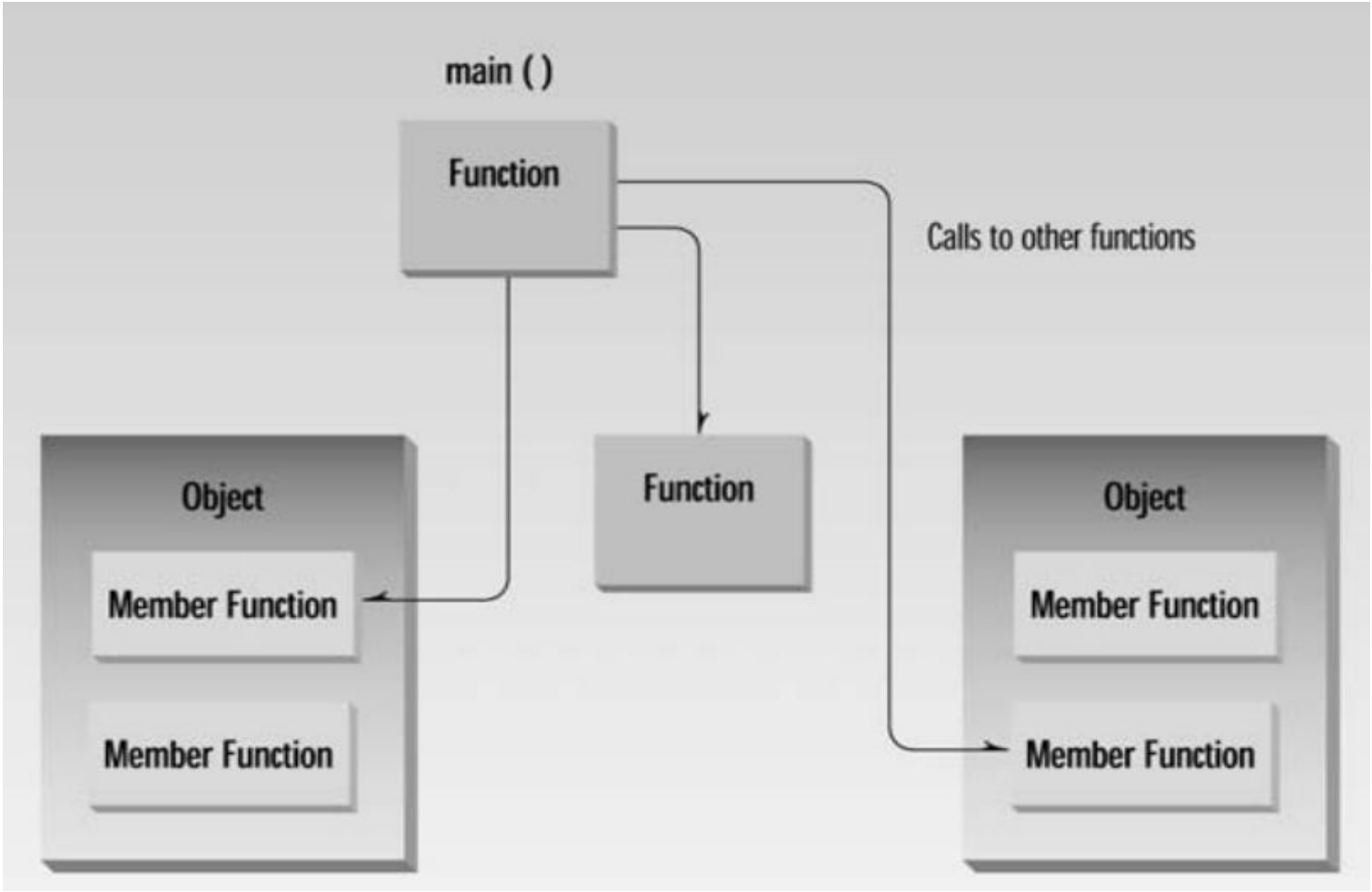
C++ Programming Basics

Mr. Santosh N. Nagargoje

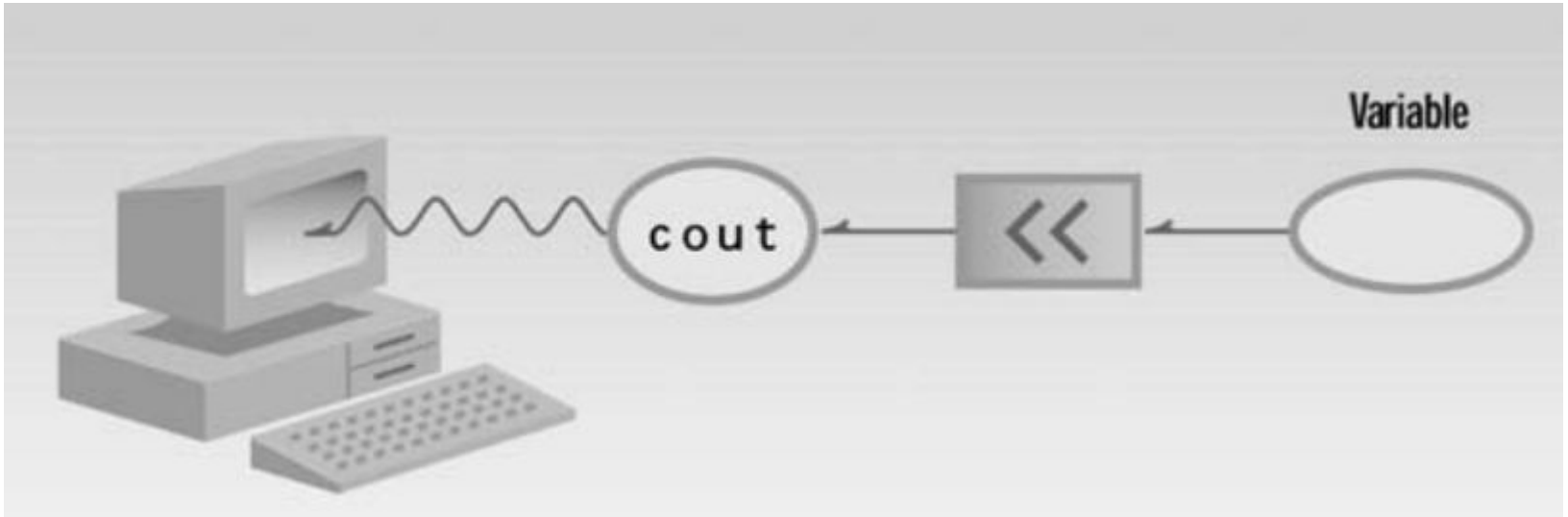
Basic Program Construction

```
#include <iostream>     //header file

using namespace std;    //namespace

int main()              /* main function */

{                       /* open curly brace */

cout << "Every age has a language of its own\n"; //output

return 0;          //return value 0

}               //close curly brace
```


main ( )
Function
Calls to other functions
Object
Member Function
Member Function
Function
Object
Member Function
Member Function

Output Using cout

- << (Insertion or put to Operator), object of standard ostream class.

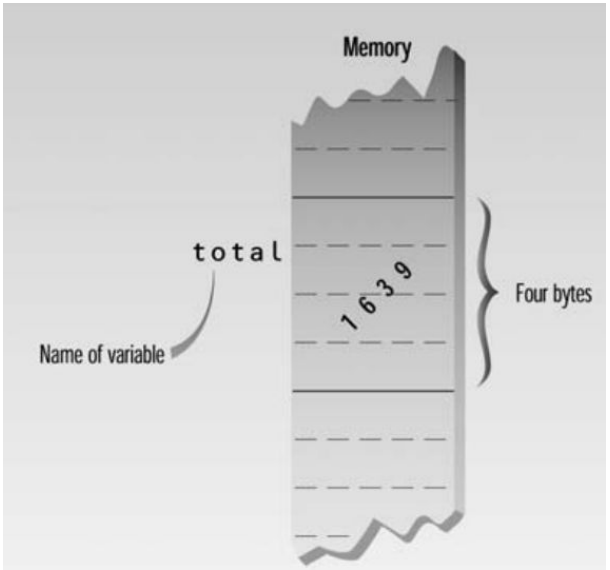


Directives

- **Preprocessor Directives**
  - Starts with # (number sign) e.g. #include
  - an instruction to the compiler.
  - #include → tells the compiler to insert another file into your source file.
  - Files included by #include → header files
- **Header Files**
  - Defines the input/output operations for C++.
  - Generally found at *include* directory in your compilers source directory.
  - e.g. #include<iostream>
- **using Directive**
  - e.g. using namespace std;
  - describes that all the program statements that follow are within the std namespace.
  - cin, cout are declared under the namespaces.

Integer Variables

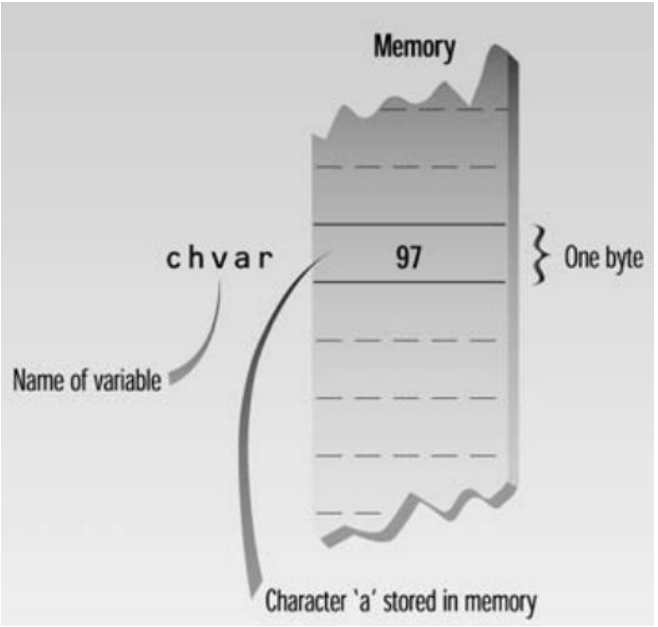
- **Variable**:
  - symbolic name which stores value.
  - Located in particular spaces in computer's memory.
- represent integer numbers like 1, 30,000, and –27
- have no fractional part
- **Defining Integer Variables**
  - Syntax: ***int*** variable_name;
  - E.g. int no_of_students;
  - Size: ***4 Bytes(32 bits)***
  - Range: ***–2,147,483,648 to 2,147,483,647***
- **Integer Constants**
  - E.g. 30
  - Value doesn't change during the program execution.



Integer Variables

- **The endl Manipulator**
  - Instructions that modifies the output.
  - Inserts linefeed into the stream that results into text on new line
  - Similar to \n.
- **Other Integer Types**
  - long
    - Size: 4 bytes(32 bits). Range: same as int.
  - short
    - Size: 2 bytes(16 bits). Range: –32,768 to 32,767.
  - Has fixed size no matter what system is.

Character Variables



- stores integers that range in value
- from –128 to 127
- Size: 1 bytes (8 bits)
- Used to store ASCII characters
- E.g. char ch;
- **Character Constants**
  - use single quotation marks around a character, like ‘a’ and ‘b’.
  - translates character constant into the corresponding ASCII code. E.g. ‘a’ → 97
- **Initialization:**
  - e.g. ***`char gender='M';`***

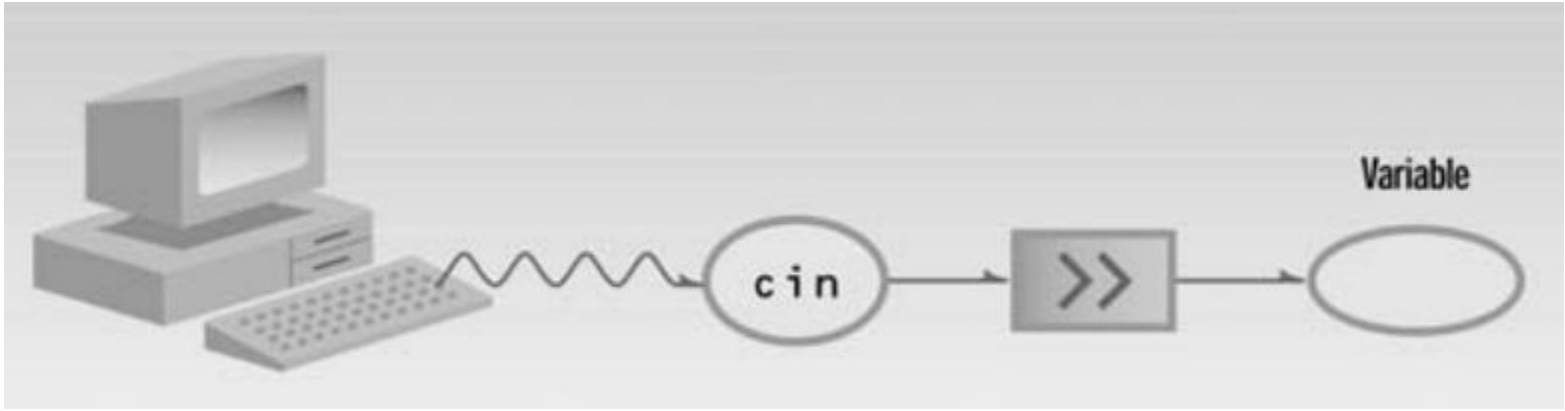
Escape Sequences

- causes an “escape” from the normal way characters are interpreted.
- used as separate characters or embedded in string constants.

Escape Sequence	Character	Escape Sequence	Character
\a	Bell (alarm)	\\	backslash
\b	backspace	\’	Single quotation mark
\f	formfeed	\”	Double quotation mark
\n	newline	\?	Question mark
\r	return		
\t	horizontal tab		

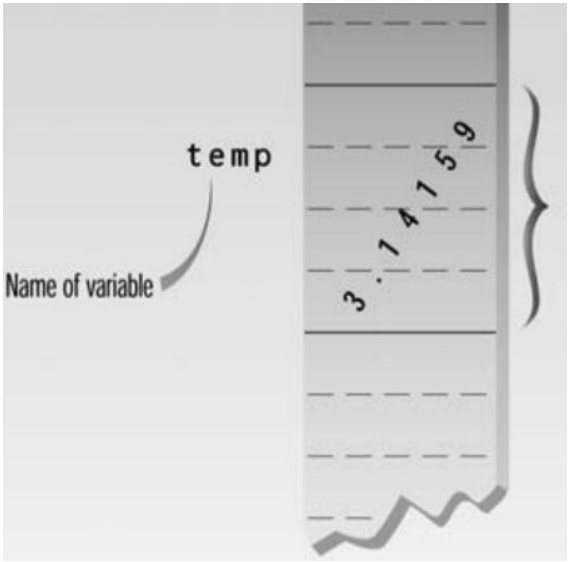
Input with cin

- an object, predefined in C++ to correspond to the standard input stream.
- represents data coming from the keyboard.
- uses **>>** (extraction or get from operator).
  - takes the value from the stream object on its left and places it in the variable on its right.



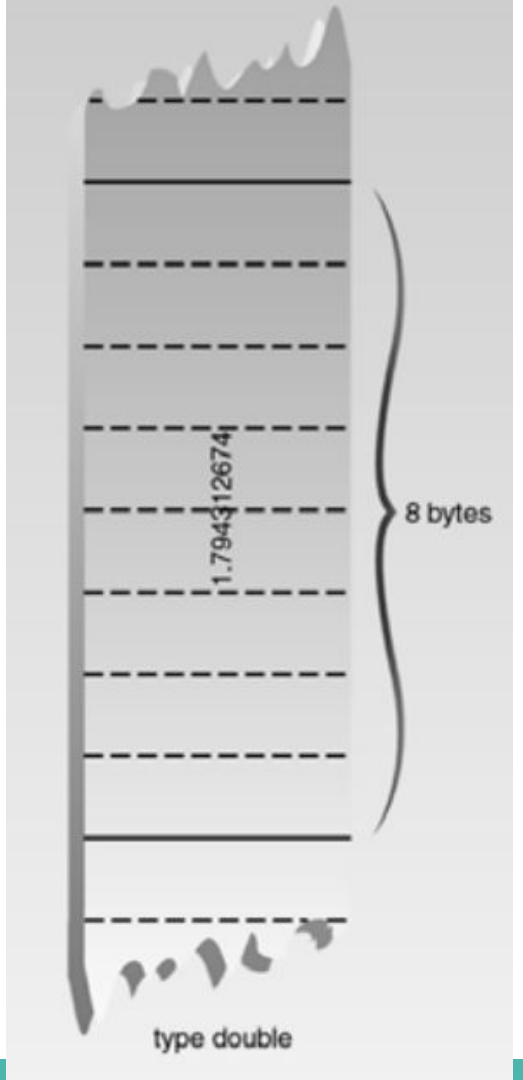
Floating Point Types

- represent numbers with a decimal place—like 3.1415927, 0.0000625, and –10.2
- have both an integer part, to the left of the decimal point, and a fractional part, to the right.
- **Type float**
  - Range: 3.4×10^{-38} to 3.4×10^{38}
  - Precision: 7 digits
  - Size: 4 Bytes (32 bits)
  - e.g. float pi = 3.14156;



Floating Point Types

- **Type double and long double**
  - Size: 8 bytes (64 bits)
  - Range: 1.7×10^{-308} to 1.7×10^{308}
  - Precision: 15 digits
  - e.g. double area = 12.3456343433;
- **Floating-Point Constants**
  - E.g. 3.14159F where F → float
  - Can be written with exponential notation as well.
  - E.g. *1,000,000,000 = 1.0E9*
  - *1234.56 = 1.23456E3*
  - *0.0000635239 = 6.35239E–5*



const Qualifier

- const (for constant) precedes the data type of a variable.
- specifies that the value of a variable will not change throughout the program.
- E.g. `const float PI = 3.14159F;`

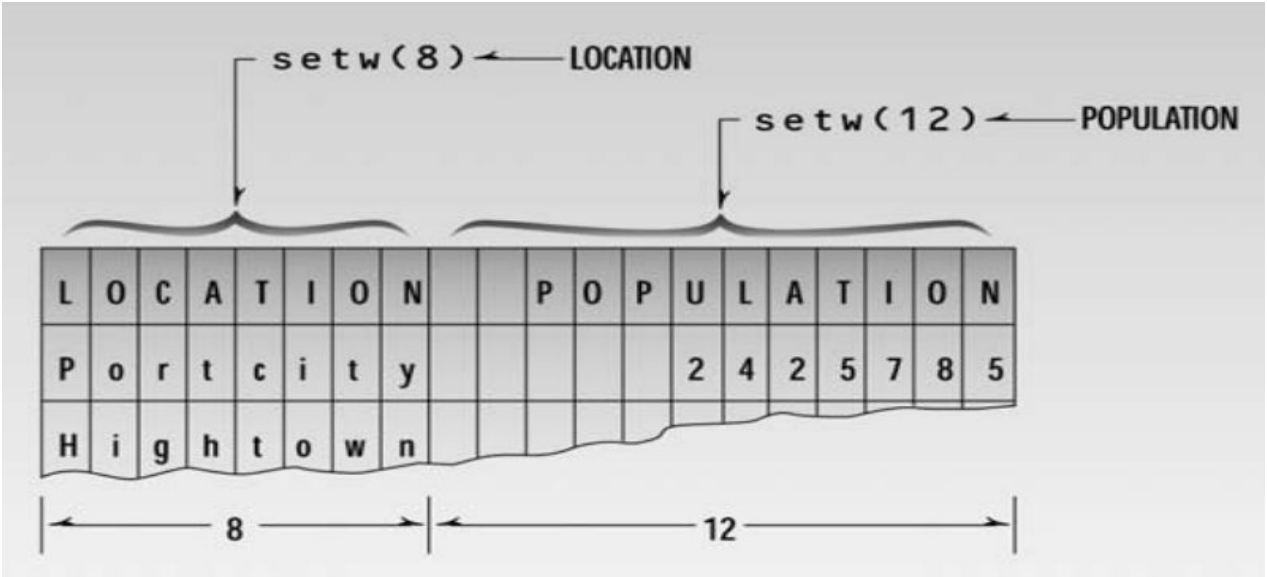
The #define Directive

- Used to define constants
- Example:

```
#define PI 3.14159
```

The setw Manipulator

- Manipulators → operators used with the insertion operator (<<) to modify—or manipulate—the way data is displayed.
- changes the field width of output.



Data Types Summary

Keyword	Numerical Range		Digits of Precision	Bytes of Memory
	Low	High		
bool	false	true	NA	1
char	-128	127	NA	1
short	-32768	32767	NA	2
int	–2,147,483,648	2,147,483,647	NA	4
long	–2,147,483,648	2,147,483,647	NA	4
float	$3.4x10^{-38}$	$3.4x10^{38}$	7	4
double	$1.7x10^{-308}$	$1.7x10^{308}$	15	8

unsigned Data Types

Keyword	*Numerical Range* *Low*	*High*	*Bytes of Memory*
`unsigned char`	0	255	1
`unsigned short`	0	65,535	2
`unsigned int`	0	4,294,967,295	4
`unsigned long`	0	4,294,967,295	4

Summary

- **main()** is always the first one executed when a program is executed.
- Output handled with **cout and << (insertion operator or put to operator)**
- Input handled with **cin and >> (extraction operator or get from operator)**
- Data types: integer types: **char, int, long, short** and floating-point types: **float, double, long double**.
- Preprocessor directives consist of instructions to the compiler, rather than to the computer.
  - **#include** → insert another file into the present source file
  - **#define** → substitute one thing for another.
  - **using** → recognize names that are in a certain namespace.