



JDK, JRE va JVM.  
Dasturlash muhitini tayyorlash.

O'qituvchi: Sofoyeva Fotima

# Mavzular:

1. Java Platformasi | JRE, JSL, JDT
2. Java compiler | Bytecode
3. JRE tarkibi | Java API, Class Loader, Bytecode Verifier, JVM
4. JVM qanday ishlaydi?
5. JDK ni o'rnatish.
6. Birinchi java kod: "hello world".
7. IntelliJ IDEA ni o'rnatish.

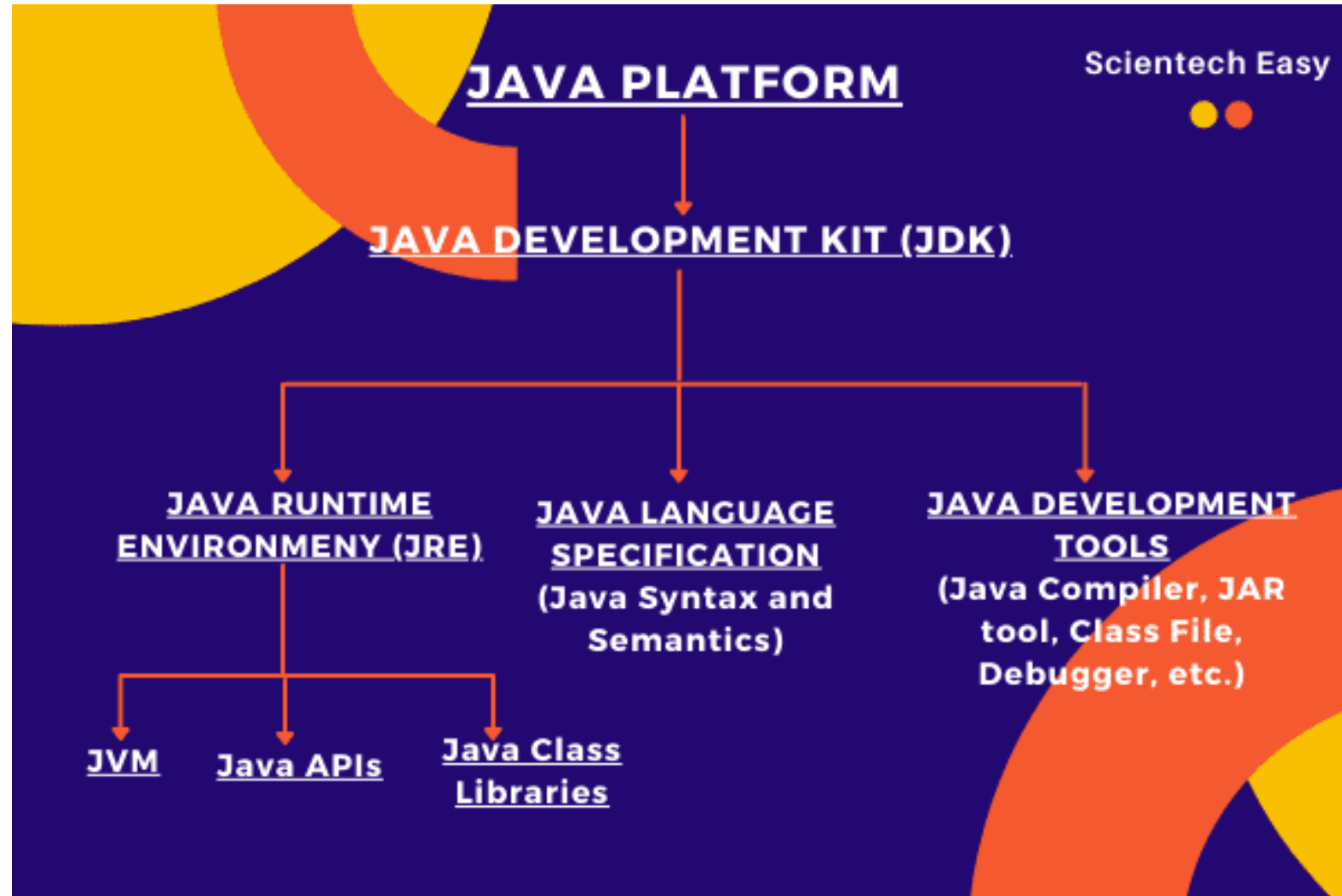
# The Java Programming Language Platforms

- **Java Platform, Standard Edition (Java SE)** - Java SE is the foundational edition of the Java platform. It provides the core libraries, APIs, and runtime environment for developing general-purpose Java applications.
- **Java Platform, Enterprise Edition (Java2EE/Java EE/Jakarta EE)** - Java EE, now known as Jakarta EE (since the Eclipse Foundation took over the project), is designed for developing large-scale, enterprise-level applications.
- **Java Platform, Micro Edition (Java ME)** - Java ME is a platform intended for developing applications for resource-constrained devices, such as mobile phones, embedded systems, and Internet of Things (IoT) devices.

# Types of applications that can be built using Java

- **Desktop Applications**
- **Web Applications**
- **Enterprise Applications**
- **Mobile Applications**
- **Embedded Systems and IoT**
- **Game Development**
- ...

**Java Platform** - is the environment for developing and managing Java applets and applications.



# Java versiyalari

- <https://www.codejava.net/java-se/java-se-versions-history> java versiyalari haqida maqola.
- <https://www.oracle.com/java/technologies/javase/jdk-relnotes-index.html> rasmiy java versiyalari qaydlari.

gy over the years. The following table summarizes all versions of Java SE from its early days to the latest.

Java SE Version	Version Number	Release Date
JDK 1.0 (Oak)	1.0	January 1996
JDK 1.1	1.1	February 1997
J2SE 1.2 (Playground)	1.2	December 1998
J2SE 1.3 (Kestrel)	1.3	May 2000
J2SE 1.4 (Merlin)	1.4	February 2002
J2SE 5.0 (Tiger)	1.5	September 2004
Java SE 6 (Mustang)	1.6	December 2006
Java SE 7 (Dolphin)	1.7	July 2011

Java SE 8	1.8	March 2014
Java SE 9	9	September, 21st 2017
Java SE 10	10	March, 20th 2018
Java SE 11	11	September, 25th 2018
Java SE 12	12	March, 19th 2019
Java SE 13	13	September, 17th 2019
Java SE 14	14	March, 17th 2020
Java SE 15	15	September, 15th 2020
Java SE 16	16	March, 16th 2021
Java SE 17	17	September, 14th 2021
Java SE 18	18	March, 22nd 2022
Java SE 19	19	September, 20th 2022
Java SE 20	20	March, 21st 2023
Java SE 21	21	September, 19th 2023

# JDK

java, javac, jdb, appletviewer, javah, javaw  
jar, rmi.....

## JRE

Class Loader, Byte Code Verifier  
Java API, Runtime Libraries

## JVM

Java Interpreter  
JIT  
Garbage Collector  
Thread Sync.....

# Java Development Kit (JDK) - it is used to write java programs by programmers.

Components of JDK:

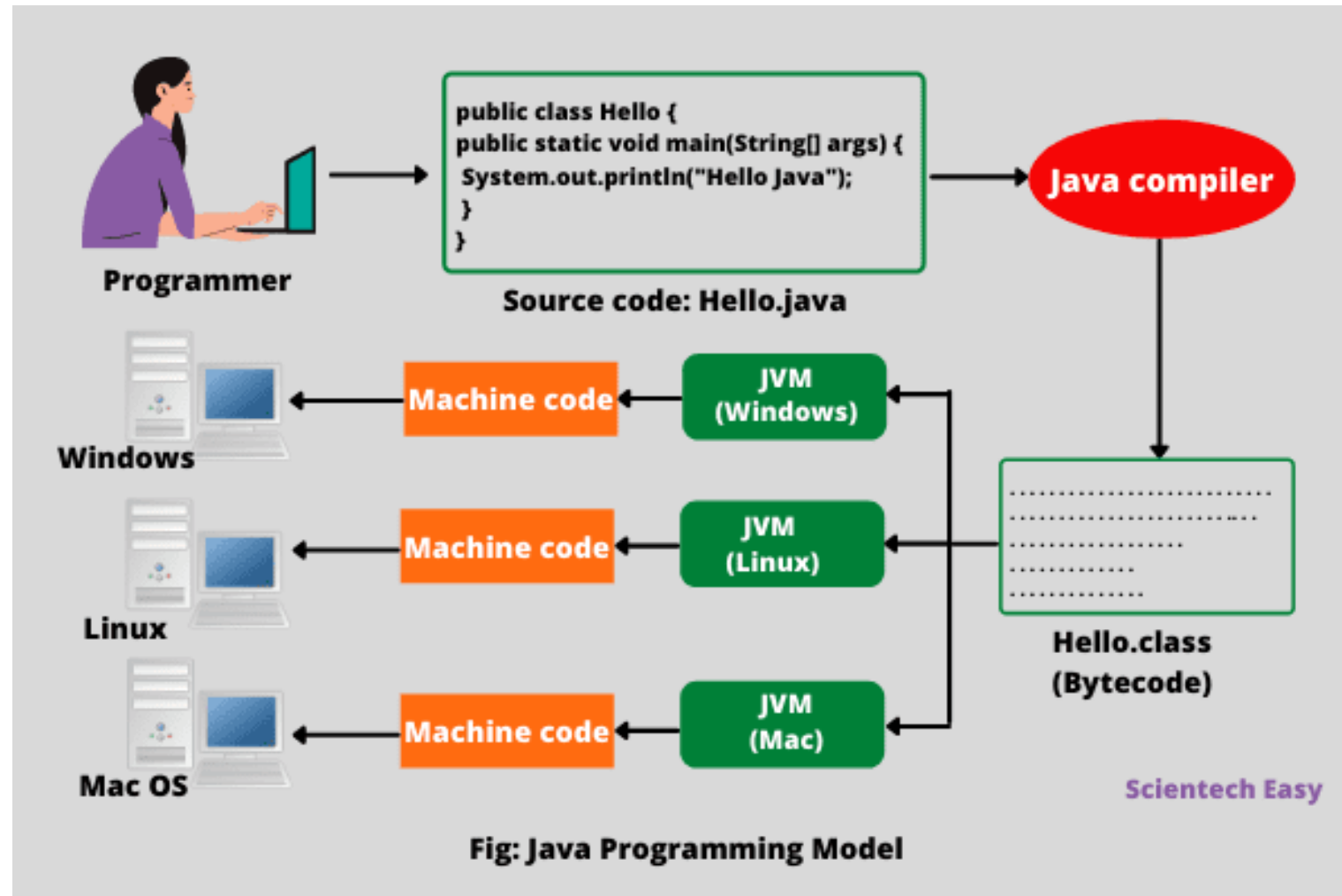
1. **Java Runtime Environment (JRE)** - It is an environment that is required for running (executing) a java application. It cannot be used for the development of Java applications. It is used only for executing the application program.
2. **Java Language Specification** - is a technical definition of syntax and semantics of the Java programming language.
3. **Java Development Tools** - It consists of [Java compiler](#), JAR tool, class file disassembler, debugger, JRE builder, etc. Java Development Tools provides everything for compiling, running, monitoring, debugging, and documenting applications.



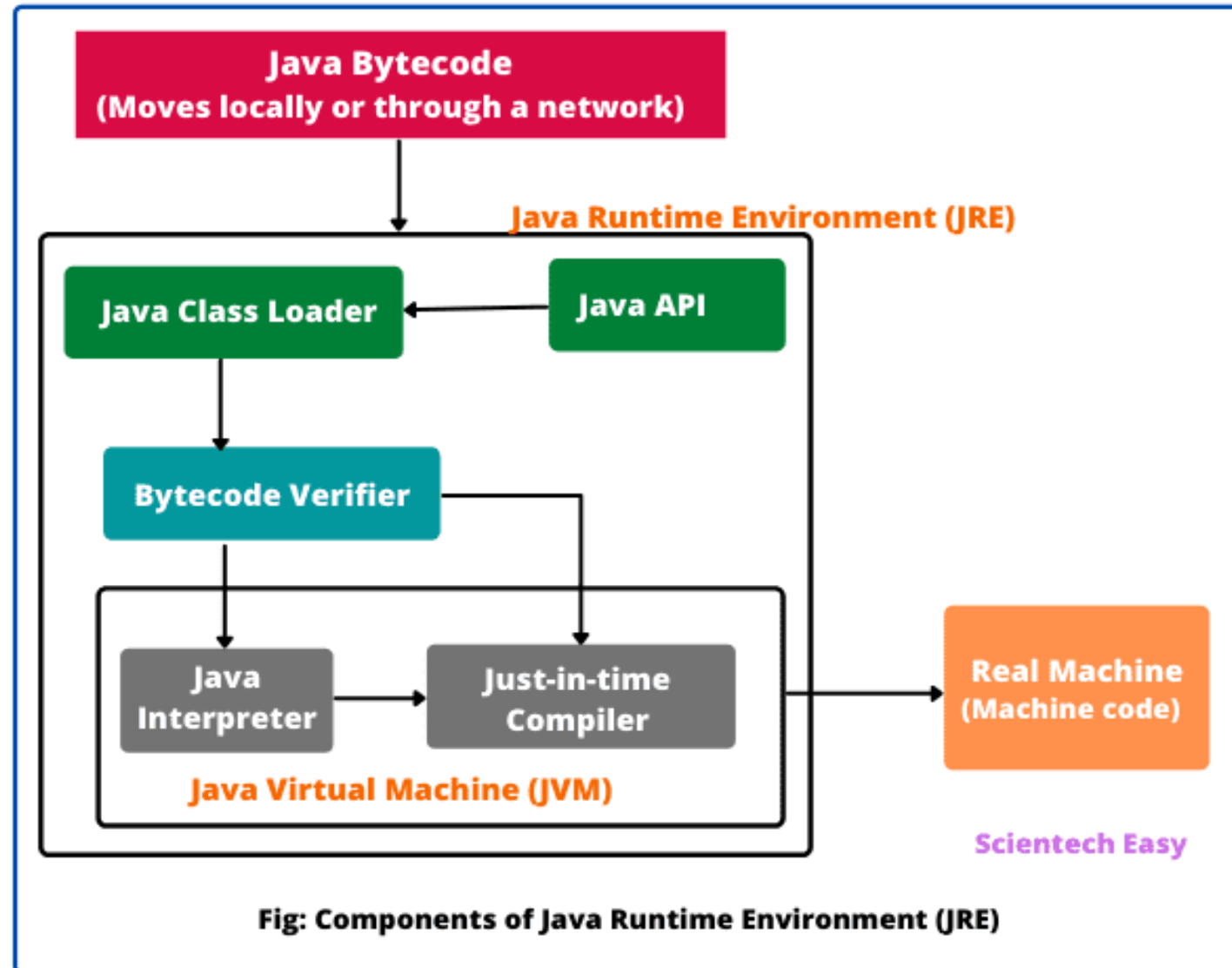
# What is Java Compiler?

- Java compiler is a program that is implemented in C and C++ with the name javac.exe. javac is short for java compiler. It is platform-independent. It is responsible for the following tasks that are as follows:
  - a) Java compiler checks the syntactical error (Syntax error).
  - b) It converts source code into byte code with the help of Java Virtual Machine (JVM). Bytecode is just like machine code, but it is not for a specific processor or platform. It cannot be directly executed.
  - c) Java compiler also adds the additional code to your program if required.

**Bytecode in Java** - is a highly optimized set of instructions for the [Java Virtual Machine](#) (JVM) that reads and interprets to run the java program.



**What is JRE** - is a software environment in which Java program executes.

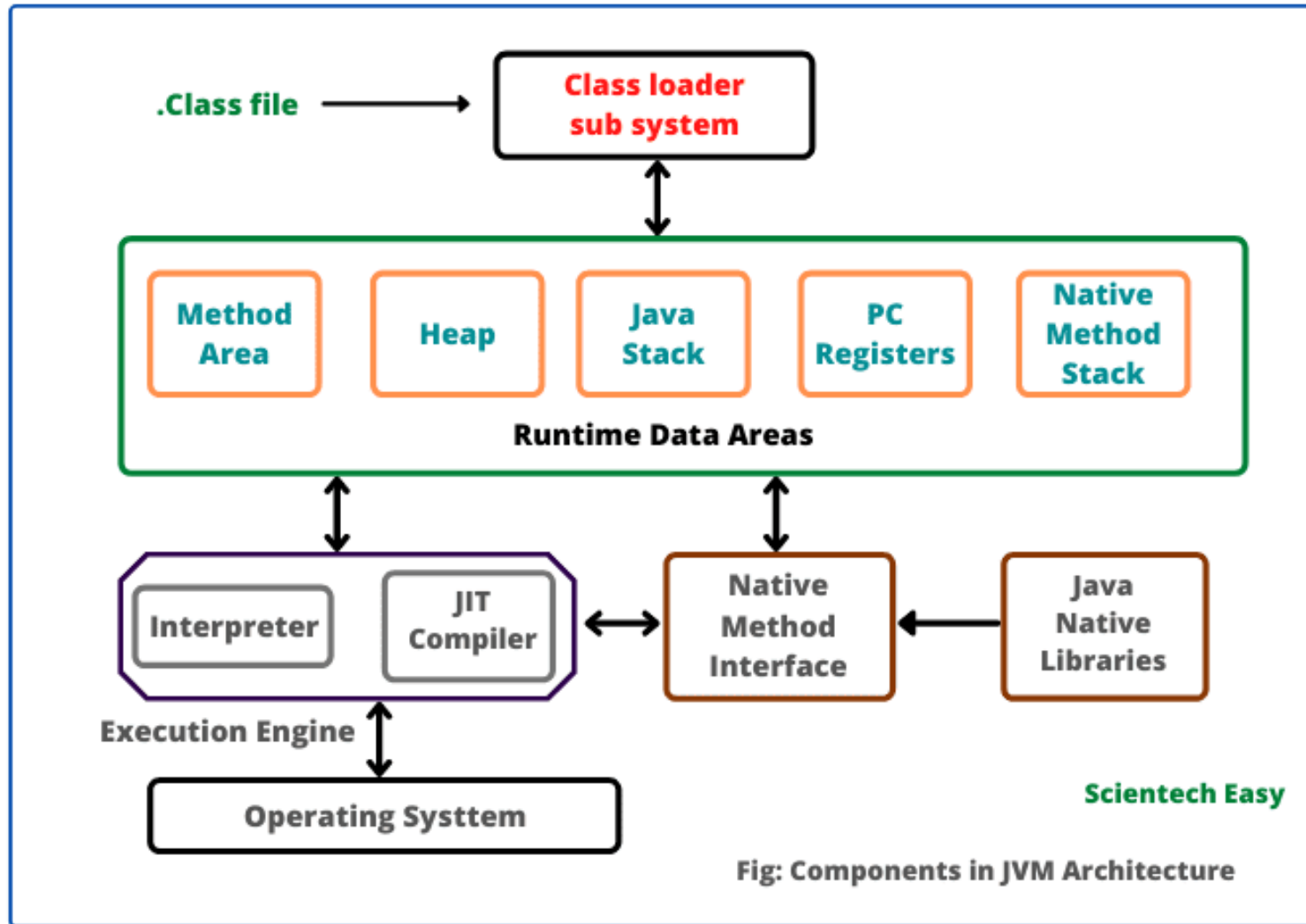


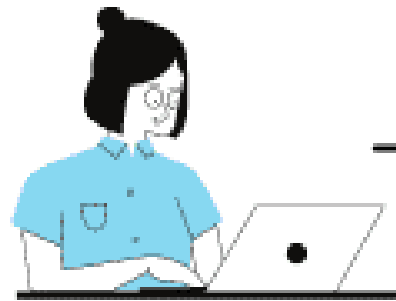
# Components of Java Runtime Environment (JRE)

- **Java API (Application Programming Interface)** - is a very large collection of prepackaged, ready-made software components that provides the core functionality of the Java programming language.
- **Class Loader** - When we write a program in java, the program is placed in memory by the class loader before it can be executed.
- **Bytecode verifier** - The bytecode verifier verifies that byte codes are valid or not without breaching any of Java's security rules.
- **Java Virtual Machine (Interpreter)**

# Java Virtual Machine (JVM) in Java

- is the heart of the entire execution process of the Java program.





**Developer**

writes

```
public class Test {  
    .....  
    .....  
    .....  
}
```

**Test.java**  
**(Javasource file)**

Is compiled  
by

**javac**

Generates

**Java  
bytecode file**

Is executed  
by

**JVM**

on

**OS**

**Steps from Java code to Machine code:**

- Java source code is compiled.
- Transformed to bytecode by Java compiler.
- Interpreted and executed by the Java virtual machine on the underlying operating system.

Sciencetech Easy

# JDK ni oʻrnatish

- [Linux Platformasi uchun](#)
- [MacOS uchun](#)
- [Microsoft Windows Platformasi uchun](#)

# 1-Bosqich. Microsoft Windows Platformasi uchun JDK yuklab olamiz.

1. <https://www.oracle.com/java/technologies/downloads/> link orqali web sahifaga o'tamiz.
2. Rasmda ko'rsatilgan ketma-ketlikda JDK ni yuklab olamiz.

The screenshot shows the Oracle Java Downloads page. At the top, there is a navigation bar with the Oracle logo and links for Products, Industries, Resources, Customers, Partners, Developers, and Company. Below this is a secondary navigation bar with links for Java downloads, Tools and resources, and Java archive. A prominent banner asks 'Looking for other Java downloads?' with buttons for 'OpenJDK Early Access Builds' and 'JRE for Consumers'. The main content area is titled 'Java 21 and Java 17 available now' and includes a button to 'Learn about Java SE Subscription'. A list of download options is shown, with 'JDK 21' selected. Underneath, there is a section for 'JDK Development Kit 21 downloads' with a table of download links for different operating systems. The 'Windows' tab is selected, and the 'x64 Installer' is highlighted. The download link for the x64 installer is circled in red, and a note indicates that the link should be copied to download the file.

**Java 21 and Java 17 available now**

JDK 21 is the latest long-term support release of Java SE Platform. [Learn about Java SE Subscription](#)

1. JDK ning versiyasini tanlaymiz.

**JDK 21** JDK 17 GraalVM for JDK 21 GraalVM for JDK 17

**JDK Development Kit 21 downloads**

JDK 21 binaries are free to use in production and free to redistribute, at no cost, under the Oracle No-Fee Terms and Conditions (NFTC).

JDK 21 will receive updates under the NFTC, until September 2026, a year after the release of the next LTS. Subsequent JDK 21 updates will be licensed under the Java SE OTN License (OTN) and production use beyond the limited free grants of the OTN license will require a fee.

Linux macOS **Windows** 2. Operatsion sistemamizga mos platformani tanlaymiz.

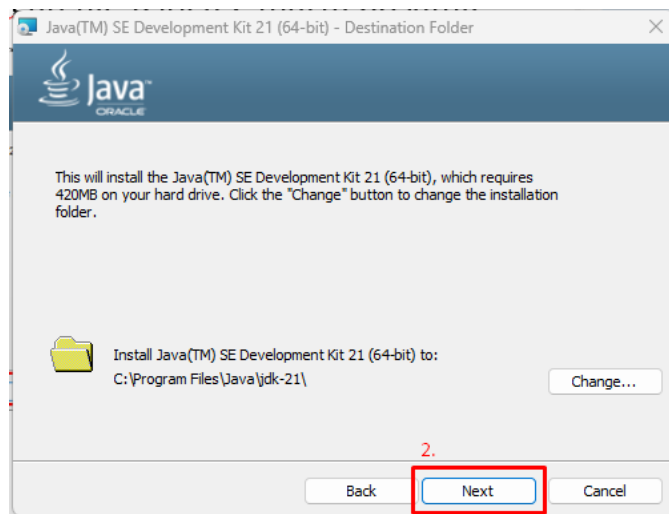
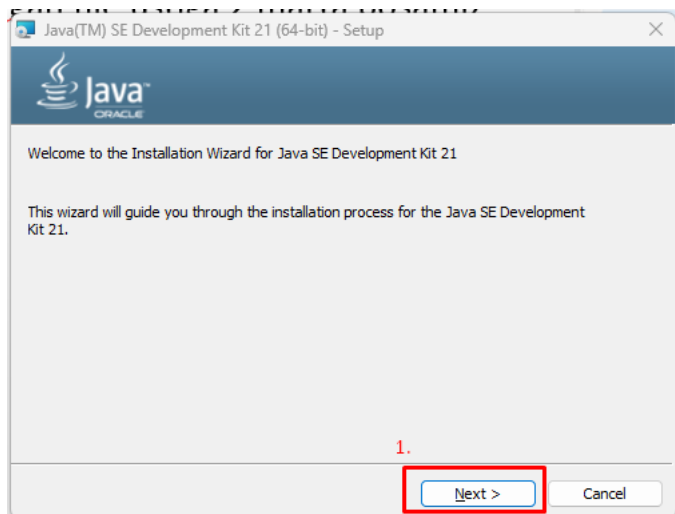
Product/file description	File size	Download
x64 Compressed Archive	180.99 MB	<a href="https://download.oracle.com/java/21/latest/jdk-21_windows-x64_bin.zip">https://download.oracle.com/java/21/latest/jdk-21_windows-x64_bin.zip</a> (sha256)
<b>x64 Installer</b> 3. x64 installer ni tanlaymiz.	160.12 MB	<a href="https://download.oracle.com/java/21/latest/jdk-21_windows-x64_bin.exe">https://download.oracle.com/java/21/latest/jdk-21_windows-x64_bin.exe</a> (sha256) 4. linkni bosib fileni yuklab olamiz
x64 MSI Installer	158.90 MB	<a href="https://download.oracle.com/java/21/latest/jdk-21_windows-x64_bin.msi">https://download.oracle.com/java/21/latest/jdk-21_windows-x64_bin.msi</a> (sha256)



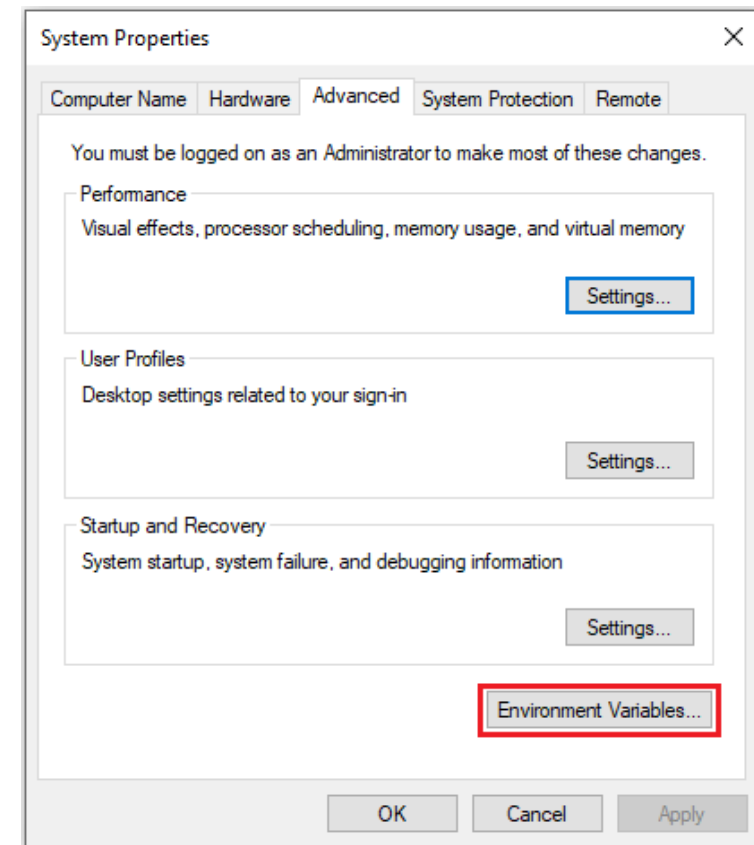
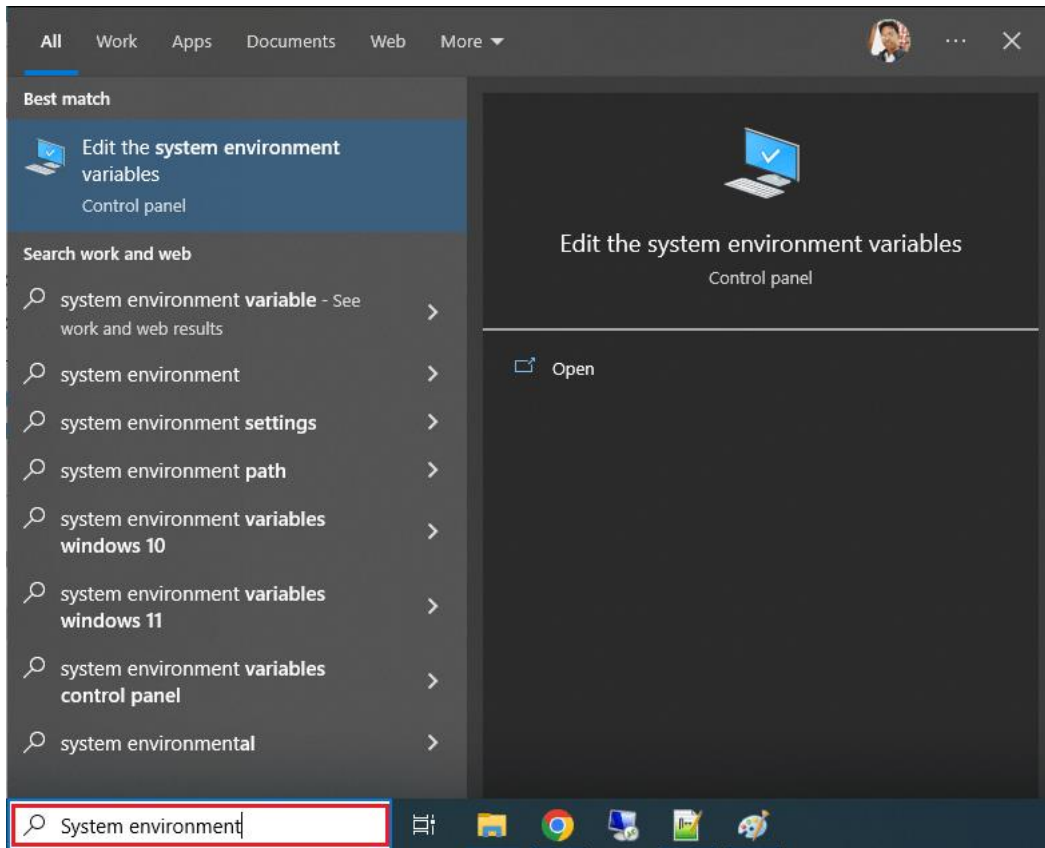
## 2-Bosqich. **JDK ni o'rnatamiz.**

1. Yuklab olingan file ustiga 2 marta bosamiz.
2. Rasmdagi ketma-ketlikda tugmalarni bosamiz.
3. JDK o'rnatildi!!!

File Name	Date Modified	Type	Size
▼ Today			
jdk-21_windows-x64_bin.exe	06-Oct-23 10:26	Application	167,721 KB



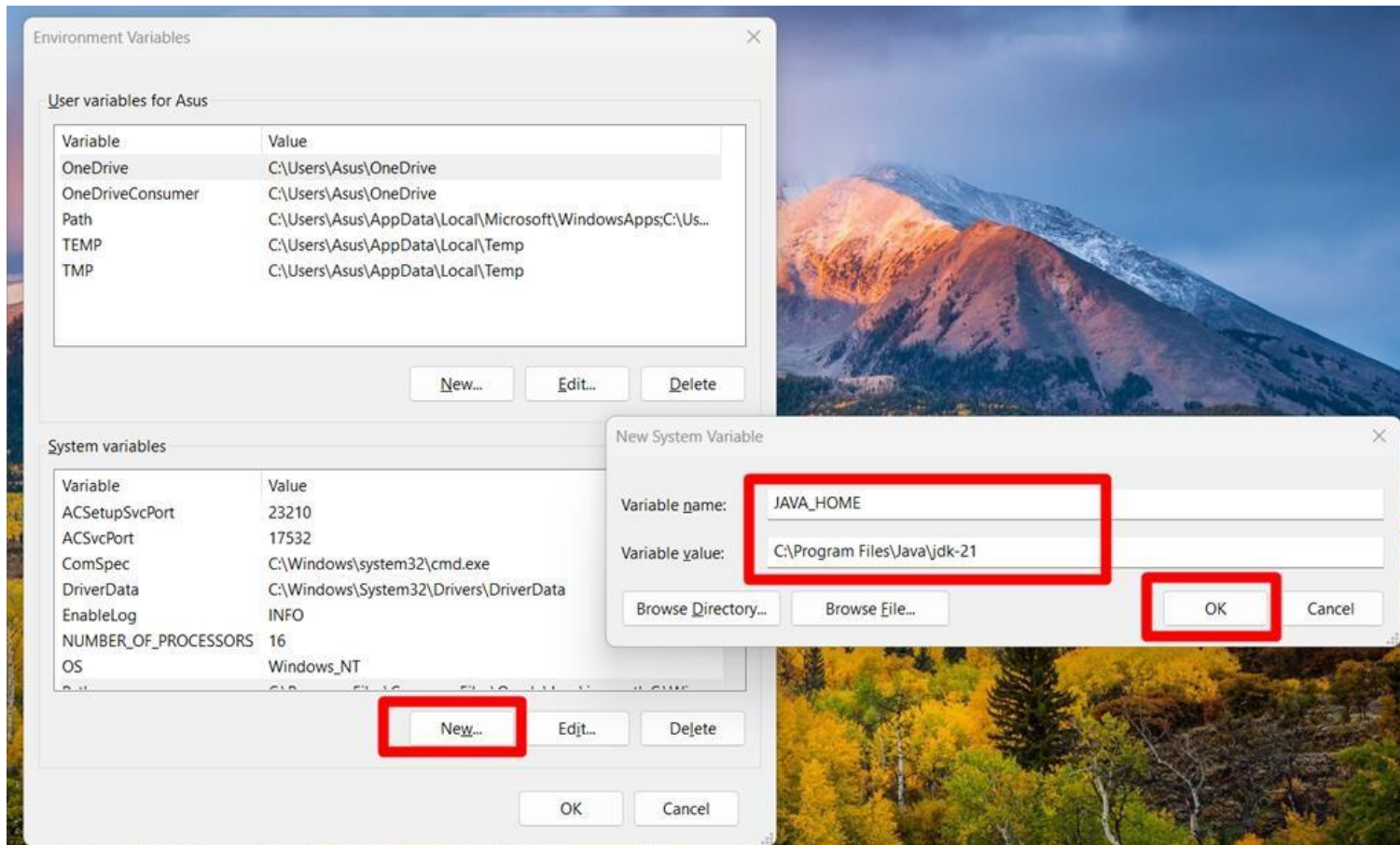
### 3 – Bosqich. System Environment Variables larni oʻrnatamiz.



Панель управления > Система > Дополнительные параметры системы

This PC > Local Disk (C:) > Program Files > Java > jdk-21 >

- **PATH** -> *C:\Program Files\Java\jdk-21\bin* (java 15 dan keyin kerakmas)
- **JAVA\_HOME** -> *C:\Program Files\Java\jdk-21*



System Properties

Computer Name Hardware Advanced System Protection Remote

You must be logged on as an Administrator to make most of these changes.

Performance  
Visual effects, processor scheduling, memory usage, and virtual memory  
Settings...

User Profiles  
Desktop settings related to your sign-in  
Settings...

Startup and Recovery  
System startup, system failure, and debugging information  
Settings...

1 Environment Variables...

OK Cancel Apply

USER VARIABLES FOR ASUS

Variable	Value
OneDrive	C:\Users\Asus\OneDrive
OneDriveConsumer	C:\Users\Asus\OneDrive
Path	C:\Users\Asus\AppData\Local\Microsoft\WindowsApps;C:\Us...
TEMP	C:\Users\Asus\AppData\Local\Temp
TMP	C:\Users\Asus\AppData\Local\Temp

New... Edit... Delete

System variables

Variable	Value
DriverData	C:\Windows\System32\Drivers\DriverData
EnableLog	INFO
NUMBER_OF_PROCESSORS	16
OS	Windows_NT
2 Path	C:\Program Files\Common Files\Oracle\Java\javapath;C:\Win...
PATHEXT	.COM;.EXE;.BAT;.CMD;.VBS;.VBE;.JS;.JSE;.WSF;.WSH;.MSC
PROCESSOR_ARCHITECTU...	AMD64
PROCESSOR_IDENTIFIER	AMD64-3_20M...

New... Edit... Delete

OK Cancel

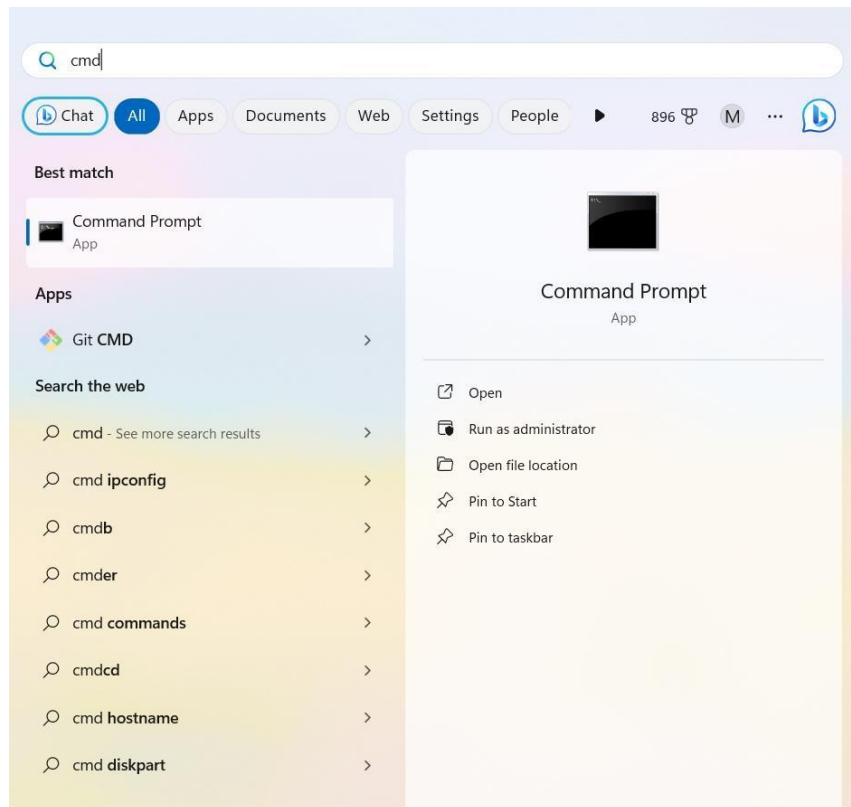
C:\Program Files\Common Files\Oracle\Java\javapath	3
%SystemRoot%\system32	
%SystemRoot%	
%SystemRoot%\System32\Wbem	
%SYSTEMROOT%\System32\WindowsPowerShell\v1.0\	
%SYSTEMROOT%\System32\OpenSSH\	
C:\Program Files (x86)\NVIDIA Corporation\PhysX\Common	
C:\Program Files\PuTTY\	
C:\Program Files (x86)\Bitvise SSH Client	
C:\Program Files\Git\cmd	
C:\Program Files\PostgreSQL\12\lib	
C:\Program Files\PostgreSQL\12\bin	
C:\Program Files\NVIDIA Corporation\NVIDIA nVDLISR	
C:\Program Files\Docker\Docker\resources\bin	
4 C:\Program Files\Java\jdk-21\bin	

New Edit Browse... Delete Move Up Move Dgwn Edit text...

5 OK Cancel

## 4- Bosqish. JDK o'rnatilganligini tekshiramiz.

- **Win -> cmd** - terminalga kiramiz.
- **java -version** – javaning versiyasini ko'ramiz.



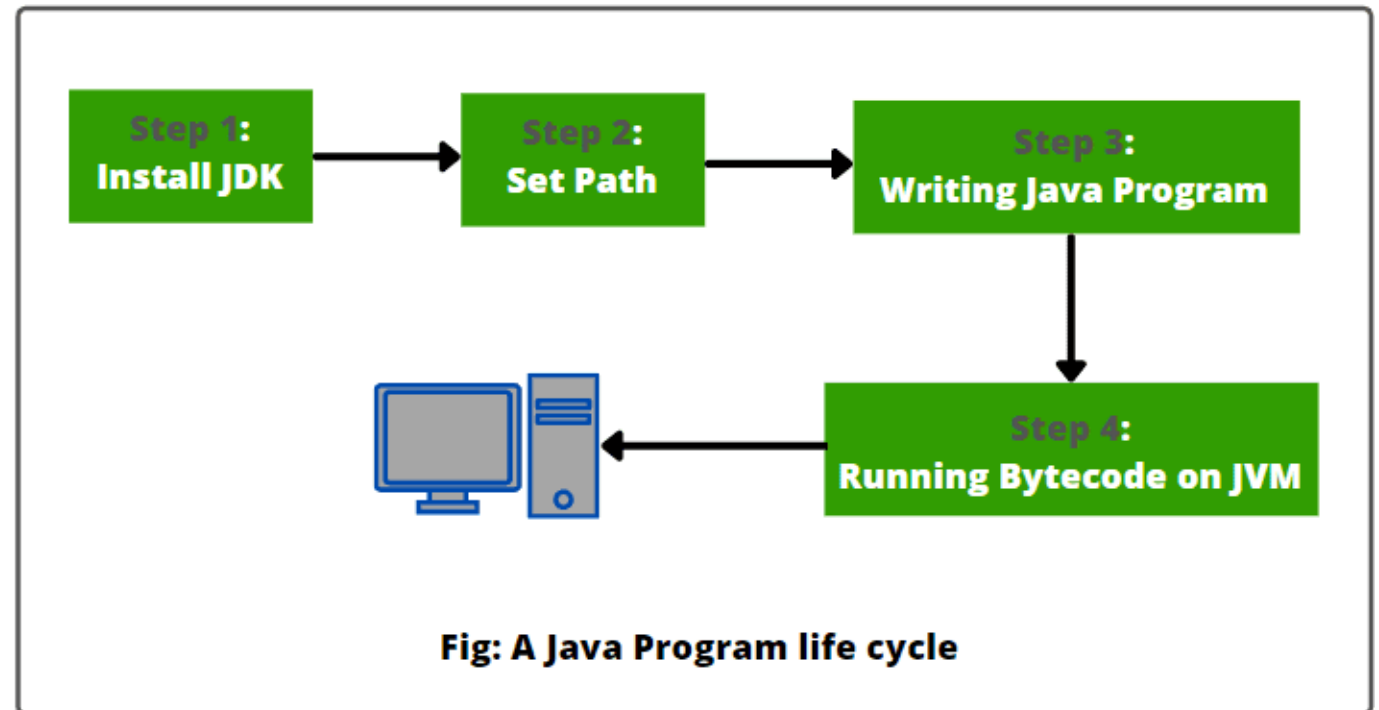
```
Command Prompt
Microsoft Windows [Version 10.0.22621.2361]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Asus>java -version
java version "21" 2023-09-19 LTS
Java(TM) SE Runtime Environment (build 21+35-LTS-2513)
Java HotSpot(TM) 64-Bit Server VM (build 21+35-LTS-2513, mixed mode, sharing)

C:\Users\Asus>
```

# Requirements for Simple Java Program

- Following are four steps needed for creating and executing any program in java.
  1. Install the JDK. If you don't have installed it, download the JDK and install it.
  2. Set the path of the *jdk/bin* directory.
  3. Writing the java program.
  4. Compiling java program.
  5. Running bytecode on JVM.



1. \_\_\_\_\_.java keygaytmalik file ochamiz

2. Ichiga shu kodni yozamiz:

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

3. file turgan joyda terminalni ochamiz: **cmd** orqali.

4. **javac Hello.java** ni execute qilamiz.

5. **java Hello** ni execute qilamiz.

File Explorer window showing the contents of a folder named "java". The folder contains two files: "Hello.java" (1 KB, JAVA File) and "Hello.class" (1 KB, CLASS File). A code editor window titled "Hello.java" is open, displaying the following code:

```
class Hello { // Start class definition.
public static void main(String args[])
{
    System.out.println("Hello world");
}
} // End class definition.
```

The status bar at the bottom of the code editor shows: Ln 1, Col 1 | 100% | Windows (CRLF) | UTF-8.

File Explorer sidebar shows the following folders: Desktop, Downloads, Documents, Pictures, Music, Videos, Nordics\_lessons, Masalalar, Modul 1, Java\_teaching, This PC, Local Disk (C:), New Volume (I), New Volume (I), Network, Linux.

2 items | 1 item selected | 162 bytes

Command Prompt window showing the execution of the Java program:

```
C:\Windows\System32\cmd.e
Microsoft Windows [Version 10.0.22621.2361]
(c) Microsoft Corporation. All rights reserved.

D:\NORDIC\java>javac Hello.java

D:\NORDIC\java>java Hello
Hello World

D:\NORDIC\java>
```



# IntelliJ IDEA Community Edition ni o'rnatamiz.

- <https://www.jetbrains.com/idea/download> link orqali web sahifaga o'tamiz

