Comparing the difference between JDK, JRE and JVm and how they are interconnected

There are three core technological tools used in java programming.
These tools are the:

- **Java Development Kit (JDK)**
- **Java Runtime Environment(JRE)**
- **Java Virtual Machine(JVM)**

1.Java Development Kit (JDK)

Java Development Kit is a tool used to create java-based software or applications and it contains tools like the JRE and JVM that help run these applications. The JDK allows developers to create software or applications that would later be run by the JRE, with the help of the JVM. The JDK also has a which is capable of taking raw .java files which are plain text and converting them to executable class files.

It also compiles code into bytecode, which is read by the jvm and converted to machine language, so the code can do what it is meant to do. A good example of this would be the eclipse IDE, which we are using right now as it allows you to write and run java programs

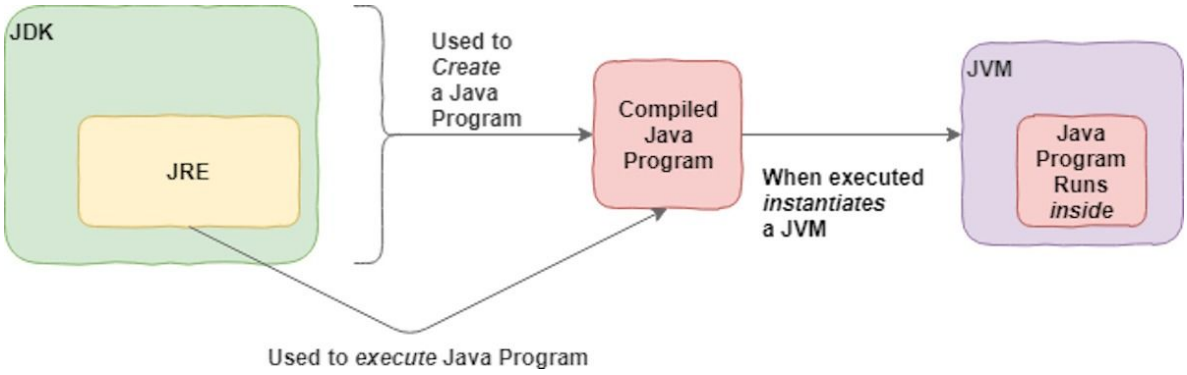

Figure1: High level view of the JDK (Tyson,2021)

2.Java Runtime Environment (JRE)

JRE is a software that is used to run java code written and it usually comes with a JDK when you install it. A runtime environment is software that is programmed to run other software. As the runtime environment for Java, the JRE contains tools like Java class libraries, the Java class loader,which is involved in loading classes and connecting them with the core Java class libraries and the Java Virtual Machine, JVM.

A software program needs to execute, and for that to happen it needs a suitable environment to run in. The runtime environment loads class files and makes sure there is an access to memory and other system resources to run them. Before now, most software used the operating system (OS) as its runtime environment. The program ran inside whatever computer it was on, but relied on operating system settings for resource access, like memory, program files and dependencies. When the Java Runtime Environment came, it changed all that, at least for Java programs.

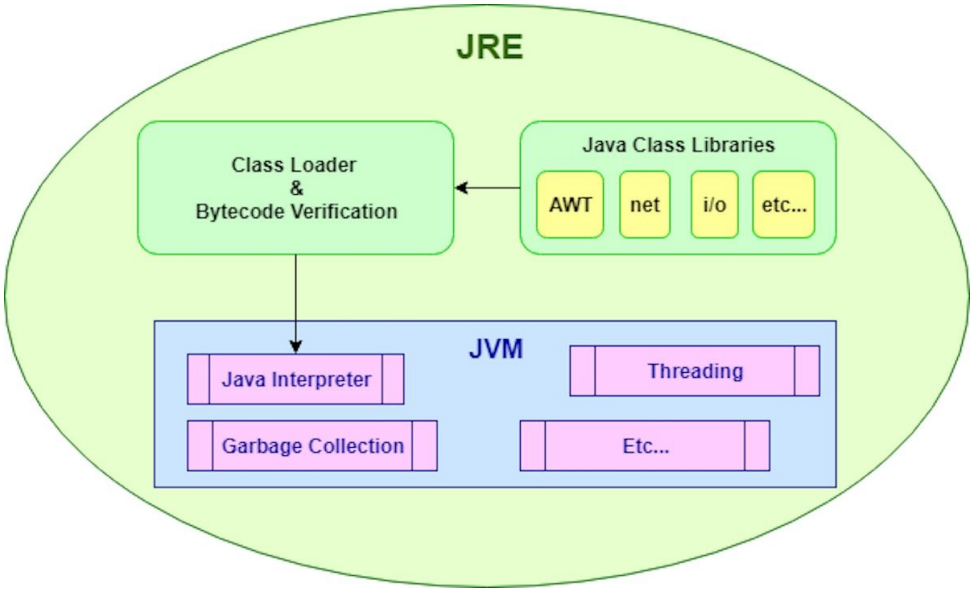

Figure2: A layered architectural view shows that the JRE contains the JVM, class loader, and Java class libraries.(Tyson,2021)

3.Java Virtual Machine

The Java Virtual Machine is a software whose purpose is to create JREs, which are used to execute java programs. JVM has two functions: to allow Java programs to run on any device or operating system and to manage and optimize program memory.

Java was released in 1995 and then, computer programs were always programmed to a specific operating system, and program memory was managed by the software developer. When JVM was created it made memory management easier. The most common interaction with a running JVM is to check the memory usage in the heap and stack.

Before Java, all program memory was managed by the programmer. In Java, program memory is managed by the JVM. The JVM manages memory through a process called garbage collection, which continuously identifies and eliminates unused memory in Java programs. Garbage collection happens inside a running JVM. The JVM is responsible for ensuring Java applications have the resources they need to run and perform well in your device or cloud environment.

In conclusion,
The JVM is the java platform component that executes java programs, the JRE is the environment on which the programs are run, and it works together with the JVM and the JDK is the the software used to write java programs and create java applications.The three are interconnected: the JVM creates the JRE which allows java code written in the JDK to run.

References

1. Tyson, M., 2021. *What Is The JDK? Introduction To The Java Development Kit*. [online] InfoWorld. Available at: <https://www.infoworld.com/article/3296360/what-is-the-jdk-introduction-to-the-java-development-kit.html> [Accessed 15 January 2021].\
2. Tyson, M., 2021. *What Is The JVM? Introducing The Java Virtual Machine*. [online] InfoWorld. Available at: <https://www.infoworld.com/article/3272244/what-is-the-jvm-introducing-the-java-virtual-machine.html> [Accessed 15 January 2021].
3. Tyson, M., 2021. *What Is The JRE? Introduction To The Java Runtime Environment*. [online] InfoWorld. Available at: <https://www.infoworld.com/article/3304858/what-is-the-jre-introduction-to-the-java-runtime-environment.html> [Accessed 15 January 2021].
4. JDK vs JRE vs JVM: Key Differences (2020). Available at: https://www.guru99.com/difference-between-jdk-jre-jvm.html#:~:text=JDK%20is%20a%20software%20development%20kit%20whereas%20JRE%20is%20a,JVM%20is%20Java%20Virtual%20Machine. (Accessed: 17 January 2021).