Napredno programiranje i programski jezici

06 Java

Fakultet tehničkih nauka, Novi Sad
23-24/Z
Dunja Vrbaški

Java PL:

- James Gosling
- 1995
- Sun Microsystems → Oracle
- sintaksa slična kao C++

C++ kompajler → izvršni kod
Write once compile anywhere

Java kompajler → bytecode → JVM interpreter izvršava
Write once run anywhere

Jednom kad prevedemo program napisan u Javi možemo da ga izvršavamo na bilo kojoj platformi koja podržava Javu.

Java - jezik
Java - platforma

C++ kompajler → izvršni kod

Različiti kompajleri

Java kompajler → bytecode → JVM interpreter izvršava

Različiti kompajleri

Različite JVM

C++ vs Java

C++	Java
kompajler	kompajler + interpreter
proceduralno + OO	OO
x	jedinstvena hijerarhija klasa
preklapanje operatora	x
virtual deklaracija	sve (nestatičke) metode su virtual
x	GC
pass by value, pass by reference	pass by value

C++ vs Java

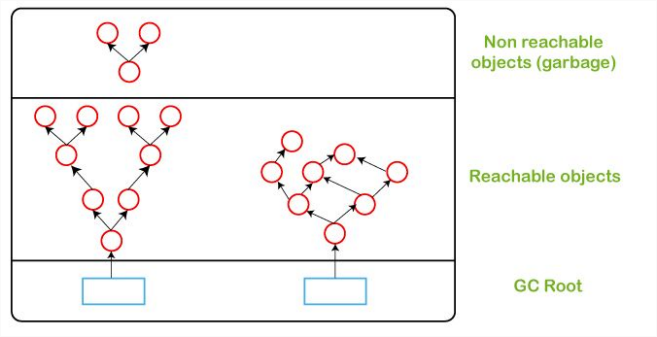
C++	Java
private, protected nasleđivanje	x
višestruko nasleđivanje	x
const	x
x	interface
x	abstract kw
.hpp, .cpp	.java (isto kao naziv klase)
...	

filozofija?

Garbage Collection (GC)
Automatsko upravljanje memorijom

```
C++      - new/delete
Java     - new
```

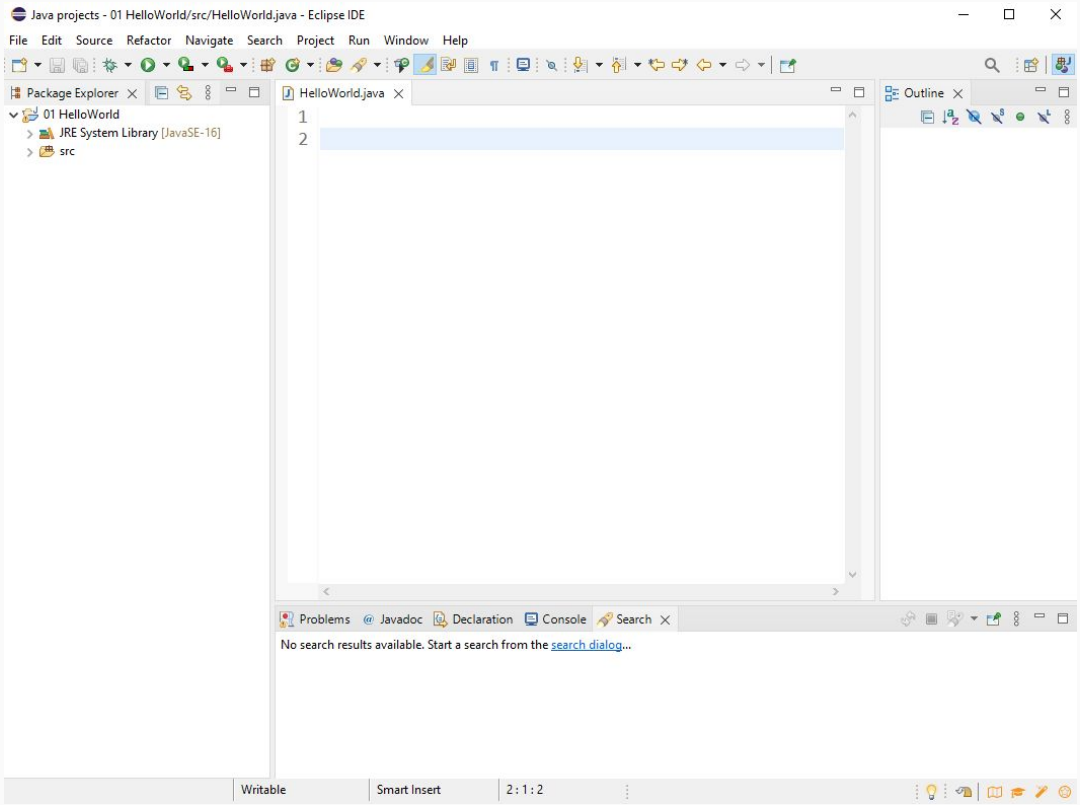
- programeri oslobođeni odgovornosti
- ne znamo trenutak
- različiti algoritmi



mark&swipe

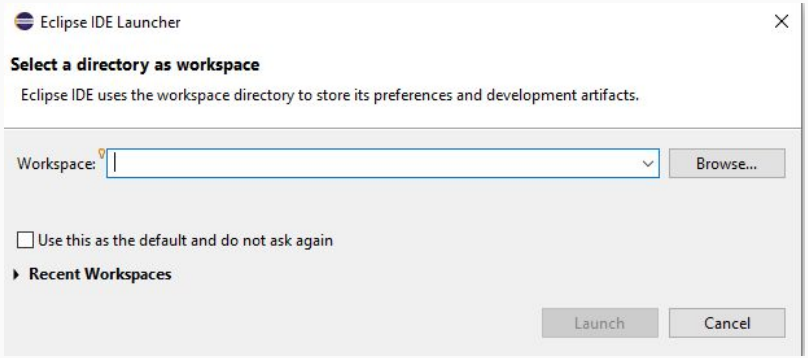
Eclipse IDE

https://www.eclipse.org/



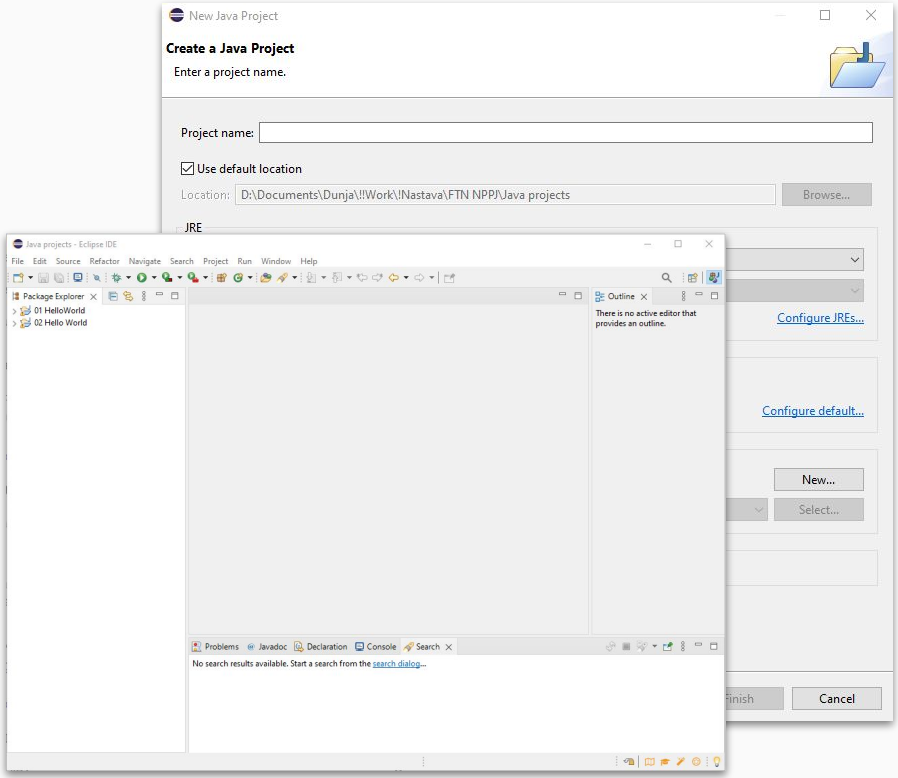
Workspace

projekti + podešavanja, informacije



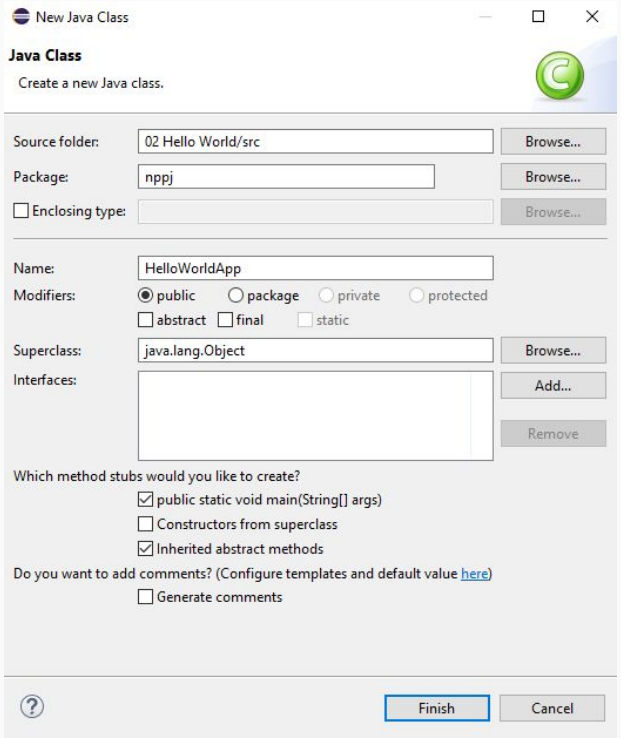
Projekat

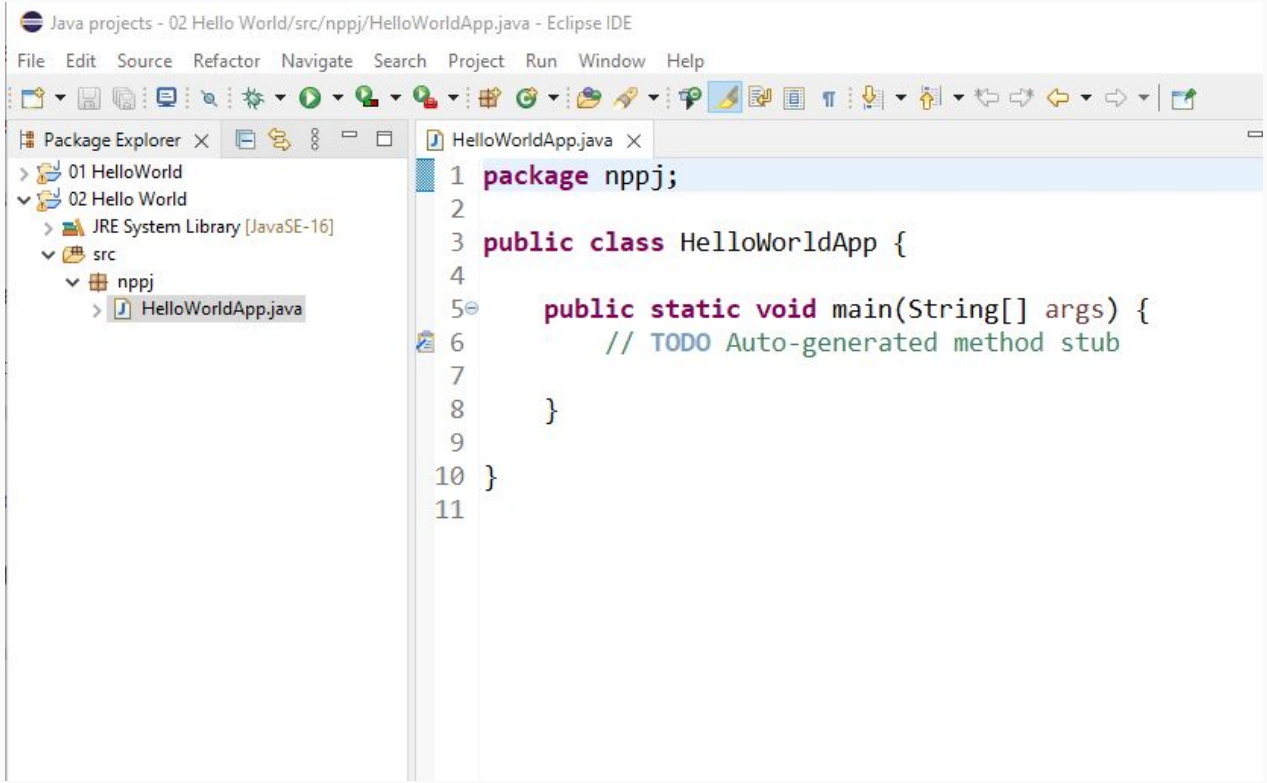
Java project



Klasa

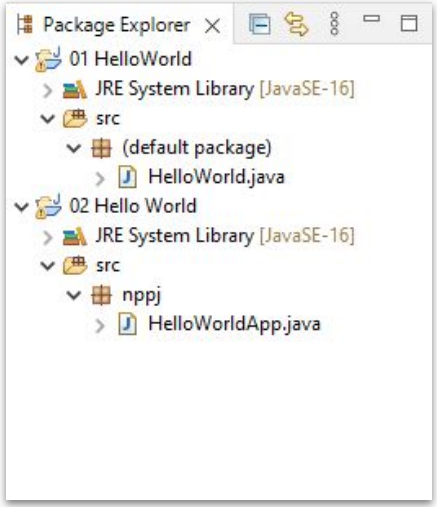
**sa main metodom*



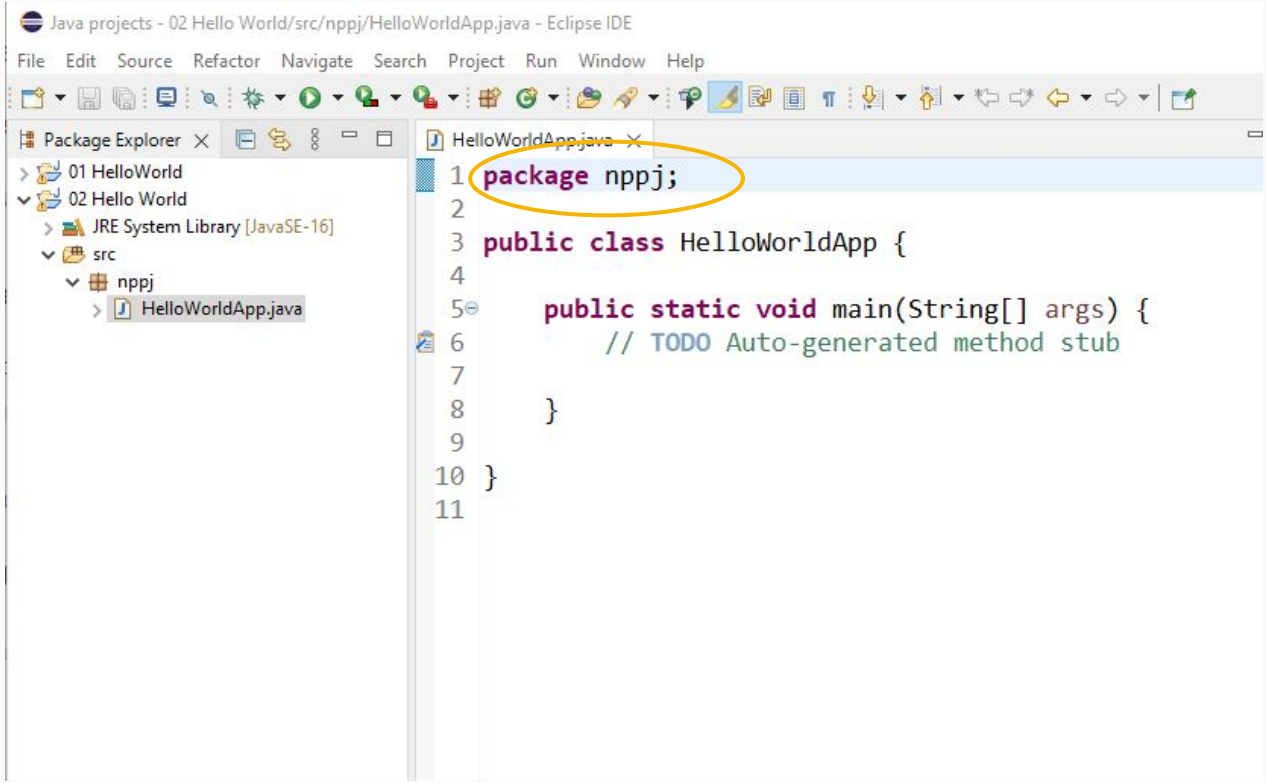

Java projects - 02 Hello World/src/nppj/HelloWorldApp.java - Eclipse IDE
File Edit Source Refactor Navigate Search Project Run Window Help
Package Explorer
01 HelloWorld
02 Hello World
JRE System Library [JavaSE-16]
src
nppj
HelloWorldApp.java
HelloWorldApp.java
1 package nppj;
2
3 public class HelloWorldApp {
4
5 public static void main(String[] args) {
6 // TODO Auto-generated method stub
7
8 }
9
10 }
11

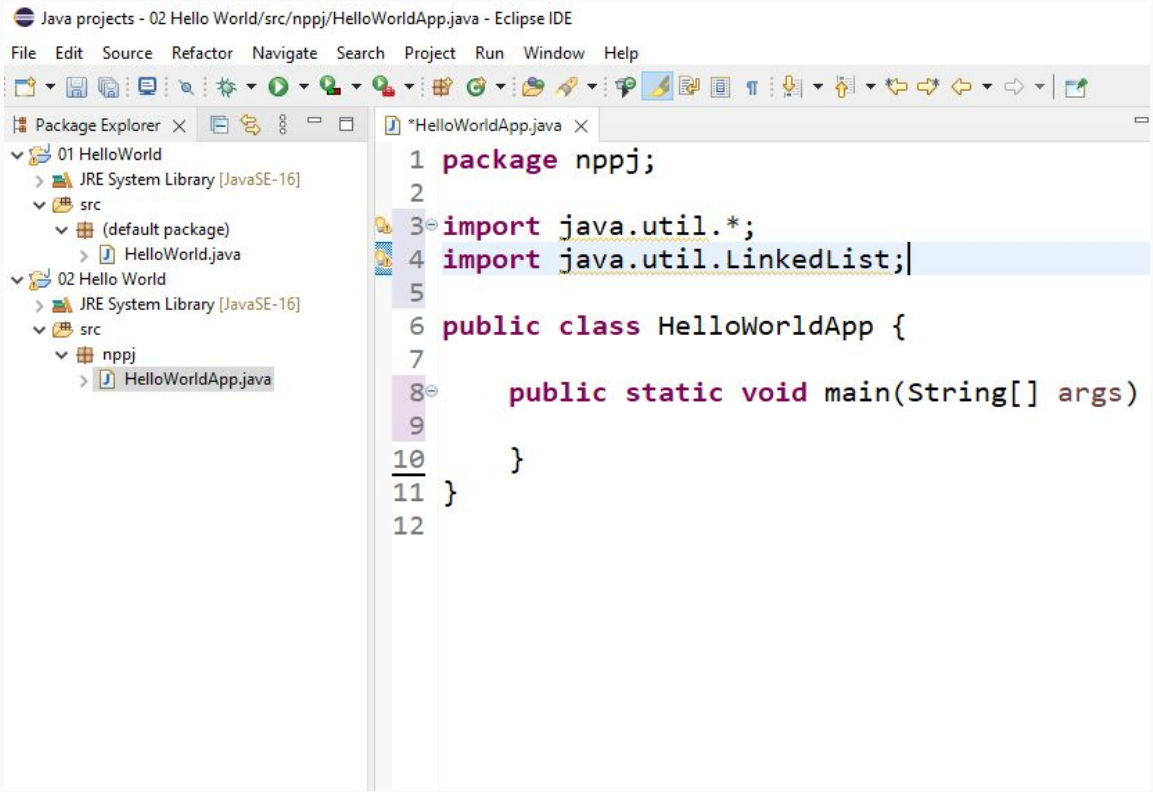
Paket

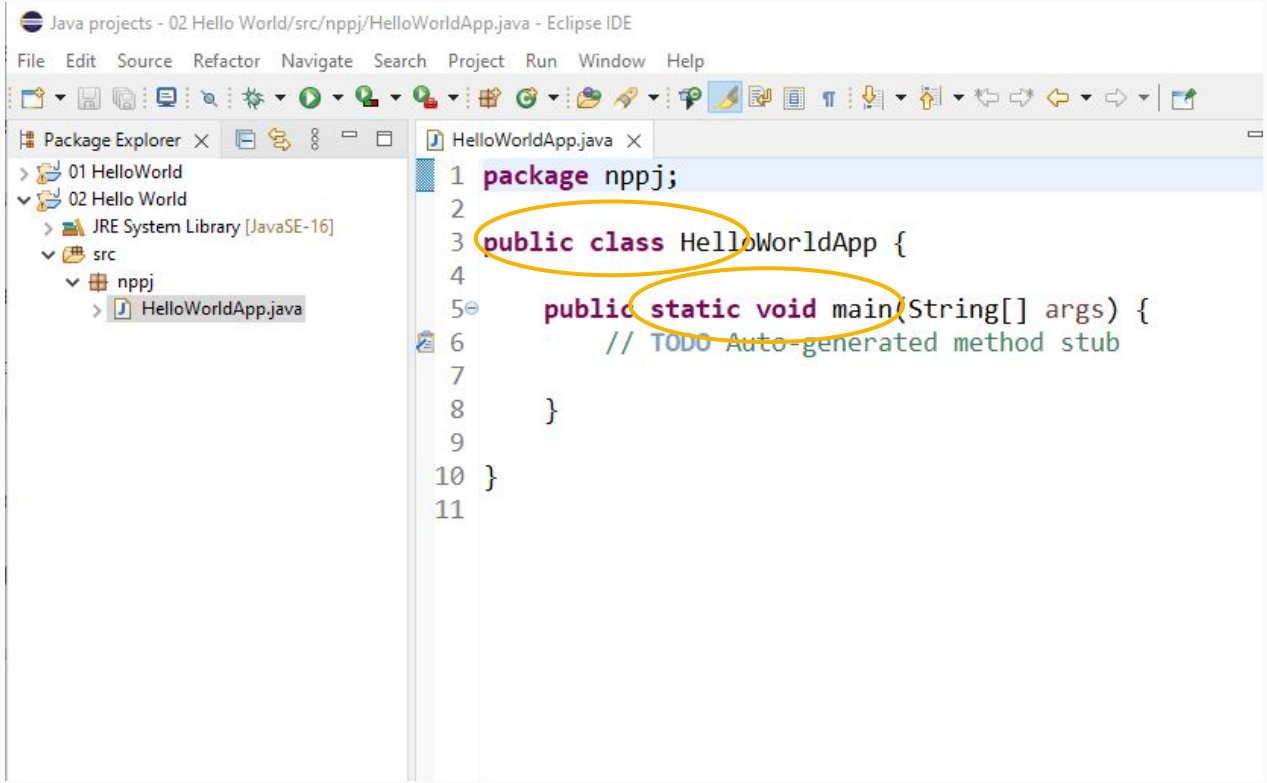
- modularizacija, organizacija
- imenovanje
- prava pristupa



prava pristupa, vidljivost, prevođenje...: c++ vs java

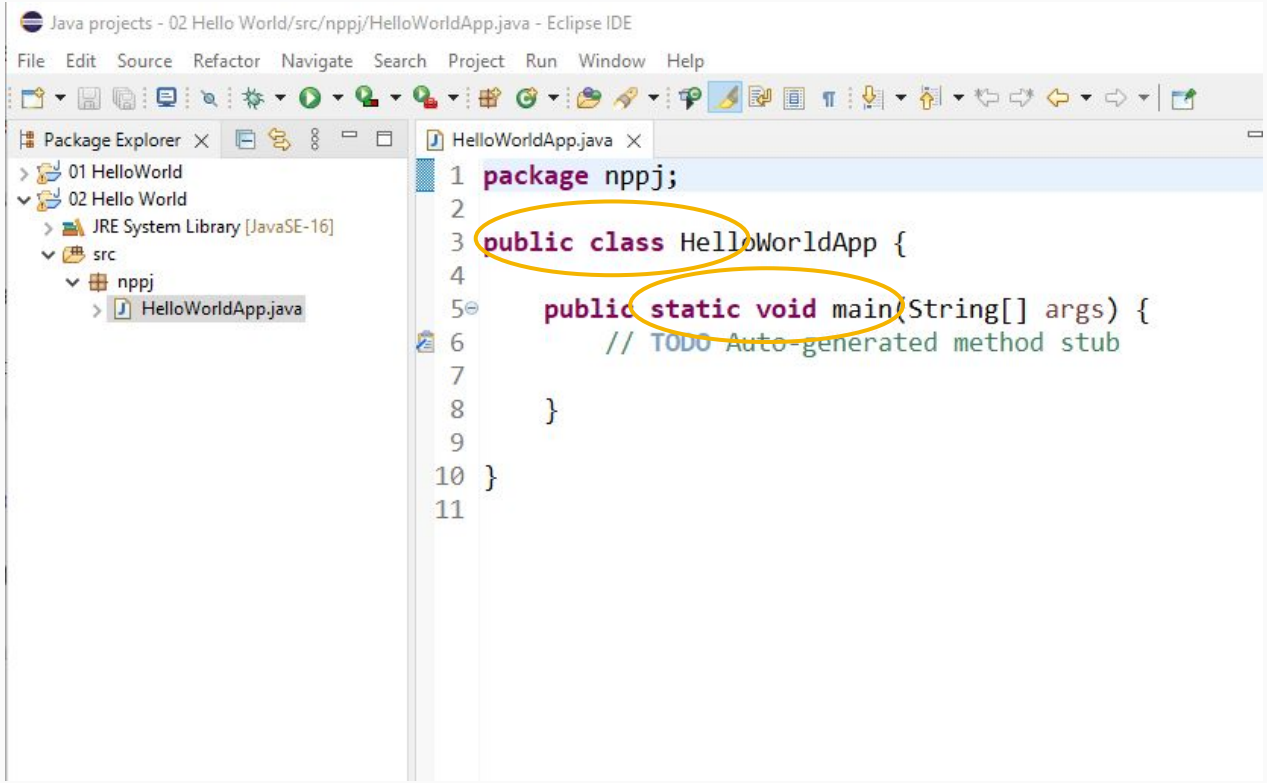

Java projects - 02 Hello World/src/nppj/HelloWorldApp.java - Eclipse IDE
File Edit Source Refactor Navigate Search Project Run Window Help
Package Explorer
01 HelloWorld
02 Hello World
JRE System Library [JavaSE-16]
src
nppj
HelloWorldApp.java
HelloWorldApp.java
1 package nppj;
2
3 public class HelloWorldApp {
4
5 public static void main(String[] args) {
6 // TODO Auto-generated method stub
7
8 }
9
10 }
11


Java projects - 02 Hello World/src/nppj/HelloWorldApp.java - Eclipse IDE
File Edit Source Refactor Navigate Search Project Run Window Help
Package Explorer
01 HelloWorld
JRE System Library [JavaSE-16]
src
(default package)
HelloWorld.java
02 Hello World
JRE System Library [JavaSE-16]
src
nppj
HelloWorldApp.java
*HelloWorldApp.java
1 package nppj;
2
3 import java.util.*;
4 import java.util.LinkedList;
5
6 public class HelloWorldApp {
7
8 public static void main(String[] args)
9
10 }
11 }
12

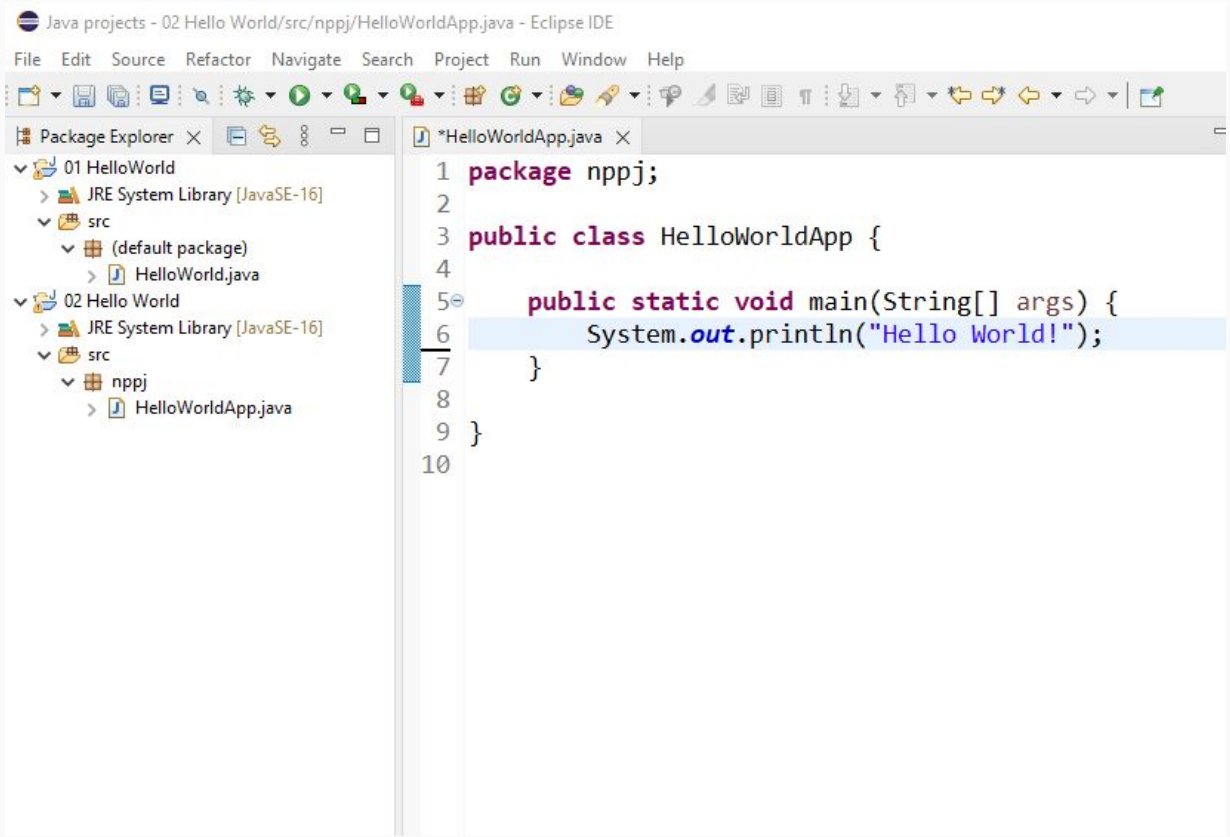

Java projects - 02 Hello World/src/nppj/HelloWorldApp.java - Eclipse IDE
File Edit Source Refactor Navigate Search Project Run Window Help
Package Explorer
01 HelloWorld
02 Hello World
JRE System Library [JavaSE-16]
src
nppj
HelloWorldApp.java
HelloWorldApp.java
1 package nppj;
2
3 public class HelloWorldApp {
4
5 public static void main(String[] args) {
6 // TODO Auto-generated method stub
7
8 }
9
10 }
11

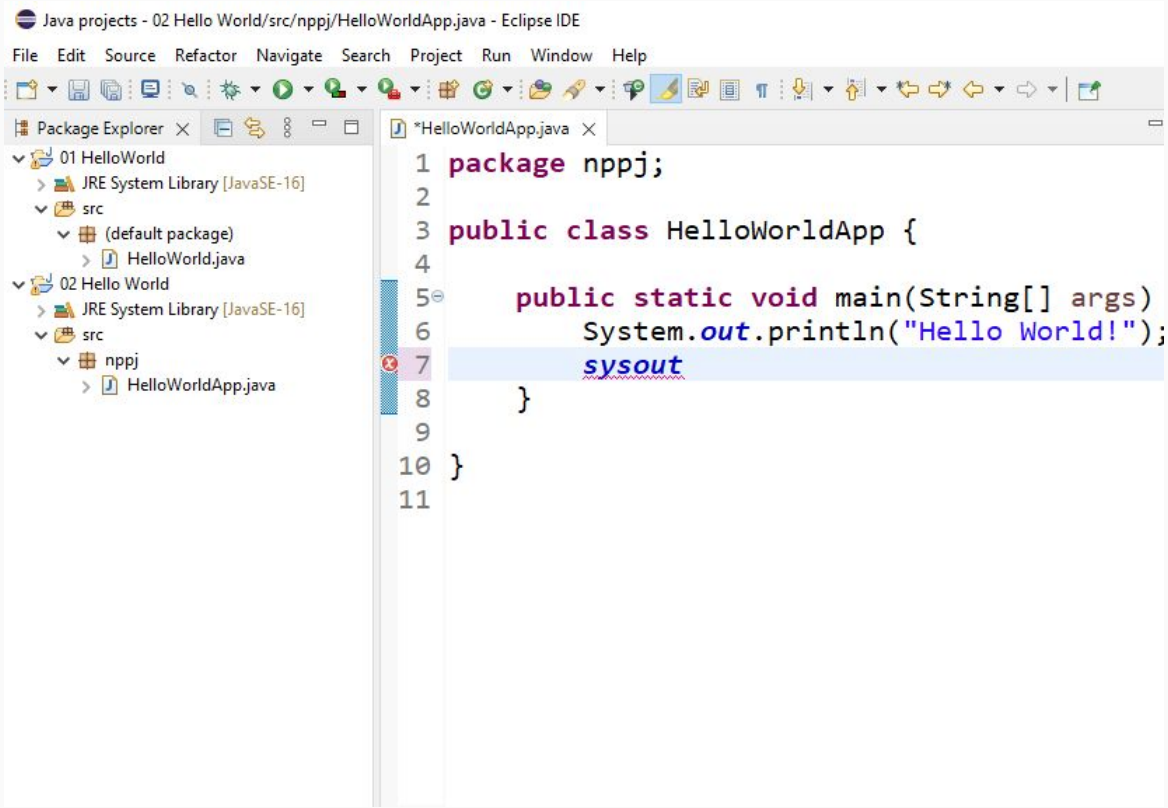
C++	Java
x	jedinstvena hijerarhija klasa
proceduralno + OO	OO
main() je slobodna funkcija	main() je metod neke klase

Java - sve klase su nasleđene od jedne zajedničke klase Object
Nema slobodnih funkcija

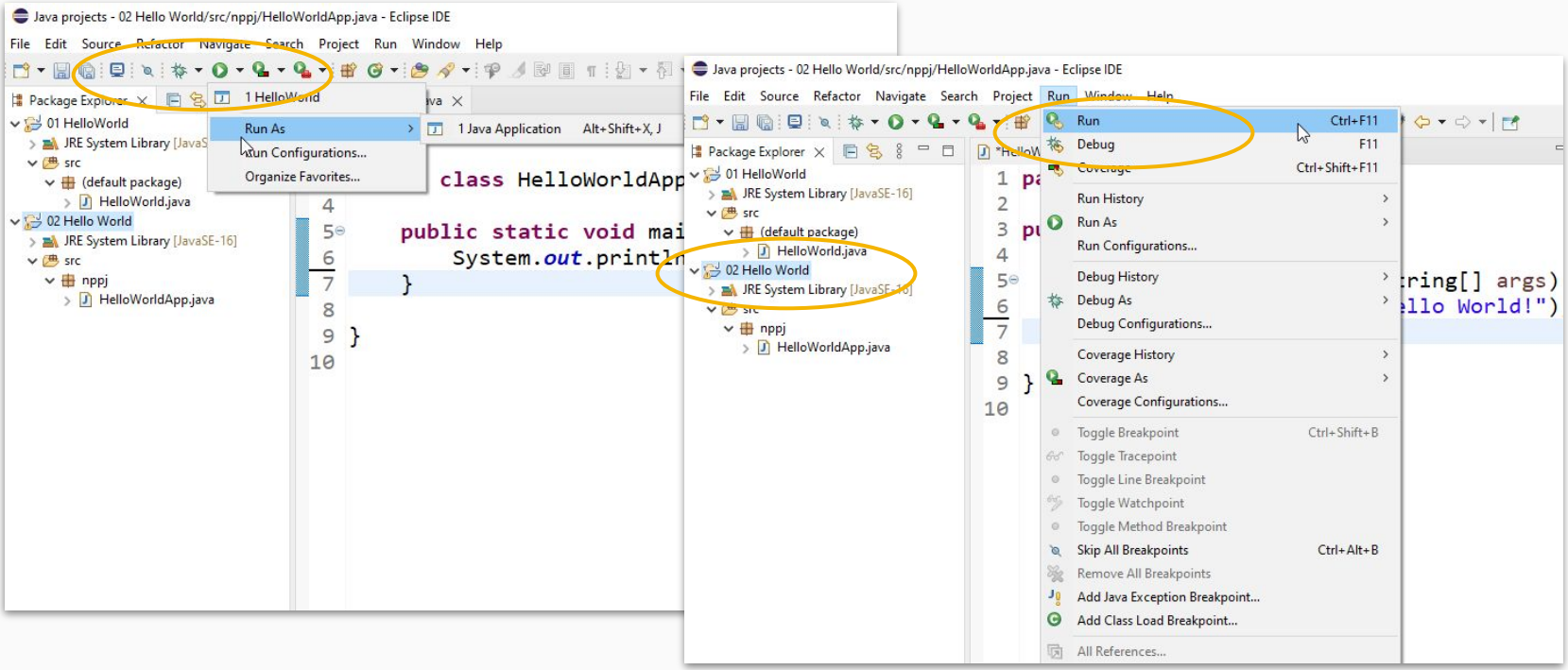


static - u nastavku...

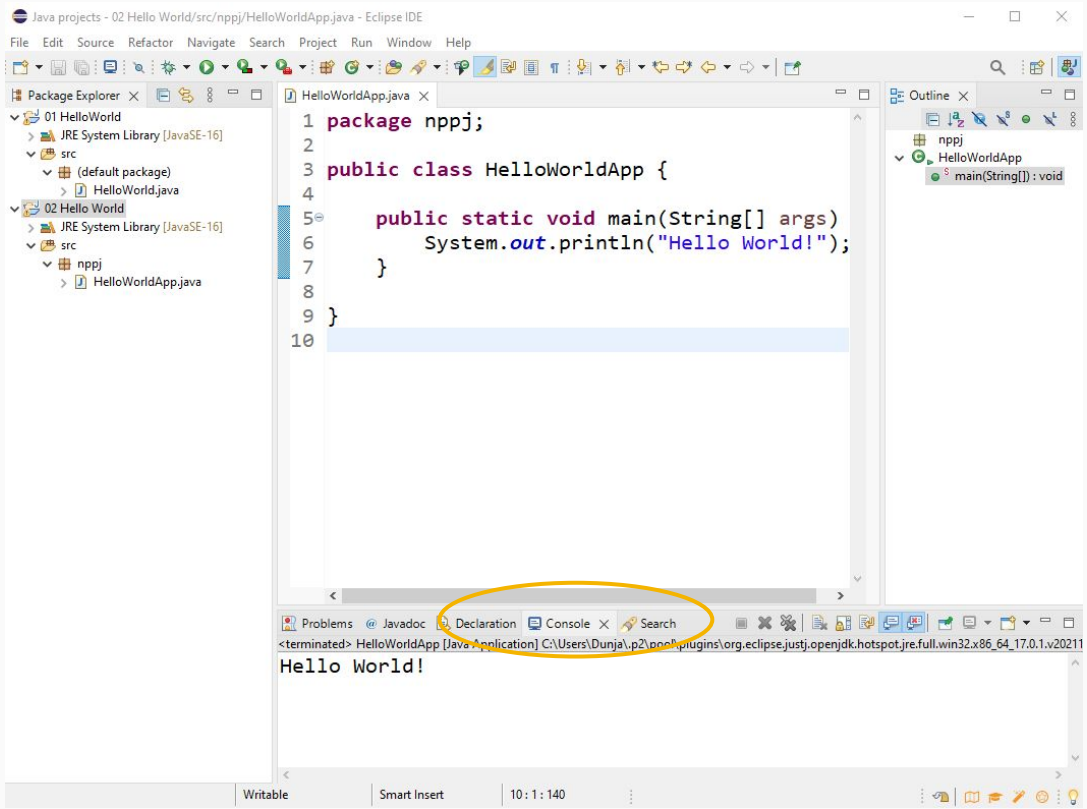

Java projects - 02 Hello World/src/nppj/HelloWorldApp.java - Eclipse IDE
File Edit Source Refactor Navigate Search Project Run Window Help
Package Explorer
01 HelloWorld
JRE System Library [JavaSE-16]
src
(default package)
HelloWorld.java
02 Hello World
JRE System Library [JavaSE-16]
src
nppj
HelloWorldApp.java
*HelloWorldApp.java
1 package nppj;
2
3 public class HelloWorldApp {
4
5 public static void main(String[] args) {
6 System.out.println("Hello World!");
7 }
8
9 }
10


Java projects - 02 Hello World/src/nppj/HelloWorldApp.java - Eclipse IDE
File Edit Source Refactor Navigate Search Project Run Window Help
Package Explorer
01 HelloWorld
JRE System Library [JavaSE-16]
src
(default package)
HelloWorld.java
02 Hello World
JRE System Library [JavaSE-16]
src
nppj
HelloWorldApp.java
*HelloWorldApp.java
1 package nppj;
2
3 public class HelloWorldApp {
4
5 public static void main(String[] args)
6 System.out.println("Hello World!");
7 sysout
8 }
9
10 }
11

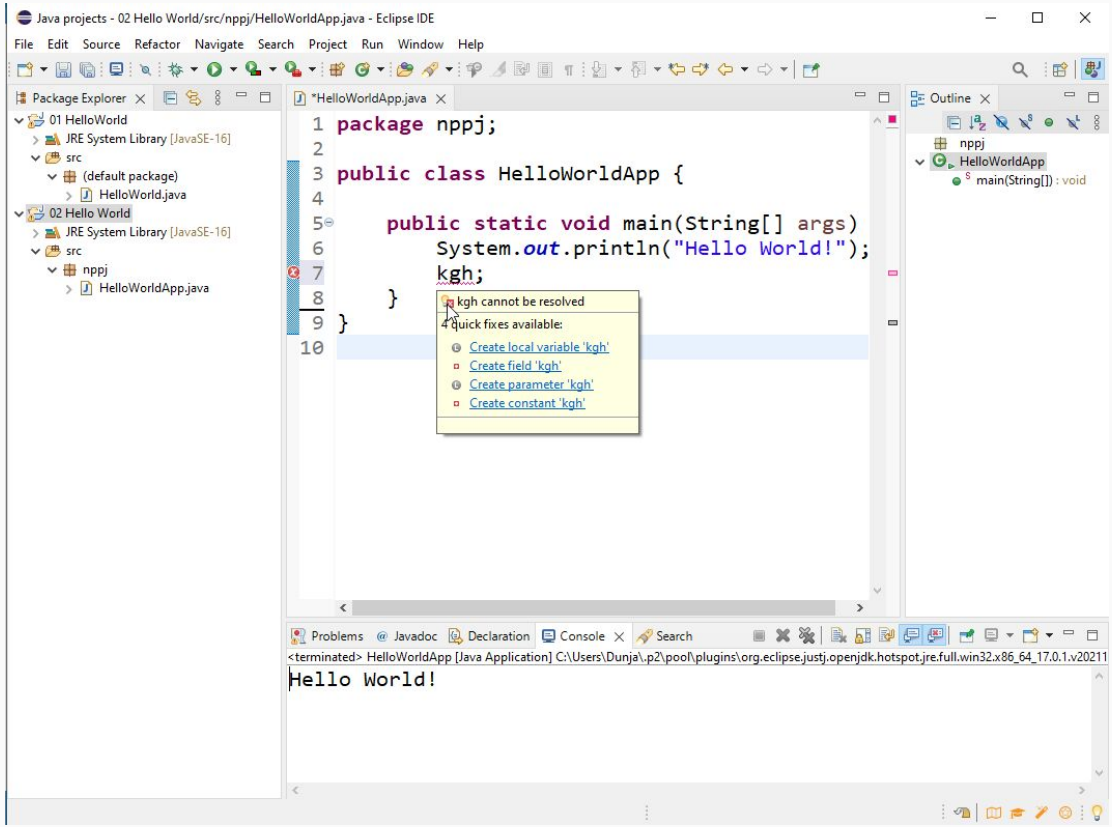
ctrl + space


Java projects - 02 Hello World/src/nppj/HelloWorldApp.java - Eclipse IDE
File Edit Source Refactor Navigate Search Project Run Window Help
Package Explorer
01 HelloWorld
JRE System Library [JavaSE-16]
src
(default package)
HelloWorld.java
02 Hello World
JRE System Library [JavaSE-16]
src
nppj
HelloWorldApp.java
1 HelloWorld
Run As
Run Configurations...
Organize Favorites...
1 Java Application Alt+Shift+X, J
class HelloWorldApp
public static void mai
System.out.println
}
}
Run Ctrl+F11
Debug F11
Coverage Ctrl+Shift+F11
Run History
Run As
Run Configurations...
Debug History
Debug As
Debug Configurations...
Coverage History
Coverage As
Coverage Configurations...
Toggle Breakpoint Ctrl+Shift+B
Toggle Tracepoint
Toggle Line Breakpoint
Toggle Watchpoint
Toggle Method Breakpoint
Skip All Breakpoints Ctrl+Alt+B
Remove All Breakpoints
Add Java Exception Breakpoint...
Add Class Load Breakpoint...
All References...

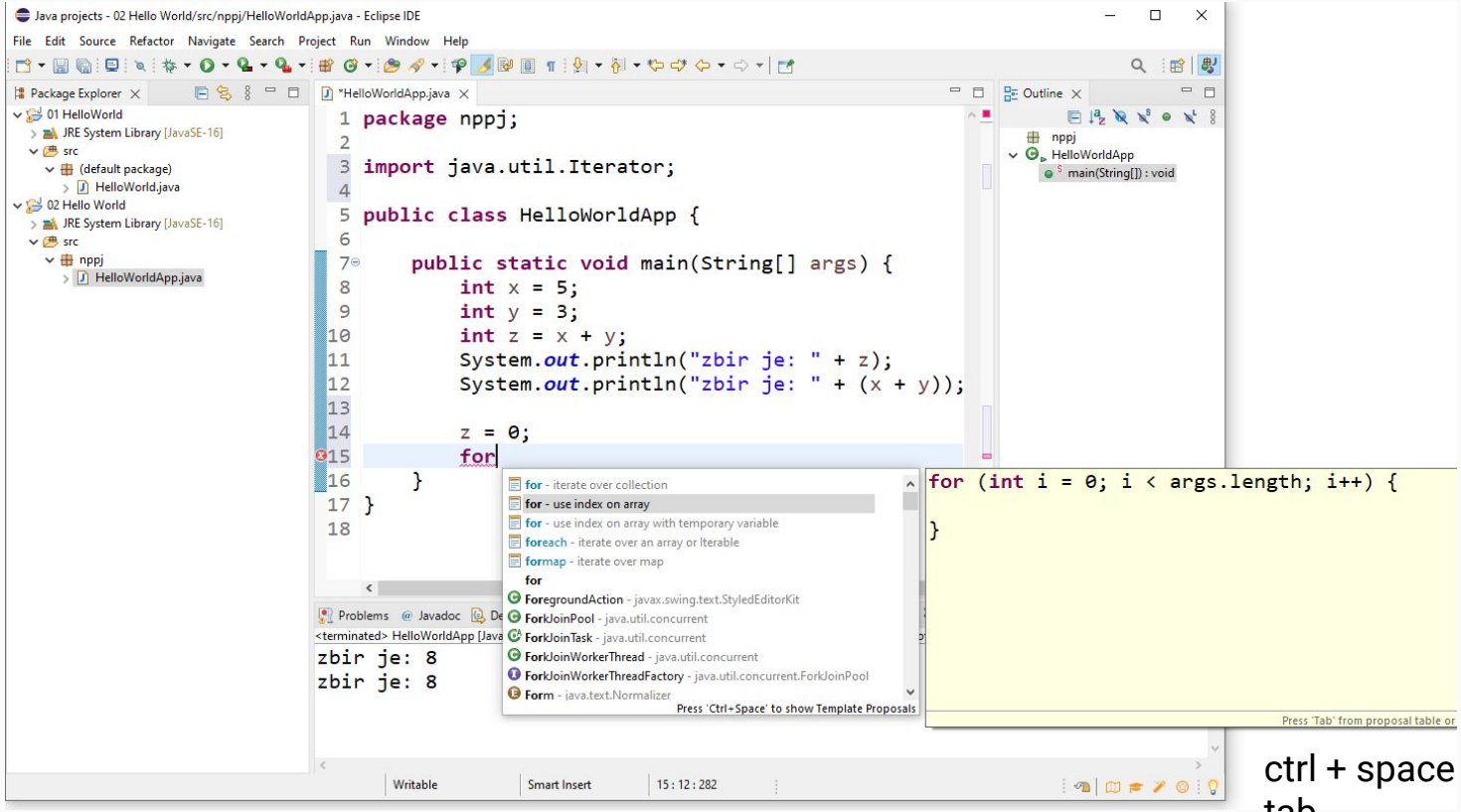
F11


Java projects - 02 Hello World/src/nppj/HelloWorldApp.java - Eclipse IDE
File Edit Source Refactor Navigate Search Project Run Window Help
Package Explorer
01 HelloWorld
JRE System Library [JavaSE-16]
src
(default package)
HelloWorld.java
02 Hello World
JRE System Library [JavaSE-16]
src
nppj
HelloWorldApp.java
HelloWorldApp.java
1 package nppj;
2
3 public class HelloWorldApp {
4
5 public static void main(String[] args)
6 System.out.println("Hello World!");
7 }
8
9 }
10
Outline
nppj
HelloWorldApp
main(String[]) : void
Problems Javadoc Declaration Console Search
<terminated> HelloWorldApp [Java Application] C:\Users\Dunja\.p2\pool\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_17.0.1.v20211
Hello World!
Writable
Smart Insert
10 : 1 : 140


.settings
bin
src
.classpath
.project
HelloWorldApp.java
HelloWorldApp.class

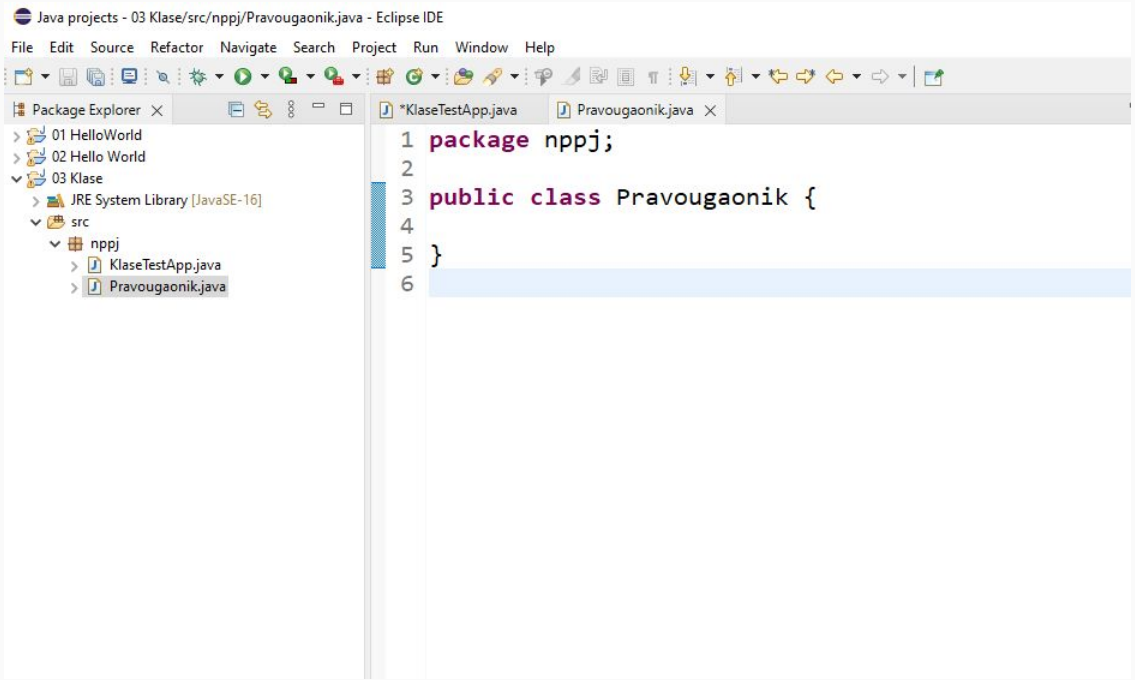

Java projects - 02 Hello World/src/nppj/HelloWorldApp.java - Eclipse IDE
File Edit Source Refactor Navigate Search Project Run Window Help
Package Explorer
01 HelloWorld
JRE System Library [JavaSE-16]
src
(default package)
HelloWorld.java
02 Hello World
JRE System Library [JavaSE-16]
src
nppj
HelloWorldApp.java
*HelloWorldApp.java
1 package nppj;
2
3 public class HelloWorldApp {
4
5 public static void main(String[] args)
6 System.out.println("Hello World!");
7 kgh;
8 }
9 }
10
kgh cannot be resolved
4 quick fixes available:
Create local variable 'kgh'
Create field 'kgh'
Create parameter 'kgh'
Create constant 'kgh'
Outline
nppj
HelloWorldApp
main(String[]) : void
Problems Javadoc Declaration Console Search
<terminated> HelloWorldApp [Java Application] C:\Users\Dunja\.p2\pool\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_17.0.1.v20211
Hello World!

```
package nppj;

public class HelloWorldApp {

	public static void main(String[] args) {
		int x = 5;
		int y = 3;
		int z = x + y;

		System.out.println("zbir je: " + z);
		System.out.println("zbir je: " + (x + y));
	}
}
```

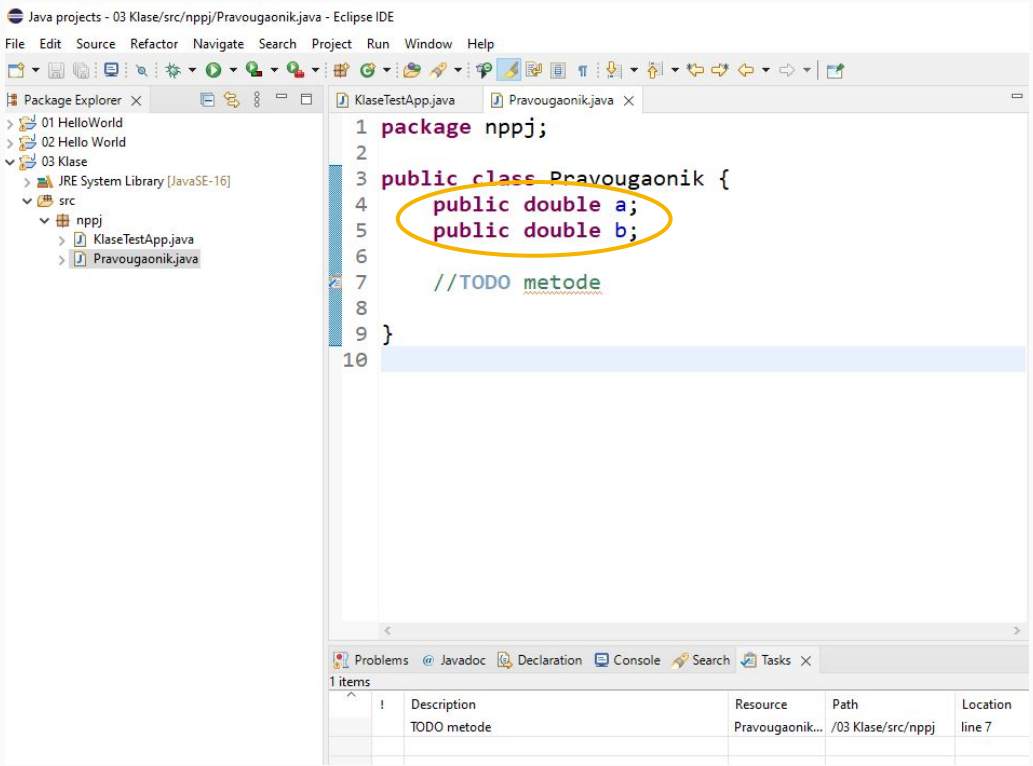


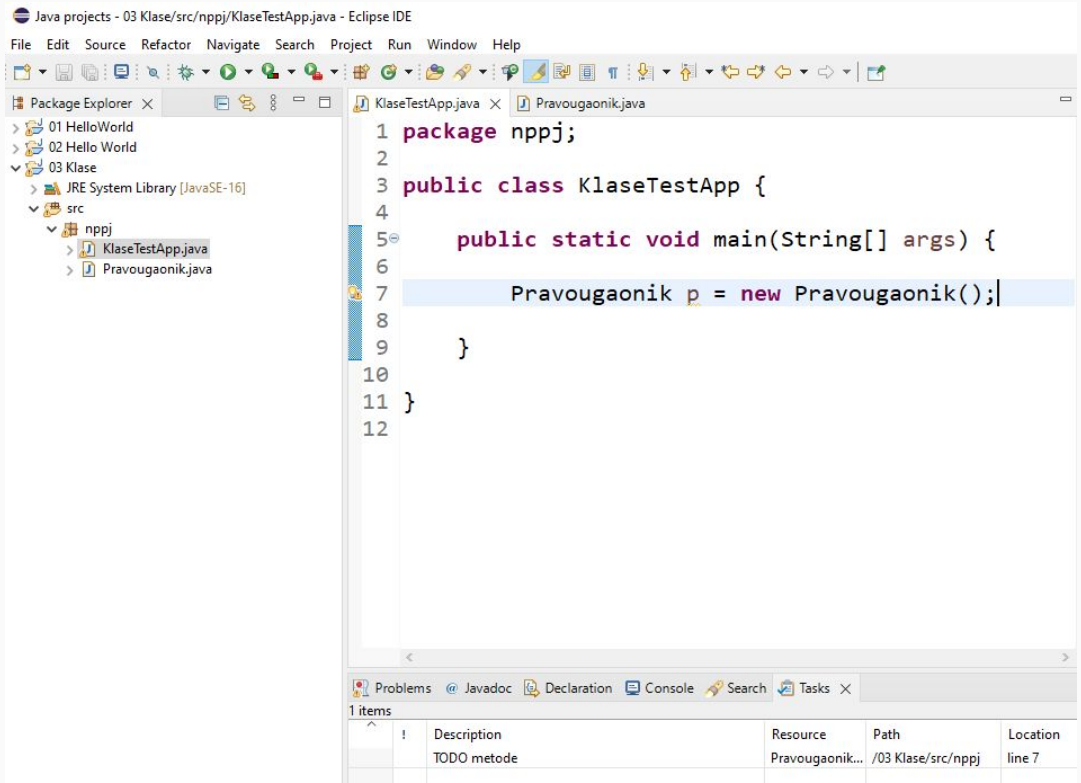
ctrl + space
tab

```
package nppj;

public class HelloWorldApp {

	public static void main(String[] args) {
		int x = 5;
		int y = 3;
		int z = x + y;
		System.out.println("zbir je: " + z);
		System.out.println("zbir je: " + (x + y));

		z = 0;
		for (int i = 0; i < 10; i++) {
			z += i;
		}
		System.out.println("zbir je: " + z);
	}
}
```



fajl se zove isto kao klasa


Java projects - 03 Klase/src/nppj/Pravougaonik.java - Eclipse IDE
File Edit Source Refactor Navigate Search Project Run Window Help
Package Explorer
01 HelloWorld
02 Hello World
03 Klase
JRE System Library [JavaSE-16]
src
nppj
KlaseTestApp.java
Pravougaonik.java
KlaseTestApp.java
Pravougaonik.java
1 package nppj;
2
3 public class Pravougaonik {
4 public double a;
5 public double b;
6
7 //TODO metode
8
9 }
10
Problems Javadoc Declaration Console Search Tasks
1 items
! Description Resource Path Location
TODO metode Pravougaonik... /03 Klase/src/nppj line 7


Java projects - 03 Klase/src/nppj/KlaseTestApp.java - Eclipse IDE
File Edit Source Refactor Navigate Search Project Run Window Help
Package Explorer
01 HelloWorld
02 Hello World
03 Klase
JRE System Library [JavaSE-16]
src
nppj
KlaseTestApp.java
Pravougaonik.java
KlaseTestApp.java
Pravougaonik.java
1 package nppj;
2
3 public class KlaseTestApp {
4
5 public static void main(String[] args) {
6
7 Pravougaonik p = new Pravougaonik();
8
9 }
10
11 }
12
Problems Javadoc Declaration Console Search Tasks
1 items
! Description Resource Path Location
TODO metode Pravougaonik... /03 Klase/src/nppj line 7

```
package nppj;

public class Pravougaonik {
	public double a;
	public double b;

	//TODO metode
}
```

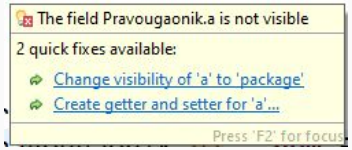
```
package nppj;

public class KlaseTestApp {

	public static void main(String[] args) {

		Pravougaonik p = new Pravougaonik();

	}
}
```

```
package nppj;

public class Pravougaonik {
	public double a;
	public double b;

	//TODO metode
}
```

```
package nppj;

public class KlaseTestApp {

	public static void main(String[] args) {

		Pravougaonik p = new Pravougaonik();
		p.a = 5;
		p.b = 3;
	}
}
```

```
package nppj;

public class Pravougaonik {
	private double a;
	private double b;

	//TODO metode
}
```

```
package nppj;

public class KlaseTestApp {

	public static void main(String[] args) {

		Pravougaonik p = new Pravougaonik();
		p.a = 5;
		p.b = 3;
	}
}
```



- private → samo u klasi
- protected → sve klase u paketu + sve nasleđene klase u drugom paketu
- public → sve klase
- default → sve klase u paketu
  **kad se ne navede*