ULI101

Week 10

Lesson Overview

- Shell Start-up and Configuration Files
- Shell History
- Alias Statement
- Shell Variables
- Introduction to Shell Scripting
- Positional Parameters
- echo and read Commands
- if and test statements
- for loop

Shell Start-up and Configuration Files

- Shell Start-up/Configuration files are settings that are applied every time a shell is created
  - Start-up files are sequences of shell commands (scripts)
  - They also apply when users log in, as it creates a shell
- There is a single system-wide configuration file that belongs to the root user - /etc/profile
- User-specific configuration files that belong to the user are hidden files found in the user’s home directory
  - .bash_profile
  - .bashrc
  - .bash_logout
    - Executed when you log out

/etc/profile

- This file can only be modified by the root user
- Affects the environment of all users, regardless of their default shell
- Bash users can change their environment by modifying the .bash_profile or the .bashrc files
  - Different shells have different configuration files
- Other configuration files such as .profile exist – read comments in your .bash_rc file to find out more

.bashrc and .bash_profile

- Located in the user’s home directory
- These files are executed every time a user logs in or creates a new shell
  - Things vary depending whether the shell is interactive or not
- By modifying either one of these files, each user can change his individual working environment
- They can be used for the following:
  - Setting the prompt and screen display
  - Creating local variables
  - Creating temporary Linux commands (aliases)
  - Mapping new keys on the keyboard

Shell History

- Many shells keep a history of recently executed command lines in a file
- This history is used by users to save time, when executing same or similar commands over and over
  - Bash uses the up/down arrow keys
  - Use the Ctrl+r to search by keyword
- Bash stores it’s history in the .bash_history file

Alias

- A way to create “shortcuts” or temporary commands in UNIX
- Stored in memory, while the user is logged in
- Usually found in the .bash_profile
- Syntax:

  ```
  alias name=value
  ```

  For example: `alias dir=ls`
- Even complex command lines can have an alias – enclose the command within double quotes

  For example:

  ```
  alias clearfile=”cat /dev/null >”
  ```

Shell Variables

- Shell variables a classified in 2 groups
  - System (shell) variables, describing the working environment
  - User-created variables, associated with scripts
- Variables can be read/write or read-only
- Name of a variable can be any sequence of letters and numbers, but it must not start with a number

Common Shell Variables

- Shell environment variables shape the working environment whenever you are logged in
- Common shell variables include:
  - PS1 – primary prompt
  - PWD – present working directory
  - HOME – absolute path to user’s home
  - PATH – list of directories where executables are
  - HOST – name of the host
  - USER – name of the user logged in
  - SHELL – current shell
- The set command will display all available variables

The PATH variable

- PATH is an environment variable present in Unix/Linux operating systems, listing directories where executable programs are located
- Multiple entries are separated by a colon (:)
- Each user can customize a default system-wide PATH
- The shell searches these directories whenever a command is invoked in sequence listed for a match
- In case of multiple matches use the which utility to determine which match has a precedence
- On some systems the present working directory may not be included in the PATH by default
- Use ./ prefix or modify the PATH as needed

Assigning a Value

Syntax: name=value

For example:

course=ULI101

- If variable values are to contain spaces or table they should be surrounded by (double) quotes For example: phone=“1 800 123-4567”

Read-Only Variables

- Including the keyword readonly before the command assignment prevents you from changing the variable afterwards
  For example: readonly phone="123-4567"
- After a variable is set, it can be protected from changing by using the readonly command
  Syntax: readonly variable
  For example: readonly phone
- If no variable name is supplied a list of defined read only variables will be displayed

Removing Variables

variable=

For example: course=

OR

unset variable

For example: unset phone

- Read-only variables cannot be removed – you must log out for them to be cleared

Variable Substitution

- Whenever you wish to read a variable (its contents), use the variable name preceded by a dollar sign ($)
- This is commonly called variable substitution

Example:

```
name=Bob
echo $name
```

Introduction to Shell Scripting

- Shell programming
  - Scope ranges from simple day-to-day tasks to large database-driven CGI applications
- Shell-dependent – each shell script is written for a specific shell, such as bash
- First line of each script usually specifies the path to the program which executes the script - #! statement, for example: #/bin/bash
  - Use the which utility to find out what path to use there
  - This must be the first line and nothing can precede it, not even a single space
  - This line is not necessary if the script will be executed in the default shell of the user
- Any line other than first one starting with a # is treated as a comment

Positional Parameters

- Every script can have parameters supplied
- Traditionally command line parameters are referred to as $0…$9
- Parameters > $9 can be accessed by using the shift command
    - shift will literally shift parameters to the left by one or more positions
- Some shells can use the ${ } form
    - This enables direct access to parameters >$9
      For example: ${10}

Positional parameters

- $* and $@ represent all command line arguments
- $# represents the number of parameters (not including the script name)

echo command

- Displays messages to the terminal followed by a newline
  - Use the –n option to suppress the default newline
- Output can be redirected or piped
- Arguments are usually double quoted

read command

- The read command allows obtaining user input and storing it in a variable
  - Everything is captured until the Enter key is pressed

Example:

```
echo –n “What is your name? ”
read name
echo Hello $name
```

Using Logic

The purpose of the if statement is execute a command or commands based on a condition

The condition is evaluated by a test command, represented below by a pair of square brackets

```
if [ condition ]
then
    command(s)
fi
```

if Statement Example

Test with a condition
Notice the spaces after “[“ and before “]”

```
read password


if [  ”$password” = ”P@ssw0rd!”  ]
then
  echo ”BAD PASSWORD!”
fi
```

The test Command

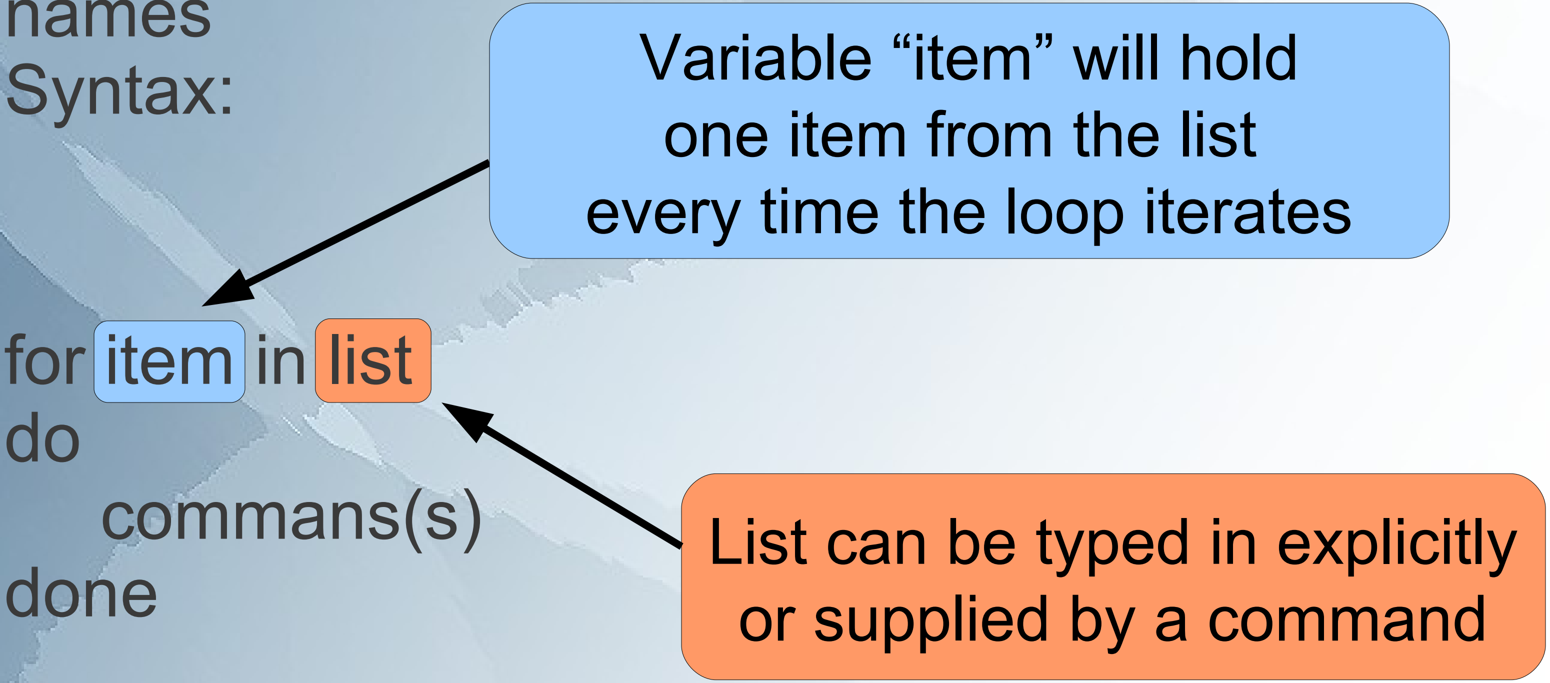
- The test command can be used in two ways:
  - As a pair of square brackets: [condition]
  - The test keyword: test condition
- The condition test can result in true (0) or false (1), unless the negation ”is not” (!), is used
- The test can compare numbers, strings and evaluate various file attributes
  - Use = and != to compare strings,
    for example: [”$name” = ”Bob”]
  - Use -z and -n to check string length,
    for example: [! -z “$name”]
  - Use -gt, -lt, -eq, -ne, -le, -ge for number,
    for example: [”$salary” -gt 100000]

The Test Command

- Common file test operations include:
  - -e (file exists)
  - -d (file exists and is a directory)
  - -s (file exists and has a size greater than zero)
  - -w (file exists and write permission is granted)
- Check man test for more details

Using Loops

- A for loop is a very effective way to repeat the same command(s) for several arguments such as file names
  Syntax:



- for item in list
  do
  	commans(s)
  done

Variable “item” will hold one item from the list every time the loop iterates

List can be typed in explicitly or supplied by a command

Loop Examples

```
for addr in $(cat ~/addresses)
do
        mail -s ”Newsletter” $addr < ~/spam/newsletter.txt
done
```

```
for count in 3 2 1 'BLAST OFF!!!'
do
        sleep 1
        echo $count
done
```

```
for id in $(seq 1 1000)
do
        mkdir student_$id
done
```