 6: Use of wildcards to display files 1.

Q: What was the command and argument used in Figure 6? What was implicated?

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



```
Command Prompt
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>
```

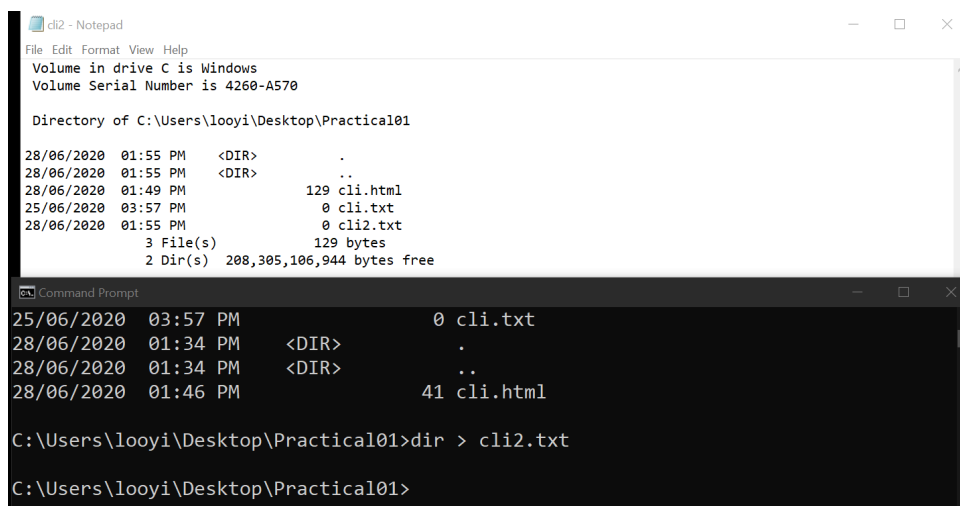
Figure 7: Use of wildcards to display files 2.

Q: What was the command and argument used in Figure 7? 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”.



```
cli2 - 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

Command Prompt
25/06/2020  03:57 PM                0 cli.txt
28/06/2020  01:34 PM  <DIR>      .
28/06/2020  01:34 PM  <DIR>      ..
28/06/2020  01:46 PM                41 cli.html

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

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

Figure 8: Echo directory details into a file.

Q: What was the command used in Figure 8? 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.

```

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

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

Figure 9: Using sort command.

Q: What was implicated after executing similar steps in Figure 9?

### 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 10.

```

cli3 - 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

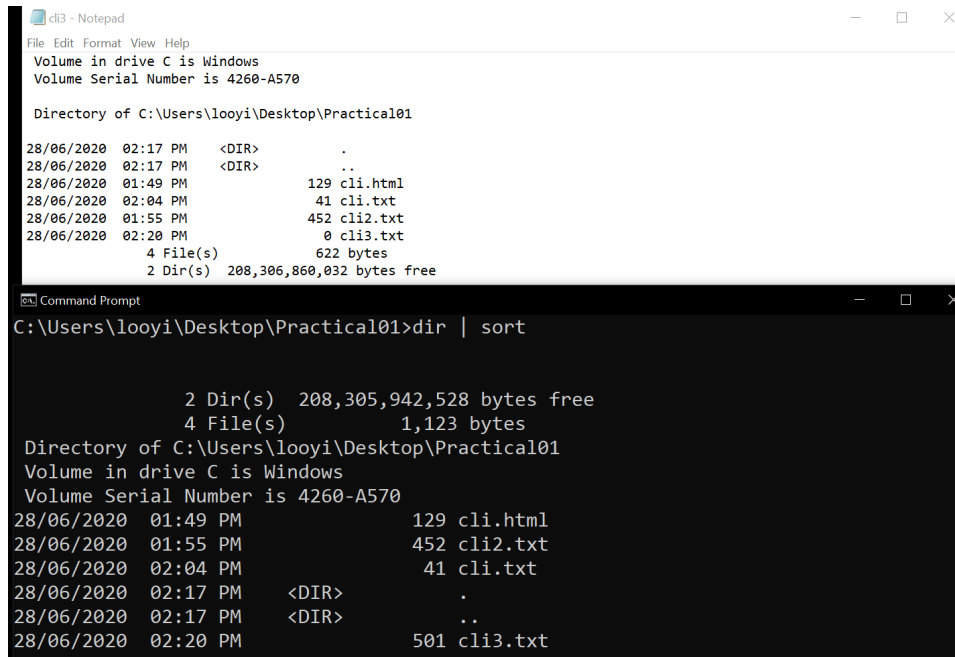
Command Prompt
C:\Users\looyi\Desktop\Practical01>dir > cli3.txt

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

Figure 10: Echo directory details into cli3.txt.

Now, type “dir | sort” and compare the output in CLI with “cli3.txt” as shown in Figure 11.

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The image shows two windows. The top window is Notepad, titled 'cli3 - Notepad', displaying the output of a 'dir' command in the directory 'C:\Users\looyi\Desktop\Practical01'. It lists files 'cli.html', 'cli.txt', 'cli2.txt', and 'cli3.txt' with their sizes and timestamps. The bottom window is Command Prompt, titled 'Command Prompt', showing the command 'C:\Users\looyi\Desktop\Practical01>dir | sort' being executed. The output is sorted by size, showing the same files and directories in a different order.

```
cli3 - 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
               4 File(s)             622 bytes
               2 Dir(s)  208,306,860,832 bytes free

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

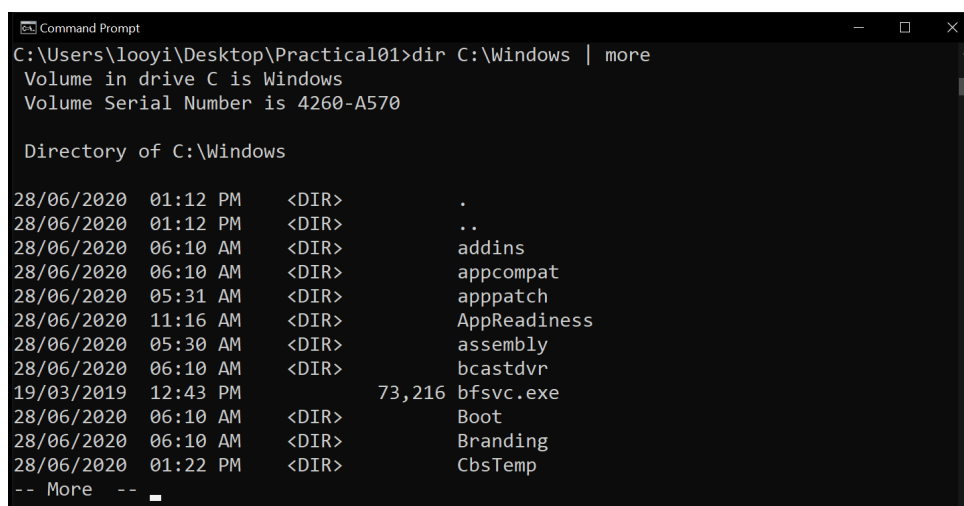
               2 Dir(s)  208,305,942,528 bytes free
               4 File(s)             1,123 bytes
Directory of C:\Users\looyi\Desktop\Practical01
Volume in drive C is Windows
Volume Serial Number is 4260-A570
28/06/2020  01:49 PM             129 cli.html
28/06/2020  01:55 PM            452 cli2.txt
28/06/2020  02:04 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 11: Piping in CLI.

Q: What was implicated after execution of the command line as shown in Figure 11?

#### 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”.



The image shows a Command Prompt window titled 'Command Prompt' with the command 'C:\Users\looyi\Desktop\Practical01>dir C:\Windows | more' entered. The output shows the directory listing for 'C:\Windows', including subdirectories like 'addins', 'appcompat', 'apppatch', 'AppReadiness', 'assembly', 'bcastdvr', and files like 'bfsvc.exe', 'Boot', 'Branding', and 'CbsTemp'. The output is paginated, with a '-- More --' prompt at the bottom.

```
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 bfsvc.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 12: Piping “more” to “dir” in CLI.

Q: What was implicated after execution of the command line as shown in Figure 12?

### Batch Files.

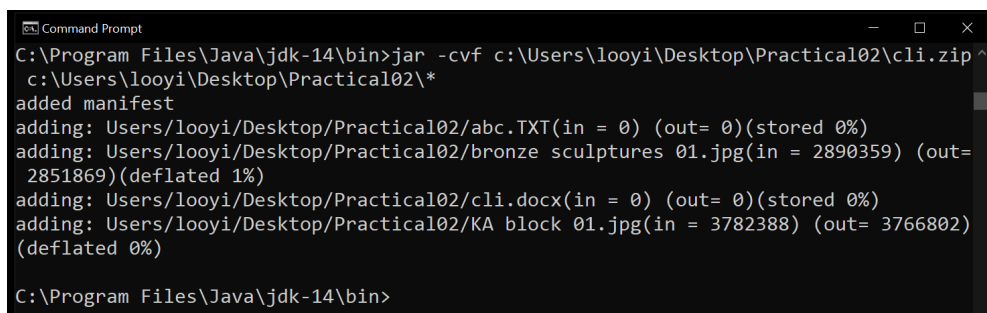
Submission of a software project / assignment by email usually use a common way of zipping up all files and send or upload to an email address or a cloud storage. Normally one would use a program such as WinZip for this task. We all know what are the steps; click on the WinZip icon. Click, click, click,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



```

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 13: Create a zip file.

**Q: What was implicated in Figure 13?**

#### 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 14.

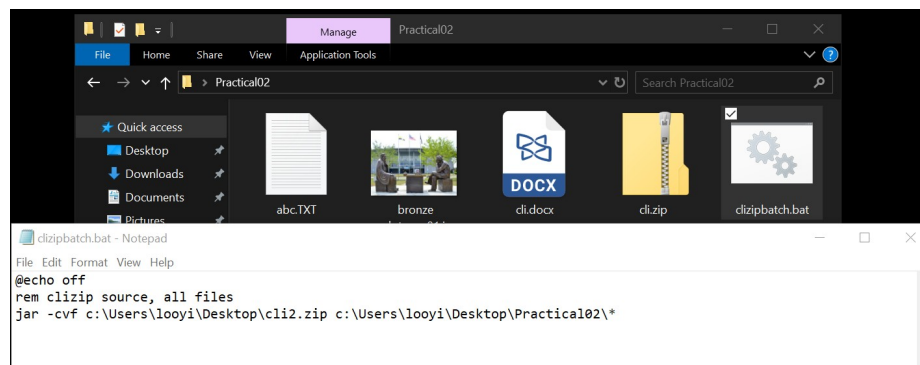
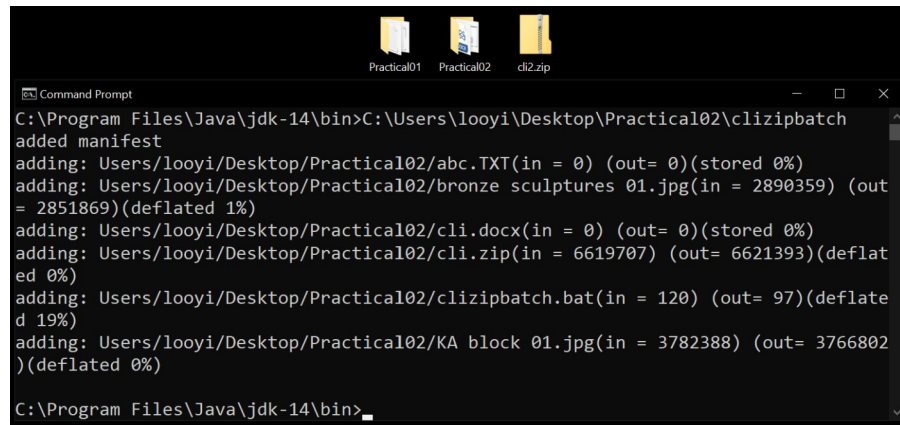


Figure 14: Create a batch file for zip function.

Now launch clizipbatch.bat file in the CLI as shown in Figure 15.



```

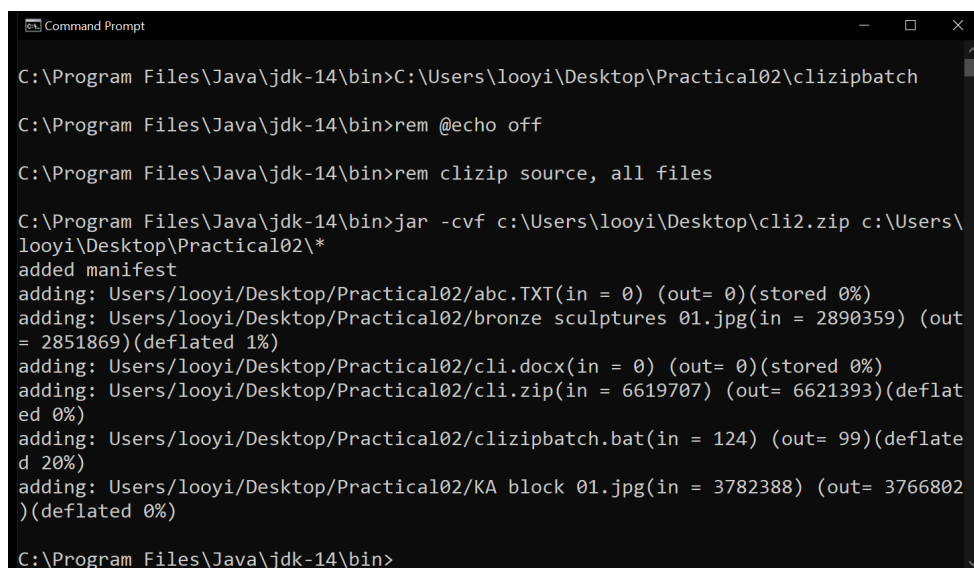
C:\Program Files\Java\jdk-14\bin>C:\Users\looyi\Desktop\Practical02\clizipbatch
added manifest
adding: Users/looyi/Desktop/Practical02/abc.TXT(in = 0) (out= 0)(stored 0%)
adding: Users/looyi/Desktop/Practical02/bronze sculptures 01.jpg(in = 2890359) (out
= 2851869)(deflated 1%)
adding: Users/looyi/Desktop/Practical02/cli.docx(in = 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 15: Run clizipbatch.bat in CLI.

**Q: What was implicated in Figure 15?**

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 16.



```

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 16: Run edited clizipbatch.bat in CLI.

**Q: What was implicated in Figure 16?**

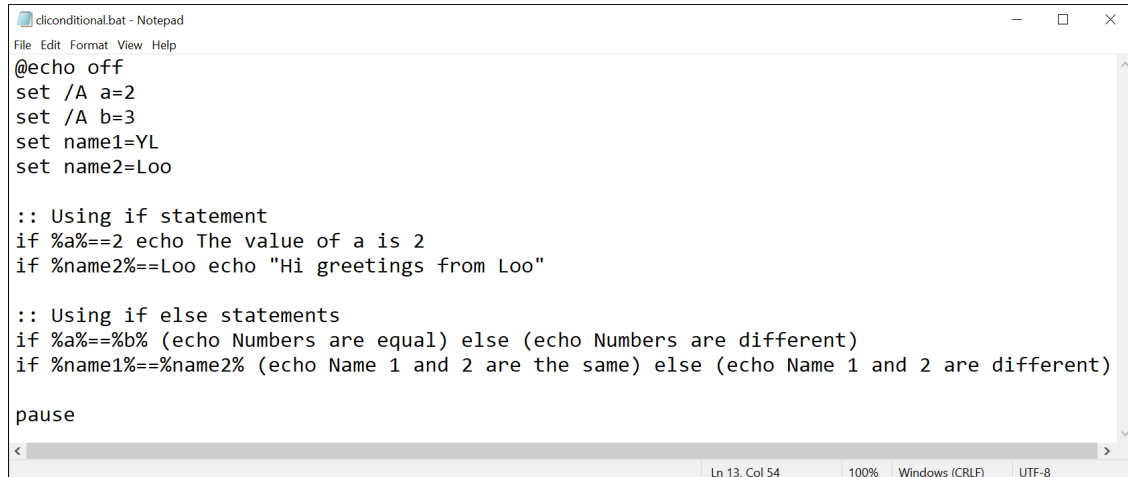


### Simple Programming.

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 17 in Practical01 folder. Execute the batch file in CLI.



```
clconditional.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
```

Figure 17: Create a batch file that contains conditional statements.

Q: What was implicated after executing batch file of Figure 17? 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 18 in Practical01 folder. Then execute the batch file in CLI.



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

pause
```

Figure 18: Create a batch file that contains loop/repeating statements.

Q: What was implicated after executing batch file of Figure 18? How to loop through directories instead of files?