Walchand College of Engineering, Sangli

Walchand Linux Users' Group

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OPEN SOURCE DAY

GIT

BASH

LEARN & CONTRIBUTE

Limited Seats	Hands-On

- Introduction to GIT
- Basic GIT commands
- Branching
- Advance Commands

Scan To Register

- Introduction to Shell
- Basic of Shell Scripting
- Loops and Functions
- Automation Scripts

3rd December

Venue: Main & Mini CCF

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FREE FOR ALL

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Shell Scripting

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What is Shell?

- It is a command line interpreter.
- It acts as an interface between the kernel and the user.
- Shell is an environment in which we can run our commands, programs and shell scripts.

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What is a Kernel?

- Kernel is the core component of the operating system.
- Main layer between the software and underlying computer hardware.
- Carries out many operations such as task scheduling, memory management etc.

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What is Shell Scripting?

- A shell script is a list of commands in a program that is run by the Unix shell which is a command line interpreter.

- The different operations performed by shell scripts are program execution, file manipulation and text printing.

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Why Shell Scripting?

- Increases Efficiency
- Easy to learn
- Helps us automate our tasks
- Easily available on all linux based platforms and easier to debug

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Interpreting languages

- Interpreter-based
- Use to combine existing components and automate specific task
- Do not create extra files
- Eg. Bash,Ruby,Python

Compiling languages

- Compiler-based
- Used to develop an application or software
- Create extra files ex: *.exe* file
- Eg. C,C++,Java

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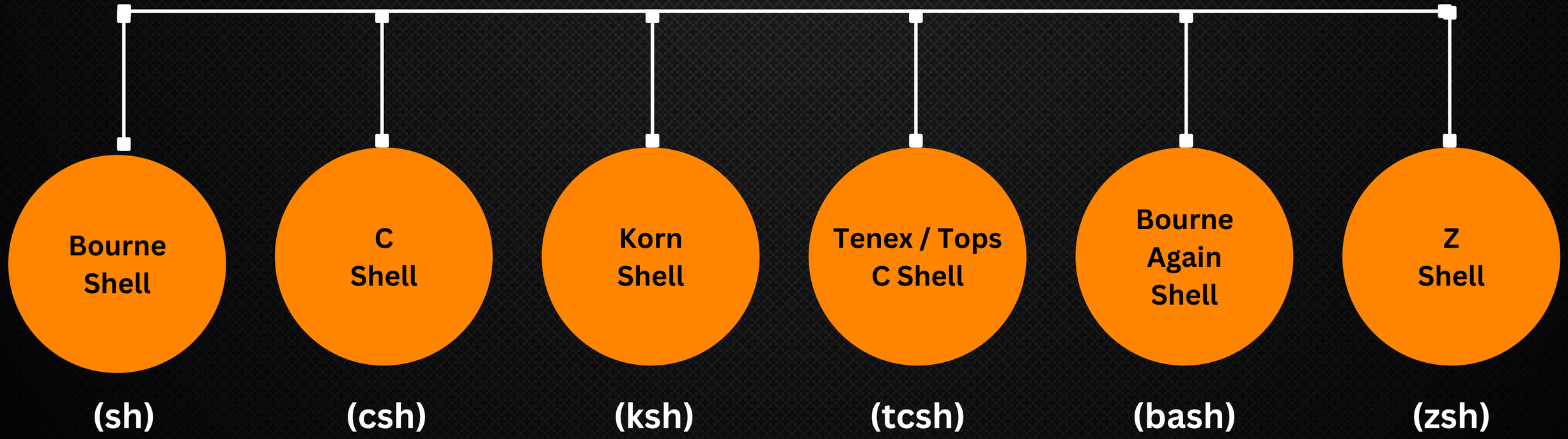
History of Shells



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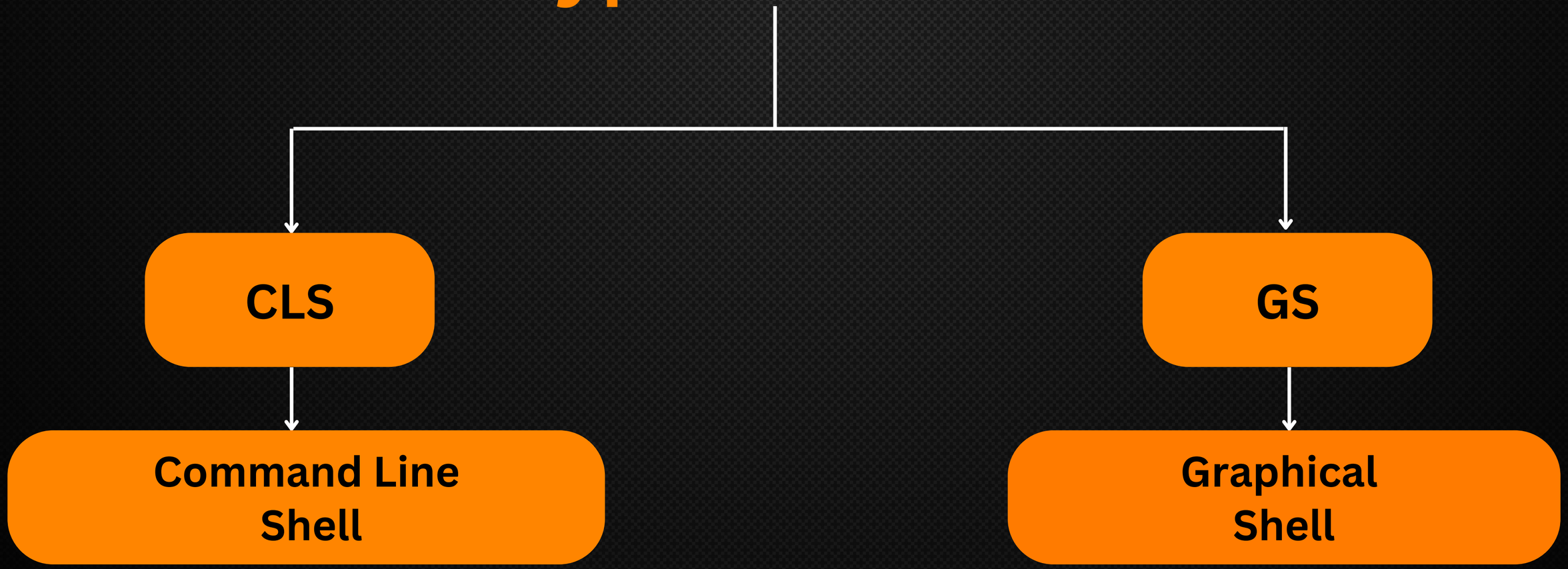
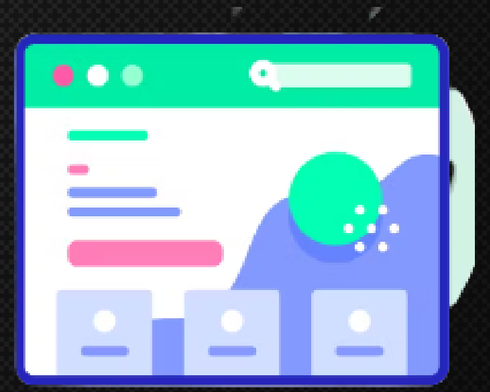
Types of Shell



CLI and GUI

Provides CLI

Allows the user to interact with the system using commands



Provides GUI

Allows the user to interact with the system using graphics

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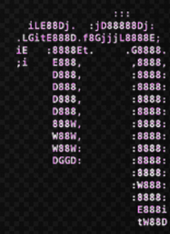
Text Editors

- VS CODE
- GEDIT
- NANO
- VIM
- KWRITE
- EMACS



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File Permission

- Owner permissions
- Group/Directory permissions
- Other (world) permissions

To check file permission 'ls' command is used with flag -l

$ls -l [file_name]

read(-r)

write(-w)

execute(-x)

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Change File permission

- chmod command is used to define file permissions.
- chmod stands for Change Mode
- 2 ways to use chmod :

Symbolic Mode

Absolute Mode

Symbolic Mode

+	Adds the designated permission(s) to a file or directory.
-	Removes the designated permission(s) from a file or directory.
=	Sets the designated permission(s).

Example: $chmod +x testfile

Absolute Mode

- For absolute permission each permission is assigned a numerical value, and the total of each set of permission provides permission for that user

No permission	---
Execute permission	--x
Write permission	-w-

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Absolute Mode

Execute and write permission: 1 (execute) + 2 (write) = 3	-wx
Read permission	r--
Read and execute permission: 4 (read) + 1 (execute) = 5	r-x
Read and write permission: 4 (read) + 2 (write) = 6	rw-
All permissions: 4 (read) + 2 (write) + 1 (execute) = 7	rwx

Example: $ chmod 755 testfile

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Shebang

- This sequence of character is called as Shebang.
- Used at the start of the script.
- Used to specify the interpreter.
- Syntax : #! interpreter [arguments]

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Variables

- Variables are an important aspect of any programming language, as it is used to store any required data.

Types of Variables

There are two types of variables in bash:

Environmental Variables

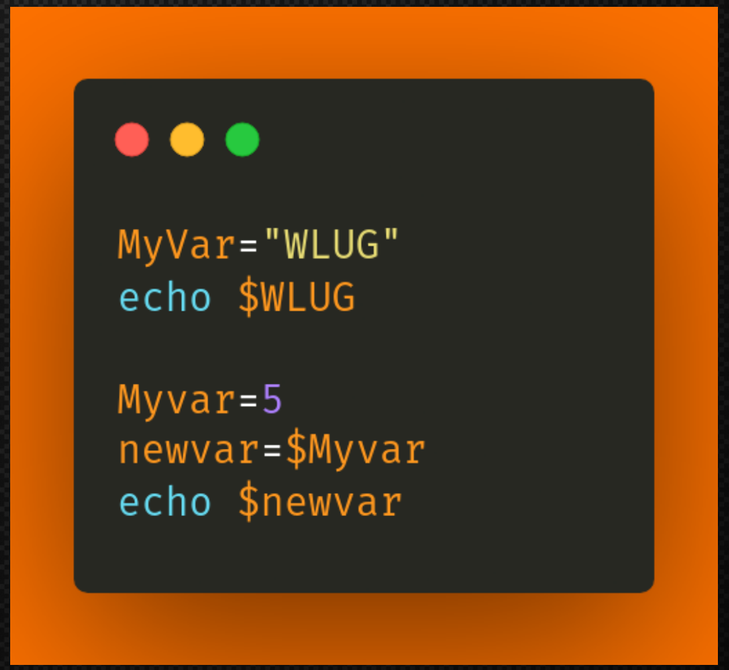
User-Defined Variables

Environmental Variables

- Pre-defined Variable
- set or env command can be used to see the list of Environmental Variables
- Example
  - BASH_VERSION
  - BASH
  - PWD
  - OSTYPE
  - HOME
  - HOSTNAME
  - PATH
  - COLUMNS
  - USER
  - LANG

User-Defined Variable

- Variables that we define
- Working with variables
  - Direct assigning values
  - Set value



Operations on Variables

- read- To take input for variables
- Length of a variable

```
#read
read a
echo $a
read -p "Do you like music?" ans

#Length of a variable
a=Hello
echo ${#a}
```

Special Variables

- These are the special shell variables that are set internally by the shell and which are available for the user:

Variables	Description
$0	The name of the current script.
$$	The process id of the current shell.
$@	Stores the list of arguments as an array.
$?	Specifies the exit status of the last command or the most recent execution process.
$!	Shows the pid of the last background command.

Comment

- Annotation in code/explanation

```
#Single Line Comment

: '
This
is
Multi-Line
Comment
'

<<COMMENT
Another way to write
Multi-Line Comment
COMMENT
```

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Basic Operators

- Some basic operators in bash/shell scripting:

Arithmetic Operators

File Test Operators

Boolean Operators

Conditional Operators

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Arithmetic Operators

Operator	Description
+	Addition
-	Substraction
*	Multiplication
/	Division
**	Exponentiation
%	Modulo

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Arithmetic Operators

Operator	Description
+=	Increment
-=	Decrement
*=	Multiply by Constant
/=	Divide by Constant
%=	Remainder of Dividing by Constant

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Conditional Operators

Operator	Description
-eq (==)	Returns true if two numbers are equivalent
-lt (<)	Returns true if a number is less than another number
-gt (>)	Returns true if a number is greater than another number
-le (<=)	Returns true if two strings are equivalent
-ge (>=)	Returns true if two strings are not equivalent
-ne (!=)	Returns true if two numbers are not equivalent

Conditional Statements

- if statement

  Syntax :

```
if [ expression ] # (( expression ))
then
    <statement>
fi
```

Conditional Statements

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if-else statement

```
if [ expression ]
then
    statement1
else
    statement2
fi
```

if-elif-else statement

```
if [ expression ]
then
    statement1
elif [ expression ]
then
    statement2
else
    statement3
fi
```

nested if statement

```
if [ expression ]
then
    if [ expression ]
    then
        statement1
    fi
fi
```

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Boolean Operators

Operator	Description	Example
!	logical negation	[! false] is true.
-o	logical OR	[$a -lt 20 -o $b -gt 100] is true.
-a	logical AND.	[$a -lt 20 -a $b -gt 100] is false.

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Array in Shell Scripts

- Data Structure consisting of collection of Elements
- Initialization of an array

```
a=('Welcome' 'To' 'Bash' 5)

echo ${a[0]} ${a[2]} ${a[1]}

echo ${a[@]}

echo ${!a[@]}

echo ${#a[@]}
```

Loops and Functions

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For Loop

- The for loop is used when you are looping through a range of variables.
- Syntax:

```
for (( START; END; OPERATION ))
do
    command1
    command2
done
```

While Loop

- The while loop is used when you are looping until some condition is false
- Syntax:

Until Loop

- Sometimes you need to execute a set of commands until a condition becomes true.
  This is exactly the opposite of a while loop.
- Syntax:

Loop Control

- Break:
  The break statement is used to terminate the execution of the entire loop.

- Continue:
  The continue statement is used to skip the current iteration rather than breaking the entire loop.

Functions

- A function is a block of structured, reusable code that is used to perform a single, related task whenever it is required.

- Syntax :

```
function_name () {

list of commands

}
```

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Automation Demo

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Thank You!!