CCA-101: Fundamentals of IT & Programming

Assignment - 2

Q1. What is the difference between Machine Language and High Level Language?

Ans. Both ***High level language*** and ***low level language*** are the programming languages's types.
The main difference between ***high level language*** and ***low level language*** is that, Programmers can easily understand or interpret or compile the high level language in comparison of machine. On the other hand, Machine can easily understand the low level language in comparison of human beings.
Examples of high level languages are C, C++, Java, Python, etc.
Let's see the difference between high level and low level languages:

S.NO	HIGH LEVEL LANGUAGE	LOW LEVEL LANGUAGE
1.	It is programmer friendly language.	It is a machine friendly language.
2.	High level language is less memory efficient.	Low level language is high memory efficient.
3.	It is easy to understand.	It is tough to understand.

4.	It is simple to debug.	It is complex to debug comparatively.
5.	It is simple to maintain.	It is complex to maintain comparatively.
6.	It is portable.	It is non-portable.
7.	It can run on any platform.	It is machine-dependent.
8.	It needs compiler or interpreter for translation.	It needs assembler for translation.
9.	It is used widely for programming.	It is not commonly used now-a-days in programming.

Q2. *Discuss about different data types of C programming Language.*

Ans. **DATA TYPES IN C LANGUAGE**

Data types specify how we enter data into our programs and what type of data we enter. C language has some predefined set of data types to handle various kinds of data that we can use in our program. These datatypes have different storage capacities.

C language supports 2 different type of data types:

1. **Primary data types**:

   These are fundamental data types in C namely integer(`int`), floating point(`float`), character(`char`) and `void`.

2. **Derived data types**:

   Derived data types are nothing but primary datatypes but a little twisted or grouped together like **array**, **stucture**, **union** and **pointers**. These are discussed in details later.

Data type determines the type of data a variable will hold. If a variable `x` is declared as `int`. it means x can hold only integer values. Every variable which is used in the program must be declared as what data-type it is.

Integer type

Integers are used to store whole numbers.

Size and range of Integer type on 16-bit machine:

Type	Size(bytes)	Range
int or signed int	2	-32,768 to 32767
unsigned int	2	0 to 65535
short int or signed short int	1	-128 to 127
unsigned short int	1	0 to 255
long int or signed long int	4	-2,147,483,648 to 2,147,483,647
unsigned long int	4	0 to 4,294,967,295

FLOATING POINT TYPE

Floating types are used to store real numbers.

Type	Size(bytes)	Range
Float	4	3.4E-38 to 3.4E+38
double	8	1.7E-308 to 1.7E+308
long double	10	3.4E-4932 to 1.1E+4932

Size and range of Integer type on 16-bit machine

Character type

Character types are used to store characters value.

Size and range of Integer type on 16-bit machine

Type	Size(bytes)	Range
char or signed char	1	-128 to 127
unsigned char	1	0 to 255

---

void type

`void` type means no value. This is usually used to specify the type of functions which returns nothing. We will get acquainted to this datatype as we start learning more advanced topics in C language, like functions, pointers etc.

Q3. Find the output of the following expressions

*a) X=20/5*2+30-5 b) Y=30 – (40/10+6) +10 c) Z= 40*2/10-2+10*

***Ans.*(A) X=20/5*2+30-5**

X=4*2+30-5

X=8+30-5

X=38-5

X=33

(B)

(C) Z=40*2/10-2+10

Z=40*0.2-2+10

Z=8-2+10

Z=6+10

Z=16

Q4. Describe the syntax of the following statements

a) If – else statement b) for loop c) while loop d) do-while loop

Ans. (A) Example

If the current time (HOUR) is less than 20:00, output "Good day" in an element with id="demo":

```
var time = new Date().getHours();
if (time < 20) {
```

```
document.getElementById("demo").innerHTML = "Good day"
```

DEFINITION AND USAGE

The if/else statement executes a block of code if a specified condition is true. If the condition is false, another block of code can be executed.

The if/else statement is a part of JavaScript's "Conditional" Statements, which are used to perform different actions based on different conditions.

In JavaScript we have the following conditional statements:

- Use **if** to specify a block of code to be executed, if a specified condition is true
- Use **else** to specify a block of code to be executed, if the same condition is false
- Use **else if** to specify a new condition to test, if the first condition is false
- Use **switch** to select one of many blocks of code to be execute

Syntax

The **if** statement specifies a block of code to be executed if a condition is true:

```
if (condition) {
  // block of code to be executed if the condition is true
}
```

The **else** statement specifies a block of code to be executed if the condition is false:

```
if (condition) {
  // block of code to be executed if the condition is true
} else {
  // block of code to be executed if the condition is false
}
```

The **else if** statement specifies a new condition if the first condition is false:

```
if (condition1) {
  // block of code to be executed if condition1 is true
```

```
} else if (condition2) {
  // block of code to be executed if the condition1 is false and
condition2 is true
} else {
  // block of code to be executed if the condition1 is false and
condition2 is false
}
```

(B) avaScript Loops

Loops are handy, if you want to run the same code over and over again, each time with a different value.

Often this is the case when working with arrays:

Instead of writing:

```
text += cars[0] + "<br>";
text += cars[1] + "<br>";
text += cars[2] + "<br>";
text += cars[3] + "<br>";
text += cars[4] + "<br>";
text += cars[5] + "<br>";
```

You can write:

```
var i;
for (i = 0; i < cars.length; i++) {
  text += cars[i] + "<br>";
}
```

Different Kinds of Loops

JavaScript supports different kinds of loops:

- `for` - loops through a block of code a number of times
- `for/in` - loops through the properties of an object
- `for/of` - loops through the values of an iterable object
- `while` - loops through a block of code while a specified condition is true
- `do/while` - also loops through a block of code while a specified condition is true

The For Loop

The `for` loop has the following syntax:

```
for (statement 1; statement 2; statement 3) {
  // code block to be executed
}
```

Statement 1 is executed (one time) before the execution of the code block.

Statement 2 defines the condition for executing the code block.

Statement 3 is executed (every time) after the code block has been executed.

Example

```
for (i = 0; i < 5; i++) {
  text += "The number is " + i + "<br>";
}
```

From the example above, you can read:

Statement 1 sets a variable before the loop starts (var i = 0).

Statement 2 defines the condition for the loop to run (i must be less than 5).

Statement 3 increases a value (i++) each time the code block in the loop has been executed.

Statement 1

Normally you will use statement 1 to initialize the variable used in the loop (i = 0).

This is not always the case, JavaScript doesn't care. Statement 1 is optional.

You can initiate many values in statement 1 (separated by comma):

Example

```
for (i = 0, len = cars.length, text = ""; i < len; i++) {
  text += cars[i] + "<br>";
}
```

And you can omit statement 1 (like when your values are set before the loop starts):

Example

```
var i = 2;
var len = cars.length;
var text = "";
for (; i < len; i++) {
  text += cars[i] + "<br>";
}
```

Statement 2

Often statement 2 is used to evaluate the condition of the initial variable.

This is not always the case, JavaScript doesn't care. Statement 2 is also optional.

If statement 2 returns true, the loop will start over again, if it returns false, the loop will end.

If you omit statement 2, you must provide a **break** inside the loop. Otherwise the loop will never end. This will crash your browser. Read about breaks in a later chapter of this tutorial.

Statement 3

Often statement 3 increments the value of the initial variable.

This is not always the case, JavaScript doesn't care, and statement 3 is optional.

Statement 3 can do anything like negative increment (i--), positive increment (i = i + 15), or anything else.

Statement 3 can also be omitted (like when you increment your values inside the loop):

Example

```
var i = 0;
var len = cars.length;
for (; i < len; ) {
  text += cars[i] + "<br>";
  i++;
}
```

The For/In Loop

The JavaScript `for/in` statement loops through the properties of an object:

Example

```
var person = {fname:"John", lname:"Doe", age:25};

var text = "";
var x;
for (x in person) {
  text += person[x];
}
```

The For/Of Loop

The JavaScript `for/of` statement loops through the values of an iterable objects.

`for/of` lets you loop over data structures that are iterable such as Arrays, Strings, Maps, NodeLists, and more.

The `for/of` loop has the following syntax:

```
for (variable of iterable) {
  // code block to be executed
}
```

variable - For every iteration the value of the next property is assigned to the variable. *Variable* can be declared with `const`, `let`, or `var`.

iterable - An object that has iterable properties.

Looping over an Array

Example

```
var cars = ["BMW", "Volvo", "Mini"];
var x;

for (x of cars) {
  document.write(x + "<br >");
}
```

Looping over a String

Example

```
var txt = "JavaScript";
var x;

for (x of txt) {
  document.write(x + "<br >");
}
```

(C) ***The While Loop***

The `while` loop and the `do/while` loop will be explained in the next chapter.

Exercise:

Create a loop that runs from 0 to 9.

```
var i;
      (      =     ;      <     ;      ) {
  console.log(i);
}
```

The While Loop

The `while` loop loops through a block of code as long as a specified condition is true.

Syntax

```
while (condition) {
  // code block to be executed
}
```

Example

In the following example, the code in the loop will run, over and over again, as long as a variable (i) is less than 10:

Example

```
while (i < 10) {
  text += "The number is " + i;
  i++;
}
```

(D) ***He Do/While Loop***

The `do/while` loop is a variant of the while loop. This loop will execute the code block once, before checking if the condition is true, then it will repeat the loop as long as the condition is true.

Syntax

```
do {
  // code block to be executed
}
while (condition);
```

Example

The example below uses a `do/while` loop. The loop will always be executed at least once, even if the condition is false, because the code block is executed before the condition is tested:

Example

```
do {
  text += "The number is " + i;
  i++;
}
while (i < 10);
```

Do not forget to increase the variable used in the condition, otherwise the loop will never end!

Comparing For and While

If you have read the previous chapter, about the for loop, you will discover that a while loop is much the same as a for loop, with statement 1 and statement 3 omitted.

The loop in this example uses a `for` loop to collect the car names from the cars array:

Example

```
var cars = ["BMW", "Volvo", "Saab", "Ford"];
var i = 0;
var text = "";

for (;cars[i];) {
  text += cars[i] + "<br>";
  i++;
}
```

The loop in this example uses a `while` loop to collect the car names from the cars array:

Example

```
var cars = ["BMW", "Volvo", "Saab", "Ford"];
var i = 0;
var text = "";

while (cars[i]) {
  text += cars[i] + "<br>";
  i++;
}
```

Exercise:

Create a loop that runs as long as `i` is less than 10.

```
var i = 0;
      (i      10) {
  console.log(i);
  i++
}
```

Q5. Find the output of the following program segments

Ans.