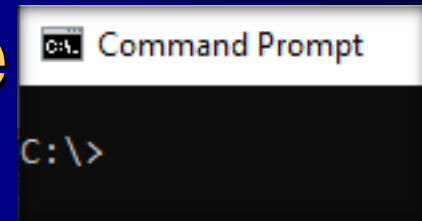


Take control of your Windows PC ... from the



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Learn how to use the Command Prompt in Windows 10 to: generate flat and hierarchical file and directory listings; copy, move, and remove files; find specific character sequences in text files; recall and edit previous commands; direct outputs of commands into files; automate reuse of commands through short scripts; and more.

This workshop was “inspired by” *Library Carpentry: The UNIX Shell* (<https://librarycarpentry.org/lc-shell/>).

Four decades ago...

- “MS-DOS was the main operating system for IBM PC compatible personal computers during the 1980s... Initial release August 12, 1981” (from <https://en.wikipedia.org/wiki/MS-DOS>)

Microsoft moves from New Mexico to Bellevue on January 1, 1979.

By Nick Rouso | Posted 12/30/2020 | HistoryLink.org Essay 21161

This essay made possible by:
King County



Paul Allen and Bill Gates, Lakeside School, Seattle, 1970

On January 1, 1979, after nearly four years in Albuquerque, New Mexico, Bill Gates (b. 1955) and Paul Allen (1953-2018) move their fledgling computer-software company to Bellevue. The move returns the Lakeside School graduates to their native Seattle area and triggers a success story of staggering proportions. With fewer than 15 employees, Microsoft leases offices in the Old Bank Building in downtown Bellevue. The following year, it will move to an office park near Highway 520. By 1987 Microsoft will be housed in its new Redmond campus, with more than 1,800 employees and \$345 million in annual sales.

Dawn of the Personal Computer

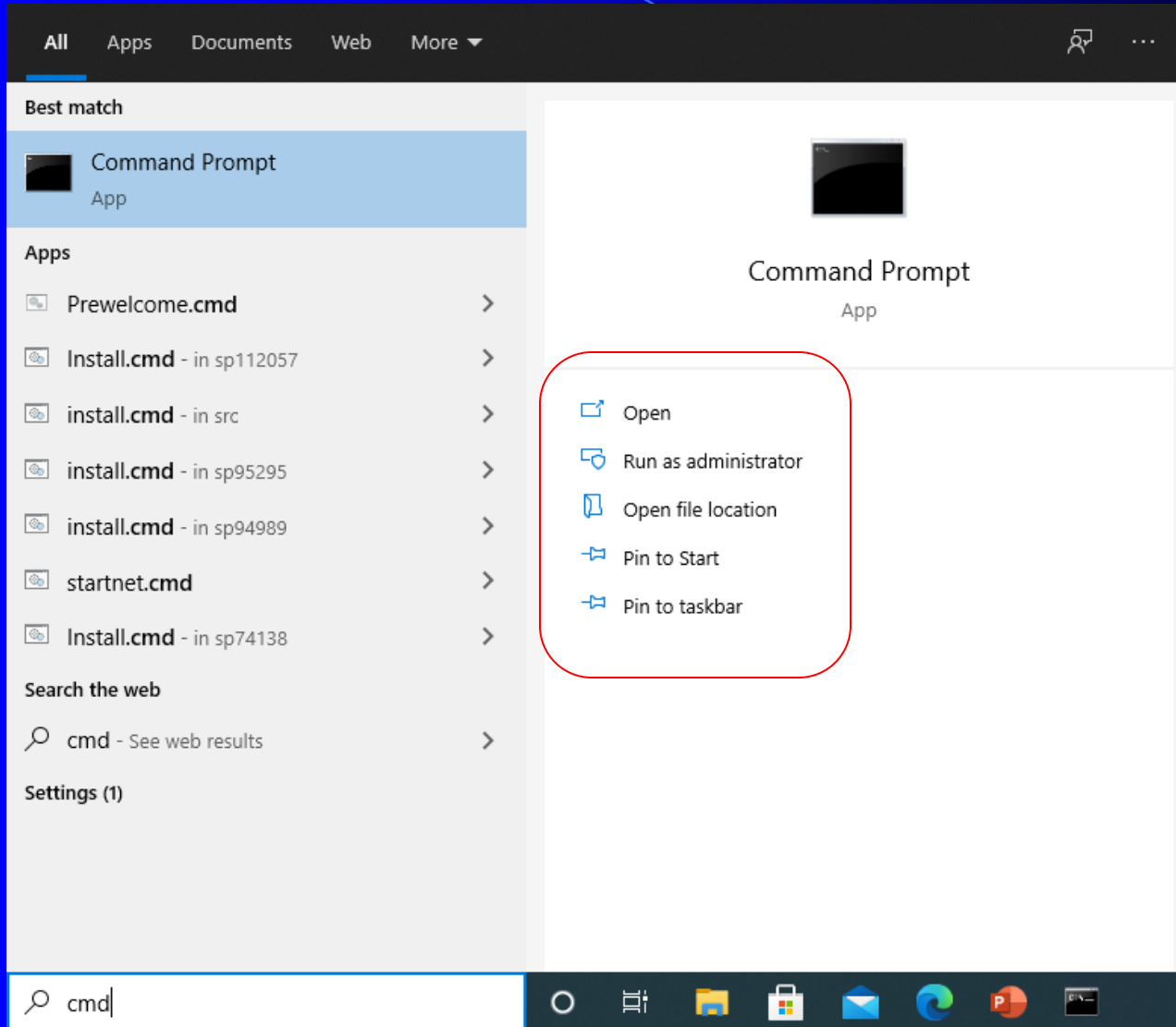
Before it became a juggernaut in **Redmond**, Microsoft consisted of a handful of college-aged computer zealots trying to harness the coming computer revolution from a strip mall in a dusty patch of New Mexico. Their saga began in 1975 with the first personal computer -- the Altair 8800, developed by Micro Instrumentation and Telemetry Systems (MITS) of Albuquerque.

- Source: <https://www.historylink.org/File/21161>

Some Windows command prompt essentials

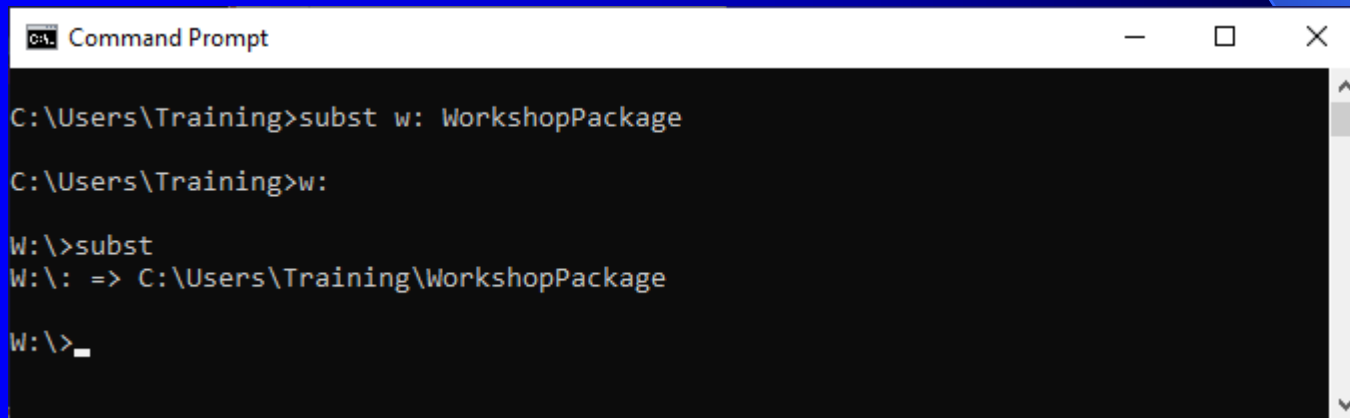
- “Directory” is synonymous with “folder” in Windows
- Windows *commands* are *NOT* case-sensitive
 - E.g.: CLS and clS and cLS all work, but convention is to show them uppercase
 - But watch for case-sensitivity elsewhere – see FIND command later
- You can quickly *recall* previously typed commands with the *up-arrow* key and then edit them – can save a lot of typing!
 - *Down-arrow* key moves forward through the history of issued commands after up-arrow
- The *tab* key auto-completes the names of existing directories or files – can save a lot of typing, too!

Getting to the Windows Command Prompt



In preparation for this workshop

- A handy command ... so we're all on seeing the same drive
 - If your PC *already* has a W: drive, choose a different unused drive letter



```
Command Prompt

C:\Users\Training>subst w: WorkshopPackage

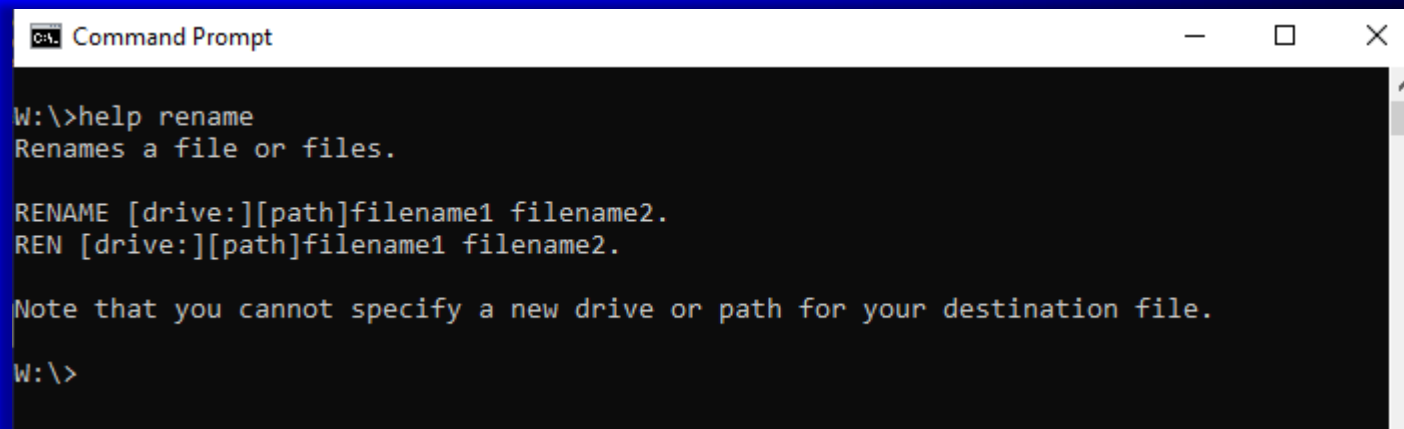
C:\Users\Training>w:

W:\>subst
W:\: => C:\Users\Training\WorkshopPackage

W:\>_
```

Windows command: HELP

- By itself, displays *all* available Windows prompt commands
- Followed by *another* command, describes *that* command and its parameters (possible options):



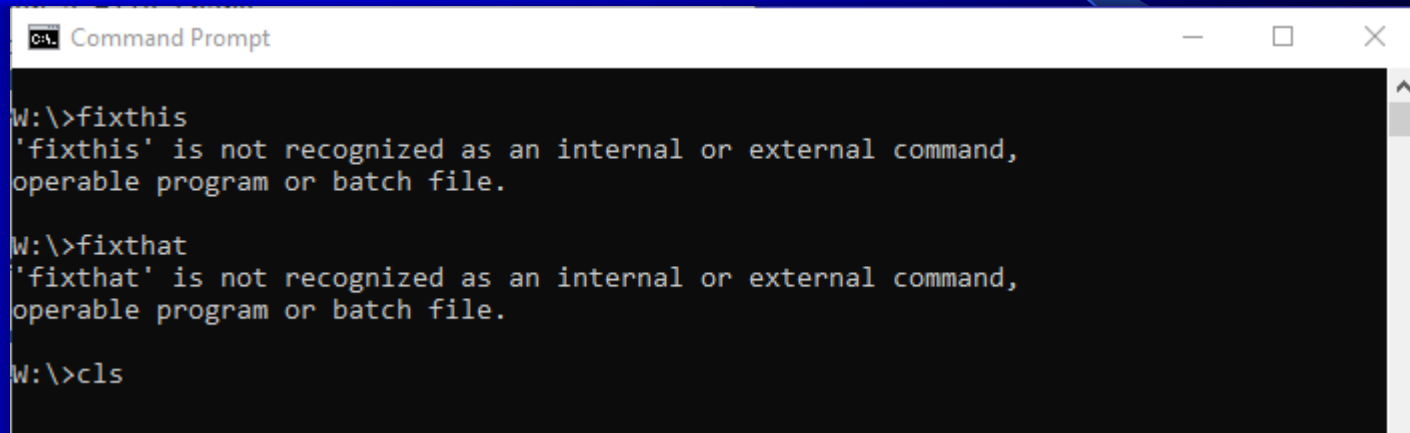
```
Command Prompt
W:\>help rename
Renames a file or files.

RENAME [drive:][path]filename1 filename2.
REN [drive:][path]filename1 filename2.

Note that you cannot specify a new drive or path for your destination file.
W:\>
```

Windows command: CLS

- Clears the Screen = command prompt is back at the top of the window



```
Command Prompt
W:\>fixthis
'fixthis' is not recognized as an internal or external command,
operable program or batch file.

W:\>fixthat
'fixthat' is not recognized as an internal or external command,
operable program or batch file.

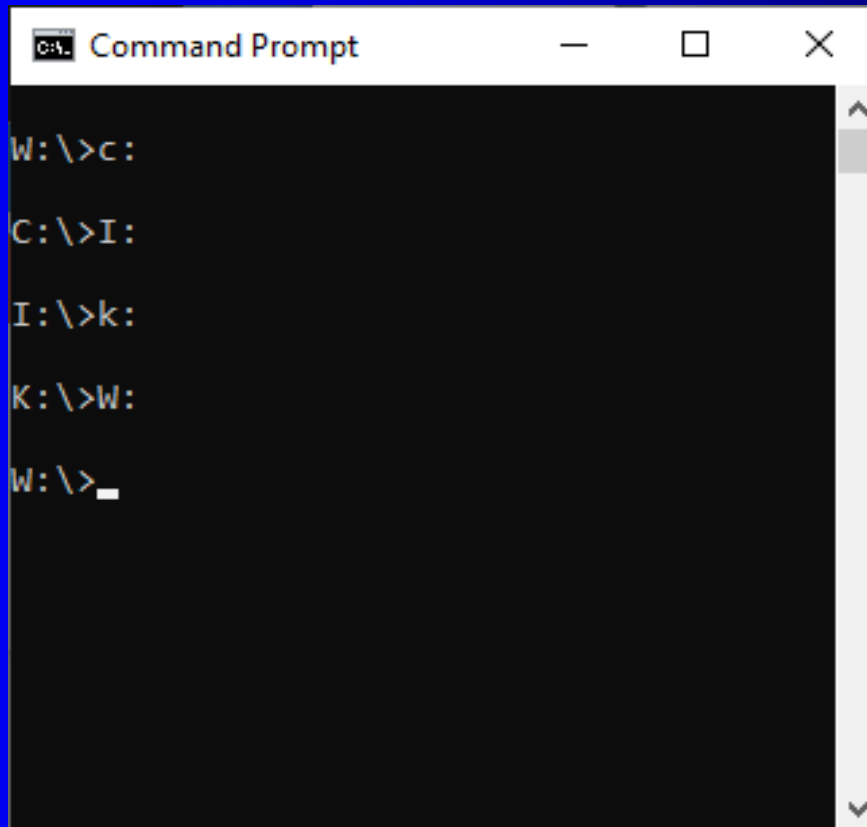
W:\>cls
```



```
Command Prompt
W:\>
```

Navigating between drives

- Simply enter the letter of an existing drive followed by colon:



A screenshot of a Windows Command Prompt window titled "Command Prompt". The window has a black background with white text. The text shows a sequence of drive changes: "W:\>c:", "C:\>I:", "I:\>k:", "K:\>W:", and "W:\>_". The cursor is at the end of the last line. The window has standard Windows window controls (minimize, maximize, close) in the title bar.

```
W:\>c:
C:\>I:
I:\>k:
K:\>W:
W:\>_
```

Windows command: CD (or CHDIR)

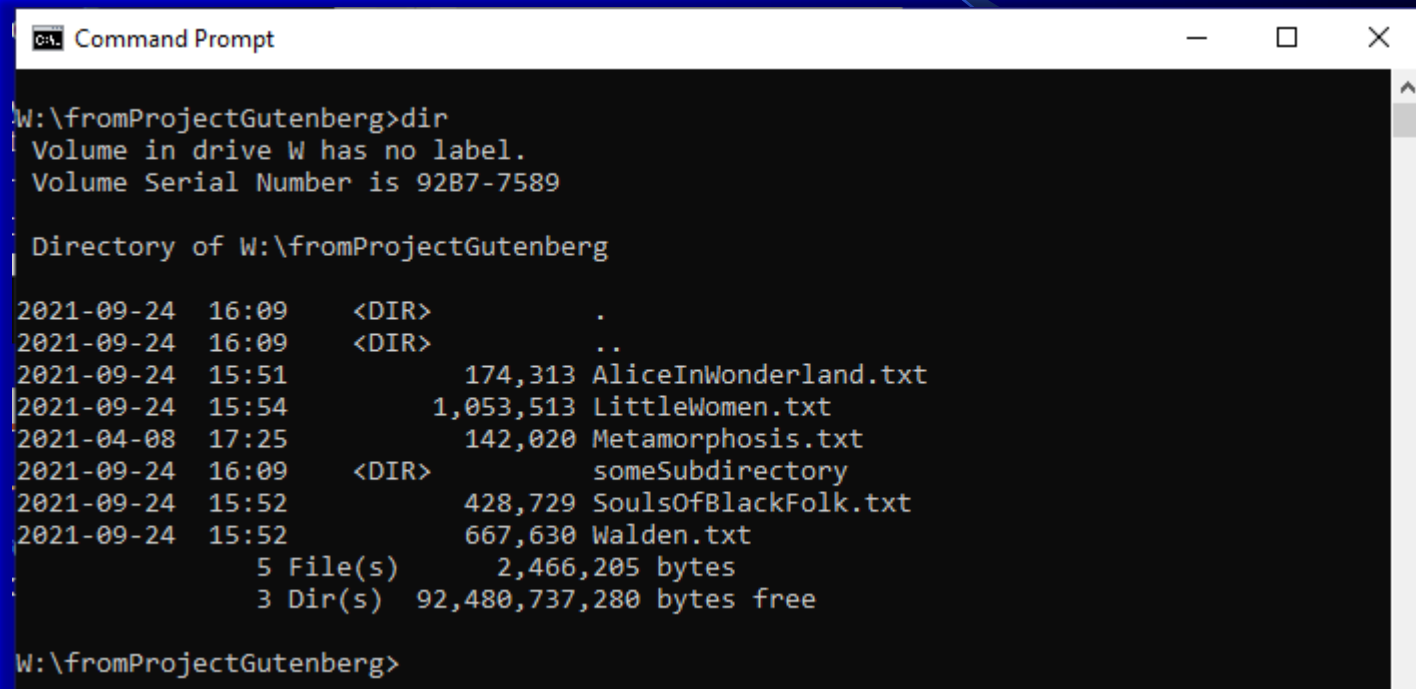
- By itself, displays the currently active directory (= folder)
 - which is usually displayed in the command prompt anyway, so not that useful
- *Followed* by a directory name, changes active directory to that:



```
Command Prompt
W:\>cd practice
W:\practice>_
```

Windows command: DIR

- By itself, displays the contents of the currently active directory:



```
Command Prompt
W:\fromProjectGutenberg>dir
Volume in drive W has no label.
Volume Serial Number is 92B7-7589

Directory of W:\fromProjectGutenberg

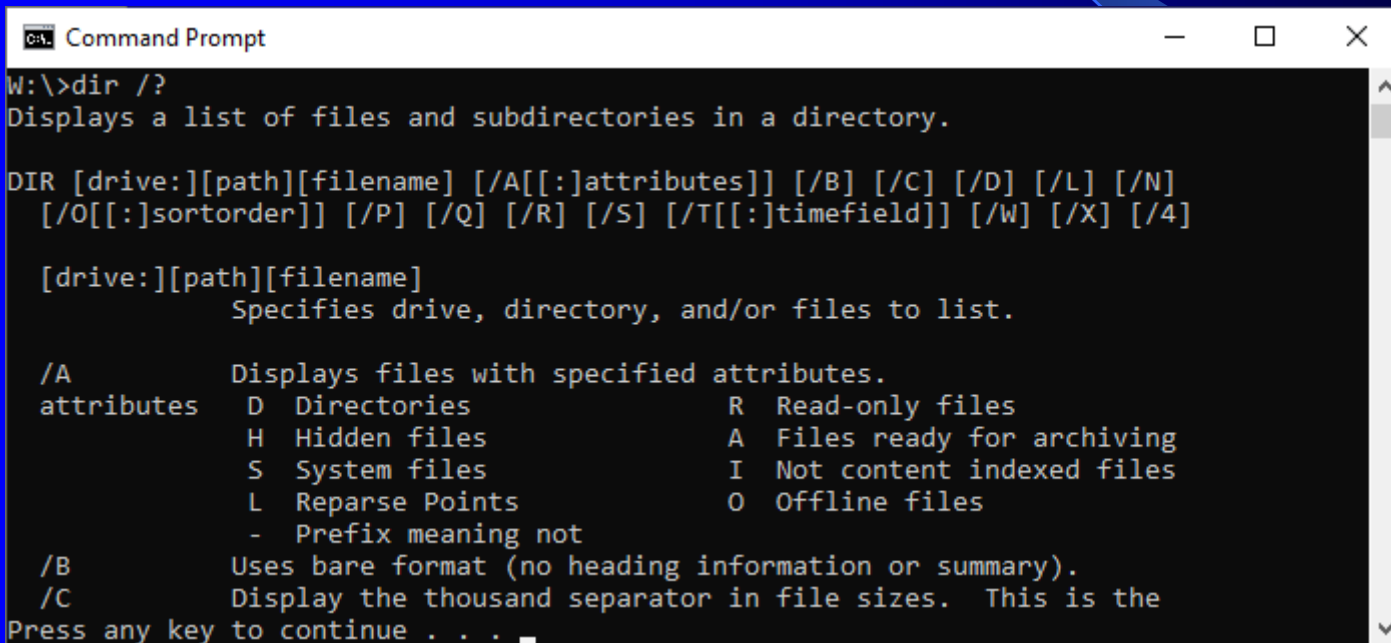
2021-09-24  16:09    <DIR>          .
2021-09-24  16:09    <DIR>          ..
2021-09-24  15:51             174,313 AliceInWonderland.txt
2021-09-24  15:54           1,053,513 LittleWomen.txt
2021-04-08  17:25           142,020 Metamorphosis.txt
2021-09-24  16:09    <DIR>          someSubdirectory
2021-09-24  15:52           428,729 SoulsOfBlackFolk.txt
2021-09-24  15:52           667,630 Walden.txt
               5 File(s)          2,466,205 bytes
               3 Dir(s)  92,480,737,280 bytes free

W:\fromProjectGutenberg>
```

- Note that files' date, size, and name are shown; also size totals and some directories
- The . directory is the current one, the .. directory is one level up (= "parent directory")

Another way (aside from HELP) to see a command's parameters

- Enter any command followed by / ?



```
Command Prompt
W:\>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.

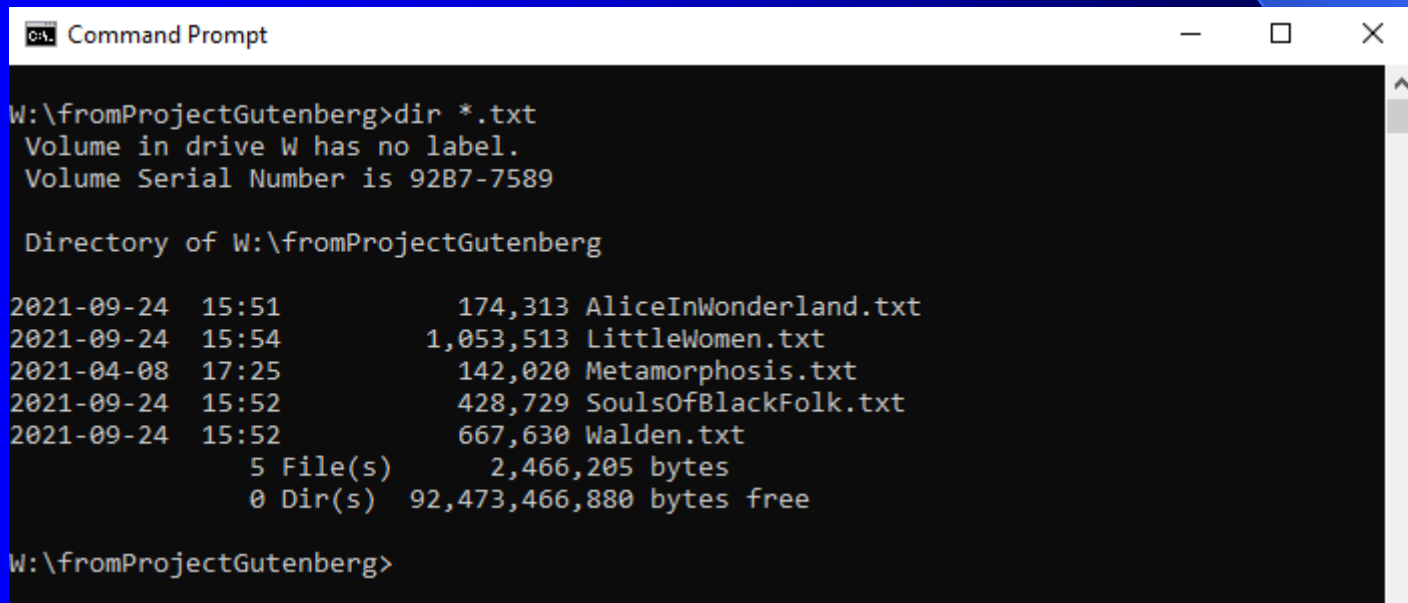
  /A      Displays files with specified attributes.
attributes  D Directories                R Read-only files
              H Hidden files              A Files ready for archiving
              S System files              I Not content indexed files
              L Reparse Points            O Offline files
              - Prefix meaning not

  /B      Uses bare format (no heading information or summary).
  /C      Display the thousand separator in file sizes. This is the
Press any key to continue . . .
```

- Note “press any key to continue” when output does not fit on screen

Let's go wild: file name *wildcards* in Windows commands

- * (= asterisk) matches *any sequence of characters* before or after the . separator of filename and extension – example of *before*:



```
Command Prompt
W:\fromProjectGutenberg>dir *.txt
Volume in drive W has no label.
Volume Serial Number is 92B7-7589

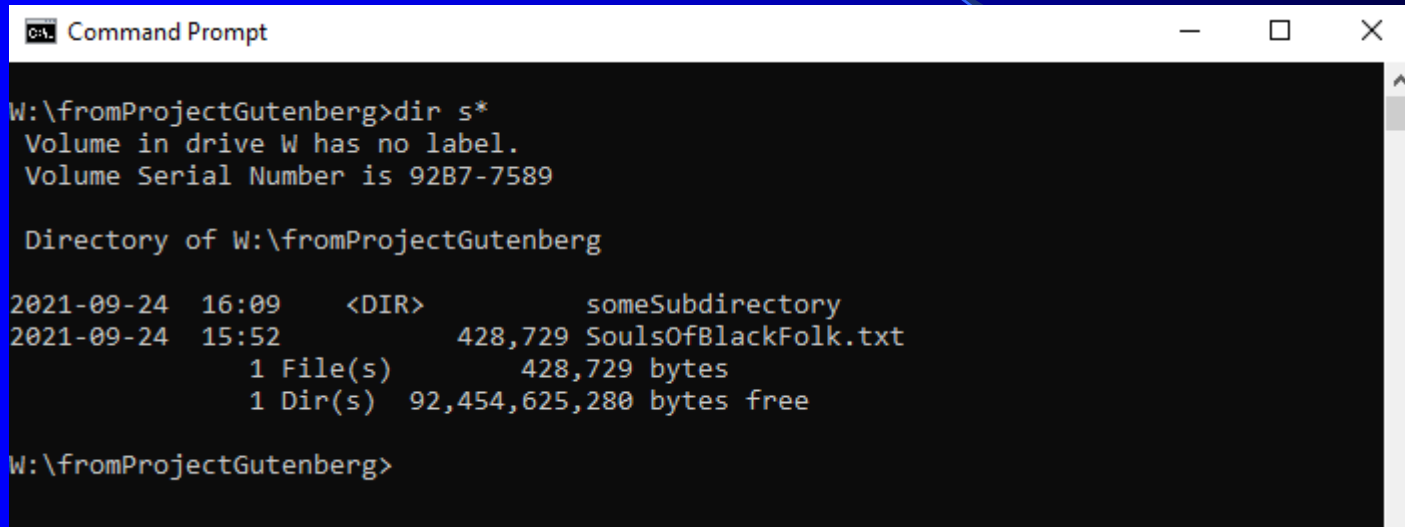
Directory of W:\fromProjectGutenberg

2021-09-24  15:51           174,313 AliceInWonderland.txt
2021-09-24  15:54       1,053,513 LittleWomen.txt
2021-04-08  17:25        142,020 Metamorphosis.txt
2021-09-24  15:52        428,729 SoulsOfBlackFolk.txt
2021-09-24  15:52        667,630 Walden.txt
               5 File(s)      2,466,205 bytes
               0 Dir(s)  92,473,466,880 bytes free

W:\fromProjectGutenberg>
```

Let's go wild: *wildcards* for filenames

- * (= asterisk) can also be used *after* one or more characters:



```
Command Prompt

W:\fromProjectGutenberg>dir s*
Volume in drive W has no label.
Volume Serial Number is 92B7-7589

Directory of W:\fromProjectGutenberg

2021-09-24  16:09    <DIR>          someSubdirectory
2021-09-24  15:52             428,729 SoulsOfBlackFolk.txt
               1 File(s)          428,729 bytes
               1 Dir(s)  92,454,625,280 bytes free

W:\fromProjectGutenberg>
```

- ? (question mark) matches exactly *one* character in a filename

Many Windows commands have *switches*

- “Switches” follow a command separated by / (forward slash)
- A useful example: show *all* files with extension .tsv (tab-separated values) or .csv (comma-separated values), and possibly others, in *entire* C: drive:



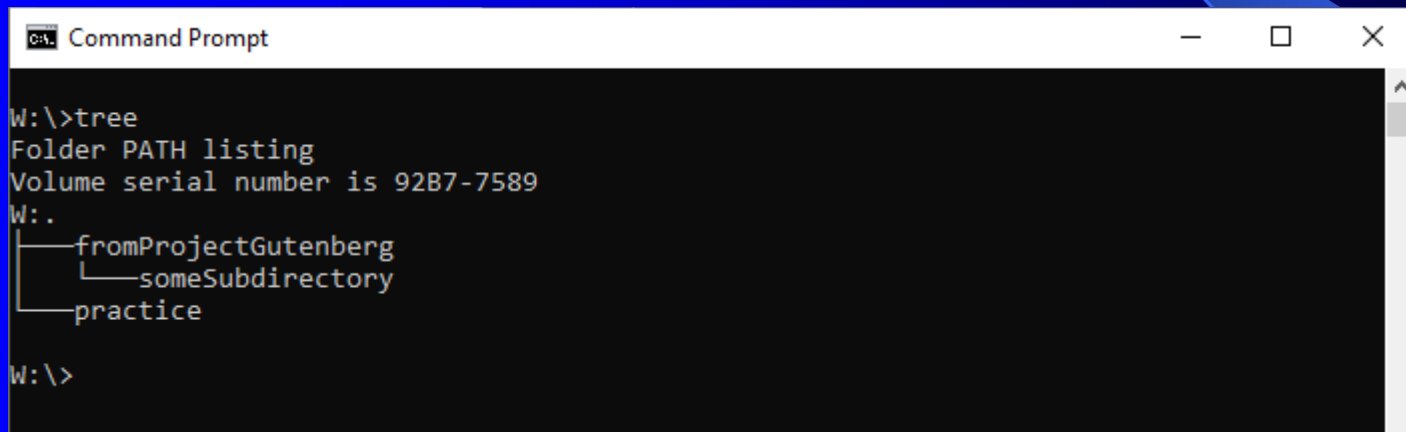
```
C:\>dir /s *.*?sv
```

- The /s switch of the DIR command “Displays files in specified directory and all subdirectories.”
- The wildcard ? Matches a single character
- this will very likely generate output too long to read – more on what to do about that shortly! Ctrl-C interrupts long output.

Many Windows commands have *switches*

- Another example:

TREE shows hierarchy of directories - and optionally files in them. By itself, only directories:

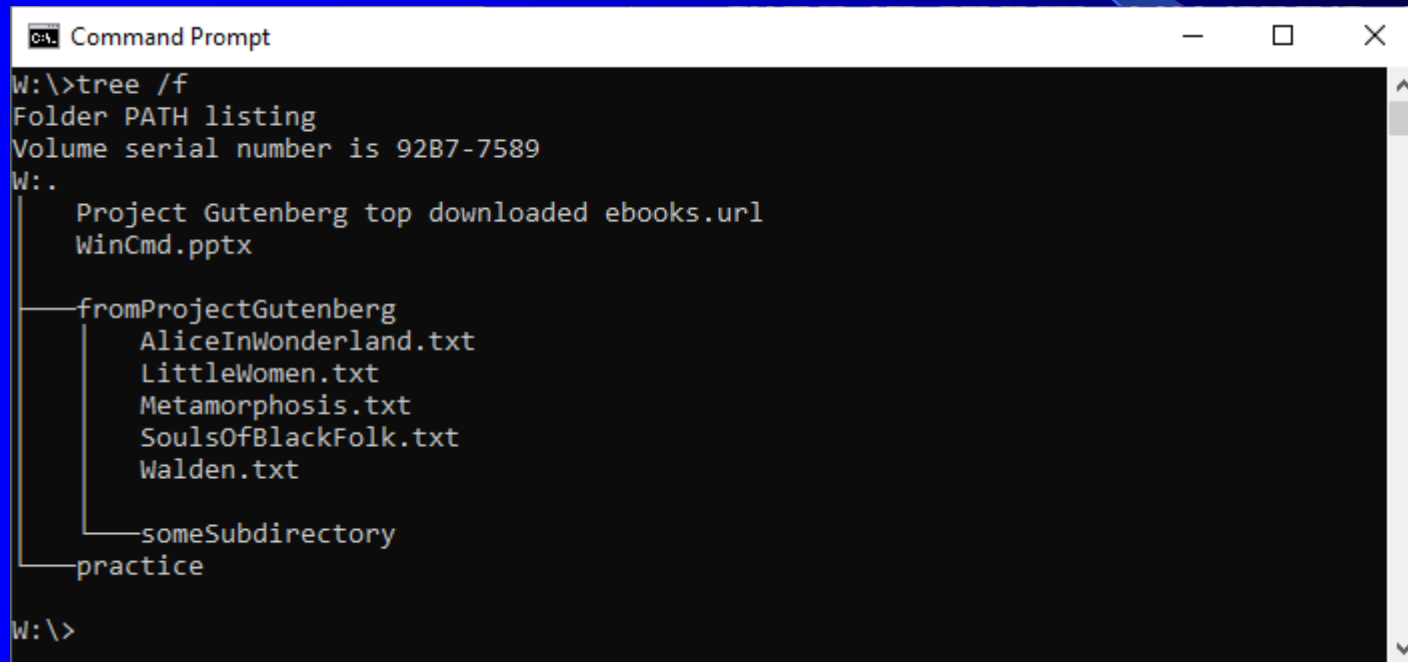


```
Command Prompt
W:\>tree
Folder PATH listing
Volume serial number is 92B7-7589
W:.
|
|---fromProjectGutenberg
|    |---someSubdirectory
|---practice
W:\>
```

- But ...

Many Windows commands have *switches*

- ... with the switch `/F` after it, `TREE` also shows the files in the directories:



```
Command Prompt
W:\>tree /f
Folder PATH listing
Volume serial number is 92B7-7589
W:.
|   Project Gutenberg top downloaded ebooks.url
|   WinCmd.pptx
|
|   --fromProjectGutenberg--
|       AliceInWonderland.txt
|       LittleWomen.txt
|       Metamorphosis.txt
|       SoulsOfBlackFolk.txt
|       Walden.txt
|
|   --someSubdirectory--
|
|   --practice--
W:\>
```

- Together with `/A` this can become useful for *generating text files containing* such listings – as we will see shortly

Directing command output into a file

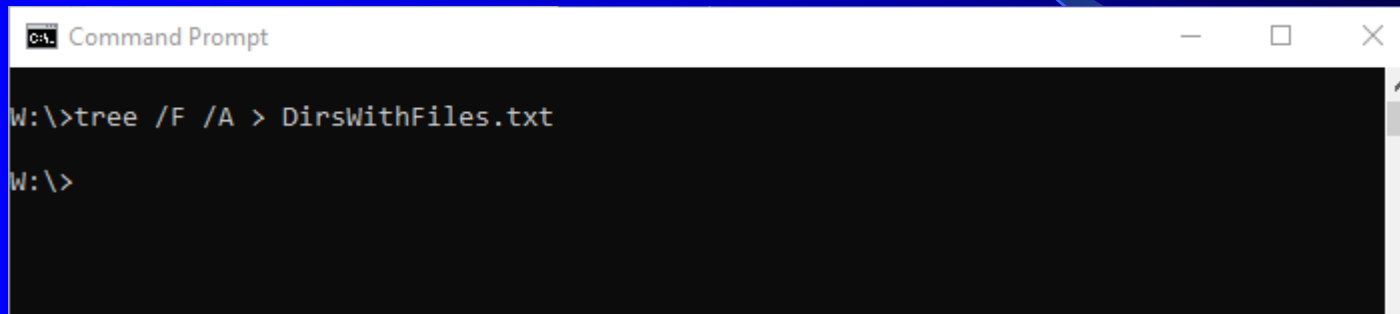
- > (greater than) after a command *directs its output into a file* you specify rather than displaying it on the screen
 - **Careful**: if that file already exists, it will be *overwritten*! Check first if in doubt.
- Example 1: make a file containing output of HELP:



```
Command Prompt
W:\>help > theCommands.txt
W:\>
```

Directing command output into a file

- Example 2: make a text file containing hierarchy of directories with files:

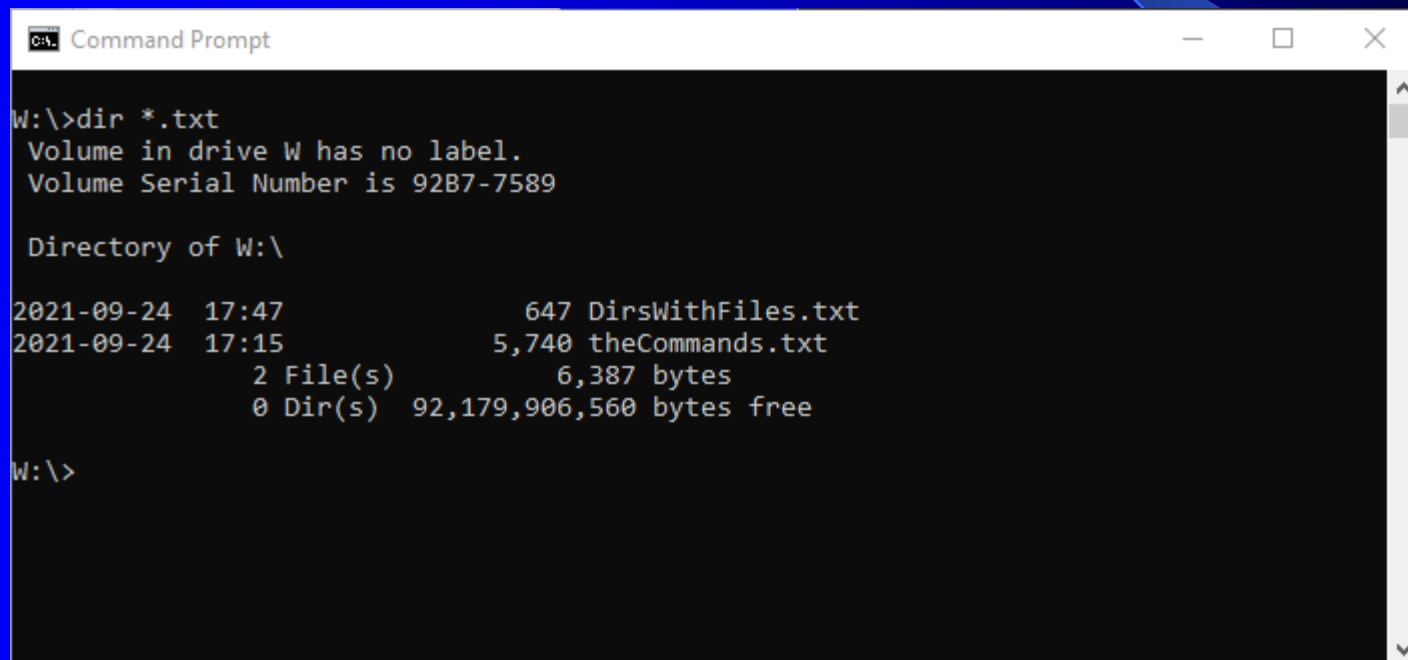


```
Command Prompt
W:\>tree /F /A > DirsWithFiles.txt
W:\>
```

- The /A switch replaces the graphical lines with characters suitable for a text file

Are the two generated files really there?

- Let's check:



```
Command Prompt
W:\>dir *.txt
Volume in drive W has no label.
Volume Serial Number is 92B7-7589

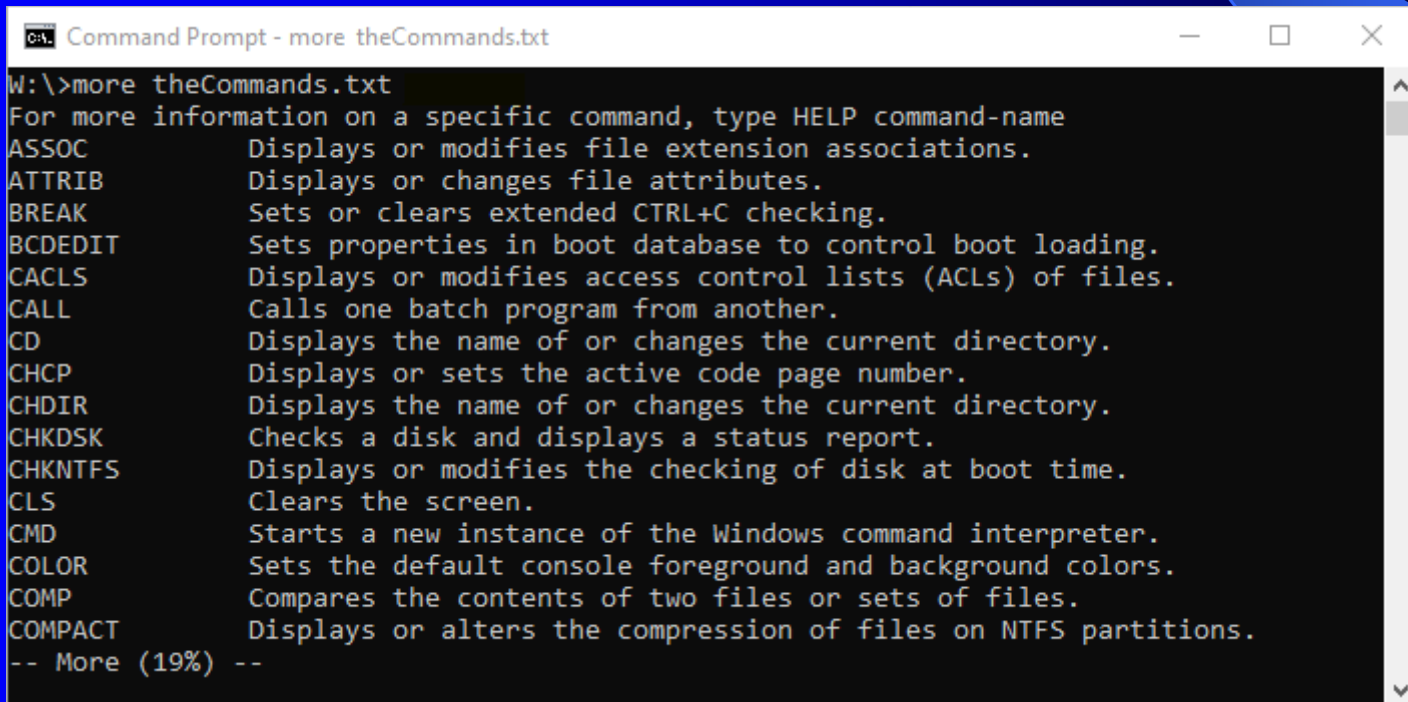
Directory of W:\

2021-09-24  17:47                647 DirsWithFiles.txt
2021-09-24  17:15            5,740 theCommands.txt
                2 File(s)          6,387 bytes
                0 Dir(s)  92,179,906,560 bytes free

W:\>
```

Displaying long text files one screenful at a time with MORE

- TYPE displays *an entire text file* – which may well be (way) too long to fit into the command prompt window
- MORE displays a text file *one screen at a time* – press spacebar to continue reading, Ctrl-C to return to the command prompt



```
W:\>more theCommands.txt
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.
-- More (19%) --
```

Viewing/editing text files with Notepad from the command prompt

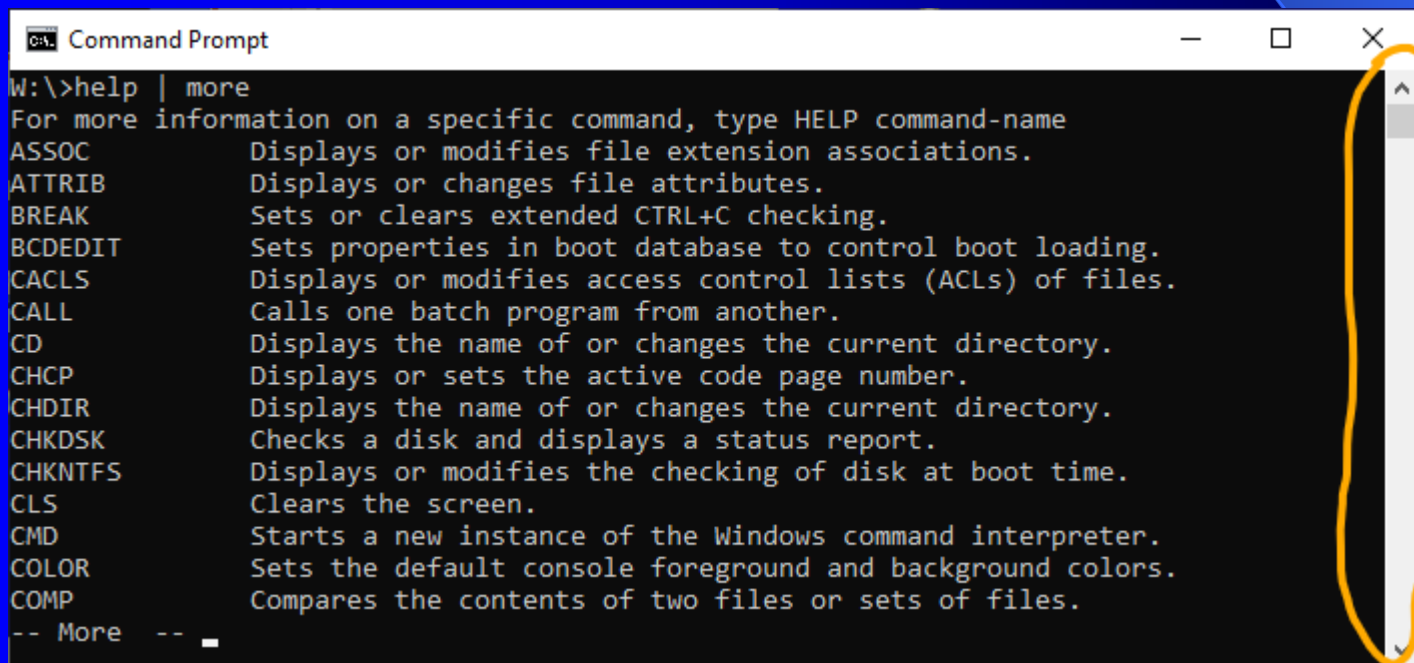
- An alternative to opening a text file from Windows Explorer:



```
Command Prompt
W:\>notepad DirsWithFiles.txt
W:\>notepad theCommands.txt
W:\>_
```

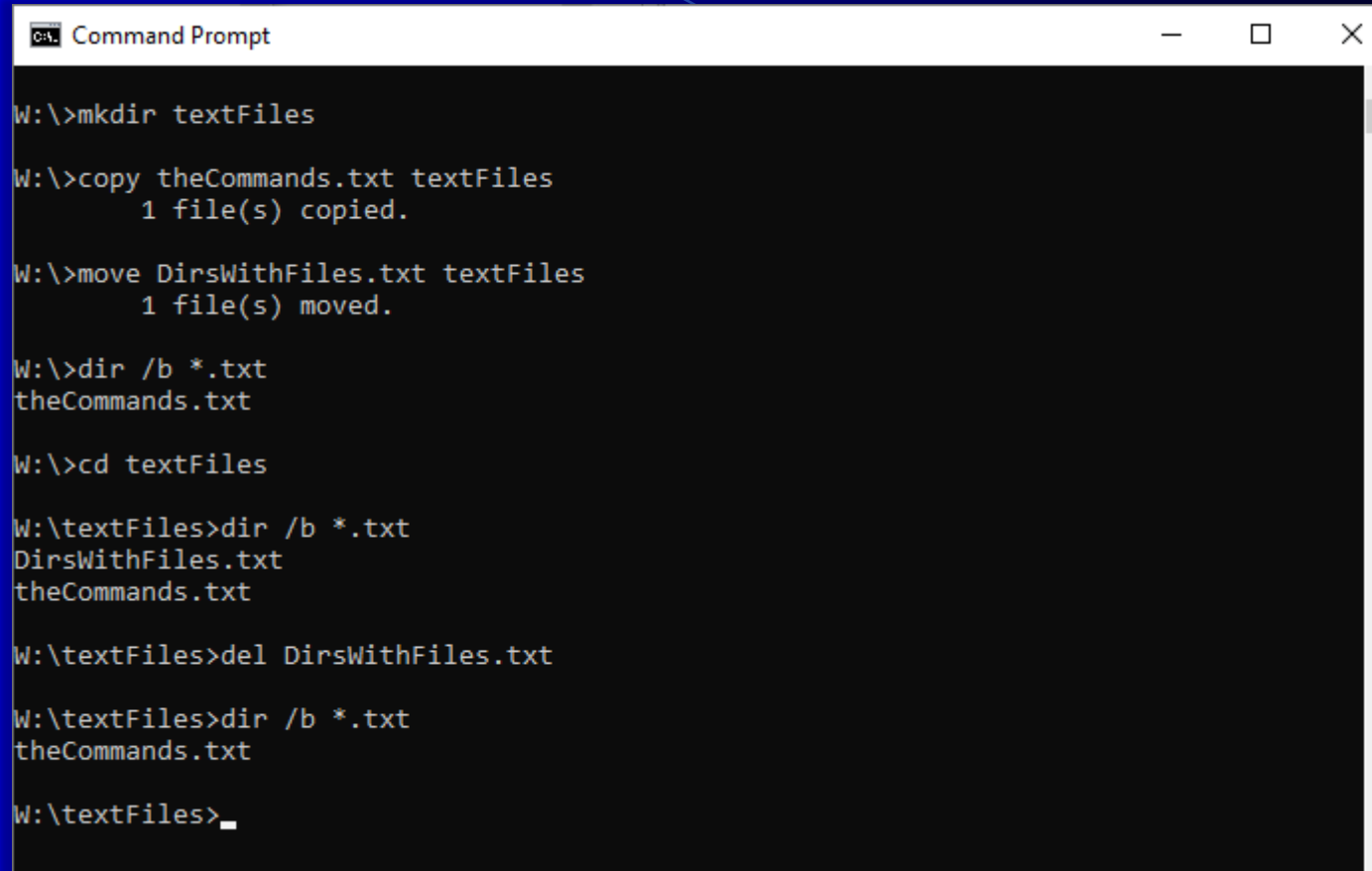
Pausing long command outputs with | MORE

- Some commands produce outputs so long they just scroll by – example: HELP (by itself)
- You can use the | (vertical bar) symbol to “pipe” the output into the MORE command:



```
W:\>help | more
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.
-- More --
```

Create a new directory, copy one and move another file into it, then delete one file from it



```
W:\>mkdir textFiles

W:\>copy theCommands.txt textFiles
        1 file(s) copied.

W:\>move DirsWithFiles.txt textFiles
        1 file(s) moved.

W:\>dir /b *.txt
theCommands.txt

W:\>cd textFiles

W:\textFiles>dir /b *.txt
DirsWithFiles.txt
theCommands.txt

W:\textFiles>del DirsWithFiles.txt

W:\textFiles>dir /b *.txt
theCommands.txt

W:\textFiles>_
```

- The DIR switch /b “Uses bare format (no heading information or summary)”
- Caution: when you DELETE a file, it’s *really gone* – not into a recycling bin!

Go up to parent directory, rename directory just created, check what file(s) are in it, rename a file in it, check again

```
Command Prompt

W:\TextFiles>cd ..

W:\>ren TextFiles myTextfiles

W:\>dir myTextfiles
Volume in drive W has no label.
Volume Serial Number is 92B7-7589

Directory of W:\myTextfiles

2021-09-27  16:07    <DIR>          .
2021-09-27  16:07    <DIR>          ..
2021-09-24  17:15                5,740 theCommands.txt
               1 File(s)                5,740 bytes
               2 Dir(s)  92,204,748,800 bytes free

W:\>ren myTextfiles\theCommands.txt WinCommands.txt

W:\>dir /b myTextfiles
WinCommands.txt

W:\>
```

FINDing strings of text in text file(s)

```
C:\> Command Prompt
W:\fromProjectGutenberg>find author: *.txt
FIND: Parameter format not correct

W:\fromProjectGutenberg>find "author:" *.txt

----- ALICEINWONDERLAND.TXT
----- LITTLEWOMEN.TXT
----- METAMORPHOSIS.TXT
----- SOULSOFBBLACKFOLK.TXT
----- WALDEN.TXT

W:\fromProjectGutenberg>find /i "author:" *.txt

----- ALICEINWONDERLAND.TXT
Author: Lewis Carroll

----- LITTLEWOMEN.TXT
Author: Louisa May Alcott

----- METAMORPHOSIS.TXT
Author: Franz Kafka

----- SOULSOFBBLACKFOLK.TXT
Author: W. E. B. Du Bois

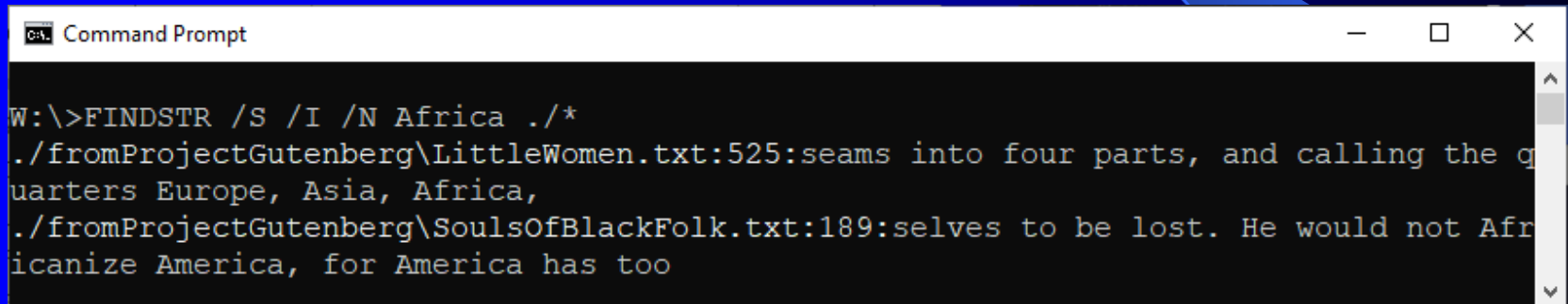
----- WALDEN.TXT
Author: Henry David Thoreau

W:\fromProjectGutenberg>
```

- Enclose text to find in quotes
- Use /I switch to avoid case-sensitivity in the search for text strings

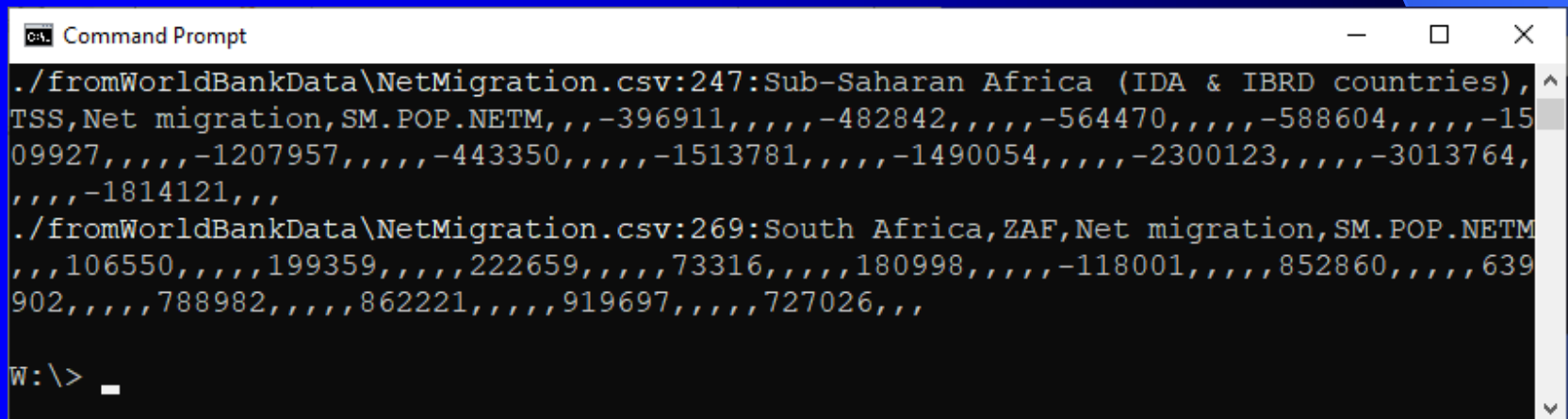
More options than FIND: FINDSTR

- As FINDSTR /? shows, it has far more options than FIND – useful for more complex searches
 - In particular, FINDSTR can search in subdirectories and has more options for where to match the given text string in files
 - Example: search for “Africa” in all files in current directory and its subdirectories, case-insensitive, showing the matching line number in each file:



```
W:\>FINDSTR /S /I /N Africa *.*
./fromProjectGutenberg\LittleWomen.txt:525:seams into four parts, and calling the q
quarters Europe, Asia, Africa,
./fromProjectGutenberg\SoulsOfBlackFolk.txt:189:selves to be lost. He would not Afr
icanize America, for America has too
```

....



```
./fromWorldBankData\NetMigration.csv:247:Sub-Saharan Africa (IDA & IBRD countries),
TSS,Net migration,SM.POP.NETM,,,-396911,,,,,-482842,,,,,-564470,,,,,-588604,,,,,-15
09927,,,,,-1207957,,,,,-443350,,,,,-1513781,,,,,-1490054,,,,,-2300123,,,,,-3013764,
,,,,-1814121,,
./fromWorldBankData\NetMigration.csv:269:South Africa,ZAF,Net migration,SM.POP.NETM
,,,106550,,,,,199359,,,,,222659,,,,,73316,,,,,180998,,,,,-118001,,,,,852860,,,,,639
902,,,,,788982,,,,,862221,,,,,919697,,,,,727026,,
W:\>
```

More options than FIND: FINDSTR

- Variation on previous command: search for “Africa” in all .CSV files in current directory and its subdirectories, case-insensitive, showing the matching line number in each file:

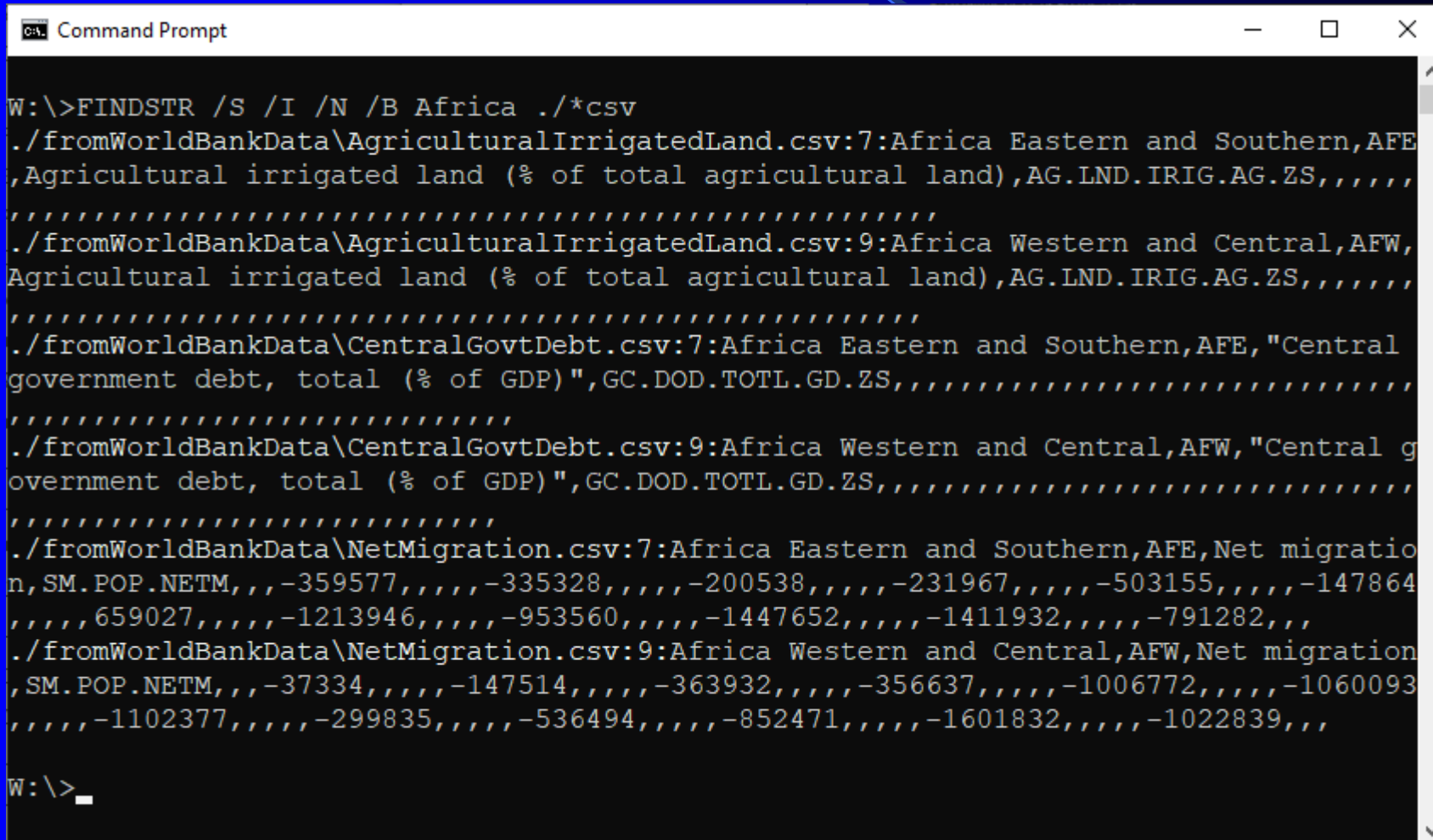
```
Command Prompt
W:\>FINDSTR /S /I /N Africa ./*csv
./fromWorldBankData\AgriculturalIrrigatedLand.csv:7:Africa Eastern and Southern,AFE
,Agricultural irrigated land (% of total agricultural land),AG.LND.IRIG.AG.ZS,,,,,
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
./fromWorldBankData\AgriculturalIrrigatedLand.csv:9:Africa Western and Central,AFW,
Agricultural irrigated land (% of total agricultural land),AG.LND.IRIG.AG.ZS,,,,,
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
./fromWorldBankData\AgriculturalIrrigatedLand.csv:40:Central African Republic,CAF,A
gricultural irrigated land (% of total agricultural land),AG.LND.IRIG.AG.ZS,,,,,
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
./fromWorldBankData\AgriculturalIrrigatedLand.csv:159:Middle East & North Africa,ME
```

....

```
Command Prompt
10,,,,,952361,,,,,104444,,,,,-668599,,,,,-1640863,,,,,-1457748,,,,,-2129142,,,,,-36
46941,,,,,-3144500,,,
./fromWorldBankData\NetMigration.csv:247:Sub-Saharan Africa (IDA & IBRD countries),
TSS,Net migration,SM.POP.NETM,,, -396911,,,,,-482842,,,,,-564470,,,,,-588604,,,,,-15
09927,,,,,-1207957,,,,,-443350,,,,,-1513781,,,,,-1490054,,,,,-2300123,,,,,-3013764,
,,,,-1814121,,,
./fromWorldBankData\NetMigration.csv:269:South Africa,ZAF,Net migration,SM.POP.NETM
,,,106550,,,,,199359,,,,,222659,,,,,73316,,,,,180998,,,,,-118001,,,,,852860,,,,,639
902,,,,,788982,,,,,862221,,,,,919697,,,,,727026,,,
W:\>
```

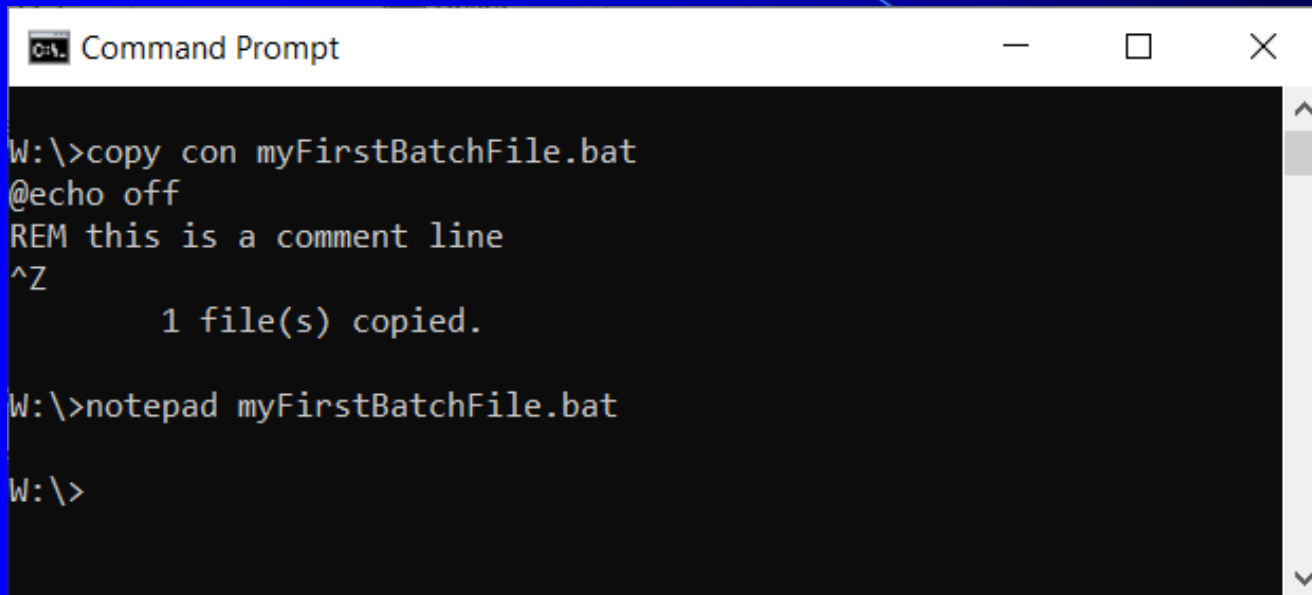
More options than FIND: FINDSTR

- Variation on previous command: search for “Africa” **only at the beginning of a line** (using switch /B) in all .CSV files in current directory and its subdirectories, case-insensitive, showing the matching line number in each file:



```
W:\>FINDSTR /S /I /N /B Africa ./*csv
./fromWorldBankData\AgriculturalIrrigatedLand.csv:7:Africa Eastern and Southern,AFE
,Agricultural irrigated land (% of total agricultural land),AG.LND.IRIG.AG.ZS,,,,,
./fromWorldBankData\AgriculturalIrrigatedLand.csv:9:Africa Western and Central,AFW,
Agricultural irrigated land (% of total agricultural land),AG.LND.IRIG.AG.ZS,,,,,
./fromWorldBankData\CentralGovtDebt.csv:7:Africa Eastern and Southern,AFE,"Central
government debt, total (% of GDP)",GC.DOD.TOTL.GD.ZS,,,,,
./fromWorldBankData\CentralGovtDebt.csv:9:Africa Western and Central,AFW,"Central g
overnment debt, total (% of GDP)",GC.DOD.TOTL.GD.ZS,,,,,
./fromWorldBankData\NetMigration.csv:7:Africa Eastern and Southern,AFE,Net migratio
n,SM.POP.NETM,,,-359577,,,-335328,,,-200538,,,-231967,,,-503155,,,-147864
,,,-659027,,,-1213946,,,-953560,,,-1447652,,,-1411932,,,-791282,,
./fromWorldBankData\NetMigration.csv:9:Africa Western and Central,AFW,Net migration
,SM.POP.NETM,,,-37334,,,-147514,,,-363932,,,-356637,,,-1006772,,,-1060093
,,,-1102377,,,-299835,,,-536494,,,-852471,,,-1601832,,,-1022839,,
W:\>
```

Creating and running commands from batch (.bat) files



The screenshot shows a Windows Command Prompt window titled "Command Prompt". The window has a black background with white text. The text inside the window shows the following commands and output:

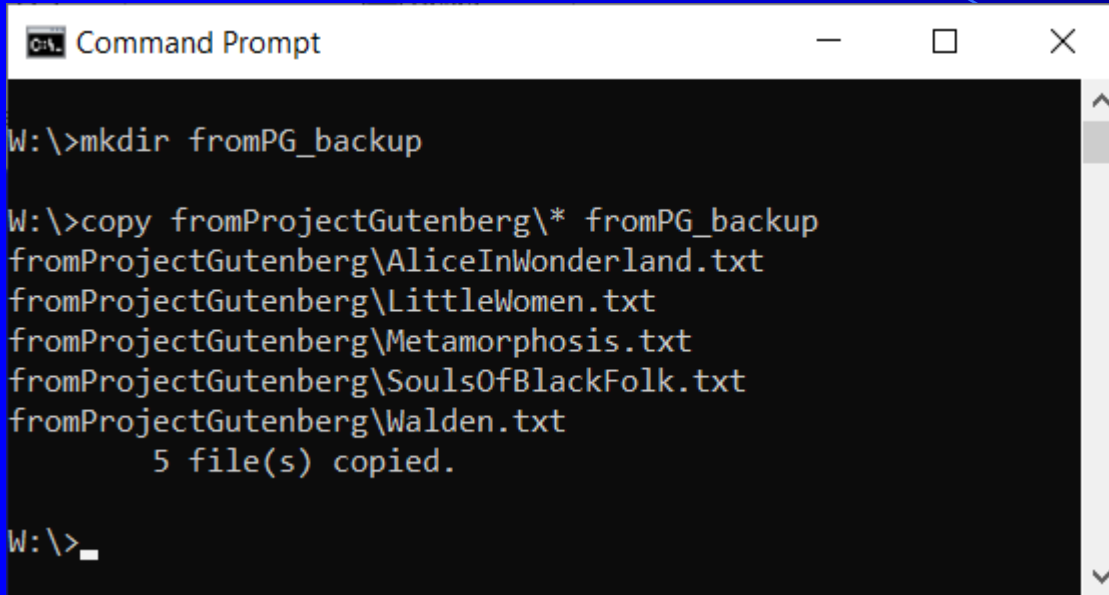
```
W:\>copy con myFirstBatchFile.bat
@echo off
REM this is a comment line
^Z
        1 file(s) copied.

W:\>notepad myFirstBatchFile.bat

W:\>
```

- Copy (input) from the console (command prompt) into named batch file
- @echo off suppresses showing command when batch file is run
- REM creates a line that will not be executed
 - Useful for file documentation – who created it, when, why, ...
- Ctrl-Z ends the input and the file is created

Try a command at the prompt



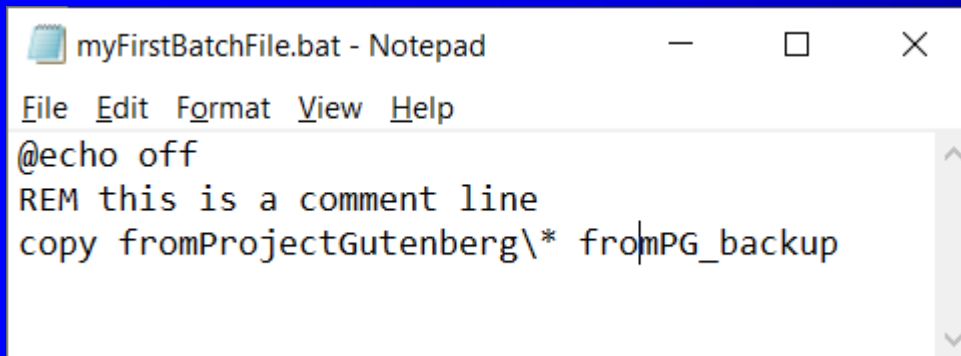
```
W:\>mkdir fromPG_backup

W:\>copy fromProjectGutenberg\* fromPG_backup
fromProjectGutenberg\AliceInWonderland.txt
fromProjectGutenberg\LittleWomen.txt
fromProjectGutenberg\Metamorphosis.txt
fromProjectGutenberg\SoulsOfBlackFolk.txt
fromProjectGutenberg\Walden.txt
        5 file(s) copied.

W:\>_
```

- If satisfactory result, put it into the batch file and save it (Ctrl-S)

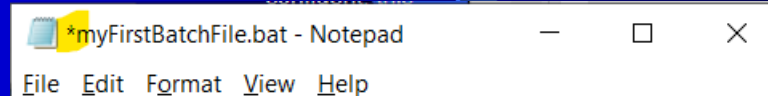
- Once you feel confident, this prior testing may not longer be needed



```
myFirstBatchFile.bat - Notepad
File Edit Format View Help
@echo off
REM this is a comment line
copy fromProjectGutenberg\* fromPG_backup
```

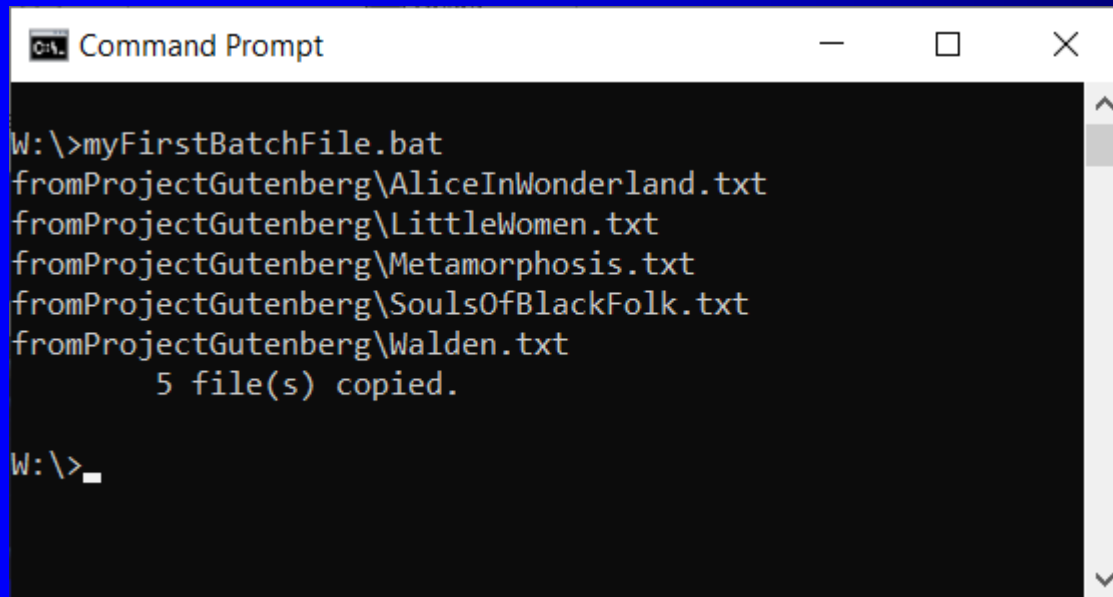
Executing the batch file

- Make sure the file is saved = NOT showing * next to filename:



You may leave it open in Notepad for further editing

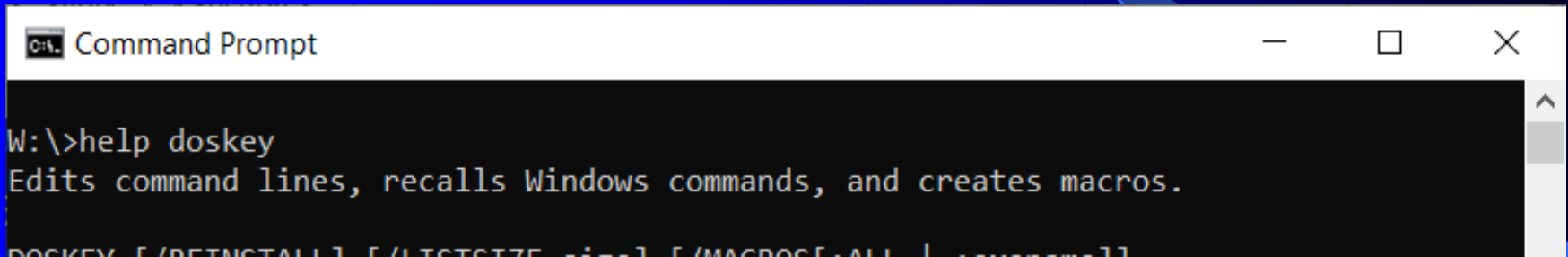
- Simply type the filename at the prompt:



```
W:\>myFirstBatchFile.bat
fromProjectGutenberg\AliceInWonderland.txt
fromProjectGutenberg\LittleWomen.txt
fromProjectGutenberg\Metamorphosis.txt
fromProjectGutenberg\SoulsOfBlackFolk.txt
fromProjectGutenberg\Walden.txt
5 file(s) copied.

W:\>
```

One more useful command: DOSKEY



```
Command Prompt

W:\>help doskey
Edits command lines, recalls Windows commands, and creates macros.

DOSKEY F1/REINSTALL F2/TEST75 F3/F1 F4/MACROF1 F5/F1 F6/F1 F7/F1 F8/F1 F9/F1 F10/F1
```

UP and DOWN ARROWS recall commands; ESC clears command line; F7 displays command history; ALT+F7 clears command history; F8 searches command history; F9 selects a command by number; ALT+F10 clears macro definitions.

Heading for the EXIT

- The “official” way to leave the command prompt (or you can close the window)



```
W:\>exit_
```

Yearning for MORE? ; -)

- Windows PowerShell:
<https://docs.microsoft.com/en-us/powershell/>
- Unix (Linux) bash shell – available via:
<https://gitforwindows.org/> and used in
<https://software-carpentry.org/lessons/>

Thank you for your time & attention!

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