

① What is final, static, Access modifier

① final → "final" is a keyword in Java is used to "restrict the user".

→ final is a non-access modifier applicable only to a variable, method or a class.

→ ④ final variable → When variable is declared with final keyword, its value can't be modified, essentially a constant.

⑤ final method → final method cannot be overridden, which means even though a sub class can call the final method of Parent class without any error but it cannot override it.

⑥ final class → A final class cannot be extended means inherited. Two reasons to make final class.

① One is to prevent inheritance

② To create immutable class.

② Static → "static" is a keyword in Java used primarily for "memory management".

→ It can be used in class (nested class), variable, method, & blocks.

→ It belongs to the class than instance of the class, which means if you make a member static, you can access it without object.

③ Access modifier → The access modifier in Java specifies the accessibility or scope of a field, method, constructor in class, interfaces.

Access modifier	within class	within Package	outside package by subclass only	outside Package
Private	Yes	No	No	No
default	Yes	Yes	No	No
Protected	Yes	Yes	Yes	No
Public	Yes	Yes	Yes	Yes

② Difference b/w JRE, JVM & JDK.

④ JDK → "Java development kit" which provides environment to develop and execute (run) the Java program & used only by Java developer.

↳ JDK is a kit (of Package) which includes two things.

- ① Development tools (to provide an environment to develop your Java Program)
- ② JRE (to execute your Java Program)

④ JRE → "Java Runtime Environment" is an installation package which provides environment to only run (not develop) the Java program (or application) onto your machine.

→ JRE is only used by them who only want to run the Java program i.e end user of your system.

④ JVM → "Java Virtual Machine" is a very important part of both JDK & JRE, because it is contained inbuilt in both.

→ Whenever Java program you run using JRE & JDK goes into JVM & JVM is responsible for executing the Java program line by line. hence it is also called / known as Interpreter.

② What are the different primitive types? their memory size and range of values.

→ ① char → to store characters, which are stored as ASCII value.

Memory size: 1 Byte (→ 8 bits (binary digits))

Range: -128 to 127.

→ Stores only one character.

② int → to store Integer / number's.

Memory size: 2 Bytes → 16 bits

Range: -32768 to +32767

③ float → to store real number's (single precision no's)

Memory size: 4 Bytes → 32 bits

Range: 3.4×10^{-38} to 3.4×10^{38}

④ Double → to store real number's. (double precision no's)

Memory size: 8 Bytes → 64 bits

Range: 1.7×10^{-308} to 1.7×10^{308}

④ Significance of BigDecimal.

↳ The BigDecimal class provides operation for arithmetic, comparison, hashing, rounding, manipulation & format conversion.

- This method can handle very small & very big floating point numbers with great precision.
- In Java, BigDecimal consists of a random precision integer scale & a 32 bit integer scale. If the scale is zero, the scale is the no/ of digits to the right of the decimal point.
- If less than zero, the uncaled value of the no/ is multiplied by ten to the power of the negation of scale ($10^{(-\text{scale})}$)

⑤ Which is the latest version of Java SE / JDK?

↳ Java Platform, Standard Edition 16

Java SE 16.0.1 is the latest release.

⑥ How do declare Constants in Java? (use of final).

- By using "final" keyword in Java we can declare constants variable.
- "final" keyword can be used with data member (variable), method and classes.

Ex: Final class Test

Final int PI = 3.14;

Final int function1();

⑦ Explain the compilation process for Java?

- In Java compilation process, the source code of a Java program is compiled to an intermediate binary code called the "Bytecode".

- This Bytecode cannot be directly executed by the machine known as JVM. JVM contains a Java Interpreter which converts the Bytecode into machine code of the target computer.
- JVM is platform specific, i.e., each platform has its own JVM. But once the proper JVM is installed on the machine, it can run any Java Bytecode program.

⑧ How does Java achieve portability? (Explain Bytecode, JVM)

- Java programs are portable, which means that the same bytecode program can run on any computer system that has a Java Interpreter. Also, a source program can be compiled into bytecode on any computer that has a Java compiler.

→ Bytecode → Bytecode in Java is an intermediate machine independent code. It is a set of instructions for JVM & it acts pretty similar to the assembler in C++. In general, bytecode is a code that is lowered to high-level lang. The bytecode is not processed by the processor.

⑨ Given Examples of code with the following time complexities.

① O(1) → Ex: `int n = 1000;`

`System.out.println ("Welcome" + n);`

② O(log n) → Ex: `for (i=1; i<n; i=i*2) {`

`System.out.println ("Hello Welcome" + i);`

→ running time grows in proportion to logarithm of
the i/p (in this case, log to the base 2):

③ $O(n)$ → Ex: $\text{for } (\text{int } i=0; i < n; i++) \{$
 $\quad \text{System.out.println ("Hello welcome" + i);}$

④ $O(n \log n)$ → Ex: $\text{for } (\text{int } i=1; i < n; i++) \{$
 $\quad \text{for } (\text{int } j=1; j < n; j+=2) \{$
 $\quad \quad \text{System.out.println ("Hi " + i + " welcome" + j);}$

⑤ $O(N^2)$ → Ex: $\text{for } (\text{int } i=1; i \leq n; i++) \{$
 $\quad \text{for } (\text{int } j=1; j \leq n; j++) \{$
 $\quad \quad \text{System.out.println ("Hello welcome" + i + " and" + j);}$

⑥ $O(N^3)$ → Ex: $\text{for } (\text{int } i=1; i \leq n; i++) \{$
 $\quad \text{for } (\text{int } j=1; j \leq n; j++) \{$
 $\quad \quad \text{for } (\text{int } k=1; k \leq n; k++) \{$
 $\quad \quad \quad \text{System.out.println ("Hello" + i + " welcome" + j + " Hi" + k);}$

⑩ Why float & double should not be used for banking
app? Explain how it is not accurate enough.

→ float & double are bad for financial (even though monetarily we) world. never use them for monetary calculations. If precision is one of your requirements use BigDecimal instead.

↳ All floating point values that can represent a currency amount (in dollar, cents etc) cannot be stored exactly as it is in the memory.