DATA STRUCTURES AND ALGORITHMS

SLIDE 1

DATA STRUCTURE

- Data structure is a term used to denote how data is stored and organized in a computer file
- A data structure provides an efficient way of storing and organising data in the computer so that it can be used efficiently.
- Some examples of Data Structures are arrays, Linked List, Stack, Queue,Tree, Graph etc

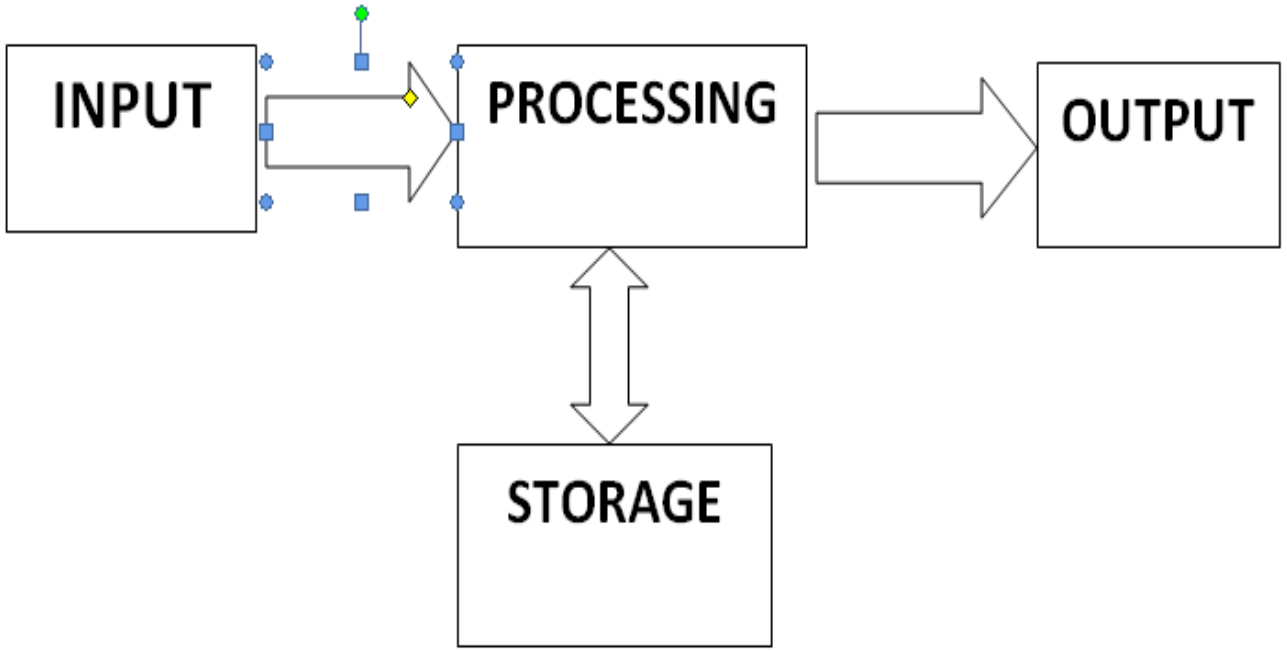
DATA STUCTURES OPERATIONS

- TRAVERSING – visit elements in a data structure
- INSERTION – Adding an element
- DELETION – Removing an element
- SEARCHING – finding an element
- SORTING – Arranging elements in a certain order
- MERGING – Joining different data structures

ALGORITHM

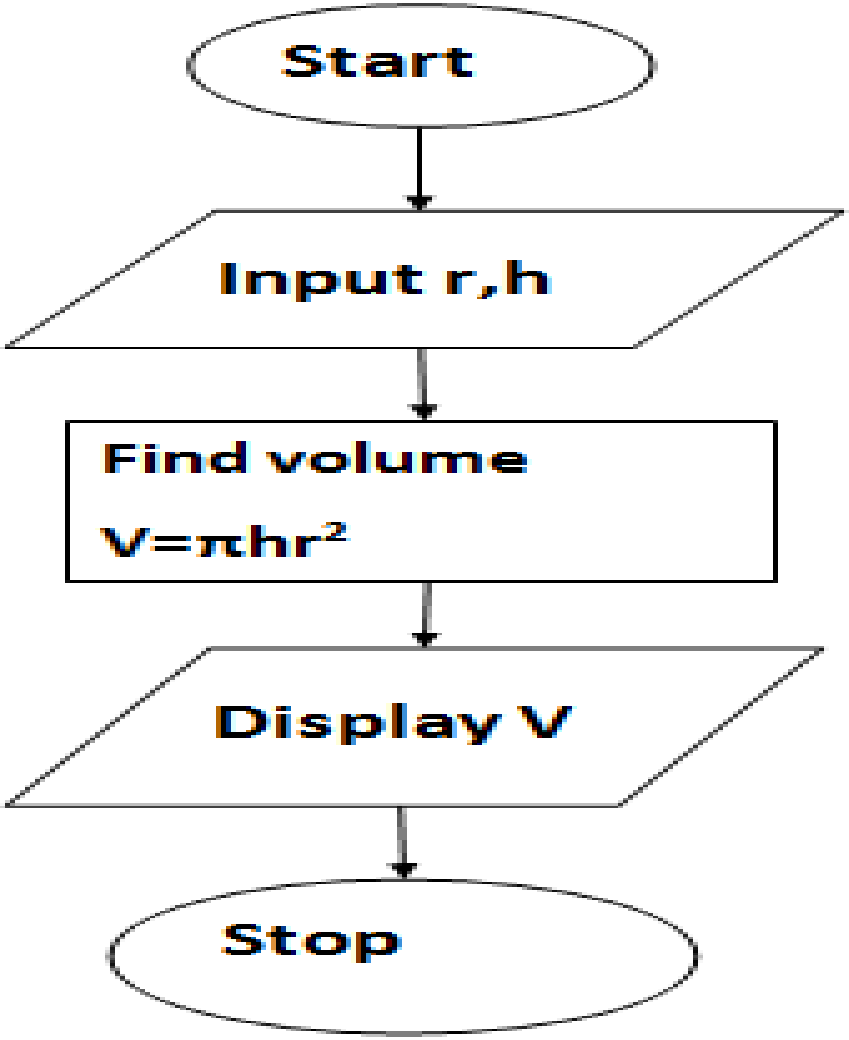
- This is a term used to refer to the sequence of steps followed in performing a task
- An Computer Algorithm consist of a finite sequence of well-defined, computer-implementable instructions, designed to perform a specific task such performing a computation, sorting data in a file, searching etc

Elements of a Computer Program



- **A computer program**
  - INPUTS – provides commands for entering data eg cout<< (in C++), scanf(in C), readln(in pascal)
  - PROCESSES data – mathematical operators like arithmetic (+,*,/ etc), relational(>,<,=) and logical operators (and, or, not) are used by the ALU to process data.
  - STORAGE – a computer program stores data in main memory and secondary memory
  - OUTPUT – output commands eg cout<< display data via an output device

Program Flowchart



Program Flowchart Design Symbols

Symbol	Name	Function
	Start/End	Flowchart terminator
	Arrows	A line is a connector that represent relationship between the representetive shapes and its flow direction
	Input/Output	A parallelogram represents input or output of your program
	Process	A rectangle represent a process
	Decision	A diamond indicates a decision

Coding

```
#include<iostream>
using  namespace std;
int main()
{
float r,h,v
cout<<“Enter  Radius”;
cin>>r;
cout<<“Enter height”;
cin>>h;
v=3-14*r*r*h;
cout<<“The  volume  of the Cylinder is:”<<v;
return 0;
}
```

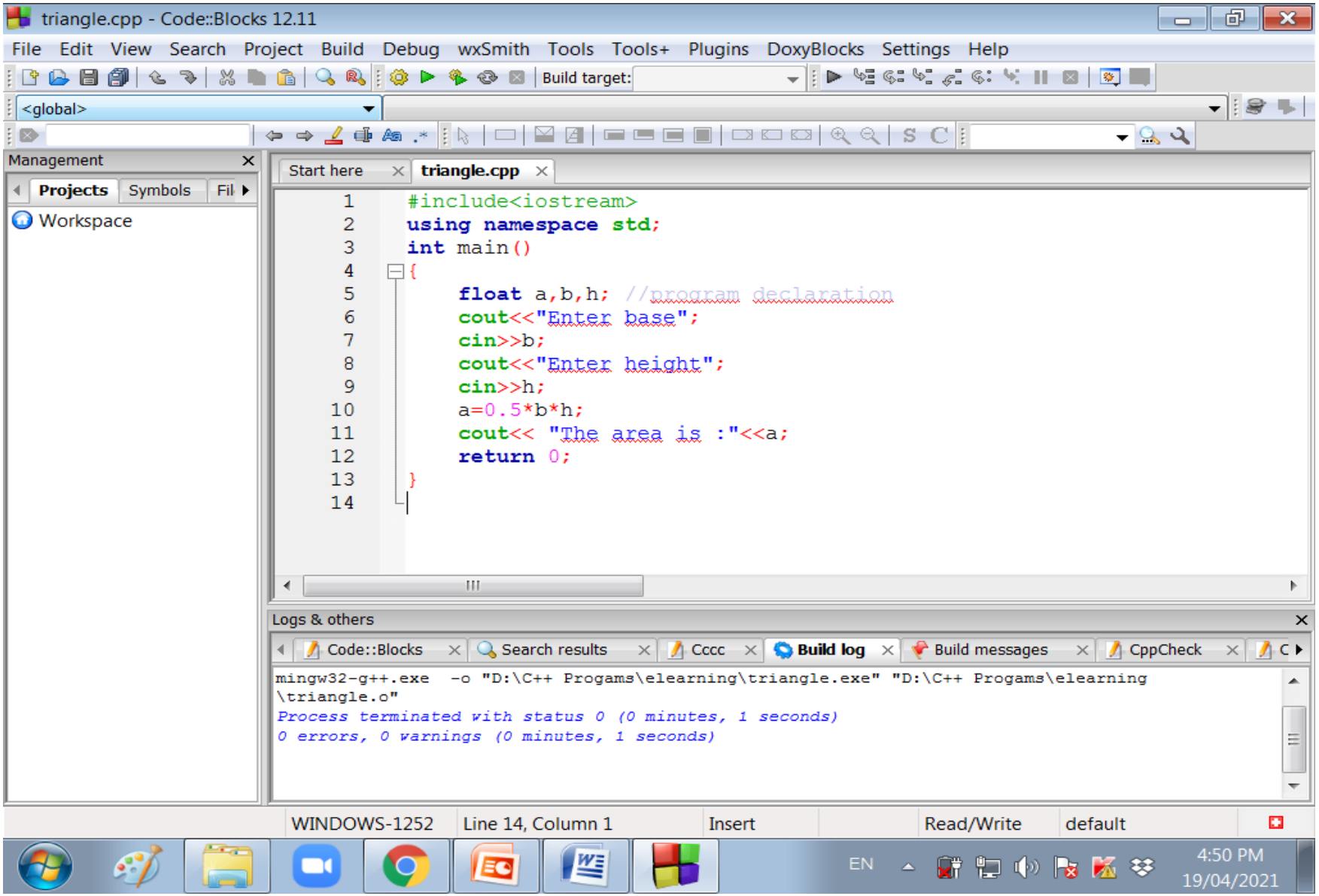
Stages of program development

- Identify the problem
- Program analysis
- Program design
- Coding
- Compile /debug
- Running /Testing
- Documentation

- Compile – converts source code into object code
- Debug – remove bugs(program errors

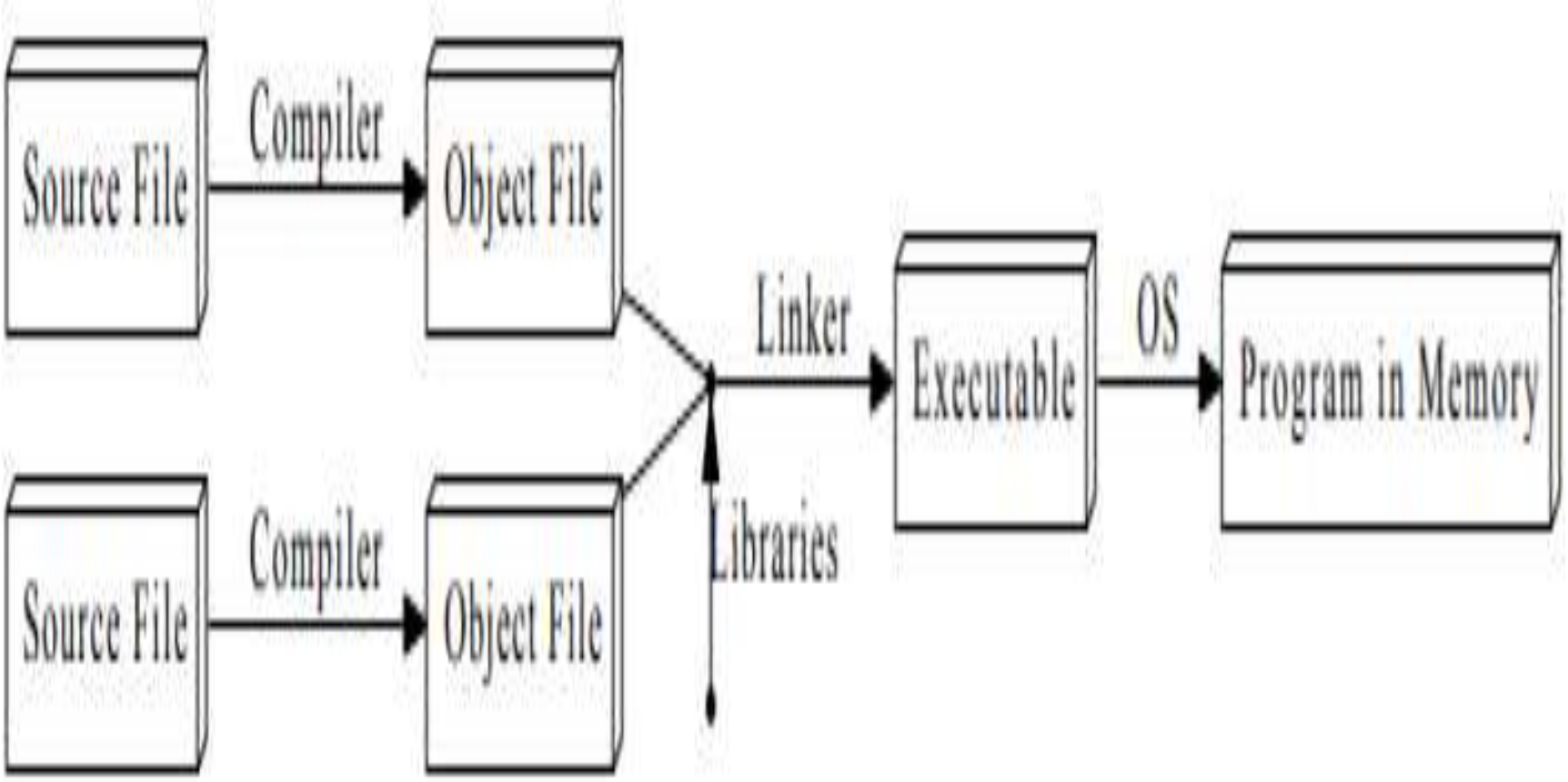
  Types of program errors
  - Syntax – occurs when program rules violated
  - Logical errors – program logic incorret. The program generates wrong results
  - Semantic/runtime errors – occurs when a program performs an illegitimate operation

C++ program Environment



Compilation Process

A program goes from text files (or source files) to processor instructions as follows:



THE END

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