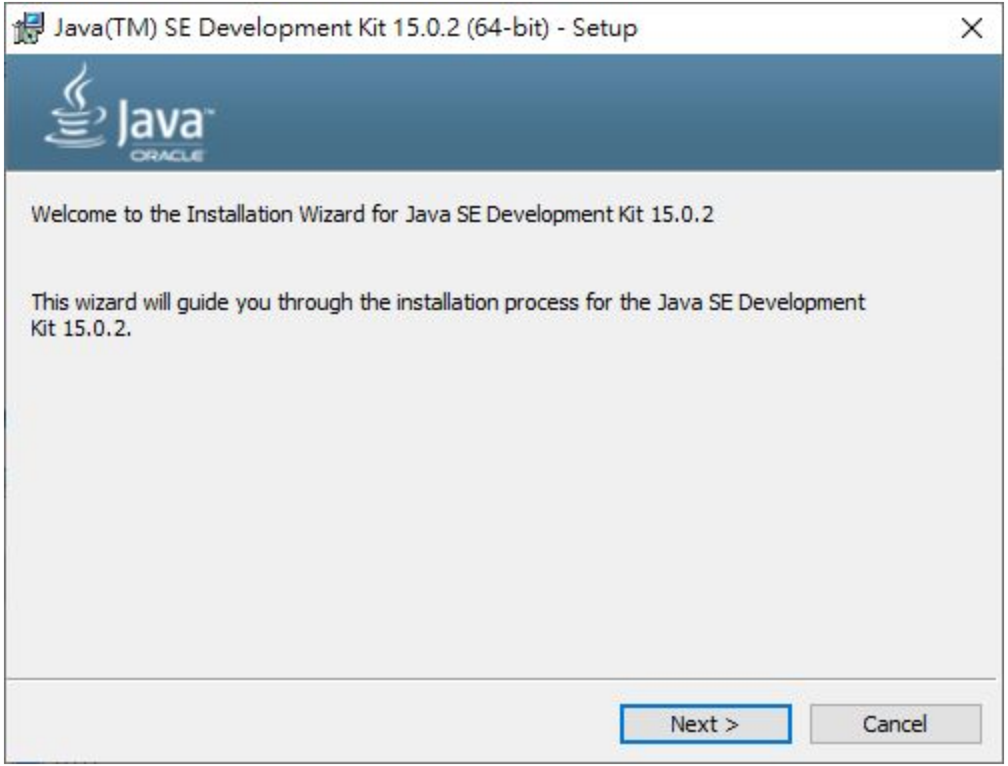
# Java JDK
# 2021 02 25

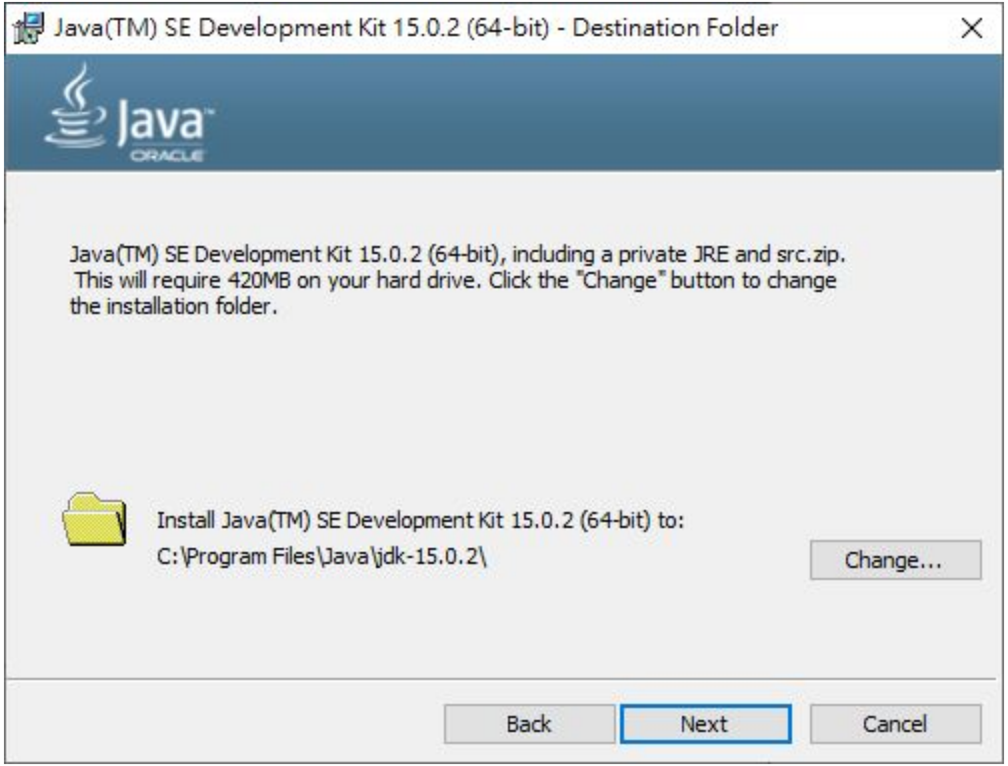
https://www.kjnotes.com/devtools/35



Java(TM) SE Development Kit 15.0.2 (64-bit) - Setup

Welcome to the Installation Wizard for Java SE Development Kit 15.0.2

This wizard will guide you through the installation process for the Java SE Development Kit 15.0.2.

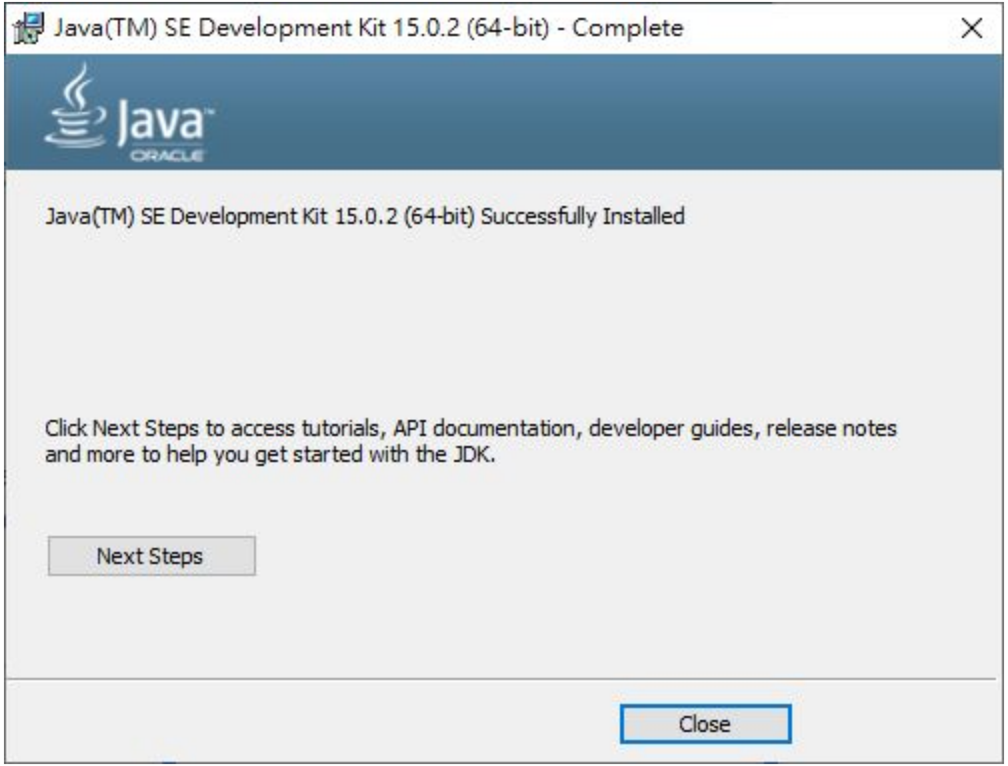


Java(TM) SE Development Kit 15.0.2 (64-bit) - Destination Folder
Java
ORACLE

Java(TM) SE Development Kit 15.0.2 (64-bit), including a private JRE and src.zip. This will require 420MB on your hard drive. Click the "Change" button to change the installation folder.

Install Java(TM) SE Development Kit 15.0.2 (64-bit) to:
C:\Program Files\Java\jdk-15.0.2\

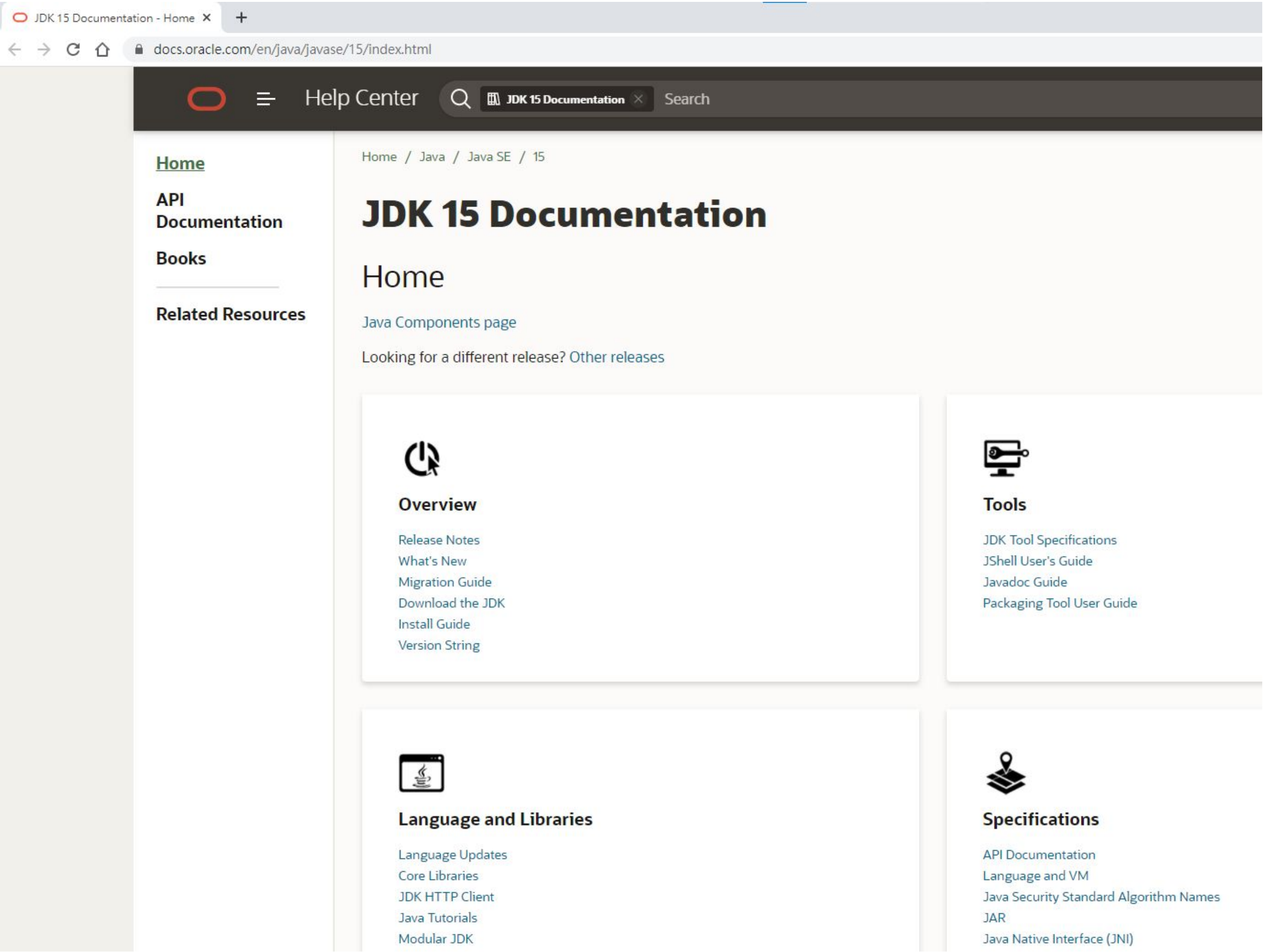
Change...
Back
Next
Cancel



Java(TM) SE Development Kit 15.0.2 (64-bit) - Complete

Java(TM) SE Development Kit 15.0.2 (64-bit) Successfully Installed

Click Next Steps to access tutorials, API documentation, developer guides, release notes and more to help you get started with the JDK.



JDK 15 Documentation - Home
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Related Resources

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# JDK 15 Documentation

## Home

Java Components page

Looking for a different release? Other releases

### Overview

- Release Notes
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### Tools

- JDK Tool Specifications
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- Javadoc Guide
- Packaging Tool User Guide

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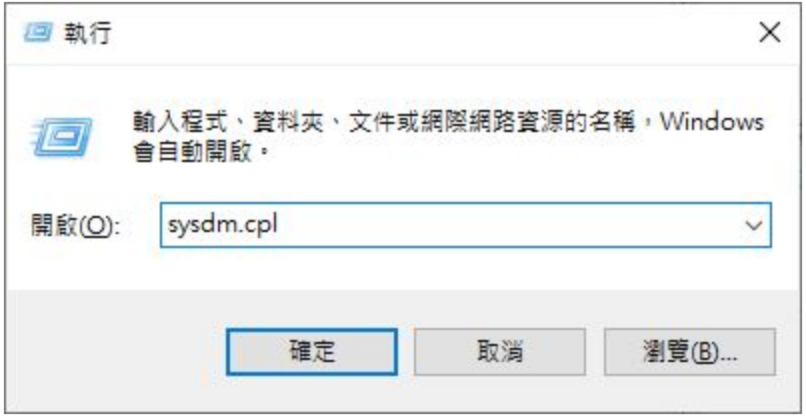
- Core Libraries
- JDK HTTP Client
- Java Tutorials
- Modular JDK

### Specifications

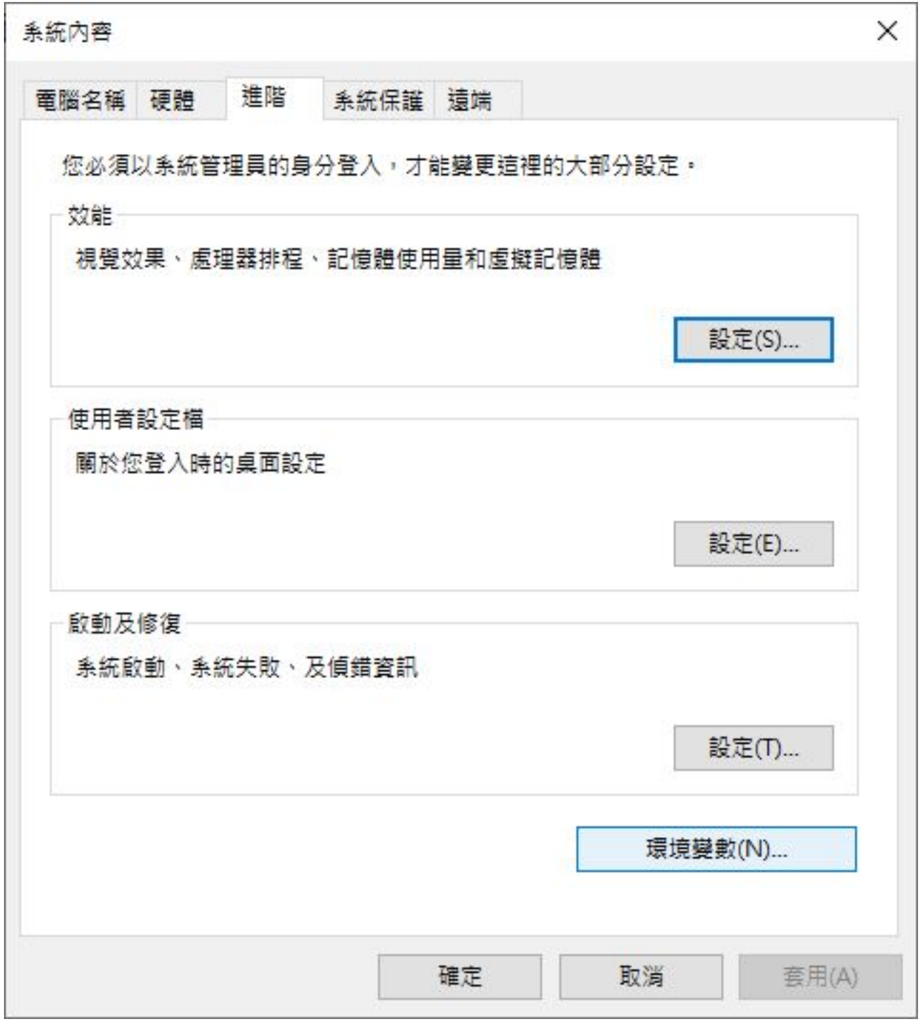
- API Documentation
- Language and VM
- Java Security Standard Algorithm Names
- JAR
- Java Native Interface (JNI)



執行

輸入程式、資料夾、文件或網際網路資源的名稱，Windows 會自動開啟。

開啟(O): sysdm.cpl



系統內容

您必須以系統管理員的身分登入，才能變更這裡的大部分設定。

效能

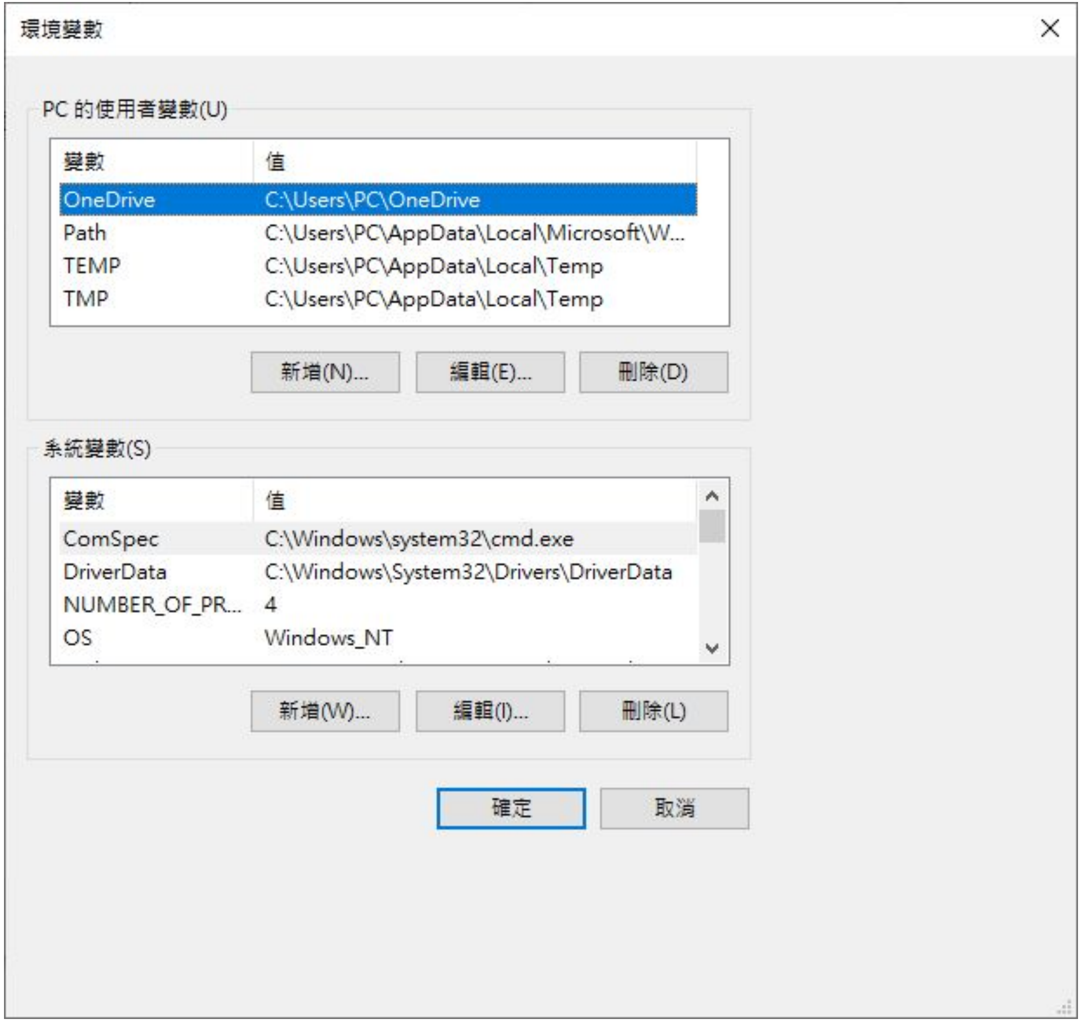
視覺效果、處理器排程、記憶體使用量和虛擬記憶體

使用者設定檔

關於您登入時的桌面設定

啟動及修復

系統啟動、系統失敗、及偵錯資訊



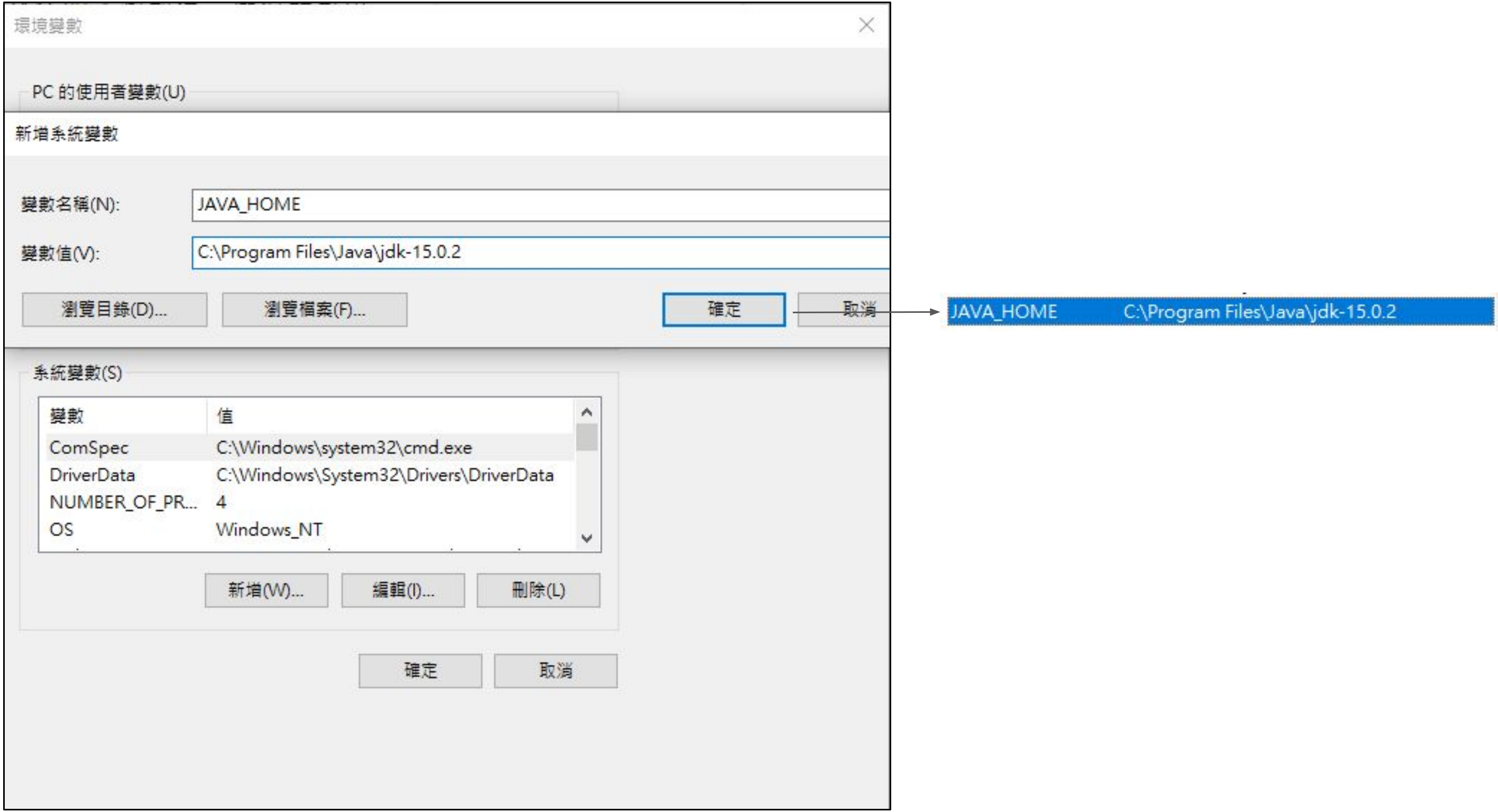
環境變數

PC 的使用者變數(U)

| 變數 | 值 |
|---|---|
| OneDrive | C:\Users\PC\OneDrive |
| Path | C:\Users\PC\AppData\Local\Microsoft\W... |
| TEMP | C:\Users\PC\AppData\Local\Temp |
| TMP | C:\Users\PC\AppData\Local\Temp |

系統變數(S)

| 變數 | 值 |
|---|---|
| ComSpec | C:\Windows\system32\cmd.exe |
| DriverData | C:\Windows\System32\Drivers\DriverData |
| NUMBER_OF_PR... | 4 |
| OS | Windows_NT |

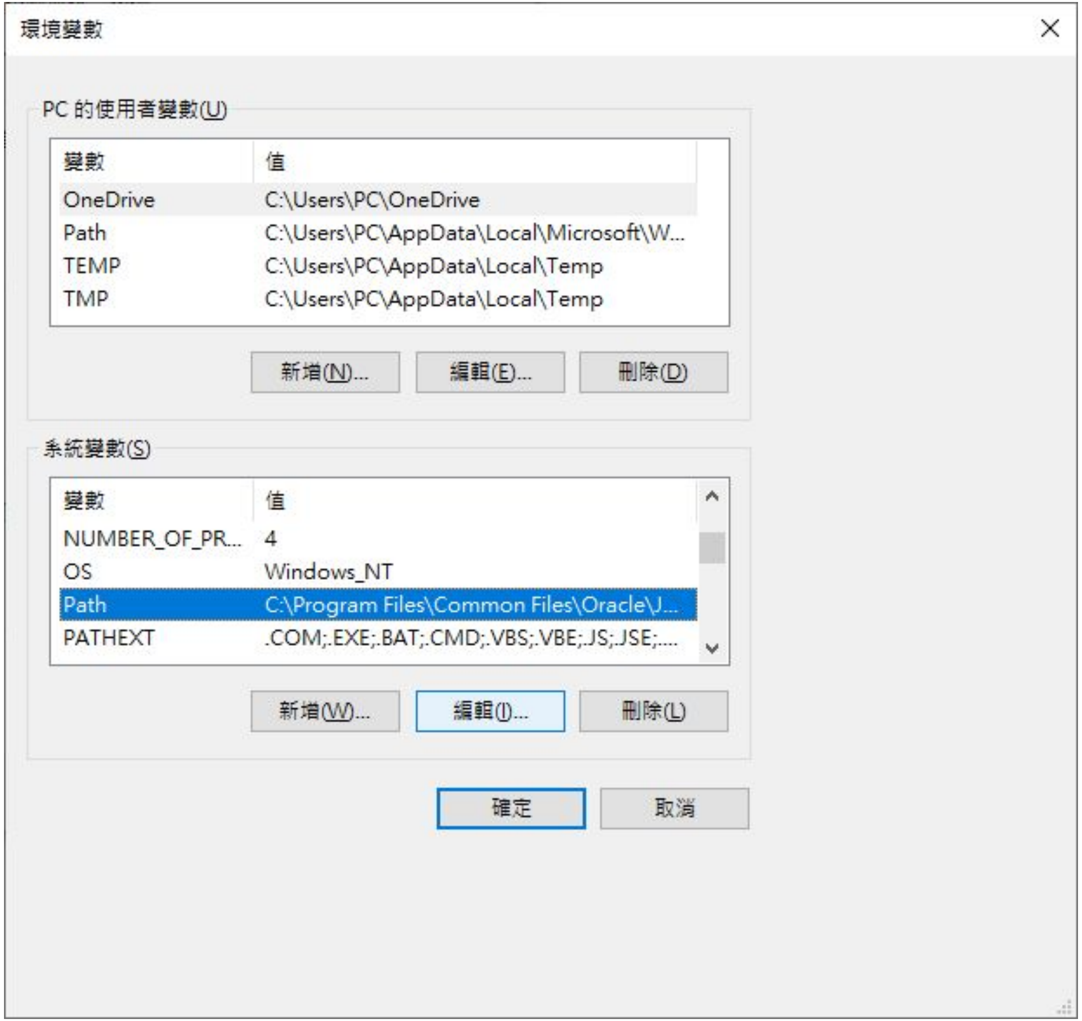


變數名稱(N): JAVA_HOME

變數值(V): C:\Program Files\Java\jdk-15.0.2

| 變數 | 值 |
|---|---|
| ComSpec | C:\Windows\system32\cmd.exe |
| DriverData | C:\Windows\System32\Drivers\DriverData |
| NUMBER_OF_PR... | 4 |
| OS | Windows_NT |

JAVA_HOME C:\Program Files\Java\jdk-15.0.2

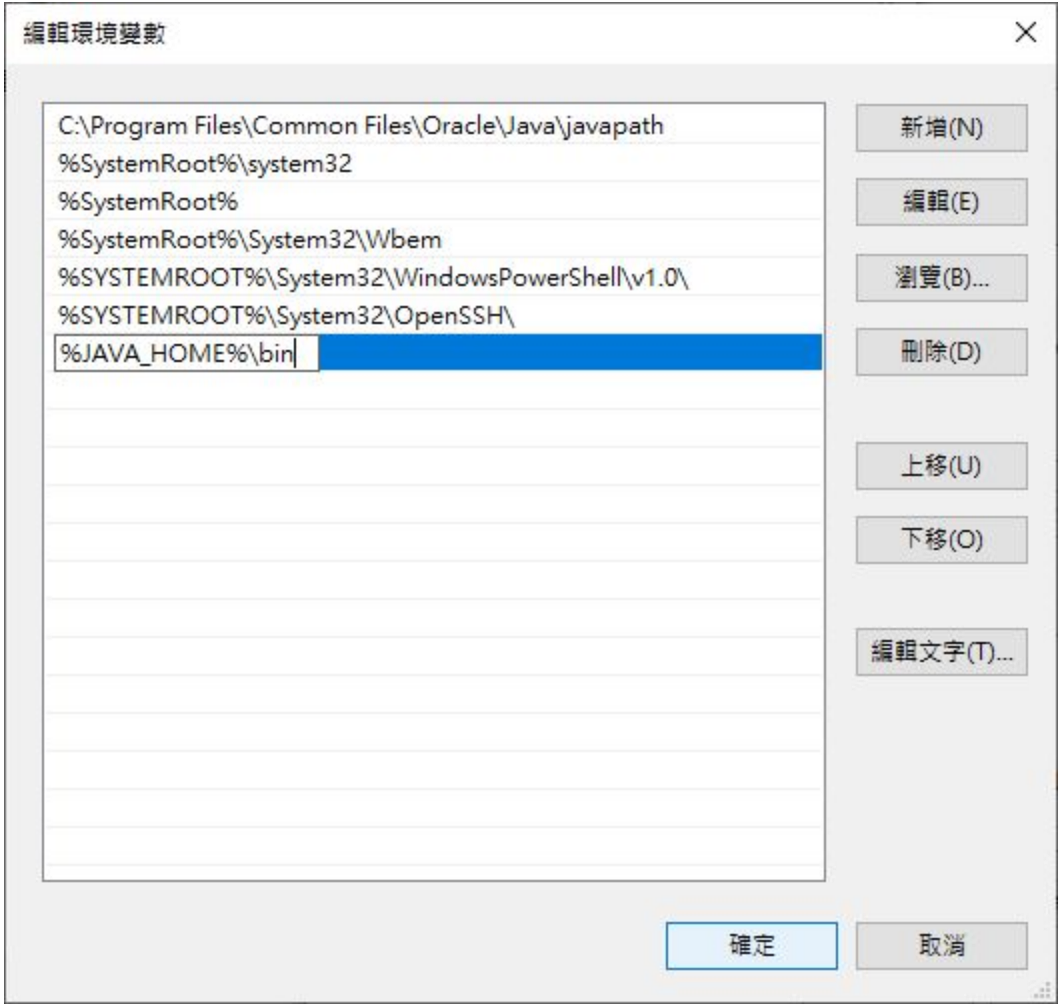


PC 的使用者變數(U)

| 變數 | 值 |
|---|---|
| OneDrive | C:\Users\PC\OneDrive |
| Path | C:\Users\PC\AppData\Local\Microsoft\W... |
| TEMP | C:\Users\PC\AppData\Local\Temp |
| TMP | C:\Users\PC\AppData\Local\Temp |

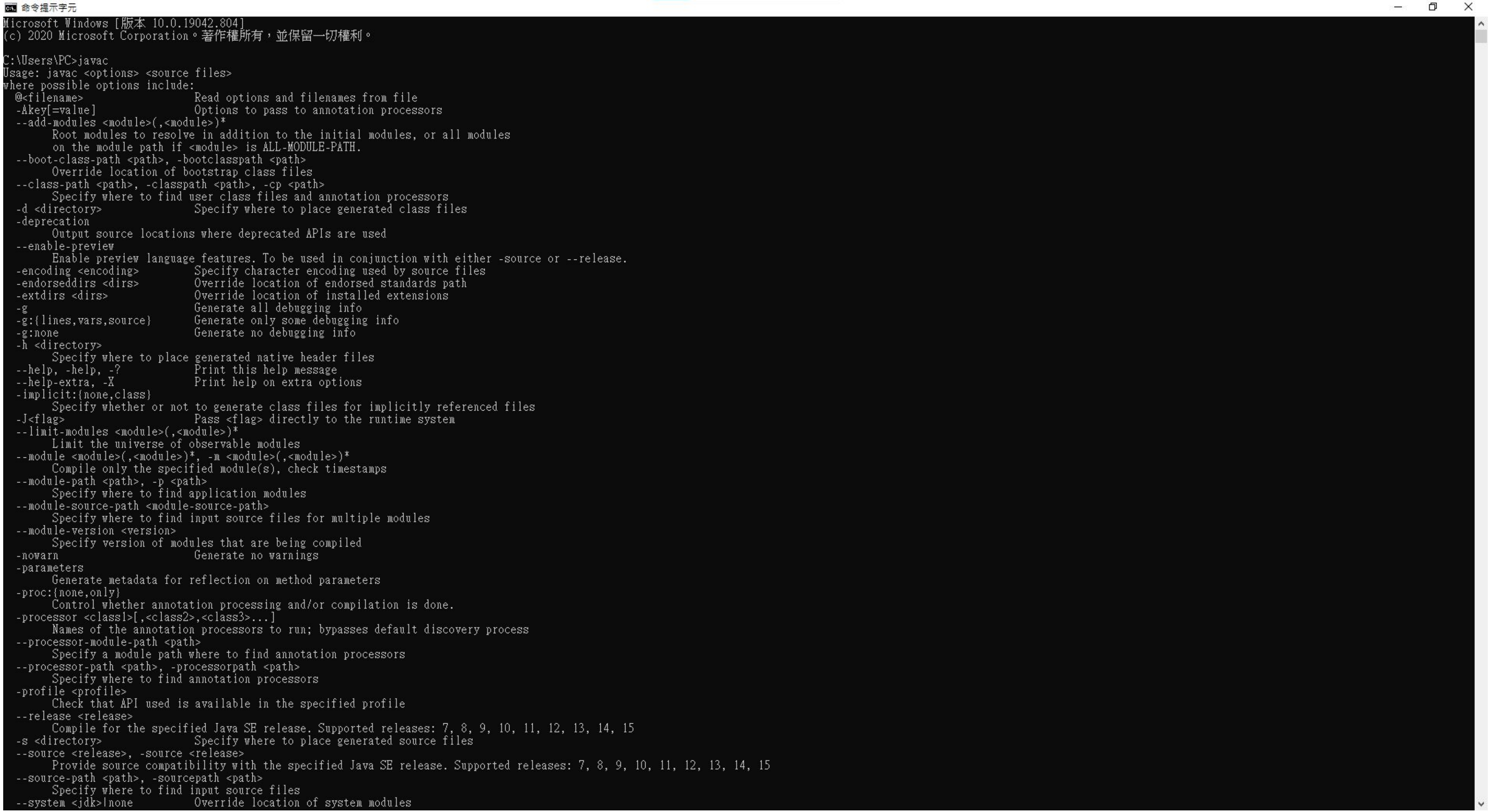
系統變數(S)

| 變數 | 值 |
|---|---|
| NUMBER_OF_PR... | 4 |
| OS | Windows_NT |
| Path | C:\Program Files\Common Files\Oracle\J... |
| PATHEXT | .COM;.EXE;.BAT;.CMD;.VBS;.VBE;.JS;.JSE;.... |

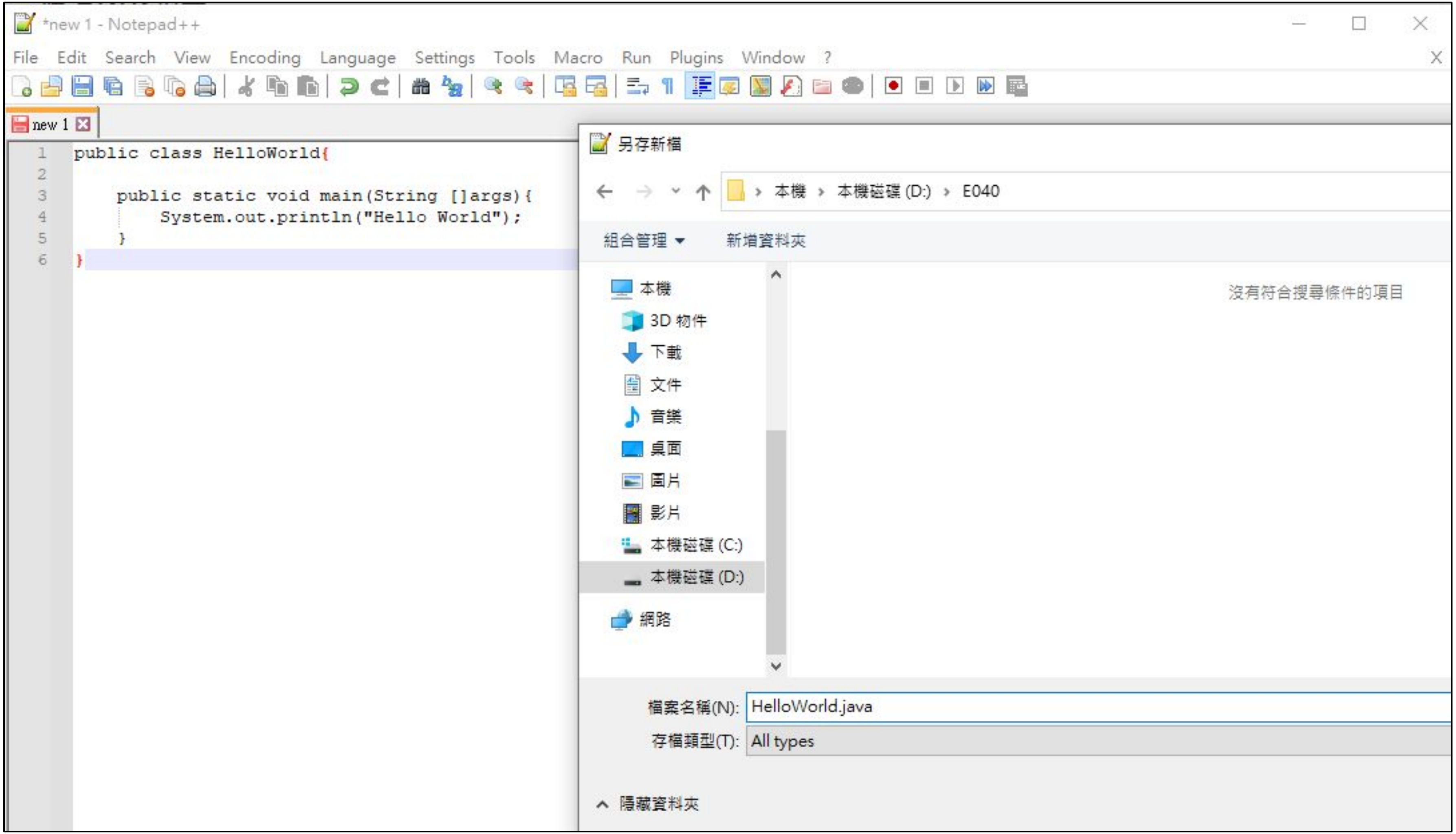


```
C:\Program Files\Common Files\Oracle\Java\javapath
%SystemRoot%\system32
%SystemRoot%
%SystemRoot%\System32\Wbem
%SYSTEMROOT%\System32\WindowsPowerShell\v1.0\
%SYSTEMROOT%\System32\OpenSSH\
%JAVA_HOME%\bin
```

**%JAVA_HOME%\bin**



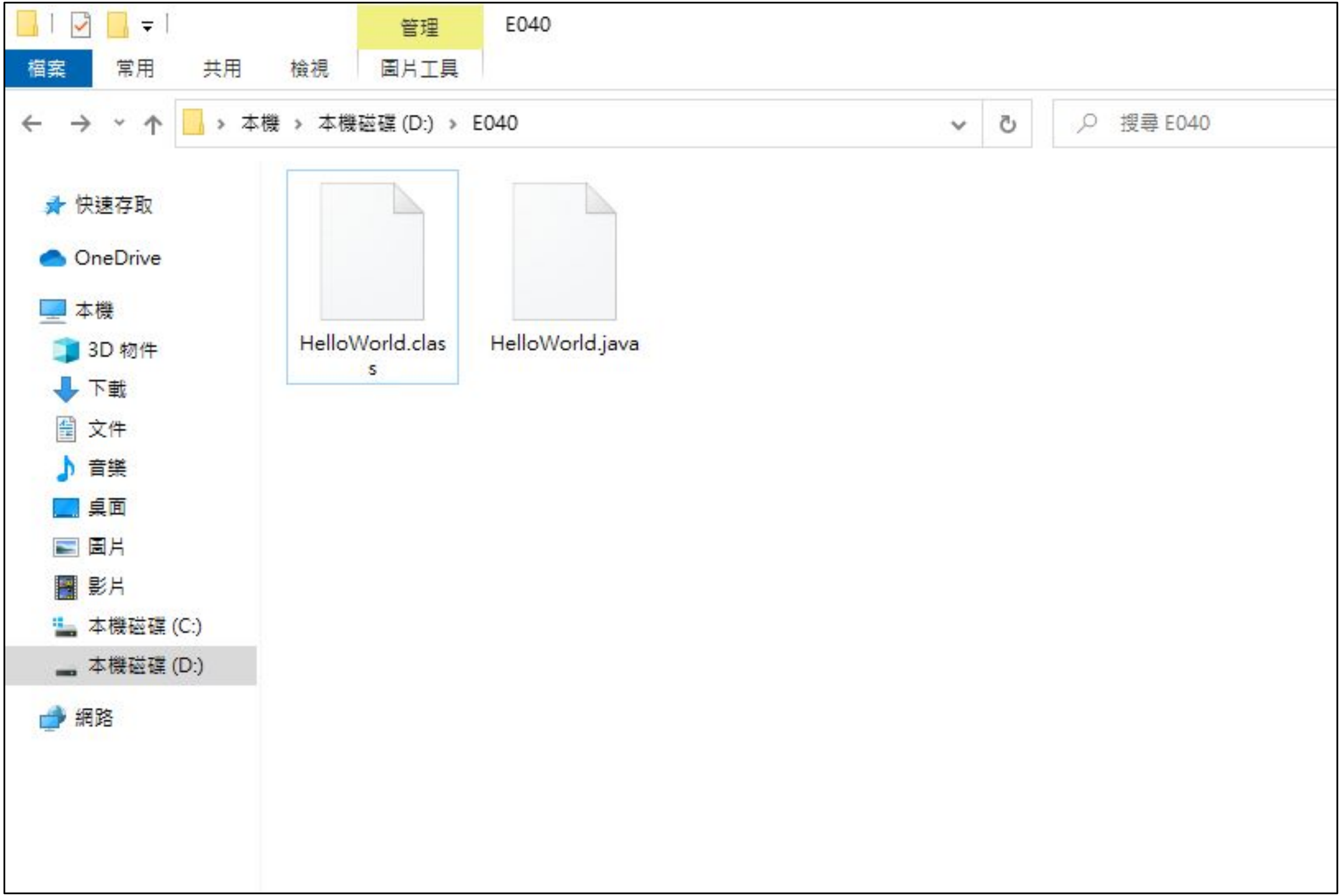
```
Microsoft Windows [版本 10.0.19042.804]
(c) 2020 Microsoft Corporation。著作權所有，並保留一切權利。

C:\Users\PC>javac
Usage: javac <options> <source files>
where possible options include:
  @<filename>                  Read options and filenames from file
  -Akey[=value]                Options to pass to annotation processors
  --add-modules <module>(,<module>)*
        Root modules to resolve in addition to the initial modules, or all modules
        on the module path if <module> is ALL-MODULE-PATH.
  --boot-class-path <path>, -bootclasspath <path>
        Override location of bootstrap class files
  --class-path <path>, -classpath <path>, -cp <path>
        Specify where to find user class files and annotation processors
  -d <directory>               Specify where to place generated class files
  -deprecation
        Output source locations where deprecated APIs are used
  --enable-preview
        Enable preview language features. To be used in conjunction with either -source or --release.
  -encoding <encoding>         Specify character encoding used by source files
  -endorseddirs <dirs>         Override location of endorsed standards path
  -extdirs <dirs>              Override location of installed extensions
  -g                           Generate all debugging info
  -g:{lines,vars,source}       Generate only some debugging info
  -g:none                      Generate no debugging info
  -h <directory>
        Specify where to place generated native header files
  --help, -help, -?            Print this help message
  --help-extra, -X             Print help on extra options
  -implicit:{none,class}
        Specify whether or not to generate class files for implicitly referenced files
  -J<flag>                     Pass <flag> directly to the runtime system
  --limit-modules <module>(,<module>)*
        Limit the universe of observable modules
  --module <module>(,<module>)*, -m <module>(,<module>)*
        Compile only the specified module(s), check timestamps
  --module-path <path>, -p <path>
        Specify where to find application modules
  --module-source-path <module-source-path>
        Specify where to find input source files for multiple modules
  --module-version <version>
        Specify version of modules that are being compiled
  -nowarn                      Generate no warnings
  -parameters
        Generate metadata for reflection on method parameters
  -proc:{none,only}
        Control whether annotation processing and/or compilation is done.
  -processor <class1>[,<class2>,<class3>...]
        Names of the annotation processors to run; bypasses default discovery process
  --processor-module-path <path>
        Specify a module path where to find annotation processors
  --processor-path <path>, -processorpath <path>
        Specify where to find annotation processors
  -profile <profile>
        Check that API used is available in the specified profile
  --release <release>
        Compile for the specified Java SE release. Supported releases: 7, 8, 9, 10, 11, 12, 13, 14, 15
  -s <directory>               Specify where to place generated source files
  --source <release>, -source <release>
        Provide source compatibility with the specified Java SE release. Supported releases: 7, 8, 9, 10, 11, 12, 13, 14, 15
  --source-path <path>, -sourcepath <path>
        Specify where to find input source files
  --system <jdk>|none          Override location of system modules
```

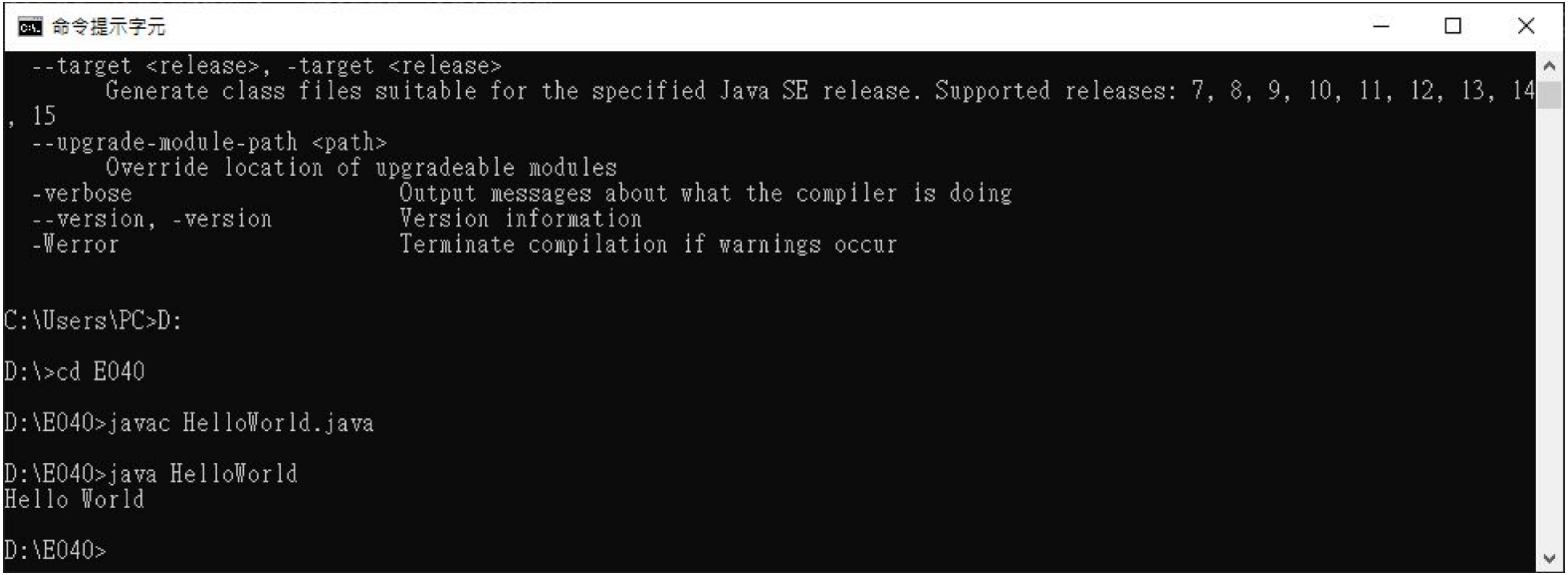


```
public class HelloWorld{

    public static void main(String []args){
        System.out.println("Hello World");
    }
}
```

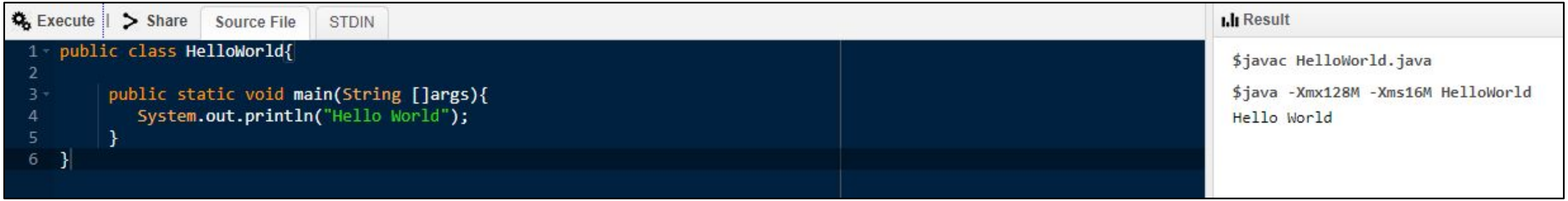
檔案名稱(N): HelloWorld.java

存檔類型(T): All types


管理
E040
檔案
常用
共用
檢視
圖片工具
本機 › 本機磁碟 (D:) › E040
搜尋 E040
快速存取
OneDrive
本機
3D 物件
下載
文件
音樂
桌面
圖片
影片
本機磁碟 (C:)
本機磁碟 (D:)
網路
HelloWorld.class
HelloWorld.java



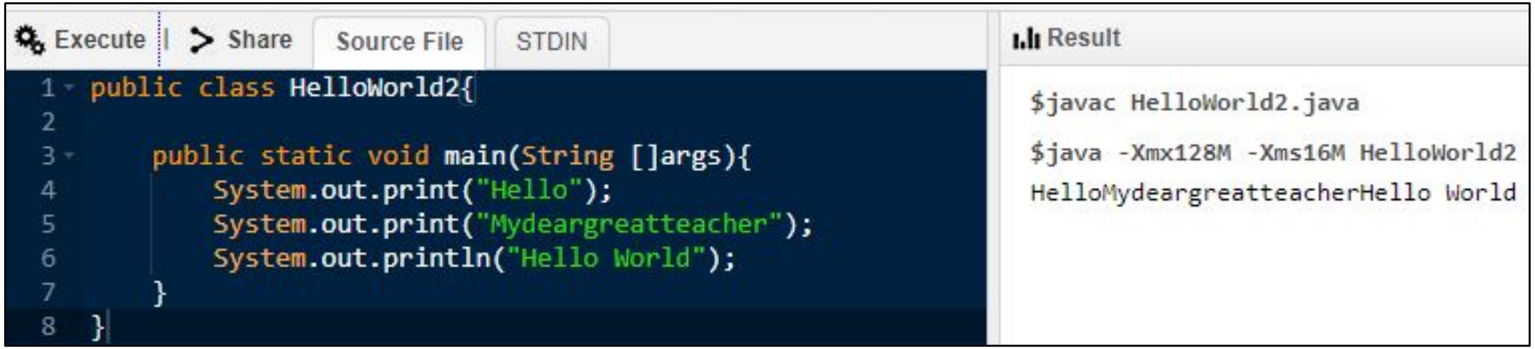
```
  --target <release>, -target <release>
        Generate class files suitable for the specified Java SE release. Supported releases: 7, 8, 9, 10, 11, 12, 13, 14
, 15
  --upgrade-module-path <path>
        Override location of upgradeable modules
  -verbose                     Output messages about what the compiler is doing
  --version, -version          Version information
  -Werror                      Terminate compilation if warnings occur


C:\Users\PC>D:

D:\>cd E040

D:\E040>javac HelloWorld.java

D:\E040>java HelloWorld
Hello World

D:\E040>
```



```java
public class HelloWorld{

    public static void main(String []args){
       System.out.println("Hello World");
    }
}
```

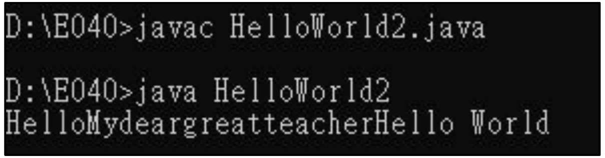
```
$javac HelloWorld.java

$java -Xmx128M -Xms16M HelloWorld
Hello World
```

# println()和print()有何差別?

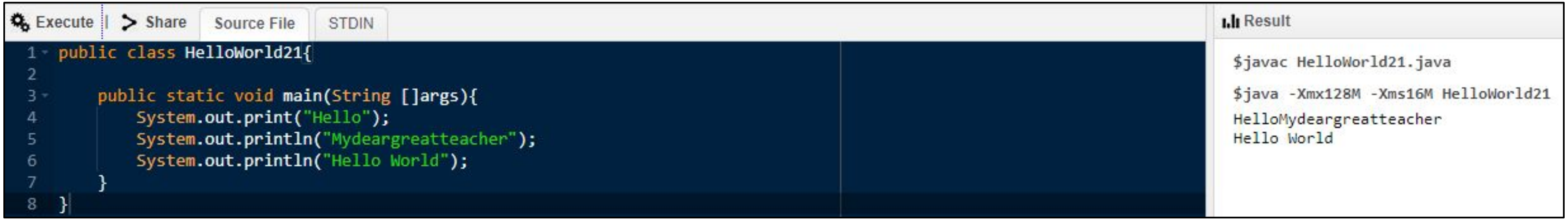


```java
public class HelloWorld2{

    public static void main(String []args){
        System.out.print("Hello");
        System.out.print("Mydeargreatteacher");
        System.out.println("Hello World");
    }
}
```

```
$javac HelloWorld2.java

$java -Xmx128M -Xms16M HelloWorld2
HelloMydeargreatteacherHello World
```

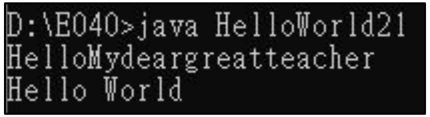


```
D:\E040>javac HelloWorld2.java

D:\E040>java HelloWorld2
HelloMydeargreatteacherHello World
```

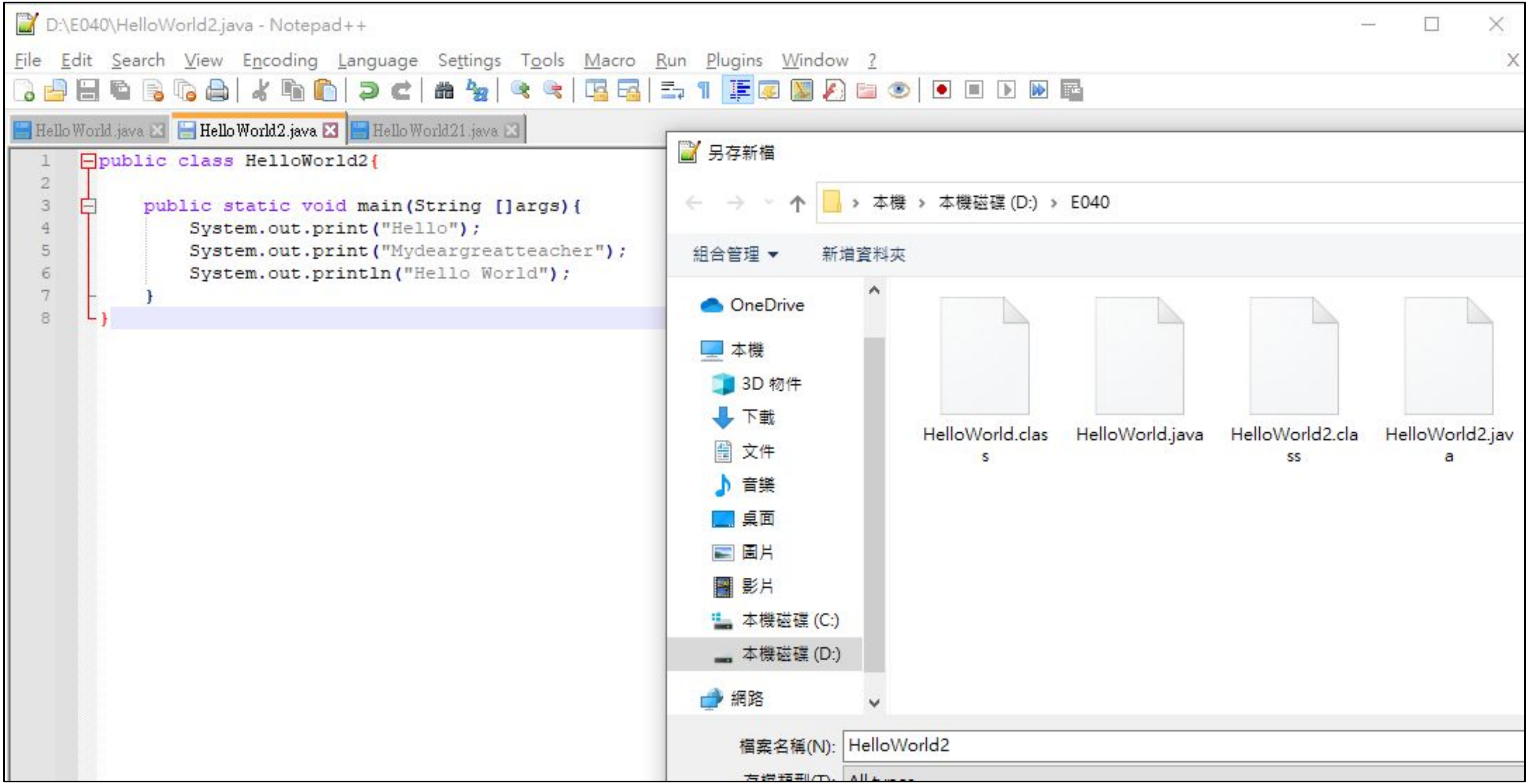


```java
public class HelloWorld21{

    public static void main(String []args){
        System.out.print("Hello");
        System.out.println("Mydeargreatteacher");
        System.out.println("Hello World");
    }
}
```

```
$javac HelloWorld21.java

$java -Xmx128M -Xms16M HelloWorld21
HelloMydeargreatteacher
Hello World
```



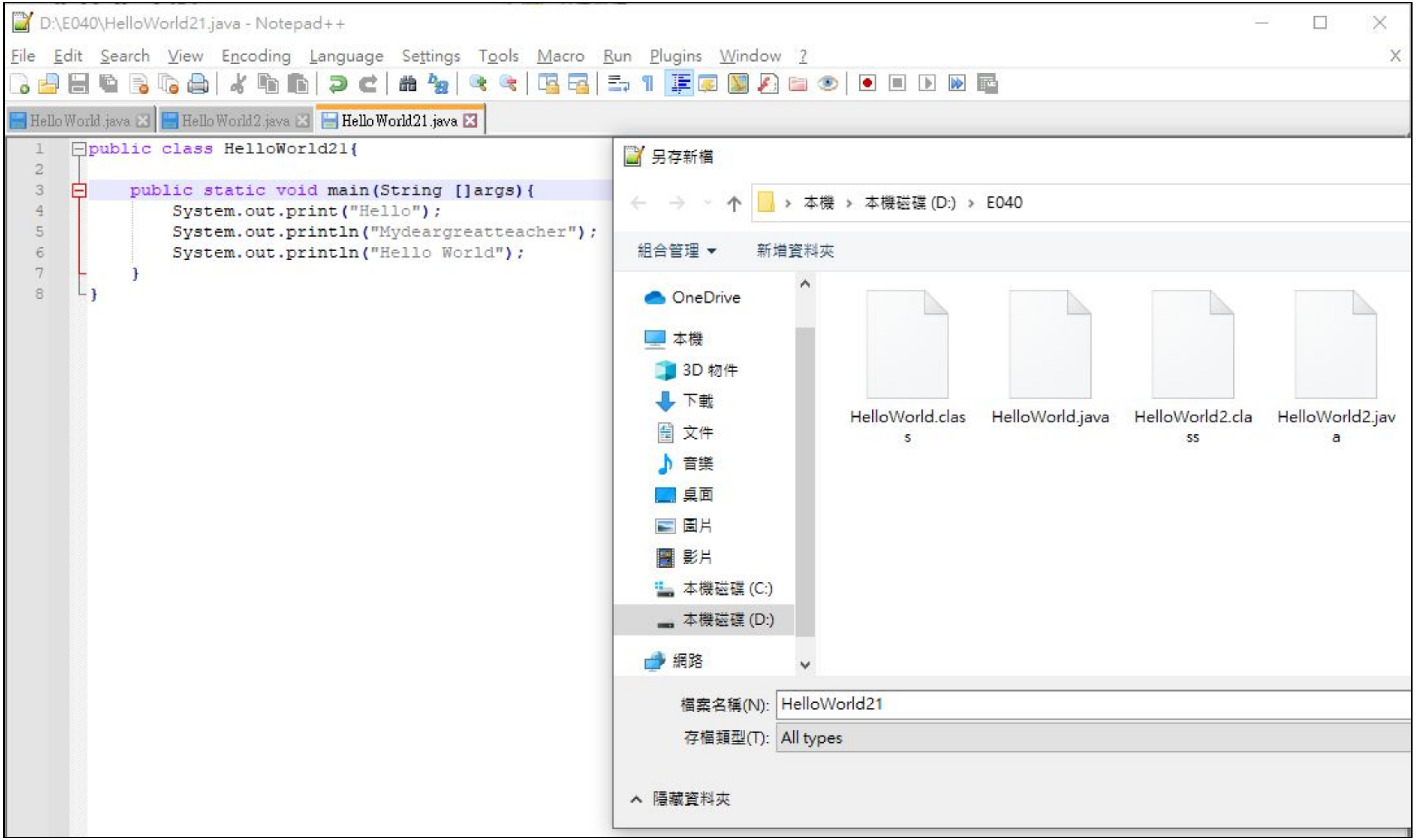
```
D:\E040>java HelloWorld21
HelloMydeargreatteacher
Hello World
```



```java
public class HelloWorld2{

    public static void main(String []args){
        System.out.print("Hello");
        System.out.print("Mydeargreatteacher");
        System.out.println("Hello World");
    }
}
```

檔案名稱(N): HelloWorld2

存檔類型(T): All types



D:\E040\HelloWorld21.java - Notepad++

```
public class HelloWorld21{

    public static void main(String []args){
        System.out.print("Hello");
        System.out.println("Mydeargreatteacher");
        System.out.println("Hello World");
    }
}
```

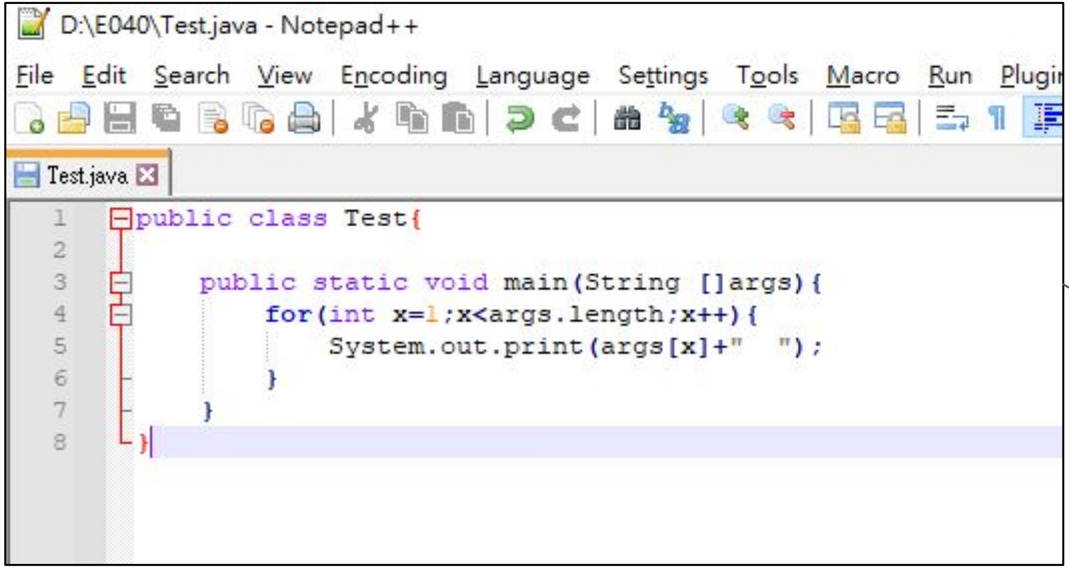
另存新檔

本機 › 本機磁碟 (D:) › E040

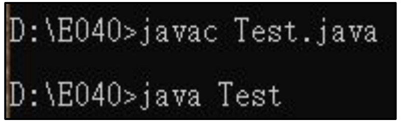
HelloWorld.class
HelloWorld.java
HelloWorld2.class
HelloWorld2.java

檔案名稱(N): HelloWorld21

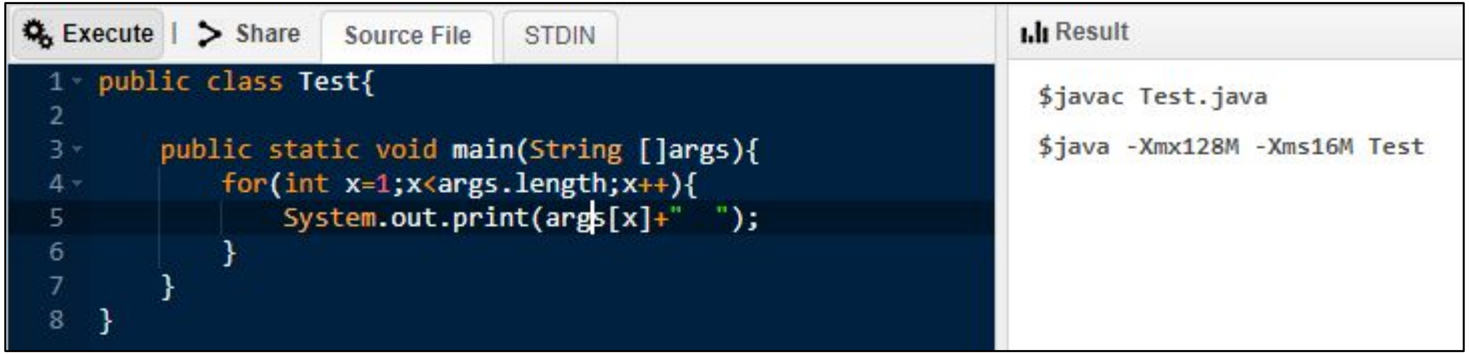
存檔類型(T): All types


D:\E040\Test.java - Notepad++
File Edit Search View Encoding Language Settings Tools Macro Run Plugi
Test.java

```java
public class Test{

    public static void main(String []args){
        for(int x=1;x<args.length;x++){
            System.out.print(args[x]+"   ");
        }
    }
}
```

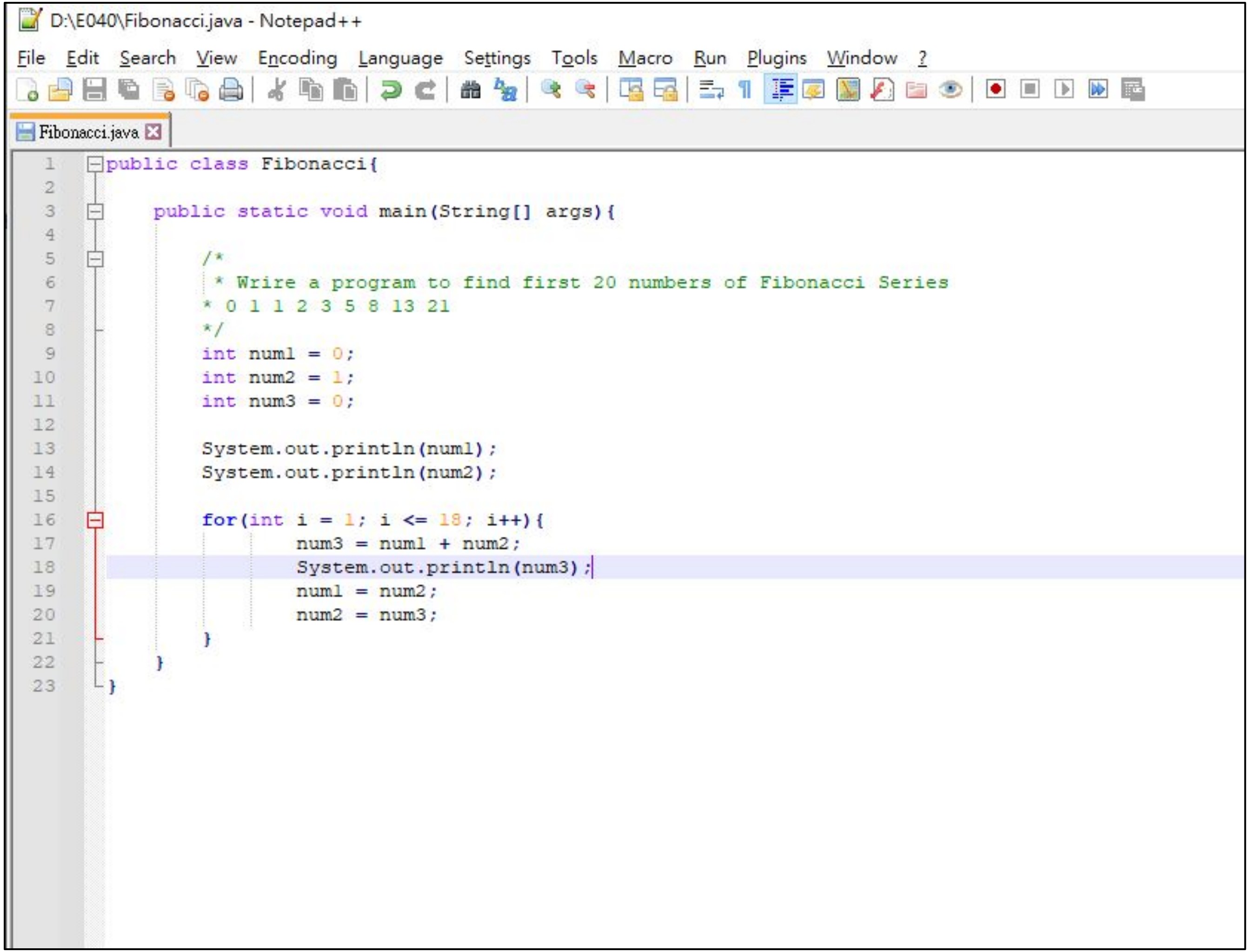


```
D:\E040>javac Test.java

D:\E040>java Test
```

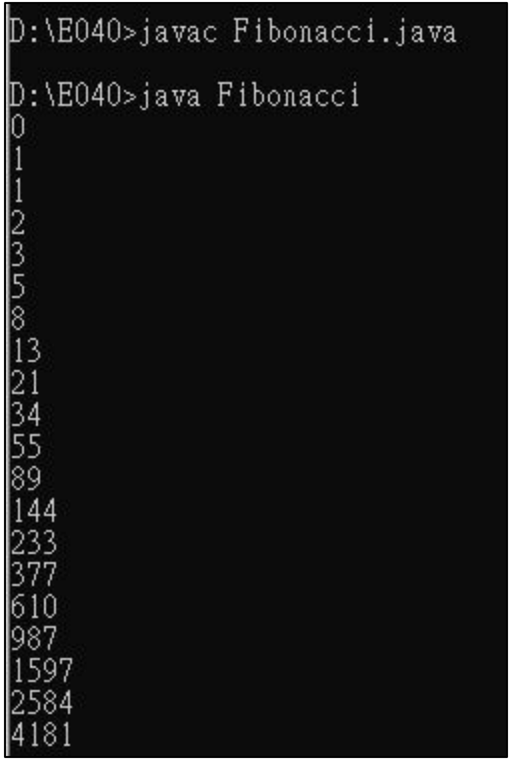


```java
public class Test{

    public static void main(String []args){
        for(int x=1;x<args.length;x++){
            System.out.print(args[x]+"   ");
        }
    }
}
```

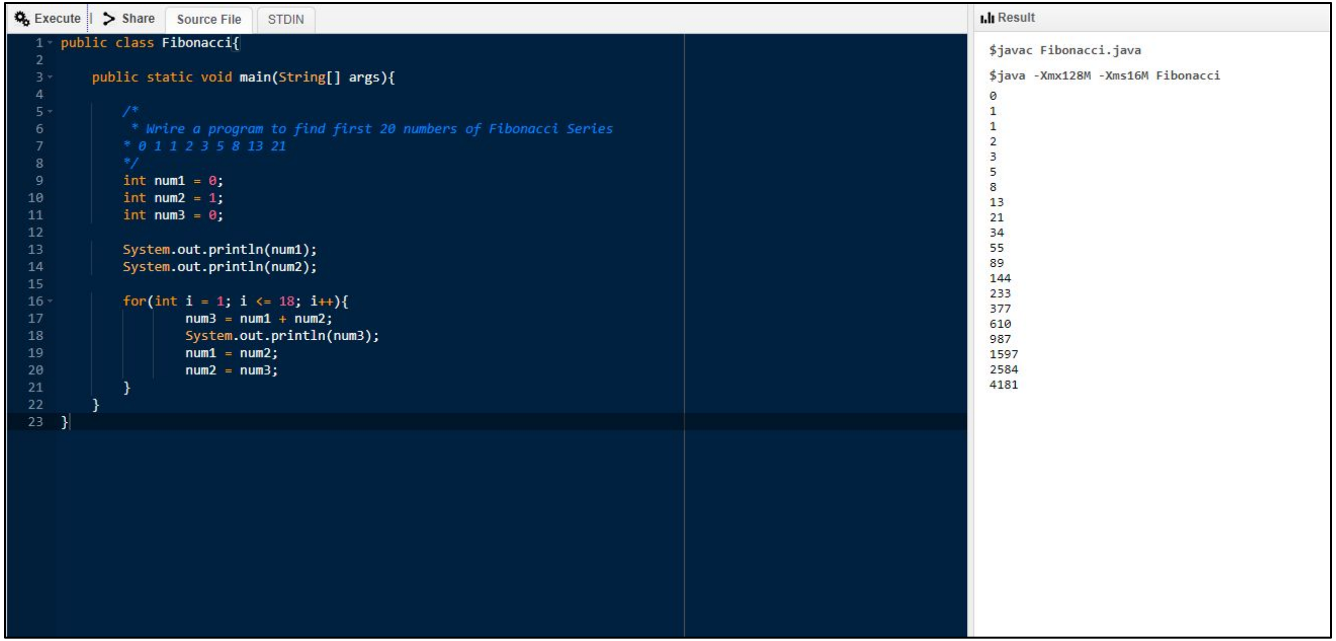
```
$javac Test.java

$java -Xmx128M -Xms16M Test
```



```java
public class Fibonacci{

    public static void main(String[] args){

        /*
         * Wrire a program to find first 20 numbers of Fibonacci Series
        * 0 1 1 2 3 5 8 13 21
        */
        int num1 = 0;
        int num2 = 1;
        int num3 = 0;

        System.out.println(num1);
        System.out.println(num2);

        for(int i = 1; i <= 18; i++){
                num3 = num1 + num2;
                System.out.println(num3);
                num1 = num2;
                num2 = num3;
        }
    }
}
```



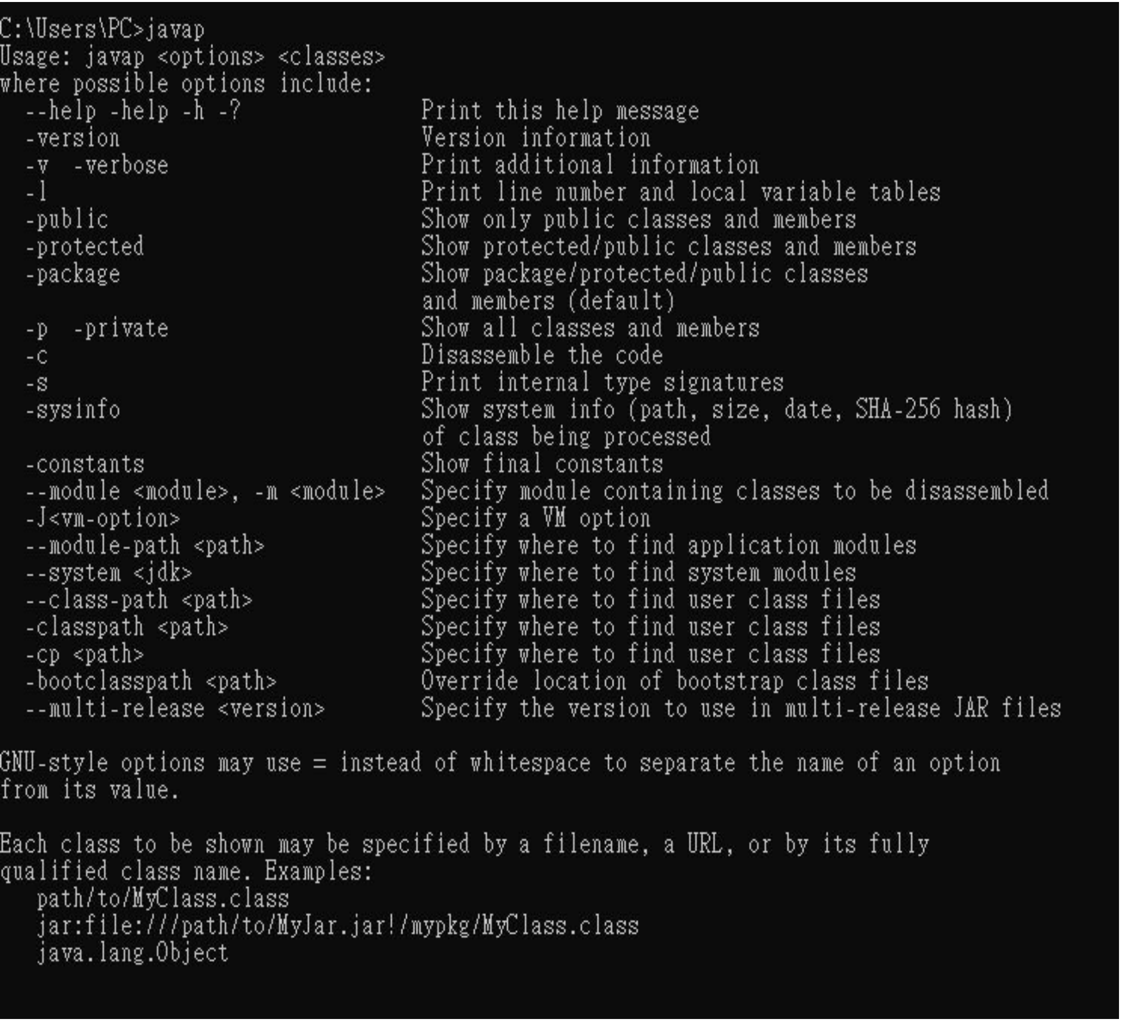
```
D:\E040>javac Fibonacci.java

D:\E040>java Fibonacci
0
1
1
2
3
5
8
13
21
34
55
89
144
233
377
610
987
1597
2584
4181
```



```java
public class Fibonacci{

    public static void main(String[] args){

        /*
         * Wrire a program to find first 20 numbers of Fibonacci Series
        * 0 1 1 2 3 5 8 13 21
        */
        int num1 = 0;
        int num2 = 1;
        int num3 = 0;

        System.out.println(num1);
        System.out.println(num2);

        for(int i = 1; i <= 18; i++){
                num3 = num1 + num2;
                System.out.println(num3);
                num1 = num2;
                num2 = num3;
        }
    }
}
```

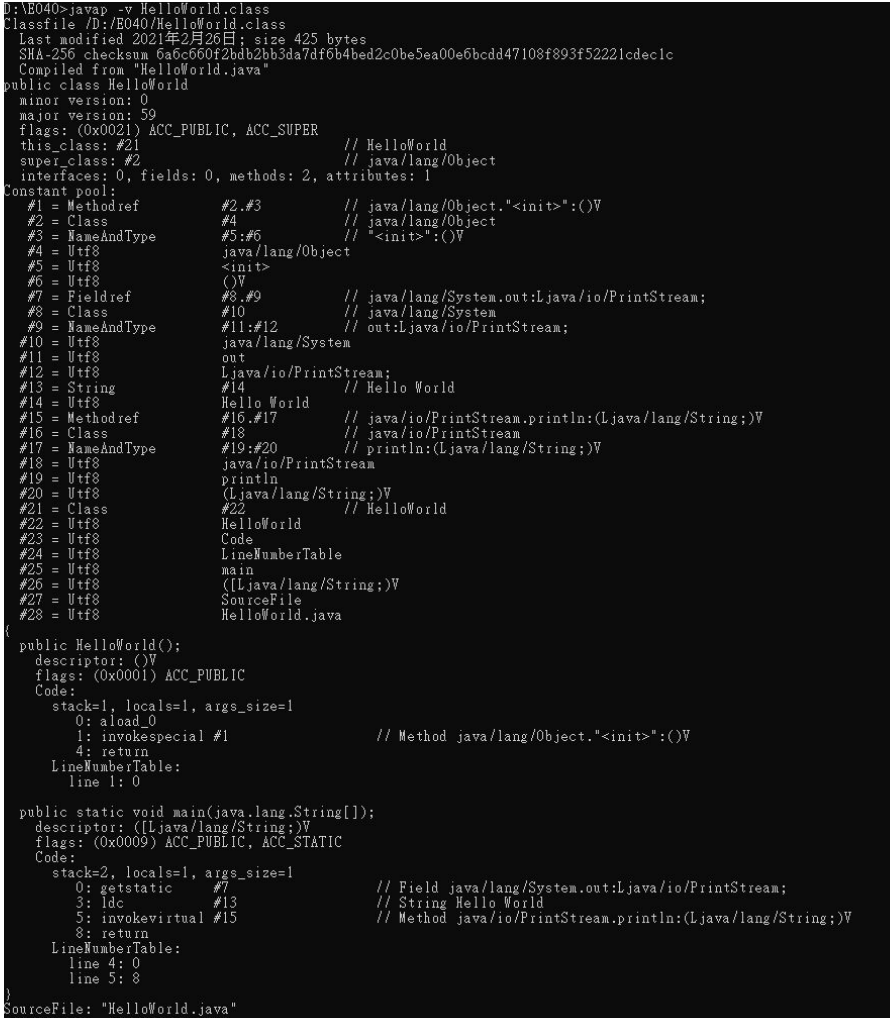
```
$javac Fibonacci.java

$java -Xmx128M -Xms16M Fibonacci
0
1
1
2
3
5
8
13
21
34
55
89
144
233
377
610
987
1597
2584
4181
```

# 反編譯



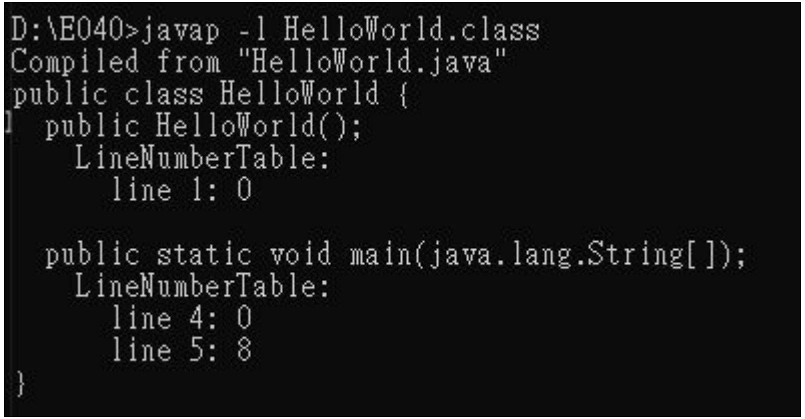
```
C:\Users\PC>javap
Usage: javap <options> <classes>
where possible options include:
  --help -help -h -?               Print this help message
  -version                         Version information
  -v  -verbose                     Print additional information
  -l                               Print line number and local variable tables
  -public                          Show only public classes and members
  -protected                       Show protected/public classes and members
  -package                         Show package/protected/public classes
                                   and members (default)
  -p  -private                     Show all classes and members
  -c                               Disassemble the code
  -s                               Print internal type signatures
  -sysinfo                         Show system info (path, size, date, SHA-256 hash)
                                   of class being processed
  -constants                       Show final constants
  --module <module>, -m <module>   Specify module containing classes to be disassembled
  -J<vm-option>                    Specify a VM option
  --module-path <path>             Specify where to find application modules
  --system <jdk>                   Specify where to find system modules
  --class-path <path>              Specify where to find user class files
  -classpath <path>                Specify where to find user class files
  -cp <path>                       Specify where to find user class files
  -bootclasspath <path>            Override location of bootstrap class files
  --multi-release <version>        Specify the version to use in multi-release JAR files

GNU-style options may use = instead of whitespace to separate the name of an option
from its value.

Each class to be shown may be specified by a filename, a URL, or by its fully
qualified class name. Examples:
   path/to/MyClass.class
   jar:file:///path/to/MyJar.jar!/mypkg/MyClass.class
   java.lang.Object
```

**javap -v**
**不僅會輸出行號、**
**本地變亮表信息、**
**反編譯匯編代碼,**
**還會輸出當前用到的常量池等信息**



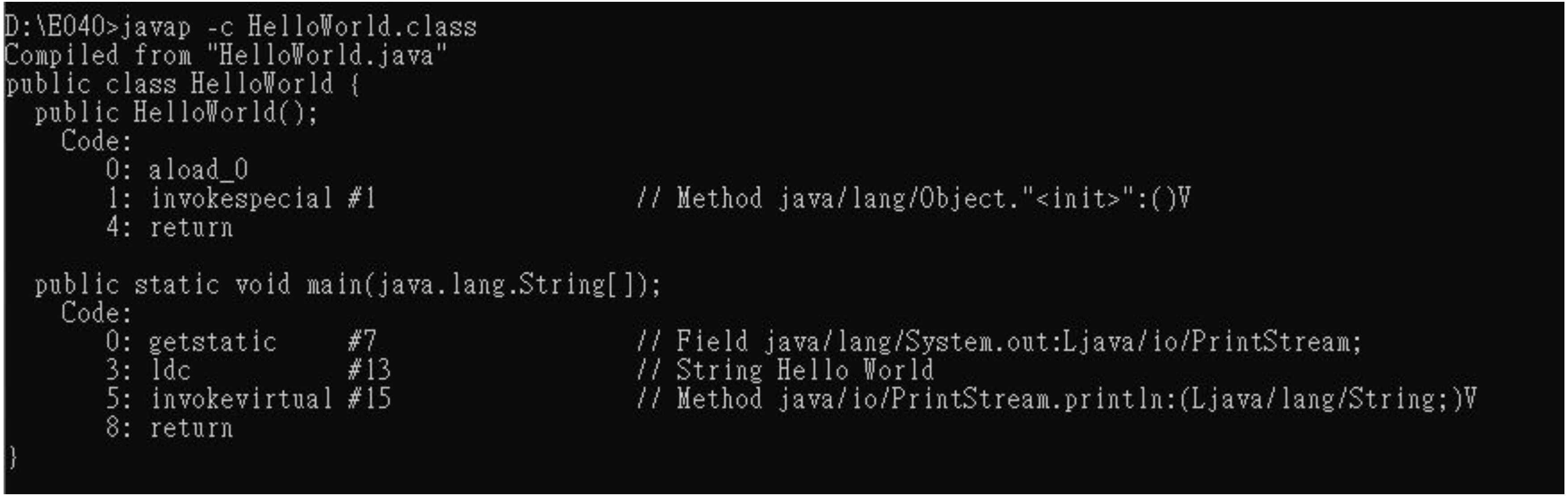
```
D:\E040>javap -v HelloWorld.class
Classfile /D:/E040/HelloWorld.class
  Last modified 2021年2月26日; size 425 bytes
  SHA-256 checksum 6a6c660f2bdb2bb3da7df6b4bed2c0be5ea00e6bcdd47108f893f52221cdec1c
  Compiled from "HelloWorld.java"
public class HelloWorld
  minor version: 0
  major version: 59
  flags: (0x0021) ACC_PUBLIC, ACC_SUPER
  this_class: #21                         // HelloWorld
  super_class: #2                         // java/lang/Object
  interfaces: 0, fields: 0, methods: 2, attributes: 1
Constant pool:
   #1 = Methodref          #2.#3          // java/lang/Object."<init>":()V
   #2 = Class              #4             // java/lang/Object
   #3 = NameAndType        #5:#6          // "<init>":()V
   #4 = Utf8               java/lang/Object
   #5 = Utf8               <init>
   #6 = Utf8               ()V
   #7 = Fieldref           #8.#9          // java/lang/System.out:Ljava/io/PrintStream;
   #8 = Class              #10            // java/lang/System
   #9 = NameAndType        #11:#12        // out:Ljava/io/PrintStream;
  #10 = Utf8               java/lang/System
  #11 = Utf8               out
  #12 = Utf8               Ljava/io/PrintStream;
  #13 = String             #14            // Hello World
  #14 = Utf8               Hello World
  #15 = Methodref          #16.#17        // java/io/PrintStream.println:(Ljava/lang/String;)V
  #16 = Class              #18            // java/io/PrintStream
  #17 = NameAndType        #19:#20        // println:(Ljava/lang/String;)V
  #18 = Utf8               java/io/PrintStream
  #19 = Utf8               println
  #20 = Utf8               (Ljava/lang/String;)V
  #21 = Class              #22            // HelloWorld
  #22 = Utf8               HelloWorld
  #23 = Utf8               Code
  #24 = Utf8               LineNumberTable
  #25 = Utf8               main
  #26 = Utf8               ([Ljava/lang/String;)V
  #27 = Utf8               SourceFile
  #28 = Utf8               HelloWorld.java
{
  public HelloWorld();
    descriptor: ()V
    flags: (0x0001) ACC_PUBLIC
    Code:
      stack=1, locals=1, args_size=1
         0: aload_0
         1: invokespecial #1                  // Method java/lang/Object."<init>":()V
         4: return
      LineNumberTable:
        line 1: 0

  public static void main(java.lang.String[]);
    descriptor: ([Ljava/lang/String;)V
    flags: (0x0009) ACC_PUBLIC, ACC_STATIC
    Code:
      stack=2, locals=1, args_size=1
         0: getstatic     #7                  // Field java/lang/System.out:Ljava/io/PrintStream;
         3: ldc           #13                 // String Hello World
         5: invokevirtual #15                 // Method java/io/PrintStream.println:(Ljava/lang/String;)V
         8: return
      LineNumberTable:
        line 4: 0
        line 5: 8
}
SourceFile: "HelloWorld.java"
```

## javap -l
## 會輸出行號和本地變量表信息

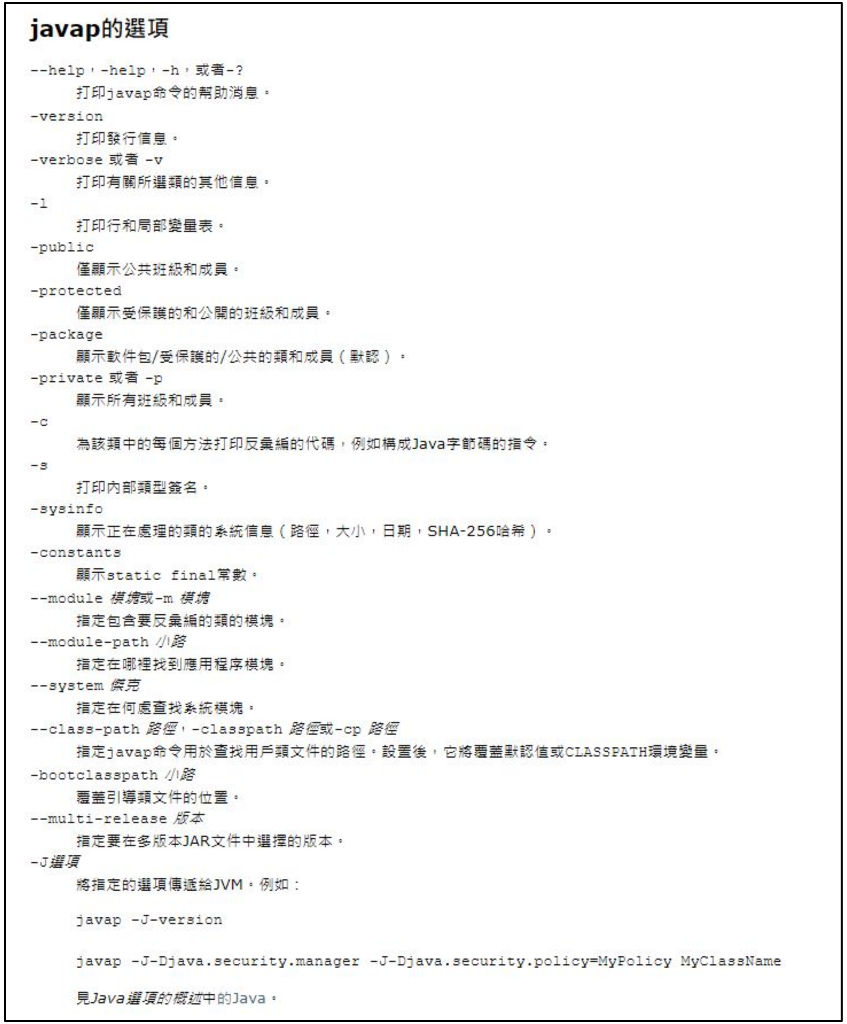


```
D:\E040>javap -l HelloWorld.class
Compiled from "HelloWorld.java"
public class HelloWorld {
  public HelloWorld();
    LineNumberTable:
      line 1: 0

  public static void main(java.lang.String[]);
    LineNumberTable:
      line 4: 0
      line 5: 8
}
```

## javap -c
## 會對當前class字結碼進行反編譯生成匯編代碼



```
D:\E040>javap -c HelloWorld.class
Compiled from "HelloWorld.java"
public class HelloWorld {
  public HelloWorld();
    Code:
       0: aload_0
       1: invokespecial #1                  // Method java/lang/Object."<init>":()V
       4: return

  public static void main(java.lang.String[]);
    Code:
       0: getstatic     #7                  // Field java/lang/System.out:Ljava/io/PrintStream;
       3: ldc           #13                 // String Hello World
       5: invokevirtual #15                 // Method java/io/PrintStream.println:(Ljava/lang/String;)V
       8: return
}
```



## javap的選項

--help，-help，-h，或者-?

打印javap命令的幫助消息。

-version

打印發行信息。

-verbose 或者 -v

打印有關所選類的其他信息。

-l

打印行和局部變量表。

-public

僅顯示公共班級和成員。

-protected

僅顯示受保護的和公開的班級和成員。

-package

顯示軟件包/受保護的/公共的類和成員（默認）。

-private 或者 -p

顯示所有班級和成員。

-c

為該類中的每個方法打印反彙編的代碼，例如構成Java字節碼的指令。

-s

打印內部類型簽名。

-sysinfo

顯示正在處理的類的系統信息（路徑，大小，日期，SHA-256哈希）。

-constants

顯示static final常數。

--module *模塊*或-m *模塊*

指定包含要反彙編的類的模塊。

--module-path *小路*

指定在哪裡找到應用程序模塊。

--system *傑克*

指定在何處查找系統模塊。

--class-path *路徑*，-classpath *路徑*或-cp *路徑*

指定javap命令用於查找用戶類文件的路徑。設置後，它將覆蓋默認值或CLASSPATH環境變量。

-bootclasspath *小路*

覆蓋引導類文件的位置。

--multi-release *版本*

指定要在多版本JAR文件中選擇的版本。

-J*選項*

將指定的選項傳遞給JVM。例如：

```
javap -J-version

javap -J-Djava.security.manager -J-Djava.security.policy=MyPolicy MyClassName
```

見*Java選項的概述*中的Java。

https://docs.oracle.com/en/java/javase/15/docs/specs/man/javap.html#javap-example