Operating Systems LAB

PAPER CODE	**:**	**CIC-353**
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MAHARAJA AGRASEN INSTITUTE OF TECHNOLOGY

Computer Science & Engineering Department

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"To be centre of excellence in education, research and technology transfer in the field of computer engineering and promote entrepreneurship and ethical values."

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To foster an open, multidisciplinary and highly collaborative research environment for producing world-class engineers capable of providing innovative solutions to real-life problems and fulfil societal needs.

LAB Assessment Sheet

S.No.	Experiment Name	M	A	R	K	S	Total Marks	Date of Perf.	Date of Check.	Signature
		R1	R2	R3	R4	R5				

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		R1	R2	R3	R4	R5				

Lab Exercise - 1

❖ AIM :: Introduction to Linux & vi-Editor

1. Introduction to Linux

- **What is Linux?**: Linux is a powerful and versatile open-source operating system based on the Unix architecture. It was created by Linus Torvalds in 1991 and has since grown into a widely-used platform for both personal and professional computing.
- **Open Source Nature**: One of the defining characteristics of Linux is that its source code is freely available for anyone to view, modify, and distribute. This has led to a collaborative environment where developers worldwide contribute to its development.
- **Kernel and Distributions**: Linux is composed of a kernel, which is the core component of the OS, and various distributions (distros) that bundle the kernel with software and package management systems. Popular distributions include Ubuntu, Fedora, Debian, and CentOS.
- **Linux in Different Environments**: Linux is used in a variety of environments, including desktops, servers, mobile devices, and embedded systems. Its flexibility allows it to run on a wide range of hardware, from supercomputers to small IoT devices.

2. Overview of the `vi` Editor

The `vi` (Visual Editor) is a powerful text editor available on almost all Unix-like operating systems, including Linux. It's known for its efficiency and versatility, particularly in environments where only a terminal interface is available. Here is a detailed look at the `vi` editor and its commands, presented in informative points.

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1. Basics of `vi` Editor

- **Launching** `vi`: To start `vi`, type `vi filename` in the terminal. If `filename` does not exist, `vi` will create it.
- **Modes in** `vi`:
  - **Normal Mode**: The default mode where you can navigate and manipulate text.
  - **Insert Mode**: Used for inserting text. Enter by pressing `i`, `a`, or `o`.
  - **Command Mode**: Enter by typing `:` in Normal Mode for commands like saving, quitting, etc.
  - **Visual Mode**: Used to highlight and manipulate blocks of text.

2. Basic Commands for Running a C File

To work with C files in the `vi` editor, you only need a few basic commands to edit, save, and compile the file. Here's a simplified guide:

- **Open a File**: `vi filename.c`
  - Launches `vi` and opens the file named `filename.c`. If it doesn't exist, `vi` will create it.
- **Insert Mode**:
  - `i`: Enter Insert Mode before the cursor position.
  - `I`: Enter Insert Mode at the beginning of the line.
  - `a`: Enter Insert Mode after the cursor position.
  - `A`: Enter Insert Mode at the end of the line.
  - `o`: Open a new line below the current line and enter Insert Mode.
  - `O`: Open a new line above the current line and enter Insert Mode.
- **Save and Exit**:
  - `:w`: Save the file without exiting.
  - `:w filename`: Save the file with a new name.
  - `:q`: Quit `vi` without saving.
  - `:wq` **or** `ZZ`: Save the file and quit `vi`.
  - `:q!`: Quit without saving changes.

Implementation

Writing and Running a basic "Hello, World!" program in C using the terminal on a Linux system.

```
1. cd ~/project

2. vi hello.c



/* Save and Exit vi:

    • Press Esc to exit Insert Mode.
    • Type :wq and press Enter to save the file and quit vi.

*/


3. gcc hello.c -o hello

4. ./hello
```

```
#include <stdio.h>

int main() {
    printf("Hello, World!\n");
    return 0;
}

~
~
~
~
:wq
```

```
amit@Toshiba-Satellite-C850:~$ cd Downloads/
amit@Toshiba-Satellite-C850:~/Downloads$ vi hello.c
amit@Toshiba-Satellite-C850:~/Downloads$ gcc hello.c -o hello
amit@Toshiba-Satellite-C850:~/Downloads$ ./hello
Hello, World!
amit@Toshiba-Satellite-C850:~/Downloads$
```

Lab Exercise - 2

- AIM :: WAP in C to implement basic operations in different functions on Linux using vi-Editor

Source_Code ::

```
#include <stdio.h>
// Function to find the greatest number among three numbers
int findGreatest(int a, int b, int c)
{
   if (a > b && a > c) {
      return a;
   } else if (b > c) {
      return b;
   } else {
      return c;
   }
}
// Function to check if a number is even or odd
void evenOdd(int num)
{
   if (num % 2 == 0) {
      printf("%d is Even\n", num);
   } else {
      printf("%d is Odd\n", num);
   }
}
```

```
// Function to check if a number is prime
void checkPrime(int num)
{
    int i, flag = 0;
    if (num <= 1) {
        printf("%d is not a Prime number\n", num);
        return;
    }
    for (i = 2; i <= num / 2; ++i) {
        if (num % i == 0) {
            flag = 1;
            break;
        }
    }
    if (flag == 0) {
        printf("%d is a Prime number\n", num);
    } else {
        printf("%d is not a Prime number\n", num);
    }
}
// Function to calculate the average of three numbers
double calculateAverage(int a, int b, int c) { return (a + b + c) / 3.0; }
int main()
{
    printf("\n5C6 - Amit Singhal (11614802722)\n");
    int num1, num2, num3;
    int choice;
    printf("\nChoose an operation:\n");
    printf("1. Find Greatest of Three Numbers\n");
    printf("2. Check Even or Odd\n");
```

```
printf("3. Check Prime Number\n");
printf("4. Calculate Average of Three Numbers\n");
printf("5. Exit\n");
while (1) {
    printf("\nEnter your choice: ");
    scanf("%d", &choice);
    switch (choice) {
    case 1:
        printf("\nEnter three numbers: ");
        scanf("%d %d %d", &num1, &num2, &num3);
        printf("Greatest Number: %d\n", findGreatest(num1, num2, num3));
        break;
    case 2:
        printf("\nEnter a number: ");
        scanf("%d", &num1);
        evenOdd(num1);
        break;
    case 3:
        printf("\nEnter a number: ");
        scanf("%d", &num1);
        checkPrime(num1);
        break;
    case 4:
        printf("\nEnter three numbers: ");
        scanf("%d %d %d", &num1, &num2, &num3);
        printf("Average: %.2f\n", calculateAverage(num1, num2, num3));
        break;
    case 5:
        printf("\n");
        return 0;
    default:
```

```
        printf("\nInvalid choice! Please choose again.\n");
    }
  }
  return 0;
}
```

Output ::

```
amit@Toshiba-Satellite-C850:~$ cd Desktop/Code/
amit@Toshiba-Satellite-C850:~/Desktop/Code$ vi basic_operations.c
amit@Toshiba-Satellite-C850:~/Desktop/Code$ gcc basic_operations.c -o basic_operations
amit@Toshiba-Satellite-C850:~/Desktop/Code$ ./basic_operations

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Choose an operation:
1. Find Greatest of Three Numbers
2. Check Even or Odd
3. Check Prime Number
4. Calculate Average of Three Numbers
5. Exit

Enter your choice: 1

Enter three numbers: 105 116 122
Greatest Number: 122

Enter your choice: 2

Enter a number: 13345
13345 is Odd

Enter your choice: 3

Enter a number: 5456527
5456527 is not a Prime number

Enter your choice: 4

Enter three numbers: 2234 4523 4355
Average: 3704.00

Enter your choice: 5

amit@Toshiba-Satellite-C850:~/Desktop/Code$
```