Algorithm Components

An **algorithm** is a set of well-defined instructions to solve a problem Several fundamental components are used to build an algorithm in programming, including **variables, conditions, loops, functions**, and more.

1. Variables

A **variable** is a named storage location for data that holds values that can change during program execution.

Example:

```
// Declare variables
age = 25
name = "Alice"
price = 10.5
isAvailable = true
```

Example: Storing and updating values

```
count = 5
count = count + 1   // count is now 6
```

2. Input and Output statements

Input allows users to enter data, and output displays data.

Example:

```
// Read user input
integer age
print "Enter your age: "
input age
print "You entered: ", age
```

3. Conditional Statements (Decision Making)

Conditional statements allow programs to make decisions based on conditions.

If-Else Statement

```
integer age
print "Enter your age: "
input age
if age >= 18 then
   print "You are an adult."
else
   print "You are a minor."
```

Nested If-Else

```
integer marks
print "Enter marks: "
input marks
if marks >= 90 then
   print "Grade: A"
else if marks >= 75 then
   print "Grade: B"
else if marks >= 50 then
   print "Grade: C"
else
   print "Grade: F"
```

- This checks multiple conditions to assign a grade.

4. Loops (Iteration)

Loops are used to repeat a block of code multiple times.

While Loop

Repeats while a condition is true.

```
integer count = 1
while count <= 5 do
   print count
   count = count + 1
```

Output:

1

2

3

4

5

For Loop

Used when the number of iterations is known.

```
for integer i = 1 to 5 do
   print i
```

Same output as above.

5. Functions (Procedures)

A function is a reusable block of code.

Example: Function to Add Two Numbers

```
function add(integer a, integer b)
   return a + b


integer result = add(5, 10)
print "Sum: ", result
```

Output:

Sum: 15

6. Arrays and Lists

Arrays store multiple values of the same type.

Example: Storing Numbers

```
numbers[ ] = {10, 20, 30, 40, 50}
print numbers[2]  // Output: 30
```

Looping Through an Array

```
numbers[ ] = {1, 2, 3}
for integer i = 0 to 2 do
   print numbers[i]
```

Output:

1

2

3

Summary

Concept	Purpose	Example
Variables	Store values	x = 5
Input/Output	Get and display data	input name, print name
Conditional Statements	Decision making	if age >= 18 then ...
Loops	Repetition	for i = 1 to 5 do ...
Functions	Code reuse	function add(a, b)