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WINDOWS COMMAND INTERPRETER
COMMAND INTERPRETER?

- Interprets Command Lines
- Provides alternative to (OS and Application) GUIs

```bash
D:\dewan_backup\Java\WarmupProject>javac -d bin src\warmup\AGreeter.java
D:\dewan_backup\Java\WarmupProject>
```
GUI ALTERNATIVE

GUI

Command Interpreter
**Why Command Interpreter?**

Command lines may be preferred to GUIs in some situations and by some people.

Some applications and OS’s do not come with GUIs and must be used through command interpreter.

- java, javac, kindlegen

Some think you do not know computers if you do not understand a command interpreter.
COMMAND LINE SYNTAX

<command name> <parameters>

javac -d bin src\warmup\AGreeter.java

cd warmup

Command = Command Line
Command = Command Name
CLASSIFYING COMMAND (NAMES)

Internal
- cd

Execute code built-into OS

External
- javac

Execute some application program installed on top of OS

Command interpreter does not know about external command names; so how does it run and interpret them?
Running External Command: Tokenization and Two-Stage Command Interpretation

Command interpreter separates the command line into a sequence of units or tokens divided by “separators” (spaces and tabs).

- It treats the first token as the name of an executable file, finds it and executes it.
- It passes the remaining tokens to the newly executed program, which then interprets them.
- One or more of the parameters may be file (and folder) names.
COMMAND INTERPRETER SEARCHING FOR EXECUTABLE COMMAND: FIRST INTERPRETATION STAGE

It treats the first token as the name of an executable file, finds it and executes it.

D:\dewan_backup\Java\WarmupProject>nonExistentCommand -nonExistentParameter

'nonExistentCommand' is not recognized as an internal or external command, operable program or batch file.
EXTERNAL PROGRAM INTERPRETING PARAMETERS: SECOND INTERPRETATION STAGE

It passes the remaining tokens to the newly executed program, which then interprets it

```bash
D:\dewar_backup\Java\WarmupProject>javac -nonExistentParameter
javac: invalid flag: -nonExistentParameter
Usage: javac <options> <source files>
use -help for a list of possible options
```
Tokenization

First token = command-name
**Using Quotes for Tokens with Spaces**

```
D:\dewan_backup\Java\WarmupProject>"D:\Program Files\Java\jdk1.7.0_11\bin\javac" -d bin src\warmup\AGreeter.java
D:\dewan_backup\Java\WarmupProject>
```

First token = command-name
How to Name Files (and Folders)

One or more of the parameters may be file (and folder) names

File Names

Files and folders are both often called files
Relative/Partial vs. Absolute/Full Names

Longer names but simpler naming scheme

Absolute name

"D:\Program Files\Java\jdk1.7.0_11\bin\javac" -d D:\dewan_backup\Java\WarmupProject\bin AGreeter.java

Relative name

Shorter names but more complicated naming scheme
LOCAL NAME OF FILE/FOLDER

A file or folder is always created within some parent folder to create a hierarchical file system.

The name given within the parent folder is called the local name of the file/folder.

```
"D:\Program Files\Java\jdk1.7.0_11\bin\javac" –d D:\dewan_backup\Java\WarmupProject\bin AGreeter.java
```
Absolute/Full Name

“D:\Program Files\Java\jdk1.7.0_11\bin\javac" –d D:\dewan_backup\Java\WarmupProject\bin AGreeter.java

- Drive name
- Local name of the target file(folder)
- Names are separated by \  
- Local name of its parent
- Local name of its parent’s parent
- Preceded by Local name of its parent
- Preceded by Local name of its parent’s parent
- Preceded by ...

Gives the full “path” name, with each name taking is one level down in the folder hierarchy
**Traversing Down the Hierarchy**

```
D:
dewan_backup
  Java
    WarmupProject
    src
      warmup
        AGreeter.java
    bin
      warmup
        AGreeter.class
```

D:\dewan_backup\Java\WarmupProject\bin
Reducing Effort to Enter Absolute Names

- Copy Absolute Name from GUI and Paste into Command Line
- Edit Previously Entered Command Line
COPY ABSOLUTE NAME FROM FOLDER BROWSER GUI

Click mouse to get full name

CTRL + C
Top border, Right menu ➔ Edit ➔ Paste
TEXT PASTED AT CURRENT CURSOR POSITION
USE LEFT AND RIGHT ARROW KEYS TO CHANGE CURSOR POSITION

Cursor at start of line
Can insert or delete at cursor point

" inserted at start of line
Relative Name

Relative to current directory (or folder)

Relative to folders in System Path
Each command interpreter is associated with a current directory or folder name, parts of the Windows prompt

Build-in `cd` command can be used to change the current directory to some other directory on the same drive

Build-in `drive` command can be used to change drive

Initial folder is home directory of logged in user
CHANGING DRIVES

Command = Drive Name:

Case does not matter in drive file names on Windows
CHANGING FOLDER WITHIN DRIVE: CD COMMAND

```bash
D:\>cd D:\dewan_backup\Java\WarmupProject
D:\dewan_backup\Java\WarmupProject>
```

- `cd <folder name>`
- **Current directory** ← `<folder name>`
NAME RELATIVE TO CURRENT DIRECTORY

Relative to current directory (or folder)

Given current directory with absolute name: a

Relative name: r =

a file with absolute name: a\r

D:\dewan_backup>cd Java\WarmupProject
D:\dewan_backup\Java\WarmupProject>
**Relative Name**

Relative to single current directory (or folder)

Can be used in both command names and file parameters

```
"D:\Program Files\Java\jdk1.7.0_11\bin\javac" –d D:\dewan_backup\Java\WarmupProject\bin
AGreeter.java
```

Used only in command names

Relative to multiple folders in System Path
SETTING SYSTEM PATH: SYSTEM PROPERTIES
SETTING SYSTEM PATH: ADVANCED SYSTEM SETTINGS
SETTING SYSTEM PATH: ENVIRONMENT VARIABLES
SELECT PATH SYSTEM: SELECT PATH VARIABLE AND EDIT
SELECT PATH SYSTEM: ADD FOLDER TO PATH AFTER SEMICOLON

No need for quotes because of ;

D:\dewan_backup\Java\WarmupProject>javac -d bin src\warmup\AGreeter.java
D:\dewan_backup\Java\WarmupProject>

D:\Program Files\Java\jdk1.7.0_11\bin\javac
**REUSING COMMANDS: COMMAND HISTORY**

Want to execute (portion of) a command in history

Use up and down arrow keys to reuse commands in history
REUSING COMMANDS: UP ARROW DISPLAYS PREVIOUS EDITABLE COMMAND

First Up-Arrow shows last command
REUSING COMMANDS: UP ARROW DISPLAYS PREVIOUS EDITABLE COMMAND

Second Up Arrow shows second last command
REUSING COMMANDS: ENTER EXECUTES (POSSIBLY EDITED) PREVIOUS COMMAND

Enter

Could have edited command

History particularly useful if absolute files names entered
More on Names: Traversing Down the Hierarchy
Traversing Up (and Down) the Hierarchy

D:
  \-- dewan_backup
  \-- Java
      \-- WarmupProject
          \-- src
              \-- warmup
                  \-- AGreeter.java
          \-- bin
              \-- warmup
                  \-- AGreeter.class

Name denoting the parent

Current Directory

Target Directory
USE OF ..
Naming Current Directory

D:
dewan_backup
Java
WarmupProject

src

bin

warmup
AGreeter.java

warmup
AGreeter.class

Current Directory

The current directory

A la this in Java
USE OF .
NAMING ROOT FOLDER ON DRIVE

D:\dewan_backup\Java\WarmupProject

Changes drive, not directory within drive
**Completing File Name Token**

```
D:\>cd Pro
```

Hit tab
Completing File Name Token

D:\>cd "Program Files"

Hit tab to complete token if known to application completing

Should choose unique prefix
SAVING INTERACTION

Input
MARKING TEXT
Marking Text

Drag mouse to select text
This text can now be pasted anywhere
OUTPUT REDIRECTION

Input

Command > File

Output of Command goes to File rather than the command window

Echoed Input of “Ca va” command
INPUT REDIRECTION

Command < File

Input of Command comes from File rather than the command window

Input for "Buon Girono" Command

Echoed input from file
Pipe

Output of Command1 becomes input of Command2
GUI ALTERNATIVE: DIR COMMAND
GUI ALTERNATIVE: TYPE COMMAND
GUI ALTERNATIVE: ERASE COMMAND
GUI ALTERNATIVE: MKDIR COMMAND
**WILD CARD:** *

D:\devan_backup\Java\WarmupProject\bin>java warmup.AGreeter "Ca va" > file1.txt
Ni Hao

D:\devan_backup\Java\WarmupProject\bin>java warmup.AGreeter "Buon Giorno" > file2.txt
Namaste

D:\devan_backup\Java\WarmupProject\bin>type *

file1.txt
Hello World
Ca va
Ni Hao

file2.txt
Hello World
Buon Giorno
Namaste

D:\devan_backup\Java\WarmupProject\bin>
**WILD CARD:** *
PARTIAL WILDCARD AND FIND (PIPED)
IPOCONFIG

Windows IP Configuration

Wireless LAN adapter Wireless Network Connection 2:
- Connection-specific DNS Suffix: fe80::3474:a577:a352:d358%20
- Link-local IPv6 Address: fe80::3474:a577:a352:d358%20
- IPv4 Address: 192.168.1.3
- Subnet Mask: 255.255.255.0
- Default Gateway: 192.168.1.1

Ethernet adapter Bluetooth Network Connection:
- Media State: Media disconnected
- Connection-specific DNS Suffix:

Ethernet adapter Local Area Connection:
- Media State: Media disconnected
- Connection-specific DNS Suffix:

Ethernet adapter AFS:
PING

```
C:\Windows\system32\cmd.exe

Tunnel adapter Reusable Microsoft 6To4 Adapter:
  Media State . . . . . . . . . . . . : Media disconnected
  Connection-specific DNS Suffix .

Tunnel adapter isatap.\<88B0837A-60EE-4482-8497-5168E122359C>:
  Media State . . . . . . . . . . . . : Media disconnected
  Connection-specific DNS Suffix .

D:\dewan_backup\Java\WarmupProject\bin>ping www.google.com

Ping www.google.com [74.125.236.19] with 32 bytes of data:
  Reply from 74.125.236.19:  bytes=32 time=13ms TTL=57
  Reply from 74.125.236.19:  bytes=32 time=14ms TTL=57
  Reply from 74.125.236.19:  bytes=32 time=14ms TTL=57
  Reply from 74.125.236.19:  bytes=32 time=13ms TTL=57

Ping statistics for 74.125.236.19:
  Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
  Approximate round trip times in milli-seconds:
    Minimum = 13ms, Maximum = 14ms, Average = 13ms
```

D:\dewan_backup\Java\WarmupProject\bin>
SORT (Piped)
FIND(Piped)

FIND: Parameter format not correct
C:\Users\dewan>ping www.google.com ; find 3
FIND: Parameter format not correct
^C
C:\Users\dewan>ping www.google.com

Pinging www.google.com [74.125.236.16] with 32 bytes of data:
Reply from 74.125.236.16: bytes=32 time=13ms TTL=55
Reply from 74.125.236.16: bytes=32 time=13ms TTL=55
Reply from 74.125.236.16: bytes=32 time=13ms TTL=55
Reply from 74.125.236.16: bytes=32 time=14ms TTL=55

Ping statistics for 74.125.236.16:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 13ms, Maximum = 14ms, Average = 13ms

C:\Users\dewan>ping www.google.com ; find "Reply"
Reply from 74.125.236.16: bytes=32 time=13ms TTL=55
Reply from 74.125.236.16: bytes=32 time=13ms TTL=55
Reply from 74.125.236.16: bytes=32 time=14ms TTL=55
Reply from 74.125.236.16: bytes=32 time=13ms TTL=55

C:\Users\dewan>
STARTING SEPARATE COMMAND INTERPRETER
EXTRA SLIDES
STARTING ANOTHER COMMAND INTERPRETER IN SAME WINDOW AND EXIT

D:\dewan_backup\Java\WarmupProject>cmd
Microsoft Windows [Version 6.1.7600]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.
D:\dewan_backup\Java\WarmupProject>exit
D:\dewan_backup\Java\WarmupProject>
COMMAND INTERPRETER?

Interprets Command Lines

Provides alternative to (OS and Application) GUIs
WHY COMMAND INTERPRETER

Command lines may be preferred to GUIs

Some applications and OS’s do not come with GUIs and must be used through command interpreter

java, javac, kindlegen
GUI ALTERNATIVE

GUI

Command Interpreter

Command interpreters came first
COMMAND NAME RELATIVE TO FOLDER IN PATH

D:\dewan_backup\Java\WarmupProject>javac -d bin src\warmup\AGreeter.java
D:\dewan_backup\Java\WarmupProject>
ADVANCE
**Relative Name**

Relative to current directory (or folder)

Can used in both command names and file parameters

```
“D:\Program Files\Java\jdk1.7.0_11\bin\javac” –d D:\dewan_backup\Java\WarmupProject\bin AGreeter.java
```

Used only in command names

Relative to folders in System Path
Relative Name: Going Backward

A .. After some directory D refers to the parent of the D

Relative name: ... denotes a file with absolute name: d\f

Relative name: src\warmup\AGreeter.java denotes a file with absolute name “D: \dewan_backup \Java \WarmupProject> “\src\warmup\AGreeter.java

D:\dewan_backup>cd Java\WarmupProject
D:\dewan_backup\Java\WarmupProject>
Relative to current directory (or folder)

Given current directory with absolute name: d

Given current directory with absolute name: “D:\dewan_backup\Java\WarmupProject”

Relative name: f denotes a file with absolute name: d\f

Relative name: src\warmup\AGreeter.java denotes a file with absolute name “D:\dewan_backup\Java\WarmupProject>“\src\warmup\AGreeter.java
RELATIVE/PARTIAL VS. ABSOLUTE/FULL NAMES

```
javac -d bin src\warmup\AGreeter.java
```

D:\dewan_backup\Java\WarmupProject\src\warmup>"D:\Program Files\Java\jdk1.7.0_11\bin\javac" -d D:\dewan_backup\Java\WarmupProject\bin AGreeter.java

D:\Program Files\Java\jdk1.7.0_11\bin\javac" -d D:\dewan_backup\Java\WarmupProject\bin AGreeter.java
TOKENIZATION

D:\dewan_backup\Java\WarmupProject>javac -d D:\dewan_backup\Java\WarmupProject\bin AGreeter.java
'D:\Program' is not recognized as an internal or external command, operable program or batch file.

D:\dewan_backup\Java\WarmupProject\src\warmup>javac -d D:\dewan_backup\Java\WarmupProject\bin AGreeter.java

First token = command-name

D:\dewan_backup\Java\WarmupProject\src\warmup>"D:\Program Files\Java\jdk1.7.0_11\bin\javac" -d D:\dewan_backup\Java\WarmupProject\bin AGreeter.java
Using Quotes to Separate Tokens

First token = command-name
GUI ALTERNATIVE

Command interpreters came first
TOKENIZATION

D:\dewan_backup\Java\WarmupProject> D:\Program Files\Java\jdk1.7.0_11\bin\javac -
 d bin src\warmup\AGreeter.java
 'D:\Program' is not recognized as an internal or external command,
 operable program or batch file.
D:\dewan_backup\Java\WarmupProject>

D:\dewan_backup\Java\WarmupProject> D:\Program Files\Java\jdk1.7.0_11\bin\javac -
 d bin src\warmup\AGreeter.java

First token = command-name
**Relative Name: Going Forward**

Relative to current directory (or folder)

Given current directory with absolute name: d

Relative name: f denotes a file with absolute name: d\f

Relative name: src\warmup\AGreeter.java denotes a file with absolute name D:\dewan_backup\Java\WarmupProject>\src\warmup\AGreeter.java
GUI ALTERNATIVE

Command interpreters came first
CLASSIFYING COMMAND- NAMES

Internal

- cd

Identify code built-into OS

External

- javac

Identify some application program installed on top of OS

Command interpreter does not know about external command names; so how does it run and interpret them?
Relative/Partial vs. Absolute/Full Names

```
D:\dewan_backup\Java\WarmupProject\src\warmup>"D:\Program Files\Java\jdk1.7.0_11\bin\javac" -d D:\dewan_backup\Java\WarmupProject\bin AGreeter.java
```

- Absolute name
  - Longer names and simpler naming scheme
- Relative name
  - Shorter names but more complicated naming scheme
How to Name Files (and Folders)

One or more of the parameters may be file (and folder) names

javac -d bin src\warmup\AGreeter.java

File names

Files and folders are both often called files
FILE/FOLDER HIERARCHIES AND LOCAL NAMES

- D:
  - dewan_backup
    - Java
      - WarmupProject
        - src
          - warmup
            - AGreeter.java
        - bin
          - warmup
            - AGreeter.class
Completing File Name

D:\dewan_backup\Java\WarmupProject>"D:\Program Files\Java\jdk1.7.0_11\bin\javac"
-d bin src\warmup\AGreeter.java
D:\dewan_backup\Java\WarmupProject>notepad src\warmup\AGreeter.java
D:\dewan_backup\Java\WarmupProject>"D:\Program Files\Java\jdk1.7.0_11\bin\javac"
-d bin src\warmup\AGreeter.java
D:\dewan_backup\Java\WarmupProject>

Enter

Could have edited command

History particularly useful if absolute files names entered
Redirecting Output

Command < File

Input of Command comes from File rather than the command window
TRACING UP (AND DOWN) THE HIERARCHY

D:
dewan_backup
Java
WarmupProject

src
warmup
AGreeter.java

bin
warmup
AGreeter.class
OUTPUT REDIRECTION

Input

Command > File

Output of Command goes to File rather than the command window

Echoed Input
**INPUT REDIRECTION**

Command < File

Input of Command comes from file rather than the command window