Java

Assignment 3

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1) Explain the components of the JDK.

- appletviewer - This tool is used to run & debug java applets without a web browser.
- apt - It is an annotation processing tool
- javac - It's a compiler and, basically it converts source code into java bytecode.
- extcheck - for identifying the conflicts, this next check is used.
- jabswitch - It is a java access bridge. Exposes assistive technologies on microsoft windows system.
- javadoc - The documentation generator, which automatically generates documentation from source code comments.
- javah - The c header & stub generator, used to write native methods.
- javaws - The java web start launcher for JNLP applications.
- jdb - The debugger.
- jhat - Java heap analysis tool
- jmap - It's an oracle jmap which is also a memory map.

2) Diff^n bet^n JDK, JVM & JRE

JDK	JRE	JVM
- It used for developing java appl^n & applets.	It's provided by java to run the appl^n.	It's a specification that provides a run time environment for java

		appln & describes the requirement of Jvm implementation
- It's platfor dependent.	It's platfor dependent.	It's a platform indemendent.
- It consists of many development tools.	It consists of class libraries & other files	It does not consist of any slw tools
- It is the superset of JRE	It is the subset of JDK.	JVM is a subset of JRE

3) What is the role of the JVM in java? and how does the jvm execute java code?
Role of JVM - is a responsible for converting bytecode to machine specific code & is necessary in both JDK and JRE.
It is also platform dependent and performs many fun^, including memory management & security.

4) Explain the memory management system of the JVM.
JVM manage automatically memory in jave through a process called garbage collection.
The JVM uses 2 main memory types :-
① Heap - Stores objects and global variables. When

the heap is full, garbage collection is triggered to remove unused objects and free up memory.

② Stack - stack local variables & fun^n calls, & is used for static memory allocation. The stack memory size automatically adjusts when entering or existing a code block or method.

The JVM also uses a mark and sweep garbage collection model.

5) What are the JIT compiler and its role in the JVM? What is the bytecode and why is it important for java?

JVM uses a Just in time compiler to improve java appl^n performance. The JIT translates bytecode into native machine code while the program is running, optimizing frequently used parts.

Bytecode is the instruction set for the JVM and is ~~implement~~ important for Java's portability and security.

The JVM executes bytecodes by loading class files that package the bytecodes.

6) Describe the architecture of the JVM

① Classloader -

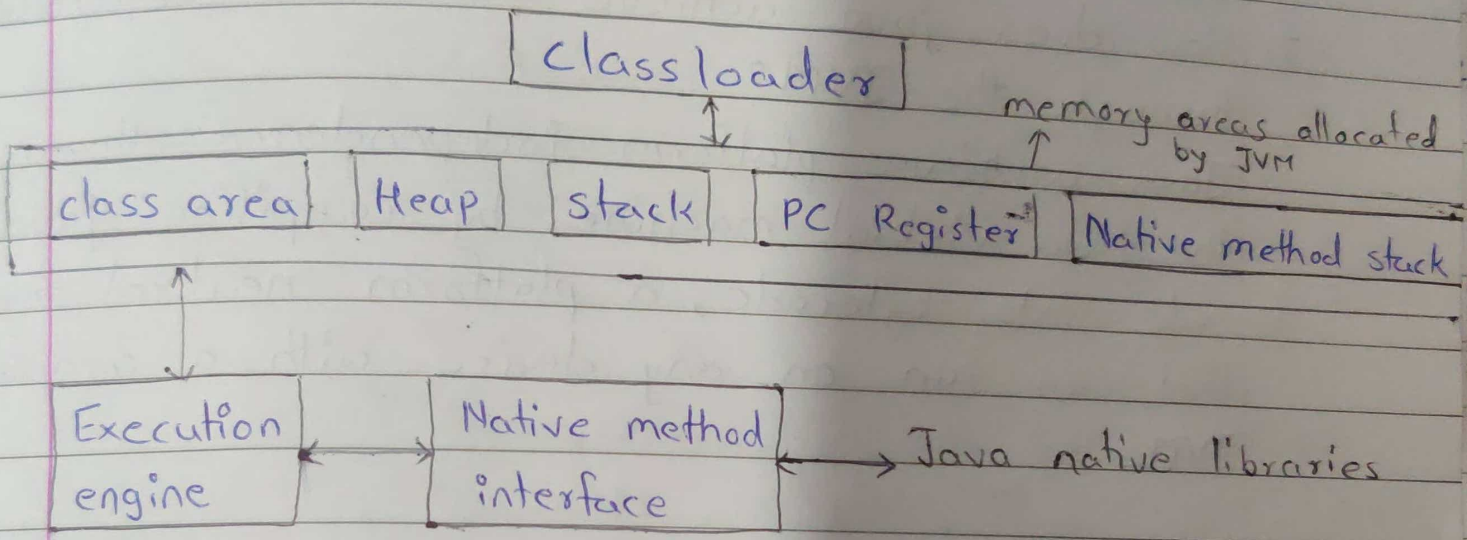
It is a subsystem of JVM used to load class files. When we execute the code, its

loaded by the classloader. There are built-in classloader in java.

a) Bootstrap classloader - It loads the rt.jar files, which contains all files of java standard edition like java.lang package, java.net package classes.

b) Extension classloader - This is the child classloader of bootstrap and parent classloader of system classloader.

c) System/application classloader



② Class area - stores perclass structures such as the runtime constant pool, field and method data, the code for methods.

③ Heap - It is the runtime data area in which objects are allocated.

④ Stack - It stores frames. It holds local variables and partial results and plays a part in method invocation and return.

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⑤ Program Counter register - It contains the address of the java virtual machine instruction currently being executed.

⑥ Native method stack - It contains all the methods used in the appln

⑦ Execution engine - It contains - a virtual processor, interpreter, JIT compiler.

7) How does java achieve platform independence through the JVM?

Java archieves platform independence through the java virtual machine by compiling java code into bytecode, a platform neutral format that can run on any device with a compatible JVM.

8) What is the process of garbage collection.

Garbage collection in java is the automated process of deleting code that's no longer needed or used.

An a use object, or a refereced object means, that some part of your program still maintains a pointer to that object.

9) What are the 4 access modifiers in Java.

1) Private -

The access level of private modifier is

only within the class. It cannot be accessed from outside the class.

2) Default -
It is only within the package. It cannot be accessed from outside the package. If you do not specify any access level it will be the default.

3) Protected -
It is within the package & outside the package through child class. If you do not make the child class, it cannot be accessed from outside the package.

4) Public -
It is everywhere. It can be accessed from within the class, outside the class, within the package & outside the package.

10) Can you override a method with a different access modifier in a subclass? for eg. can a protected method in superclass be overridden with a private method in subclass.
Yes, the protected method of a superclass can be overriden by a subclass.
If the superclass method is protected the subclass overridden method can be have protected or public.

11) What is the diff^n betn protected & default (package-private) access?

Protected

- Accessible within the same class & subclasses

Default

Accessible within the same package.

Inherited by subclasses

subclasses within the same package.

allows limited access to members.

Provides default access within the same pakage.

12) Is it possible to make a class private in Java? If yes, where can it be done, & what are the limitations?

Yes, we can declare class as private but these classes can be only inner or nested classes.

We can't a top-level class as private because it would be completely useless as nothing would have access to it.

13) Can a top level class in java be declared as protected or private?

No. If a top level class is declared as private the compiler will complain that the modifier private is not allowed here.

14) What happens if you declare a variable or method as private in a class and try to access it from another class within the same package?

The methods or data members declared as private are accessible only within the class in which they are declared.

Any other class of the same package will not be able to access these members.

Private means "only visible within the enclosing class.".