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- Class-B.Sc C.S(Entire) –III
- sem- V
- Sub- Java Programming

Unit-1   History of Java

• Java team members (also known asGreen Team), initiated a revolutionary task to develop a language for digital devices such as set-top boxes, televisions etc.

• James Gosling, Mike Sheridan, and Patrick Naughton initiated the Java language project in June 1991. The small team of sun engineers called Green Team.

• Originally designed for small, embedded systems in electronic appliances like set-top boxes.

• it was called Oak and was developed as a part of the Green project

• Oak is a symbol of strength and choosen as a national tree of many countries like U.S.A., France, Germany, Romania etc.

- In 1995, Oak was renamed as"Java" because it was already a trademark by Oak Technologies.
- Java is an island of Indonesia where first coffee was produced (called java coffee).
- Notice that Java is just a name not an acronym.
- Originally developed by James Gosling at Sun Microsystems (which is now a subsidiary of Oracle Corporation) and released in 1995.
- There are many java versions that has been released.
- JDK Alpha and Beta (1995)
- JDK 1.0 (23rd Jan, 1996)
- JDK 1.1 (19th Feb, 1997)
- J2SE 1.2 (8th Dec, 1998)
- J2SE 1.3 (8th May, 2000)
- J2SE 1.4 (6th Feb, 2002)
- J2SE 5.0 (30th Sep, 2004)
- Java SE 6 (11th Dec, 2006)
- Java SE 7 (28th July, 2011)
- Java SE 8 (18th March, 2014)

- Java SE 9 (September 2017)
- Java SE 10(March 2018)
- Java SE 11 (LTS)(September 2019)
- Java SE 12(March 2019)
- java SE 13(September 2019)
- **Java SE 14(**March 2020)

What is Java

Java is a high level, robust, secured and object oriented programming language.

Java is platform independent

Platform: Any hardware or software environment in which a program runs, is known as a platform. Since Java has its own runtime environment (JRE) and API, it is called platform.

Where it is used?

- According to Sun, 3 billion devices run java. There are many devices where java is currently used. Some of them are as follows:

- Desktop Applications such as acrobat reader, media player, antivirus etc.

- Web Applications such as irctc.co.in, javatpoint.com etc.

- Enterprise Applications such as banking applications.
  - Mobile
  - Embedded System
  - Smart Card
  - Robotics
  - Games etc.

Types of Java Applications

There are mainly 4 type of applications that can be created using java programming:

- 1) Standalone Application -It is also known as desktop application or window-based application. An application that we need to install on every machine such as media player, antivirus etc. AWT and Swing are used in java for creating standalone applications.

- 2) Web Application -An application that runs on the server side and creates dynamic page, is called web application. Currently, servlet, jsp, struts, jsf etc. technologies are used for creating web applications in java.

- 3) Enterprise Application -An application that is distributed in nature, such as banking applications etc. It has the advantage of high level security, load balancing and clustering. In java, EJB is used for creating enterprise applications.

- 4) Mobile Application-An application that is created for mobile devices. Currently Android and Java ME are used for creating mobile applications.

FEAUTURES OF JAVA TECHNOLOGY

1 **PLATFORM INDEPENDENT:** – Write once run anywhere

2 **Simple**-syntax is based on c++,removed many confusing and/or rarely used features e.g. explicit pointer, operator overloading etc.

•3 **OBECT ORIENTED**: – No coding outside of class definitions including main () – An extensive class library available in the core language packages

4 **COMPILER AND INTERPRETER**: – Code is compiled to byte codes that are interpreted by a JVM – This provides portability to any machine for which a virtual machine has been written

5 The two steps of compilation and interpretation allow for extensive code checking and improved security

6.**ROBUST**: – Exception handling built-in strong type checking

7.**AUTOMATIC MEMORY MANAGEMENT**: – Automatic garbage collection memory management handled by the JVM

C++	JAVA
• Partially object oriented language	• Purely object oriented language
• Pointers concept and Preprocessor are available	• Pointers concept and Preprocessor is not available
• Operator overloading is available	• Operator overloading is not available
	• Platform independent
• Platform dependent	
• A destructor is used to free the memory	• Automatic garbage collection
• The compiler is present	• Both compiler and interpreter is present

JVM

- JVM (Java Virtual Machine) is an abstract machine.

- It is called a virtual machine because it doesn't physically exist.

- It is a specification that provides a runtime environment in which Java bytecode can be executed.

- It can also run those programs which are written in other languages and compiled to Java bytecode.

- JVMs are available for many hardware and software platforms.
- JVM, JRE, and JDK are platform dependent because the configuration of each OS is different from each other. However, Java is platform independent.

The JVM performs the following main tasks:

- Loads code
- Verifies code
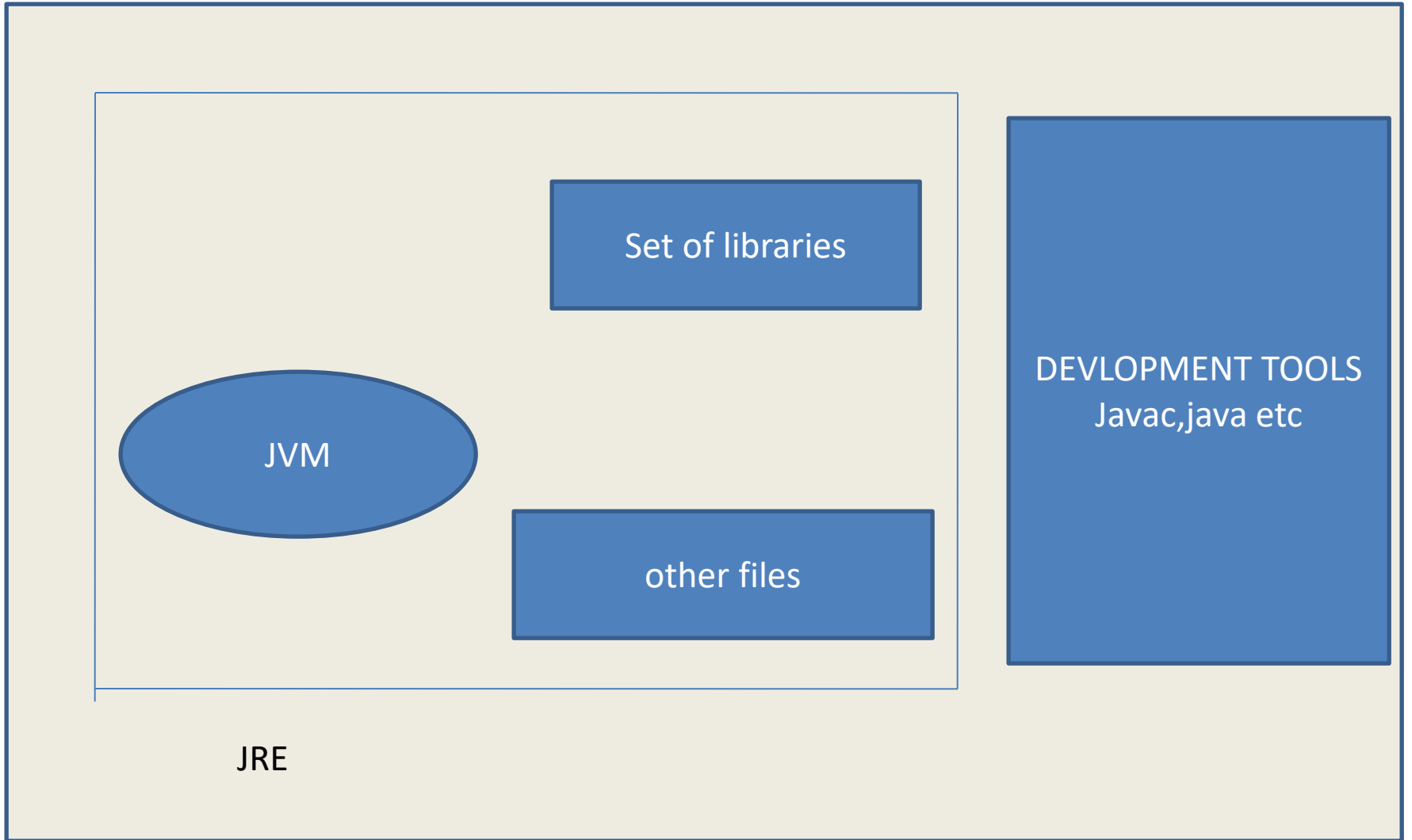- Executes code
- Provides runtime environment

JRE

- JRE is an acronym for Java Runtime Environment.

- It is also written as Java RTE.

- The Java Runtime Environment is a set of software tools which are used for developing Java applications.

- It is used to provide the runtime environment. It physically exists. It contains a set of libraries + other files that JVM uses at runtime.

Set of libraries

JVM

other files

JRE
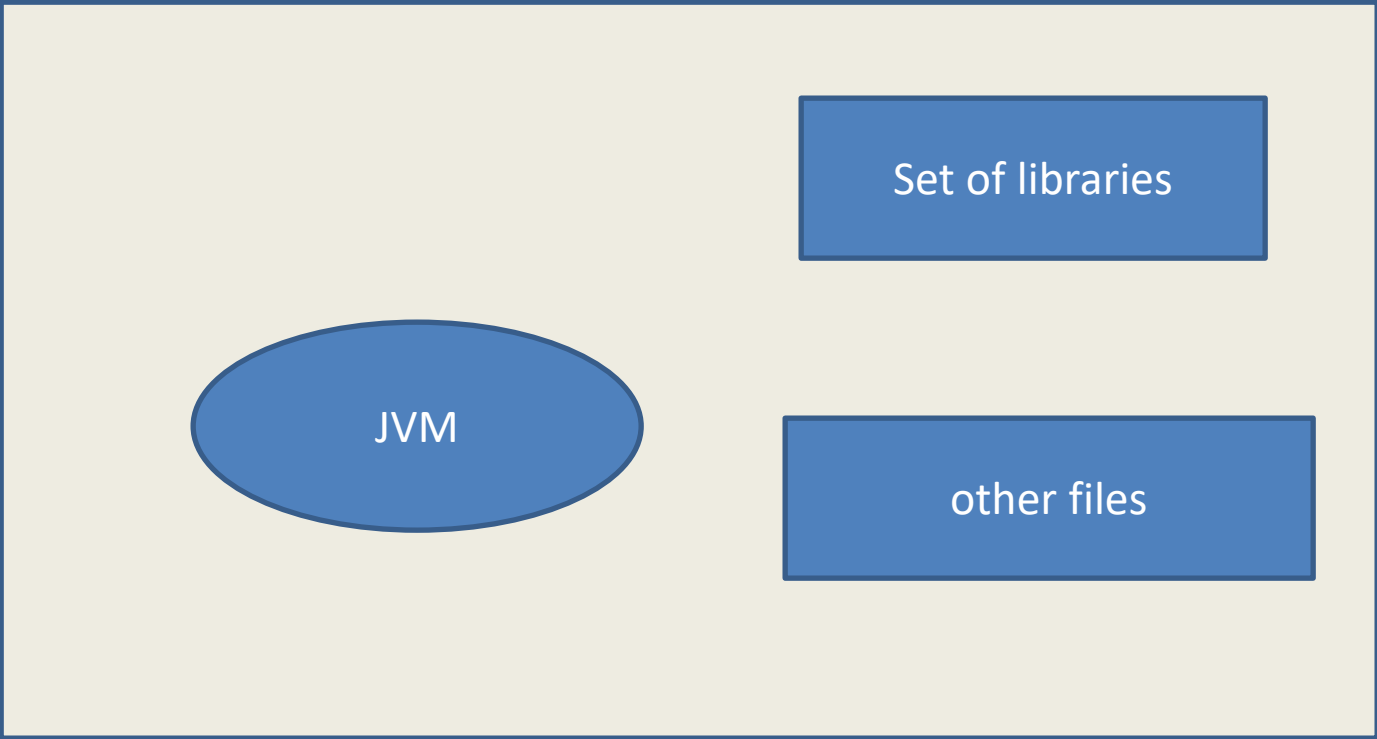
- JDK is an acronym for Java Development Kit. The Java Development Kit (JDK) is a software development environment which is used to develop Java applications and [applets](). It physically exists. It contains JRE + development tools.

- JDK is an implementation of any one of the below given Java Platforms released by Oracle Corporation:

- Standard Edition Java Platform

- Enterprise Edition Java Platform

- Micro Edition Java Platform

- The JDK contains a private Java Virtual Machine (JVM) and a few other resources such as an interpreter/loader (java), a compiler (javac), an archiver (jar), a documentation generator (Javadoc), etc. to complete the development of a Java Application.
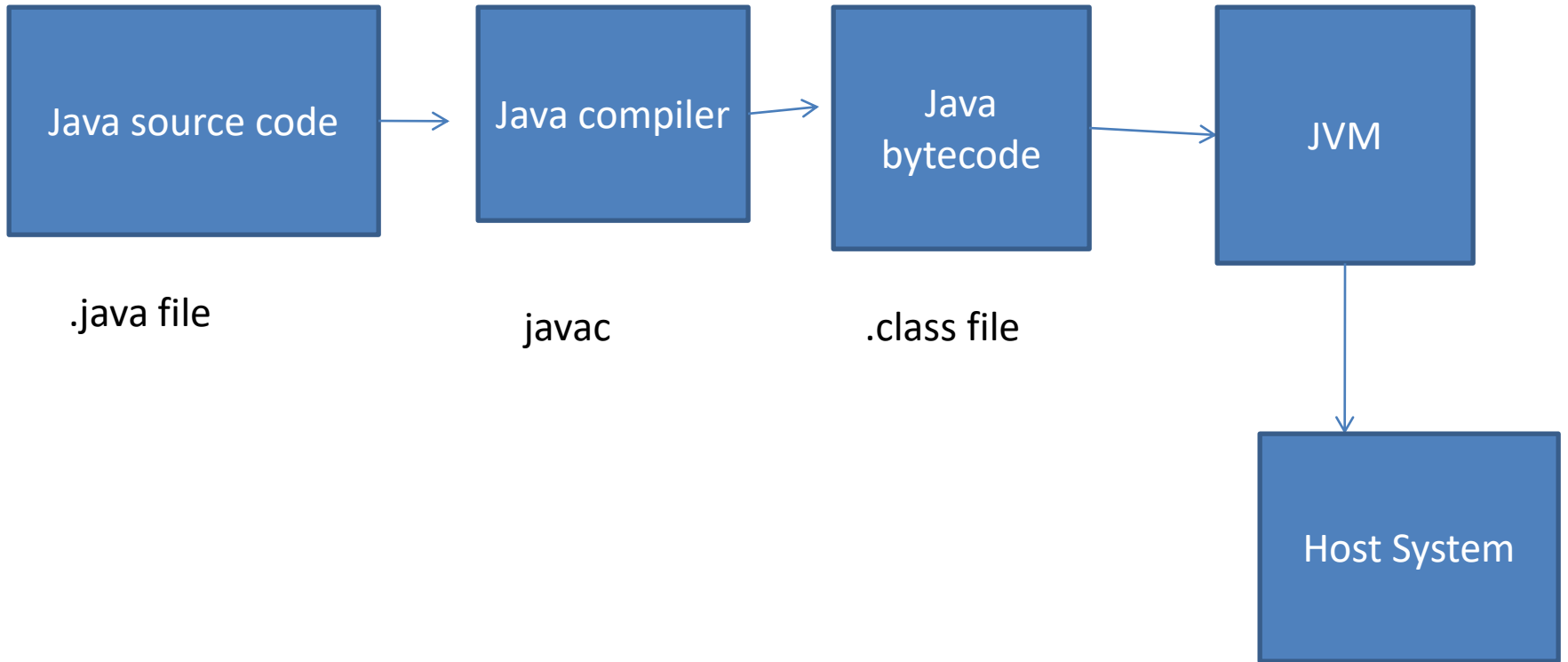
Set of libraries

DEVLOPMENT TOOLS
Javac,java etc

JVM

other files

JRE

JDK

How JVM Works – JVM Architecture?

•JVM(Java Virtual Machine) acts as a run-time engine to run Java applications. JVM is the one that actually calls the main method present in a java code. JVM is a part of JRE(Java Runtime Environment).

•Java applications are called WORA (Write Once Run Anywhere). This means a programmer can develop Java code on one system and can expect it to run on any other Java enabled system without any adjustment. This is all possible because of JVM.

•When we compile a *.java* file, *.class* files(contains byte-code) with the same class names present in *.java* file are generated by the Java compiler. This *.class* file goes into various steps when we run it. These steps together describe the whole JVM.

```
Java source code  →  Java compiler  →  Java bytecode  →  JVM

.java file            javac              .class file

                                                            ↓

                                                        Host System
```