**Label**

A **label** in assembly language is a symbolic name that represents a memory address, often used to mark the location of data, instructions, or other important points in a program. Labels provide a human-readable way to refer to memory locations, making the code easier to understand and maintain.

**Types of Labels:**

1. **Code Labels**: These labels mark a specific instruction or location in the program's code. They are often used with **jumps** or **loops**, where the control flow of the program needs to branch to a specific instruction.

start: ; code label

mov ax, 1

jmp start ; jumps to the label "start"

1. **Data Labels**: These labels represent the addresses of data stored in memory, such as constants, variables, or arrays.

num1: dw 5 ; data label representing the address of a word containing 5

**How the Assembler Differentiates Between Code and Data Labels:**

The assembler differentiates between **code labels** and **data labels** based on **context** and **sectioning**. The context in which the label is defined and how it is referenced determines whether it's associated with data or instructions.

**1. Code Labels:**

* Code labels are typically placed within the **text section** or **code section** of the program.
* They are associated with instructions, and the assembler knows they point to executable code based on their location.
* Instructions like jmp, call, and loop reference code labels.

**2. Data Labels:**

* Data labels are defined within the **data section** or **bss section**.
* They are used to reference memory locations holding data (e.g., variables, constants).
* Instructions like mov, add, lea, or lods typically reference data labels when accessing memory.

**3. Context and Usage:**

The way a label is used in an instruction also helps the assembler distinguish between code and data labels:

* If the label is used in control flow instructions like jmp, je, or call, it is interpreted as a code label.
* If it is used with data-moving instructions like mov, add, or lea, it is interpreted as a data label.