Writing C++ Program to Take Input, Process it and Give Output on Console

اَللّٰهُمَّ اُرْزُقْنِى عِلْمًا نَافِعًا وَاسِعًا عَمِيْقًا

اَللّٰهُمَّ اُرْزُقْنِى رِزْقًا وَاسِعًا حَلَالًا طَيِّبًا
مُبَارَكًا مِنْ عِنْدِكَ

Vision of this Lecture

We want to write a Program that takes Distance (kilometers) and Time (hours) as input from the user, calculates its Speed (kilometer/hour), and display the speed as output.

Vision of this Lecture

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```
D:\>c++ second.cpp -o second.exe

D:\>second.exe
Enter distance..40
Enter time..10
Speed is 4
D:\>
```

How to Write this Program ?

```
D:\>c++ second.cpp -o second.exe

D:\>second.exe
Enter distance..40
Enter time..10
Speed is 4
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```

Steps to write the program

```
D:\>c++ second.cpp -o second.exe

D:\>second.exe
Enter distance..40
Enter time..10
Speed is 4
D:\>
```

- Show a Text Message for distance.
- Let the user enter distance value and store it somewhere.
- Show a Text Message for Time.
- Let user to enter time value and store it somewhere.
- Divide the distance value by time value and store the speed.
- Show the message and value of speed.

Display Output on Console

```
D:\>c++ second.cpp -o second.exe

D:\>second.exe
Enter distance..40
Enter time..10
Speed is 4
D:\>
```

- Show a Text Message for distance.

We already know how to achieve this step.
To display something on the console we use cout command.

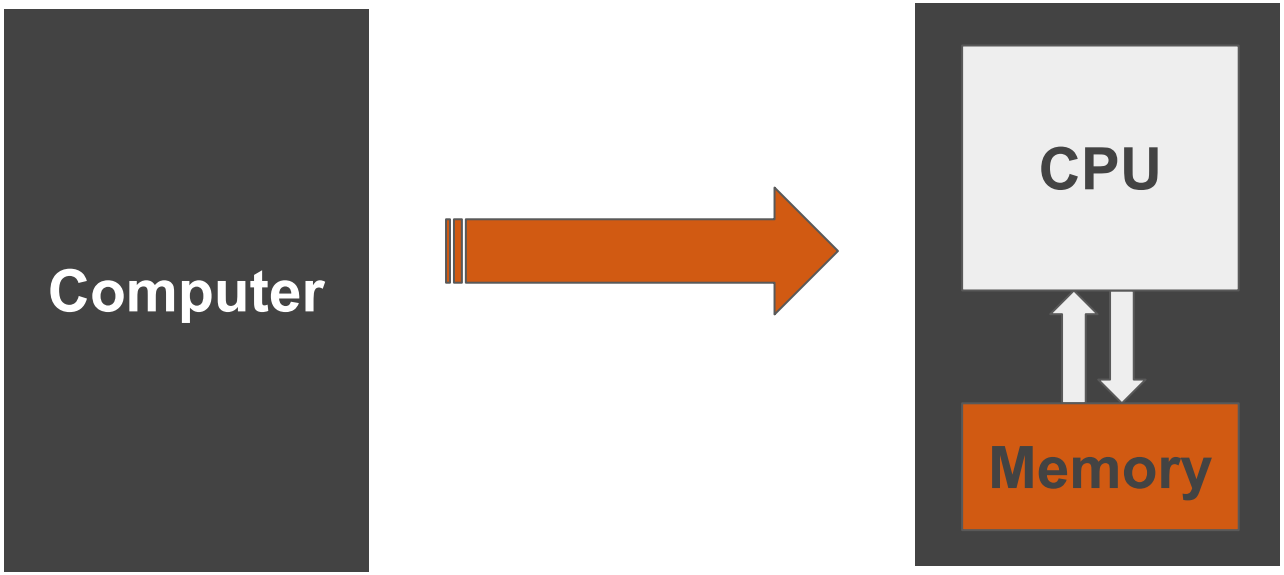
```
#include<iostream>
using namespace std;
main()
{
    cout << "Enter Distance..";
}
```

Where to Store Data?

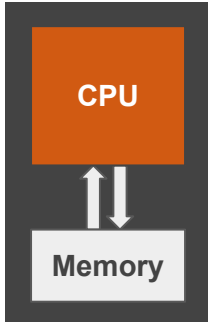
```
D:\>c++ second.cpp -o second.exe

D:\>second.exe
Enter distance..40
Enter time..10
Speed is 4
D:\>
```

- Show a Text Message for distance.
- Let the user enter distance value and store it somewhere.

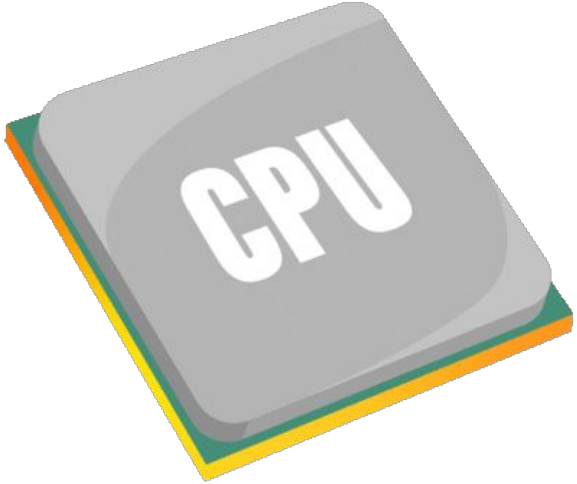
Computer store data in memory



CPU: Brain of the Computer

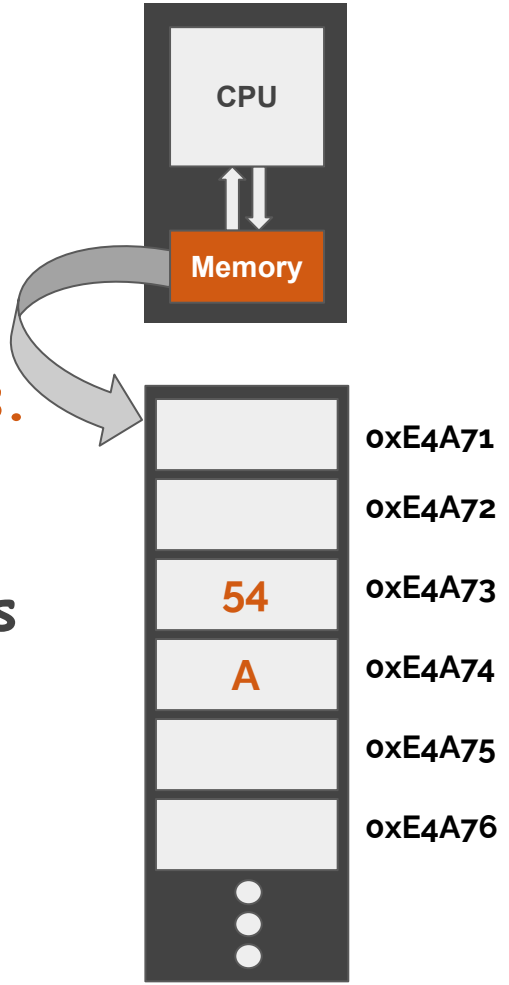


- CPU is the main processing unit
- It has predefined set of instructions



Main Memory

- Memory is called Main Memory, Primary Memory or RAM.
- This memory is divided into different cells.
- Each cell has an address like we have address of our house numbers or PO Boxes
- CPU stores data into these cells and loads data from these cells whenever it is required.



Where to Store Data: Memory

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D:\>second.exe
Enter distance..40
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Speed is 4
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```

- Show a Text Message for distance.
- Let the user enter distance value and store it ~~somewhere~~ in memory.

How to Store Data in Memory

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D:\>second.exe
Enter distance..40
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```
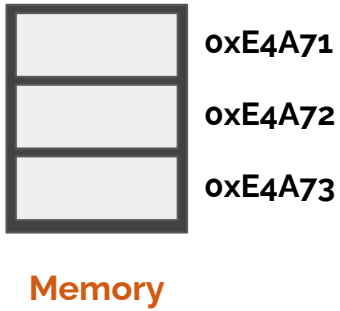

- Show a Text Message for distance.
- Let the user enter distance value and store it in memory.

To store data, first we need to reserve the space in the Memory.



How to Access Memory

```
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Enter distance..40
Enter time..10
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```
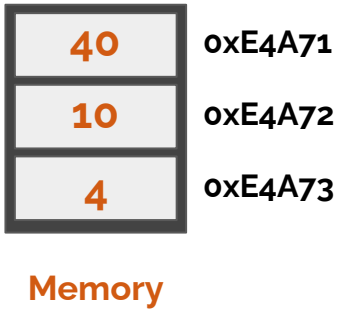

- Show a Text Message for distance.
- Let the user enter distance value and store it in memory.

When the space is reserved, we can store or retrieve data from the Memory through its Memory Addresses.



How to Access Memory

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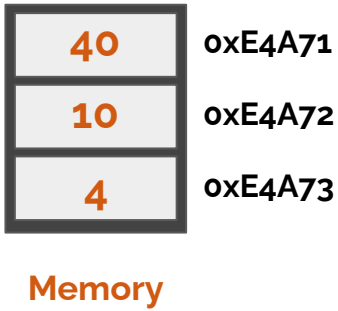
- Show a Text Message for distance.
- Let the user enter distance value and store it in memory.

It is difficult to remember the Addresses of these Memory locations.



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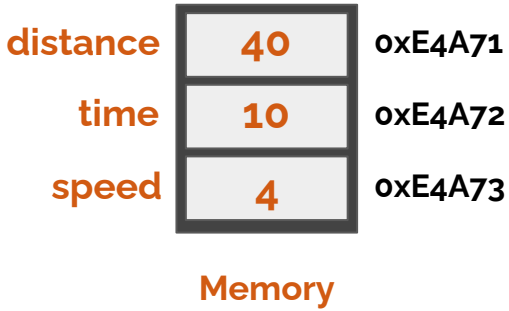
- Show a Text Message for distance.
- Let the user enter distance value and store it in memory.

High Level Languages allow us to give Names to these reserved Memory locations.



Variables: Names instead of Addresses

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D:\>c++ second.cpp -o second.exe

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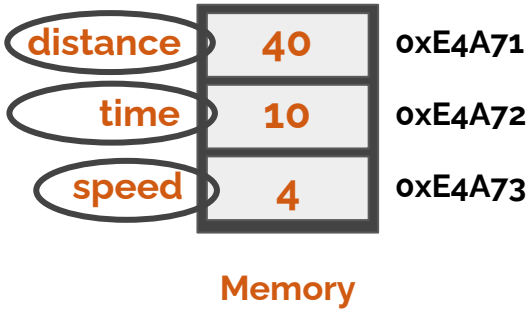
```

- Show a Text Message for distance.
- Let the user enter distance value and store it in memory.

These Names are called Variables.



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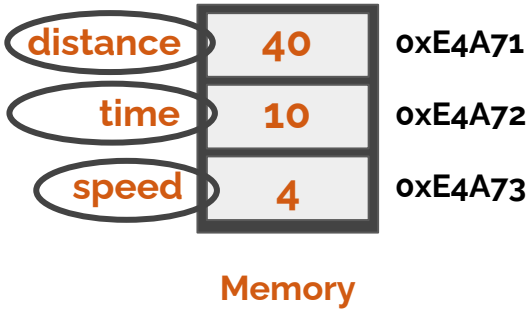
We can say variables are names through which we access memory to store and retrieve data.



How to Reserve Memory?

```
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Enter distance..40
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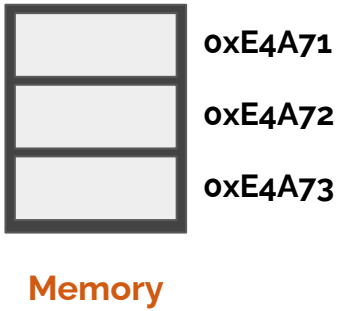
- Show a Text Message for distance.
- Let the user enter distance value and store it in memory.

To reserve memory in C++, we have to tell 2 things.

Datatype nameOfTheVariable;



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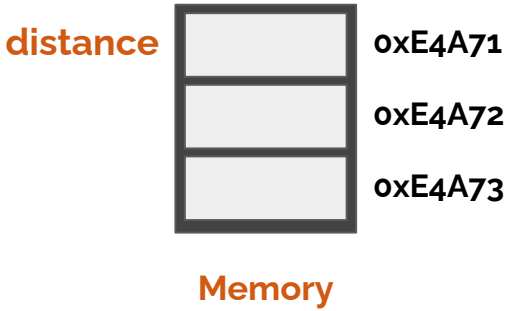
To reserve memory in C++, we have to tell 2 things.

```
Datatype nameOfTheVariable;
int  distance;
```



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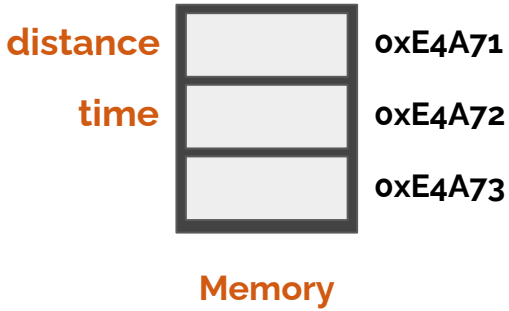

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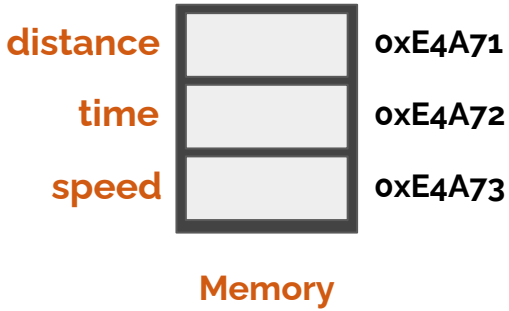

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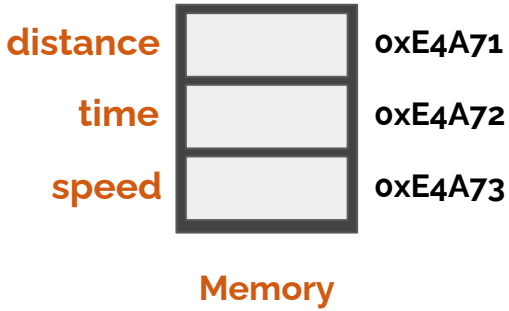
- Show a Text Message for distance.
- Let the user enter distance value and store it in memory.

Now, the second step is divided into two parts.



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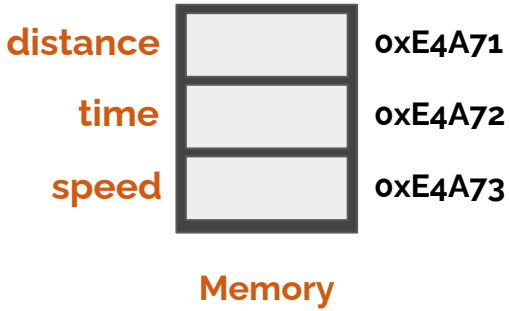

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- Show a Text Message for distance.
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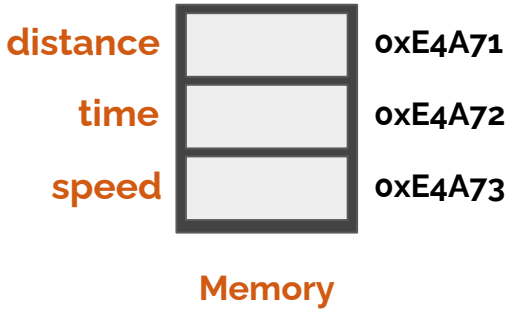
```
#include<iostream>
using namespace std;
main()
{
     cout << "Enter Distance..";
     int distance;
}
```



How to take Input?

```
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```
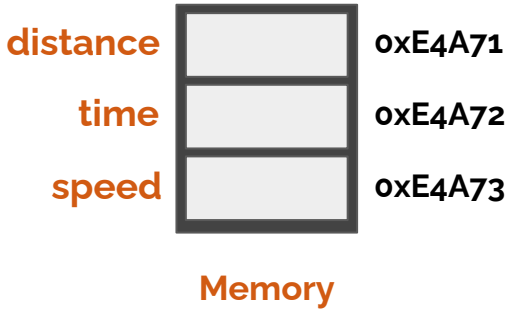

- Show a Text Message for distance.
- Reserve memory for distance

→ Let the user enter distance value and store it in the reserved memory.

Now, we have to take input from the user in distance variable.



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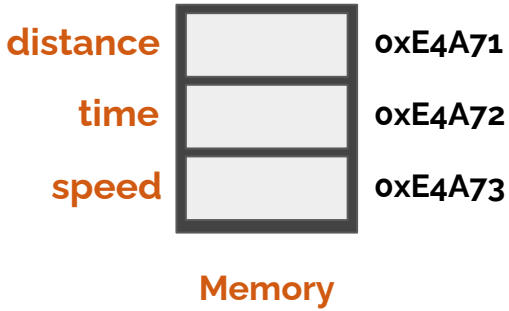
→ Let the user enter distance value and store it in the reserved memory.

In C++, we have the cin command to take input from the user.



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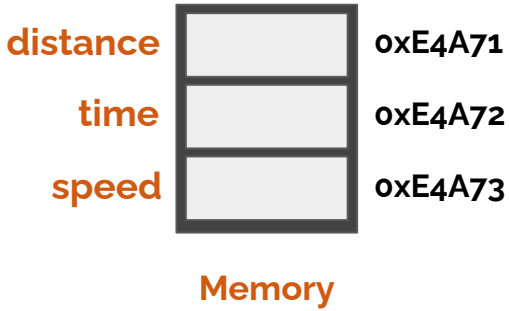


```
cin >> distance;
```

cin stands for character input.

How to take Input?

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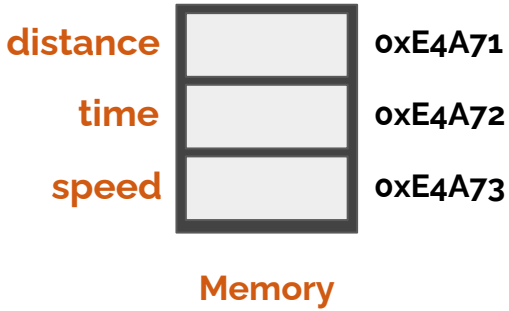


```
cin >> distance;
```

>> is the extraction operator

How to take Input?

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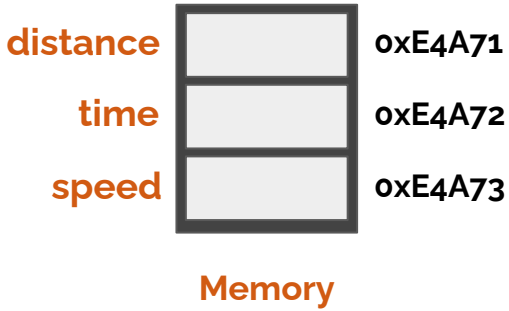

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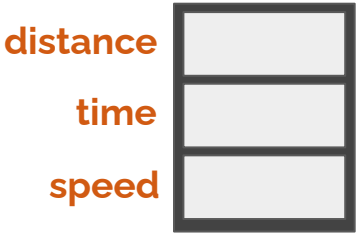


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```

- Show a Text Message for distance.
- Reserve memory for distance
  Let the user enter distance value and store it in reserved memory.
- Show a Text Message for Time.

```
#include<iostream>
using namespace std;
main()
{
    cout << "Enter Distance..";
    int distance;
    cin >> distance;
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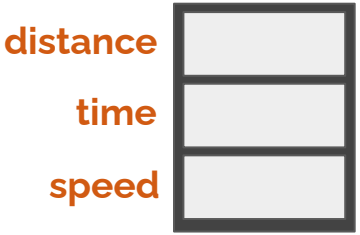
}
```

How to take Input?

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```

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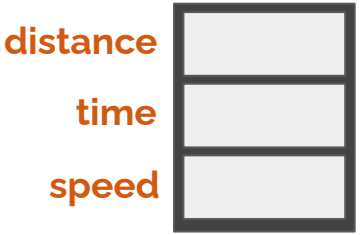
- Reserve memory for distance
  Let the user enter distance value and store it in reserved memory.
- Show a Text Message for Time.
- Reserve memory for time
  Let user to enter time value and store it in memory.

```
#include<iostream>
using namespace std;
main()
{
    cout << "Enter Distance..";
    int distance;
    cin >> distance;
    cout << "Enter Time..";
    int time;
    cin >> time;
}
```

How to Divide?

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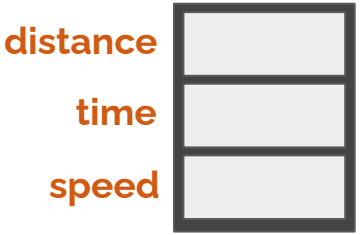
- Reserve memory for distance
  Let the user enter distance value and store it in reserved memory.
- Show a Text Message for Time.
- Reserve memory for time
  Let user to enter time value and store it in memory.
- **Divide the distance value by time value and store the speed.**

How to Divide?

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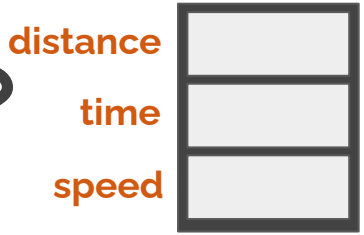
- Show a Text Message for Time.
- Reserve memory for time
  Let user to enter time value and store it in memory.
- **Divide the distance value by time value and store the speed.**

In C++, / is the arithmetic operator for division.

```
distance / time;
```

How to store result?

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  Let the user enter distance value and store it in reserved memory.
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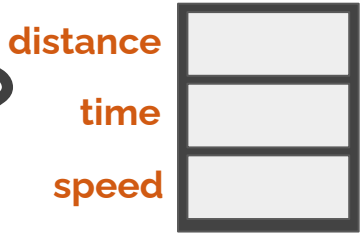
- Divide the distance value by time value and store the speed.

How to store result?

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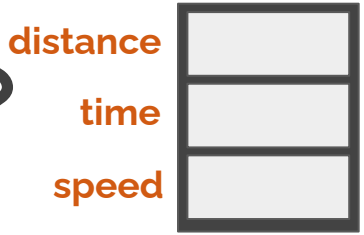
  Let the user enter distance value and store it in reserved memory.
- Show a Text Message for Time.
- Reserve memory for time
  Let user to enter time value and store it in memory.
- Divide the distance value by time value and store the speed.

In C++, = is the assignment operator for storing in memory.

```
speed = distance / time;
```

How to store result?

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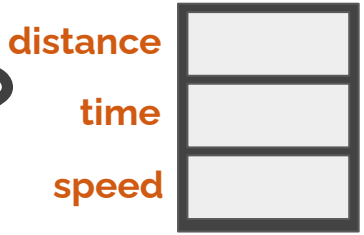
- Show a Text Message for Time.
- Reserve memory for time
  Let user to enter time value and store it in memory.
- Reserve memory for speed
  Divide the distance value by time value and store the speed.

```
#include<iostream>
using namespace std;
main()
{
    cout << "Enter Distance..";
    int distance;
    cin >> distance;
    cout << "Enter Time..";
    int time;
    cin >> time;
    int speed;
    speed = distance / time;
}
```

How to store result?

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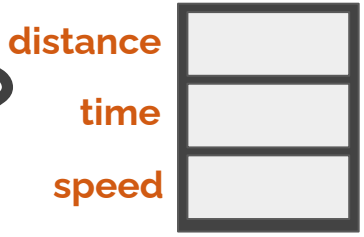
  Let the user enter distance value and store it in reserved memory.
- Show a Text Message for Time.
- Reserve memory for time
  Let user to enter time value and store it in memory.
- Reserve memory for speed
  Divide the distance value by time value and store the speed.
- Show the message and value of speed.

```
#include<iostream>
using namespace std;
main()
{
    cout << "Enter Distance..";
    int distance;
    cin >> distance;
    cout << "Enter Time..";
    int time;
    cin >> time;
    int speed;
    speed = distance / time;
}
```

How to store result?




```
D:\>c++ second.cpp -o second.exe

D:\>second.exe
Enter distance..40
Enter time..10
Speed is 4
D:\>
```

- Show a Text Message for distance.
- Reserve memory for distance
  Let the user enter distance value and store it in reserved memory.
- Show a Text Message for Time.
- Reserve memory for time
  Let user to enter time value and store it in memory.
- Reserve memory for speed
  Divide the distance value by time value and store the speed.
- Show the message and value of speed.

NOTE: when we want to display the value of a variable on Console then we do not use double quotes

```
#include<iostream>
using namespace std;
main()
{
    cout << "Enter Distance..";
    int distance;
    cin >> distance;
    cout << "Enter Time..";
    int time;
    cin >> time;
    int speed;
    speed = distance / time;
    cout << "Speed is " << speed;
}
```

Line by Line Execution of the Program

```
#include<iostream>
using namespace std;
main()
{
    cout << "Enter Distance..";
    int distance;
    cin >> distance;
    cout << "Enter Time..";
    int time;
    cin >> time;
    int speed;
    speed = distance / time;
    cout << "Speed is " << speed;
}
```

Vision of the Lecture: Achieved !!

```
#include<iostream>
using namespace std;
main()
{
    cout << "Enter Distance..";
    int distance;
    cin >> distance;
    cout << "Enter Time..";
    int time;
    cin >> time;
    int speed;
    speed = distance / time;
    cout << "Speed is " << speed;
}
```

```
G:\Programming Fundamentals (Fall 2022)\Week 3\Class Tasks>second.exe
Enter Distance..
```

Learning Objective

Write a C++ program that takes input from the user, apply mathematical operations and gives output on Console.

Self Assessment

1. Write a C++ program that takes Force acting on the object and it acceleration as input and calculates the mass of the object.

```
Enter Force..100
Enter Acceleration..20
Mass is 5
```

Self Assessment

2. Write a C++ program that takes weight 'w' as input from the user and calculates the 'm' is the mass of the object.
Formula is m = w/g. For simplicity, where 'g' is the acceleration due to gravity. consider the value of g to be 10 m/s2.