

COMP2045

Programming and Problem Solving

Introduction to Java Programming

- Computer systems consist of hardware and software
- Hardware:
 - CPU, the master mind that gives instruction
 - Volatile memory, RAM, that holds data for the current program
 - Persistent memory, HD, that holds more data, more reliable, yet slower

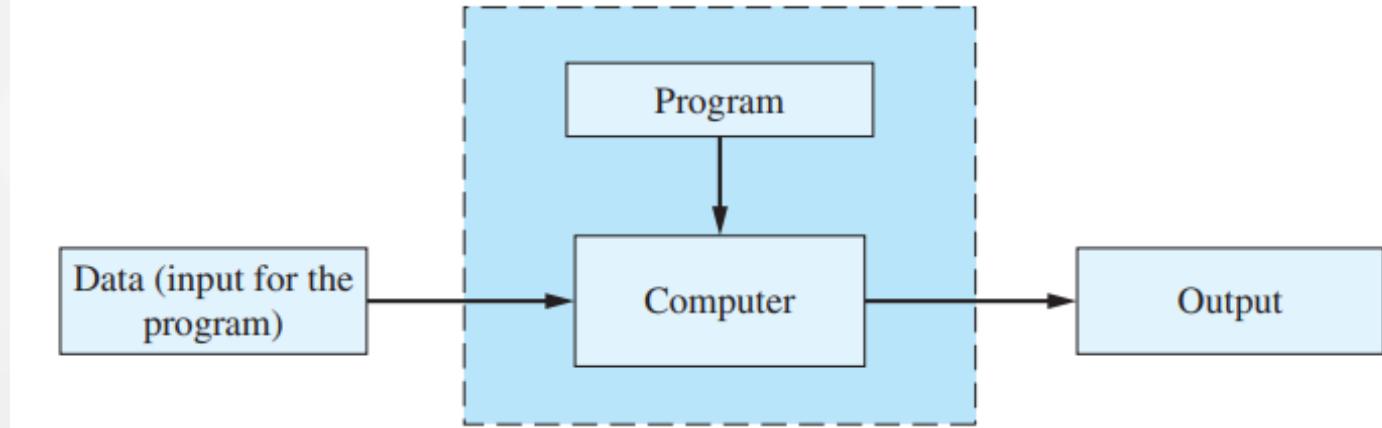
Main Memory

- Data stored in main memory is represented as binary, grouped into a byte (8-bits).
- One byte of integer can only represent the possible value of 0 to 255.
- A larger number uses a few adjacent bytes.
- Each memory slot has an address.
- A 32-bits system means we use 32-bits to store an address.

<i>Byte addresses</i>	<i>Bytes</i>	
3021	11110000	2-byte memory location at address 3021
3022	11001100	1-byte memory location at address 3023
3023	10101010	
3024	11001110	3-byte memory location at address 3024
3025	00110001	
3026	11100001	
3027	01100011	2-byte memory location at address 3027
3028	10100010	
3029	01111111	
3030	10000001	
3031	10111100	
•		
•		
•		

Programs

- Normally an **Operating System** is responsible to launch a program.
- A runnable program is **compiled** into some code (e.g. `.exe`) that can be executed on a computer platform.



Why can't we double-click-run an Android APK on Windows?

Compiler vs Interpreter

Compiler

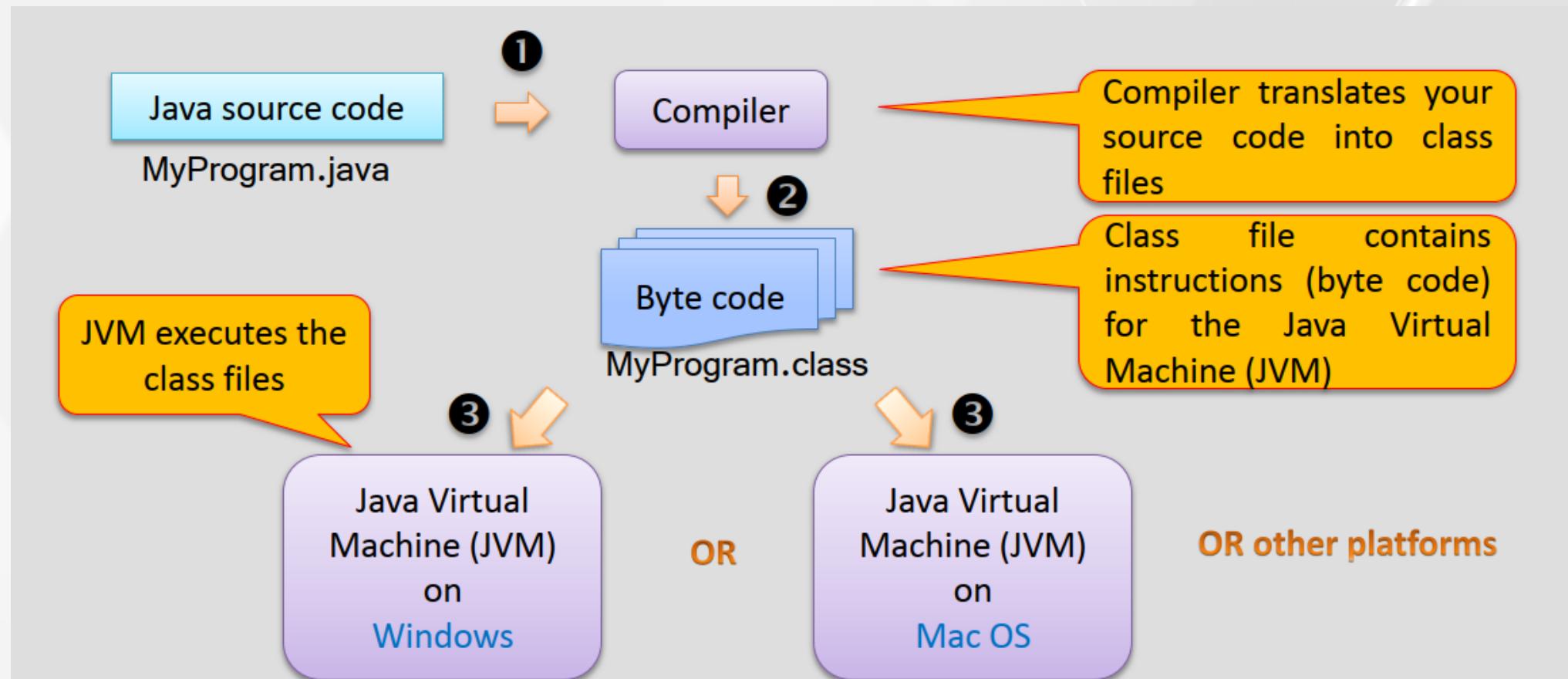
- Compiler is a special type of computer program
- Translates human writing programming code to runnable code
- A program needs to be compiled for once only
- Compiled code can be executed directly
- More efficient
- e.g. C/C++

Interpreter

- Interpreter does not compile code.
- Translates source code line-by-line while it is running
- More portable
- e.g. Python/VBA/bash script

Java Bytecode

- Java compiler *compiles* source code into **bytecode**.
- A **Java Virtual Machine (JVM)** *interprets* the bytecode.



Compile Our First Java Program

```
1 public class HelloWorld {  
2     public static void main(String argv[]) {  
3         new HelloWorld().runApp();  
4     }  
5     public void runApp() {  
6         System.out.println("Hello World!");  
7     }  
8 }
```

Name this file `HelloWorld.java`



In Windows system filename is not case sensitive. As a good habit you should strictly follow the case of your class name.

Compile Our First Java Program

Linux

```
$ ls  
HelloWorld.java  
$ javac HelloWorld.java  
  
$ ls  
HelloWorld.class HelloWorld.java  
  
$ java HelloWorld  
Hello World!
```

- `ls` - a Linux command for listing the file under the current directory
- `javac HelloWorld.java` - compiles the source program `HelloWorld.java` into a class file `HelloWorld.class`
- `java HelloWorld` - it executes the compile java program `HelloWorld.`

Compile Our First Java Program

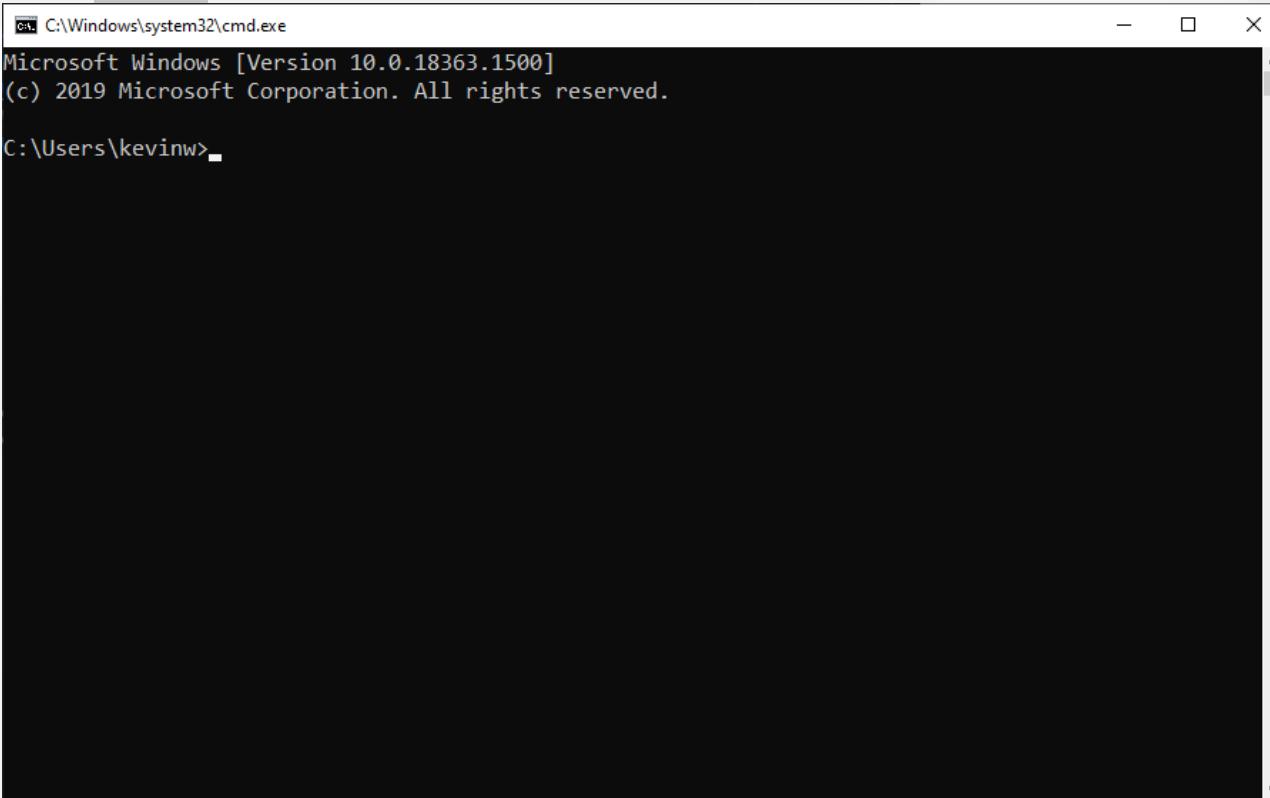
Windows' Command Prompt

1. Start a Command Prompt
2. Create your Java source file (`HelloWorld.java`)
3. Compile the source file
4. Run the program

Compile Our First Java Program

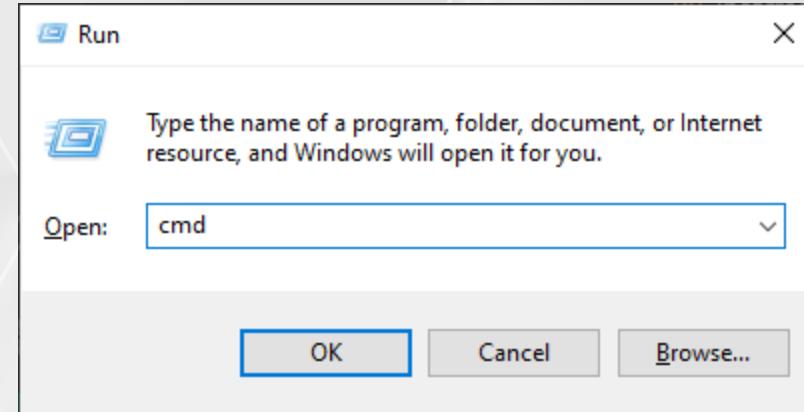
Start a Command Prompt

1. Press Windows Key + R to launch Run
2. Type cmd in the box and click OK.



A screenshot of a Microsoft Windows Command Prompt window. The title bar says "C:\Windows\system32\cmd.exe". The window displays the following text:
Microsoft Windows [Version 10.0.18363.1500]
(c) 2019 Microsoft Corporation. All rights reserved.

C:\Users\kevinw> -



Compile Our First Java Program

```
C:\Users\kevinw>cd Desktop
```

```
C:\Users\kevinw\Desktop>mkdir MyFirstJava
```

```
C:\Users\kevinw\Desktop>cd MyFirstJava
```

```
C:\Users\kevinw\Desktop\MyFirstJava>Dir
```

```
Volume in drive C has no label.
```

```
Volume Serial Number is 91D0-BC80
```

```
Directory of C:\Users\kevinw\Desktop\MyFirstJava
```

```
05/11/2021  04:12 PM    <DIR>
```

```
.
```

```
05/11/2021  04:12 PM    <DIR>
```

```
..
```

```
          0 File(s)           0 bytes
```

```
          2 Dir(s)   604,250,165,248 bytes free
```

```
C:\Users\kevinw\Desktop\MyFirstJava>notepad HelloWorld.java
```

Compile Our First Java Program

- Use the program **Notepad** to edit `HelloWorld.java`.
- Save after you have done.
- Make sure the **Save as type** is All Files.
- Do not use **Wordpad** or **Word**.

  Files saved in Wordpad or Word has their own format and its own file extension. Moreover, Word processors will convert the symbol quotation "" to “” which cannot be recognized by the compiler.

Compile Our First Java Program

```
C:\Users\kevinw\Desktop\MyFirstJava>dir
Volume in drive C has no label.
Volume Serial Number is 91D0-BC80

Directory of C:\Users\kevinw\Desktop\MyFirstJava

05/11/2021  04:41 PM    <DIR>          .
05/11/2021  04:41 PM    <DIR>          ..
05/11/2021  04:41 PM                199 HelloWorld.java
                           1 File(s)           199 bytes
                           2 Dir(s)   604,243,447,808 bytes free

C:\Users\kevinw\Desktop\MyFirstJava>javac HelloWorld.java

C:\Users\kevinw\Desktop\MyFirstJava>java HelloWorld
Hello World!

C:\Users\kevinw\Desktop\MyFirstJava>
```

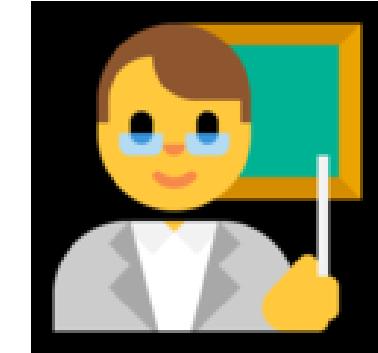
- Integrated Development Environment (IDE) - Software application that helps us:
 - Editing our programs
 - Compiling our programs
 - Executing our programs; and
 - Debugging our programs
- Popular IDEs for Java:
 - NetBeans
 - Eclipse
 - **IntelliJ**
 - Visual Studio Code

Compiling a Java Program with IntelliJ

 [Youtube](#)



Compile First
Java Program
with IntelliJ



Comment in Java

- We want to leave some remarks/comments inside our program to enhance the readability.
- Comments in Java are not read by the compiler[^].
- Comments can be taken in either form

Line comment: texts after the symbol `//` are comments

```
// line comment
// another line comment
```

Block comment: texts between the symbol `/*` and `*/` are comments

```
/* First lines of comments
Another lines of comments */
```

Image Credit

- W. Savitch and F Carrano, "Java An Introduction to Problem Solving & Programming," Pearson, 6th Ed.