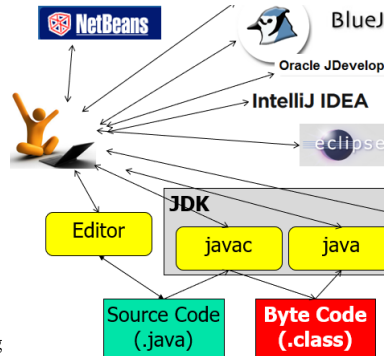
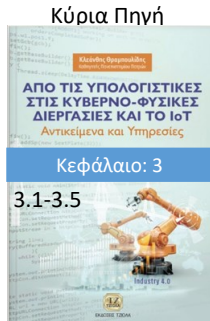


Αντικειμενοστρεφής Προγραμματισμός (Object-Oriented Programming)

(CEID_NNY106)

Java Technology Introduction

Java
High-level programming
language



Java is a high-level, class-based, object-oriented programming language that is designed to have as few implementation dependencies as possible.
[Wikipedia](#)

Designed by: James Gosling

First appeared: May 23, 1995; 27 years ago

Paradigm: Multi-paradigm: generic, object-oriented (class-based), functional, imperative, reflective, concurrent

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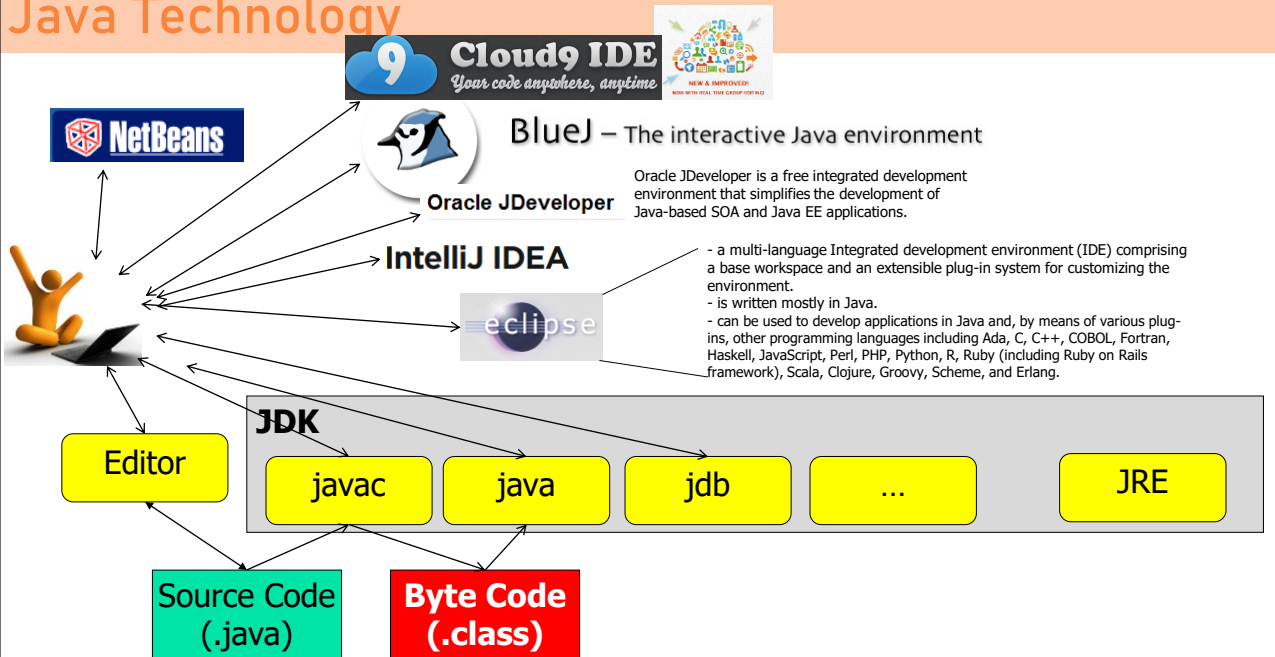
Οργάνωση Διάλεξης

- **Java Technology**
- Απλά Προγράμματα σε Java
 - Hello World!
 - Echo
- Java Development Kit (JDK)
 - Java Virtual Machine (JVM)
 - javac
 - java
 - javadoc
 - jar
 - jdb

Java Technology

- Με τον όρο τεχνολογία Java αναφερόμαστε:
 - στη γλώσσα προγραμματισμού, και
 - στην πλατφόρμα λογισμικού που είναι η υποδομή για ανάπτυξη προγραμμάτων με χρήση της γλώσσας.
- Java Development Kit (**JDK**)
 - **Javac**: Ο μεταγλωττιστής (compiler) της Java
 - **Java**: Ο διερμηνευτής (interpreter) της Java
 - Java Runtime Environment (**JRE**): Java Virtual Machine (JVM) + class libraries

Java Technology



Οργάνωση Διάλεξης

- Java Technology
- **Απλά Προγράμματα σε Java**
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Hello World σε Java

```

/*****
* File name : HelloWorld.java
* Compile with javac:      javac HelloWorld.java
* Execute with java:      java HelloWorld
*
* Developer's Comments
* The HelloWorld class implements an application that simply
* displays "Hello World!" to the standard output.
*****/

```

```

public class HelloWorld {

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

}

```

Δραστηριότητα 3.2 Το πρόγραμμα HelloWorld

Αναπτύξτε ένα πρόγραμμα σε Java που θα τυπώνει στην οθόνη τη φράση «Hello World!».

Echo example program

The screenshot shows an IDE window titled "Echo - Echo" with a menu bar (Project, Edit, Tools, View, Help) and a toolbar (Compile, Undo, Cut, Copy, Paste, Find..., Close). The main editor displays the following Java code:

```

1 /**
2  * Write a description of class Echo here.
3  *
4  * @author (Kleanthis Thramboulidis)
5  * @version (17Feb2023-V1.0)
6  */
7 import java.util.Scanner;
8
9 public class Echo
10 {
11     public static void main(String[] args){
12         var sc = new Scanner(System.in);
13         String message;
14
15         System.out.println("Echo running - write \"bye\" to exit");
16         while(true){
17             message = sc.nextLine();
18             System.out.println(message);
19             if(message.equals("bye") )
20                 break;
21         }
22         sc.close();
23     }
24 }

```

Below the code, a terminal window titled "BlueJ: Terminal Window - Echo" shows the program's execution output:

```

Options
Echo running - write "bye" to exit
hello
hello
there
there
bye
bye

```

At the bottom of the IDE, the status bar displays: © 2023 Κλεάνθης Θραμπουλίδης, Java Technology - Εισαγωγή, and Διαφάνεια 7.

Οργάνωση Διάλεξης


- Java Technology
- Απλά Προγράμματα σε Java
 - Hello World!
 - Echo
- **Java Development Kit (JDK)**
 - **Java Virtual Machine (JVM)**
 - javac
 - java
 - javadoc
 - jar
 - jdb

Java Development Kit (JDK)

The Java Development Kit (**JDK**) is a distribution of [Java Technology](#) by [Oracle Corporation](#). It implements the Java Language Specification (**JLS**) and the Java Virtual Machine Specification (**JVMS**) and provides the Standard Edition (**SE**) of the Java Application Programming Interface (**API**). It is derivative of the community driven [OpenJDK](#) which Oracle stewards.^[5] It provides software for working with Java applications. Examples of included software are the virtual machine, a compiler, performance monitoring tools, a debugger, and other utilities that Oracle considers useful for a Java programmer.

Oracle have released the current version of the software under the Oracle No-Fee Terms and Conditions (**NFTC**) license. Oracle release binaries for the x86-64 architecture for Windows, macOS, and Linux based operating systems, and for the aarch64 architecture for macOS and Linux. Previous versions have supported the [Oracle Solaris](#) operating system and [SPARC](#) architecture.

Java Development Kit

Developer(s)	Oracle Corporation
Stable release	18.0.2.1 / 18 August 2022; 5 months ago ^[1]
Written in	Java, C++, C, Assembly ^[2]
Operating system	Windows, macOS, Linux
Platform	aarch64, x86-64
License	Oracle No-Fee Terms and Conditions (NFTC) ^[3] with third party components ^[4]
Website	oracle.com/java/technologies/ 

Πηγή: Wikipedia

Java Development Kit (JDK)

The Java Virtual Machine (JVM): The Platform That Powers The World

+ [Comment Now](#) + [Follow Comments](#)

Wikipedia: A Java virtual machine is a program which executes certain other programs, namely those containing Java bytecode instructions..... JVM's are most often implemented to run on an existing [operating system](#), but can also be implemented to run directly on hardware. A JVM provides a [run-time environment](#) in which [Java bytecode](#) can be executed. A JVM is distributed along with [Java Class Library](#), a set of [standard class libraries](#) (in [Java bytecode](#)) that implement the Java [Application programming interface \(API\)](#). These libraries, bundled together with the JVM, form the [Java Runtime Environment \(JRE\)](#).

Source: Forbes

JDK Tools

Windows (C:) > Program Files > Java > jdk-17.0.1 > bin

Name	Date modified	Type	Size
jar	20-Oct-21 11:31 AM	Application	20 KB
jarsigner	20-Oct-21 11:31 AM	Application	20 KB
java.dll	20-Oct-21 11:31 AM	Application extens...	141 KB
java	20-Oct-21 11:31 AM	Application	50 KB
javaaccessbridge.dll	20-Oct-21 11:31 AM	Application extens...	279 KB
javac	20-Oct-21 11:31 AM	Application	20 KB
javadoc	20-Oct-21 11:31 AM	Application	20 KB
javajpeg.dll	20-Oct-21 11:31 AM	Application extens...	172 KB
javap	20-Oct-21 11:31 AM	Application	20 KB
javaw	20-Oct-21 11:31 AM	Application	50 KB
jawt.dll	20-Oct-21 11:31 AM	Application extens...	18 KB
jcmd	20-Oct-21 11:31 AM	Application	20 KB
jconsole	20-Oct-21 11:31 AM	Application	20 KB
jdb	20-Oct-21 11:31 AM	Application	20 KB

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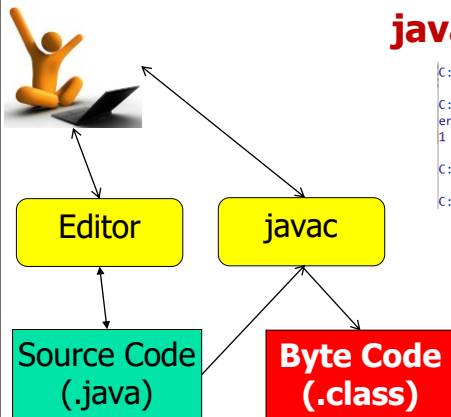
Δραστηριότητα 3.1 Εγκατάσταση του JDK.

Κατεβάστε1 και εγκαταστήστε στον υπολογιστή σας το Java Development Kit (JDK).

javac

The Java programming language compiler

- The **javac** tool reads class and interface definitions, written in the Java programming language, and compiles them into bytecode class files.



javac HelloWorld.java

```

C:\Users\thram>cd C:\Code\courses\00P22-23\BlueJ-Code\HelloWorld
C:\Code\courses\00P22-23\BlueJ-Code\HelloWorld>javac HelloWorld
error: Class names, 'HelloWorld', are only accepted if annotation processing is explicitly requested
1 error
C:\Code\courses\00P22-23\BlueJ-Code\HelloWorld>javac HelloWorld.java
C:\Code\courses\00P22-23\BlueJ-Code\HelloWorld>
  
```

- Source code file names must have .java suffixes,
- class file names must have .class suffixes, and both source and class files must have root names that identify the class.
- For example**, a class called MyClass would be written in a source file called MyClass.java and compiled into a bytecode class file called MyClass.class.

Javac

javac [options] [sourcefiles] [classes] [@argfiles]

Arguments may be in any order.

- *options*: Command-line options.
- *sourcefiles*: One or more source files to be compiled (such as MyClass.java).
- *classes*: One or more classes to be processed for annotations (such as MyPackage.MyClass).
- *@argfiles*: One or more files that lists options and source files. The -J options are not allowed in these files.

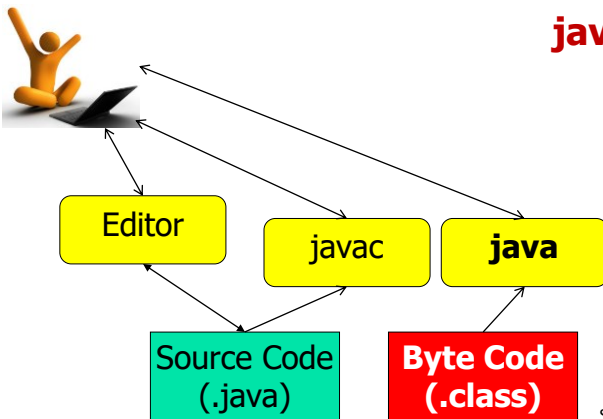
The **javac** tool reads class and interface definitions, written in the Java programming language, and compiles them into bytecode class files. (...)

Source: <https://docs.oracle.com/javase/7/docs/technotes/tools/windows/javac.html>

Java

The **Java application launcher**

- The **java** tool launches a Java application.
- It does this by starting a Java runtime environment, loading a specified class, and invoking that class's **main** method.



- The method declaration must look like the following:
public static void main(String args[])
 - The method must be declared public and static, it must not return any value, and it must accept a String array as a parameter.

Source: <https://docs.oracle.com/javase/7/docs/technotes/tools/windows/java.html>

Java

```
java [ options ] class [ arguments ]
java [ options ] -jar file.jar [ arguments ]
javaw [ options ] class [ arguments ]
javaw [ options ] -jar file.jar [ arguments ]
```

- options
 - Command-line options.
- class
 - Name of the class to be invoked.
- file.jar
 - Name of the jar file to be invoked. Used only with `-jar`.
- argument
 - Argument passed to the **main** function.
 - By default, the first argument without an option is the name of the class to be called.

Source: <https://docs.oracle.com/javase/7/docs/technotes/tools/windows/java.html>

Java HelloWorld

```
C:\Code\courses\OOP22-23\BlueJ-Code\HelloWorld>javac HelloWorld.java
```

```
C:\Code\courses\OOP22-23\BlueJ-Code\HelloWorld>dir
Volume in drive C is Windows
Volume Serial Number is 5809-5A2A
```

```
Directory of C:\Code\courses\OOP22-23\BlueJ-Code\HelloWorld
```

```
16-Feb-23 06:17 PM <DIR> .
16-Feb-23 06:17 PM <DIR> ..
17-Feb-23 09:37 AM 531 HelloWorld.class
16-Feb-23 11:56 AM 292 HelloWorld.ctxt
16-Feb-23 11:56 AM 286 HelloWorld.java
16-Feb-23 12:09 PM 732 package.bluej
16-Feb-23 11:41 AM 480 README.TXT
                    5 File(s)      2,321 bytes
                    2 Dir(s)    29,121,687,552 bytes free
```

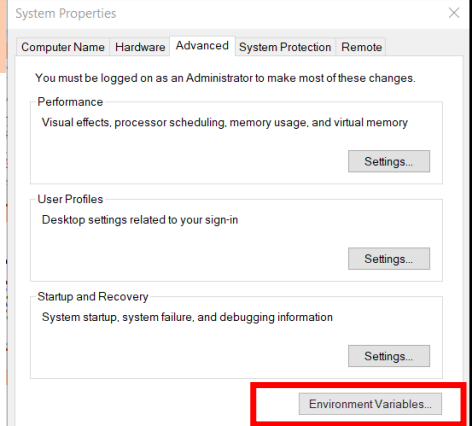
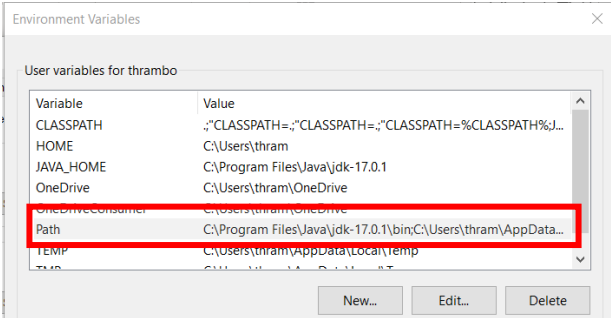


```
C:\Code\courses\OOP22-23\BlueJ-Code\HelloWorld>java HelloWorld
Hello World!
```


Set path

■ Windows

- in the Environment Variables window (as shown below), highlight the **Path** variable in the Systems Variable section and click the **Edit** button. Add or modify the path lines with the paths you wish the computer to access.



- Windows command prompt
path

set path=%PATH%;c:\bin;

Javadoc

The **Java API Documentation Generator**

- Generates HTML pages of API documentation from Java source files.
- The **Javadoc**TM tool parses the declarations and documentation comments in a set of Java source files and produces a corresponding set of HTML pages describing (by default) the public and protected classes, nested classes (but not anonymous inner classes), interfaces, constructors, methods, and fields.
- You can use it to generate the API (Application Programming Interface) documentation or the implementation documentation for a set of source files.

```
javadoc [ options ] [ packagenames ] [ sourcefilenames ] [ -subpackages pkg1:pkg2:... ] [ @argfiles ]
```

Source: <https://docs.oracle.com/javase/7/docs/technotes/tools/windows/javadoc.html>

Javadoc for HelloWorld

javdoc -d doc HelloWorld.java

```
C:\Code\courses\OOP22-23\BlueJ-Code\HelloWorld>javdoc -d doc HelloWorld.java
Loading source file HelloWorld.java...
Constructing Javadoc information...
Creating destination directory: "doc\"
Building index for all the packages and classes...
Standard Doclet version 17.0.14-LTS-39
Building tree for all the packages and classes...
Generating doc\HelloWorld.html...
HelloWorld.java:12: warning: no comment
    public static void main(String [] args){
                       ^
Generating doc\package-summary.html...
Generating doc\package-tree.html...
Generating doc\overview-tree.html...
Building index for all classes...
Generating doc\allclasses-index.html...
Generating doc\allpackages-index.html...
Generating doc\index-all.html...
Generating doc\index.html...
Generating doc\help-doc.html...
1 warning
```

Name	Date modified	Type	Size
doc	17-Feb-23 12:15 PM	File folder	
HelloWorld.class	17-Feb-23 9:37 AM	CLASS File	
HelloWorld.txt	16-Feb-23 11:56 AM	CTXT File	1 KB
HelloWorld	16-Feb-23 11:56 AM	JAVA File	1 KB
package	16-Feb-23 12:09 PM	BlueJ Project File	1 KB
README	16-Feb-23 11:41 AM	Text Document	1 KB

jar

The Java Archive Tool

Combines multiple files into a single JAR archive file.

- jar is a **general-purpose archiving and compression tool**, based on ZIP and the ZLIB compression format.
- However, **jar** was designed mainly to facilitate the packaging of java applets or applications into a single archive.

Create jar file

```
jar cv0Mjf jarfile [-C dir] inputfiles [-Joption]
```

Typical usage to combine files into a jar file is:

```
C:\Java> jar cf myFile.jar *.class
```

Source: <https://docs.oracle.com/javase/7/docs/technotes/tools/windows/jar.html>

jdb

The **Java Debugger**

- **jdb** helps you find and fix bugs in Java language programs.
- is a simple command-line debugger for Java classes.

- **jdb** [options] [class] [arguments]
- options
 - [Command-line options.](#)
- class
 - Name of the class to begin debugging.
- arguments
 - Arguments passed to the main() method of class.