

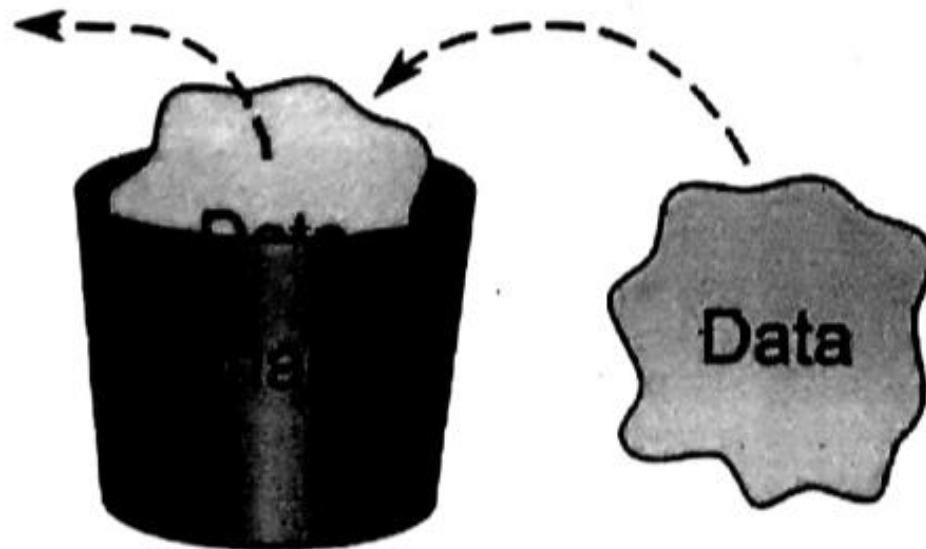
# Variables in C++

# Variable in C++

- Variable is an identifier which holds data.
- Variable are used in C++, where we need storage for any value, which will change in program.
- Variable can be declared in multiple ways each with different memory requirements and functioning.
- Variable is the name of memory location allocated by the compiler depending upon the datatype of the variable.

# Variable in C++

- A **variable** is a **location** in computer memory where a **value** can be stored.
- Variables must be declared before they are used in a program.



# Variable in C++

- In a program a variable has:
  - Name
  - Type
  - Value (Optional)
- **Variable Declarations**
  - This is the process of allocating sufficient memory space for the data in term of variable.
- **Syntax**

```
Datatype variable_name;
```

- **Example:**

```
int number;
```

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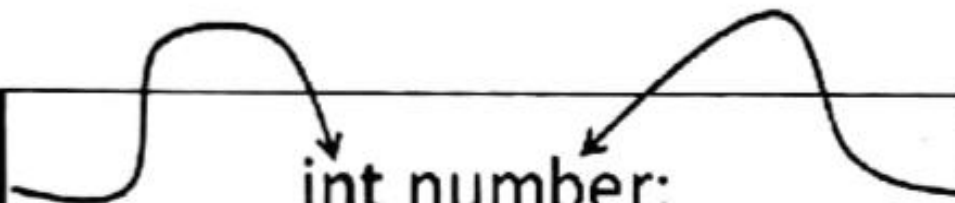
```
Datatype variable_name;
```

- **Example:**

**Variable Type**

```
int number;
```

**Variable Name**



# Example of Variable

- The following diagram illustrates two types of variables: int and double. An int variable stores an integer (whole number). A double variable stores a real number

NAME	VALUE	TYPE
number	123	int
sum	-456	int
pi	3.1416	double
average	-55.66	double

A variable has a name, stores a value of the declared type

## Declaration and Initialization of Variable

- Variable must be declared before they are used. Usually it is preferred to declare them at the starting of the program, but in C++ they can be declared in the middle of program too, but must be done before using them.
- **Example**

```
int result;           // declared but not initialized
char c;              // declared but not initialized
double number;      // declared but not initialized
float digits;       // declared but not initialized
```

## Declaration and Initialization of Variable

- initialization means assigning value to an already declared variable,

```
int number; // declaration  
number = 10; // initialization
```

- Initialization and declaration can be done in one single step also,

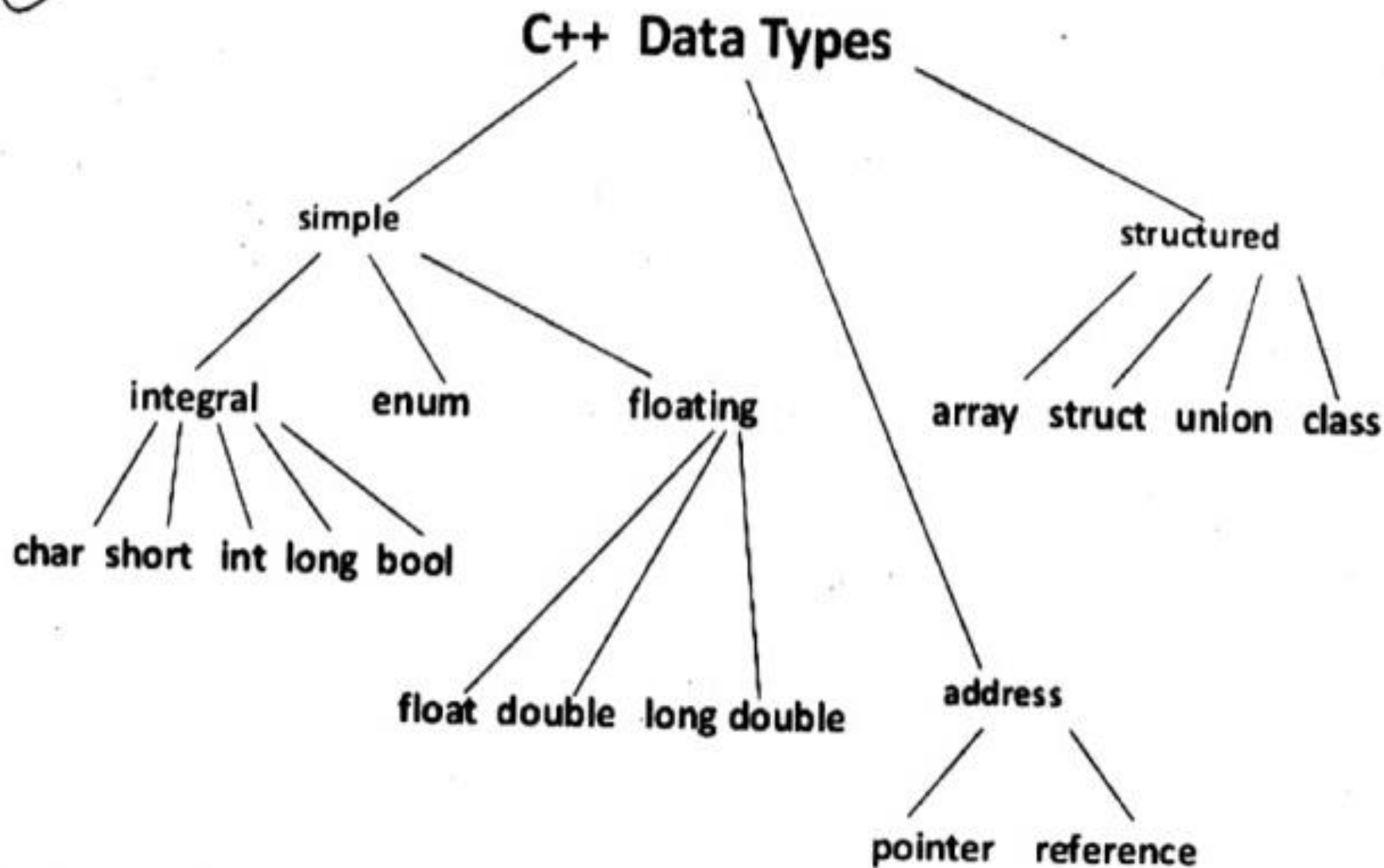
```
int number=10; //initialization and declaration in same step
```

- **Syntax:**

```
data_type variable_name = value;
```



# Datatype in C++



## Data Type In C++

- The simple types supported in C/C++ are
  - **Boolean** type (bool)
  - **Character** types (char and wchar\_t)
  - **Integer** types (short, int, long)
  - **Floating** point numbers (double, float, long double, etc.)
  - **Pointers** (int\*, char\*, bool\*, double\*, void\*, etc.)

# Primitive Built-in Types

Type	Keyword
Boolean	bool
Character	char
Integer	int
Floating point	float
Double floating point	double
Valueless	void
Wide character	wchar_t

## Example of Data Type

- `char c = 'A';` // character type
- `int number = 1;` // integer type
- `float pi = 3.14159;` // floating point type
- `double e = 6e-4;` // double type (e is for exponential)
- `bool = true;` //boolean data type

## Data Type In C++

- The following table shows the variable type, how much memory it takes to store the value in memory, and what is maximum and minimum value which can be stored in such type of variables.

Type	Typical Bit Width	Typical Range
char	1byte	-128 to 127 or 0 to 255
unsigned char	1byte	0 to 255
signed char	1byte	-128 to 127
int	4bytes	-2147483648 to 2147483647
unsigned int	4bytes	0 to 4294967295
signed int	4bytes	-2147483648 to 2147483647

## Example of bool Data type

```
#include <iostream>
using namespace std;
int main()
{
    //declaring boolean variable
    bool b, bl;
    //assigning values to these variables
    b = true;
    bl = 5 < 4;
    cout << "b : " << b << endl;
    cout << "bl : " << bl << endl;
    return 0;
}
```

**Output is:**

b : 1

bl : 0