

Experiment 6: Shell Loops

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Aim:

- To understand and implement shell loops (**for**, **while**, **until**) in Bash.
- To practice loop control constructs (**break**, **continue**) and loop-based file processing.

Requirements

- A Linux system with bash shell.
- A text editor (nano, vim) and permission to create and execute shell scripts.

Theory

Loops allow repeated execution of commands until a condition is met. Common loop constructs in Bash include **for** (iterate over items), **while** (repeat while condition true), and **until** (repeat until condition becomes true). Loop control statements like **break** and **continue** change the flow inside loops. Loops are essential for automating repetitive tasks such as processing multiple files, generating sequences, and collecting user input.

Procedure & Observations

Exercise 1: Simple **for** loop

Task Statement:

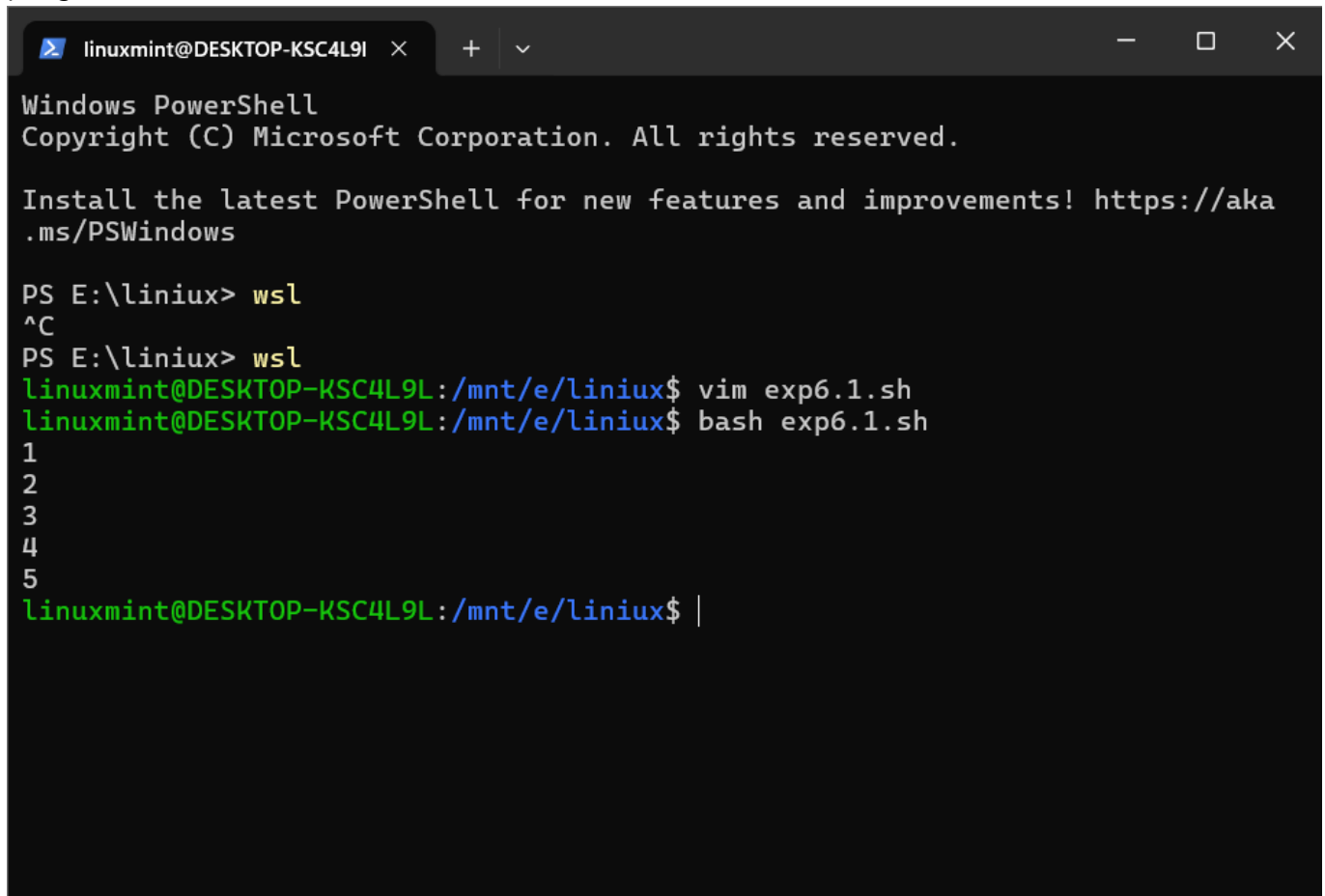
Write a **for** loop that prints numbers 1 to 5.

Command(s):

```
for i in 1 2 3 4 5; do
    echo "Number: $i"
done
```

Output:

p align="center">



```
linuxmint@DESKTOP-KSC4L9L  x  +  v
Windows PowerShell
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Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS E:\linux> wsl
^C
PS E:\linux> wsl
linuxmint@DESKTOP-KSC4L9L:/mnt/e/linux$ vim exp6.1.sh
linuxmint@DESKTOP-KSC4L9L:/mnt/e/linux$ bash exp6.1.sh
1
2
3
4
5
linuxmint@DESKTOP-KSC4L9L:/mnt/e/linux$ |
```

Exercise 2: **for** loop over files

Task Statement:

Process all **.txt** files in a directory and count lines in each.

Command(s):

```
for f in *.txt; do
    echo "File: $f - Lines: $(wc -l < "$f")"
done
```

Output:

```
linuxmint@DESKTOP-KSC4L9L:/mnt/e/liniux$ vim exp6.2.sh
linuxmint@DESKTOP-KSC4L9L:/mnt/e/liniux$ bash exp6.2.sh
Usage: exp6.2.sh <directory_path>
linuxmint@DESKTOP-KSC4L9L:/mnt/e/liniux$ vim exp6.2.sh
linuxmint@DESKTOP-KSC4L9L:/mnt/e/liniux$ bash exp6.2.sh
File: backup_file.txt - Lines: 0
File: config.txt - Lines: 2
File: dated_file.txt - Lines: 0
wc: 'standard input': Is a directory
File: exper.txt - Lines: 0
File: fil.txt - Lines: 0
wc: 'standard input': Is a directory
File: file1.txt - Lines: 0
wc: 'standard input': Is a directory
File: hii.txt - Lines: 0
File: logfile.txt - Lines: 0
File: newfile.txt - Lines: 0
wc: 'standard input': Is a directory
File: readme.txt - Lines: 0
File: summary.txt - Lines: 4
File: system.txt - Lines: 1
File: system_info.txt - Lines: 22
wc: 'standard input': Is a directory
File: todo.txt - Lines: 0
wc: 'standard input': Is a directory
File: touch.txt - Lines: 0
linuxmint@DESKTOP-KSC4L9L:/mnt/e/liniux$ |
```

Exercise 3: C-style **for** loop

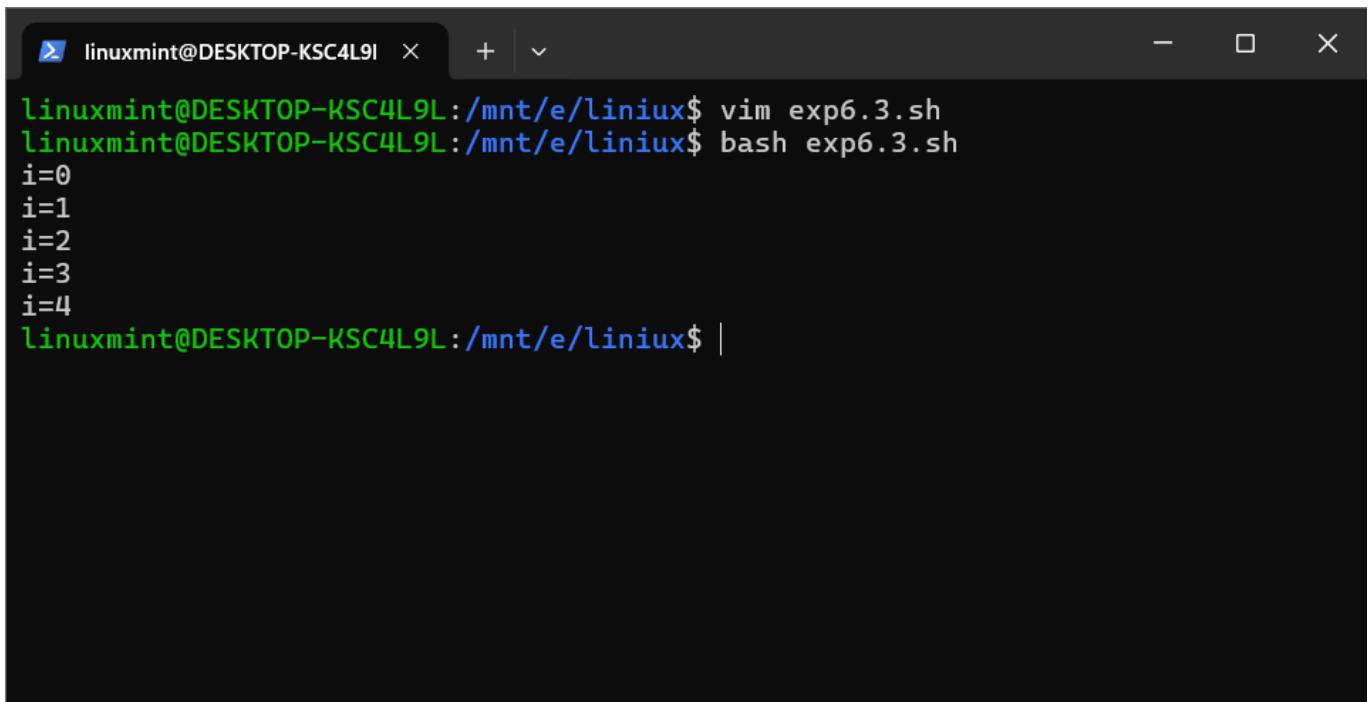
Task Statement:

Use arithmetic C-style loop for numeric iteration.

Command(s):

```
for ((i=0;i<5;i++)); do
    echo "i=$i"
done
```

Output:

A terminal window with a dark background. The title bar shows 'linuxmint@DESKTOP-KSC4L9L' and window control buttons. The terminal shows a user editing a file 'exp6.3.sh' with 'vim' and then running it with 'bash'. The script prints a sequence of numbers from 0 to 4, and the prompt returns to the user.

```
linuxmint@DESKTOP-KSC4L9L:/mnt/e/linux$ vim exp6.3.sh
linuxmint@DESKTOP-KSC4L9L:/mnt/e/linux$ bash exp6.3.sh
i=0
i=1
i=2
i=3
i=4
linuxmint@DESKTOP-KSC4L9L:/mnt/e/linux$ |
```

Exercise 4: **while** loop and reading input

Task Statement:

Write a **while** loop that reads lines from a file or from user input.

Command(s):

```
# Read from file
while read -r line; do
    echo "Line: $line"
done < sample.txt

# Read from user with exit condition
while true; do
    read -p "Enter a number (0 to exit): " n
    if [[ $n -eq 0 ]]; then
        echo "Exiting..."; break
    fi
    echo "You entered: $n"
done
```

Output:

```
linuxmint@DESKTOP-KSC4L9L: /mnt/e/linux$ vim exp6.4.sh
linuxmint@DESKTOP-KSC4L9L: /mnt/e/linux$ bash exp6.4.sh
exp6.4.sh: line 5: sample.txt: No such file or directory
Enter a number (0 to exit): 1
You entered: 1
Enter a number (0 to exit): 6
You entered: 6
Enter a number (0 to exit): 3
You entered: 3
Enter a number (0 to exit): 0
Exiting...
linuxmint@DESKTOP-KSC4L9L: /mnt/e/linux$ |
```

Exercise 5: `until` loop

Task Statement:

Use an `until` loop to run until a condition becomes true.

Command(s):

```
count=1
until [ $count -gt 5 ]; do
    echo "count=$count"
    ((count++))
done
```

Output:

```
linuxmint@DESKTOP-KSC4L9L: /mnt/e/linux$ vim exp6.5.sh
linuxmint@DESKTOP-KSC4L9L: /mnt/e/linux$ bash exp6.5.sh
count=1
count=2
count=3
count=4
count=5
linuxmint@DESKTOP-KSC4L9L: /mnt/e/linux$ |
```

Exercise 6: **break** and **continue**

Task Statement:

Demonstrate **break** and **continue** inside a loop.

Command(s):

```
for i in {1..10}; do
  if [[ $i -eq 5 ]]; then
    echo "Reached 5, breaking"; break
  fi
  if (( i % 2 == 0 )); then
    echo "Skipping even $i"; continue
  fi
  echo "Processing $i"
done
```

Output:

```
linuxmint@DESKTOP-KSC4L9L: /mnt/e/linux$ vim exp6.6.sh
linuxmint@DESKTOP-KSC4L9L: /mnt/e/linux$ bash exp6.6.sh
Processing 1
Skipping even 2
Processing 3
Skipping even 4
Reached 5, breaking
linuxmint@DESKTOP-KSC4L9L: /mnt/e/linux$ |
```

Exercise 7: Nested loops

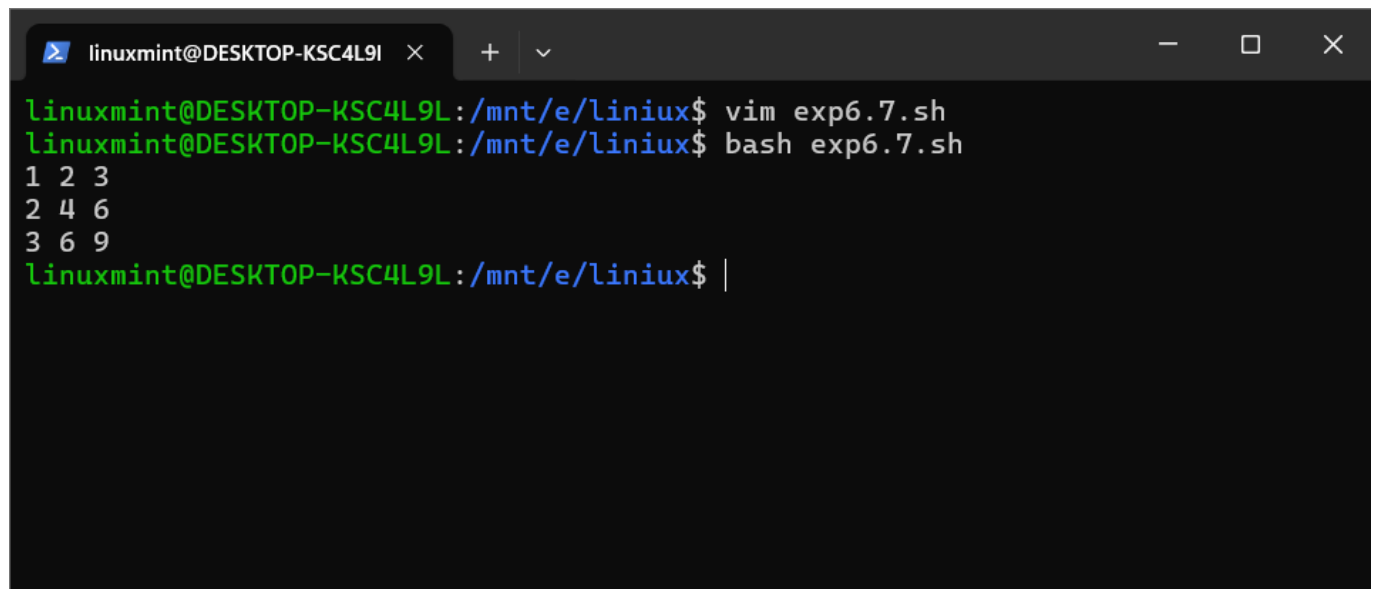
Task Statement:

Create nested loops to generate a multiplication table.

Command(s):

```
for i in {1..3}; do
  for j in {1..3}; do
    echo -n "${i*j}) "
  done
done
echo
```

Output:

A terminal window titled 'linuxmint@DESKTOP-KSC4L9I' with standard window controls. The terminal shows the following commands and output:

```
linuxmint@DESKTOP-KSC4L9I:/mnt/e/linux$ vim exp6.7.sh
linuxmint@DESKTOP-KSC4L9I:/mnt/e/linux$ bash exp6.7.sh
1 2 3
2 4 6
3 6 9
linuxmint@DESKTOP-KSC4L9I:/mnt/e/linux$ |
```

Result

- Implemented `for`, `while`, and `until` loops and used loop control statements.
- Practiced reading input, processing files, and nested iteration.

Challenges Faced & Learning Outcomes

- Challenge 1: Handling spaces and special characters when iterating filenames — learned to use quotes and `read -r`.
- Challenge 2: Remembering arithmetic syntax in Bash — used `(())` and `expr` where needed.

Learning:

- Loops are powerful for automation in shell scripting. Correct quoting and use of control constructs prevent common bugs.

Conclusion

The lab demonstrated practical loop constructs in Bash for automating repetitive tasks and processing data efficiently.