

# **University Institute of Engineering and Technology, Panjab University, Chandigarh**

## **BE CSE 2<sup>nd</sup> Semester: OOPs LAB**

### **Programming Environment:**

1. Code :: Blocks is a free C++ compiler which meets the most demanding needs of its users. It is designed to be very extensible and fully configurable. It is a cross-platform IDE that supports compiling and running multiple programming languages. Available at: <http://www.codeblocks.org/>
2. Linux using gcc compiler.

### **The C++ Programming Environment in Linux**

Software tools needed:

- *An editor* : To write and modify the C++ program components or source code. Most popular editors are emacs and vi.
- *A compiler* : To convert the source code into machine instructions which can be executed on the system.
- *A linking or linker program* : To link the compiled program components with each other and with a selection of routines from existing libraries of computer code, in order to form the complete machine-executable object program.
- *A debugger* : To diagnose errors, either in compiling programs in the first place, or if the object program runs but gives unwanted results.

For the compiler and linker, the *GNU g++ compiler/linker*, and for the debugger *GNU debugger gdb* could be used.

For an integrated development environment (IDE) that combines an editor, a compiler, a linking program and a debugger in a single programming environment IDEs like V IDE, kdevelop are available for Linux environment.

## **GNU Compiler Collection (GCC)**

GCC stands for —GNU Compiler Collection|. GCC is an integrated distribution of compilers for several major programming languages. These languages currently include C, C++, Objective-C, Objective-C++, Java, Fortran , and Ada.

# **The Vi Editor**

Vi and Emacs are the only tools that come with every Linux that work in text mode.

### **Getting Started**

To start Vi, open a terminal or console and simply type "**vi**" (without the quotation marks) followed by the name of any existing file or a new file you want to create.

Vi works in two main modes, one for editing text and the other for giving commands. To switch between the two modes you use the **I (Insert)** and **Esc** keys. The program opens in the Command mode, which is used for cursor movements, delete, cut, copy, paste, and saving changes.

The Insert mode is what you'll work in most of the time. You use it to make changes in an open file. Enter the Insert mode by pressing the **I** key. Newer Vi versions will display the word "INSERT" on the bottom line while you're in Insert mode.

Press the **Esc** key to switch Vi back to Command mode. As soon as you hit the **Esc** key the text "INSERT" on the bottom line disappears.

You save your changes to the open file from the Command mode. Press Shift-ZZ to save.

If you make a mistake when saving a file, such as pressing Ctrl-ZZ or closing Vi before saving the file, you'll end up with a swap file (akin to a DOS/Windows temp file) in addition to the original file. Usually the swap file will have the .swp extension. The original file will not contain the recent changes you made; attempting to reopen it will result in an error message. The swap file is not readable but can be recovered by typing a command like this at the \$ prompt and pressing Enter:

```
vi -r {your file name}
```

In some extreme cases, recovery is not possible. But in most cases, such as closing Vi before saving, a system crash, or a power failure, recovery works very well. After you recover, you must manually delete the swap file using a command like this at the \$ prompt:

**rm .{your file name}.swp**

## **Common Vi Commands** Function:

Press Key(s):\*

I	Insert text before the cursor
A	Insert text after the cursor
:	Switch to ex mode
\$	Go to last place on the line
^	Go to first place on the line
W	Next word
B	Previous word
Shift-G	Last line of the file
20 Shift-G	Go to line 20
Y	Copy. (Note: Y3W = copy 3 words; Y3J = copy 4 lines.)
P	Paste
D	Cut
X	Delete character under the cursor

## Steps for Creation of Program on Linux

1. Make a new file called "test" by opening a console and typing this line after the \$ prompt and press Enter:

**vi test**

2. You'll get an empty console screen since Vi will start with the empty new file. Remember, Vi always starts Command mode, so press the **I (Insert)** key to enter the Insert mode. If you're ever not sure whether you're in Insert mode, you can always just hit **I** again.

3. Next, type the contents of your program.

4. Press the Esc key to return to the Command mode.

5. Save the file by pressing the **—:wq||** key. This command save the file as well as exit from the file. But if you just want to save without exiting then press **—:w||**.

6. Vi should close and you should see your \$ prompt back in the console.

7. The program can be compiled by writing the following command on the \$ prompt:

**g++ filename.extension** followed by pressing enter.

Eg: **g++ test.cpp**

8. If there are any errors in the program it will be displayed on the prompt with line numbers.

9. To remove the errors reopen the file you created. At the \$ prompt, type this and press Enter:

**vi test**

This time Vi opens up to the text in your file, not a blank screen.

10. Now save the file again by pressing Esc to enter the Command mode and recompile it.

11. If no errors then now run the program to get the output by typing this on \$ prompt and press enter:

**./a.out**

12. Whenever you make any changes in your program, you need to save and recompile it before running it for the output.

13. Repeat the entire process again, for each program.

## List of Programs

1. Write a program for multiplication of two matrices using OOP.
2. Write a program to perform addition of two complex numbers using constructor overloading.  
The first constructor which takes no argument is used to create objects which are not initialized, second which takes one argument is used to initialize real and imag parts to equal values and third which takes two argument is used to initialized real and imag to two different values.
3. Write a program to find the greatest of two given numbers in two different classes using friend function.
4. Implement a class string containing the following functions:
  - Overload + operator to carry out the concatenation of strings.
  - Overload = operator to carry out string copy.
  - Overload <= operator to carry out the comparison of strings.
  - Function to display the length of a string.
  - Function tolower( ) to convert upper case letters to lower case.
  - Function toupper( ) to convert lower case letters to upper case.
5. Create a class called LIST with two pure virtual function store() and retrieve(). To store a value call store and to retrieve call retrieve function. Derive two classes stack and queue from it and override store and retrieve.
6. Write a program to define the function template for calculating the square of given numbers with different data types.
7. Write a program to demonstrate the use of special functions, constructor and destructor in the class template. The program is used to find the bigger of two entered numbers.
8. Write a program to perform the deletion of white spaces such as horizontal tab, vertical tab, space, line feed, new line and carriage return from a text file and store the contents of the file without the white spaces on another file.
9. Write a program to read the class object of student info such as name, age, sex, height and weight from the keyboard and to store them on a specified file using read() and write() functions. Again, the same file is opened for reading and displaying the contents of the file on the screen.
10. Write a program to raise an exception if any attempt is made to refer to an element whose index is beyond the array size.

# **FORMAT OF THE LAB RECORD TO BE PREPARED BY THE STUDENTS**

Front page of the lab record should have following

## ***NAME OF THE LAB***

Font should be (Size 20, italics bold, Times New Roman)



Faculty name

Font should be (12, Times Roman)

Student name

Roll No.:

Semester:

Group:

Font should be (12, Times Roman)

Department of Computer Science and Engineering  
University Institute of Engineering and Technology,  
Panjab University, Chandigarh-160014

(Font should be (18, Times Roman))