

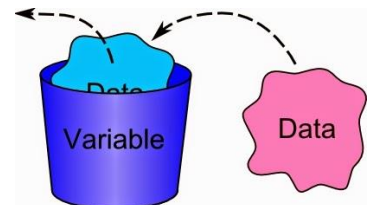
SLIIT ACADEMY FCIT – Semester 1

PROGRAMMING SKILLS - I

Pseudocode

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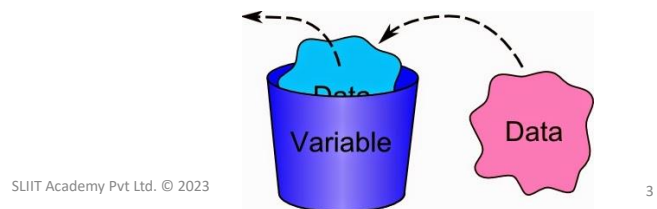
What is a Variable?



Variables

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- It is called a variable because the value stored in the memory location **may change or vary** as the program executes.

Example:



Identifiers (Meaningful names)

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- **Example : number1, number2 and number3 are more meaningful names for three numbers than A, B and C.**
- **When more than one word is used in the name of a variable, then underscores are useful as word separators.**

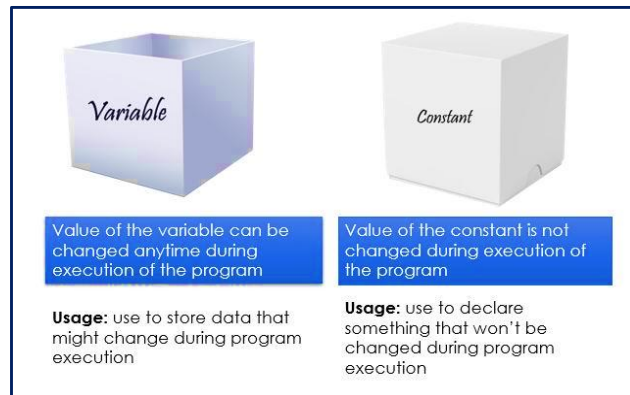
Example:

- **Do not have a space in a variable name, as a space would signal the end of the variable name and thus imply that there were two variables.**

Example:

Constant

- A data item with a name and a value that remain the same during the execution of the program.



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Data Types : Elementary Data Types

- **Integer** - representing a set of **whole numbers, positive, negative** or **zero**

Example:

- **Real** - representing a set of **numbers, positive** or **negative**, may include values before or after a decimal point. Sometimes referred to as **floating point numbers**.

Example:

- **Character** - representing the set of **characters** on the keyboard, plus some **special characters**.

Example:

- **Boolean** - representing a **control flag** or switch that may contain one of only **two possible values, true or false**.

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Data Types : Data structures

A structure that is made up of other data items.

❑ **Record:** a collection of data items or fields that all bear some relationship to one another.

Example: student record may contain the student's number, name, address and enrolled subjects.

❑ **File:** a collection of related records.

Example: a student file may contain a collection of the above student records.

Data Types : Data structures

Array

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Example: an array called scores may contain a collection of students' exam scores.

- Access to the individual items in the array is made by the use of an **index or subscript** beside the name of the array.

Example: scores (3) represents the third score in the array called scores.

Data Types : Data structures

String

- A collection of characters that can be fixed or variable.

Example: the string Jenny Parker may represent a student's name.

What is Pseudocode?



- It mixes natural language with standard programming language constructs, such as

- **Expressions:** $c = a + b$
- **Decision Structures:** IF condition THEN true-actions [ELSE false-actions].
- **While-Loops:** While condition do actions. We use indentation to indicate what actions should be included in the loop actions.
- **Array Indexing:** $A[i]$ represents the i th cell in the array A . The cells of an n -celled array A are indexed from $A[0]$ to $A[n-1]$.

How to Write Pseudo-code..

The Six Basic Computer Operations

1. **Receive information**
2. **Output information**
3. **Perform arithmetic**
4. **Assign a value to a variable or memory location**
5. **Compare two variables and select one of two alternative actions**
6. **Repeat a group of actions**

1. A Computer Can Receive Information

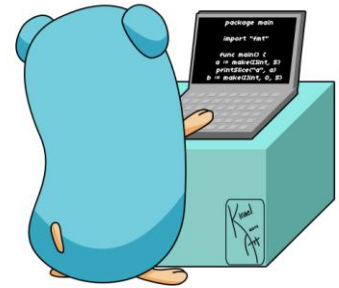
Required to receive information or input from a particular source, whether it be a terminal, a disk or any other device, the verbs **READ**, **INPUT** and **GET** are used in pseudocode.

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2. A Computer Can Output Information

Required to supply information or output to a device, the verbs **PRINT**, **WRITE**, **OUTPUT** or **DISPLAY** are used in pseudocode.



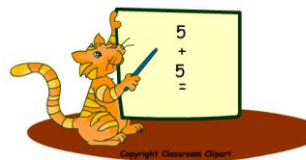
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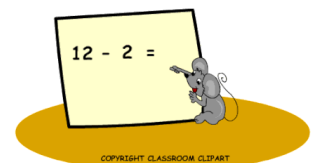
3. Computer Can Perform Arithmetic

To write a mathematical calculation or formula either actual mathematical symbols or the words for those symbols can be used.

What is the sum?



What is the difference ?



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Arithmetic Operators

Operators	Meaning	Example (a = 8 , b = 4)	Result
+	Addition	$a + b$	
-	Subtraction	$a - b$	
*	Multiplication	$a * b$	
/	Division	a / b	
%	Modulus (to get the remainder in integer division)	$a \% b$	

Precedence

Priority	Operators	Description
1	()	If nested, inner most is the first
2	*, / , %	If several , from left to right (Associativity Rule)
3	+, -	If several , from left to right (Associativity Rule)

If a is 10 and b is 5 then, $x = a * (b + 7) + (a / b - 3)$?

4. Computer Can Assign a Value to a Variable or Memory Location

- Computers can assign or change the value of a variable. Some common command for assignment are **SET, =, STORE, INITIALIZE**
- To give data an initial value → **INITIALIZE, SET, =**
- To assign a value as a result of some processing → **= or ←**
- To keep a variable for later use → **SAVE / STORE**

4. Computer Can Assign a Value to a Variable or Memory Location

- Example:
 - INITIALIZE total_price to zero / total_price = 0
 - SET student_count to 0
 - Total_price = cost_price + sales_tax
 - Total_price ← cost_price + sales_tax
 - STORE customer_num in last_customer_num

5. Can Compare Two Variables and Select One of Two Alternative Actions

- Computers can **compare two variables** and then, as a result of the comparison, **select one of the two alternative actions**.
- The special keywords are used: **IF**, **THEN**, and **ELSE**.
- If the question in the IF clause evaluates to True, the statements in the THEN path are executed. Otherwise the statements in the ELSE path are executed.

```
IF ( age > 18 ) THEN
    Display 'Adult'
ELSE
    Display 'Child'
END IF
```

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Logical Operators

Operators	Meaning	Example (a = 8 , b = 4)	Result
AND	Logical and	((a < b) AND (a > b))	
OR	Logical or	((a < b) OR (a > b))	
NOT	Logical not	NOT(a < b)	

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Logical Operators

AND

```
IF (( x >= 32 ) AND ( y == 7 )) THEN
    sum = x + y
END IF
```

OR

```
IF (( letter == 'A' ) OR ( letter == 'E' ) THEN
    DISPLAY 'Vowel'
END IF
```

NOT

```
IF ( NOT ( letter == 'A' ) THEN
    DISPLAY ' Not letter A'
END IF
```

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6. Computer Can Repeat a Group of Actions

- Two special keywords, **WHILE DO** and **END WHILE**, are used.
- The condition for the repetition of a group of actions is established in the WHILE DO clause, and the actions to be repeated are listed beneath it.
- Some common commands for repeat are:
 - ☐ **FOR loop,**
 - ☐ **WHILE loop,**
 - ☐ **REPEAT UNTIL loop**

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Relational Operators

Operators	Meaning	Example (a = 8 , b = 4)	Result
<	Less than	a < b	
>	Greater than	a > b	
<=	Less than or equal	a <= b	
>=	Greater than or equal	a >= b	
==	Equal	a == b	
!=	Not Equal	a != b	

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Use of relational and logical operators, assume that A contains 20 and B contains 15	
Expression	Result
A >= 20	
A > 20	
A == B	
A == B + 5	
((A > B) AND (A > 20))	
((A > B) OR (B > A))	
((A < B) OR (B > A))	
NOT (A > B)	
NOT (NOT (A > B))	

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Rules for Pseudocode

- ☐ Write only one statement per line
- ☐ Capitalize initial keyword
- ☐ Indent to show hierarchy
- ☐ End multi-line structures
- ☐ Keep statements, language independent

Write a Summary

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