Introduction to Java

Agenda

- Java language
- Java software platform
- Java Virtual Machine
- Execution of Java programs

Java language

- Java is a general-purpose programming language that is class-based and object-oriented

- Java was created at Sun Microsystems, Inc. James Gosling led a team of researchers (later bought by **Oracle**)

- It is one of the most popular programming languages in the world
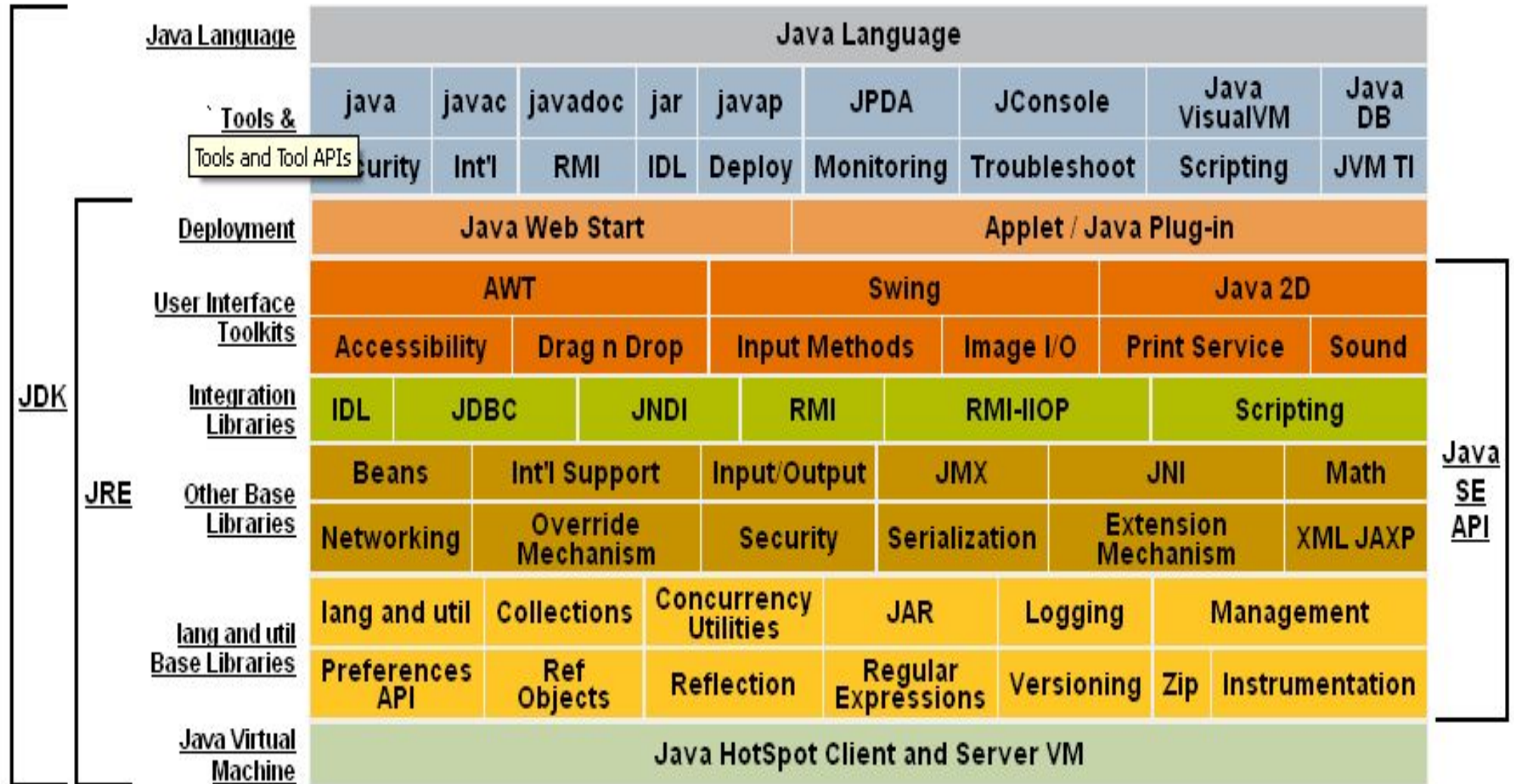
Java (software platform)

- Java programming **language**
- Java Virtual Machine (JVM)
- Java development tools (compiler, debugger etc.)
- Java standard API and other built-in libraries

Java (software platform)

All this is bundled as two types of packages:

- **JRE — Java Runtime Environment** for execution of compiled stand-alone applications, applets, servlets, etc.

- **JDK — Java Development Kit** for compilation, debugging and execution of applications

- **All** this is **open source**

Java Platform Stack

Java Language	Java Language								
Tools & / *Tools and Tool APIs*	java	javac	javadoc	jar	javap	JPDA	JConsole	Java VisualVM	Java DB
	curity	Int'l	RMI	IDL	Deploy	Monitoring	Troubleshoot	Scripting	JVM TI
Deployment	Java Web Start				Applet / Java Plug-in				
User Interface Toolkits	AWT			Swing			Java 2D		
	Accessibility		Drag n Drop		Input Methods		Image I/O	Print Service	Sound
Integration Libraries	IDL	JDBC		JNDI		RMI	RMI-IIOP		Scripting
Other Base Libraries	Beans	Int'l Support		Input/Output		JMX		JNI	Math
	Networking	Override Mechanism		Security		Serialization		Extension Mechanism	XML JAXP
lang and util Base Libraries	lang and util	Collections	Concurrency Utilities		JAR		Logging	Management	
	Preferences API	Ref Objects		Reflection		Regular Expressions	Versioning	Zip	Instrumentation
Java Virtual Machine	Java HotSpot Client and Server VM								

JDK • JRE • Java SE API

Java Virtual Machine (JVM)

• A Java virtual machine (JVM) is an abstract computing machine. There are three notions of the JVM:

– Formal specification is a book that formally describes what is required of a JVM implementation.

– Actual implementation is a computer program that meets the requirements of the JVM specification.

– Specific instance of the JVM is a process that executes a computer program compiled into Java bytecode.

What is JDK

When Java Development Kit is installed Java provides following features:

.**Development Tools**:

–**javac** compiler

–**java** interpreter of bytecode

–**javadoc** document generation tool

–**jar** class file archiver

–**jdb** debugger

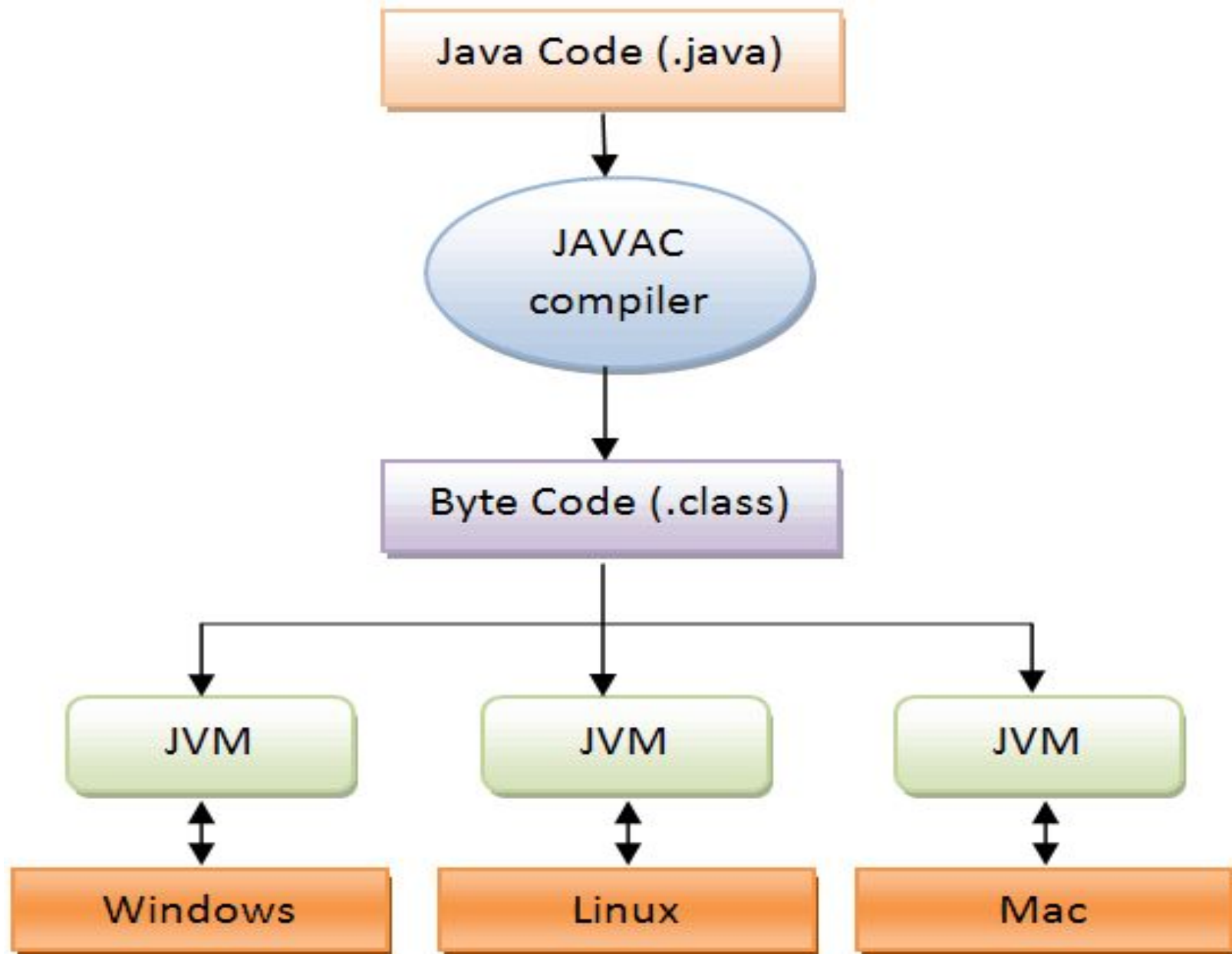–All these are included in Integrated Development Environments (**IDE**s)

Java benefits

- ***"Write once run everywhere"*** **—** applications can be executed in any operating system or hardware platform using Java Virtual Machine (JVM)

- Memory management (Garbage Collection)

- Write less code / Develop programs more quickly (if comparing with other programming languages of that time)

- Backwards compatibility

Execution of Java program

- Source code is plain text with .java extension.

- Source files are compiled into .class files, which contain instructions for Java Virtual Machine

- java launcher tool then runs application inside instance of the Java Virtual Machine.
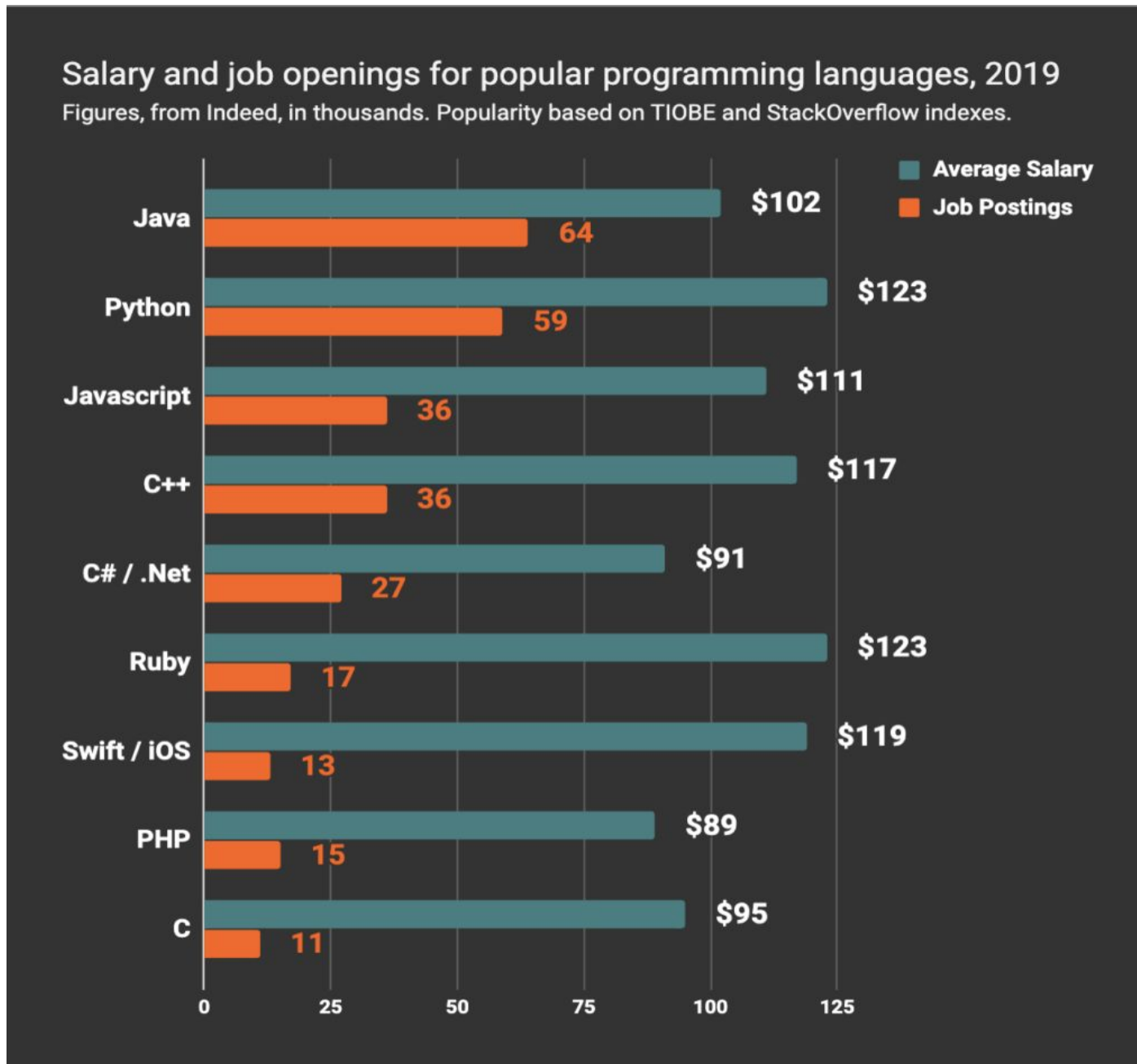
Execution of Java program

Which Java version?

Version	Release date	End of Public Updates[5]	Extended Support Until
JDK Beta	1995	?	?
JDK 1.0	January 1996	?	?
JDK 1.1	February 1997	?	?
J2SE 1.2	December 1998	?	?
J2SE 1.3	May 2000	?	?
J2SE 1.4	February 2002	October 2008	February 2013
J2SE 5.0	September 2004	November 2009	April 2015
Java SE 6	December 2006	April 2013	December 2018
Java SE 7	July 2011	April 2015	July 2022
Java SE 8 (LTS)	March 2014	January 2019 (commercial) December 2020 (non-commercial)	March 2025
Java SE 9	September 2017	March 2018	N/A
Java SE 10 (18.3)	March 2018	September 2018	N/A
Java SE 11 (18.9 LTS)	September 2018	March 2019 from Oracle Later from OpenJDK	Vendor specific
Java SE 12 (19.3)	March 2019	September 2019	N/A

Legend: ▉ Old version ▉ Older version, still supported ▉ **Latest version** ▉ Future release

Top programming languages

Salary and job openings for popular programming languages, 2019
Figures, from Indeed, in thousands. Popularity based on TIOBE and StackOverflow indexes.

- **Average Salary**
- **Job Postings**

Language	Average Salary	Job Postings
Java	$102	64
Python	$123	59
Javascript	$111	36
C++	$117	36
C# / .Net	$91	27
Ruby	$123	17
Swift / iOS	$119	13
PHP	$89	15
C	$95	11

Which Java IDE?

- Nobody writes Java code in text editor

- There are many Integrated Development Environments (IDEs) for Java, which make easier to deal with classpath and dependencies, compilation, running and debugging, etc.

- Most prominent Java IDEs are:

  - [NetBeans](#)
  - [Eclipse](#)
  - [IntelliJ IDEa](#)