Practical Algorithms and Sums Assignment

1.Pascal_Triangle

Step 1: Create a directory names Algos

```
santhosh@ccb228d15332571:~$ mkdir algos
santhosh@ccb228d15332571:~$ touch pascal_triangle.sh
```

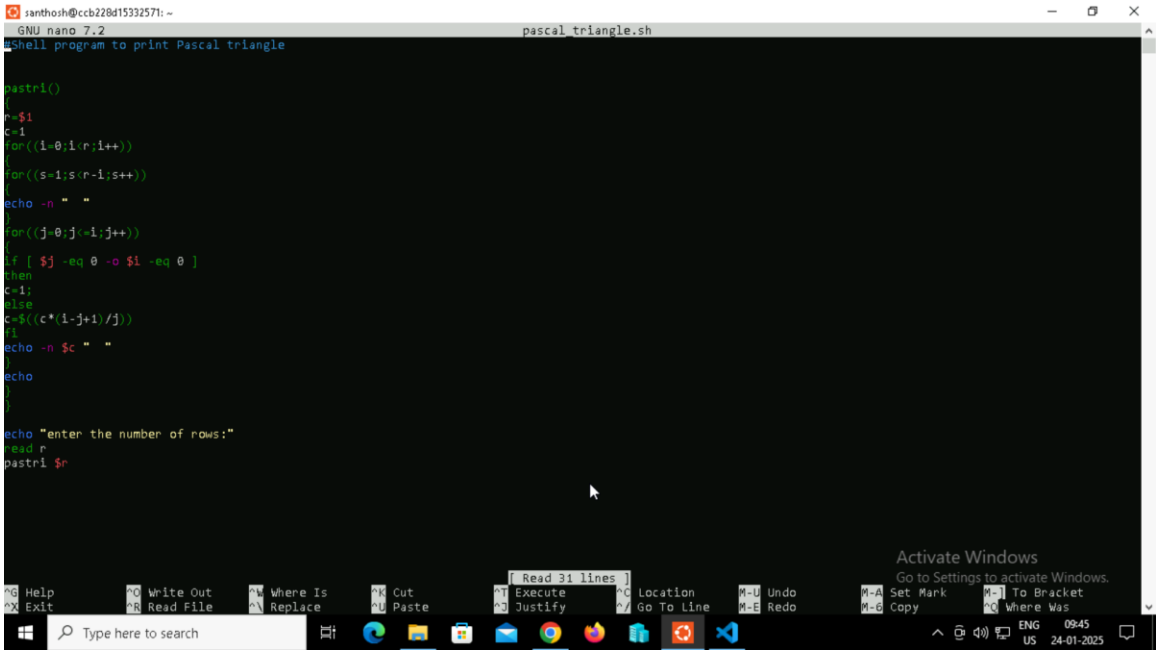
Step 2: Editing the saved Pascal_triangle File using nano command.

```
santhosh@ccb228d15332571:~$ nano pascal_triangle.sh
```

Step 3: Providing the Pascal_triangle shell script**.**

Purpose: The purpose of this shell script is to generate and display a Pascal triangle for a given number of rows.

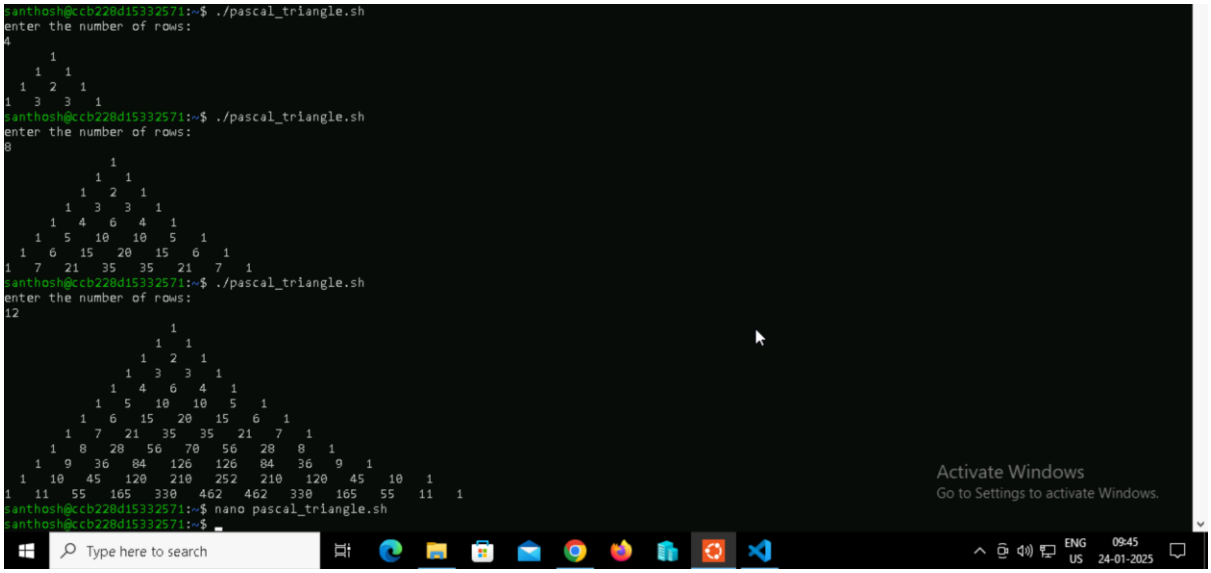
- pastri() defines the Pascal triangle generation function.
- It uses r=$1 to accept the number of rows as an argument.
- The loop for((i=0;i<r;i++)) iterates through the number of rows.
- The loop for((s=1;s<r-i;s++)) ensures proper formatting by adding spaces to center the triangle.
- The loop for((j=0;j<=i;j++)) calculates the binomial coefficients for each position in the row.
- If the current element is the first element of the row, its value is set to 1.
- For other elements, the binomial coefficient is calculated using:
- The computed value is printed using echo -n, which prevents a newline from being added after each value, ensuring they appear on the same row.
- A newline is added at the end of each row using echo.
- The script prompts the user to enter the number of rows using read r.
- The user-provided input is passed as an argument to the pastri function.



Step 4: Provide the execute permission to the file.

```
santhosh@ccb228d15332571:~$ chmod +x pascal_triangle.sh
santhosh@ccb228d15332571:~$ ./pascal_triangle.sh
```

Step 5: Output



2.Personal Message

Step 1: Touch a file name Personal message and edit it.

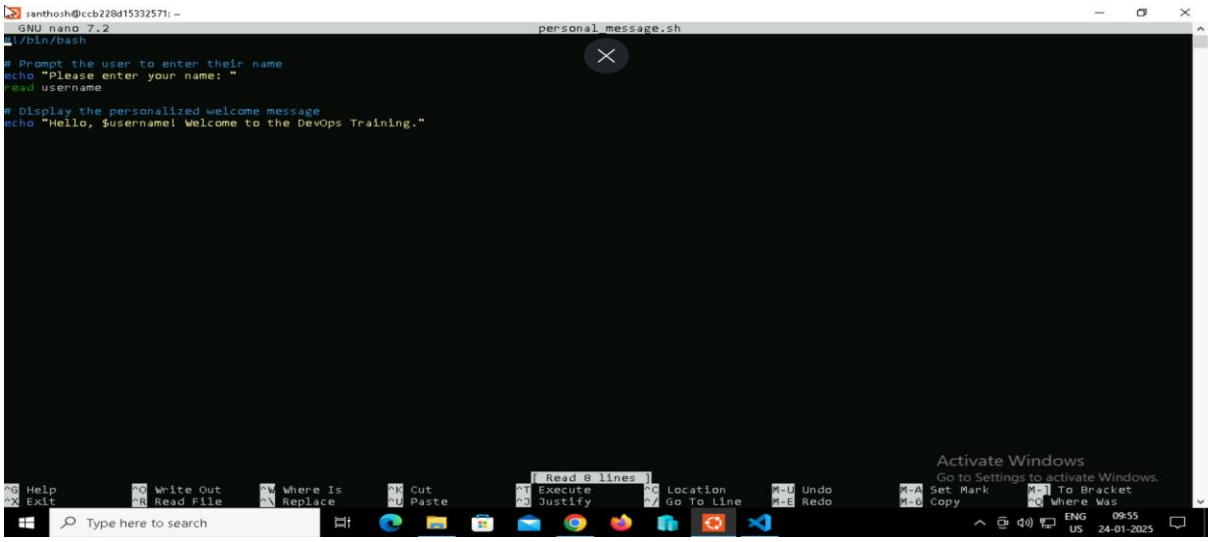
```
santhosh@ccb228d15332571:~$ touch personal_message.sh
santhosh@ccb228d15332571:~$ nano personal_message.sh
```

Step 2: Provide the shell script inside the file.

Purpose: This document explains a simple shell script that interacts with the user by asking for their name and greeting them with a personalized message.

Shebang (#!/bin/bash):

- Specifies that the script should be executed in the bash shell.
- The echo "lease enter your name" command displays a message prompting the user to input their name.
- The read Username command takes the user input and stores it in the variable Username.
- The echo "Hello $Username! Welcome to the DevOps Training." command uses string interpolation to include the user's input in the greeting message.



Step 3: Run the shell Script.

```
santhosh@ccb228d15332571:~$ ./personal_message.sh
Please enter your name:
Santhosh
```

Step 4: Output

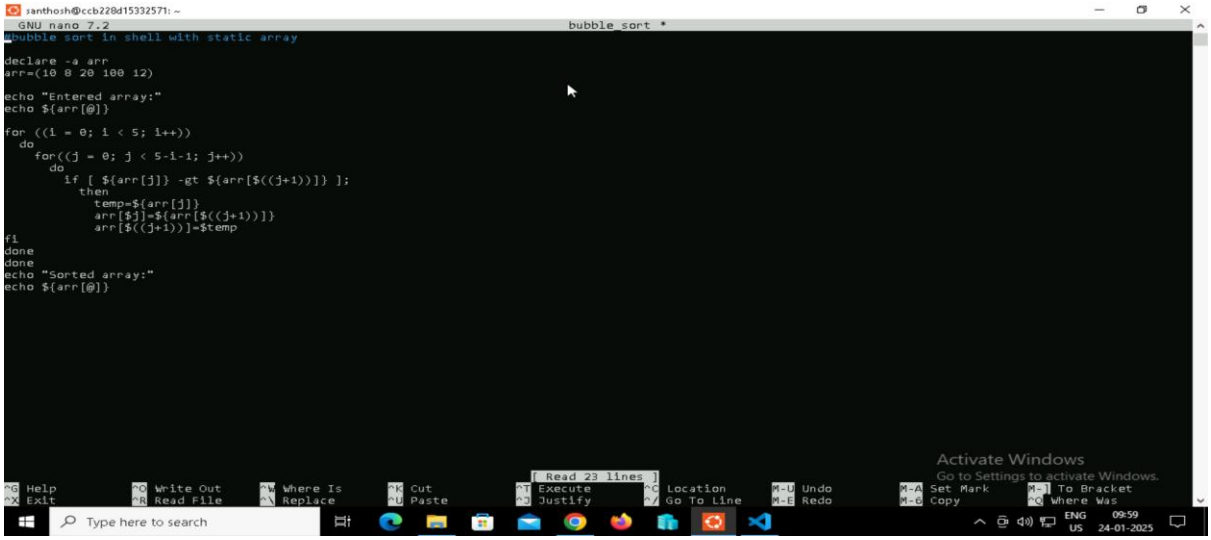
```
santhosh@ccb228d15332571:~$ ./personal_message.sh
Please enter your name:
Santhosh
Hello, Santhosh! Welcome to the DevOps Training.
```

3.Bubble Sort

Step 1: Touch a file name bubble_sort and edit it

```
santhosh@ccb228d15332571:~$ touch bubble_sort
santhosh@ccb228d15332571:~$ nano bubble_sort
```

Step 2: Provide the shell script inside the file.



Step 3: Run the shell Script after providing permissions to execute using chmod.

```
santhosh@ccb228d15332571:~$ chmod +x bubble_sort
santhosh@ccb228d15332571:~$ ./bubble.sort
```

Step 4: Output

```
santhosh@ccb228d15332571:~$ ./bubble_sort
Entered array:
10 8 20 100 12
Sorted array:
8 10 12 20 100
```

4.Reverse_nums

Step 1: Touch a file name Reverse_nums and edit it

```
santhosh@ccb228d15332571:~$ touch reverse_nums
santhosh@ccb228d15332571:~$ nano reverse_nums
```

Step 2: Provide the shell script inside the file.

```
GNU nano 7.2                    reverse_nums
#!/bin/bash

# Check if the user has provided an input number
if [ -z "$1" ]; then
    echo "Please provide a number as an argument."
    exit 1
fi

n=$1

# Ensure the input is a valid integer
if ! [[ "$n" =~ ^[0-9]+$ ]]; then
    echo "Please provide a valid integer."
    exit 1
fi

rev=0
sd=0

while [ $n -gt 0 ]
do
    # Get the last digit
    sd=$((n % 10))

    # Update reverse number
    rev=$((rev * 10 + sd))

    # Remove the last digit from the number
    n=$((n / 10))
done

echo "Reverse Number is $rev"
```

Step 3: Run the shell Script after providing permissions to execute using chmod.

```
santhosh@ccb228d15332571:~$ chmod +x reverse_nums
```

Step 4: Output

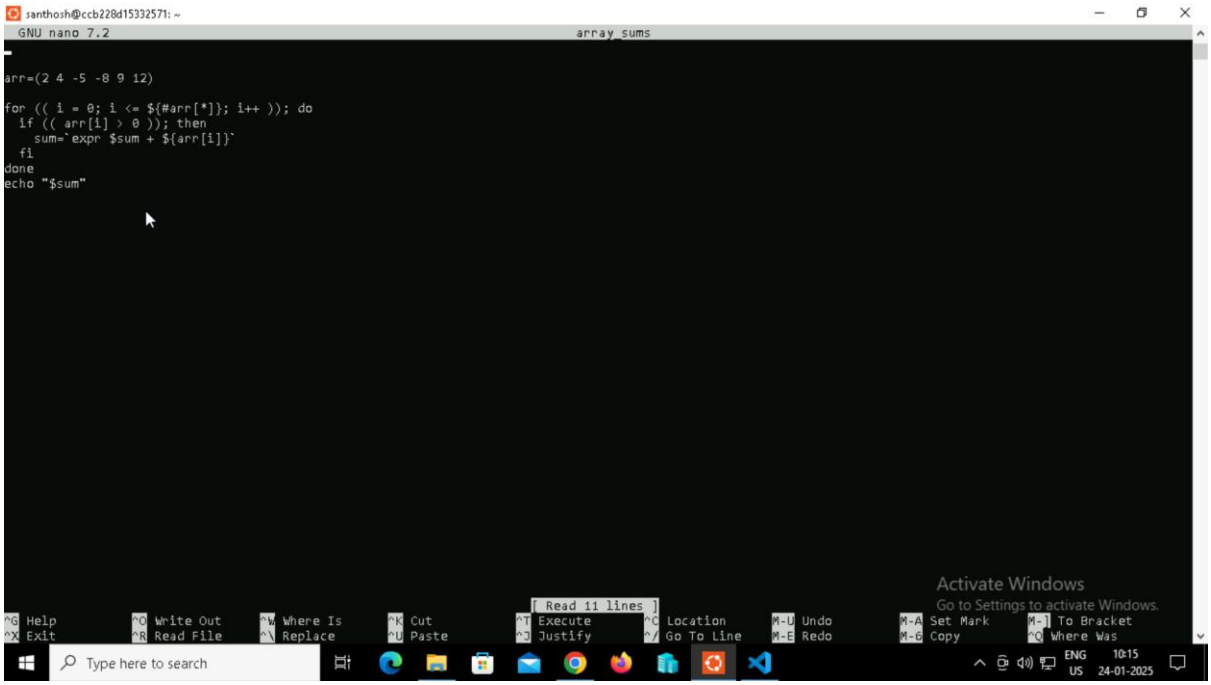
```
santhosh@ccb228d15332571:~$ ./reverse_nums 98765
Reverse Number is 56789
```

5.Array_sums

Step 1: Touch a file name Array_sums and edit it

```
santhosh@ccb228d15332571:~$ touch array_sums
santhosh@ccb228d15332571:~$ nano array_sums
```

Step 2: Provide the shell script inside the file.



Step 3: Run the shell Script after providing permissions to execute using chmod.

```
santhosh@ccb228d15332571:~$ chmod +x array_sums
```

Step 4: Output

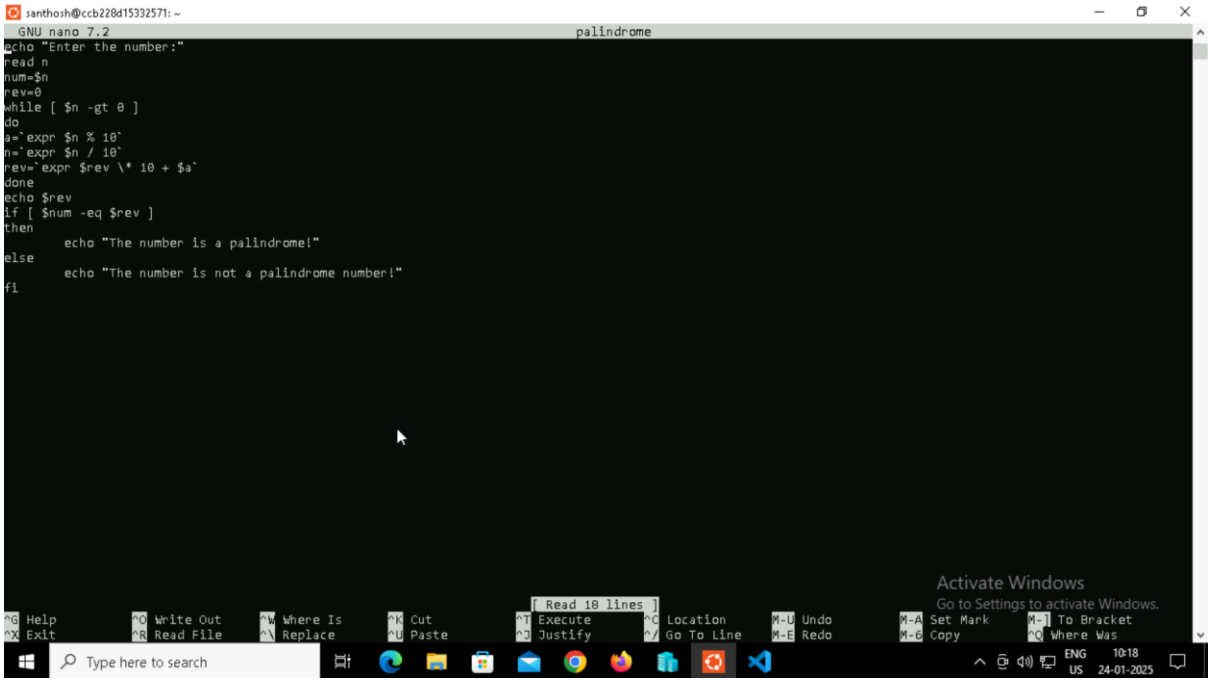
```
santhosh@ccb228d15332571:~$ ./array_sums
27
```

6.Palindrome

Step 1: Touch a file name Palindrome and edit it

```
santhosh@ccb228d15332571:~$ touch palindrome
santhosh@ccb228d15332571:~$ nano palindrome
```

Step 2: Provide the shell script inside the file.



Step 3: Run the shell Script after providing permissions to execute using chmod.

```
santhosh@ccb228d15332571:~$ chmod +x  palindrome
```

Step 4: Output

```
santhosh@ccb228d15332571:~$ ./palindrome
Enter the number:
12345
54321
The number is not a palindrome number!
```

7. Arithmetic

Shell Script: Integer Addition with Input Validation

Step 1: Create a directory first using mkdir sum and change the directory to the sum directory.

```
santhosh@ccb228d15332571: ~/Demo/sum
santhosh@ccb228d15332571:~/Demo$ mkdir sum
santhosh@ccb228d15332571:~/Demo$ cd sum
```

Step 2: Touch and nano a file named arithmetic.sh

```
santhosh@ccb228d15332571:~/Demo/sum$ touch arithmetic.sh
santhosh@ccb228d153325 :~/Demo/sum$ nano arithmetic.sh
```

Step 3: Code Purpose

1. Prompts the user: Asks the user to enter two integer values.

2. Input Validation: Checks if the user provided input for both values. If either input is empty, an error message is displayed, and the script exits.

3. Calculates Sum: Calculates the sum of the two input integers using the bc command for arbitrary precision arithmetic. Calculates the sum using the expr command for basic integer arithmetic.

4. Displays Results: Prints the calculated sum using both bc and expr.

```
santhosh@ccb228d15332571:~/Demo/sum$ cat arithmetic.sh
#Shell program to add two integer values
#and check if any input is given or not



#!/usr/bin/bash
read -p "Input1 : " inp1
if [[ -z $inp1 ]]
then
        echo "Input 1 cannot be empty, plese enter an integer."
        exit
fi

read -p "Input2 : " inp2
if [[ -z $inp2 ]]
then
        echo "Input 2 cannot be empty, please enter an integer."
        exit
fi

bc_val=`echo "$inp1+$inp2" | bc`
echo "BC Value : $bc_val"

expr_val=`expr $inp1 + $inp2`
echo "EXPR Value : $expr_val"

santhosh@ccb228d15332571:~/Demo/sum$
```

Step 4: Code Explanation • #!/usr/bin/bash specifies that the script should be executed with the Bash interpreter. • read -p "Input1 : " inp1: Prompts the user

to enter the first integer and stores it in the inp1 variable. • read -p "Input2 : " inp2: Prompts the user to enter the second integer and stores it in the inp2 variable. • if [[-z $inp1]]: Checks if inp1 is empty. If empty, displays an error message and exits with an error code (1). • if [[-z $inp2]]: Checks if inp2 is empty. If empty, displays an error message and exits with an error code (1). • bc_val=$(echo "$inp1 + $inp2" | bc): Uses the bc command to calculate the sum with arbitrary precision and stores the result in bc_val. • expr_val=$(expr $inp1 + $inp2): Uses the expr command to calculate the sum with basic integer arithmetic and stores the result in expr_val. • echo "BC Value : $bc_val": Displays the sum calculated using bc. • echo "EXPR Value : $expr_val": Displays the sum calculated using expr.

Step 5: Running the file using ./arithmetic.sh

```
santhosh@ccb228d15332571:~/Demo/sum$ ./arithmetic.sh
-bash: ./arithmetic.sh: Permission denied
```

Step 6: Providing the execut permissions to the arithmetic shell file.

```
santhosh@ccb228d15332571:~/Demo/sum$ chmod +x arithmetic.sh
```

Step 7: Output of the shell script.

```
santhosh@ccb228d15332571:~/Demo/sum$ ./arithmetic.sh
Input1 : 12
Input2 : 14
BC Value : 26
EXPR Value : 26
```