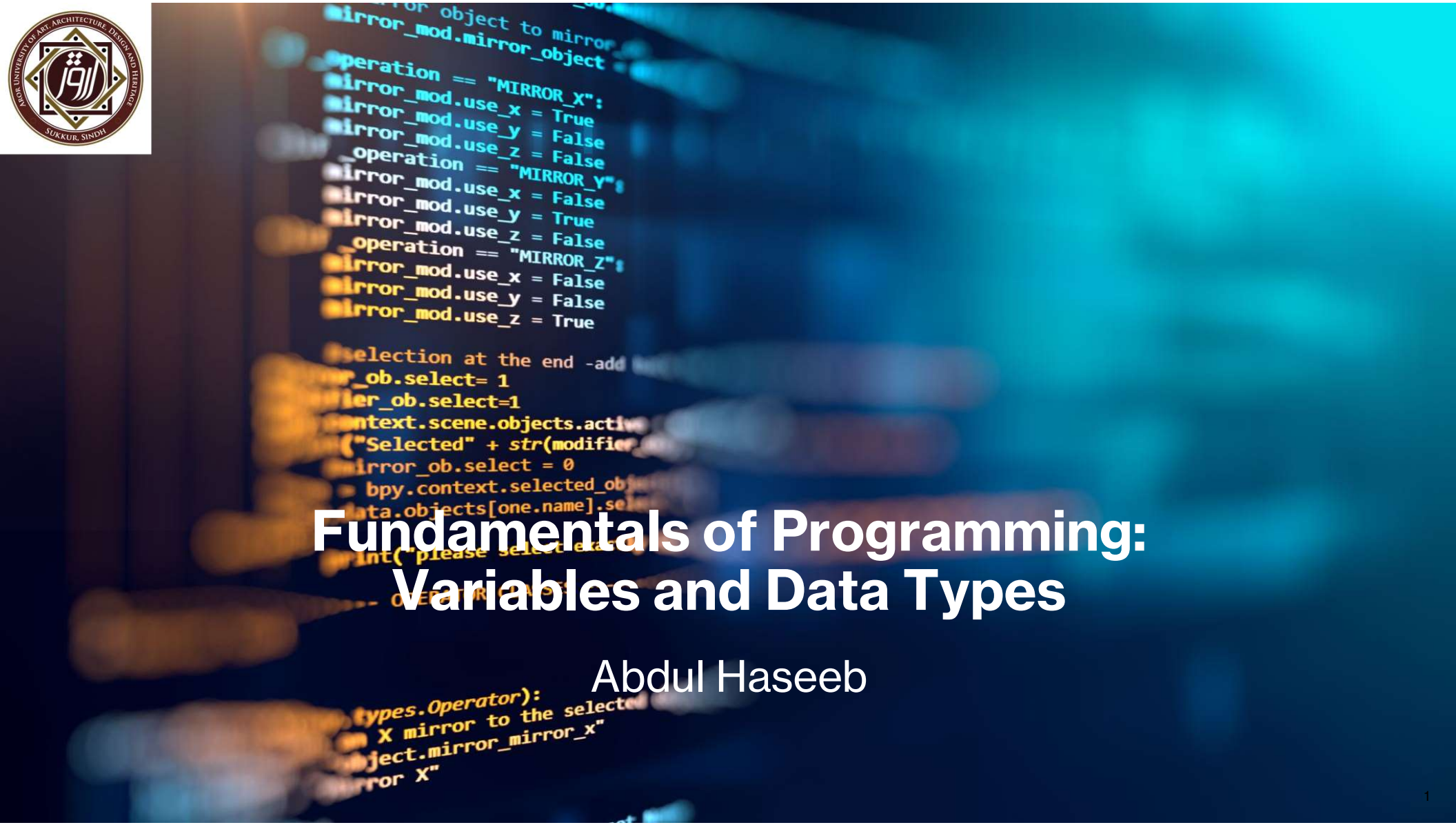


Fundamentals of Programming: Variables and Data Types

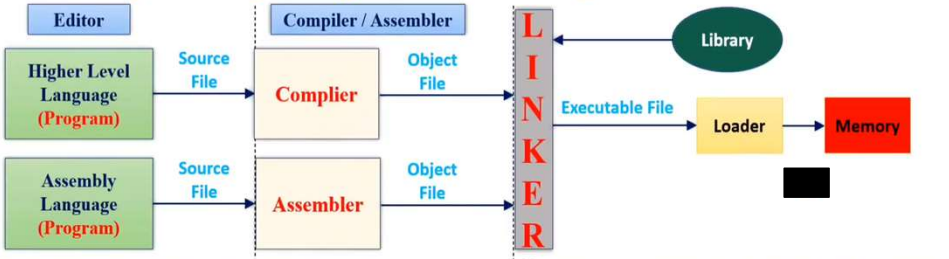
Abdul Haseeb

RECAP

- IDE
- Problem Solving
- Algorithms
- Structure of first C++ Program
- Features of C++

Processing of a C++ Program

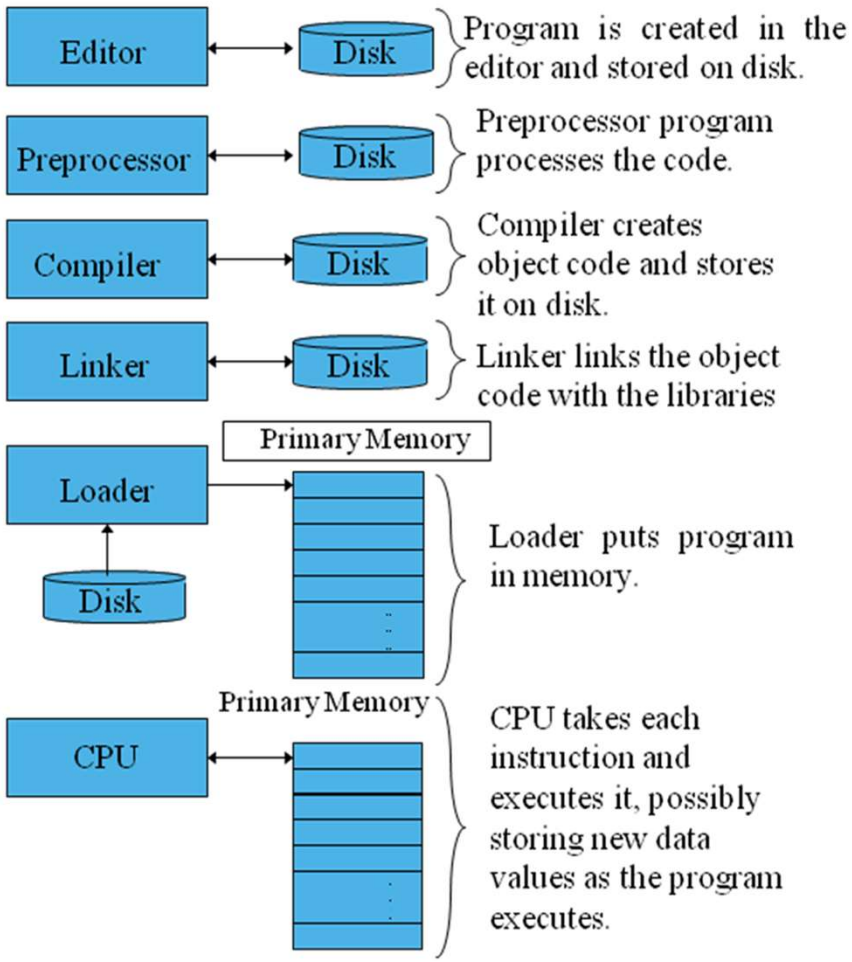
Editor, Compiler, Assembler, Linker & Loader



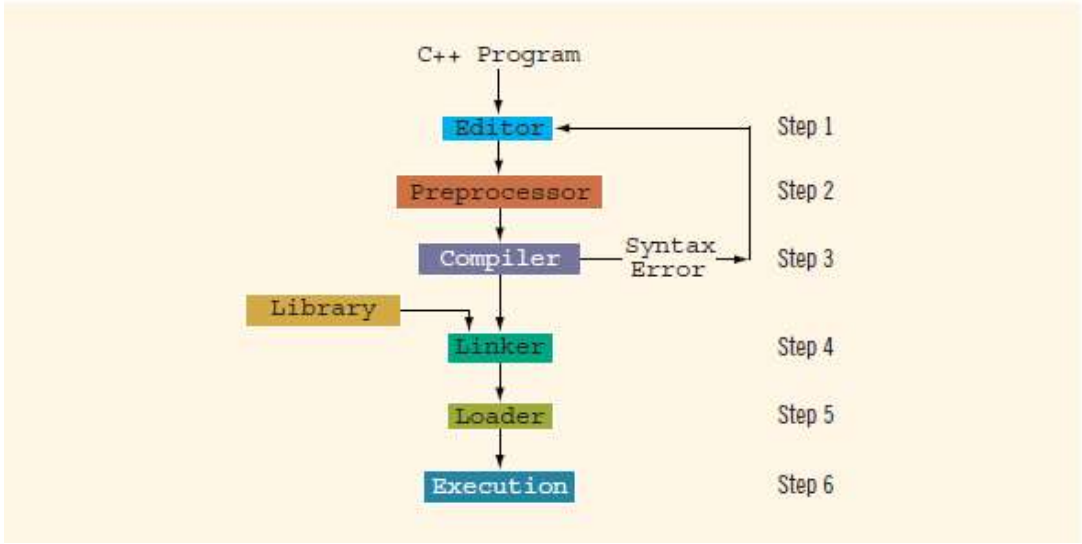
- In Editor we write programs for Microcontroller.
- Programs may be written in Assembly Language or Higher Level Language {C Language}.
- By writing program we generate source file.
- Assembler : It is used to convert Assembly language into machine code or object file. It also shows errors if any syntax error is there in program.
- Complier : It is used to convert Higher Level language into machine code or object file. It also shows errors if any syntax error is there in program. It also gives warnings if it is there with programs.

- Linker : It is linking all the object files of compiler and assembler with the use of library.
- It will generate executable files.
- Loader: It is used to load executable files into the memory of microcontroller.
- Once program is loaded into memory, microcontroller can execute it as per the requirement of USER.

Processing of a C++ Program



Processing of a C++ Program



Variables

- We often use **different types of data**
  - Variables are used:
    - To store value for a particular type of data

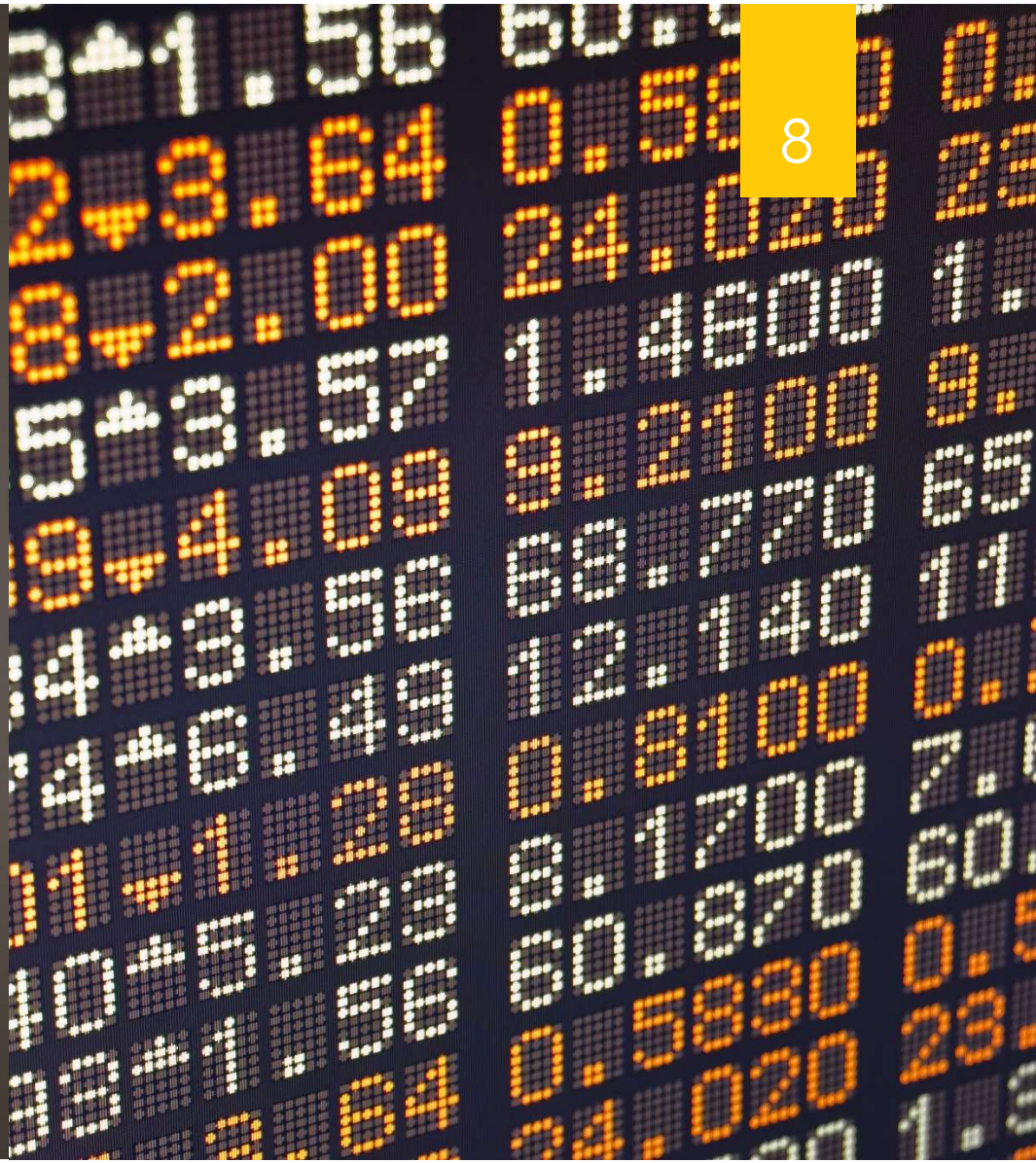
Variables

- Each variable in C++ has:
  - Data Type
  - Name
  - Value

Three Actions for Variables

- Declaring a Variable:
  1. Set the name and data type for a variable
     a) These two properties don't change

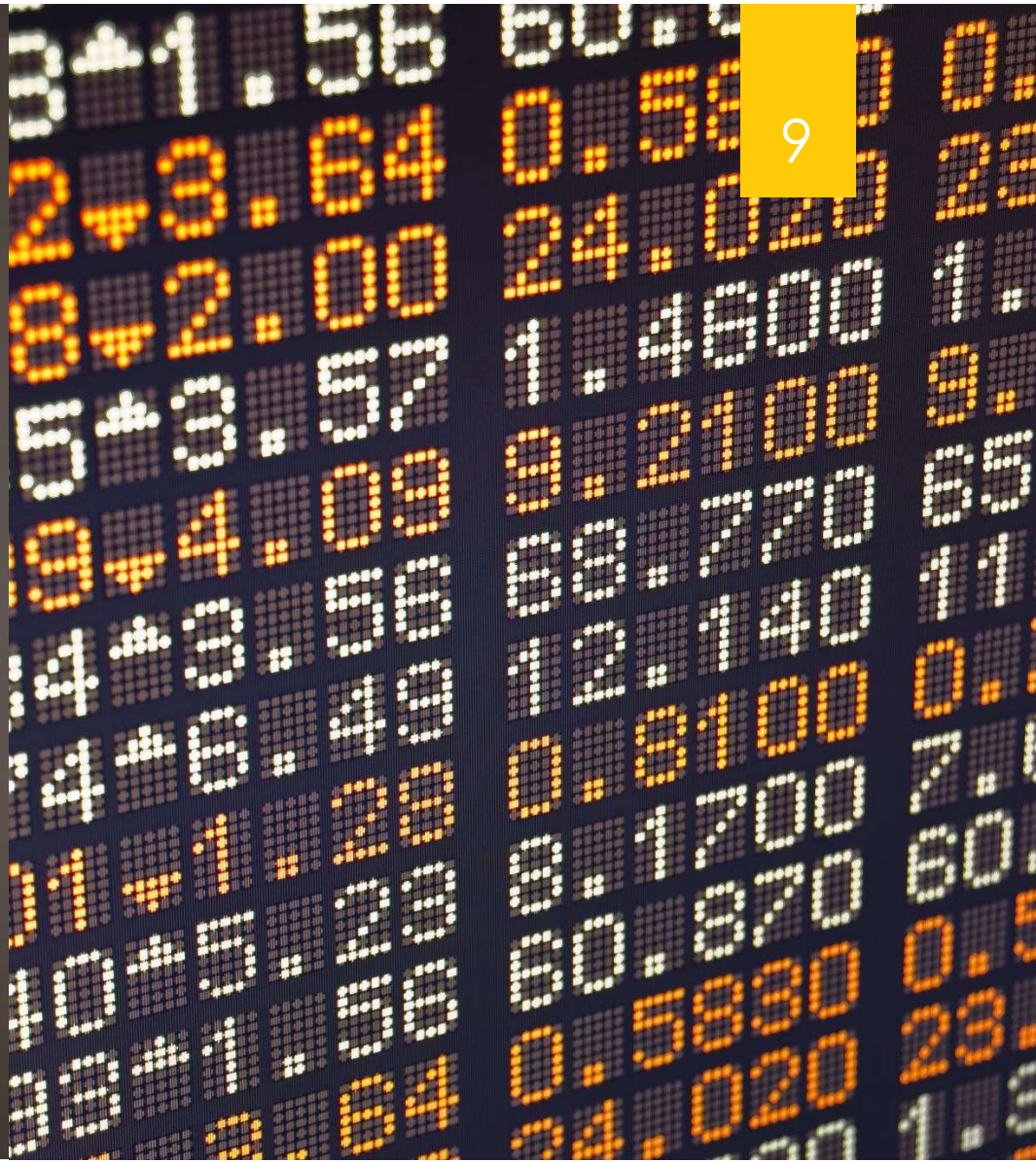
```
//declaring (giving the variable a type)
int number;
bool true_or_false;
char letter;
```



Three Actions for Variables

- Assigning (Initializing) a Variable:
  1. Set the value of a variable
     a) It can change

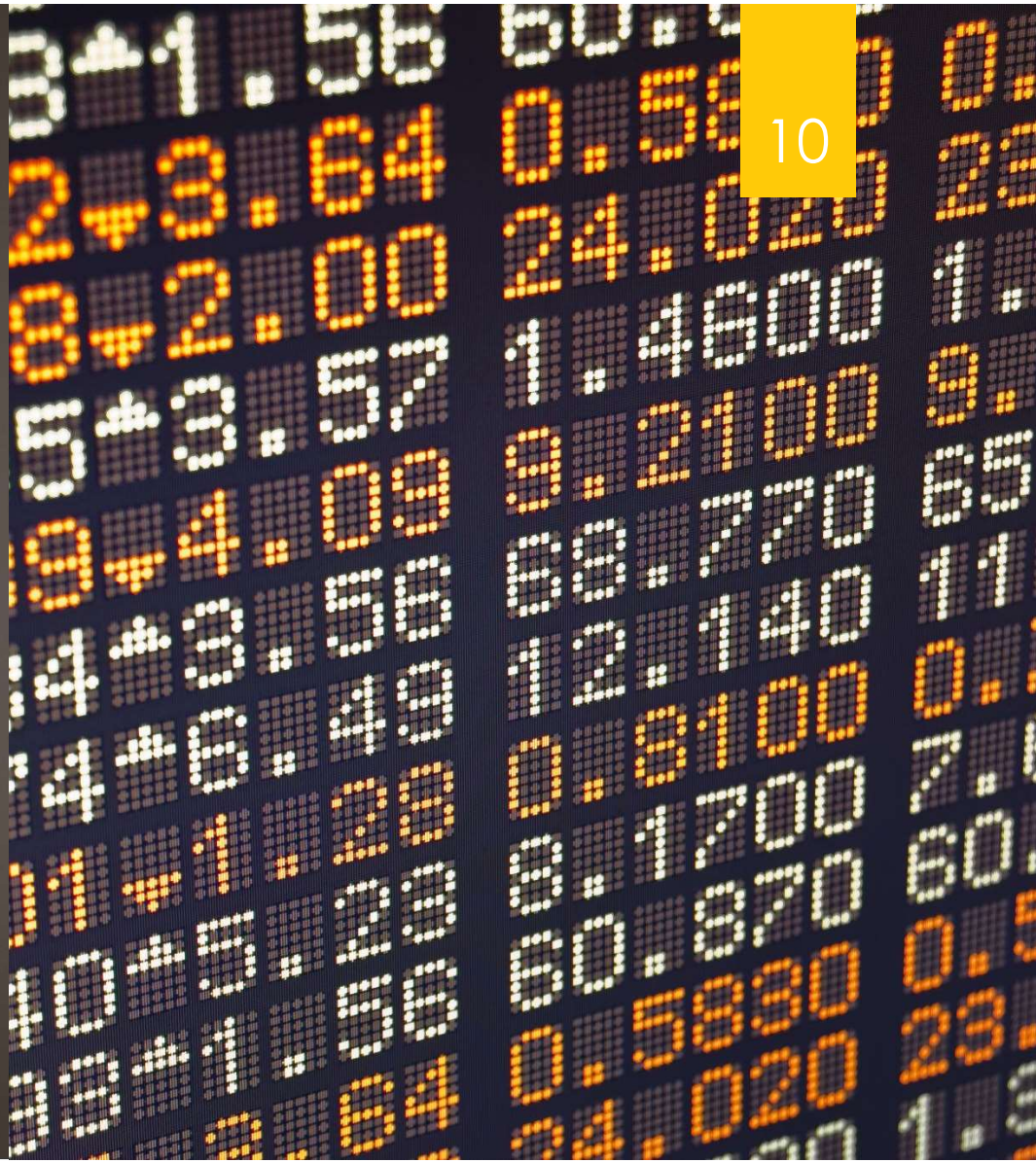
```
//assigning (giving the variable a value)
number = 99;
true_or_false = true;
letter = 'a';
```



Three Actions for Variables

- Accessing a Variable:
  1. Retrieve the value, by calling it's name.
  2. You must declare and assign a variable before you can access it.

```
//accessing (retrieving the value of the data by printing)
cout <<number <<endl;
cout << true_or_false << endl;
cout << letter << endl;
```



Characteristics of a Variable

- Variables are changeable
- Variables are container
- Variables are identifier
- Example: a, name, age, salary, x

Variable and its values in memory

- Variable: a memory location whose contents can be changed

Figure 2-2 Memory allocation

Rules for defining a variable name

A to Z	a to z	Alphanumerical like a1, day1, name1 etc
Multiple characters like name, fName, etc.	Can not use special characters except '_' underscore.	Can not be keywords of C/C++

Examples

- a Correct
- A Correct
- Age Correct
- name Correct
- name1 Correct
- first_name Correct
- _age Correct
- first-name Incorrect
- 2age Incorrect
- my@age Incorrect
- include Incorrect
- Include Correct
- delay Incorrect