

Research Assignment: What is a Variable in C#?

1. What is a Variable?

A **variable** is a named place in a computer's memory that is used to store data.

A variable has a name that allows the programmer to identify the stored information. It also has a data type, which tells the programming language what kind of information the variable is intended to contain. The value stored in a variable can be used by different parts of a program and, depending on how the variable is defined, its value can be changed while the program is running.

In simple words, a variable is a way for a program to keep information, identify that information, and work with it during execution.

Think of a variable like a box with a name. You put something inside the box, and you can use or change it later.

For example:

```
int age = 20;
```

Here:

`int` → tells C# that the variable will store a whole number.

`age` → the name of the variable.

`20` → the value stored in the variable.

`=` → assigns the value `20` to `age`.

2. Why are Variables Necessary in a Program?

Variables are necessary because programs need to store and use information.

Without variables, it would be difficult for a program to remember information while it is running.

Variables also make programs more flexible. Information stored in a variable can change during the execution of a program, allowing the program to respond to new information and perform different operations.

Therefore, variables are an important part of programming because they allow a program to store information temporarily, access it, change it, and use it during its execution.

For example, imagine a student program that needs to remember a student's name and age.

We can write:

```
string name = "Ali";
```

```
int age = 21;
```

Now the program can use this information whenever it needs it.

For example:

```
Console.WriteLine("Student: " + name);
```

```
Console.WriteLine("Age: " + age);
```

Output:

Student: Ali

Age: 21

Variables are useful because they allow us to:

Store information

3. How Do Variables Allow a Program to Store and Manipulate Data?

Variables allow a program to store data in the computer's memory and give that data a name. The program can then refer to the variable whenever it needs to access the information.

Variables also allow data to be manipulated. Manipulating data means working with information by changing it, processing it, comparing it, or using it in different operations. When the value of a variable changes, the program can continue working with the new value.

The data stored in variables can also be combined with other data or used in calculations and logical operations. This allows programs to process information and produce results based on the data they have received.

Example in C#

```
int price = 10;
```

```
int quantity = 3;
```

```
int total = price * quantity;
```

```
Console.WriteLine(total);
```

Explanation

- price stores the value 10.
- quantity stores the value 3.
- The program multiplies price by quantity.
- The result is stored in the variable total.
- The program displays 30.

So, this shows both parts of the question:

Storing data:

- The variables price and quantity store information.

Manipulating data:

- The program uses those values in a calculation to produce a new value, total.