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OPERATING SYSTEM LAB

BCSC-0803

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Basics of linux commands....

A screenshot of a CoCalc terminal window titled "2024-04-24-terminal-2.term". The terminal shows the following command being run:

```
$ history
```

The output of the command is:

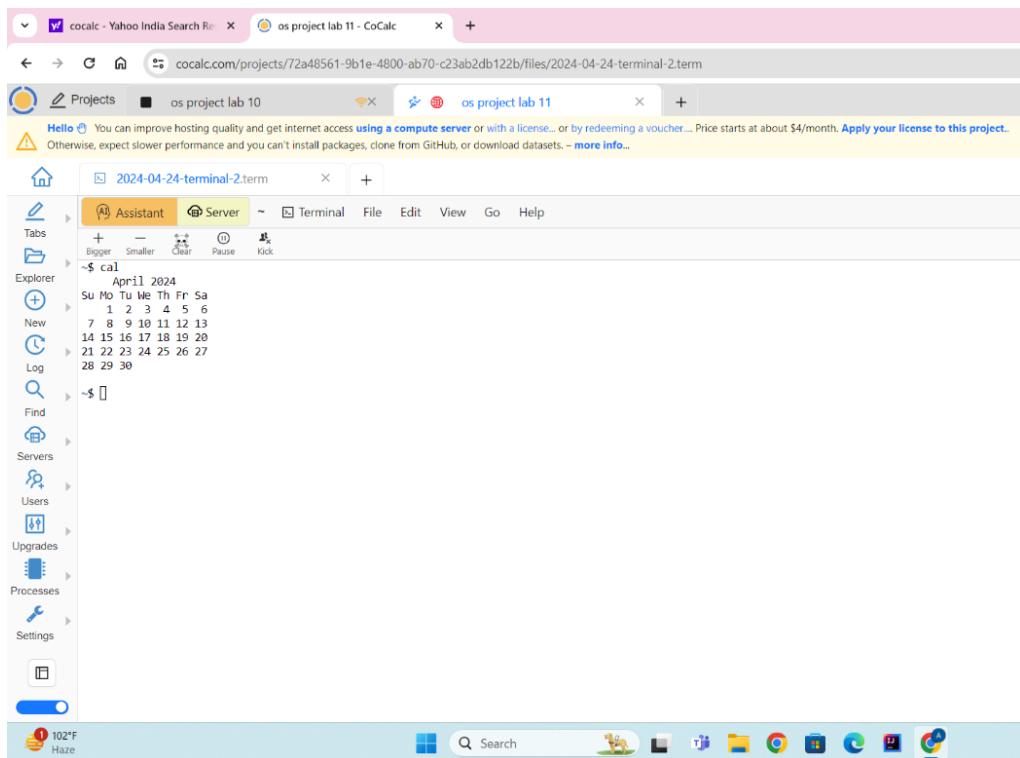
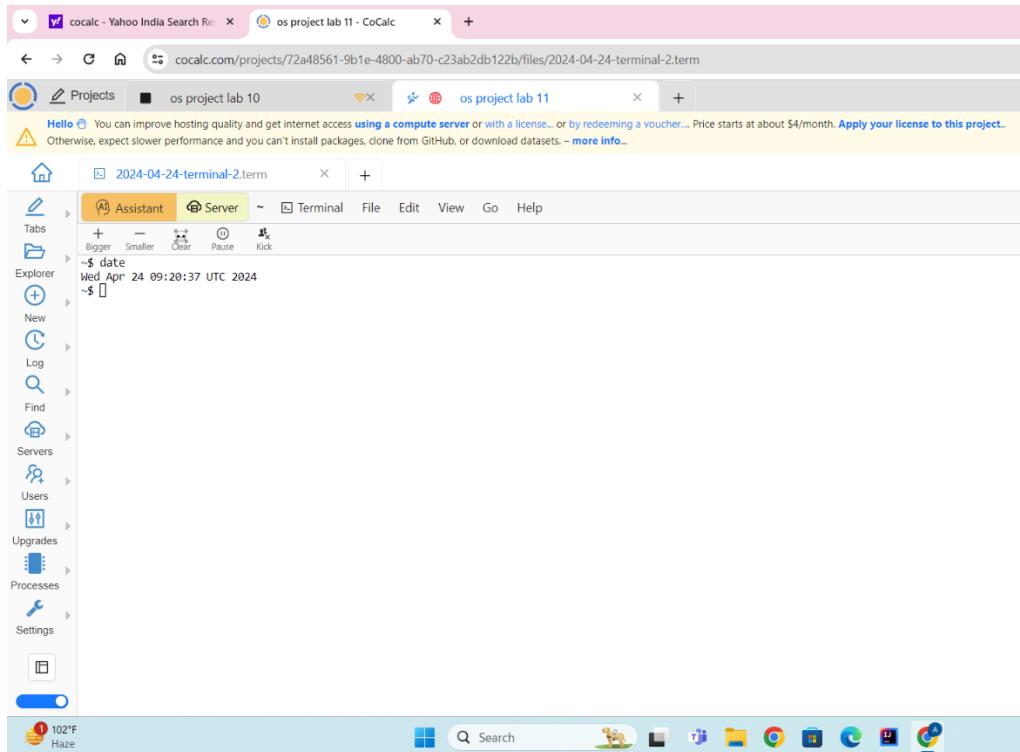
- 1 man
- 2 clear
- 3 man mkdir
- 4 clear
- 5 ls
- 6 clear
- 7 history

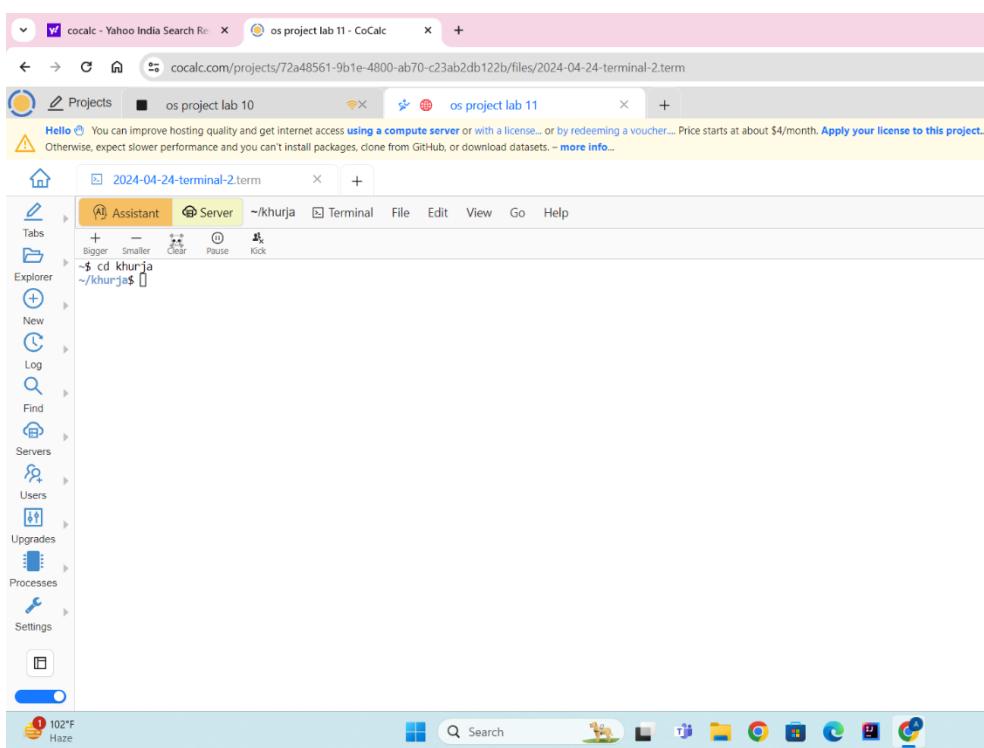
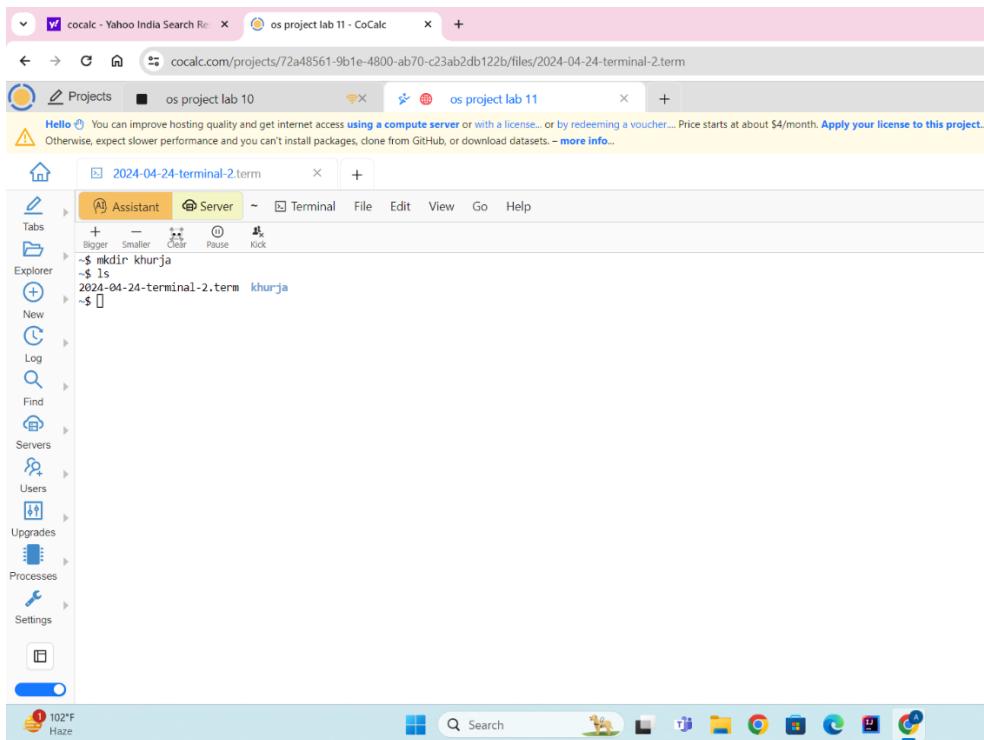
A screenshot of a CoCalc terminal window titled "2024-04-24-terminal-2.term". The terminal shows the following command being run:

```
$ history
```

The output of the command is:

- 1 man
- 2 clear
- 3 man mkdir
- 4 clear
- 5 ls
- 6 clear
- 7 history





A screenshot of a CoCalc terminal window titled "2024-04-24-terminal-2.term". The terminal interface includes a sidebar with "Projects", "Tabs", "New", "Log", "Find", "Servers", "Users", "Upgrades", "Processes", and "Settings". The main area shows a command-line session:

```
~/khurja$ cd ..
```

A screenshot of a CoCalc terminal window titled "2024-04-24-terminal-2.term". The terminal interface includes a sidebar with "Projects", "Tabs", "New", "Log", "Find", "Servers", "Users", "Upgrades", "Processes", and "Settings". The main area shows a command-line session:

```
~/khurja$ touch kanika
~/khurja$ cat kanika
$
```

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cocalc.com/projects/72a48561-9b1e-4800-ab70-c23ab2db122b/files/2024-04-24-terminal-2.term

Projects os project lab 10 os project lab 11

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Home 2024-04-24-terminal-2.term +

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+ Bigger Smaller Clear Pause Kick

```
-$ cat > kanika
hello dear
how are you?
```

Explorer New Log Find Servers Users Upgrades Processes Settings

102°F Haze

This screenshot shows a terminal session in a CoCalc workspace. The terminal window title is '2024-04-24-terminal-2.term'. The user has run the command 'cat > kanika', which creates a file named 'kanika'. The contents of the file are 'hello dear' and 'how are you?'. The terminal interface includes tabs for Assistant and Server, and standard file operations like Open, Save, and Delete.

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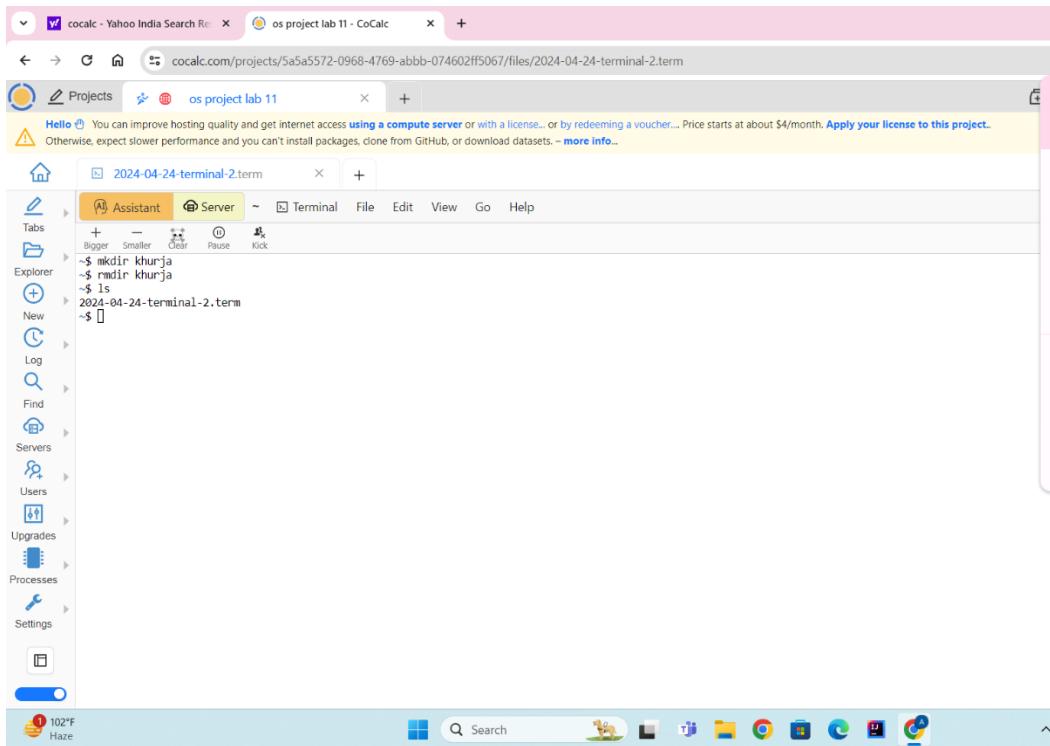
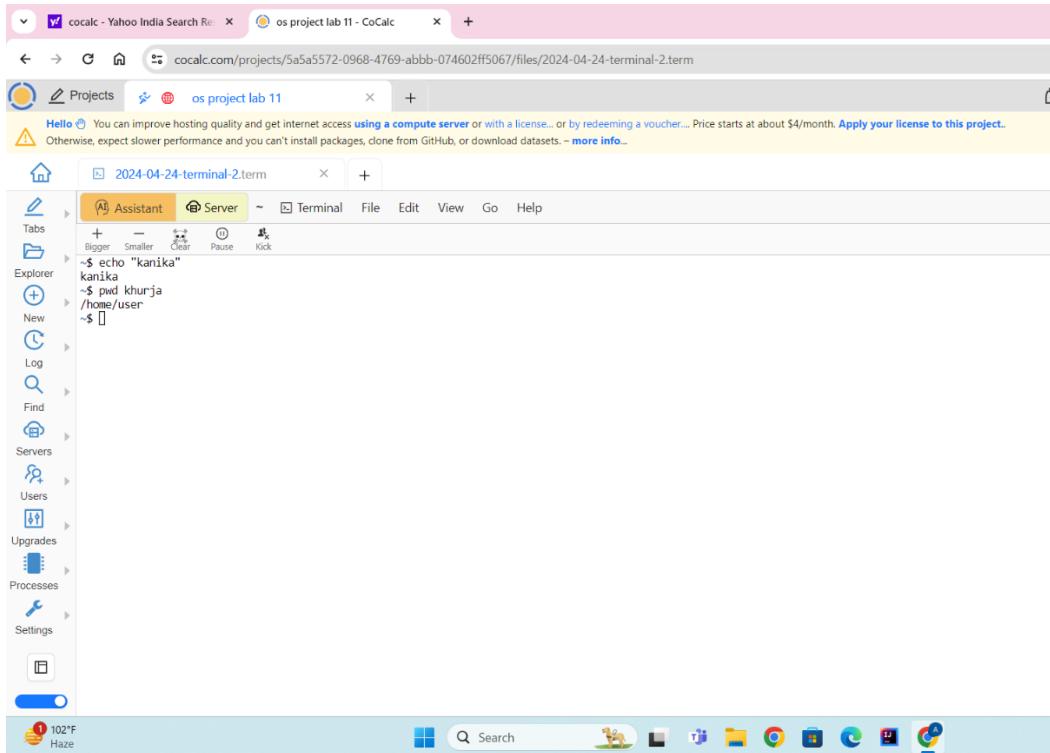
+ Bigger Smaller Clear Pause Kick

```
-$ echo "kanika"
kanika
-$
```

Explorer New Log Find Servers Users Upgrades Processes Settings

102°F Haze

This screenshot shows another terminal session in a CoCalc workspace. The terminal window title is '2024-04-24-terminal-2.term'. The user has run the command 'echo "kanika"', which outputs the string 'kanika'. The terminal interface is identical to the one in the first screenshot, with tabs for Assistant and Server, and standard file operations.



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```
$ cat > kanika
hello dear
^C
$ mv kanika abhilasha
$ cp abhilasha garg1
```

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```
$ cat > kanika
hello dear
^C
$ mv kanika abhilasha
$ cp abhilasha garg1
$ cat garg1
hello dear
```

The screenshot shows a CoCalc terminal window titled "2024-04-24-terminal-2.term". The terminal interface includes tabs for Assistant and Server, with the Server tab currently active. The terminal content displays a session in the vi editor:

```
-\$ vi abhilasha
-> cat abhilasha
hello dear
how are you?
-> 
```

The left sidebar contains various project management and system navigation icons and links, such as Projects, Tabs, Explorer, Log, Find, Servers, Users, Upgrades, Processes, Settings, and a status indicator for "Haze".

Sum and Average of N number...

The screenshot shows a CoCalc interface with a terminal window titled "2024-04-30-terminal-2.term". The terminal content is as follows:

```
#!/bin/bash
sum=0
average=0
count=0
read -p "Enter the number of elements: " N
for ((i=1; i<=$N; i++))
do
    read -p "Enter element $i: " num
    sum=$((sum + num))
    count=$((count + 1))
done
average=$(echo "scale=2; $sum / $N" | bc)
echo "Sum of the numbers: $sum"
echo "Average of the numbers: $average"
```

The terminal output shows the variables being initialized and updated, followed by the final sum and average calculations.

The screenshot shows a CoCalc interface with a terminal window titled "2024-04-30-terminal-2.term". The terminal content is as follows:

```
$ vi sum
$ chmod 752 sum
$ ./sum
Enter the number of elements: 5
Enter element 1: 5
Enter element 2: 4
Enter element 3: 3
Enter element 4: 6
Enter element 5: 7
./sum: line 16: bc: command not found
Sum of the numbers: 25
Average of the numbers:
$
```

The terminal output shows the user entering five numbers, but the bc command used for calculation is not found, resulting in an error message.

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cocalc.com/projects/04164de2-1389-49e6-98a2-7d08ba99d37d/files/2024-04-30-terminal-2.term

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```
# Find the largest number
echo "Enter numbers:"
read -a numbers
largest=${numbers[0]}
for num in "${numbers[@]}"; do
    if ((num > largest)); then
        largest=$num
    fi
done
echo "The largest number is $largest"

# Find the smallest number
smallest=${numbers[0]}
for num in "${numbers[@]}"; do
    if ((num < smallest)); then
        smallest=$num
    fi
done
echo "The smallest number is $smallest"
```

84°F Clear

This screenshot shows a terminal session in CoCalc. The user has written a shell script to prompt for a list of numbers, then iterate through them to find the maximum and minimum values. The script uses `read -a numbers` to store the input in an array, `largest` to track the current largest number, and a loop to compare each number against the current largest. It then prints the results. The terminal interface includes tabs, a sidebar with various project-related links, and a status bar at the bottom.

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cocalc.com/projects/04164de2-1389-49e6-98a2-7d08ba99d37d/files/2024-04-30-terminal-2.term

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2024-04-30-terminal-2.term x +

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```
$ vi larger
$ chmod 752 large
$ ./larger
bash: ./larger: Permission denied
$ chmod 752 larger
$ ./larger
Enter numbers:
$4 63 77
The largest number is 77
The smallest number is 54
$ vi larger
$ chmod 752 larger
$ ./larger
Enter numbers:
55 99 33
The largest number is 99
The smallest number is 33
$
```

84°F Clear

This screenshot shows a terminal session in CoCalc where the user has run the script. The output shows the script prompting for input, finding the maximum and minimum values, and then running again with different input. The terminal interface includes tabs, a sidebar with various project-related links, and a status bar at the bottom.

To find leap year or not....

The screenshot shows a web-based terminal interface from CoCalc. The terminal window is titled "2024-04-30-terminal-2.term". The code in the terminal is:

```
#!/bin/bash
echo "Enter a year:"
read year
if [ $((year % 4)) -eq 0 ]; then
    if [ $((year % 100)) -ne 0 ] || [ $((year % 400)) -eq 0 ]; then
        echo "$year is a leap year."
    else
        echo "$year is not a leap year."
    fi
else
    echo "$year is not a leap year."
fi
```

The terminal output shows the script being run:

```
"leap" 14L, 285B
```

The status bar at the bottom indicates "92°F Clear".

The screenshot shows a web-based terminal interface from CoCalc. The terminal window is titled "2024-04-30-terminal-2.term". The code in the terminal is:

```
$ vi leap
$ chmod 752 leap
$ ./leap
Enter a year:
2024
2024 is a leap year.
$ vi leap
$ chmod 752 leap
$ ./leap
Enter a year:
2025
2025 is not a leap year.
$
```

The status bar at the bottom indicates "USD/CNY +0.13%".

To find even or odd number...

The screenshot shows a CoCalc terminal window titled "2024-04-30-terminal-2.term". The terminal content is as follows:

```
#!/bin/bash
echo "Enter a number: "
read num
if [ $((num % 2)) -eq 0 ]; then
    echo "$num is even"
else
    echo "$num is odd"
```

The terminal output shows the script running and prompting for input. The user enters "odd" and the script outputs "odd" 10L, 130B.

The screenshot shows a CoCalc terminal window titled "2024-04-30-terminal-2.term". The terminal content is as follows:

```
$ vi odd
$ chmod 752 odd
$ ./odd
Enter a number:
24
24 is even
$ vi odd
$ chmod 752 odd
$ ./odd
Enter a number:
35
35 is odd
$
```

This version of the script uses the vi editor to edit the "odd" file, changes its permissions, and then runs it. It correctly identifies 24 as even and 35 as odd.

To find sum of N digits....

The screenshot shows a CoCalc terminal window titled "2024-04-30-terminal-2.term". The terminal interface includes tabs for Assistant and Server, and a menu bar with Terminal, File, Edit, View, Go, and Help. The terminal window displays a Bash script:

```
#!/bin/bash
sum=0
read -p "Enter the number of digits (N): " N
for ((i=1; i<=N; i++))
do
    read -p "Enter digit $i: " num
    sum=$((sum + num))
done
echo "Sum of the $N digits is: $sum"
```

The terminal output shows the script being run and the sum of digits being calculated.

The screenshot shows a CoCalc terminal window titled "2024-04-30-terminal-2.term". The terminal interface includes tabs for Assistant and Server, and a menu bar with Terminal, File, Edit, View, Go, and Help. The terminal window displays a Bash script:

```
#!/bin/bash
$ vi digits
$ chmod 752 digits
$ ./digits
Enter the number of digits (N): 5
Enter digit 1: 7
Enter digit 2: 9
Enter digit 3: 8
Enter digit 4: 6
Enter digit 5: 5
Sum of the 5 digits is: 35
$ vi digits
$ chmod 752 digits
$ ./digits
Enter the number of digits (N): 8
Enter digit 1: 3
Enter digit 2: 5
Enter digit 3: 9
Enter digit 4: 7
Enter digit 5: 6
Enter digit 6: 5
Enter digit 7: 2
Enter digit 8: 1
Sum of the 8 digits is: 38
$
```

The terminal output shows the script being run and the sum of digits being calculated for different values of N.

To find the Fibonacci series....

A screenshot of a web-based terminal interface from CoCalc. The terminal window is titled "2024-04-30-terminal-2.term". The code being run is:

```
#!/bin/bash
echo "Enter the number of terms in the Fibonacci series:"
read n
a=0
b=1
echo "The Fibonacci series is:"
for ((i=0;i<n;i++))
do
    echo -n "$a "
    fn=$((a + b))
    a=$b
    b=$fn
done
```

The terminal shows the script being typed in. The status bar at the bottom indicates "fibo" is 15L, 194B. The system tray shows a temperature of 92°F.

A screenshot of the same CoCalc terminal session after the script has been run. The terminal window is still titled "2024-04-30-terminal-2.term". The output of the script is displayed:

```
-s vi fibo
-s chmod 752 fibo
-s ./fib
Enter the number of terms in the Fibonacci series:
10
The Fibonacci series is:
0 1 1 2 3 5 8 13 21 34 ~$ vi fibo
~$
```

The terminal shows the completed series and the user's prompt again. The status bar at the bottom indicates "fibo" is 15L, 194B. The system tray shows a temperature of 92°F.

To find the factorial of number.

The screenshot shows a CoCalc terminal window titled "2024-04-30-terminal-2.term". The terminal content is a bash script for calculating factorial:

```
# Function to calculate factorial
factorial(){
    if [ $1 -le 1 ]; then
        echo 1
    else
        echo $(( $1 * $(factorial $(( $1 - 1 ))) ))
    fi
}

read -p "Enter a number: " num
result=$(factorial $num)
echo "The factorial of $num is: $result"
```

The terminal output is:

```
$ vi facto
$ chmod 752 facto
$ ./facto
Enter a number: 10
The factorial of 10 is: 3628800
$ chmod 752 facto
$ ./facto
Enter a number: 5
The factorial of 5 is: 120
$ vi facto
$
```

The screenshot shows a CoCalc terminal window titled "2024-04-30-terminal-2.term". The terminal content is a bash script for calculating factorial:

```
# Function to calculate factorial
factorial(){
    if [ $1 -le 1 ]; then
        echo 1
    else
        echo $(( $1 * $(factorial $(( $1 - 1 ))) ))
    fi
}

read -p "Enter a number: " num
result=$(factorial $num)
echo "The factorial of $num is: $result"
```

The terminal output is:

```
$ vi facto
$ chmod 752 facto
$ ./facto
Enter a number: 10
The factorial of 10 is: 3628800
$ chmod 752 facto
$ ./facto
Enter a number: 5
The factorial of 5 is: 120
$ vi facto
$
```

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84°F Clear

string" 6L, 91B

Search

Yahoo India Search Results

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os project 1 - CoCalc

2024-04-30-terminal-2.term

```
#!/bin/bash
echo "Enter a string: "
read input
echo "Length of the string is: ${#input}"
```

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Search

2024-04-30-terminal-2.term

```
$ vi string
$ chmod 752 string
$ ./string
Enter a string:
"hello world welcome to the linux"
Length of the string is: 35
$ vi string
$ chmod 752 string
$ ./string
Enter a string:
" welcome to cocalc"
Length of the string is: 20
$
```

To find the palindrome number.

The screenshot shows a web-based terminal interface from CoCalc. The terminal window is titled "2024-04-30-terminal-2.term". The code entered is:

```
#!/bin/bash
echo "Enter a number:"
read num
reverse=0
temp=$num
while [ $num -gt 0 ]
do
    remainder=$((num % 10))
    reverse=$((reverse * 10 + remainder))
    num=$((num / 10))
done
if [ $temp -eq $reverse ]
then
    echo "$temp is a palindrome"
else
    echo "$temp is not a palindrome"
fi
```

The output of the script is displayed below the code:

```
"palindrome" 211, 302B
```

The status bar at the bottom indicates "84°F Clear".

The screenshot shows a web-based terminal interface from CoCalc. The terminal window is titled "2024-04-30-terminal-2.term". The user has run the script and is now interacting with the terminal:

```
~$ vi palindrome
~$ chmod 752 palindrome
~$ ./palindrome
Enter a number:
121
121 is a palindrome
~$ chmod 752 palindrome
~$ ./palindrome
Enter a number:
765
765 is not a palindrome
~$ vi palindrome
~$
```

The status bar at the bottom indicates "84°F Clear".

Fork system call..

The screenshot shows a CoCalc workspace titled "os project 1". In the terminal window, a C program named "abhi.c" is being run. The code uses the fork() system call to differentiate between a parent process and a child process. The terminal output shows the parent process printing "This is the parent process\n" and the child process printing "This is the child process\n".

```
GNU nano 6.2
#include <stdio.h>
#include <stdlib.h>
#include <unistd.h>

int main() {
    pid_t pid;
    pid = fork();
    if (pid < 0) {
        fprintf(stderr, "Fork failed");
        return 1;
    } else if (pid == 0) {
        printf("This is the child process\n");
    } else {
        printf("This is the parent process\n");
    }
    return 0;
}
```

The screenshot shows the same CoCalc workspace and terminal window. After compilation with gcc, the program is run again. This time, the parent process prints "This is the parent process" and the child process prints "This is the child process".

```
$ nano abhi.c
$ gcc abhi.c
$ ./abhi.out
bash: ./abhi.out: No such file or directory
$ gcc abhi.c
$ ./a.out
This is the parent process
This is the child process
$ nano abhi.c
$ 
```

To display the time and date using exec system call

The screenshot shows a CoCalc terminal window titled "2024-04-30-terminal-2.term". The terminal content is as follows:

```
GNU nano 6.2
#include <stdio.h>
#include <stdlib.h>
int main() {
    system("date");
    system("date +%T");
    return 0;
}
```

The terminal output shows the current date and time:

```
-$ nano kanak.c
-$ gcc kanak.c
-$ ./a.out
Tue Apr 30 16:31:37 UTC 2024
16:31:37
-$ nano kanak.c
-$
```

The screenshot shows a CoCalc terminal window titled "2024-04-30-terminal-2.term". The terminal content is as follows:

```
GNU nano 6.2
#include <stdio.h>
#include <stdlib.h>
int main() {
    system("date");
    system("date +%T");
    return 0;
}
```

The terminal output shows the current date and time:

```
-$ nano kanak.c
-$ gcc kanak.c
-$ ./a.out
Tue Apr 30 16:31:37 UTC 2024
16:31:37
-$ nano kanak.c
-$
```