



TECHIN



04 Cikliniai algoritmai (while, for)

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Turinys

- Increment/Decrement;
- Nežinomo kartojimų skaičiaus ciklas WHILE;
- break
- Žinomo kartojimų skaičiaus ciklas FOR;
- continue



Increment/Decrement

```
int x = 5;

// Increment
x++;      // x = x + 1;
System.out.println("x = " + x); // 6

// Decrement
int y = 10;
y--;      // y = y - 1;
System.out.println("y = " + y); // 9
```



Prefix/postfix

| Operator | Operator name | Sample expression | Explanation |
|-----------------|-------------------|-------------------|---|
| <code>++</code> | prefix increment | <code>++a</code> | Increment a by 1, then use the new value of a in the expression in which a resides. |
| <code>++</code> | postfix increment | <code>a++</code> | Use the current value of a in the expression in which a resides, then increment a by 1. |
| <code>--</code> | prefix decrement | <code>--b</code> | Decrement b by 1, then use the new value of b in the expression in which b resides. |
| <code>--</code> | postfix decrement | <code>b--</code> | Use the current value of b in the expression in which b resides, then decrement b by 1. |



Prefix/postfix

```
int i = 1;  
System.out.println(i++); // 1  
System.out.println(i); // 2  
System.out.println(++i); // 3  
System.out.println(i); // 3
```



Nežinomo kartojimų skaičiaus ciklas WHILE

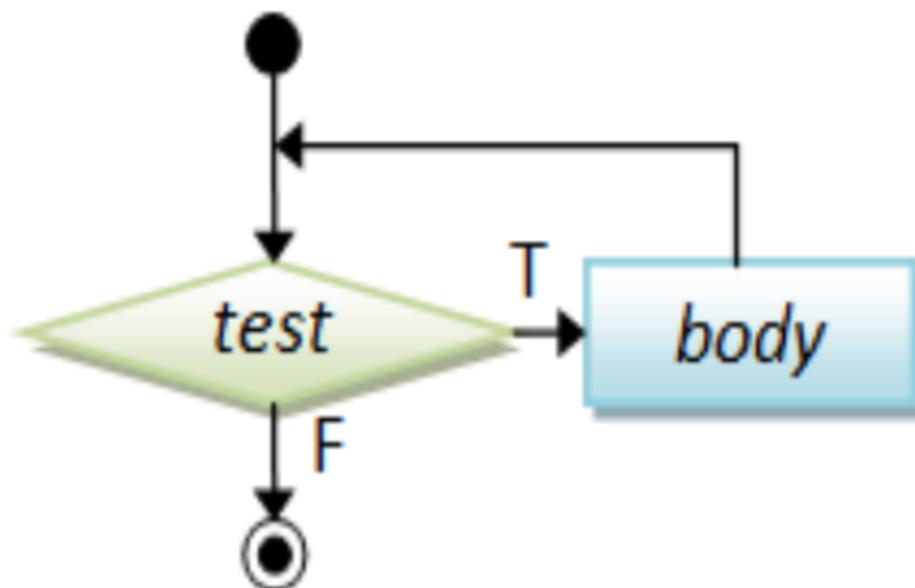
100 times {
 System.out.println("Welcome to Java!");
 System.out.println("Welcome to Java!");
 ...
 System.out.println("Welcome to Java!");

```
int count = 0;  
while (count < 100) {  
    System.out.println("Welcome to Java!");  
    count++;  
}
```

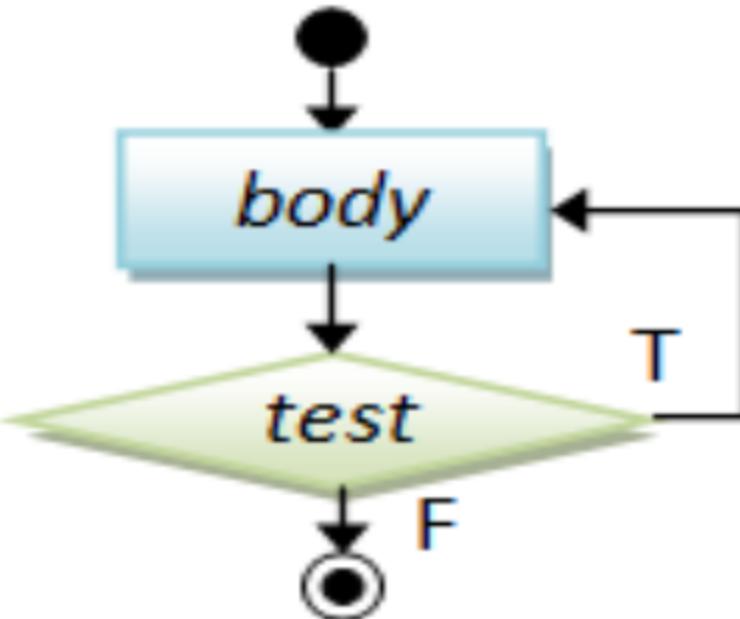


Nežinomo kartojimų skaičiaus ciklas WHILE

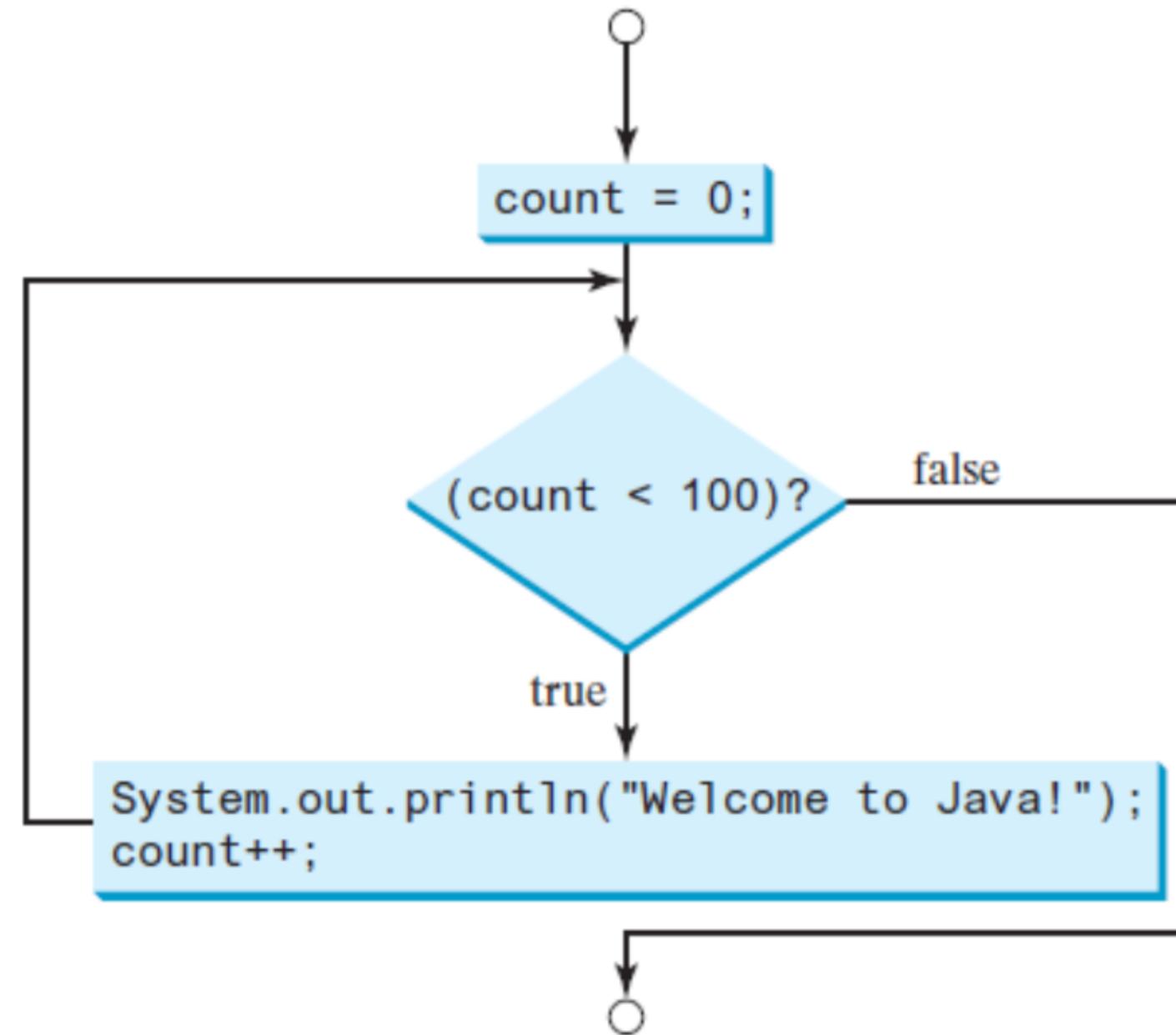
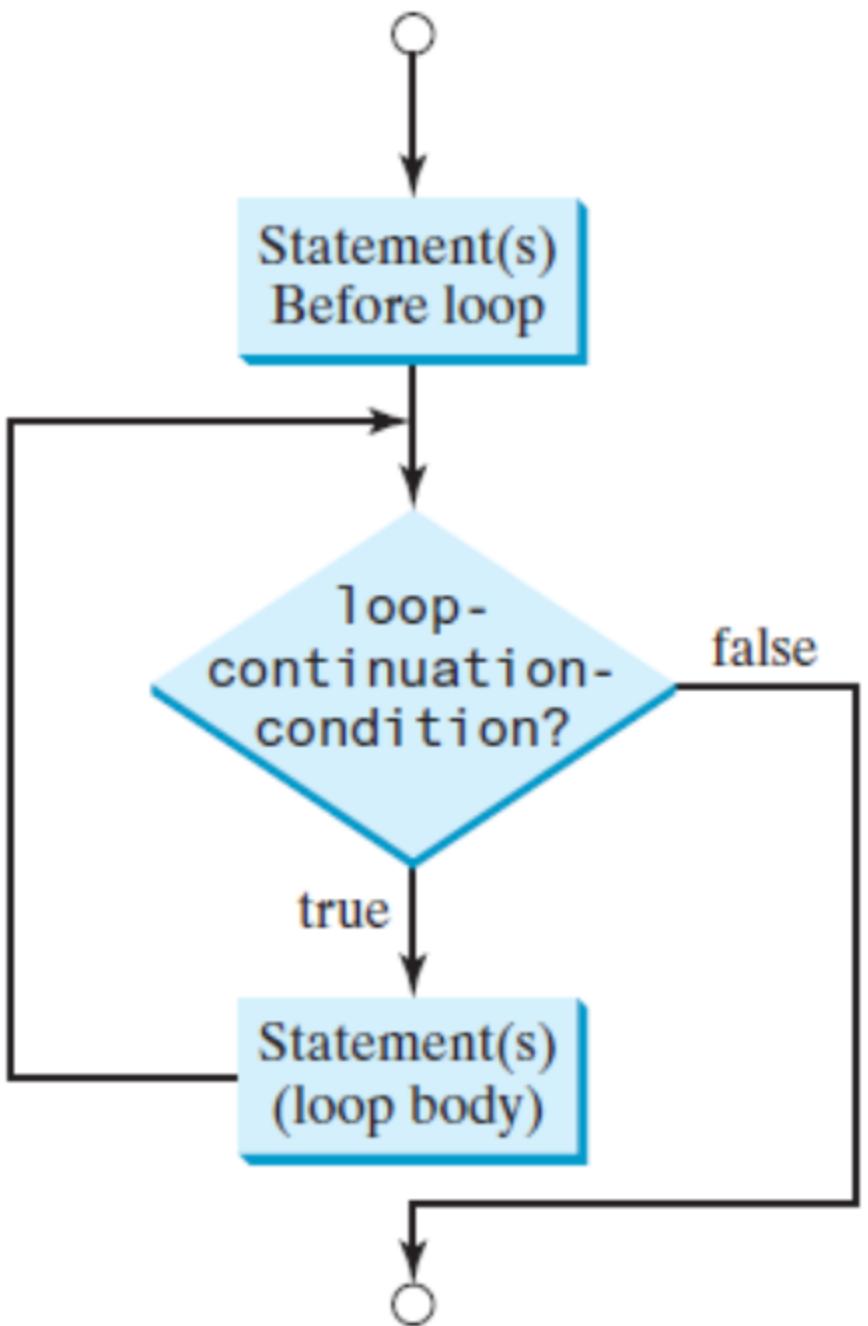
```
// while-do loop  
while ( test ) {  
    body;  
}
```



```
// do-while loop  
do {  
    body;  
}  
while ( test );
```



Ciklas WHILE

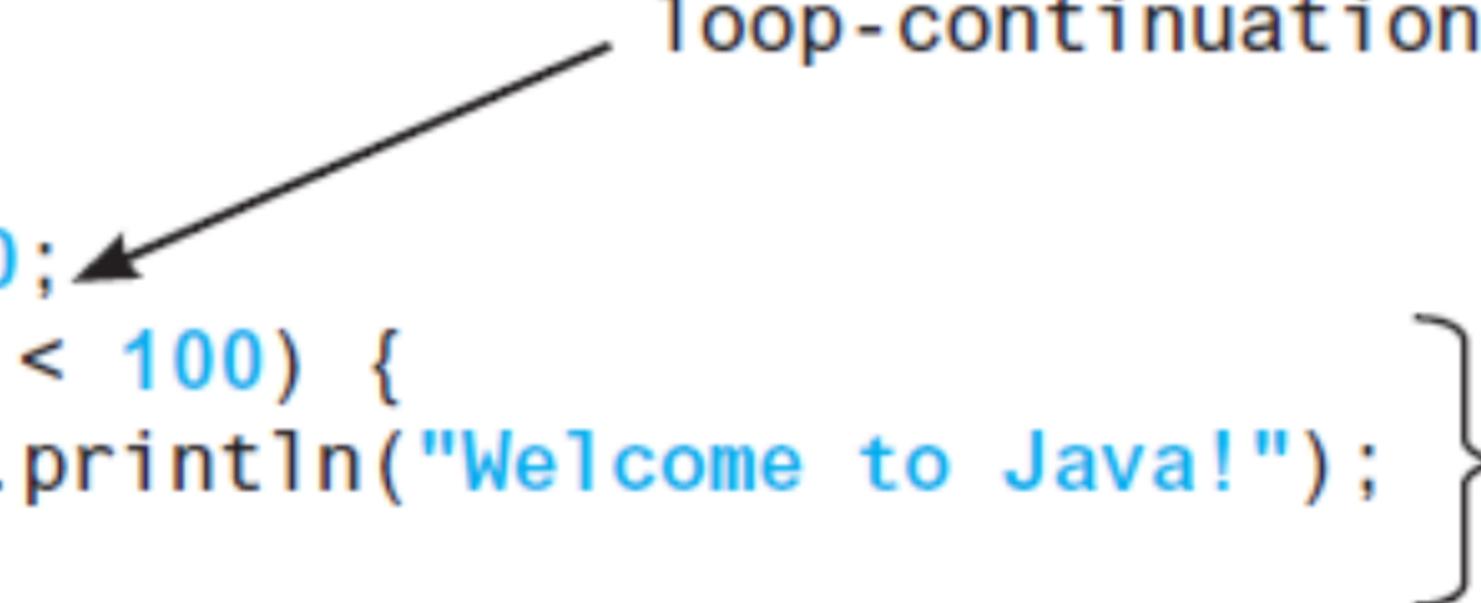


Ciklas WHILE

```
int count = 0;  
while (count < 100) {  
    System.out.println("Welcome to Java!"); } }  
    count++;  
}
```

loop-continuation-condition

loop body



Pavyzdys while

```
int i = 0;  
while (i < 11) {  
    System.out.print(i + " ");  
    i++;  
}  
// 0 1 2 3 4 5 6 7 8 9 10
```



Pavyzdys do while

```
int count = 1;  
do {  
    System.out.print(count + " ");  
    count++;  
} while (count < 11);
```

```
1 2 3 4 5 6 7 8 9 10
```



While vs do-while



While vs do-while

```
int countDown;

System.out.println("While loop:");

countDown = 0;
while (countDown > 0) {
    System.out.println("Hello");
    countDown = countDown - 1;
}

System.out.println("-----");
System.out.println("Do-while loop:");

countDown = 0;
do {
    System.out.println("Hello");
    countDown = countDown - 1;
} while (countDown > 0);
```

While loop:

Do-while loop:
Hello



Pavyzdys infinite loop

```
int i = 10;  
  
while (i > 1) {  
    System.out.println(i);  
    i++;  
}
```

```
while (true) {  
    System.out.println("I can program!");  
}
```



Pavyzdys While

```
int number1 = (int) (Math.random() * 10);
int number2 = (int) (Math.random() * 10);

Scanner input = new Scanner(System.in);

System.out.print("What is " + number1 + " + " + number2 + "? ");
int answer = input.nextInt();

while (number1 + number2 != answer) {
    System.out.print("Wrong answer. Try again."
                    + " What is " + number1 + " + " + number2 + "? ");
    answer = input.nextInt();
}

System.out.println("You got it!");
```

```
What is 6 + 1? 4
Wrong answer. Try again. What is 6 + 1? 8
Wrong answer. Try again. What is 6 + 1? 7
You got it!
```



break

```
Scanner reader = new Scanner(System.in);

while (true) {
    System.out.println("I can program!");

    System.out.print("Continue? ('no' to quit)? ");
    String command = reader.nextLine();
    if (command.equals("no")) {
        break;
    }

    System.out.println("Thank you and see you later!");

    reader.close();
}
```

```
I can program!
Continue? ('no' to quit)? Hi
I can program!
Continue? ('no' to quit)? Hello
I can program!
Continue? ('no' to quit)? Bye
I can program!
Continue? ('no' to quit)? no
Thank you and see you later!
```



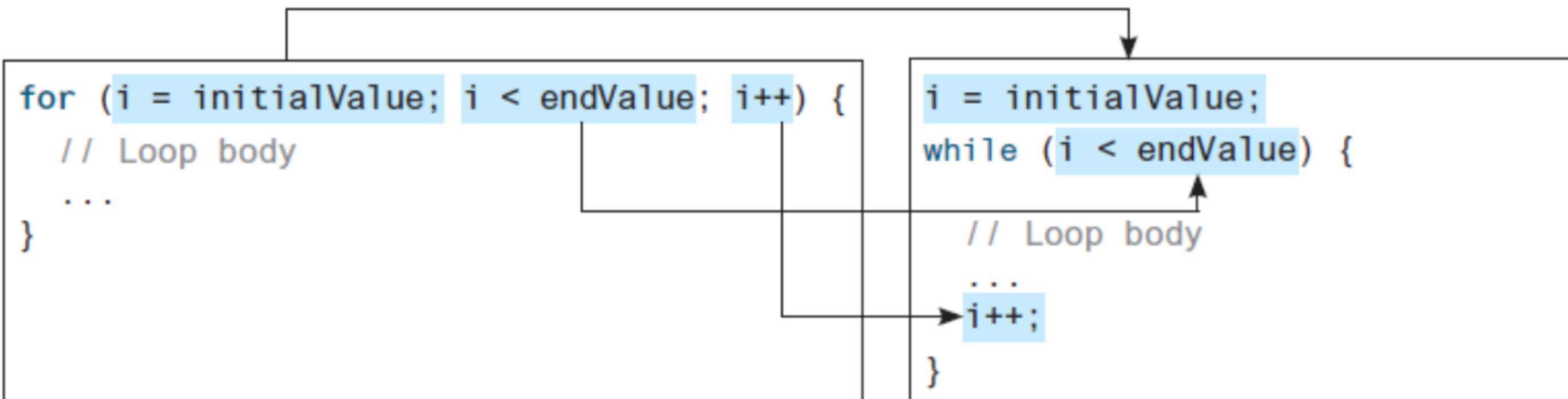
Žinomo kartojimų skaičiaus ciklas FOR

```
for /*Initialization*/ ; /*Condition*/ ; /* Iteration */ {  
    /* loop body */  
}
```

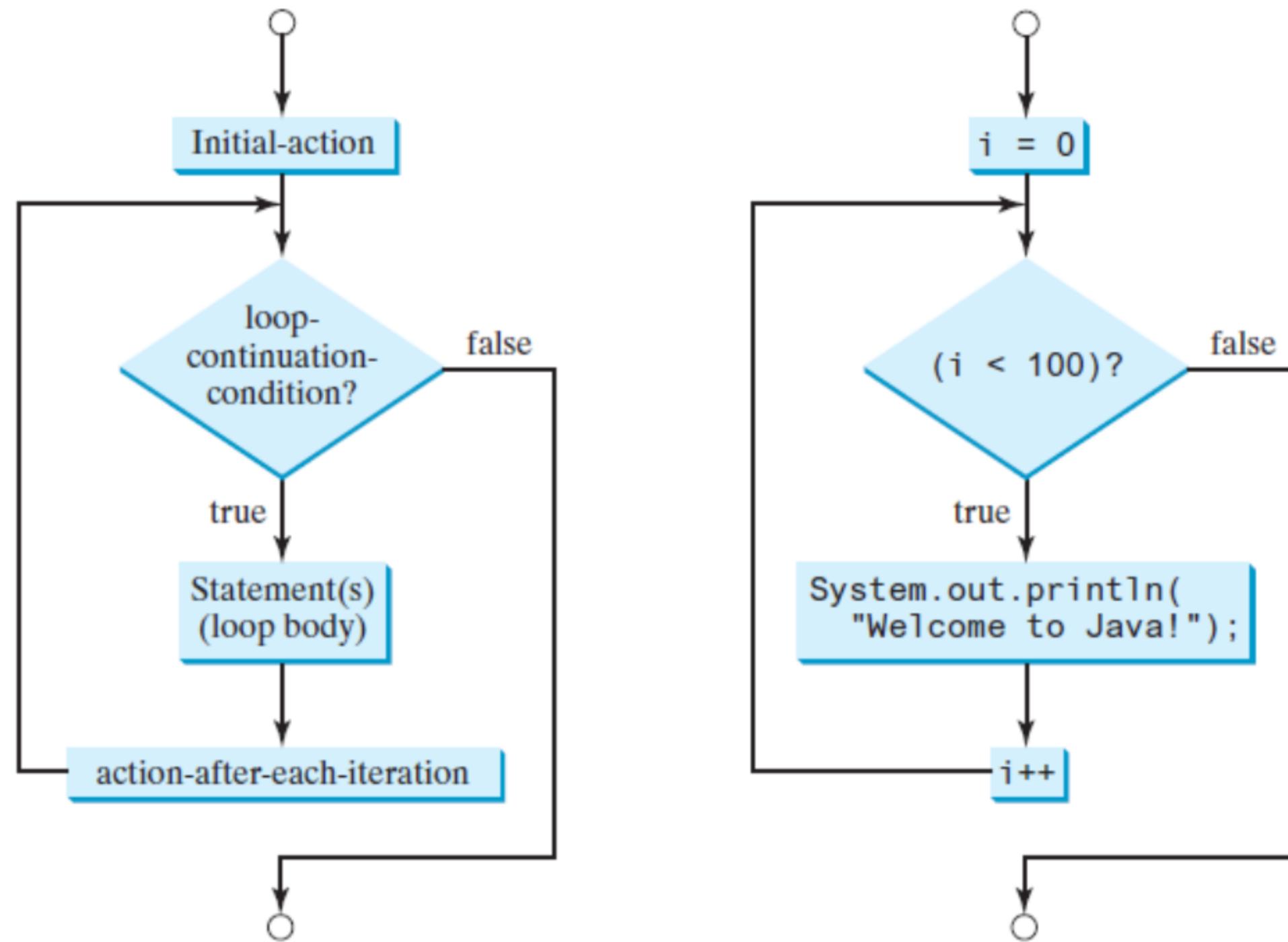
```
for /*inicjalizacija*/; /*loginė-išraiška*/; /*kitimo-žingsnis*/ {  
    // kartojami sakiniai  
}
```



Žinomo kartojimų skaičiaus ciklas FOR



Žinomo kartojimų skaičiaus ciklas FOR



for

```
for (int i = 1; i < 6; i++) {  
    System.out.println("i is " + i);  
}
```

```
i is 1  
i is 2  
i is 3  
i is 4  
i is 5
```



for (i scope)

```
for (int i = 1; i < 6; i++) {  
    System.out.println("i is " + i);  
}  
  
System.out.println(i); // nesikompiliuoja
```



for (i scope)

```
int i;  
  
for (i = 1; i < 6; i++) {  
    System.out.println("i is " + i);  
}  
  
System.out.println("After loop i is " + i);
```

```
i is 1  
i is 2  
i is 3  
i is 4  
i is 5  
After loop i is 6
```



for

```
int a = 5;
int b = 9;

for (int i = a; i < b; i++) {
    System.out.println("i = " + i);
}
```

```
i = 5
i = 6
i = 7
i = 8
```

```
int a = 5;
int b = 15;

for (int i = a; i < b; i = i + 2) {
    System.out.println("i = " + i);
}
```

```
i = 5
i = 7
i = 9
i = 11
i = 13
```



for

```
int a = 1;  
  
for (int i = 5; i < 11; i++) {  
    a = a * i;  
    System.out.println("Kai i = " + i + ", tai a = " + a);  
}
```

```
Kai i = 5, tai a = 5  
Kai i = 6, tai a = 30  
Kai i = 7, tai a = 210  
Kai i = 8, tai a = 1680  
Kai i = 9, tai a = 15120  
Kai i = 10, tai a = 151200
```



Pavyzdys (4) | FOR ir IF

Parenkite programą, kuri atspausdintų visus dviženklius skaičius dalius iš 6.

```
for (int i = 10; i < 100; i++) {  
    if (i % 6 == 0) {  
        System.out.print(i + " ");  
    }  
}
```

12 18 24 30 36 42 48 54 60 66 72 78 84 90 96



Pavyzdžiai* (5)

```
for (int x = 1; x < 2; x++) {  
    System.out.println(x); // Legal  
}  
System.out.println(x); // Not Legal! x is now out of scope  
// and can't be accessed.
```

```
for (int i = 0, j = 0; (i < 10) && (j < 10); i++, j++) {  
    System.out.println("i is " + i + " j is " + j);  
}
```

```
int i = 0;  
for (; i < 10;) {  
    i++;  
    // do some other work  
}
```



Sumos algoritmas

```
int sum = 0;  
for (int i = 0; i < 11; i++) {  
    sum = sum + i; // sum+=i;  
}  
System.out.println("sum = " + sum);
```

sum = 55

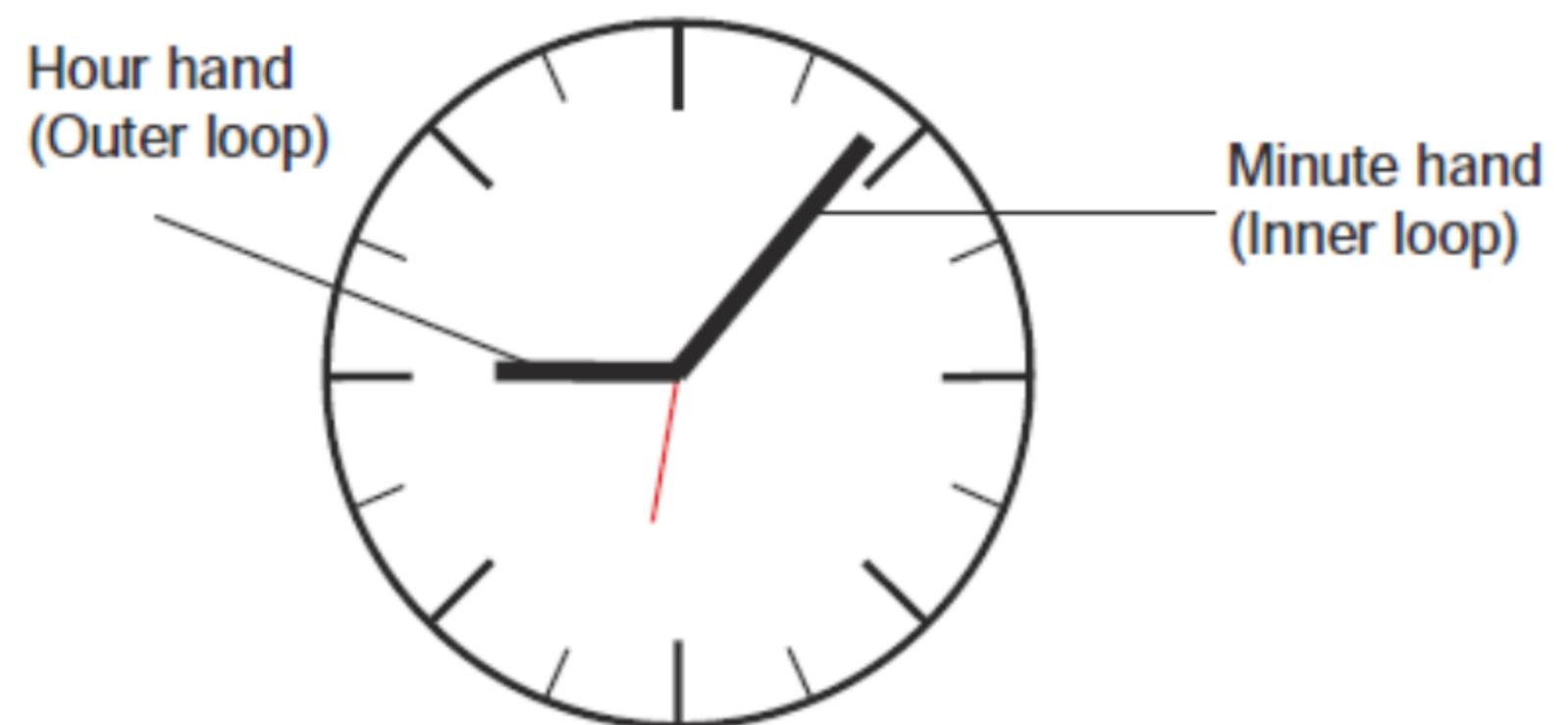


Kiekio algoritmas

```
int count = 0;
for (int i = 13; i < 24; i++) {
    if (i % 3 == 0) {
        count = count + 1; // count++
    }
}
System.out.println("count = " + count); // count = 3
```



Nested loops



1 hour = 60 minutes

1 hour = 1 complete revolution
by minute hand



Nested loops

```
//executes 6x60 times
for (int hrs = 1; hrs <= 6; hrs++) {          //outer loop
    for (int min = 0; min < 60; min++) { //inner loop
        System.out.println(hrs + ":" + min);
    }
}
```



Nested loops

```
int rowNum, columnNum;  
for (rowNum = 1; rowNum <= 3; rowNum++) {  
    for (columnNum = 1; columnNum <= 2; columnNum++)  
        System.out.print(" row " + rowNum + " column " + columnNum);  
    System.out.println();  
}
```

```
row 1 column 1 row 1 column 2  
row 2 column 1 row 2 column 2  
row 3 column 1 row 3 column 2
```



Nested loops

```
int size = 8;
for (int row = 1; row <= size; ++row) { // Outer loop
    for (int col = 1; col <= size; ++col) { // Inner loop
        System.out.print("# ");
    }
    System.out.println();
}
```

```
# # # # # # # #
# # # # # # # #
# # # # # # # #
# # # # # # # #
# # # # # # # #
# # # # # # # #
# # # # # # # #
# # # # # # # #
```



continue

```
double f = 0;
for(int i=-3; i<4; i++){
    if (i == 0)
        continue;

    f = (double) 1 / i;
    System.out.println("f(" + i + ") = " + f);
}
```

```
f(-3) = -0.3333333333333333
f(-2) = -0.5
f(-1) = -1.0
f(1) = 1.0
f(2) = 0.5
f(3) = 0.3333333333333333
```



labeled *continue* and *break*

```
boolean.isTrue = true;
outer: for (int i = 0; i < 5; i++) {
    while (isTrue) {
        System.out.println("Hello");
        break outer;
    } // end of inner while loop
    System.out.println("Outer loop."); // Won't print
} // end of outer for loop
System.out.println("Good-Bye");
```

Hello
Good-Bye



Dažna klaida!!!

```
for (int count = 1; count <= 10; count++) ; ← Problem  
System.out.println("Hello"); semicolon
```

