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Basic Shell Programming

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Contents

1. Introduction

- What is shell scripting ?
- Why we require shell scripting ?
- To run :

make executable: `$ chmod +x <script_filename>`
`$ ./<script_filename>`

To run in command line:
`$ sh <script_filename>`

2. User Input

- Shell allows you to prompt for user input.
- Syntax:
  - `read varname1, [varname2, .. ]`

    example

```
echo “Enter your name: \c”
read my_name
```

3. Bash Control Structures

- if-then-else
- case
- loops
  - for
  - while
  - until
  - select

3.1 Simple if Statement

General Syntax:

```
if command
then
    statements
fi
```

statements are executed only if **command** succeeds, i.e. has return status “0”

3.2 if-then–else Statement

General syntax:

```
if [ condition ];
then
    statements-1
else
    statements-2
fi
```

- executes statements-1 if condition is true
- executes statements-2 if condition is false

3.3 If-then-elif-then-else Statement

General syntax:

```
if [ condition ]; then
  statements
elif [ condition ]; then
    statement
else
    statements
fi
```

- The word **elif** stands for “else if”
- It is part of the if statement and cannot be used by itself

3.4 Relational Operators

Meaning	Numeric	String
Greater than	-gt	-
Greater than or equal	-ge	-
Less than	-lt	-
Less than or equal	-le	-
Equal	-eq	= or ==
Not equal	-ne	!=

Meaning	Numeric	String
str1 is less than str2	-	str1 < str2
str1 is greater str2	-	str1 > str2
String length is greater than zero	-	-n str
String length is zero	-	-z str

3.5 File Testing

Options	Meaning
-d	True if file is a directory
-f	True if file is a ordinary file
-r	True if file is readable
-w	True if file is writable
-x	True if file is executable
-s	True if length of file is non - zero

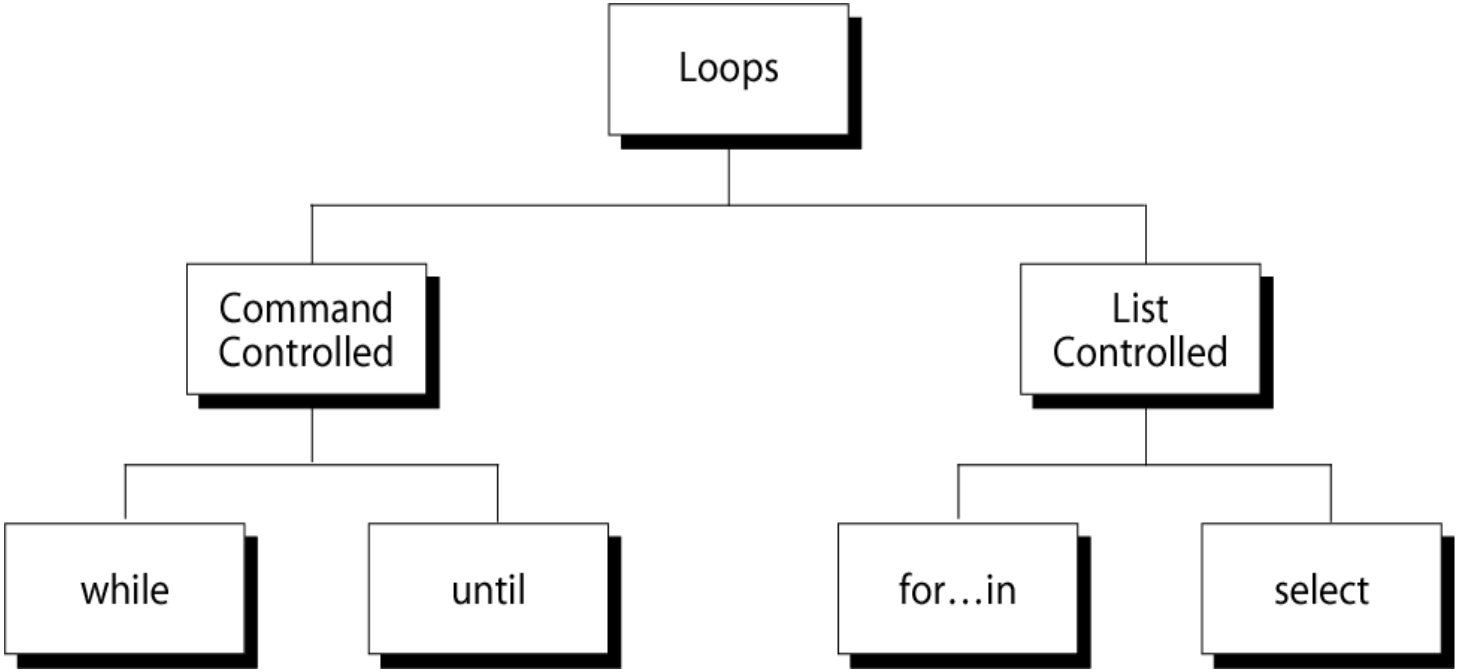
3.6 case Statement

- use the case statement for a decision that is based on multiple choices

General syntax:

```
case word in
pattern1) command-list1
;;
pattern2) command-list2
;;
patternN) command-listN
;;
esac
```

4. Repetition Constructs



4.1 while Loop

- To execute commands in “command-list” as long as “expression” evaluates to true

General syntax:

```
while [ expression ]

do

    command-list

done
```

4.2 The until Loop

- To execute commands in “command-list” as long as “expression” evaluates to false

General syntax:

```
until [ expression ]
do
    command-list
done
```

4.3 The for Loop

- To execute commands as many times as the number of words in the “argument-list”

General Syntax:

```
for variable in argument-list

do

    commands

done
```

4.4 select Command

- Constructs simple menu from word list
- Allows user to enter a number instead of a word
- User enters sequence number corresponding to the word

General Syntax:

```
select WORD in LIST
do
    RESPECTIVE-COMMANDS
done
```

Loops until end of input, i.e. ^d (or ^c)

4.5 break and continue

- Interrupt for, while or until loop
- The break statement
  - transfer control to the statement AFTER the done statement
  - terminate execution of the loop
- The continue statement
  - transfer control to the statement TO the done statement
  - skip the test statements for the current iteration
  - continues execution of the loop

5. Shell Functions

- A shell function is similar to a shell script
  - stores a series of commands for execution later
  - shell stores functions in memory
  - shell executes a shell function in the same shell that called it
- Where to define
  - In .profile
  - In your script
  - Or on the command line

General Syntax:

```
function-name () {
   statements
}
```

- must be defined before they can be referenced
- usually placed at the beginning of the script

- Remove a function
  - Use unset built-in

5.1 Function Parameters

- Need not be declared
- Arguments provided via function call are accessible inside function as $1, $2, $3, ...

  $# reflects number of parameters

  $0 still contains name of script (not name of function)

5.2 Local Variables in Function

- Variables defined within functions are global, i.e. their values are known throughout the entire shell program
- Keyword “local” inside a function definition makes referenced variables “local” to that function

6. Debugging Shell Programs

- Debugging is troubleshooting errors that may occur during the execution of a program/script
- The following two commands can help you debug a bash shell script:
  - echo - use explicit output statements to trace execution
  - set

6.1 Debugging Using “set”

- The “**set**” command is a shell built-in command has options to allow flow of execution
  - **–v** option prints each line as it is read
  - **–x** option displays the command and its arguments
  - **–n** checks for syntax errors

- options can turned on or off
  - To turn *on* the option: `set -xv`
  - To turn *off* the options: `set +xv`
- Options can also be set via she-bang line

```
#! /bin/bash -xv
```

7. Applications

- You can write a script which installs prequisites
- To kill or start multiple applications together
- To observe large database of files and find some patterns out of it
- So in general to automate the process and the list goes on

8. Limitations

- Inadvertent typing errors such as **`rm -rf * /`** (instead of the intended **`rm -rf */`**)
- need to launch a new process for almost every shell command executed, slow execution speed

References

- Beginning the Shell Scripting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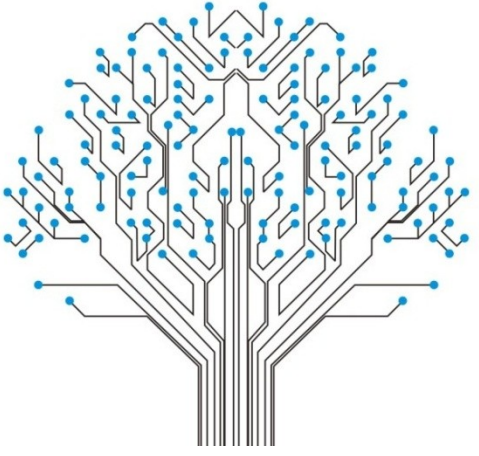

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