

Programming and Data Structure Laboratory (CS13002)

**Dr. Sudeshna Sarkar
Dr. Indranil Sengupta**

Dept. of Computer Science & Engg., IIT Kharagpur

Some Rules to be Followed

- **Attendance is mandatory.**
- **Regular assignments must be done fully in the lab class.**
- **Each student must bring a C language book every day.**
- **If you face any problems catching up, draw the attention of one of the teachers.**

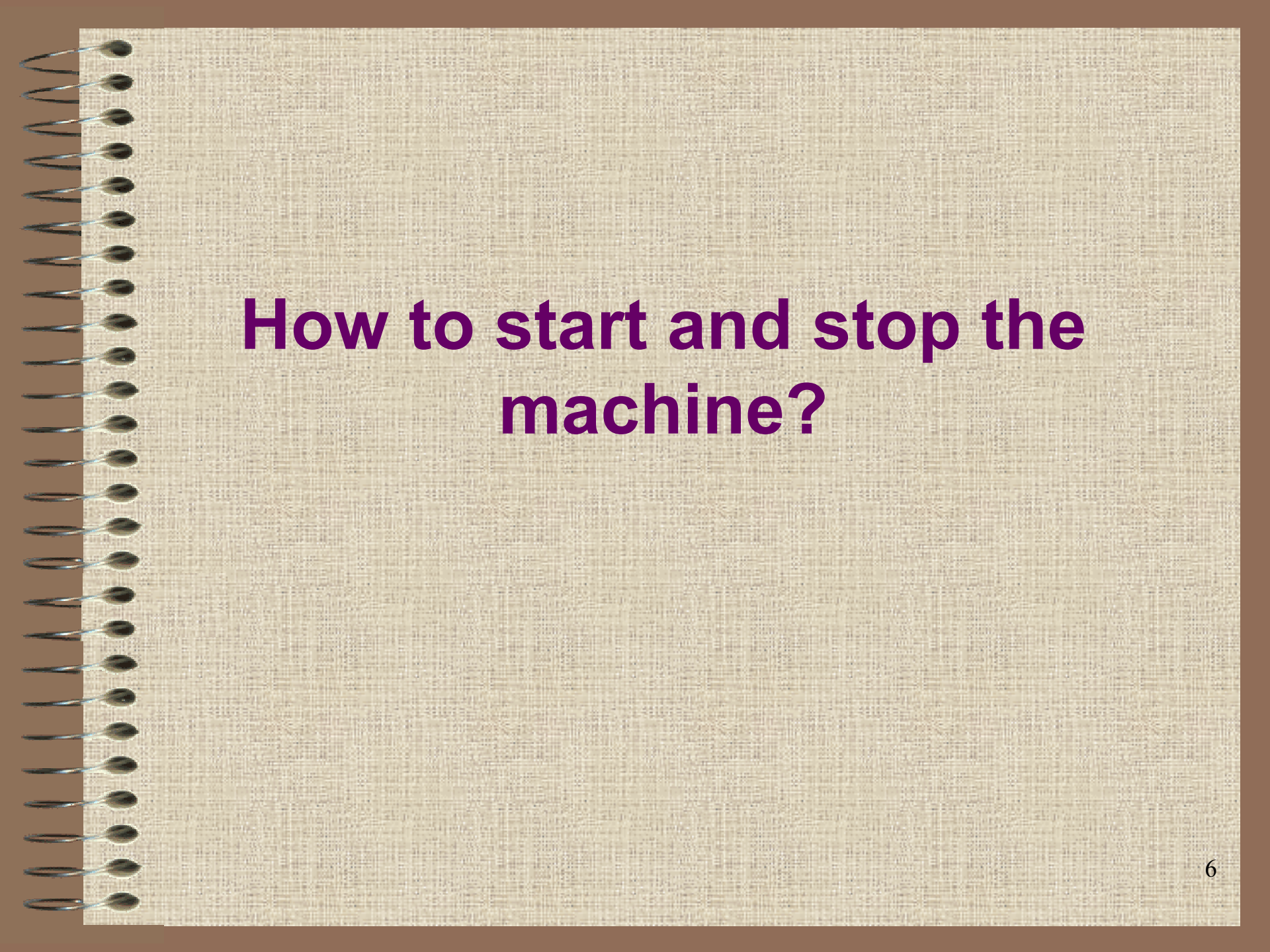
Marks Distribution

- 40% of the PDS course marks is in the laboratory.
- Laboratory evaluation:
 - Regular assignments : 25%
 - Laboratory Test 1 : 20%
 - Laboratory Test 2 : 25%
 - Laboratory Test 3 : 30%

The Computing Environment

- **PC with Pentium-4 processor**
 - **Clock** : **1.7 GHz**
 - **Main Memory** : **256 Mbytes**
 - **Cache Memory (L2)** : **256 Kbytes**
 - **Hard Disk** : **40 Gbytes**

- **Operating System: Redhat Linux 7.3 / 8.0**
- **Programming language: C**
- **Compiler : gcc**
- **Editor : emacs**
- **Window manager : KDE / Gnome**

A spiral-bound notebook with a light beige, textured cover. The metal spiral binding is visible on the left side. The text is centered on the cover.

How to start and stop the machine?

How to start the machine?

1. Power on the PC (monitor first, then the main cabinet)
2. Wait until **LILO boot**: message comes on the screen.
3. Select the **Linux** option by pressing the ↓ arrow if necessary, and press **Enter** key.
4. Supply your **login** and **password**
Login: **cnn**
Password: **cnn**
nn is the PC number (01, 02,.....)
5. Click on the **terminal** icon to open a window (**xterm**).

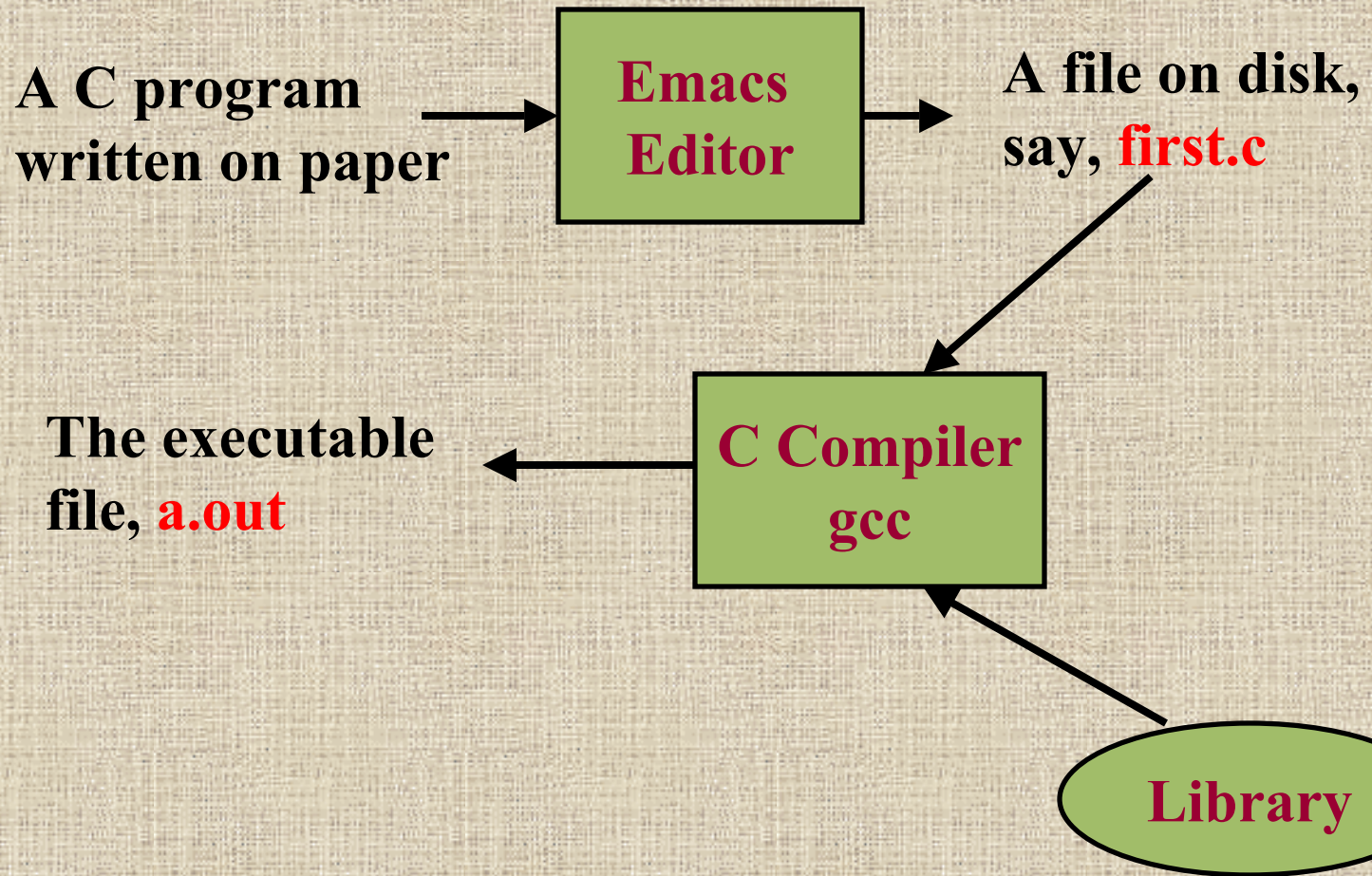
Remember that

- It is possible to adjust the size of a window.
- It is possible to move a window to any position on the screen.
- You may create other windows from the first one by typing `xterm &` and then pressing the **Enter** key.
- A window must be active for you to type anything in it.
 - To make a window active, move the mouse pointer to the upper horizontal bar of window, and press the left button of the mouse.

How to Power Off the Machine?

1. Close all windows.
2. Logout from the window manager.
 - This leaves you again in the login console.
3. Select the Shutdown option.
 - Wait till the machine completely shuts down.
4. Switch off the VDU (power of the main cabinet gets switched off automatically).

Steps in Running a Program



How to Start the emacs Editor

- **Select a window and enter the command**
emacs &
 - **An emacs window is created.**
 - **You can select the font size.**
 - **You can now type in a program (shown later).**
- **To close the emacs window**
 - **Select Files menu of emacs**
 - **Select Exit Emacs**

Write, Compile & Execute a C Program

1. Start the emacs editor.
2. Select **Files** menu, and then select the **Open File** menu.
3. In the bottom of the emacs window you will be asked to give the name of a file where your C program will be stored.
 - Say, the file name is “first.c”

4. Type the following C program in the emacs window:

```
/** This is my first program */  
/** Write your name, roll number, and PC  
    no. here */  
#include <stdio.h>  
int main()  
{  
    printf ("This is my first program\n");  
}
```

5. Save the buffer as the named file (first.c) by again selecting **Files** menu, and then selecting **Save Buffer**.

6. To compile the C program, type the following in a separate window:

```
cc first.c
```


- **cc is the name of the C compiler. If the process ends without any message, the compilation is successful, and the translated executable module is “a.out”.**

7. Run the program “a.out”

```
./a.out
```

- **The message flashes on the screen.**
- **Close the emacs window.**

If the Program has an Error

```
/** This is my first program */  
/** Write your name, roll number, and PC  
    no. here */  
#include <stdio.h>  
int main(  No closing ')'  
{  
    printf ("This is my first program\n");  
}
```

- If this program is compiled, we get the message

```
first.c: In function 'main':  
first.c:6: parse error before '}'
```

 **Line number**

How to correct the mistake?

1. Open the file “**first.c**” in emacs.
2. Identify the errors, and fix them.
3. Save the modified file (same name).
4. Compile it again (using gcc), to get the new executable file “**a.out**”, and then run it.

Some Linux Commands

- **ls** : Lists the directory contents.
- **pwd** : Show current working directory.
- **rm** : Remove files.
- **cd** : Change working directory.
- **mkdir** : Make directories.
- **rmdir** : Remove empty directories.
- **cat** : Create and display (short) files.
- **cp** : Copy files and directories.
- **mv** : Move / rename files.
- **man** : Display on-line manual pages.

Files and Directories

Practice Program 1

```
/* This is the first practice program
   File name : second.c */
#include <stdio.h>
int main()
{
    int n;      /* Declare an integer variable */
    scanf ("%d", &n); /* Read the value of n */
    printf ("Sum of (0 + ... + %d) = %d\n",
           n, n*(n+1)/2 );
}
```

Program expects an input

Practice Program 2

```
/* To find the area of a circle
   File name: third.c          */
#include <stdio.h>
#include <math.h>
int main()
{
    float radius, area;
    printf ("\nEnter the radius: ");
    scanf ("%f", &radius);
    area = 4.0 * atan(1.0) * radius * radius;
    printf ("\nRadius = %f, CircleArea = %f\n",
            radius, area );
}
```

Must compile with the command "cc -lm third.c"

Getting Information

- Look at the course web site at:
<http://www.facweb.iitkgp.ernet.in/~pds>
using Mozilla (or any other browser).
- How to take print-outs?
 - Details available in the above web site.