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Describe the role of variables and data types in programming, and how they are used to store and manipulate data.

Variables are used to store and manage data within a program. They act as containers or placeholders that hold values.Variables have names (identifiers) that programmers assign to them. These names are used to reference and manipulate the data stored in the variable.Variables have a scope that determines where in the program they are accessible. Local variables are only available in specific functions or code blocks, while global variables can be accessed from anywhere in the program.We use access modifiers which can be private,public and protected.

Variables can store different types of data, such as numbers, text, and more, and they provide a way to reference and work with that data.

Variables are defined by a name, a data type, and an initial value (optional). For example, in Python, you can define a variable like this:

Age = 30

Name = “John

Data types define the kind of data that can be stored in a variable and the operations that can be performed on that data.

Common data types include integers (int), floating-point numbers (float), strings (str), boolean (bool), and more complex types like lists, dictionaries, and objects.

Different programming languages have their own set of data types, and they provide a set of operations (methods) that can be performed on each data type.

For example in C language there are several data types:

They can be basic or derived.

The following are the basic data types:

Int: Used to store integer values.

Float: Used to store single-precision floating-point numbers.

Double: Used to store double-precision floating-point numbers.

Char: Used to store a single character.

Bool: Used to store boolean values (0 for false, 1 for true).

Void: Typically used in function return types to indicate no value.

The following are the derived data types:

Enum: Used to define a set of named integer constants.

Struct: Used to create user-defined composite data types.

Union: Similar to a struct, but it can store only one member at a time, sharing the same memory space.

Array: A collection of elements of the same data type.

Pointer: Used to store memory addresses.

They can also be user defined using the typedef:

Typedef: Allows you to create your own data type names for existing data types, improving code readability.

Python has more data types such as list,turples,dictionary and set.

List: An ordered collection of elements that can be of different data types .It is mutable i.e elements can be added and removed from the list. (e.g., [1, 2, 3], [‘apple’, ‘banana’, ‘cherry’]).

Tuple: An ordered, immutable collection of elements (e.g., (1, 2, 3)).

Dict: A collection of key-value pairs (e.g., {‘name’: ‘John’, ‘age’: 30}).

Set: An unordered collection of unique elements (e.g., {1, 2, 3}).

When you declare a variable, you typically specify its data type. For example, in C, you might declare an integer variable as int myNumber = 5;.

The data type determines how much memory is allocated for the variable and what operations are valid on that data.

You can then manipulate the data stored in the variable, perform operations, change values, and use variables to control the flow of your program.