CD COMPILER PROJECT

LANGUAGE REFERENCE MANUAL

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1. Program constructs

- **Identifiers**
  - Any combination of alphabets is accepted.
    - Ex : abcd, x, value……
  - Alphabets following numbers are accepted but numbers can't come first .
    - Ex : v10, xyz0 - [accepted]
    - Ex : 1v, 34cv - [not accepted]
  - Underscore symbol can be used in identifiers.
    - Ex : _a, first_min, temp0_1, _value1…….

- **Data Types**
  - All Data types should have first letter capital.
  - Integer :
    - Accepted
      - Int a = 0;
      - Int a;
      - Int a,b,c = 0,d=2,e;
    - UnAccepted
      - Int a, Int b = 0;
  - Character
    - Accepted
      - Char a = "H";
      - Char a;
      - Char a="j",b,c="k";
    - UnAccepted
      - Char a, Char b="J";

- Arrays :
  - Accepted
    - Int a[5] = {1,2,3,4,5};
    - Int a[3] = {1,2};
    - Int a[2];
    - Char a[2] = “He”;
  - UnAccepted
    - Int a[2] = {1,2,3};
    - Int a = {1,2};
    - Char a[2] = “Hello”;

- Strings :
  - Accepted
    - String s = “Hello World”;
    - String s;
    - String s=”Hello”,a=”World!”;

- **Loops**
  - Nested Loops are accepted.
  - For loop :
    - Declaration :
      - For(initialization;condition;iteration){}
      - Variable used for looping has to be declared before For Loop.
    - Accepted
      - Example

```
Int j = 0;
Int a = 0;
For(i=0;i<10;i++)
{
        Int i = 0;
        For(i=0;i<5;i++)
        {
                a = a + 1;
        }
}
```

    - UnAccepted
      - For(Int a = 0;a<10;a++){}

- do While :
  - Declaration :
    - do{statements}While(condition){statements}
    - Variable used for checking conditions have to be declared before looping.
      - Ex : do{}While(a<n)

- **Conditional statements**
  - If-else :
    - Nested if-else statements are accepted.
    - If :
      - Declaration :
        - If (condition){}
          - Ex : If (a<b){}
    - Elseif :
      - Declaration :
        - Else If(condition){}
          - Ex : Else If(a>b){}
    - Else :
      - Declaration :
        - Else{}
          - Ex : Else{}

- **Operators**
  - Arithmetic operators
    - + , - , * , / , %
  - Assignment operators
    - =
  - Comparison operators
    - == , != , < , <= , > , >=
  - Logical operators
    - and (&&) , or (||)

- **Expressions**
  - Arithmetic :
    - Simple :
      - a + b + 5;
      - a + b;
      - a * b + 4;
      - a /4 + 6;
      - a[0] - b - 2;
      - a[1] * b - 2
    - Compound :
      -
    - Complex :
      - ((a + b) * (a - b))*b - a - 5;
      - ((a+b)*c[2])/6;

  - Relational :
    - Simple :
      - a < b
      - b <= a
      - a >= 5
      - a[2] < 5
      - a[2] >= b
    - Compound :
      - X
    - Complex :
      - ((a+b)*b) < ((a-b)*(c[3]+5));
  - Logical :
    - Simple :
      - a and b;
      - a or b;
    - Compound :
      - X
    - Complex :
      - (a and b) or (a or (a+c)) and (b-a)

- **Comments**
  - Single Line Comments
    - Statement should have '//' at the beginning
    - Example:
      - // this is single line comment
      - // This line is commented
  - Multi Line Comments
    - Commented lines should begin and end with - ''' (triple single quotes)
    - Example:
      - '''Line 1
        Line 2
        Line 3
        All above lines are commented '''
- **Statements**
  - Iteration
    - For Loop
      - 'For' loop supports Nested loops of any number of levels.
    - do While
      - 'do While' loop supports Nested loops of any number of levels.
    - If Else
      - If-Else statements support Nested statements of any number of levels.
  - I/O
    - Print Statement
      - 'P' should be capital
      - Declaration
        - Print("[Beginning statement] %[Variable Type]",[Variable]);
      - Examples
        - Print("Value od a is %I",a);
        - Print("Values are %I %I\n",a,b[2]);
        - Print("String %C is %S",c,s);
    - Scan Statement
      - 'S' should be capital
      - Declaration
        - Scan([identifier])

- Examples
  - Scan(a)
  - Scan(a,b)

- **Functions**
  - Declaration :
    - *FunctionType Name*(parameters)
    - Variables should not be declared in Input space
    - Return statements don't work with void functions.
  - Examples
    - Void add(Int i){}
    - Int addtwonumbers(Int i, Int j){}

  - Passing arguments :
    - *FunctionName*(input)
    - Ex : addtwonumbers(a,b);

  - Recursive function :
    - Example
    - ```
      int fib(int n)
      {
        if (n <= 1)
          return n;
        return fib(n - 1) + fib(n - 2);
      }
      ```
      ```

2. Sample Programs

a. Arithmetic Operations

This Sample Program covers simple and complex arithmetic operations using integer values. Print Statements for integers, strings. Scan Statements for Integer values.

```
Int main()
{

    Int a = 20;
    Int b = 6;

    Int c = a % b;
    Print("Remainder: %I\n",c);

    c = a + b;
    Print("Add: %I\n",c);

    c = a - b;
    Print("Sub: %I\n",c);

    c = a * b;
    Print("Mul: %I\n",c);

    String s = "Enter values a and b: ";

    Print("%S\n",s);
    Scan(a,b);
    Print("Entered values: %I - %I\n",a,b);

    c = (((a+b)*(a-b))+a-b)/b;
    Print("Complex: %I\n",c);

    If(a>b)
    {
        Print("a is greater than b\n");
    }
    Else
    {
        Print("a is not greater than b\n");
    }

    If(a<b)
```

```
    {
        Print("b id greater than a\n");
    }
    Else
    {
        Print("b is not greater than a\n");
    }

}
```

b. Sum of Array Elements.

This Sample program covers declaration of array, For loop, arithmetic operations with array elements, printing array elements with Print statement.

```
Int main()
{
    Int a[5] = {2,15,1,3,4};
    Int i = 0;
    Int j = 0;
    For(i=0;i<5;i++)
    {
        j = a[i-1] + j;
    }
    Print("Sum of values of array a is: %I\n",j);

    a[0] = 10;
    a[1] = 12;
    a[2] = 0;

    Print("First 3 values of array a are: %I %I %I\n",a[0],a[1],a[2]);
}
```

c. Sorting an Array.

This Sample code covers sorting technique for an array using Insertion sort.

```
Int main()
{
    Int a[9] = {2,9,7,3,10,54,100,1,0};
    Int len = 9;
    Int i = 0;


    Print("Initial Array => %I",a[0]);
    For(i=1;i<len;i++)
    {
        Int k = 0;
        k = a[i-1] + 0;
        Print(" - %I",k);
    }
    Print("\n");


    For(i=0;i<(len-1);i++)
    {
        Int j = 0;
        For(j=i;j<len;j++)
        {
            Int k = a[i-1] + 0;
            Int p = a[j-1] + 0;
            If(k>p)
            {
                a[j-1] = k;
                a[i-1] = p;
            }
        }
    }


    Print("Sorted Array  => %I",a[0]);
    For(i=1;i<len;i++)
    {
        Int k = 0;
        k = a[i-1] + 0;
        Print(" - %I",k);
    }
    Print("\n");

}
```

d. Functions.

This Sample program covers declaration of functions, void function types, Int function types with return statements, recursive functions.

```
Void pr(Int d)
{
    String s = "Value received is:";
    Print("%S %I\n",s,d);
}

Void printfib(Int l, Int q, Int r, Int y)
{
    If(r<=y)
    {
        Int g = l + q;
        Print("%I ",g);
        r++;
        printfib(q,g,r,y);
    }

}

Int addtwonumbers(Int i, Int j)
{
    pr(i);
    pr(j);
    i = i + j;
    return i;
}

Int main()
{
    Int a = 1;
    Int b = 1;
    Int k = addtwonumbers(a,b);
    Print("Value of k is: %I\n",k);
    Int c = 15;
    Int d = 3;
    Print("Fibonacci series: %I %I ",a,b);
    printfib(a,b,d,c);
    Print("\n");
}
```

e. Dowhile.

This Sample code covers while loop and do while loop.

```
Int main()
{

    Int a = 0;
    Int i = 0;

    While(i<10)
    {
        a= a + 2;
        i++;
    }
    Print("Value of a is: %I\n",a);

    do{
        a = a - 1;
    }While(a>20);

    Print("Value of a is: %I\n",a);

}
```

f. If - Else.

This Sample program covers If Else-if and Else conditional statements and nested If Else Statements.

```
Int main()
{

    Int a = 12;
    Int b = 4;

    If(a>5 and b>5)
    {
        Print("1\n");
    }
    Else If(a>5 or b>5)
    {
```

```
        If(a<5)
        {
            Print("2.1\n");
        }
        Else If(b>5)
        {
            Print("2.2\n");
        }
        Else{
            Print("2.3\n");
        }
    }
    Else{
        Print("3\n");
    }

}
```