

Scripting for System Administration

- System Administration
 - Maintain and operating a computer system and/or network
 - Installing, supporting and maintaining servers or other computers and planning for and responding to service outages and other problems
 - Scripting, light programming, project management, training
- Scripting helps to eliminate repetitive work
 - Writing the same set of commands over and over again to get a certain task done
 - Repeat the same set of commands/task for multiple users
 - May take a bit of time initially, but can save a lot of time when finished
 - Ensure certain 'boring but necessary' are carried out

Scripting

- A **scripting language, script language or extension language** is a programming language that allows some control of a single or many software application(s)
- Different from programmes
- Interpreted from source code (not compiled)
- Early scripting languages:
 - Batch languages or job control languages
- Many web browsers provide a scripting language
 - E.g. JavaScript, HTML

Types of Scripting Languages

- Job control languages and shells
 - Automation of job control
 - Command-line interpreters
- GUI Scripting (macros)
- Application-specific languages
- Web browsers
 - Client-side scripting (JavaScript)
- Web servers
 - Server-side scripting (PHP, JSP)
- Text processing languages
 - Unix's AWK, sed and grep
- General-purpose dynamic languages (Perl)
- Extension-embeddable languages

More Info

- **#! bang (unix)**
 - Shebang, hashbang, hashpling, pound bang
 - Refers to the characters “#!” when they are the first two characters in a text file
- Useful sites
 - <http://commandwindows.com/batch.htm>
 - Simple overview
 - <http://www.allenware.com/icsw/icswidx.htm>
 - More detailed course

Scripts

- A shell script is a script written for the shell, or command line interpreter of an OS
- ~ a domain-specific programming language
- Typical operations:
 - File manipulation, program execution and printing text
- Unix: shell scripting
- Windows: batch file

Capabilities

- Allow several commands that would be entered "by hand" at a command line interface to be executed automatically and rapidly
- Use wildcard characters
 - a simple way of matching multiple related files
 - e.g. copy *.txt /mytemp
- Basic pattern matching
 - Performs commands on groups of items with similar names and sometimes parse simple strings of text
- Variables
- Return codes
- General-purpose programming language features
 - Control-flow constructs (if, while), subroutines

Advantages and Disadvantages

- **Advantages**
 - Quicker than other programming languages
 - Interactive debugging
 - Can be used to provide sequencing and decision-making linkage around existing programs
- **Disadvantages**
 - prone to costly errors
 - slow execution speed
 - compatibility problems between different platforms

Example: xcopy

- Copy is a command for copying a file
copy source destination
e.g. copy myfile.txt myfile.bak
- Xcopy is a more powerful command for copying and backing-up files and directories
- Simple syntax
xcopy source destination (switches)
e.g. xcopy myfile.txt myfile.bak
- Full syntax
XCOPY source [destination] [/A | /M] [/D[:date]]
[/P] [/S [/E]] [/V] [/W] [/C] [/I] [/Q] [/F] [/L]
[/G] [/H] [/R] [/T] [/U] [/K] [/N] [/O] [/X] [/Y]
[/-Y] [/Z] [/EXCLUDE:file1[+file2][+file3]...]

Batch Files (MS Windows)

- Open notepad
 - (Start, Run, notepad)
- Type the file

```
@echo off
echo Hello this is a test batch file
pause
dir c:\windows
```
- Save the file (with .bat extension)
- Click on file to run
- Use command /? to get more info on each command
- Example: copy /?

Batch Commands

- REM or :: (double colon)
 - For writing comments
- @echo off
 - Prevents commands from the batch file being displayed, just the info needed
- echo
 - will echo a message in a batch file
 - Use with @echo off

```
REM Script to demonstrate echo
@echo off
echo Hello World
```
 - echo . Creates an empty line

```
REM Script to demonstrate echo. for an empty line
@echo off
echo Hello World
echo.
```

Batch Commands

- pause
 - prompt the user to press any key to continue

```
REM Script to demonstrate pause
@echo off
echo Hello World
pause
```
- cls
 - Clears the screen

```
REM Script to demonstrate cls
cls
@echo off
echo Hello World
pause
```

Batch Commands

- Variables
 - set allows you to define a variable

```
REM Script to demonstrate a set
@echo off
set mydir=cal70
pause
```
 - %var% expands the variable (i.e. accesses the contents or value)

```
REM Script to demonstrate expanded variable
@echo off
set mydir=cal70
echo Hello %mydir%
pause
```

Batch Commands

- %1

- Allows users to add variables

```
REM Script to demonstrate a variable
@echo off
echo Hello %1
pause
```

- Can be extended to %2, %3 etc

```
REM Script to demonstrate variables
@echo off
echo Hello %1
echo Goodbye %2
pause
```

Batch Commands

- Environmental variables

- There are certain environmental variables set up by the system e.g. path, prompt, windir

```
REM Script to demonstrate environmental variables
@echo off
echo My path is %path%
pause
```

- Can be extended to %2, %3 etc

```
REM Script to demonstrate variables
@echo off
echo Hello %1
echo Goodbye %2
pause
```

Batch Commands

- :label

- Allows you to give a name to sections of a batch file

```
REM Script to demonstrate labels
@echo off
set mydir=cal70
echo Hello %mydir%
pause
:CLEANUP
set mydir=
REM End Of File code
:EOF
```

Batch Commands

- if

- Used to check for a certain condition if the condition exists
- if that condition exists it will perform that function

```
REM Script to demonstrate if
REM The user should type either student or
REM lecturer on the command line
@echo off
if %1==student echo Hello %1
if %1==lecturer echo Goodbye %1
pause
```

Batch Commands

- If (cont.)

- Check if a file (or directory) exists

```
REM Script to demonstrate if
@echo off
echo Is there a Windows directory?
if exist c:\windows echo HELLO WINDOWS
pause
```

If ... else

If (condition) (command1) Else (command2)

Batch Commands

- If (cont.)

- Do several things

```
REM Script to demonstrate if with 2 actions
@echo off
echo Are you a student or a lecturer?
if exist c:\windows (
echo HELLO WINDOWS
echo I'm finished
)
pause
```

Batch Commands

- Redirection
 - Used to send the standard input/output somewhere else
 - > redirects standard output
 - Example: send the standard output to a file

```
REM Script to demonstrate redirection (e.g. sam.bat)
@echo off
echo "Testing redirection"
dir *.*!*
```
 - On the command line
 - >sam.bat > myout.txt
 - >type myout.txt

Batch Commands

- For
 - On the command line
 - for {each item} in {a collection of items} do {command}**

```
REM Script to demonstrate for
@echo off
echo Testing for
for %%n in (fred joe mary) do echo %%n
pause
```

Batch Commands

- For (cont.)

```
REM Script to demonstrate for with directories
@echo off
echo Testing for with directories
for /d %%n in (c:\*) do echo %%n
pause
```

Batch Commands

- For (cont.)

```
REM Script to demonstrate for (looping)
@echo off
echo Testing for
for /l %%n in (1, 1, 99) do echo %%n
pause
```