Tutorial For JDK Installation

> Based on the tutorial of "2020S-Java-A" designed by teaching group in SUSTech
>
> Modified (mainly change to markdown file) by ZHU Yueming in 2021. Jan. 11th
>
> Modified (mainly change to JDK17 version) by LI Boao in 2022. Sep. 3rd
>
> Modified (added JDK 17 notes and minor changes) by Yida Tao in 2022. Sep. 5th

Objectives

1. Install JDK 17 and configure environment variable.
2. Learn compilation and execution of your first Java program in command line.

Software Installation

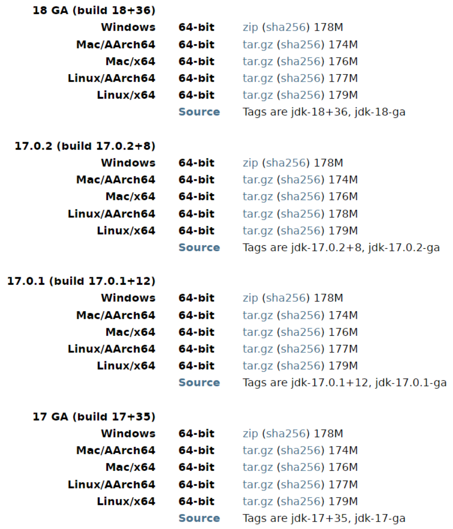
1. JDK Introduction

JDK: The Java Development Kit (JDK) is a software development environment for developing Java applications and applets. It includes a 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.

2. Download and Install JDK

Download approach 1: https://www.oracle.com/java/technologies/javase/jdk17-archive-downloads.html

Download approach 2: https://jdk.java.net/archive/



18 GA (build 18+36)		
Windows	**64-bit**	zip (sha256) 178M
Mac/AArch64	**64-bit**	tar.gz (sha256) 174M
Mac/x64	**64-bit**	tar.gz (sha256) 176M
Linux/AArch64	**64-bit**	tar.gz (sha256) 177M
Linux/x64	**64-bit**	tar.gz (sha256) 179M
	Source	Tags are jdk-18+36, jdk-18-ga
17.0.2 (build 17.0.2+8)		
Windows	**64-bit**	zip (sha256) 178M
Mac/AArch64	**64-bit**	tar.gz (sha256) 174M
Mac/x64	**64-bit**	tar.gz (sha256) 176M
Linux/AArch64	**64-bit**	tar.gz (sha256) 178M
Linux/x64	**64-bit**	tar.gz (sha256) 179M
	Source	Tags are jdk-17.0.2+8, jdk-17.0.2-ga
17.0.1 (build 17.0.1+12)		
Windows	**64-bit**	zip (sha256) 178M
Mac/AArch64	**64-bit**	tar.gz (sha256) 174M
Mac/x64	**64-bit**	tar.gz (sha256) 176M
Linux/AArch64	**64-bit**	tar.gz (sha256) 177M
Linux/x64	**64-bit**	tar.gz (sha256) 179M
	Source	Tags are jdk-17.0.1+12, jdk-17.0.1-ga
17 GA (build 17+35)		
Windows	**64-bit**	zip (sha256) 178M
Mac/AArch64	**64-bit**	tar.gz (sha256) 174M
Mac/x64	**64-bit**	tar.gz (sha256) 176M
Linux/AArch64	**64-bit**	tar.gz (sha256) 177M
Linux/x64	**64-bit**	tar.gz (sha256) 179M
	Source	Tags are jdk-17+35, jdk-17-ga

Note: You need to download the corresponding JDK according to your operating system.

Please choose 17.0.2 version.

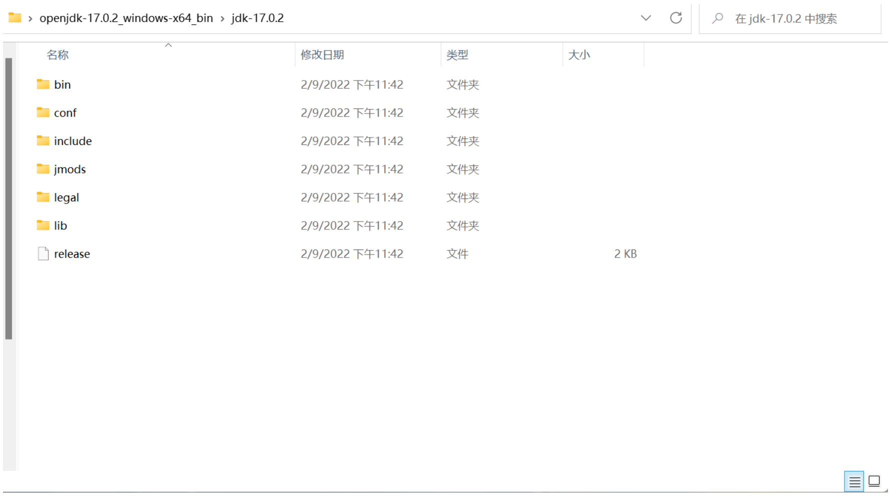
If you use Windows 64-bit, click 'zip' and start downloading.

If you use Mac OS, please check the form of your CPU. If your computer uses Intel chip, please download "x64" version. If your computer uses Apple M1 chip, please download "AArch64" version.

Installation:

Once downloaded, just uncompress the zip all.

Then you will see a directory like this.



名称	修改日期	类型	大小
bin	2/9/2022 下午11:42	文件夹	
conf	2/9/2022 下午11:42	文件夹	
include	2/9/2022 下午11:42	文件夹	
jmods	2/9/2022 下午11:42	文件夹	
legal	2/9/2022 下午11:42	文件夹	
lib	2/9/2022 下午11:42	文件夹	
release	2/9/2022 下午11:42	文件	2 KB

However, the system cannot find the *java/javac* file under the "bin" directory at once.

So we need to configure the environment variable in order to solve the problem.

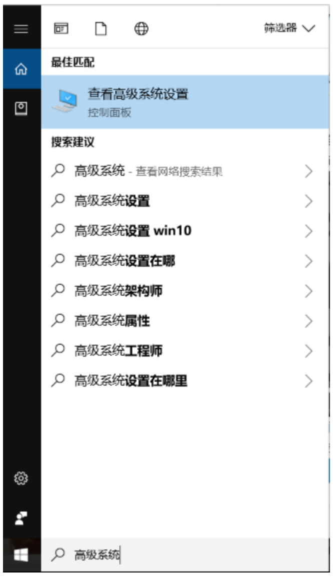
3. Environment Variable

If you are a **Mac OS** user, you can ignore environment variable in this lab.

If you are a Windows user, you need to do as following steps.

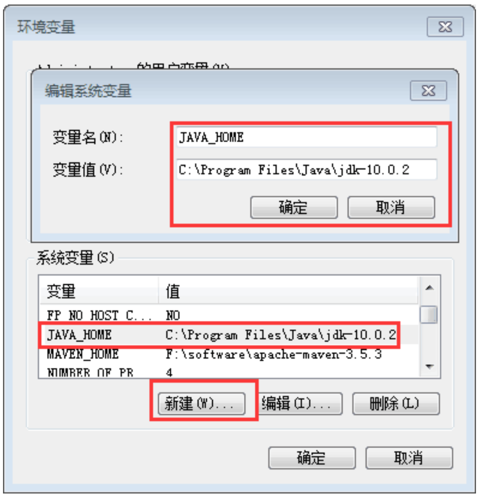
- Advanced System Settings: Type **advanced system settings** (高级系统设置) in the search box (beside the Windows start button), clicks View **advanced system settings**.

  Note: You can also find it by right click "My computer", then choose "Properties".



- Add `JAVA_HOME`：First click **environment variables**(环境变量). Create a new **System variables**(系统变量), name the variable as `JAVA_HOME` and set the value as the installation location of JDK. *(The following picture assumes JDK 10 is installed, find your equivalent JDK 17 folder)*

  Windows 7 version:

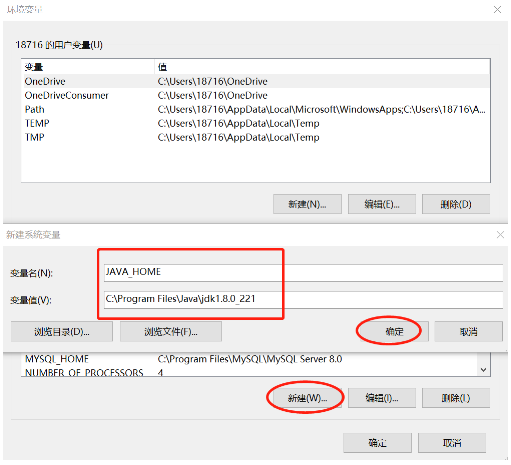
  

  变量名(N): JAVA_HOME

  变量值(V): C:\Program Files\Java\jdk-10.0.2

变量	值
FP_NO_HOST_C...	NO
JAVA_HOME	C:\Program Files\Java\jdk-10.0.2
MAVEN_HOME	F:\software\apache-maven-3.5.3
NUMBER_OF_PR	4

  windows 10/11 version:

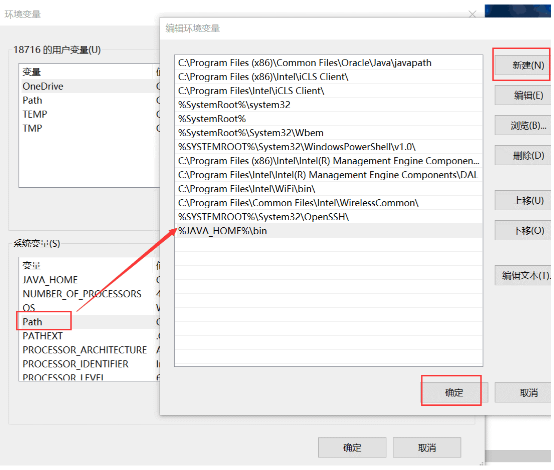
变量	值
OneDrive	C:\Users\18716\OneDrive
OneDriveConsumer	C:\Users\18716\OneDrive
Path	C:\Users\18716\AppData\Local\Microsoft\WindowsApps;C:\Users\18716\A...
TEMP	C:\Users\18716\AppData\Local\Temp
TMP	C:\Users\18716\AppData\Local\Temp

  变量名(N): JAVA_HOME

  变量值(V): C:\Program Files\Java\jdk1.8.0_221

MYSQL_HOME	C:\Program Files\MySQL\MySQL Server 8.0
NUMBER_OF_PROCESSORS	4

- Update Path: In System variables, find **PATH**, clicks edit and append this `%JAVA_HOME%\bin` into the last line (Windows 10/11 user)

变量
OneDrive
Path
TEMP
TMP

变量
JAVA_HOME
NUMBER_OF_PROCESSORS
OS
Path
PATHEXT
PROCESSOR_ARCHITECTURE
PROCESSOR_IDENTIFIER
PROCESSOR_LEVEL

  ```
  C:\Program Files (x86)\Common Files\Oracle\Java\javapath
  C:\Program Files (x86)\Intel\iCLS Client\
  C:\Program Files\Intel\iCLS Client\
  %SystemRoot%\system32
  %SystemRoot%
  %SystemRoot%\System32\Wbem
  %SYSTEMROOT%\System32\WindowsPowerShell\v1.0\
  C:\Program Files (x86)\Intel\Intel(R) Management Engine Componen...
  C:\Program Files\Intel\Intel(R) Management Engine Components\DAL
  C:\Program Files\Intel\WiFi\bin\
  C:\Program Files\Common Files\Intel\WirelessCommon\
  %SYSTEMROOT%\System32\OpenSSH\
  %JAVA_HOME%\bin
  ```

  Click "Confirm" to save the settings.

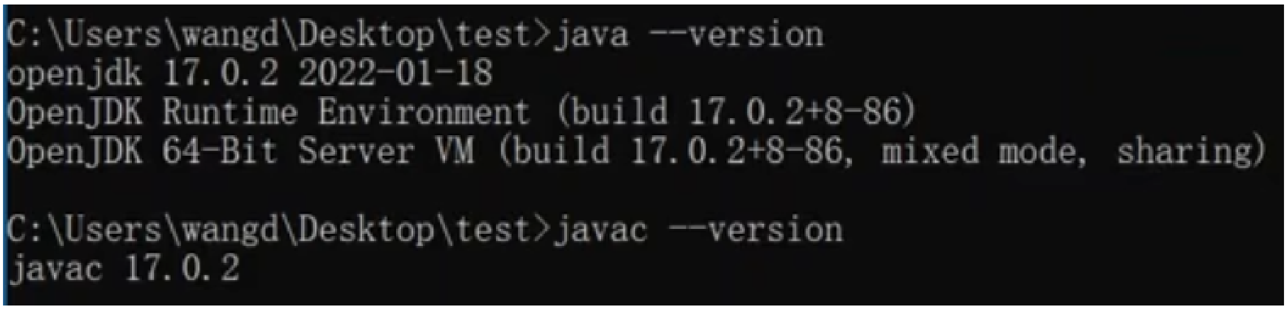
- Restart your command prompt to load the environment configure.
- Checking

  Press Win+R. Type cmd to enter the command prompt.

  Then type the command below:

  ```
  java -version
  javac -version
  ```

  You will see one of two things. If the JDK / Java compiler is correctly installed, you should see a version number like so:

  ```
  C:\Users\wangd\Desktop\test>java --version
  openjdk 17.0.2 2022-01-18
  OpenJDK Runtime Environment (build 17.0.2+8-86)
  OpenJDK 64-Bit Server VM (build 17.0.2+8-86, mixed mode, sharing)

  C:\Users\wangd\Desktop\test>javac --version
  javac 17.0.2
  ```

  However, if the JDK isn't installed or the environment variables are not properly configured, then you'll see an error like so:

  ```
  C:\Users\18716>java -version
  'java' 不是内部或外部命令，也不是可运行的程序
  或批处理文件。

  C:\Users\18716>javac -version
  'javac' 不是内部或外部命令，也不是可运行的程序
  或批处理文件。
  ```

4. Editor

A simple editor **Visual Studio Code** is recommended: https://code.visualstudio.com/

Or, you can simply use any text editor (the source code of Java programs is just a sequence of characters), for example **notepad** on windows and **TextEdit** on Mac.

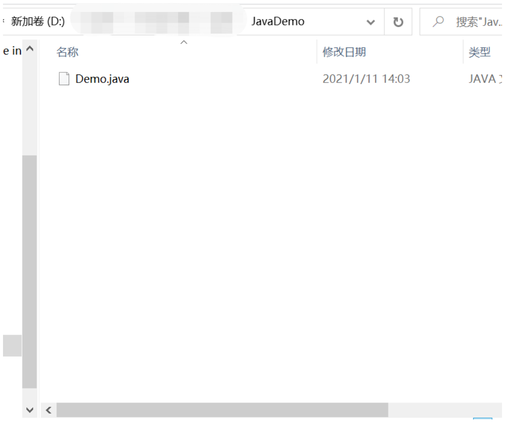
Exercise

Compile a Java Program in Command line

- Open txt file and create a new text file and type the following code.

```
public class Demo {
    public static void main(String[] args) {
        System.out.println("Hello, world!");
    }
}
```

- Using the “save as” command in the “File” menu to save the file with the name `Demo.java`. Note that the .java file name has to be **the same as** the main Class name in your program.



名称	修改日期	类型
Demo.java	2021/1/11 14:03	JAVA

- Open the `cmd` program; in the `cmd` window, use `cd` command to go to the directory where you save your `Demo.java`; use `javac` command to compile your “.java” file; use `java` command to execute the .class file (which must have a main function). The procedure is as follows

  ```
  D:\JavaDemo>javac Demo.java

  D:\JavaDemo>java Demo
  Hello, world!
  ```

  Also, you may notice that a new file **Demo.class** has been produced. This file works when we run the command in cmd. The `java Demo` command still works inspite you delete the **Demo.java** file. However, it is not readable because it is a binary file.

- Starting from JDK 11, you could directly execute a **single** .java file using `java Demo.java` without the `javac` command. The source code is compiled in memory and then executed by the interpreter, without producing a `.class` file on disk. However, this feature is limited to code that resides in a single source file. You cannot add additional source files to be compiled in the same run [reference].

Other Basic CMD:

- Change to d driver:

  ```
  d:
  ```

- go into sub folder `xxx`:

```
cd xxx
```

- go into root folder:

```
cd /
```

- go into super folder:

```
cd ..
```

- find all files in current folder:

```
dir
```

In this lab, you are using an editor and the compiler separately. There are software products (e.g. Eclipse, NetBeans, IDEA) that could link them up and facilitate your work. In this semester, you are recommended to use IDEA. You can download the community version at the following link:

https://www.jetbrains.com/idea/download/

Detailed introductions on how to use IDEA will be introduced in the next lab.