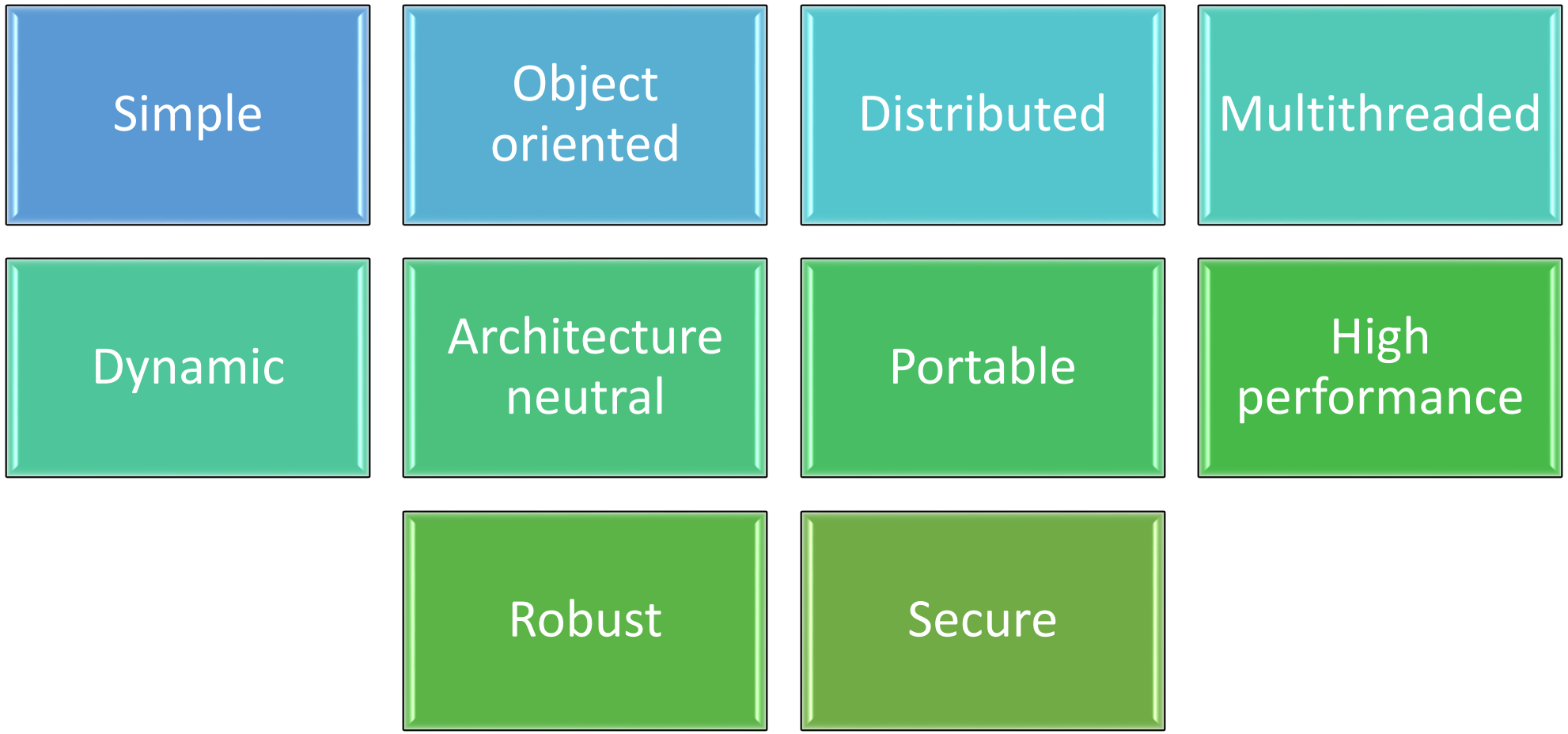
Introduction to Java

- Java is a high level programming language developed by Sun Microsystems.
- Java was developed by James Gosling and released in 1995
- Java technology is both a programming and a platform
- The latest release of the Java Standard Edition is Java SE 8.
- Java promised **Write Once , Run Anywhere.**

Features of Java



- Simple

  Java is designed to be easy to learn. The syntax is based on C++.
- Object oriented

  Object-oriented means we organize our software as a combination of different types of objects that incorporates both data and behaviour.

  Object-oriented programming(OOPs) is a methodology that simplify software development and maintenance by providing some rules.
- Distributed

  Java is designed for the distributed environment of the internet. RMI and EJB are used for creating distributed applications. We may access files by calling the methods from any machine on the internet.
- Multithreaded

  With Java's multithreaded feature it is possible to write programs that can perform many tasks simultaneously. This design feature allows the developers to construct interactive applications that can run smoothly.
- Dynamic

  Java is considered to be more dynamic than C or C++ since it is designed to adapt to an evolving environment. Java programs can carry extensive amount of run-time information that can be used to verify and resolve accesses to objects on run-time.

- Architecture neutral

  Java compiler generates an architecture-neutral object file format, which makes the compiled code executable on many processors, with the presence of Java runtime system.

  But in java, data type occupies 4 bytes of memory for both 32 and 64 bit architectures which is not in C and C++

- Portable

  Being architecture-neutral and having no implementation dependent aspects of the specification makes Java portable. Compiler in Java is written in ANSI C with a clean portability boundary.

- High performance

  With the use of Just-In-Time compilers, Java enables high performance.

- Robust

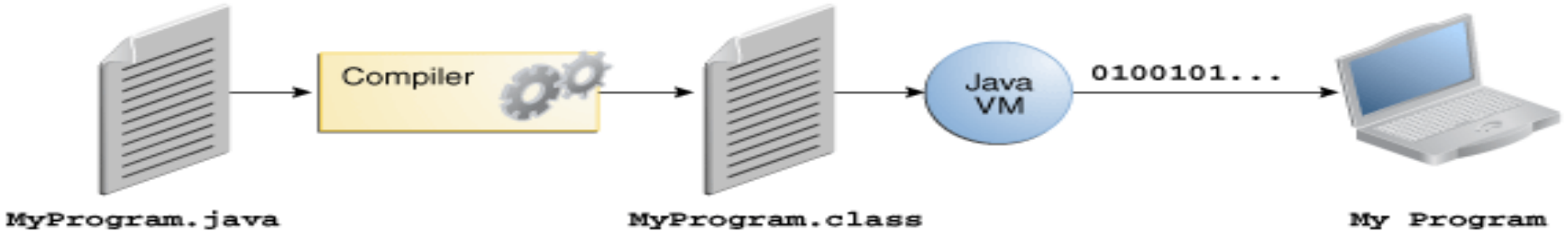
  Robust simply means strong. Java uses strong memory management. There are lack of pointers that avoids security problem. There is automatic garbage collection in java. There is exception handling and type checking mechanism in java. All these points makes java robust.

- Secure

  With Java's secure feature it enables to develop virus-free, tamper-free systems. Authentication techniques are based on public-key encryption.

Development process of Java

In the Java programming language, all source code is first written in plain text files ending with the .java extension. Those source files are then compiled into .class files by the javac compiler. A .class file does not contain code that is native to your processor; it instead contains bytecodes — the machine language of the Java Virtual Machine1 (Java VM). The java launcher tool then runs your application with an instance of the Java Virtual Machine.



Java Platform

A *platform* is the hardware or software environment in which a program runs. Most platforms can be described as a combination of the operating system and underlying hardware. The Java platform differs from most other platforms in that it's a software-only platform that runs on top of other hardware-based platforms.

The Java platform has two components:

- The *Java Virtual Machine*
- The *Java Application Programming Interface* (API)

Java Virtual Machine is the base for the Java platform and is ported onto various hardware-based platforms.

The API is a large collection of ready-made software components that provide many useful capabilities. It is grouped into libraries of related classes and interfaces; these libraries are known as *packages*.

JVM, JDK & JRE

JVM

The Java Virtual Machine is the cornerstone of the Java platform. It is the component of the technology responsible for its hardware- and operating system-independence, the small size of its compiled code, and its ability to protect users from malicious programs.

The Java Virtual Machine is an abstract computing machine. Like a real computing machine, it has an instruction set and manipulates various memory areas at run time.

The Java Virtual Machine knows nothing of the Java programming language, only of a particular binary format, the class file format. A class file contains Java Virtual Machine instructions (or bytecodes) and a symbol table

JDK

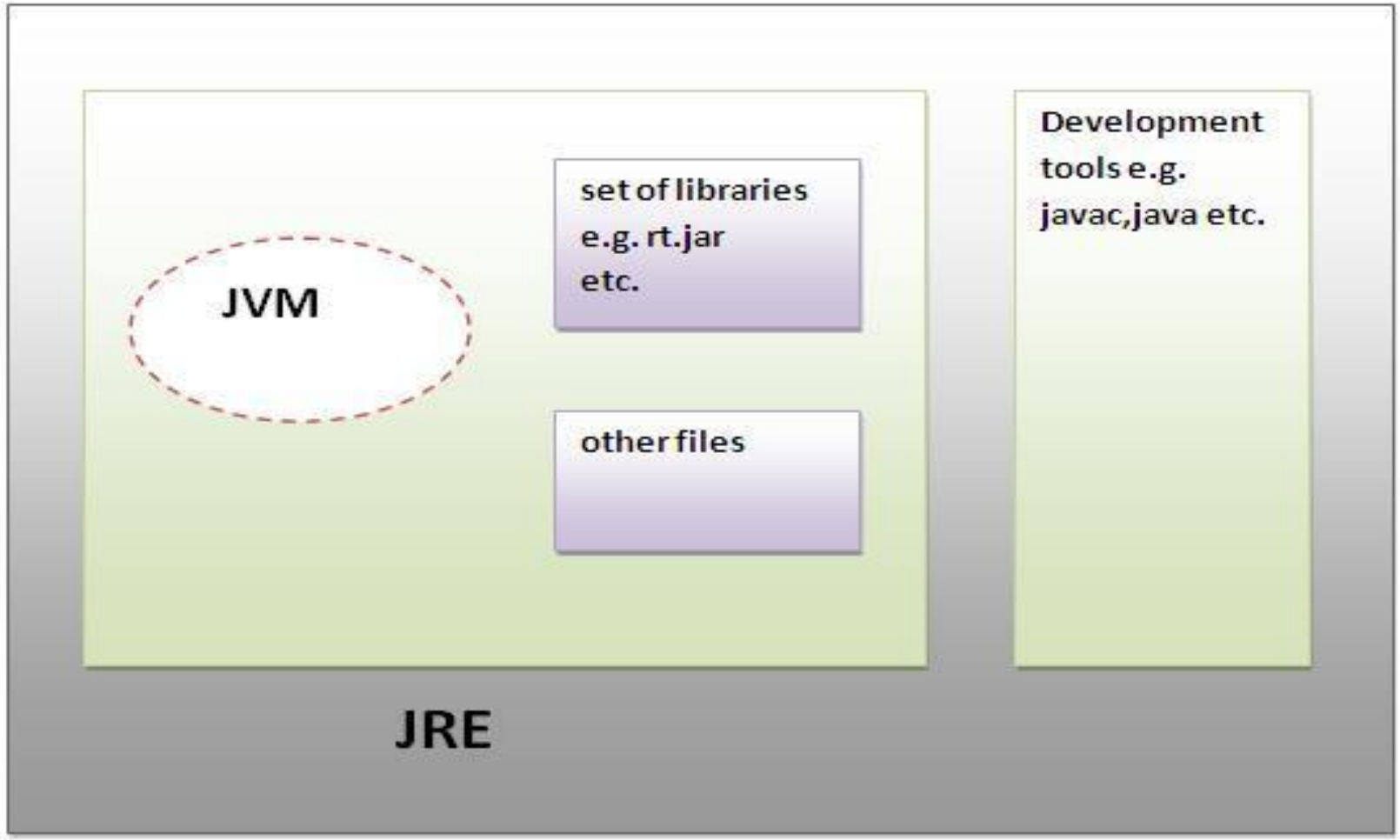
The Java Development Kit (JDK) is a software development environment used for developing Java applications and applets. It includes the Java Runtime Environment (JRE), an interpreter/loader (java), a compiler (javac), an archiver (jar), a documentation generator (javadoc) and other tools needed in Java development.

There are different JDKs for various platforms. The supported platforms include Windows, Linux and Solaris. Mac users need a different software development kit, which includes adaptations of some tools found in the JDK.

JRE

The JRE provides the libraries, Java virtual machine, and other components necessary for you to *run* applets and applications written in the Java programming language. This runtime environment can be redistributed with applications to make them free-standing.

If the JRE is not installed on a computer, Java programs may not be recognized by the operating system and will not run. The JRE software provides a runtime environment in which Java programs can be executed, just like software programs that have been fully compiled for the computer's processor. JRE software is available as both a standalone environment and a Web browser plug-in, which allows Java applets to be run within a Web browser.


JVM
set of libraries
e.g. rt.jar
etc.
other files
Development
tools e.g.
javac,java etc.
JRE
JDK