



BITS Pilani
Pilani Campus

Module 1 - Introduction to Computer Programming

Dr. Jagat Sesh Challa

Department of Computer Science & Information Systems

Module Overview



- **General course information**
- **Objectives of the Course**
- **Computers and Computing**
- **Introduction to Programming**
- **The C language**
- **Program and Process Execution**



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General Course Information

CS F111 - Team



Instructors for Lecture Session



**Dr. Asish
Bera**



**Dr. Tanmaya
Mahapatra**



**Dr. Bharat
Richhariya**



**Dr. Jagat Sesh
Challa (I/C)**

Instructors for Laboratory Sessions

Rudresh Pillai, Aravind BS, Aarti, Neha Chaudhary, Neha Sangwan, Anupama Ranjan, Jaya Pathak, Vijay Shankar

Text Book and Reference Books



Text Book:

Hanly, J.R. and E.B. Koffman. *Problem Solving and Program Design in C*(7/e). Pearson Education, 2013

Reference Books:

1. Patt, yale. Introduction to computing systems: from bits & gates to C &beyond (2/e). Mcgraw hill education, 2017.
2. Forouzan, b.A. And richard F. Gilberg . computer science A structured programming approach using C (3/e). Cengage learning, 2007
3. [Gottfried, B.S. and Jitender chhabra. Programming with C \(schaum's outlines series, 3/e\). Mcgraw hill education, 2017.](#)
4. Kernighan, b.W and dennis ritchie. The C programming language (2/e). Pearson education india, 2015.
5. Das, s. Unix: concepts and applications (4/e). Mcgraw hill education, 2017.
6. [Das, Sumitabha. Computer fundamentals and C programming. New delhi, india: mcgraw hill education. \(2018\)](#)

Course Website



Course Website

- **Nalanda – LMS of BITS Pilani**
 - <https://nalanda-aws.bits-pilani.ac.in/>
- **Nalanda will be used for:**
 - **Uploading Lecture notes and lab sheets**
 - **Course Announcements and notices**
 - *You will get a notification of the announcement on your registered BITS email ID.*



Laboratory Sessions

Laboratory Sessions

- **Weekly 2 hours. Total 13 lab sessions. The first lab is non-evaluative. The remaining 12 are evaluative. The best 10 will be considered for grading.**
- **Each lab session will have a lab sheet.**
- **You will have to go through the lab sheet and do the given tasks.**
- **You will be assisted by a team of 4-5 instructors who would help you solve the lab sheets and clarify your doubts.**
- **Lab sessions will be conducted on Ubuntu OS in the IPC/CSIS Dept. labs. C Programs are to be run using GCC compiler only.**
- **For home practice - install Ubuntu OS or WSL on your personal computers, along with the gcc compiler and sublime text editor [DIY]**

Evaluation Components



Component	Duration	Marks	Date & Time	Nature of component (Close Book/ Open Book)
Mid-Semester Test	90 Min.	50	4/3 FN2	Closed Book
Comprehensive Examination	180 Min.	100	5/5 AN	Partly Open Book
Quiz	45 Min.	30	16/2	Closed Book
Programming test	180 Min.	90	13/4	Open Book
Laboratory Sessions	120 Min. each	30	--	--

Makeup Policy



- **Make-ups are generally considered only for **medical emergencies** leading to hospitalization (or a personal emergency of similar nature).**
- **The decision by the Instructor-in-Charge regarding granting make-ups shall be final.**
- **Makeups are allowed for Mid-Semester Test and Comprehensive Examination.**
- **No makeup for weekly laboratory sessions.** Out of 13 scheduled lab sessions, 12 will be evaluative. Best 10 will be considered for grading.
- **For lab tests, you will be allowed to take **makeup for only one lab test**. If you happen to miss both, you will be given makeup only for one of them.**

Disciplinary Policy



- If we find you using unfair means during the evaluative components, the case will be reported to AUGSD and shall be dealt with very seriously as per the guidelines.
- You can find the AUGSD guidelines for unfair means cases over here –

[https://academic.bits-pilani.ac.in/Downloads/Unfair Means Offence Revised 02 AUG 2022.pdf](https://academic.bits-pilani.ac.in/Downloads/Unfair%20Means%20Offence%20Revised%2002%20AUG%202022.pdf)

- So don't indulge in unfair means and **BE HAPPY!**



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Course Objectives

Course Objectives



- **Learn about *Computers and Computing Methodologies***
- **Learn basic *concepts of programming* using the *C language***
- **Construct *Solutions to Scientific Problems* through programming**
- ***Systematic techniques* and approaches for constructing programs**



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Computers and Computing

We have seen Computers...



**Desktop
Computer**



**Laptop
Computer**

Smart Devices (Small Computers)



Tablet

Smart Phone



Smart Watch

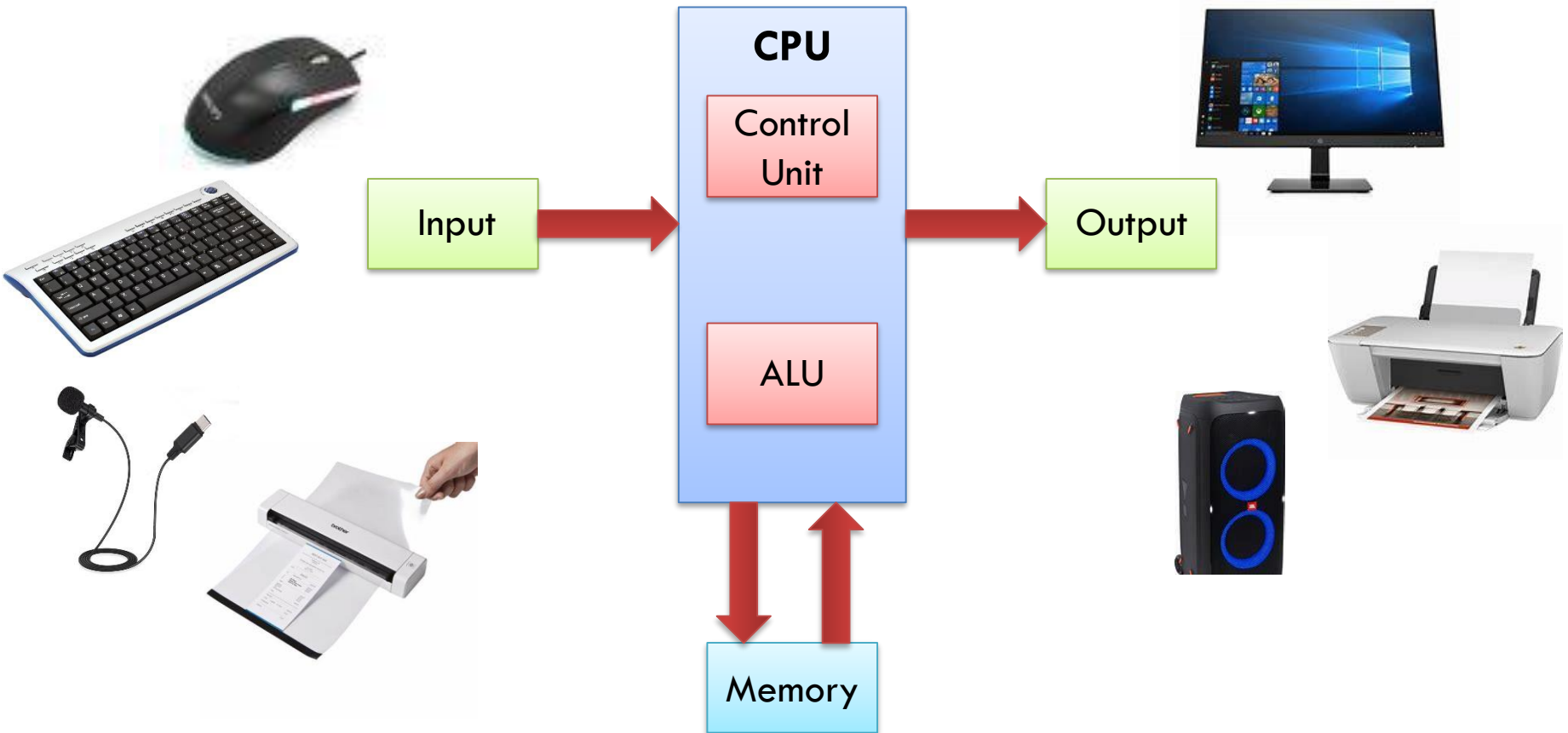
Super Computer...



What is a Computer?



A device that takes data as input, does some processing and then returns an output.



What is a CPU?



- **CPU** stands for **Central Processing Unit**.
- The CPU is often simply referred to as the **processor**.
- The CPU is the **brain of a computer**, containing all the electronic circuitry needed to process input, store data, and output results.
 - Essentially **CPU executes computer programs**.
- It consists of an **arithmetic and logic unit (ALU)**, and a **control unit**
 - ALU performs arithmetic and logical operations specified by a computer program
 - Control Unit directs the operations of the Processor



**Intel i7
Processor**

What is memory?



- Computer memory is the storage space in the computer, where “**data to be processed**” and “**instructions required for processing**” are stored.



RAM chips



Hard Disk

Types of Memory



**Cost
reduces**

**Speed
reduces**

**Size
increases**

Registers (inbuilt on the processor)

Cache (inbuilt on the processor)

Primary (RAM, ROM)

Secondary (HDD, SSD, PenD, Floppy, Tape, CD)

Registers, Cache and **RAM** are **volatile**

- Retains data as long as the voltage is applied

ROM and **Secondary devices** are **non-volatile**

- Retains data permanently without any voltage

*In this course, we will deal with
Primary memory (**RAM**) and
Secondary Memory (**DISK**) only!*

Hardware vs Software



HARDWARE



VS

SOFTWARE



- **Hardware is the physical parts of the computer: *motherboard, CPU, RAM, keyboard, monitor*, etc.**
- **Software is a collection of instructions that can be run on the hardware of the computer. These instructions tell the computer what to do.**
 - **In other words, *Software is a Computer Program*.**
- ***Software is not a physical thing, just a bunch of programs.***



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Introduction to Programming

What is a Computer Program?



“A **Computer Program** (or simply a **Program**) is a **collection of instructions** that performs a specific task when executed by a computer”

Where are Programs Used?



- **MS Word** is a Program



- **Google Chrome** is a Program

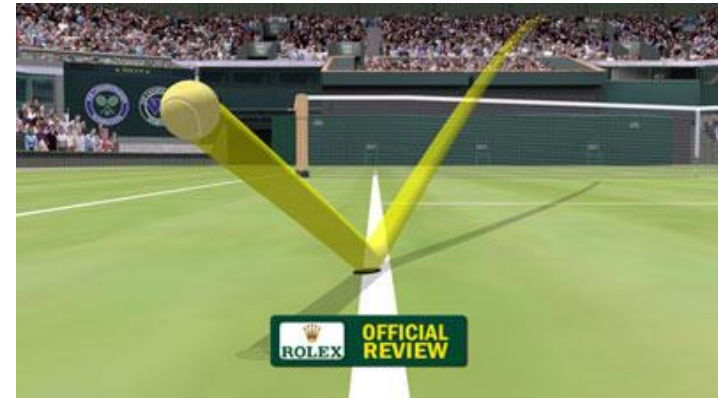


- **Skype** is a Program



- **Hawk's-eye** is a Program

- **Windows OS** is a Program



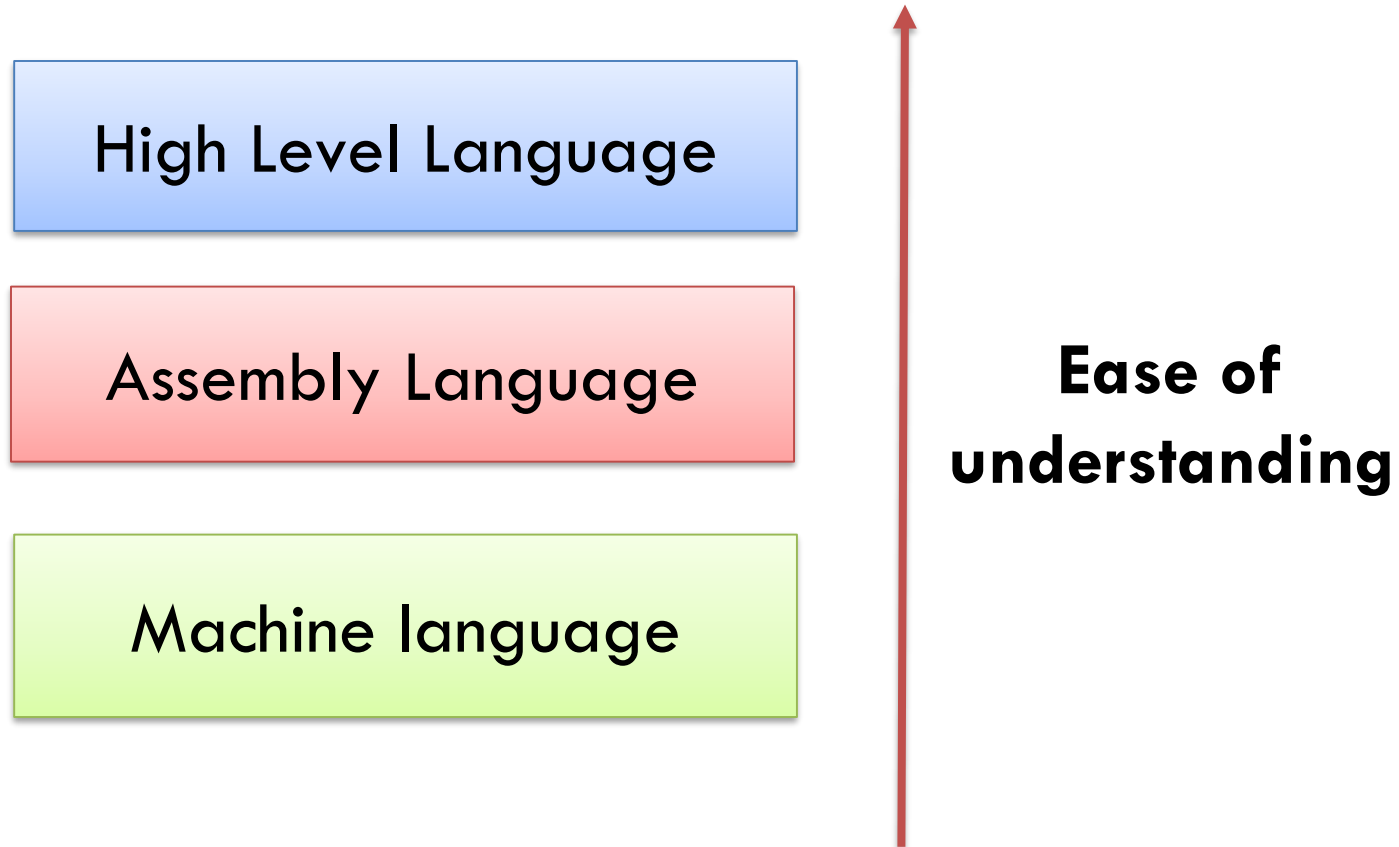
Anything we do on a computer requires us to write a program...



Programming Language

- Programs in a computer are written using a *Programming Language*
- A programming language is a **vocabulary** and **set of grammatical rules** for instructing a computer to perform specific tasks.
- Examples: **C**, **C++**, **Java**, **Python**, etc.
- Each language has a **unique set of keywords** (words that it understands) and a **special syntax** for organizing program instructions.
- Programming languages are **unambiguous**.

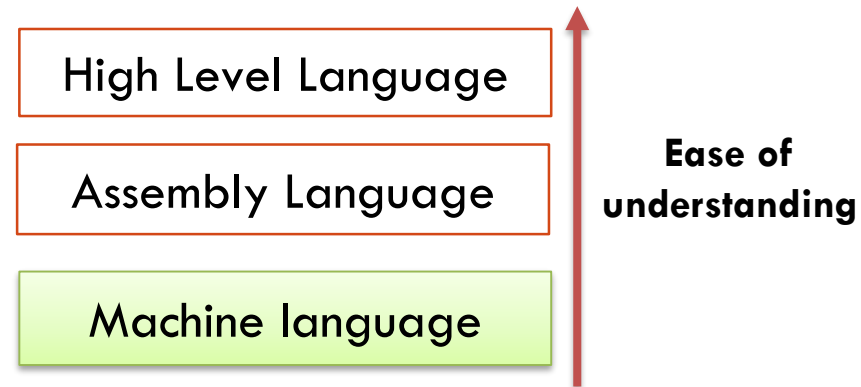
Levels of Programming Languages



Machine Language



- **Language of the machine**
- **Made up of a series of binary patterns**
- **Can be run directly**
- **Difficult to learn**



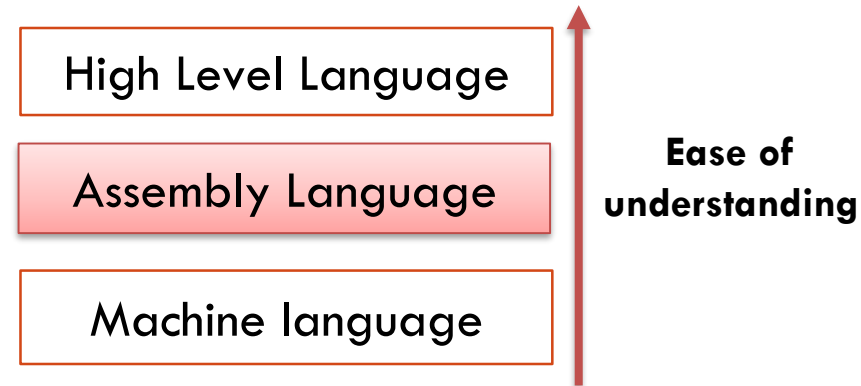
Machine Code

```
1001110100001101000000
0110000110100001111011
1000000101111101101110
1111011000101101100010
1000000010011110000110
1001001100011100000001
```

Assembly Language



- Uses simple **pneumonic abbreviations**
- Unique to a specific **CPU architecture**
- Requires an **assembler**



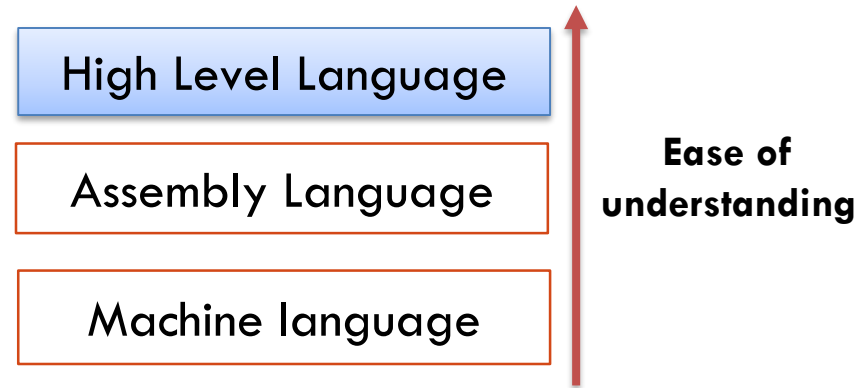
Assembly Code

```
__start:  
  
    mov edx, len  
    add ecx, edx  
    mov ebx, 1  
    sub eax, edx  
    int 0x80
```

High level Language



- English-like
- Easier to understand
- Requires **Compiler** or **Interpreter**
 - to generate **Object Code**



High-level Code

```
#include<stdio.h>
int main() {
    int a, b, sum;
    scanf("%d %d", &a, &b);
    sum = a + b;
    printf("The sum is %d\n", sum);
    return 0;
}
```



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The C Programming Language

The C language



- General Purpose **high-level** programming language
- Language is **platform independent**
- Closely associated with the UNIX operating system
- **Most versatile** as it supports direct access of memory locations through pointers
- **Compiler** based language
- ***C programs are the fastest!***

***We will Study
More about C in
this course***



Program and Process Execution

Perform tasks with Programs



You want to perform a specific task using a computer. You will do the following steps:

- **Write a C program specific to your task**
- **Save it on the computer**
- **Compile and Run your program**

What happens to your program?



You write a program...

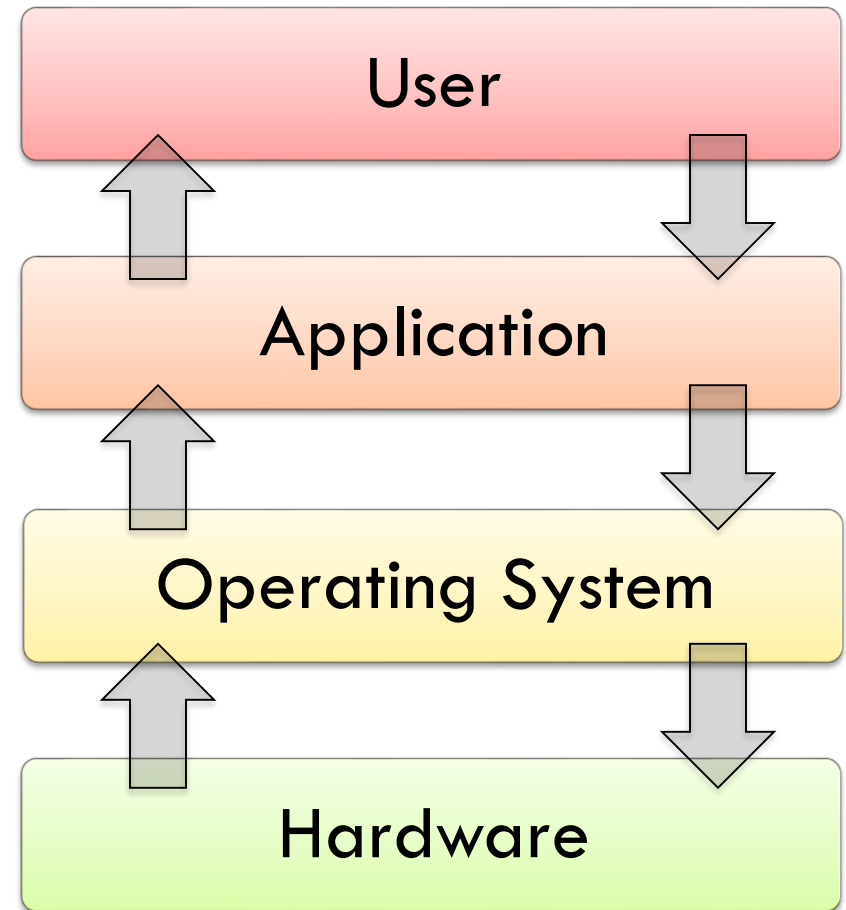
- 1. Where is your program saved?***
- 2. What happens to your program when you try to compile and run it?***

Before we answer the above questions let us see what is an operating system...

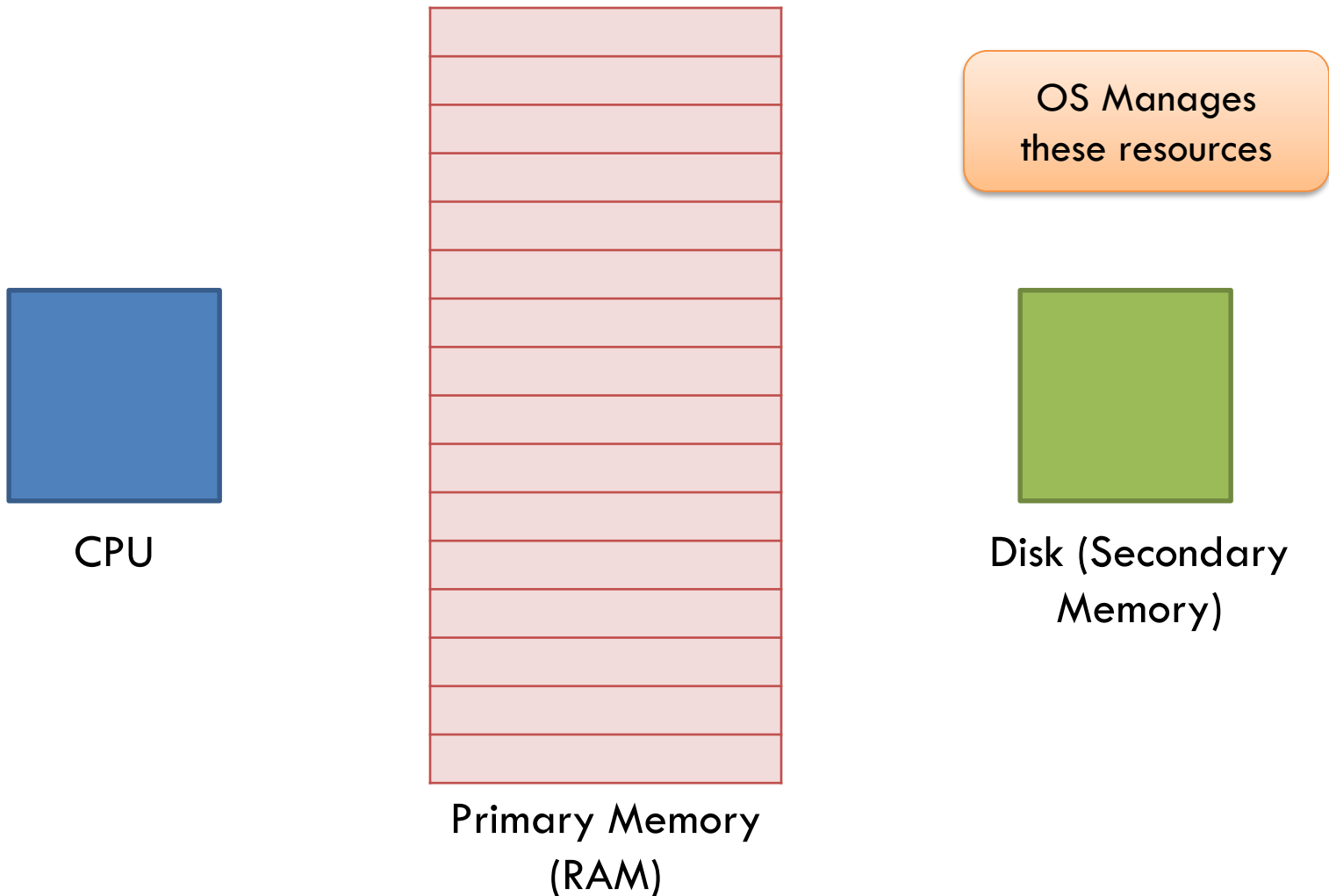
Operating System (OS)



- An **OS** is a layer of software interposed between the application programs and the hardware
- OS manages everything on your computer including hardware
- OS is responsible for executing your program



Basic layout of Computer Hardware



What happens to your program?



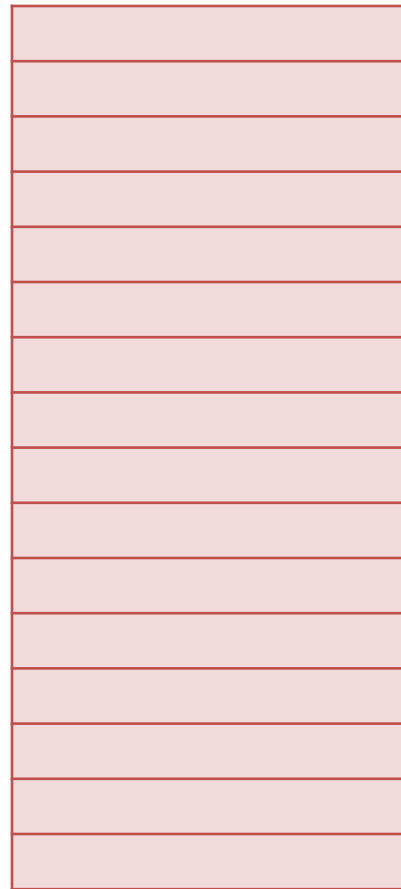
Now let us answer these questions...

1. *Where is your program saved?*
2. *What happens to your program when you try to compile and run it?*

1. Where is your program saved?



CPU



Primary Memory
(RAM)

Your program when
saved gets stored on
the disk



Disk (Secondary
Memory)

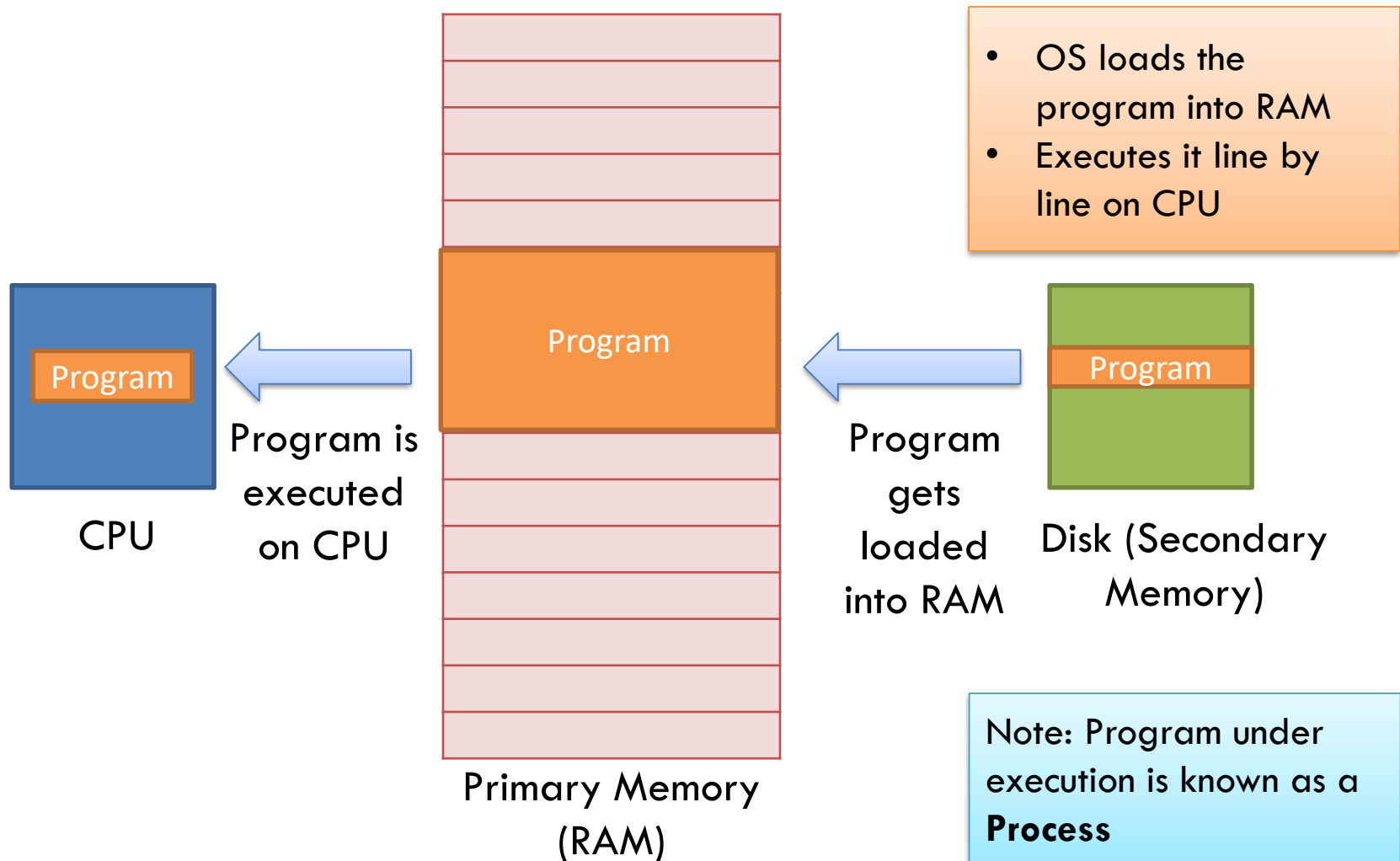
What happens to your program?



Now let us answer these questions...

1. *Where is your program saved?*
2. ***What happens to your program when you try to compile and run it?***

2. What happens to your program when you try to compile and run it?





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Thank you
Q & A