Napredno programiranje i programski jezici

07 Java

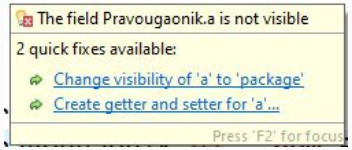
Fakultet tehničkih nauka, Novi Sad
23-24/Z
Dunja Vrbaški

```
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;
	}
}
```

```java
package nppj;

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

	//TODO metode
}
```

```java
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*

```
package nppj;

public class KlaseTestApp {

	public static void main(String[] args) {
		int x = 5;
		Pravougaonik p = new Pravougaonik();
	}
}
```

Tipovi:

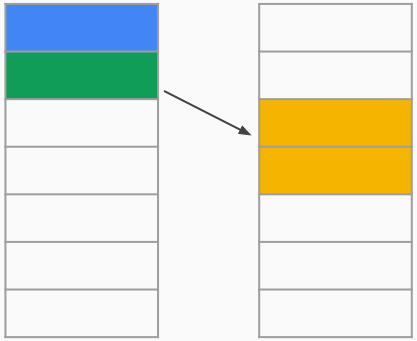
primitivni, vrednosni (int, double, boolean,...)

lokalne promenljive u metodama i parametri → stek

objekti

sami objekti, sadržaj → heap

pristupa im se preko **referenci**



C++

```
Pravougaonik p1;
Pravougaonik* pp2 = new Pravougaonik();
```

p1 - postoji pravougaonik u memoriji
(pozvan je ctor bez parametara)

pp2 - postoji objekat u memoriji

Pravougaonik *pp1 = &p1;
Pravougaonik &pRef = p1; (čvrsto vezana za podatak)

Java

```
Pravougaonik p1;
Pravougaonik p2 = new Pravougaonik();
```

p1 - deklarisana je referenca na pravougaonik
ali pravougaonik u memoriji ne postoji

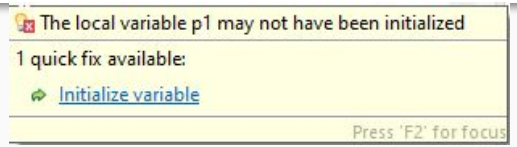
p2 - deklarisana je referenca i definisana da se odnosi na novokreirani pravougaonik u memoriji

nema *
nema &
(ograničeno)

⇒

```
Pravougaonik p1;
Pravougaonik p2 = new Pravougaonik();

p1 = new Pravougaonik();
p1 = p2;
p1 = null;
```

```
public static void main(String[] args) {
	Pravougaonik p1;
	Pravougaonik p2 = new Pravougaonik();

	System.out.println(p1.a);
}
```



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

```
public static void main(String[] args) {
	int x;
	Pravougaonik p;
}
```

POLJA u klasi

inicijalne vrednosti
a = 0, b = 0

(boolean - false, objekti - null)

LOKALNE promenljive

inicijalne vrednosti
nema!

Ne mogu da se koriste dok se ne inicijalizuju

```
int x;
Pravougaonik p;

if (x > 5)
 ...

if (p.a > 5)
 ...
```

C++	može, postoji i x i p , zatečeno stanje u memoriji
Java	ne može, zahteva se inicijalizacija

```
int x;
Pravougaonik p;

if (x > 5)
 ...

if (p.a > 5)
 ...
```

```
int x = 3;
Pravougaonik p = new Pravougaonik();

if (x > 5)
 ...

if (p.a > 5)
 ...
```

```
int x = 3;
Pravougaonik p = new Pravougaonik();
Pravougaonik p = null;

if (x > 5)
 ...

if (p.a > 5)
 ...
```

Jeste inicijalizacija

može da se javi greška iz drugih razloga
(prevodilac zna da je tu vrednost null i da ne vredi da pristupamo poljima)

```
public static void main(String[] args) {
	int x1;
	if (x1 > 5)
		System.out.println("test");

	int x2 = 3;
	if (x2 > 5)
		System.out.println("test");

	Pravougaonik p1;
	if (p1.a > 5)
		System.out.println("test");

	Pravougaonik p2 = null;
	if (p2.a > 5)
		System.out.println("test");

	Pravougaonik p3 = new Pravougaonik();
	if (p3.a > 5)
		System.out.println("test");
}
```

```
The local variable x1 may not have been initialized
```

```
The local variable p1 may not have been initialized
```

```
Null pointer access: The variable p can only be null at this location
```

```
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();

	}
}
```

```
public static void print(Pravougaonik p) {
	System.out.println("a = " + p.a + " b = " + p.b + "\n");
}

public static void main(String[] args) {
	Pravougaonik p1 = new Pravougaonik();
	p1.a = 3; p1.b = 5;
	System.out.print("P1: "); print(p1);

	Pravougaonik p2 = new Pravougaonik();
	p2.a = 2; p2.b = 4;
	System.out.print("P2: "); print(p2);
}
```

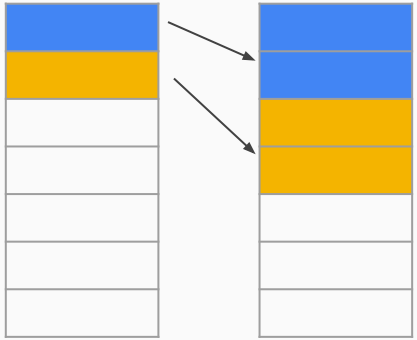
?

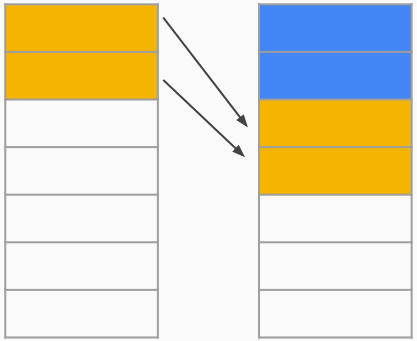
```
public static void print(Pravougaonik p) {
	System.out.println("a = " + p.a + " b = " + p.b + "\n");
}

public static void main(String[] args) {
	Pravougaonik p1 = new Pravougaonik();
	p1.a = 3; p1.b = 5;
	System.out.print("P1: "); print(p1);

	Pravougaonik p2 = new Pravougaonik();
	p2.a = 2; p2.b = 4;
	System.out.print("P2: "); print(p2);

	p1 = p2;
	System.out.print("P1: "); print(p1);
	System.out.print("P2: "); print(p2);
}
```

?

```
public static void print(Pravougaonik p) {
	System.out.println("a = " + p.a + " b = " + p.b + "\n");
}

public static void main(String[] args) {
	Pravougaonik p1 = new Pravougaonik();
	p1.a = 3; p1.b = 5;
	System.out.print("P1: "); print(p1);

	Pravougaonik p2 = new Pravougaonik();
	p2.a = 2; p2.b = 4;
	System.out.print("P2: "); print(p2);

	p1 = p2;
	System.out.print("P1: "); print(p1);
	System.out.print("P2: "); print(p2);
}
```

```
P1: a = 3.0 b = 5.0

P2: a = 2.0 b = 4.0

P1: a = 2.0 b = 4.0

P2: a = 2.0 b = 4.0
```

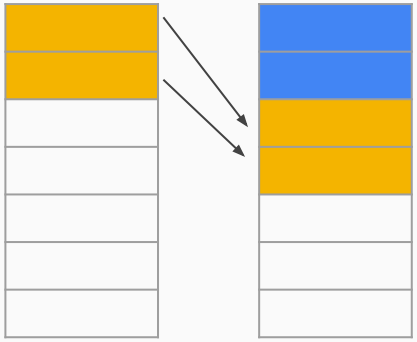




```
public static void print(Pravougaonik p) {
	System.out.println("a = " + p.a + " b = " + p.b + "\n");
}

public static void main(String[] args) {
	Pravougaonik p1 = new Pravougaonik();
	p1.a = 3; p1.b = 5;
	System.out.print("P1: "); print(p1);

	Pravougaonik p2 = new Pravougaonik();
	p2.a = 2; p2.b = 4;
	System.out.print("P2: "); print(p2);

	p1 = p2;
	System.out.print("P1: "); print(p1);
	System.out.print("P2: "); print(p2);

	p1.a += 100;
	System.out.print("P1: "); print(p1);
	System.out.print("P2: "); print(p2);
}
```

?

```
public static void print(Pravougaonik p) {
	System.out.println("a = " + p.a + " b = " + p.b + "\n");
}

public static void main(String[] args) {
	Pravougaonik p1 = new Pravougaonik();
	p1.a = 3; p1.b = 5;
	System.out.print("P1: "); print(p1);

	Pravougaonik p2 = new Pravougaonik();
	p2.a = 2; p2.b = 4;
	System.out.print("P2: "); print(p2);

	p1 = p2;
	System.out.print("P1: "); print(p1);
	System.out.print("P2: "); print(p2);

	p1.a += 100;
	System.out.print("P1: "); print(p1);
	System.out.print("P2: "); print(p2);
}
```

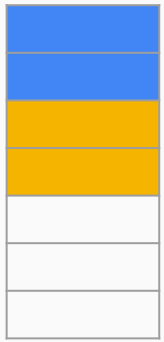


```
P1: a = 3.0 b = 5.0

P2: a = 2.0 b = 4.0

P1: a = 2.0 b = 4.0

P2: a = 2.0 b = 4.0

P1: a = 102.0 b = 4.0

P2: a = 102.0 b = 4.0
```

C++

```
p1 = p2;
```

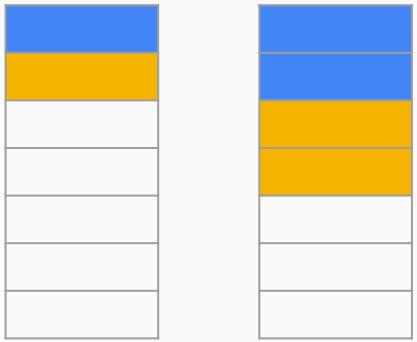
Kopira se sadržaj p2 u p1
shallow copy
preklopljeni operator za deep copy



Java

```
p1 = p2;
```

Ne kopira se sadržaj objekta
Kopira se referenca
Promenljiva p1 se sada odnosi na isto što i p2
(*referenca p1 pokazuje na isto što i p2*)



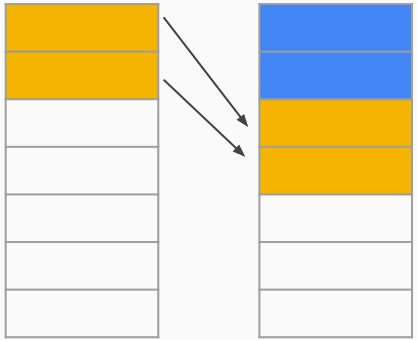
```java
public static void print(Pravougaonik p) {
	System.out.println("...");
}

public static void promeni(Pravougaonik p) {
	p.a += 200;
}
```

```java
public static void main(String[] args) {
	Pravougaonik p1 = new Pravougaonik();
	p1.a = 3; p1.b = 5;
	System.out.print("P1: "); print(p1);

	Pravougaonik p2 = new Pravougaonik();
	p2.a = 2; p2.b = 4;
	System.out.print("P2: "); print(p2);

	p1 = p2;
	System.out.print("P1: "); print(p1);
	System.out.print("P2: "); print(p2);

	p1.a += 100;
	System.out.print("P1: "); print(p1);
	System.out.print("P2: "); print(p2);

	promeni(p2);
	System.out.print("P1: "); print(p1);
	System.out.print("P2: "); print(p2);
}
```

?

```
public static void print(Pravougaonik p) {
	System.out.println("...");
}

public static void promeni(Pravougaonik p) {
	p.a += 200;
}
```

```
P1: a = 3.0 b = 5.0

P2: a = 2.0 b = 4.0

P1: a = 2.0 b = 4.0

P2: a = 2.0 b = 4.0

P1: a = 102.0 b = 4.0

P2: a = 102.0 b = 4.0

P1: a = 302.0 b = 4.0

P2: a = 302.0 b = 4.0
```



```
public static void main(String[] args) {
	Pravougaonik p1 = new Pravougaonik();
	p1.a = 3; p1.b = 5;
	System.out.print("P1: "); print(p1);

	Pravougaonik p2 = new Pravougaonik();
	p2.a = 2; p2.b = 4;
	System.out.print("P2: "); print(p2);

	p1 = p2;
	System.out.print("P1: "); print(p1);
	System.out.print("P2: "); print(p2);

	p1.a += 100;
	System.out.print("P1: "); print(p1);
	System.out.print("P2: "); print(p2);

	promeni(p2);
	System.out.print("P1: "); print(p1);
	System.out.print("P2: "); print(p2);
}
```

C++

```
public:
   void promeni(Pravougaonik p) {
       p.a += 200;
   }

   void promeni(Pravougaonik &p) {
       p.a += 200;
   }

   void promeni(Pravougaonik *p) {
       p->a += 200;
   }
```

Java

```
public static void promeni(Pravougaonik p) {
       p.a += 200;
}
```

ZADATAK: Realizovati klasu Pravougaonik.

```
package nppj;

public class Pravougaonik {

	private double a;
	private double b;

	public Pravougaonik(double a, double b) {
		this.a = a;
		this.b = b;
	}
}
```

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

	public Pravougaonik(double a, double b) {
		this.a = a;
		this.b = b;
	}
}
```

```
public class FigureApp {

	public static void main(String[] args) {
		Pravougaonik p = new Pravougaonik(3, 5);
		~~Pravougaonik p2 = new Pravougaonik();~~
	}
}
```

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

	public Pravougaonik(double a, double b) {
		this.a = a;
		this.b = b;
	}
	public double getA() {
		return a;
	}

	public void setA(double a) {
		this.a = a;
	}

	public double getB() {
		return b;
	}

	public void setB(double b) {
		this.b = b;
	}
}
```

```
public class FigureApp {

	public static void main(String[] args) {
		Pravougaonik p = new Pravougaonik(3, 5);
	}
}
```

desni klik > source > generate get/set

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

	public Pravougaonik(double a, double b) {
		this.a = a;
		this.b = b;
	}
	public double getA() const {
		return a;
	}

	public void setA(double a) {
		this.a = a;
	}

	public double getB() const {
		return b;
	}

	public void setB(double b) {
		this.b = b;
	}
}
```

```
public class FigureApp {

	public static void main(String[] args) {
		Pravougaonik p = new Pravougaonik(3, 5);
	}
}
```

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

	public Pravougaonik(double a, double b) {
		this.a = a;
		this.b = b;
	}
	public double getA() ...
	public void setA(double a) ...
	public double getB() ...
	public void setB(double b) ...

	public double getO() {
		return 2*(a + b);
	}

	public double getP() {
		return a * b;
	}

}
```

```
public static void main(String[] args) {
	Pravougaonik p = new Pravougaonik(3, 5);
	System.out.println("P = " + p.getP());
	System.out.println("O = " + p.getO());
}
```