Basics of Java

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What do you know about Java ?

Type a few things...

Students, write your response!

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1 History of Java

History of Java

- Java is a **general-purpose programming language**
- That is **class-based, object-oriented**, and designed to have **as few dependencies as possible**
- It is intended to **Write Once, Run Anywhere (WORA)**
- Applications are compiled to **bytecode** that can run on any **Java Virtual Machine (JVM)**

History of Java

- **Sun Microsystems** released the first public implementation as **Java 1.0 in 1996**
- Major web browsers incorporated **Java applets** and Java became popular
- **Java 2** had **multiple configurations** built **for different** types of **platforms**

History of Java

- **J2EE** (Java 2 Enterprise Edition) included **technologies for enterprise** applications
- It **runs in server** environments, while **J2ME** (Java 2 Micro Edition) featured APIs **optimized for mobile** applications
- The **desktop version** was renamed **J2SE**

History of Java

- **As of 2006**, Sun released much of its Java Virtual Machine (JVM) as **free and open-source software (FOSS)**, under the terms of the **GNU General Public License (GPL).**
- **In 2007**, Sun finished the process, making all of its **JVM's core code available** under free software/open-source distribution terms, **aside from a small portion of code** to which Sun did not hold the copyright.

History of Java

- Following **Oracle Corporation's acquisition** of Sun Microsystems in 2009–10, Oracle has described itself as the **steward of Java technology** with a relentless commitment to fostering a community of participation and transparency.
- This did not prevent Oracle from **filing a lawsuit against Google** shortly after that for using Java inside the Android SDK.
- Java software runs on everything **from laptops to data centers, game consoles to scientific supercomputers.**

2 Java Specification

Java Specification

- Computer languages have **strict rules** of usage.
- If you do not follow the rules, the **computer** will **not understand** it
- Java language **specification defines standards**
- Application program interface (**API**), contains **predefined classes** and **interfaces**
- Specification is a **technical definition** of the language's syntax and semantics.

Java Specification

- **What is JVM? :**
  - JVM is an **virtual machine**
  - It provides a **runtime environment** for Java **bytecode**
  - It also **runs** programs in **other languages** and compiled to Java bytecode
  - JVMs are available for many platforms. **JVM**, **JRE**, and **JDK** are **platform dependent** because the configuration of each OS is different

Java Specification

- **What is JVM? :**
  - However, **Java is platform-independent**
  - The JVM performs the following **main tasks**:
    - **Loads** code
    - **Verifies** code
    - **Executes** code
    - **Provides** runtime **environment**

Java Specification

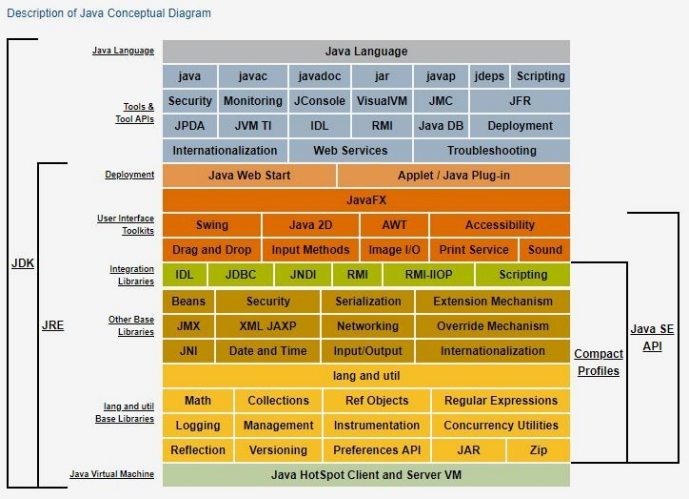
- **What is JRE? :**
  - Java Runtime Environment is a **software package**
  - It **bundles the libraries** (jars), the **J**ava **V**irtual **M**achine and other components
  - To execute any Java application, **you need JRE** installed
  - JREs can be downloaded as **part of JDKs** or **separately**

Java Specification

- **What is JDK? :**
  - Java Development Kit is a **superset of JRE**
  - It contains everything that **JRE has** along with **development tools for developing**, **debugging**, and **monitoring**
  - You need JDK **when** you need to **develop** Java applications

Java Specification

- **Java Conceptual Diagram :**



A Simple Java Program

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1 A Simple Java Program

A Simple Java Program

- **Welcome Message from Java :**

```
1  public class Welcome {
2      public static void main(String[] args) {
3      // Display message 'Welcome to Java!' on the console
4      System.out.println("Welcome to Java!");
5      }
6  }
7
```

```
1  Welcome to Java!
2
```

A Simple Java Program

- **Welcome Message from Java :**
  - Line 1 defines **a class**
  - Every Java program must have **at least one** class
  - Each class has a name

```
1  public class Welcome {
2      public static void main(String[] args) {
3      // Display message 'Welcome to Java!' on
4      System.out.println("Welcome to Java!");
5      }
6  }
7
```

```
1  Welcome to Java!
2
```


A Simple Java Program

- **Welcome Message from Java :**
  - Line 2 defines **the main method**
  - Program **starts from the main** method

```
1  public class Welcome {
2      public static void main(String[] args) {
3      // Display message 'Welcome to Java!' on
4      System.out.println("Welcome to Java!");
5      }
6  }
7
```

```
1  Welcome to Java!
2
```

A Simple Java Program

- **Welcome Message from Java :**
  - Line 3 is **a comment**
  - Java comments are preceded by two slashes (**//**) on a line,
  - Or enclosed between **/*** and ***/** for several lines

```
1  public class Welcome {
2      public static void main(String[] args) {
3      // Display message 'Welcome to Java!' on
4      System.out.println("Welcome to Java!");
5      }
6  }
7
```

```
1  Welcome to Java!
2
```


A Simple Java Program

- **Welcome Message from Java :**
  - Line 4 is **a statement** "System.out.println"
  - It displays the string **Welcome to Java!**
  - Every Java statement **ends with a semicolon (;)**

```
1  public class Welcome {
2      public static void main(String[] args) {
3      // Display message 'Welcome to Java!' on
4      System.out.println("Welcome to Java!");
5      }
6  }
7
```

```
1  Welcome to Java!
2
```

A Simple Java Program

- **Welcome Message from Java :**
  - Line 5 and 6 **terminates** two **code blocks** that group the program's components
  - In Java, **each block begins with** an opening brace ' **{** ' and **ends with** a closing brace ' **}** '

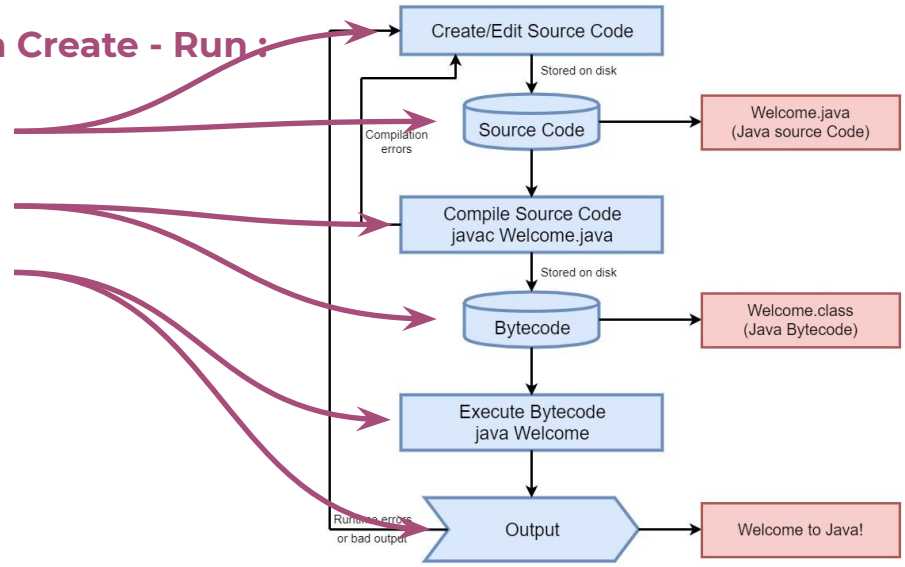
```
1  public class Welcome {
2      public static void main(String[] args) {
3      // Display message 'Welcome to Java!' on
4      System.out.println("Welcome to Java!");
5      }
6  }
7
```

```
1  Welcome to Java!
2
```


2 Create, Compile and Run

Create, Compile and Run

- **Steps through Create - Run :**
  - **Create**
  - **Compile**
  - **Run**



Running and Building Locally

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1 What is Building and Compiling?

What is Building and Compiling?

- **Compiling :**
  - Compiling is the process of converting **source code** files **into standalone software artifact(s)**
  - These artifacts are **executable files**

What is Building and Compiling?

- **Building :**
  - Building is a **broader concept**
  - It consists of :
    - **Generating** sources (sometimes)
    - **Compiling** sources
    - **Compiling test sources**
    - **Executing tests** (unit tests, integration tests, etc)
    - **Packaging** (into jar, war, ejb-jar, ear)
    - **Generating reports**

2 Building JAR Files

Building JAR Files

- JAR stands for **Java Archive**
- It is a kind of **zip file**
- It is a **platform-independent** file (As long as the platform has at least JVM)
- It holds :
  - All application content like :
    - **Class files**
    - **Resources** (images, sound files, Manifest file (optional))

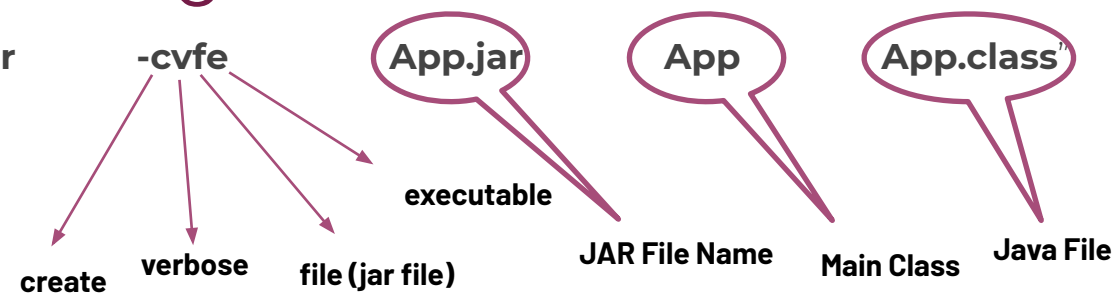
Building JAR Files

- Compilation with "**javac App.java**"
- It gives "**.class**" file
- "**java App**" runs
- "**jar -cvfe App.jar App App.class**" gives JAR
- "**java -jar App.jar**" runs the JAR file

```
MyMac:Desktop home$ cd JavaApp/
MyMac:JavaApp home$ ls
App.java
MyMac:JavaApp home$ javac App.java
MyMac:JavaApp home$ ls
App.class       App.java
MyMac:JavaApp home$ java App
hello world!
MyMac:JavaApp home$ jar -cvfe App.jar App App.class
added manifest
adding: App.class(in = 412) (out= 286)(deflated 30%)
MyMac:JavaApp home$ ls
App.class       App.jar         App.java
MyMac:JavaApp home$ java -jar App.jar
hello world!
MyMac:JavaApp home$
```


Building JAR Files

- "**jar -cvfe App.jar App App.class**"



THANKS!

Any questions?

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