

## Assignment-1

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Q 2] write a short note on Java Development kit.

Ans:- i] The Java Development Kit (JDK) is a software development kit used for Java programming.

ii] It includes tools, executable and binaries required for Java application developer. iii] JDK comprises - The Java Runtime Environment (JRE) execution libraries and development tools like compilers and debuggers.

iv] Developers are Jdk to create, compile and run Java application. It plays a crucial role in building robust and platform independent Software making it a fundamental component for Java developers.

v] JDK contains:-

- Java Runtime Environment (JRE)
- An interpreter / loader (Java)
- A compiler (javac)
- An archiver (jar) and many More.

vi] You can use the Jdk compiler to convert your Java text file into an executable programs.

Q2) List and explain the salient features of Java.

Ans:- The primary objective of Java Programming language creation was to make it portable, simple and secure programming language. The features of Java are also known as Java buzzwords:

A list of the most important features of the Java language is given below:-

### 1) Simple:-

Java is very easy to learn, and its syntax is simple, clean and easy to understand.

### 2) Object oriented:-

Java is an object-oriented programming language. Everything in Java is an object. Basic concepts of OOPS are:-

- object, class, inheritance, polymorphism
- Abstraction, Encapsulation.

### 3) Portable:-

Java is portable because it facilitates you to carry the Java byte code to any platform that doesn't require any implementation.

Q) Platform independent:-

Java is platform independent because it is different from other language like C, C++, etc

5) Secured:

Java is best known for its security with Java we can develop virus free systems.

6) Robust or

Java is robust because it uses strong memory management.

7) High performance:-

Java is faster than other traditional interpreted programming languages because Java byte code is "close" to native code.

8) Dynamic:-

Java is dynamic language It means closer are loaded on demand.

Q9) List and Explain The Components of Java virtual machine.

Ans:- The Java virtual machine (JVM) is a component of the Runtime Environment (JRE) and plays a central role in executing Java byte code. Here are the main components of the Java virtual machine.

- ① Class loader is responsible for loading classes needed by the Java program during runtime. It takes the compiled Java classes and makes these available for the JVM.
- ② Bytecode verifier
  - Ensure that the bytecode generated by the Java compiler adheres to the Java language specification and does not violate security constraints to help prevent certain security vulnerabilities.
- ③ Interpreter
  - Interprets the bytecode line by line and executes it while this approach is straightforward. It can be less efficient compared to other executions.
  - methods.
- ④ Just-In-Time (JIT) compiler
  - converts the bytecode into native machine code just before execution.
  - This can significantly improve performance or native machine code is typically faster than interpreted byte code.

### ⑤ Memory Areas

- Divided into several sections, include Heap manage memory for objects and is shared among all threads.
- Stack: Stores local variables and method call information for each threads.

Method Area: Stores class level data method information and static variables

⑥ Execute Engine:-  
consists of the interpreter and the JIT compiler. It executes the Java code by reading either by interpreting it or compiling it to native machine code for improved performance.  
These components work together to provide a platform-independent execute environment for Java programs.

Q4)

write in details about different types of operation in Java, category wise giving functionality approach and return type. Given an example statement for each:

Ans: certainly in Java operators can be categorized based on their functionality. Here are some common type.

- Arithmetic operation :-
- Functionality :- Perform basic Arithmetic operations - Numeric values
- Return type :- Same as the operands
- Example :-  

```
int result = 10 + 5; //Addition
```
- Relational operator :-
- Functionality :- Compare value and return a boolean result
- Operations Any primitive data type
- Return type is boolean
- Example : boolean Equal ( $=$ ,  $\neq$ ,  $\leq$ ,  $\geq$ ), Logical operator :-
- Functionality :- Perform logical operation on boolean values
- Operator or boolean value.
- Return value :- boolean
- Assignment operator :-
- Functionality :- Assign value the variable operator : variables and values
- Return type :- Same as the assign value.
- Example :-  

```
int x=1;
```
- Increment & decrement operations :-
- Functionality :- Traverse or decrease the value of a variable
- Operands :- Variables
- Return Type : Same as the variable type

**Q5)** what are the primitive datatype in Java? briefly explain their size range and other details.

Answer

|            | size            | range                                       |
|------------|-----------------|---|
| 1) byte    | 8 bit           | 128 to 127                                  |
| 2) short   | 16 bit          | 32768 to 32767                              |
| 3) int     | 32 bit          | 2147483648 to -2147483647                   |
| 4) long    | 64 bit          | 9223372036854775808 to -9223372036854775808 |
| 5) float   | 32 bit          | Single-precision floating-point             |
| 6) double  | 64 bit          | double-precision floating Point             |
| 7) char    | 16-bit          | unicode character.                          |
| 8) boolean | 1-bit           | True or False                               |
| 9) String  | variable length | Character sequence                          |
| 10) array  | variable length | Data structure                              |

**Q6)**

Explain above memory management in Java with reference to Stack and Heap.

Answer

In Java memory management involves the allocation and deallocation of memory for objects during program execution. The memory is divided into two main area the stack and the heap.

- i) Stack: its
- purpose is the stack is used for storing local variables and managing invocations.

• size and Allocation :- Memory allocation is automatic and follows a last-in first-out (LIFO) structure. Each thread has its own stack and the size is usually smaller compared to the heap.

- Data types :- Store primitive data type and reference to objects.
- Lifetime :- Short-lived memory is automatically reclaimed when the method execution completes.

- Purpose :- The heap is used for dynamic memory allocation primarily for objects and arrays.

- Size and Allocation :- memory allocation is managed by the Java virtual machine (JVM). The heap size can be adjusted using JVM parameters.

- Data Types :- More objects and memory objects have a longer lifetime and may exist beyond the scope of a single method.

- Memory Leaks :- If reference to objects are not properly managed memory leaks can occur, impacting performance.

Q3]

Explain the terms of narrowing widening

In Java narrowing and widening refer to type conversion between different data types specifically concerning numeric type

i) Widening:

Definition of widening also known as implicit conversion occurs when a value of a smaller data type is automatically converted to a larger data type.

Example:- Converting an 'int' to a 'long' or a float to a double

ii) Automatic:- It happens automatically there generally no loss of precision because the largest type can represent the entire range of the source type

iii) Narrowing (Explicit conversion):-

Definition of Narrowing, or explicit conversion occurs when a value of a larger data type is explicitly converted to a smaller data type.

Example:- Converting 'double' to an int or a float to a short

iv) Manual casting:- It requires manual intervention through casting and there might be loss of precision if the target type cannot represent.

Q8) write in detail about static keyword.

- Ans:- In Java the static keyword is used to declare members that belong to the class rather than instance of the class. It can be applied to variables, methods, nested classes and blocks. Here are detailed explanation to how the 'static' keyword used in various contexts:
- Static Variables :-  
Definition:- variables declared with the static keyword are known as static variables or class variables.  
Scope:- They are shared by all instances of the class and belong to the class rather than individual object.
  - Access : Accessed using the class rather than an instance.
  - Static method :-  
Definition:- Methods declared with the static keywords, static methods.  
Access :- class used, the class name rather than an instance. They cannot access non-static members directly.
  - Examples commonly used for utility method or operation that don't use specific instance static

Q9)

Write a short note on access Specifier in Java.

Ans:-

Access Specifier in Java determine the visibility and accessibility of classes, methods and variables in a program. There are four access Specifiers in Java.

i) Java Public

Description:- The most permissive access level. Public members are accessible from any other class.

Example:-

```
public class Example {
    public int public variable;
    public void public Method()
```

ii)

Protected Accessible within the same package and Subclasses even if they are in different packages.

Example:-

```
class Example {
    protected int protected variables;
    protected void protected method();
}
```

iii)

### iii) Default:

Description: If no access specifier is specified then default access level is package - private , members are accessible only with in same package.

Example:

```
class Example {  
    int defaultVariables;  
    void defaultMethod() {  
        // code here  
    }  
}
```

~~Access Specifiers~~