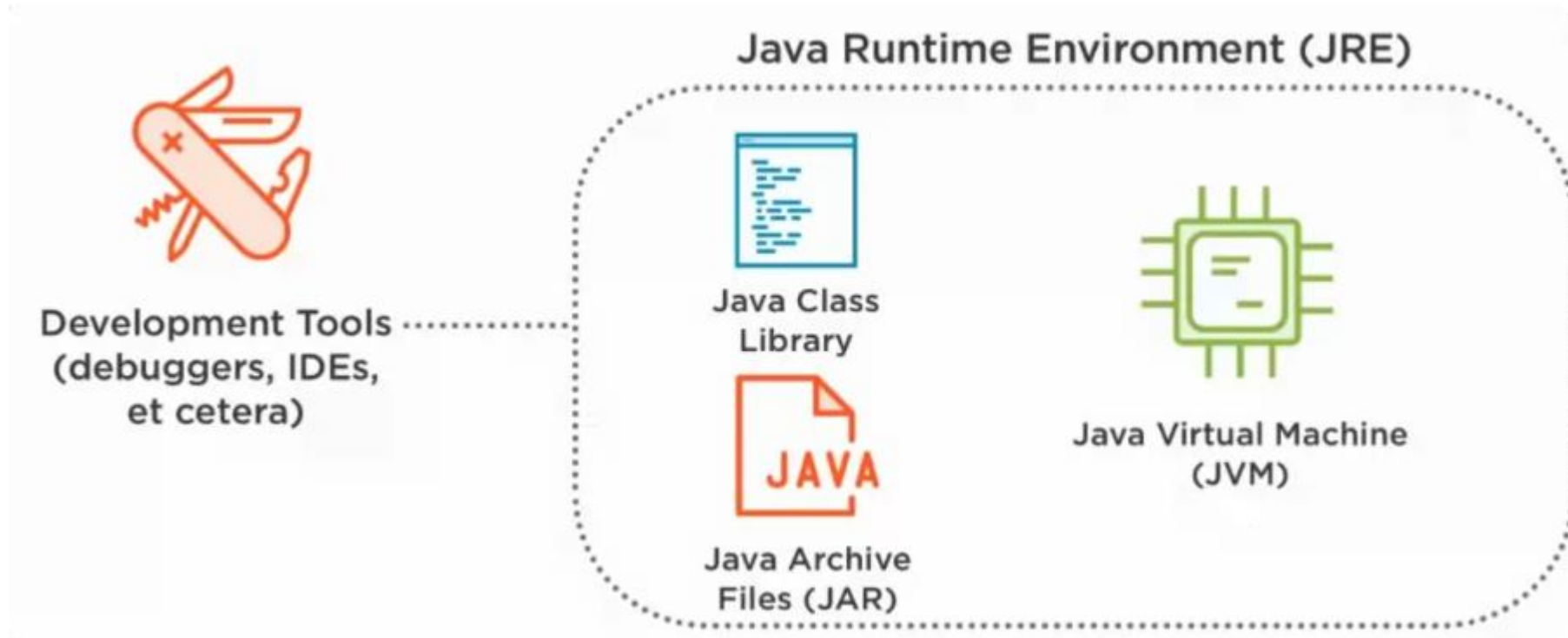
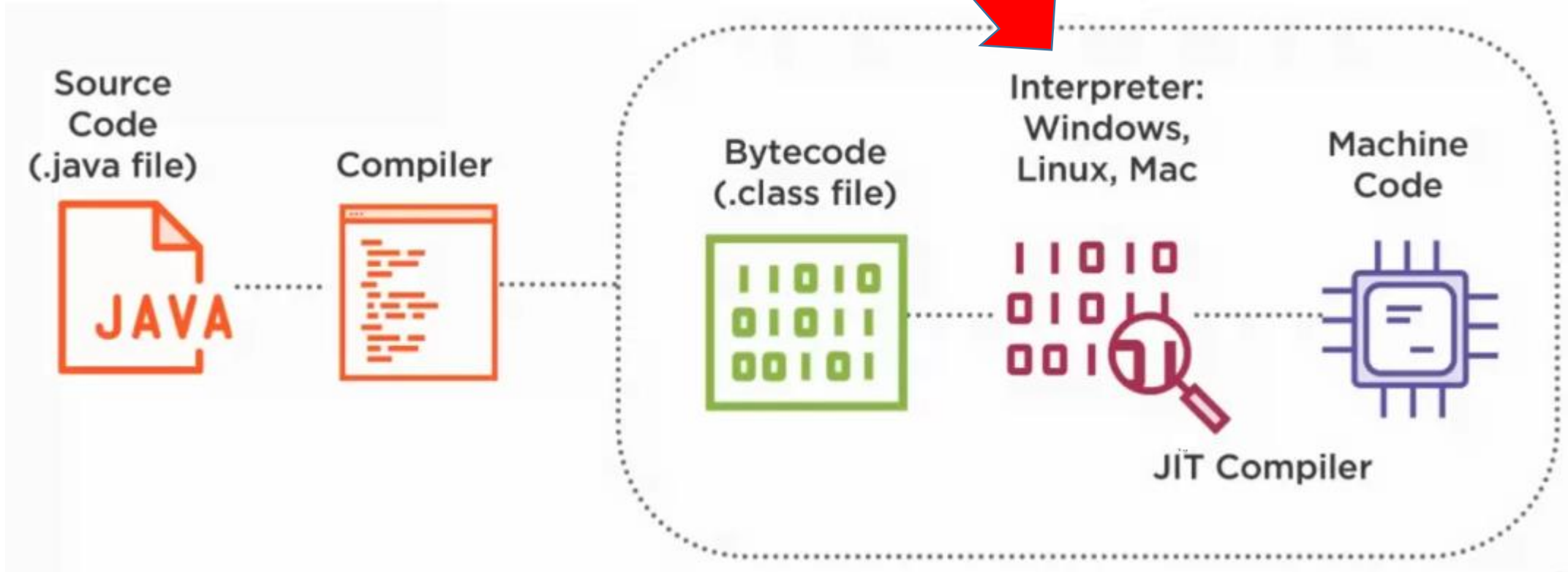


# Principles of Java ByteCode

# How Java program runs



# JVM (Java Virtual Machine) = JRE



# ByteCode

```
0: iconst_0
1: istore_1
2: iconst_2
3: istore_2
4: iconst_3
5: istore_3
6: iload_2
7: iload_3
8: imul
9: istore_1

10: getstatic      #16
13: iload_1
14: invokevirtual  #22

17: return
```

```
◀ public class Demo1 {
    public static void
        main(String[] args) {

        int a = 0;
        int b = 2;
        int c = 3;
        a = b * c;
        System.out.println(a);

    }
}
```

# Java Tools

## **javap**

- part of the Java Development Kit (JDK)
- Bytecode disassembler
- From binary back to bytecode

## **javac**

- Part of the JDK
- Compiles Java source code into binary (bytecode)

## Java Decompilers:

- Converts ByteCode to Java Source Code

# Java source code vs bytecode

- Source code ends with .java extension, eg HelloEarth.java
- Ends with extension .class, eg HelloEarth.class, or,
- .jar extension, eg HelloEarthApp.jar
- .jar extension files are archive files containing multiple .class within

# Lab Demo: Disassembling ByteCode

Download `hello_earth_proj.zip`

Password to unzip is:

`crackinglessons.com`

Lets do a Lab Practical Demo