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# *How to Download and Install JDK*

Brought to you by  Robotics Team - VRC 99909A Rising Phoenix

*This instruction is for Windows machines only.*

## JDK > JRE > JVM

JVM (Java Virtual Machine) - A Java virtual machine is a virtual machine (a program) that enables a computer to run compiled Java programs (Java bytecode) as well as programs written in other languages that are also compiled to Java bytecode.

JRE (Java Runtime Environment) - A set of software tools that include a Java Virtual Machine and core libraries. JRE is needed for running Java programs.

JDK (Java Development Kit) - A set of software tools that include JRE as well as the development tools (such as compiler and debugger). JDK is needed for writing as well as running Java programs.

For our purposes, we need to install JDK.

### Step 1: Download JDK

- Download the latest JDK from Oracle:

<https://www.oracle.com/java/technologies/javase-jdk16-downloads.html>

Select the following Windows x64 Installer:

*Jdk-<version number>\_windows-x64\_bin.exe*

The latest Java version number is "16.0.1" as of this writing. So look for:

`jdk-16.0.1_windows-x64_bin.exe`

After successful download, an executable file "**`jdk-16.0.1_windows-x64_bin.exe`**" shall appear in your computer's "Downloads" folder.

## Step 2: Install JDK

- Double-click on "**`jdk-16.0.1_windows-x64_bin.exe`**" in the "Downloads" folder to start the installation process.
- Accept all the defaults and follow the screen instructions to complete the installation. By default, JDK is installed in this directory

`C:\Program Files\Java\jdk-<version number>`

- For the version just installed, you should be able to find it here:

`C:\Program Files\Java\jdk-16.0.1`

## Step 3: Include JDK's "bin" Directory in the "PATH" environment variable

Windows' Command Prompt (CMD) searches the current directory and the directories listed in the PATH environment variable for executable programs.

JDK's programs (such as Java compiler "javac.exe" and Java runtime "java.exe") reside in the sub-directory "bin" of the JDK installed directory. JDK's "bin" needs to be added into the PATH.

Prior to JDK 15, you need to explicitly add JDK's "bin" into the PATH. Starting from JDK 15, the installation process adds the directory "C:\Program Files\Common Files\Oracle\Java\javapath" to the PATH.

Since we are installing JDK 16, nothing needs to be done here.

## Step 4: Verify JDK Installation

- Open "Command Prompt" terminal  
Click on the windows logo at the lower left corner of your screen and start typing "command"-> "Command Prompt" App should appear under ""Best match"-> Click on that to start the terminal  
A black Command Prompt terminal window shall appear.

- Type `javac -version` in the terminal  
"javac 16.0.1" shall appear in the terminal. This verifies successful installation of JDK on your windows machine.

## How to compile and run Java programs?

Java source code (the program you write with file extension `your_program.java`)

|| (Java Compiler 'javac' - included in JDK)

Bytecode (Output of Java compiler with file extension `your_program.class`)

|| (JVM - included in JRE))

Machine code (Binary instructions that are specific to the CPU)