Free
eBook

100 Java tasks & Solutions

By Adam Higherstein

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Programming Exercises with Solutions!

Learning by doing!

Language now: Java

Free book (you can keep 1 copy)
This is the first version

Pls, give comments, feedback, new ideas to the 2. version!!

Comments can be sent to:
darry.robinson@gmail.com

Thank You!

Introduction

Try to do tasks first yourself without checking solutions!

Ask if you have problems.

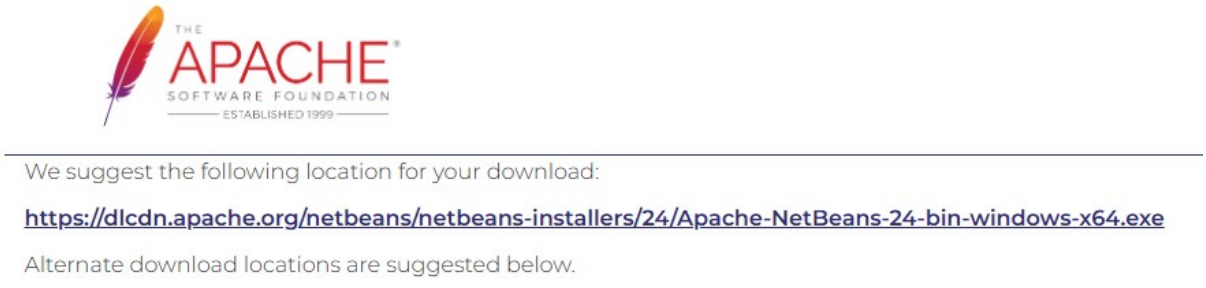
And finally check right solutions!

Check also author's YT Channel:
https://www.youtube.com/@adamhigherstein8986/videos

Tool that we use in this tutorial:

NetBeans

It can be downloaded from
https://www.apache.org/dyn/closer.lua/netbeans/netbeans-installers/24/Apache-NetBeans-24-bin-windows-x64.exe

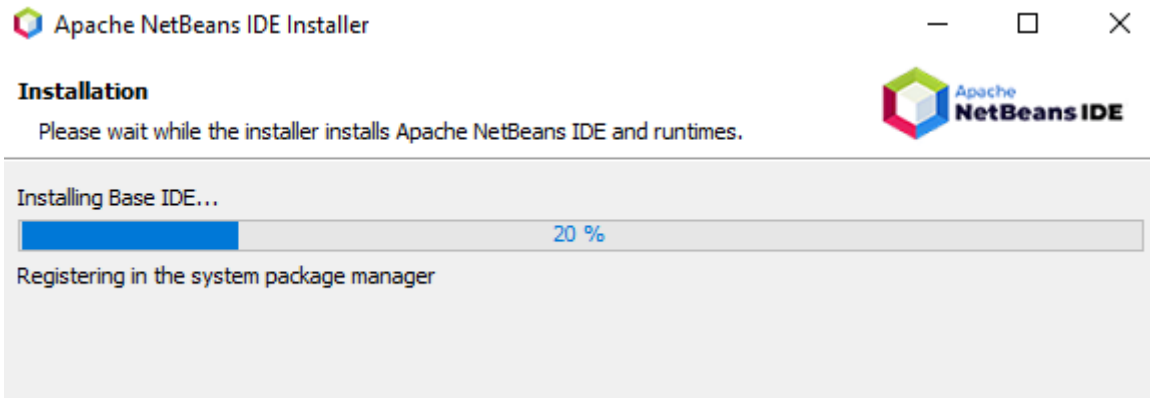


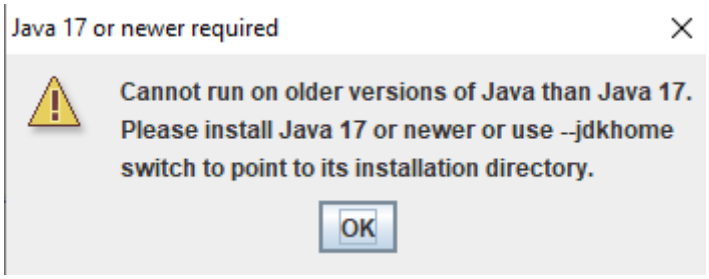
SET 1: Tool & basics

Topics:
Installation of programming tool
Testing installation with "Hello world!" classic code.
Variables and datatypes
Printing

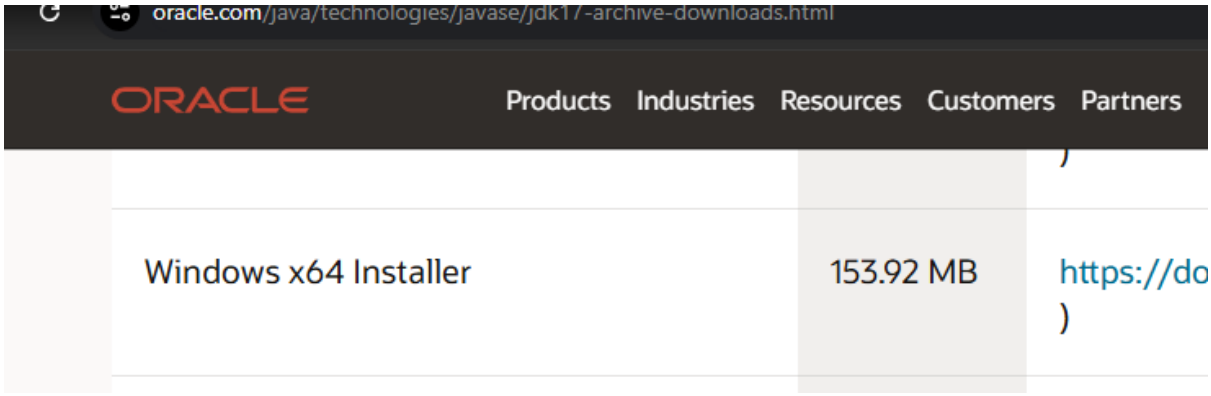
Task 1

Install NetBeans.

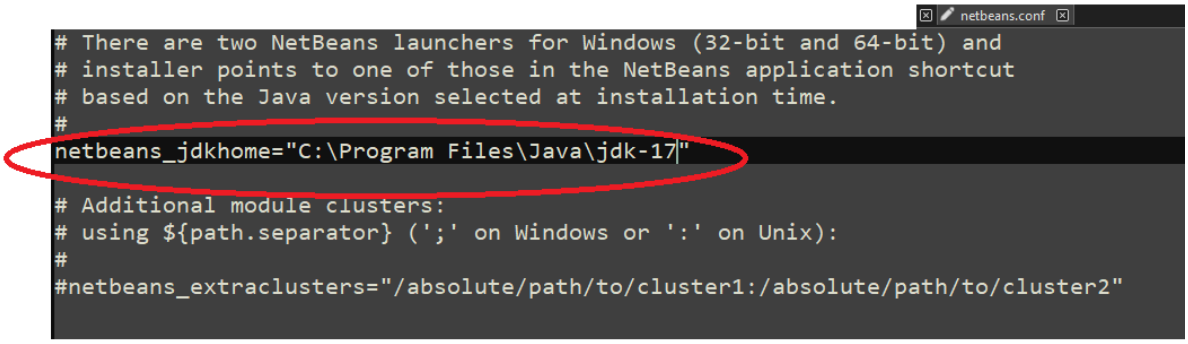




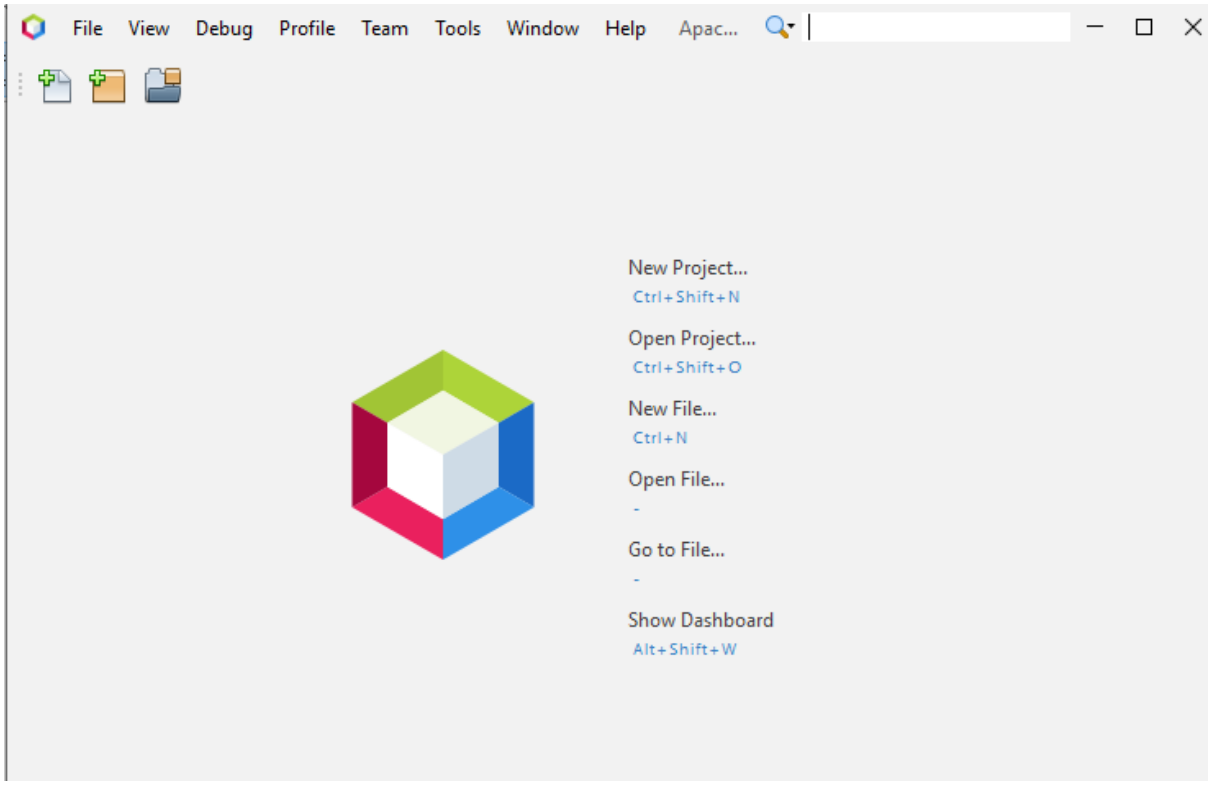
If your java is too old, you can download newer:

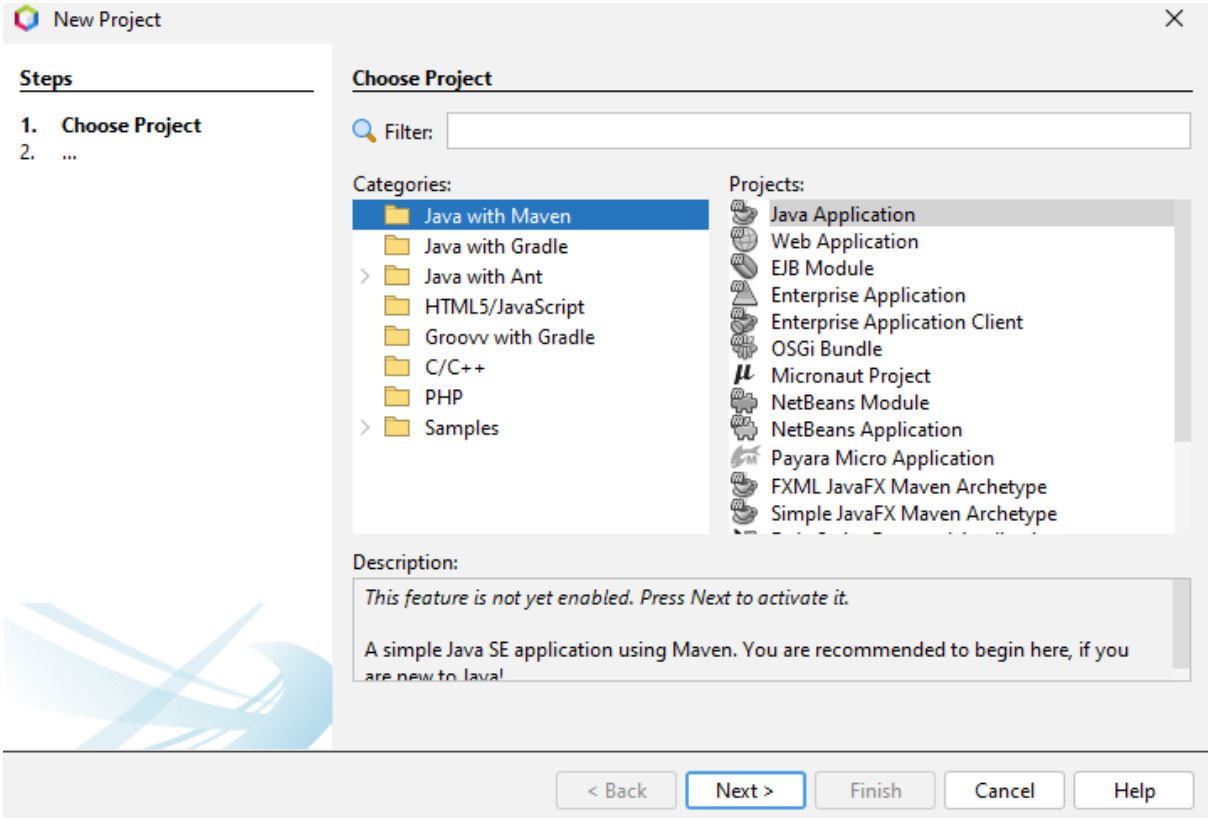


If NetBeans does not finf Java, check path:



Start the tool





Type this code, save the file and run the program

```
public class App1 {

    public static void main(String[] args) {

        System.out.println("Hello World!");

    }
}
```

This is the output:

```
--- exec:3.1.0:exec (default-cli) @ App1 ---
Hello World!
```

Task 2

Define suitable variables for these values:

a) 999999
b) 5.55555555555
c) 'x'
e) 2.33
f) 10
g) 300
h) 9 billions
i) 3 billions
j) true

Solution

```
int t1 = 999999;
double t2 = 5.55555555555;
char t3 = 'x';
float t4 = 2.33f;
short t5 = 10;
short t6 = 300;
long t7 = 9000000000L;
boolean t8 = true;

   System.out.println(t1);
   System.out.println(t2);
   System.out.println(t3);
   System.out.println(t4);
   System.out.println(t5);
   System.out.println(t6);
   System.out.println(t7);
   System.out.println(t8);
```

Output

```
999999
5.55555555555
x
2.33
10
300
9000000000
true
```

Task 3

Our programs uses Ohm's law to calculate the resistance.
Voltage and current are given.

Solution

```
float U = 50;
float I = 20;
float R = U/I;
System.out.println("R on " + R);
```

Test run

R on 2.5

Task 4

User gives the speed of the car (km/h) and the distance (km). Program calculates amount of time.

a) in hours
b) in whole hours and minutes

Solution

a)

```
float v = 75;
float s = 1150;
float t = s/v;
System.out.println("It takes hours " + t);
```

Test run

It takes hours 15.333333

b)

```
int whole_hours = (int) t;
  int minutes = (int) ( (t - whole_hours) * 60);
```

```
System.out.println("It takes  " + whole_hours +
          " hours and " + minutes + " minutes");
```

Test run

It takes 15 hours and 19 minutes

Task 5

Our program calculates BMI. Weight and height are given.

Solution

```
float height_cm = 200;  // cm
float weight = 100;  // kg

float height_m = height_cm/100;
float bmi = weight/(height_m * height_m);
System.out.println("BMI is " + bmi);
```

Test run

BMI is 25.0

Task 6

Create a euro converter: dollars to euros.

Solution

we can take the current exchange value now:


```
float dollars = 200;
float current_coeff = 0.9595f;
float euros = current_coeff * dollars;
System.out.println("Amount is " +  euros + " EUR");
```

Test run

Amount is 191.90001 EUR

Task 7

Convert seconds to hours, minutes, seconds.

Solution

```
int allSeconds = 123456;
   int hours = allSeconds / 3600;  // hours is  34
   allSeconds = allSeconds - hours * 3600;
  // allSeconds is  1056
   int minutes = allSeconds/60;  // minutes 17
   int seconds = allSeconds - minutes *  60;
   // 36 seconds
   System.out.println("hours: " + hours + ", minutes: "
 + minutes + ", seconds: " + seconds);
```

Test run

hours: 34, minutes: 17, seconds: 36

Task 8

Convert euros to 5, 10, 20, 50, 100, 200, 500 euros bills.

Solution

```
nt euros = 1234;
int b500 = euros/500;  // 2
euros = euros - b500*500; // 234
int b200 = euros/200;  // 1
euros = euros - b200*200; // 34
int b100 = euros/100;  // 0
euros = euros - 100*100; // 34
int b50 = euros/50;  // 0
euros = euros - b50 * 50; // 34
int b20 = euros/20; // 1
euros = euros - b20*20; // 14
int b10 = euros/10;  // 1
int b5 = euros - b10*10; // 0
int remainingEuros = euros - b5*5;  // 4
System.out.println("500 EUR notes: " + b500);
System.out.println("200 EUR notes: " + b200);
System.out.println("100 EUR notes: " + b100);
System.out.println("50 EUR notes: " + b50);
System.out.println("20 EUR notes: " + b20);
System.out.println("10 EUR notes: " + b20);
System.out.println("5 EUR notes: " + b5);
System.out.println("Remaining EUR: " + remainingEuros);
```

Test run

500 EUR notes: 2

200 EUR notes: 1

100 EUR notes: 0

50 EUR notes: -199

20 EUR notes: 0

10 EUR notes: 0

5 EUR notes: -6

Remaining EUR: 14

SET 2: Decision making

Topics:
decision making, branching, if else

Task 9

User gives a value and our program tells if the value is > 100 or not.

```
int x =  0;
System.out.println("Give a whole number: ");
try
{
 x = System.in.read();
}
catch (Exception ex){}

if (x > 100)
   System.out.println("It is over 100 \n");
else
 System.out.println("It is not over 100 \n");
```

Test run

Give a whole number:
55
It is not over 100

Task 10

Write a program that reads two integer values.
If the first is less than the second, print the message "up".
If the second is less than the first, print the message "down ".
If the numbers are equal, print the message "equal".

Solution

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

 int a = 0, b = 0;
System.out.println("Give a 2 whole numbers: \n");
System.out.println("Give 1. whole number: \n");
a = myObj.nextInt();
System.out.println("Give 2. whole number: \n");
b = myObj.nextInt();

if (a < b)
```

```
      System.out.println("up \n");
    else if (a > b)
      System.out.println("down \n");
    else
      System.out.println("equal \n");
```

Test run

Give a 2 whole numbers:

Give 1. whole number:

55
Give 2. whole number:

66
up

Task 11

User enters a weekday number and the program tells the name of the day in Germany.

Solution

```
System.out.println("Give the weekday nr (Monday = 1) \n");
Scanner myObj = new Scanner(System.in);
int nro = myObj.nextInt();

if (nro == 1)
 System.out.println("Montag \n");
else if (nro == 2)
 System.out.println("Dienstag \n");
else if (nro == 3)
  System.out.println("Mittwoch \n");
else if (nro == 4)
 System.out.println("Donnerstag \n");
else if (nro == 5)
   System.out.println("Freitag \n");
else if (nro == 6)
   System.out.println("Samstag \n");
else if (nro == 7)
 System.out.println("Sonntag \n");
else
   System.out.println("Not a suitable nr \n");
```

Test run

Give the weekday nr (Monday = 1)

4
Donnerstag

Task 12

Program solves a quadratic equation
Note: you have to include math.h to your source file and then use sqrt() function.

Solution

```
float a, b, c;
float x1, x2;
float diskr;
Scanner myObj = new Scanner(System.in);

System.out.println("Give coifficients a, b and c: \n");

System.out.println("Give a: \n");
a = myObj.nextFloat();

System.out.println("Give b: \n");
b = myObj.nextFloat();

System.out.println("Give c: \n");
c = myObj.nextFloat();

diskr = b*b - 4 * a * c;
if (diskr < 0)
 System.out.println("No real roots \n");
else
{
 x1 = (-b + Math.sqrt(diskr))/(2*a);
 x2 = (-b - Math.sqrt(diskr))/(2*a);
 System.out.println("x1 = " + x1);
 System.out.println("x2 = " + x2);
}
```

Task 13

User gives a month number and our program tells the number of days in that month.

Solution

```
int kk;
Scanner myObj = new Scanner(System.in);
System.out.println("Give the month number (1 - 12) \n");
kk = myObj.nextInt();
```

```
if (kk == 4 || kk == 6 || kk == 9 || kk == 11)
 System.out.println("30 \n");
else if (kk == 2)
 System.out.println("28/29 \n");
else
 System.out.println("31 \n");
```

Task 14

User gives the lengths of the triangle's sides. Program tells what is the triangle like and calculates the area of the triangle

We may have these types
Equilateral triangle

Isosceles triangle

Right angled triangle

Normal triangle

Solution

```
Scanner myObj = new Scanner(System.in);
float a, b, c;
System.out.println("Give the lengths of the sides \n");
a = myObj.nextFloat();
b = myObj.nextFloat();
c = myObj.nextFloat();

if (a == b && a == c)
    System.out.println("Equilateral triangle \n");
   else if (a == b || a == c || b == c)
         System.out.println("Isosceles triangle \n");
   else if (a*a + b*b == c*c  || a*a + c*c == b*b || b*b +
         c*c == a*a )
          System.out.println("Right angled triangle \n");
   else
         System.out.println("Basic triangle \n");

float s = (a + b + c)/2;
float tempvalue = s*(s-a)*(s-b)*(s-c);
float area = sqrt(tempvalue);

 System.out.println("Area is %f \n", area);

// Heron's formula is used for the area
// area =  SQRT(s*(s-a)*(s-b)*(s-c))
```

```
// s = (a + b + c)/2
```

Task 15

Create a program: what is the biggest of 3 given values?

Solution

```
// Method 1
int p1 = 4; int p2 = 6; int p3 = 8;
if (p1 > p2)
  if (p2 > p3)
     System.out.println("Biggest is " + p1);
  else
       if (p3 > p1)
       System.out.println("Biggest is " + p3);
       else
       System.out.println("Biggest is " +  p1);
  else
  if (p2 > p3)
       System.out.println"Biggest is " +  p2);
  else
       System.out.println("Biggest is " +  p3);

// Method  2
  if (p1 > p2 && p2 > p3)
     System.out.println(""Biggest is " + p1);
  else if (p2 > p1 && p2 > p3)
             System.out.println("Biggest is " +  p2);
   else
            System.out.println("Biggest is " + p3);

// Method 3
int biggest = p1;
if (p2 > biggest)
   biggest = p2;
if (p3 > biggest)
   biggest= p3;
 System.out.println("Biggest is " + biggest);
```

SET 3: Loops

Topics:
Loops: for, while, do while

Task 16

Program calculates the sum of values 1 - 5.
Use: for, while and do-while

Solution

```
// for
 int sum = 0;
int p;
for (p = 1; p <= 5; p++)
{
      sum += p;
}

System.out.println("sum is " + sum);

// while
sum = 0;
p = 1;
while (p <= 5)
{
      sum += p;
      p++;
}

System.out.println("sum on 2" + sum);

// do while
sum = 0;
p = 1;
do
{
      sum += p;
      p++;
}
while (p <= 5);

System.out.println("sum on " + sum);
```

Task 17

Program calculates the sum of even numbers between 2 - 40.
Use: for, while and do-while

Solution

```
// for
 int sum = 0;
 int p;
 for (p = 2; p <= 40; p += 2)           // p = p + 2;
 {
       sum += p;
 }

 System.out.println("sum is  " + sum);

// while
 sum = 0;
 p = 2;
 while (p <= 40)
 {
       sum += p;
       p += 2;
 }

 System.out.println("sum on " + sum);

// do while
 sum = 0;
 p = 2;
 do
 {
       sum += p;
       p += 2;
 }
 while (p <= 40);

 System.out.println("sum on " + sum);
```

Task 18

Program calculates sum: 5, 10, 15, .. 100.
Use: for, while and do-while

Solution

```
//      for
 int sum = 5;
 int p;
```

```
 for (p = 5; p <= 100; p += 5)           // p = p + 5;
 {
       sum += p;
 }

 System.out.println("sum is  " + sum);

// while
 sum = 5;
 p = 5;
 while (p <= 100)
 {
       sum += p;
       p += 5;
 }

 System.out.println("sum on " + sum);

// do while
 sum = 5;
 p = 5;
 do
 {
       sum += p;
       p += 5;
 }
 while (p <= 100);

 System.out.println("sum on " + sum);
```

Task 19

Program generates 50 random numbers (between 1 to 10) and calculates sum and average.

Solution

```
import java.util.Random;  // needed now
Random rand = new Random();

int sum = 0;
int i;
for (i = 0; i < 50; i++)
{
 sum = sum + rand.nextInt(10) + 1
}

System.out.println("sum is  " + sum);
```

```
float aver = (float) sum/50;
System.out.println("average is " + aver);
```

Task 20

Program throws dice 100 times and tells amounts of different values (1, 2, 3, 4, 5, and 6).

Solution

```
import java.util.Random;  // needed now
Random rand = new Random();


int n1 = 0;  int n2 = 0;  int n3 = 0;
int n4 = 0;  int n5 = 0;  int n6 = 0;

int i;
for (i = 0; i < 10000; i++)
{
     int x = rand.nextInt(6) + 1;

     switch (x)
     {
          case 1: n1++; break;
          case 2: n2++; break;
          case 3: n3++; break;
          case 4: n4++; break;
          case 5: n5++; break;
          case 6: n6++; break;
     }
}

 System.out.println("1: " + n1);
 System.out.println("2: " + n2);
 System.out.println("3: " + n3);
 System.out.println("4: " + n4);
 System.out.println("5: " + n5);
 System.out.println("6: " + n6);
```

Task 21

Create an account manager with menu:
User can make deposits
Do withdrawal
Check the balance

Create a menu
take money

add money
check balance
exit

Solution

```
int saldo = 999;

while (1)
{
 System.out.println("Menu ");
 System.out.println("1 ==> Take money ");
 System.out.println("2 ==> Add money ");
 System.out.println("3 ==> Check balance ");
 System.out.println("0 ==> Lopeta\n");

 int v = 9;
 System.out.println("Your choice?\n");
 scanf("%d", &v);
 Scanner myObj = new Scanner(System.in);

 v = myObj.nextInt();

 if (v == 1)
 {
       int sum;
       System.out.println("Give the sume: \n");
       sum = myObj.nextInt();
       if (sum <= saldo)
       {
           saldo -= sum;
           System.out.println("Balance is now " + saldo);
       }
       else
       {
            System.out.println("Not enough money \n");
            System.out.println("Push any key to go on...\n");
        }
 }

 if (v == 2)
 {
       int summa;
       System.out.println("Give the sum: \n");
       sum = myObj.nextInt();
      saldo += summa;
      System.out.println("Balance is " + saldo);
       System.out.println("Push any key to go on...\n");
```

```
}

if (v == 3)
 {
       System.out.println("Balance is " + saldo);
       System.out.println("Push any key to go on...\n");
   }

if (v == 0)
 {
       break;
    }

}
```

Note:
Variable for account balance has to be global!
=> declare it outside (above) the while loop
When user takes money you have to check if there is enough money...

Task 22
Try to solve this equation:
3x^3 - 4x^2 + 9x +5 = 0
Here ^ means exponent

Solution

```
double x, y;

 for (x = -5; x < 5; x += 0.0001)
 {
       y = 3*x*x*x  - 4*x*x + 9*x + 5;
       if (y > -0.001 && y < 0.001)
         break;
 }

 System.out.println("x = " + x);
 System.out.println("y = " + y);
```

Task 23
Print this kind shape: character and amount of rows are given.
o
oo
ooo

oooo
ooooo
oooooo

and so on.

Solution

```
char merkki = 'x';
int rivit = 20;
int i;
int j;

for (i = 1; i <= rivit; i++)
{
 for (j = 0; j < i; j++)
    System.out.print(merkki);

 System.out.println("\n");
 }
```

Task 24

Create this kind of shape: amount is given by the user

o
oo
ooo
oooo
ooooo
oooooo
ooooooo
oooooooo
ooooooooo
oooooooo
ooooooo
oooooo
ooooo
oooo
ooo
oo
o

Solution

```
int main()
{
    System.out.println("How many rows max? \n");
    int n;
```

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

    int n = myObj.nextInt();

    int i, j;
    for (i = 0; i < n; i++)
    {
      for (j = 0; j <= i; j++)
        System.out.print("¤");

     System.out.println("");

    }
    for (i = n; i >= 0; i--)
    {
       for (j = 0; j <= i; j++)
          System.out.print("¤");

     System.out.println("");
   }
    return 0;
}
```

Task 25

Generate a lotto row.
Rules: Select seven numbers from 1 to 40

Solution

Method 1 (funny way, a lot of computer work :))

```
     Random rand = new Random();
    int n1 = 0, n2 = 0, n3 = 0, n4 = 0, n5 = 0, n6 = 0, n7 = 0;

      while (true)
      {
                                          n1 = rand.nextInt(40) + 1;
     n2 = rand.nextInt(40) + 1;
     n3 = rand.nextInt(40) + 1;
     n4 = rand.nextInt(40) + 1;
     n5 = rand.nextInt(40) + 1;
     n6 = rand.nextInt(40) + 1;
     n7 = rand.nextInt(40) + 1;

     if (n1 != n2 && n1 != n2 && n1 != n3 && n1 != n4 && n1 != n5
```

```
      && n1 != n6 && n1 != n7 && n2 != n3   && n2 != n4  && n2 != n5
         && n2 != n6   && n2 != n7
         && n3 != n4  && n3 != n5  && n3 != n6 && n3 != n7
         && n4 != n5  && n4 != n6  && n4 != n7
          && n5 != n6   && n5 != n7
            && n6 != n7)
            break;

   }


   System.out.println("  " + n1);
   System.out.println("  " + n2);
   System.out.println("  " + n3);
   System.out.println("  " + n4);
   System.out.println("  " + n5);
   System.out.println("  " + n6);
   System.out.println("  " + n7);
```

Way 2

```
  int[] nros = {0,0,0,0,0,0,0};

   int i;
   for (i = 0; i < 7; i++)
   {

      int existed_already = 0;
      int newnr = rand.nextInt(40) + 1;
      int j;
      for (j = 0; j <= i; j++)
      {
          if (nros[j] == newnr)
          {
                existed_already = 1;
                break;
        }
       }

       if (existed_already == 1)
         i--;
       else
         nros[i] = newnr;

   }
```

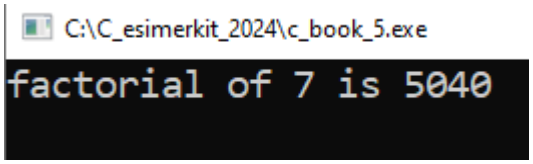
Task 26

Calculate factorial and amount of combinations.

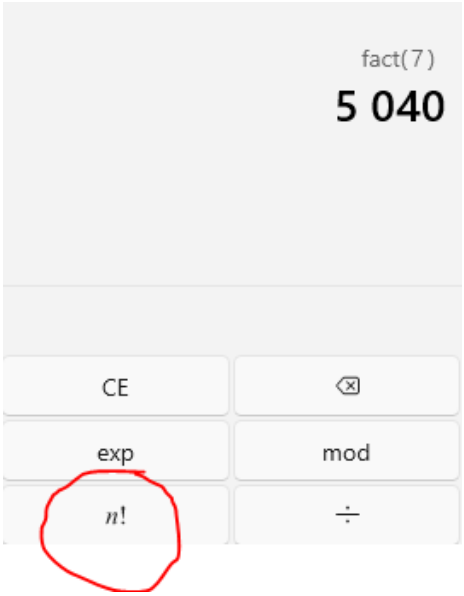
Solutions

Factorial

```
    // factorial
    /*
    0! = 1
    n! = 1 * 2 * ... * n
    */

    int f = 1;
    int i;
    // now  factorial of 7
    int n = 7;
    if (n == 0)
      f = 1;
    else
    for (i = 1; i <= 7; i++)
    {
     f = f * i;
    }

    System.out.println("factorial of " + n + " is " + f);

" "
```



Calculator check:



Task 27

Create a program that calculates amount of combinations

Combinations theory first:

```
// combinations
// amount = n!/k*(n-k)!
// n is the whole population
// k is the sample
```

Solution

```
int n, k, amount;

n = 5;
k = 3;

int i;

int n_fact = 1;

for (i = 1; i <= n; i++)
  n_fact = n_fact * i;

  int  k_fact = 1;
```

```
for (i = 1; i <= k; i++)
  k_fact = k_fact * i;


   int diff_fact = 1;

for (i = 1; i <= n-k; i++)
  diff_fact = diff_fact * i;

amount = n_fact/(k_fact*diff_fact);

System.out.println("amount is " + amount);

/*
illustration
the whole population could be "abcde", so n is 5
samples are then
 abc
 abd
 abe

 acd
 ace
 ade

 bcd
 bde
 bce

 cde

    answer is     10    combinations
*/
```

SET 4: Arrays

Task 28

Create a program that
a) fills an array with random numbers
b) prints an array
c) calculates the sum
d) calculates the average

e) finds the max and min
f) finds a spesific values
g) tells how many times some value exists in an array

Solution

```
 Random rand = new Random();

 int[] vals = new int[5];
int i;
for (i = 0; i < 5; i++)
{
 vals[i] = rand.nextInt(100);
}


int sum = 0;
for (i = 0; i < 5; i++)
{
 sum += vals[i];
}

System.out.println("Sum is " + sum);

// printing
for (i = 0; i < 5; i++)
{
      System.out.println("" + vals[i]);
}


// minimum

int min = vals[0];
for (i = 0; i < 5; i++)
{
 if (vals[i] < min)
    min = vals[i];
}

System.out.println("smallest is " + min);

// maximum

int max = vals[0];
for (i = 0; i < 5; i++)
{
```

```
 if (vals[i] > max)
       max = vals[i];
}
System.out.println("Biggest is: " + max);

// search for a value
// we put there some value that we then know it exits
vals[3] = 99999;
vals[3] = 12345;
int x = 99999;
int result = -1;
for (i = 0; i < 5; i++)
{
 if (x == vals[i])
 {
       result = i;
       break;
 }
}

if (result == -1)
  System.out.println("Not found:(  ");
else
  System.out.println("Found, location is " + result);
```

Task 29

Create a program that multiplies array values with given value.

Solution

```
int[] a = new int[4];
a[0] = 10; a[1] = -5; a[2] = 30; a[3] = 99;
int i;
// original
for (i = 0; i < 4; i++)
       System.out.println("" + a[i]);

for (i = 0; i < 4; i++)
  a[i] = 2 * a[i];

// manipulated
for (i = 0; i < 4; i++)
  System.out.println("" + a[i]);
```

Task 30

Create a program that
calculates the sum of 2 array values to 3. array.

Solution

```
int[] a = new int[4];
a[0] = 10; a[1] = -5; a[2] = 30; a[3] = 99;
int[] b = new int[4];
b[0] = 66; b[1] = 33; b[2] = 0; b[3] = -110;

int[] c = new int[4];

int i;
for (i = 0; i < 4; i++)
 c[i] = a[i] + b[i];


for (i = 0; i < 4; i++)
          System.out.println("" + c[i]);
```

Task 31

Create a program that fills and prints a 3x4 array,

Solution

```
int[][] matr = new int[3][4];

int i, j;
for (i = 0; i < 3; i++)
for (j = 0; j < 4; j++)
       matr[i][j] = rand.nextInt(100);
       // now values 0 - 99 added

// basic output
for (i = 0; i < 3; i++)
for (j = 0; j < 4; j++)
       System.out.println("" + matr[i][j]);

// arraylike output
for (i = 0; i < 3; i++)
{
 for (j = 0; j < 4; j++)
       System.out.print("\t" + matr[i][j]);

  System.out.println("\n");
```

```
    }
```

Task 32

Create a program that contains an array that has this structure column contains a year
1. column contains the population of the world Put there some 5 rows.
Print it.
Search the population of some year.

From *https://en.wikipedia.org/wiki/World_population*
we get this info

1,1804,
2,1927,
3,1960,
4,1974,
5,1987,
6,1999,
7,2011,
8,2022,
9,2037,
10,2057

Solution

```
    int[][] pops = {
    {1,1804},
    {2,1927},
    {3,1960},
    {4,1974},
    {5,1987},
    {6,1999},
    {7,2011},
    {8,2022},
    {9,2037},
    {10,205}
};

   int i, j;
   for (i = 0; i < 10; i++)
   {
    for (j = 0; j < 2; j++)
           System.out.println("\t" + pops[i][j]);
```

```
    System.out.println("\n");
   }

  int year = 2011;

  for (i = 0; i < 10; i++)
  {
   if (pops[i][1] == year)
      {
         System.out.println("" + pops[i][0]);
     break;
      }
  }
```

Task 33

Create a program that contains an array that has this structure
row 1 contains the population of some country
row 2 contains the area of that country
row 3 is empty
Calculate the population density to 3. row.

Some info about orthern countries, we take finland and Sweden with now

Country	Inhabitants	Area
Denmark	5,806,014	42,933
Finland	5,520,535	338,424
Norway	5,323,933	385,203
Sweden	10,313,447	450,295

Solution

```
    float[][] info = new float[3][2];

    // Finland
    info[0][0] = 5806014;
    info[1][0] = 338000;

     // Sweden
    info[0][1] = 10313447;
    info[1][1] = 450000;

    // pop.densities (now manually)
    info[2][0] = info[0][0]/info[1][0];
    info[2][1] = info[0][1]/info[1][1];
```

```
System.out.println(info[2][0]);
System.out.println(info[2][1]);
```

Task 34

Create a program that contains an array that has this structure and values.

1,5,6,6,7,7,

2,4,6,8,8,8,

3,5,5,8,6,8,

4,9,6,8,5,8,

5,7,6,7,8,10

1. column is the order of measurement set Columns 2-6 contain measurement values
Search for the biggest average of those measurement sets

Solution

```
int[][] measures[5][6] =
{{1,5,6,6,7,7},
{2,4,6,8,8,8},
{3,5,5,8,6,8},
{4,9,6,8,5,8},
{5,7,6,7,8,10}};

int[] sums = {0,0,0,0,0};

int i, j;
for (i = 0; i < 5; i++)
 for (j = 1; j < 6; j++)
   sums[i] = sums[i] + measures[i][j];

for (i = 0; i < 5; i++)
  System.out.println("" + sums[i]);

float avers[5];
for (i = 0; i < 5; i++)
  avers[i] = sums[i]/5.0;

for (i = 0; i < 5; i++)
  System.out.println(avers[i]);

float max = avers[0];
for (i = 0; i < 5; i++)
  if (avers[i] > max)
     max = avers[i];
```

```
System.out.println("Max. average is " +  max);
```

Task 35

Your array has these values
1, 2, 5, 8, 4, 2, 3, 22, 33, 11, 0, 5

Write a program that tells how many values are bigger than 10.

Solution

```
int[] vals =  {1, 2, 5, 8, 4, 2, 3, 22, 33, 11, 0, 5};

 int over10 = 0;
 int i;
 for (i = 0; i < 12; i++)
      if (vals[i] > 10)
           over10++;

    System.out.println("Over 10 are %d values: " + over10);
```

Task 36

Create a program that contains an array that contains 8 measurements.
Calculate the standard deviation. Compare the result to Excel result.

Solution

```
 float[] meas = {1.1, 1.5, 1.7, 2, 2.6, 2.4, 3.5, 4.5};
 float aver, sum;
 int i;

 for (i = 0; i < 8; i++)
    sum += meas[i];

aver = sum/8;

float temp_value = 0;

for (i = 0; i < 8; i++)
    temp_value = temp_value + (meas[i] - aver) * (meas[i] -
                 aver);

 float std = Math.sqrt(temp_value/7);

 System.out.println("std is " + std);
```

36

SET 5: Functions

Task 37

Create a function that:
Calculates the sum of 2 integers and prints out the result.

Solution

```
void print_values(int a, int b)
{
     System.out.println(a);
    System.out.print(b);

}
```

Task 38

Create a function that:
Returns the sum of 2 integers.

Solution

```
int calc_sum(int a, int b)
{
     return (a + b);
}
```

Task 39

Create a function that:
Returns the average of 2 integers

Solution

```
float calc_aver(int a, int b)
{
     return ((a + b)/2.0);
}
```

Task 40

Create a function that:
Returns the average of 4 floating point values.

Solution

```
float calc_aver_of_4(float a, float b, float c, float d)
{
```

```
    return ((a + b + c + d)/4);
}
```

Task 41

Create a function that:
Returns the factorial.

Solution

```
int fact(int n)
{
    int f = 1;
    int i;

    if (n == 0)
      f = 1;
    else
    for (i = 1; i <= 7; i++)
    {
     f = f * i;
    }

    return f;
}
```

Task 42

Create a function that:
Returns bigger of 2 integers.

Solution

```
int bigger(int a, int b)
{
    if (a > b)
      return a;
    else
      return b;
}
```

Task 43

Create a function that:
Returns the biggest of 3 integers.

Solution

```
int biggest_of_3(int a, int b, int c)
{
     int max;
     if (a > b && a > c)
       max = a;
     else if (b > a && b > c)
       max = b;
     else
       max = c;

     return max;
}
```

Note: there are more solutions than one...

Task 44

Create a function that:
Converts inches to centimeters.

Solution

```
float inches_to_cm(float inches)
{
     return 2.54 * inches;
}
```

Task 45

Create a function that:
Returns the BMI.

Solution

```
float bmi(float w_kg, float h_cm)
{
   float bmi =   w_kg/(h_cm/100*h_cm/100);
   return bmi;
}
```

Task 46

Create a function that:
Function returns the biggest of 5 integers.

Solution

```
int biggest_5(int a, int b, int c, int d, int e)
{
```

```
    int maks = a;
    if (b > maks)
      maks = b;
    if (c > maks)
      maks = c;
    if (d > maks)
      maks = d;
    if (e > maks)
      maks = e;

    return maks;
}
```

Task 47

Program with functions calculates amount of combinations.

```
int fact(int p)
{
    int kert = 1;
    int i;
    for (i = 1; i <= p; i++)
    {
     kert = kert * i;
    }

    return kert;
}

int kombin(int n, int k)
{
    int tulos = fact(n)/(fact(n-k) * fact(k));
    return tulos;
}
```

Task 48

Function prints out a lotto row.

Solution

```
void lotto()
{
    int[] nros  = {0,0,0,0,0,0,0};

   int i;
   for (i = 0; i < 7; i++)
```

```
    {

        int existed_already = 0;
        int newnr = rand.nextInt(40) + 1;
        int j;
        for (j = 0; j <= i; j++)
        {
             if (nros[j] == newnr)
             {
                   existed_already = 1;
                   break;
           }
         }

         if (existed_already == 1)
           i--;
         else
           nros[i] = newnr;

    }
     for (i = 0; i < 7; i++)
       System.out.println(nros[i]);
    return 0;
}

}
```

Task 49

Program with functions calculates the standard deviation.

Solution

```
float std()
{
     float[] meas = {1.1, 1.5, 1.7, 2, 2.6, 2.4, 3.5, 4.5};
     float aver, sum;
     int i;

     for (i = 0; i < 8; i++)
        sum += meas[i];

    aver = sum/8;

    float temp_value = 0;

    for (i = 0; i < 8; i++)
```

```
        temp_value = temp_value + (meas[i] - aver) *
        (meas[i] - aver);

     float std = sqrt(temp_value/7);

     System.out.println("std is " + std);



}
```

Task 50

Program with functions calculates the sum on an array.

Solution

```
int sum_of_array(int[] array, int n)
{

    int sum = 0;
    int i;
    for (i = 0; i < n; i++)
    {
     sum += array[i];
    }
    return sum;
}

Note: we could also get the array size using method lenght()...
```

Task 51

A character is passed to a function: funtion returns True if character is a vowel, otherwise False (0).
(Five of the 26 alphabet letters are vowels: A, E, I, O, and U.)

Solution

```
int is_vowel(char c)
{
        int result = 0;
        switch (c)
        {
                case 'a': result = 1; break;
                case 'e': result = 1; break;
                case 'i': result = 1; break;
                case 'o': result = 1; break;
                case 'u': result = 1; break;
  }
```

```
        return result;
}
```

Task 52

A whole number and an array (size is 5, contains integers) are passed to a function that checks how many times passed value exists in that passed array and returns the amount.

Solution

```
int amount_of_val(int[] vals, int n, int x)
{
     int amount = 0;
     int i;
     for (i = 0; i < n; i++)
     {
      if (vals[i] == x)
      amount++;
     }

     return amount;

}
```

Task 53

Your program defines and fills an array of 10 integers with random numbers that are between 1-5.
That array is passed to a method that counts the amounts of different values and prints then out.

Solution

```
int amounts_of_diff_vals(int[] vals)
{
    int difs = 0;
    int i, j;
    int[] sample = {0,0,0,0,0};
    for (i = 0; i < 10; i++)
      switch (vals[i])
      {
           case 1: sample[0]++; break;
           case 2: sample[1]++; break;
           case 3: sample[2]++; break;
           case 4: sample[3]++; break;
           case 5: sample[4]++; break;
```

```
      }

    for (i = 0; i < 5; i++)
      System.out.println(" " + i+1 + " " + sample[i]);

}

Main:
    int[] array  = new int[10];
    int i;
    for (i = 0; i < 10; i++)
    {
     array[i]  = rand.nextInt(5) + 1;
    }

    amounts_of_diff_vals(array);
```

Task 54

Just play system beeps a couple of times :)

Solution

```
void play_this()
{
          Toolkit.getDefaultToolkit().beep();

          System.out.print("wait a bit ");
          // just an easy delay
          for (int i = 0; i < 10000; i++)
              System.out.print("");

          Toolkit.getDefaultToolkit().beep();

}

Main:
    play_this();
```

Note: java.awt needed

Task 55

Function converts the text to morse code characters.

Solution

```
    String message = "SOS";
```

```
    int p = message.length();
    int i;
    for (i = 0; i < p; i++)
    {
     switch(message.charAt(i))
     {
           case 'O': System.out.println("--- "); break;
           case 'S': System.out.println("... "); break;
           case ' ': System.out.println("  "); break;
    }
```

Note: now only function bode here...

Task 56

Function returns the range value of an array that has 5 whole numbers and that is passed to the function. Range means: max – min.

Solution

```
float range(float[] vals, int n)
{
    float max = vals[0];
    float min = vals[0];

    int i;

    for (i = 0; i < n; i++)
    {
     if (vals[i] < min)
        min = vals[i];
     if (vals[i] > max)
        max = vals[i];
    }

    return (max - min);
}
int main()
{
  float[] values = {6.0, 2.5, 2.6, 3.0, 5.0};

  System.out.println("range is  +  range(values, 5));

  return 0;
}
```

SET 6: Strings

Strings

Task 57

User is asked to give the amount of values.
Then a new array is created.
It is filled with randon numbers.
10 first are then printed

Solution

```
static  void fill(int[] arr,int n)
{
    Random rand = new Random();
    int i;
    for (i = 0; i < n; i++)
     arr[i] = rand.nextInt(100);

}

static void print(int[] arr,int n)
{
    int i;
    for (i = 0; i < n; i++)
    System.out.println("" + arr[i]);

}

 public static void main(String[] args)
{
  int amount;
  Scanner myObj = new Scanner(System.in);
  System.out.println("How big array is to be created \n");
  amount = myObj.nextInt();
  int[] values = new int[amount];
  fill(values, amount);
  print(values, 10);
  }
```

Task 58

Function checks if the post code includes exactly 5 numbers

Solution

```
static int check_post_code(String text, int n)
{
```

```
    int i;
    int res = 1;
    if (n != 5)
       {
                           res = 0;
                           return res;
                       }
    else
    {
     for (i = 0; i < n; i++)
       if (text.charAt(i) < '0'  && text.charAt(i) > '9')
       {
           res = 0;
           break;
       }
    }

    return res;
}


int main()
{

   String postcode = "2233";
   int p = postcode.Length();

   System.out.println("" + check_post_code(postcode, p));

}
```

Task 59

Program checks if an email-address contains '@' character.

Solution

```
String email = "ducks@ducks.com";

int on = -1;

int p = email.Length();

int i;
for (i = 0; i < p; i++)
{
    if (email.charAt(i)  == '@')
    {
```

```
      on = i;
      break;
      }
    }

    if (on == -1)
       System.out.println("Yes \n");
    else
      System.out.println("No \n");
```

Task 60

Program prints out the country code (top level domain name) of an url.

Solution

```
    String url = "www.vossilos.com";

    int lastdot;

    int p = url.Length();

    int i;
    for (i = 0; i < p; i++)
    {
     if (url.charAt(i)  == '.')
     {
           lastdot = i;
     }
    }

    for (i = lastdot; i < p; i++)
    {
           System.out.println(url[i]);

    }
```

Note: Java's String class has also other methods to handle strings.

Task 61

Program prints out the protocol of an url.

Solution

```
 String url = "https://www.vossilos.com";

    int colonplace;
```

```
int p = url.length();

int i;
for (i = 0; i < p; i++)
{
 if (url.charAt(i)  == ':')
 {
       colonplace = i;
       break;
 }
}

for (i = 0; i < colonplace; i++)
{
 System.out.println(url[i]);

}
```

Task 62

Program tells if a string is a palindrome.

Solution

```
 String word = "aaaa";
 char[] orig = word.toCharArray();

 int size =  orig.length;

char[] newword = new char[size];

int s = 0;
int j;
for (j = size - 1; j >= 0; j--)
{
 newword[s] = orig[j];
 s++;
}

System.out.println(orig);
System.out.println(newword);

if (Arrays.equals(orig, newword))
          System.out.println("Is a pal... \n"
else
        System.out.println("Is not a pal... \n");
```

Task 63

String variable contains 5 measures separated by commas. Your program calculates the average of those values. (E.g. "2, 3.5, 1, 5.8, 10") is given.)

Solution

```
String row = "2, 3.5, 1, 5.8, 10";
int[] point_places = new int[4];
int size = row.length();
int i;
int j = 0;
for (i = 0; i < size; i++)
{
  if (row.charAt(i) == ',')
  {
   point_places[j] = i;
   j++;
}
}

for (j = 0; j < 4; j++)
  System.out.println(point_places[j]);

System.out.println("");

char[] val1 = new char[point_places[0] + 1];
char[] val2 = new char[point_places[1] - point_places[0] + 1];
char[] val3 = new char[point_places[2] - point_places[1] + 1];
char[] val4 = new char[point_places[3] - point_places[2] + 1];
char[] val5 = new char[size  - point_places[3] + 1];

for (j = 0; j < point_places[0]; j++)
  val1[j] = row.charAt(j);


System.out.println(val1);


int s = 0;
for (j = point_places[0] + 1; j < point_places[1]; j++)
  val2[s++] = row.charAt(j);


System.out.println(val2);
```

```
s = 0;
for (j = point_places[1] + 1; j < point_places[2]; j++)
  val3[s++] = row.charAt(j);


System.out.println(val3);


s = 0;
for (j = point_places[2] + 1; j < point_places[3]; j++)
  val4[s++] = row.charAt(j);


System.out.println(val4);


 s = 0;
for (j = point_places[3] + 1; j < size; j++)
  val5[s++] = row.charAt(j);

System.out.println(val5);


float a = Float.parseFloat(new String(val1));
float b = Float.parseFloat(new String(val2));
float c = Float.parseFloat(new String(val3));
float d = Float.parseFloat(new String(val4));
float e = Float.parseFloat(new String(val5));

float avg = (a + b + c + d + e)/5;

System.out.println(avg);
```

Task 64

Read a NMEA sentence and print latitude and longitude.
Info here

NMEA-0183 message: GGA

Related Topics

- NMEA-0183 messages: Overview

Time, position, and fix related data

An example of the GBS message string is:

```
$GPGGA,172814.0,3723.46587704,N,12202.26957864,W,2,6,1.2,18.893,M,-25.669,M,2.0
0031*4F
```

NOTE – The data string exceeds the NMEA standard length.

GGA message fields

Field	Meaning
0	Message ID $GPGGA
1	UTC of position fix
2	Latitude
3	Direction of latitude: N: North S: South
4	Longitude

Solution

```
  char[] nmea_sentence =
"$GPGGA,172814.0,3723.46587704,N,12202.26957864,W,2,6,1.2,18.893,M,-
25.669,M,2.0,0031*4F";

  int point1, point2, point3, point4;

  int p = 0;

  int i;
  for (i = 0; i < nmea_sentence.length; i++)
  {
    if (nmea_sentence[i] == ',')
    {
    p++;
    if (p == 2)
      point1 = i;

    if (p == 3)
```

```
        point2  = i;

      if (p == 4)
        point3 = i;

      if (p == 5)
         point4 = i;
  }
    }

    System.out.println("Latitude is \n");
    for (i = point1 + 1; i < point2; i++)
      System.out.println(nmea_sentence[i] );

    System.out.println("Longitude is");
    for (i = point3+1; i < point4; i++)
      System.out.println(nmea_sentence[i] );

    return 0;
   }
```

Task 65

Check that given country code has exactly 1..3 numbers.
Country codes are listed here...
https://www.iban.com/country-codes

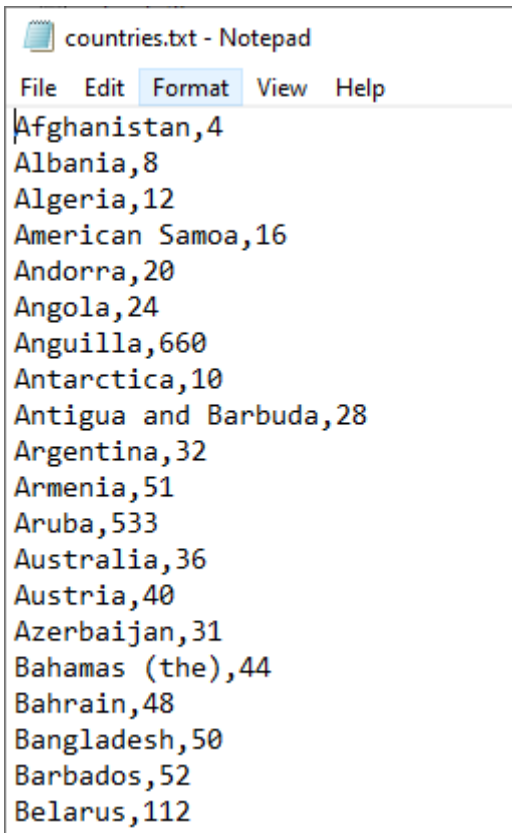
Solution

```
    char[] code = new char[5];

    System.out.println("Give the country code: \n");
    Scanner myObj = new Scanner(System.in);


    String cc = myObj.nextLine();

    code = cc.toCharArray();

    int accepted = 0;
    if (code.length == 3)
    {
      if (code[0] >= '0' && code[0] <= '9'  &&
       code[1] >= '0' && code[1] <= '9' &&
       code[2] >= '0' && code[2] <= '9')
       accepted = 1;
```

```
  else
    accepted = 0;
}

if (accepted == 0)
  System.out.println("wrong country code \n");
else
 System.out.println("correct country code \n");

return 0;
```

Task 66

Information of countries are to be taken to a textfile.
Country info is taken to a text file, example here.



Read the file and print it.

Solution

```
import java.io.*;

public class Main
{
    public static void main(String[] args) {
    File f1 = new File("countries.txt");
    String line = new String();
    String lines[] = new String [100];
     int v = 0;
   try
  {
   FileReader fr1;
   fr1 = new FileReader(f1);
   BufferedReader in1 = new BufferedReader(fr1);
   while (true)
   {
     if ( (line =  in1.readLine()) == null) break;;
     lines[v] = line;
     v++;
   }
  }
  catch (FileNotFoundException f)
  {}
  catch (IOException i)
  {}

  for (int k = 0; k < v; k++)
   System.out.println(lines[k]);

    }

}
```

Task 67

In Finland, the Personal Identity Code (Finnish: henkilötunnus (HETU), Swedish: personbeteckning) also known as Personal Identification Number consists of eleven characters of the form DDMMYYCZZZQ, where DDMMYY is the date of birth, C the century sign, ZZZ the individual number and Q the control character (checksum). Check given code.

Solution

```
    char[] sotu = "040363-011X";

    char nrs[9];
    nrs[0] = sotu[0]; nrs[1] = sotu[1];nrs[2] = sotu[2];
```

```
    nrs[3] = sotu[3];nrs[4] = sotu[4];nrs[5] = sotu[5];
    nrs[6] = sotu[7];nrs[7] = sotu[8];nrs[8] = sotu[9];

    System.out.println(nrs);

    String temp = new String(nrs);
    int as_value = Integer.parseInn(temp);
    System.out.println("" + as_value);

    int div = as_value % 31;

    String right_chars = "0123456789ABCDEFHJKLMNPRSTUVWXY";
    System.out.println(right_chars.charAt(div));

    if (right_chars.charAt(div) == sotu[11])
        System.out.println("YEAH");
    else
     System.out.println("NONO");
```

Task 68

Create a Finnish Italian dictionary. Take words from some Internet place and add them to an array. Or create a file and read it to an array.

Solution

```
import java.io.*;

public class Main
{
    public static void main(String[] args) {
    File f1 = new File("words.txt");
    String line = new String();
    String lines[] = new String [100];
    int v = 0;
    try
   {
   FileReader fr1;
   fr1 = new FileReader(f1);
   BufferedReader in1 = new BufferedReader(fr1);
   while (true)
   {
     if ( (line =  in1.readLine()) == null) break;
     lines[v] = line;
     v++;
   }
```

```
  }
  catch (FileNotFoundException f)
  {}
  catch (IOException i)
  {}

  for (int k = 0; k < v; k++)
   System.out.println(lines[k]);

    }

 String search_this = "parola";
 String inFinword = "not in the list";


for (int i = 0; i < lines.length; i++)
{
     if (lines[i] ==  search_this)
     {
           inFinword = lines[i+1];
           break;
     }
}

 System.out.println(inFinWord);
```

SET 7: Class

Task 69

Create a class that models a Dot.
Create the 2 dots in your program.

Add then 20 dots to an array (use random numbers)
Print dots

Calculate the distance of first and last dots.

Solution

```
class Dot
{
    int x;
    int y;
};


int main () {

    Dot p1 = new Dot();
    p1.x = 5;
    p1.y = 6;

   Dot p2 = new Dot();
    p2.x = 2;
    p2.y = 9;

    Dot[] points = new Dot[20];
    int i;

    Random rand = new Random();
    for (i = 0; i < 20; i++)
    {
     int xx = rand.nextInt(50);
     int yy = rand.nextInt(50);
     points[i].x = xx;
     points[i].y = yy;
    }

    for (i = 0; i < 20; i++)
    {
     System.out.println("" + points[i].x + ", " + points[i].y);
   }
```

```
int xx1, yy1, xx2, yy2;
xx1 = points[0].x;
yy1 = points[0].y;

xx2 = points[19].x;
yy2 = points[19].y;

double et = Math.sqrt((xx1 - xx2)*(xx1-xx2) +
(yy1-yy2)*(yy1-yy2));

System.out.println(et);
```

SET 8: Libraries

Task 70
Program calculates the hypotenuse of an triangle when other sides are given.

Solution
```
float a, b, c;
a = 3;
b = 4;
c = Math.sqrt(a*a + b*b);

System.out.println("c = " + c);
```

Task 71
Program rounds a double value to a value that has 2 numbers in its fractional part.

Solution
```
float x = 22.4567f;
float y = Math.round(100*x+0.5)/100.0f;
System.out.println(y);
```

Task 72
Program tells how much time does it take to sort an array of 100000 elements.
Compare sorting times to time got from Java's own sort() function.

Solution
```
Random rand = new Random();

System.out.println("elapsed time now is " +
 System.currentTimeMillis());

int size = 15000;

int[] vals = new int[size];

int i;
for (i = 0; i < size; i++)
{
   vals[i] = rand.nextInt(9999);
}
```

```
  for (i = 0; i < 20; i++)
  {
    System.out.println(vals[i]);
  }


 long time1 = System.currentTimeMillis();
  // selection sort
  int m, n, temp;
  for (m = 0; m < size; m++)
    for (n = m + 1; n < size; n++)
    {
     if (vals[n] < vals[m])
     {   // swap
           temp = vals[n];
           vals[n] = vals[m];
           vals[m] = temp;
        }
     }

  long time2 = System.currentTimeMillis();

  System.out.println("It took " + (time2 - time1) + " ms.");


  System.out.println("\n Sorted: \n");
  for (i = 0; i < 20; i++)
  {
    System.out.println("" + vals[i]);
  }


// Arrays.sort() example
// now no time with
   time1  = System.currentTimeMillis();

 Arrays.sort(vals);
 time2  = System.currentTimeMillis();

 System.out.println("It took NOW " + (time2 - time1) + " ms.");


 // here sorter example
    int[] values= { 88, 56, 100, 2, 25 };


   System.out.println("Before sorting the list is: \n");
```

```
   for( n = 0 ; n < 5; n++ ) {
      System.out.println(values[n]);
   }

  Arrays.sort(values);

   System.out.println("\nAfter sorting the list is: \n");
   for( n = 0 ; n < 5; n++ ) {
      System.out.println(values[n]);
   }
```

Task 73

Calculate the square root of some value using numeric method and compare the result to the value got with sqrt() function.

Solution

```
     float a = 5f;
     float c = 0.3f;
     while (1)
     {
      if ((c*c - a) > -0.1 && (c*c - a) < 0.1 )
            break;

      c = c * 1.1;
     }
   System.out.println(c);

// Math
c = Math.sqrt(a);
```

System.out.println(c);

Task 74

Calculate approximations of Nepers's value, pi and cos(0.9) and compare them t values of got from Math functions.

Solution

```
int fact(int n)
{
     int kert = 1;
     int i;
     for (i = 1; i <= n; i++)
     {
      kert = kert * i;
     }
```

```
    return kert;
}

int main()
{
    int j;
    float e = 1f;
    for (j = 1; j < 10; j++)
    {
      e  = e + 1.0/fact(j);
    }

    System.out.println(e);

    System.out.println(Math.E);
```

Task 75

Program throws dice 100 times and tells amounts of different values (1, 2, 3, 4, 5, and 6).

Solution

```
   int n1 = 0;  int n2 = 0;  int n3 = 0;
   int n4 = 0;  int n5 = 0;  int n6 = 0;

   int i;
   for (i = 0; i < 10000; i++)
   {
       int noppis = rand.nextInt(6) + 1;

       switch (noppis)
       {
            case 1: n1++; break;
            case 2: n2++; break;
            case 3: n3++; break;
            case 4: n4++; break;
            case 5: n5++; break;
            case 6: n6++; break;
       }
   }

    System.out.println("1: " + n1);
    System.out.println("2: " + n2);
    System.out.println("3: " + n3);
    System.out.println("4: " + n4);
```

```
    System.out.println("5: " + n5);
    System.out.println("6: " + n6);
```

Task 76

Create this array

Population, thousands

	1900	1950	2000	2018	2019
Total	2 656	4 030	5 181	5 518	5 525
Males	1 311	1 926	2 529	2 723	2 728
Females	1 345	2 104	2 652	2 795	2 797

Print it in good format

Give a year and use your array: then your program tells how many males and females Finland had in that year.

Table is here also as text if needed:

	1900	1950	2000	2018	2019
Total	2 656	4 030	5 181	5 518	5 525
Males	1 311	1 926	2 529	2 723	2 728
Females		1 345	2 104	2 652	2 795	2 797

Solution

```
   String[][] stats =
           {
   {" ", "1900","1950","2000","2018","2019"},
  {"Total","2 656","4 030","5 181","5 518","5 525"},
  {"Males","1 311","1 926","2 529","2 723","2 728"},
  {"Females","1 345","2 104","2 652","2 795","2 797"}};


   int r, s;

for (r = 0; r < 4; r++)
{
    for(s=0; s < 6; s++)
       System.out.print(" " +  stats[r][s]);

    System.out.println("\n");
}


         int year = 2000;
```

```
        System.out.println("\n");

         String year_as_string = Integer.toString(year);
        for(s=0; s < 6; s++)
       {
     if (year_as_string.equals(stats[0][s]))
     {
            System.out.println("males: " + stats[2][s] + "
females: " + stats[3][s]);
            break;
       }
    }
```

Task 77

Program tells how many big letters (capital letters) does a string contain.

Text is here:
The EEA includes EU countries and also Iceland, Liechtenstein and Norway.
It allows them to be part of the EU's single market.
Switzerland is not an EU or EEA member but is part of the single market.
This means Swiss nationals have the same rights to live and work in the UK as
other EEA nationals.

Solution

```
String text =
"The EEA includes EU countries and also Iceland, Liechtenstein and
Norway. It allows them to be part of the EU\'s single
market.Switzerland is not an EU or EEA member but is part of the
single market.";


int bigs = 0;

for (i = 0; i < text.length(); i++)
{
    if (text.charAt(i) >= 65 && text.charAt(i)<= 90)
    bigs++;
}

System.out.println(bigs);
```

Task 78

A stone is dropped down from the top of Pisa tower.
What is the final speed of the stone and how much time does the fall take?

Solution

```
//  v = s/t
//  t = sqrt(s/g)
float s = 57; // meters
float g = 9.81; //  m/sek^2
float t = sqrt(s/g);  // secs

System.out.println(t);  // secs

float v = s/t;

System.out.println(v);  // m/s

v = (s/1000)/(t/3600);  // km/h

System.out.println(v);
```

Task 79

Create an array of given animal data.

Then print it.

Some animals and ages:
https://tpwd.texas.gov/publications/nonpwdpubs/young_naturalist/animals/animal_life_spans/

Here is part of the list that is taken from Internet:

"African Grey Parrot,50",

"Alligator,68",

"Amazon Parrot,80",

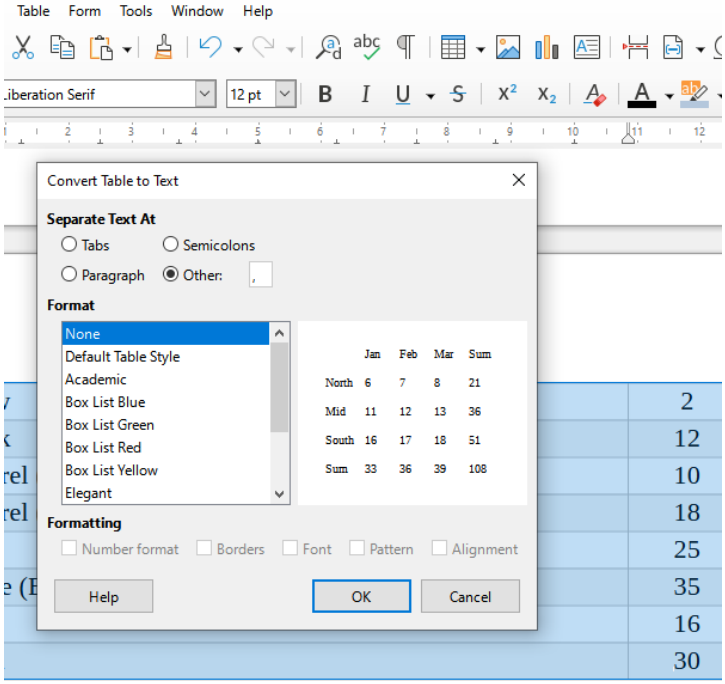
"American Alligator,56",

"American Box Turtle,123",

"American Newt,3",

… continues

You can convert animal table to text e.g like this way (depenging on your tools...)



Solution

```
String[] animals = {"Antelope (Blackbuck),15","Antelope
(Pronghorn),15","Badger,15","Bat (Guano),15",
      "Bear (Grizzly),34","Beaver,20","Buffalo,45","Camel,40","Cat
(Domestic),30","Chimpanzee,50","Deer (Fallow),25",
      "Deer (Mule),20","Deer (Whitetail),23","Dog
(Domestic),20","Donkey,50","Elephant (African),50","Elephant
(Indian),70",
      "Fox,14","Giraffe,28","Goat,10","Guinea
Pig,5","Hare,10","Hippopotamus,41","Horse,50","Jaguar,22","Javelina,
20",
      "Lion,35","Mole,3","Mountain
Lion,18","Mouse,4","Mule,37","Nutria,12","Opossum,8","Otter,15","Por
cupine,20",
```

```
"Porpoise,15","Rabbit,10","Raccoon,13","Reindeer,15","Rhinoceros,40"
,"Seal (Common),30","Sheep (Bighorn),15",
      "Sheep (Mouflon,19","Shrew,2","Skunk,12","Squirrel
(Fox),10","Squirrel (Gray),18","Tiger,25","Whale
(Blue),35","Wolf,16",
      "Zebra,30"};


        // amount of items
        System.out.println(animals.length);

int i;

for (i = 0; i < 51; i++)
      System.out.println(animals[i]);
    }
```

Task 80

Standard deviation

Solution

```
    int i;
    Random rand = new Random();
    for (i = 0; i < 51; i++)
      System.out.println(animals[i]);

     int[] vals = new int[100];
     int k;
     for (k = 0; k < 100; k++)
       vals[k] = rand.nextInt();

     int sum  = 0;
     for (k = 0; k < 100; k++)
         sum = sum + vals[k];

     double ka = sum/100.0;

     double std = 0;
     for (k = 0; k < 100; k++)
         std = std + (vals[k] - ka)*(vals[k] - ka);

     std = std/100;
     std = Math.sqrt(std);
```

```
     System.out.println( std);
```

Task 81

Students's grades (Swedish, Math) are added to arrays. Calculate the correlation.

Solution

```
  double sve[] = {1.5, 2.5, 1, 5.0, 3.5};
     double math[] = {4.5, 1.5, 1.5, 3.0, 2.5};

     double s1 = 0;
     for (k = 0; k < 5; k++)
          s1 = s1 + sve[k];

     double s2 = 0;
     for (k = 0; k < 5; k++)
         s2 = s2 + math[k];

     double ka1 = s1/5;
     double ka2 = s2/5;

     double summa1 = 0;
     for (k = 0; k < 5; k++)
          summa1 = summa1 + (sve[k] - ka1)*(math[k] - ka2);



     double summa2 = 0;
     for (k = 0; k < 5; k++)
         summa2 = summa2 + (sve[k] - ka1)*(sve[k] - ka1);


     double summa3 = 0;
     for (k = 0; k < 5; k++)
         summa3 = summa3 + (math[k] - ka2)*(math[k] - ka2);


     double korre = summa1/Math.sqrt(summa2*summa3);

     System.out.println(korre);
```

SET 9: Bitwise operators

Task 82

Create a program that uses all bit operators that are shown in the table below.

So, create 2 integer variables. Assign values and test AND, OR and XOR.
Then try shift operators with one variable.
Print also results.

Here are bitwise operators

Operator	Meaning
&	AND
\| | OR |
<< | Left shift |
>> | Right shift |
~ | One's complement |
^ | XOR |

Solution

```
int a = 199; // 1100 0111
int b = 222; // 1101 1110
int c;

// AND  &
/*
11000111
11011110
11000110    => 198
*/
c = a & b;
System.out.println("a & b is " + c);

// OR  |
/*
11000111
11011110
11011111   => 223
*/
c = a | b;
System.out.println("a | b is " + c);

// XOR ^
```

```
/*
11000111
11011110
00011001   => 25
*/
c = a ^ b;
System.out.println("a ^ b is " + c);

// shift value a 2 times to the left:   a << 2
/*
11000111   << 2
1100011100  => 796
*/
 c = a << 2;
 System.out.println("a << 2 is " + c);


// shiftvalue of variable a  once to the right   a >> 1
/*
11000111   >> 1
01100011   =>  99
*/
 c = a >> 1;
 System.out.println("a >> 1 is " + c);
```

Task 83

Check the state of given bit in a bit queue

Tips: Right shift the original bit queue until the bit that has to be inverted is the first bit. Then take bitwise AND between 1 and shifted bit queue. You get the state of the wanted bit.

Solution

```
We have value 155 in a variable. As bits it is 10011011.
We want to know the 3. bit's state.  (LSB s now position 0).
So we shift 155 3 times to the right and get  00010011.
Then we take AND between that new bit queue and value 1 and we get
0000 0001
that tells that state is 1.

int a = 155;
n = 3;
int state = (a >> n) & 1;
System.out.println("state is " + state);
```

Task 84

Invert the given bit in a bit queue.

Tips: Create a bit mask that has bits 0 and where value 1 has the same position than the bit that is to b inverted. Then take Xor between the mask and the original bit queue. The result is a new bit queue where wanted bit is inverted.…

Solution

```
int a = 155;
n = 4;
int mask = 1 << (n - 1);
a = a ^ mask;
System.out.println("a is now " + a);
```

SET 10: Time

Task 85

Print message "Life is wonderful" a) 5000 times and b) 10000 times. How long time do it take? Use time.h and time() function.

Solution

```
int n = 5000;

long time1 =   System.currentTimeMillis();
for (i = 0; i < n; i++)
{
 System.out.println("Life is wonderful ...");
}

long time2 = System.currentTimeMillis();

System.out.println("It took 1)  " + (time2-time1));


 n = 10000;

time1 =   System.currentTimeMillis();
for (i = 0; i < n; i++)
{
 System.out.println("Life is wonderful ...");
}

 time2 = System.currentTimeMillis();

System.out.println("It took 2) " + (time2-time1));
```

Task86

Create an array that contains 1 million random numbers. Sort that array using Arrays.sort() method. How much time does it take.

```
int[] numbers = new int[1000000];
for (i = 0; i < n; i++)
{
   numbers[i] = rand.nextInt(1000);
        }


 for (i = 0; i < 10; i++)
```

```
{
   System.out.println(numbers[i]);
        }

       time1 =   System.currentTimeMillis();
       Arrays.sort(numbers);
        time2 =   System.currentTimeMillis();


        System.out.println("Sorting time: " + (time2-time1));
        for (i = 0; i < 10; i++)
{
   System.out.println(numbers[i]);
        }
```

Task 87

Create an array that contains 1 million random numbers. Sort that array using selection sort

Solution

```
        for (i = 0; i < n; i++)
    {
         numbers[i] = rand.nextInt(1000);
                     }


                    time1 =   System.currentTimeMillis();
                     for (i = 0; i < 1000000; i++)
                           for (int j = i; j < 1000000; j++)
                               if (numbers[j] < numbers[i])
                               {
                                   int temp = numbers[i];
                                   numbers[i] = numbers[j];
                                   numbers[j] = temp;

                               }

                     time2 =   System.currentTimeMillis();

                       System.out.println("Sorting time: " + (time2-
time1));
                     for (i = 0; i < 10; i++)
    {
         System.out.println(numbers[i]);
                     }
```

Task 88

Use solutions of tasks 83 and 85 and take execution times. Can you tell a reason why another sorting method is so slow?

Solution

Because of many comparisons and swappings, selection sort is very slow. If we express or measure its time and space complexity, we can say it is $O(N^2)$.

If the size of array (N) increases, the execution time function is N^2.

SET 11: Linked lists

Task 89

Create a linked list that contains these values: 10, 33, 7777. Then print the list.

Solution

```
  class Item
    {

        public int value;
       public  Item next = null;
    };



public class App5 {

    public static void main(String[] args) {
          // 10, 33, 7777


            Item head = new Item();
            head.value = 10;
            Item end = head;
            Item temp  = new Item();
            temp.value = 33;
            end.next = temp;
            end = temp;
            temp  = new Item();
            temp.value = 7777;
            end.next = temp;
            end = temp;


       // print all
           for (temp = head; temp != null; temp = temp.next)
           System.out.println("Value is " + temp.value);
    }
```

Task 90

Use the list of task 89.
Add there a new item to the beginning, end and after item that has value 33.

Solution

```
    // new to the end
            temp  = new Item();
            temp.value = -500;
            end.next = temp;
            end = temp;

            // new to the beginning
            temp  = new Item();
            temp.value = 8989;
            temp.next = head;
            head = temp;


            // to the middle
            // print first
             for (temp = head; temp != null; temp = temp.next)
           System.out.println("Value is " + temp.value);


           // search place and mark it
           Item newItem = new Item();
           newItem.value = 123456;

           Item position = null;
           for (temp = head; temp != null; temp = temp.next)
           {
               if (temp.value == 33)
               {
                     position = temp;
                     break;
               }

           }
           newItem.next = position.next;

           position.next = newItem;


          for (temp = head; temp != null; temp = temp.next)
           System.out.println("Value is " + temp.value);
```

Task 91

Use the list of task 90. Remove item that has value 33.

Solution

```
Item prevRemove = null;
Item afterRemove = null;
for (temp = head; temp != null; temp = temp.next)
{
   if (temp.next.value == 33)
   {
        prevRemove = temp;
        afterRemove = temp.next.next;
        break;
   }

}

prevRemove.next = afterRemove;

   System.out.println("After removal");
   for (temp = head; temp != null; temp = temp.next)
     System.out.println("Value is " + temp.value);
```

Task 92

Create a doubly linked list that contains these values 10, 33, 567, -8. Print the list.

Solution

```
class Item
    {

       public int value;
       public  Item next = null;
       public  Item prev = null;
    };


   Item head = new Item();
            head.value = 10;
            Item end = head;

            Item temp  = new Item();
            temp.value = 33;
```

```
            temp.prev = end;
            end.next = temp;
            end = temp;


           temp  = new Item();
            temp.value = 44;
            temp.prev = end;
            end.next = temp;
            end = temp;


            temp  = new Item();
            temp.value = 55;
            temp.prev = end;
            end.next = temp;
            end = temp;

           System.out.println("");
             // print all
           System.out.println("first -> last");
          for (temp = head; temp != null; temp = temp.next)
          System.out.println("Value is " + temp.value);


          System.out.println("");

            System.out.println("last -> first");
          for (temp = end; temp != null; temp = temp.prev)
          System.out.println("Value is " + temp.value);
```

Task 93

Try java's own linked list and add there persons that have properties name and home country.

Solution

```
import java.util.LinkedList;
/**
 *
 * @author kake
 */

class Person
{
      public String name;
      public String homecountry;
};
```

```
// main():

      LinkedList<Person>  persons = new LinkedList<Person>();

       Person p1 = new Person();
       p1.name = "Tim Kim";
       p1.homecountry = "Vietnam";

      Person  p2 = new Person();
       p2.name = "Lena Horse";
       p2.homecountry = "Sweden";


       persons.add(p1);
       persons.add(p2);



        System.out.println(persons.getFirst().name);
```

SET 12: GUI

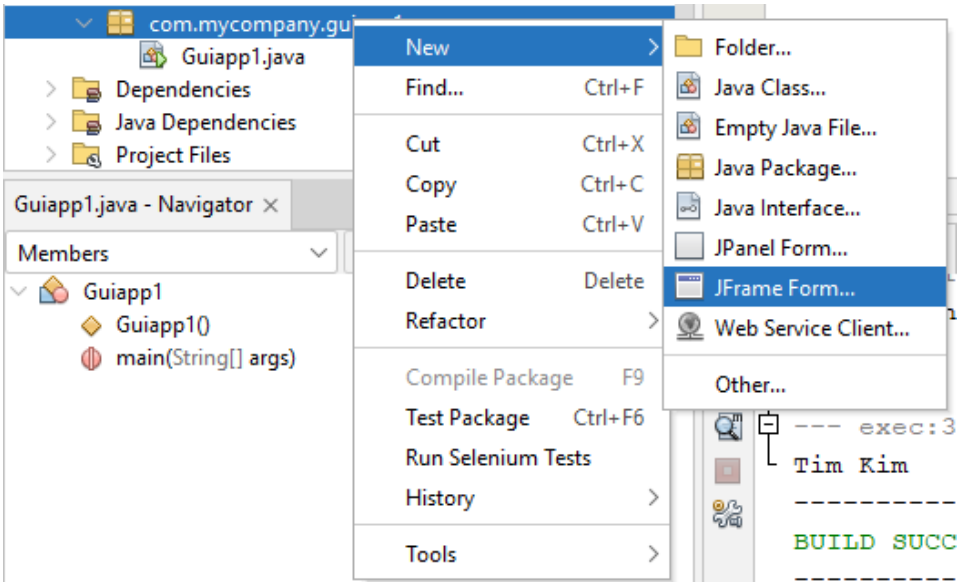
Task 94

Create a program that has one button, one textbox and 2 labels.

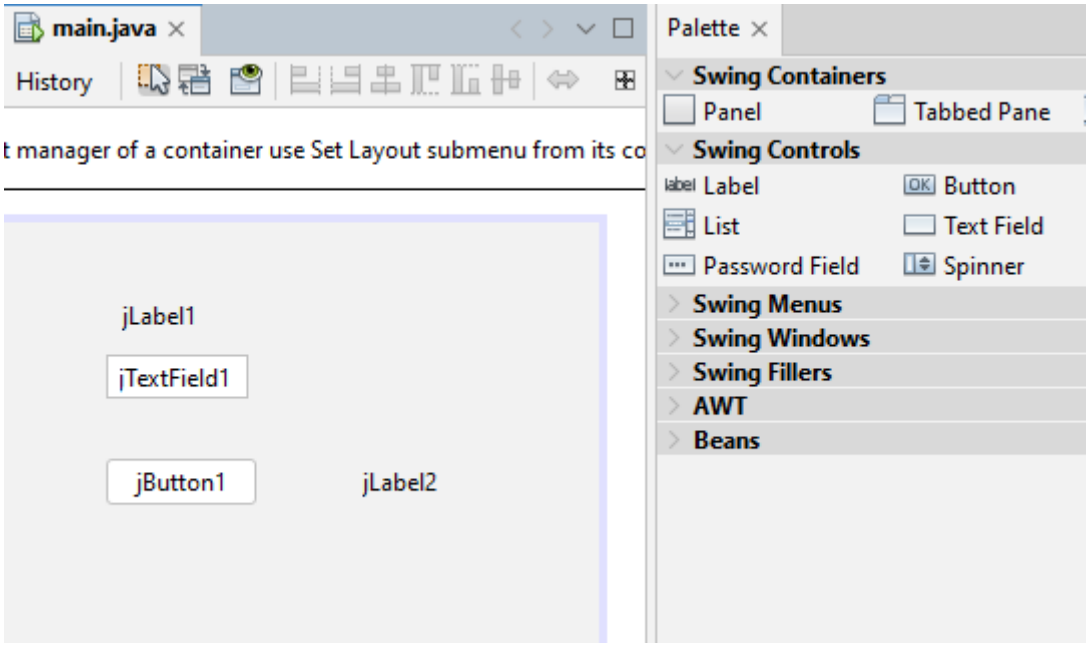
User types his/her name to the textbox and when button is clicked, name is added to one label...

Here is first some info that may help with gui.

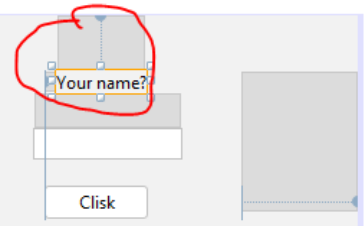
Create a project and there new frame:

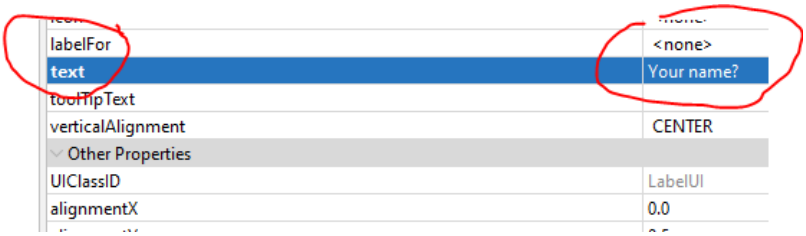


Add there components

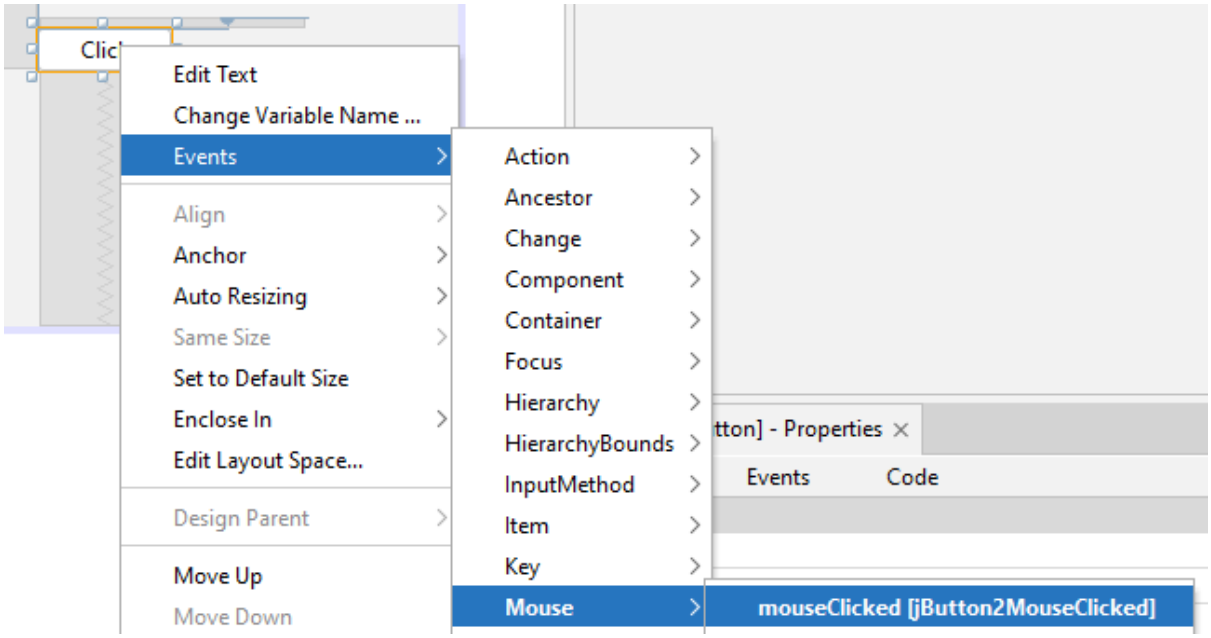


Change some properties





Add eventhandling to button: screen copy shows info:



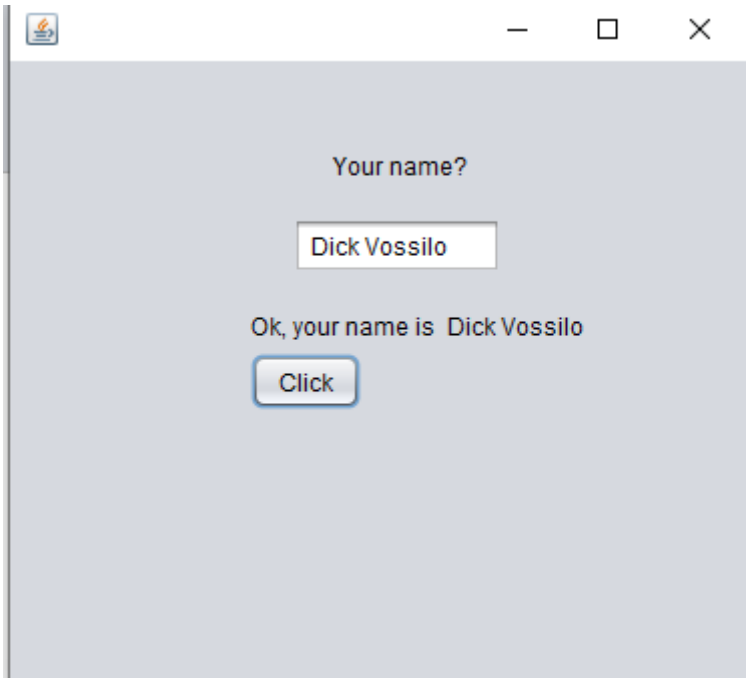
Add code

```
private void jButton2MouseClicked(java.awt.event.MouseEvent evt) {
    // TODO add your handling code here:
    String givenText =  jTextField1.getText();

    jLabel2.setText("Ok, your name is " + givenText);

}
```

Run


Your name?
Click

and

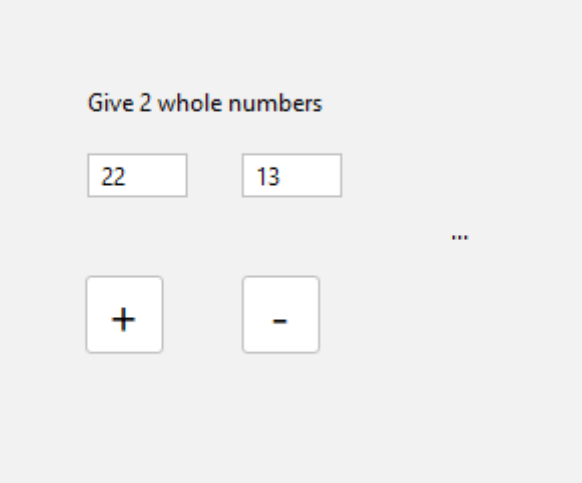

Your name?
Dick Vossilo
Ok, your name is Dick Vossilo
Click

Task 95

Now, create a minicalculator! Add 2 textboxes amd buttons with texts +, -, *, % and /.
User gives 2 whole numbers and clicks one of those buttons: result is shown on a label.

Solution
Here is just the 1. step shown...

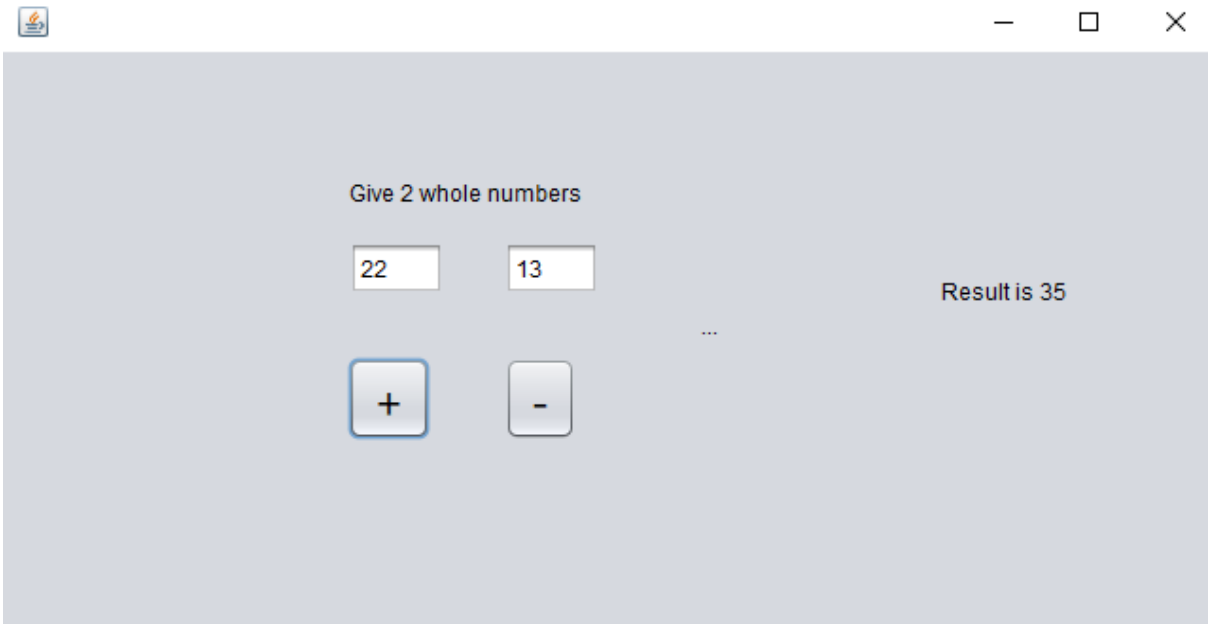
Gui that has no only 2 buttons, add more...



Add then eventhandling, below an example:

```
private void jButton2MouseClicked(java.awt.event.MouseEvent evt) {
    // TODO add your handling code here:
    String firstValueAsString =  jTextField1.getText();
    String secondValueAsString =  jTextField2.getText();

    int firstValueAsNumber = Integer.parseInt(firstValueAsString);
    int secondValueAsNumber = Integer.parseInt(secondValueAsString);
    int result = firstValueAsNumber + secondValueAsNumber;

    jLabel2.setText("Result is " + result);

}
```

Test run



SET 13: Miscellaneous

Task 96

We take a look at exception. In this task you have to read a web page contents to your tool output place. When using net connection and url, several things may go wrong. Try to put this working!

Solution

```
mport java.net.*;
import java.io.*;
import java.util.Date;

public class Guiapp1 {

private static boolean READ = false; // Do we print contents or not
private static URL urli; // This URL
private static URLConnection connection = null; // Connection to net
server

private static boolean tulostaTiedot(String name)
{
  System.out.println("This was the url  "+ name);
  Date timee = new Date(connection.getDate());
  System.out.println("Time "+timee);
  System.out.println("Length "+connection.getContentLength());
  System.out.println("Type "+connection.getContentType());
  System.out.println("Coding: "+connection.getContentEncoding());
  return true;
}


   public static void main(String[] args)  throws IOException {

  String rivi;
  BufferedReader sivu=null;  // for streaming bytes

  String add = "https://www.timbrack.de/";

 READ=true;

  try
  {
    urli = new URL(add); // Create URL object
    connection = urli.openConnection(); // URLConnection object
    sivu =  new BufferedReader(new
InputStreamReader(connection.getInputStream()));
```

```
  }
  catch(FileNotFoundException e)
  {
       System.out.println("ERROS: "+e);
    System.exit(-1);
  }
  catch(MalformedURLException e)
  {
      System.out.println("ERROS: "+e);
    System.exit(-1);
  }
  catch(UnknownHostException e)
  {
      System.out.println("ERROS: "+e);
    System.exit(-1);
  }
  catch(NoRouteToHostException e)
  {
      System.out.println("ERROS: "+e);
    System.exit(-1);
  }
  catch(ConnectException e)
  {
    System.out.println("ERROS: "+e);
    System.exit(-1);
  }

  if(READ)
  {
    while((rivi=sivu.readLine()) != null)
      System.out.println(rivi);
     System.exit(0);
  }


  if(tulostaTiedot(add) == true)
    System.out.println("There was the info..");

    }
}
```

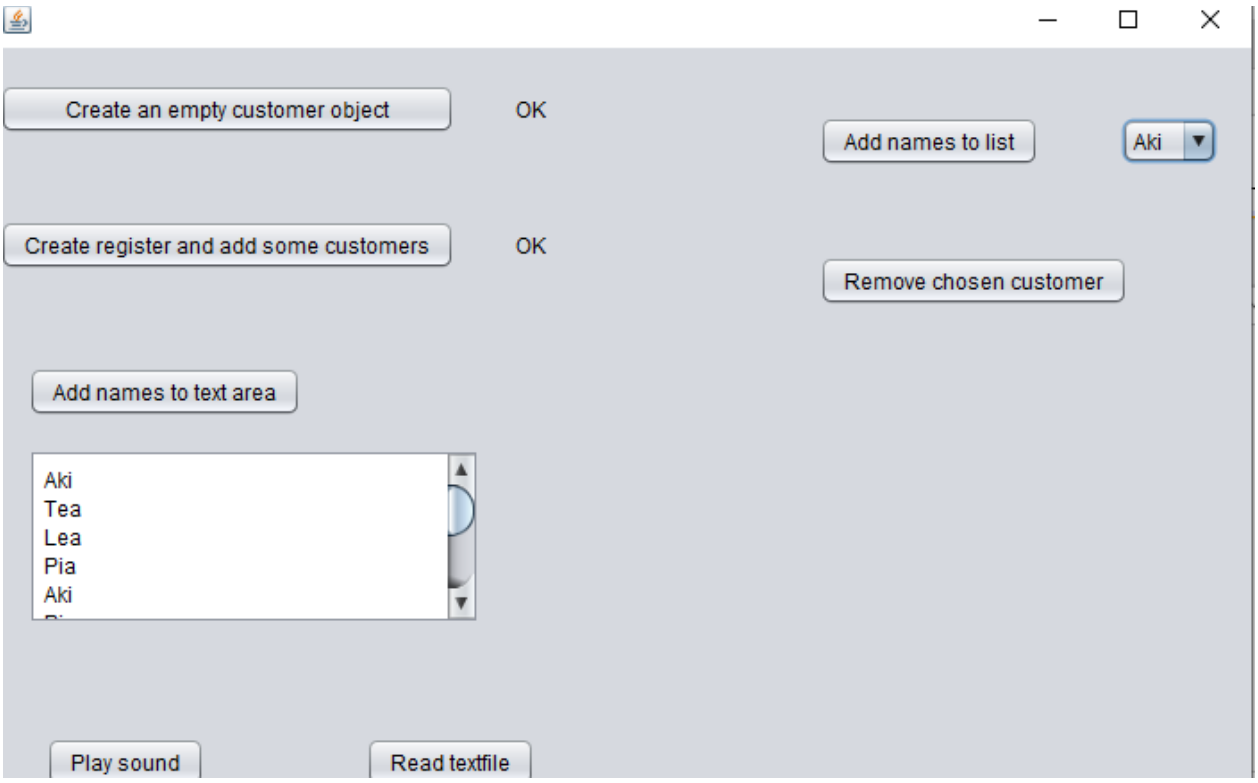
Above we read this page:

Try with different "wrong" url strings and check what exception was thrown!!

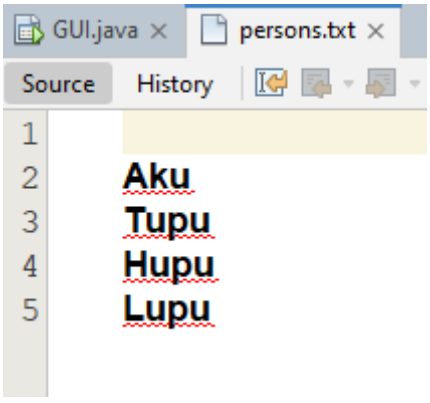
Task 97

Create an OOP to handle person data: now your task is just to create this example yourself and trying with own person names, textfile and sound!!

Here is the gui:



Here is my persons.txt



Customer class

```
public class Customer {

        private String name;

        public Customer()
        {

        }

        public Customer(String n)
        {
            name = n;
        }

        public void setName(String n)
        {
            name = n;
        }

        public String getName()
        {
            return name;
        }
}
```

CustomerRegister class

```
public  class CustomerRegister
    {
        LinkedList<Customer> customers;
        public CustomerRegister()
        {
            customers = new LinkedList<Customer>();
        }

        public String returnCustomerNamesAsString()
        {
            String list = "";
            for (int k = 0; k < customers.size(); k++)
```

```
        {
            Customer c;
            c = customers.get(k);
            list += c.getName();
            list += "\n";
        }
        return list;
    }

    public String[] returnCustomerNamesAsArray()
    {
        String[] names = new String[customers.size()];
        for (int k = 0; k < customers.size(); k++)
        {
            Customer c;
            c = customers.get(k);
            names[k] = c.getName();
        }
        return names;
    }

    public Customer returnCustomer(int k)
    {
        return customers.get(k);
    }

    public Customer returnCustomer(String n)
    {
         Customer temp = null;
         for (int k = 0; k < customers.size(); k++)
        {
                      if (customers.get(k).getName() == n)
                              temp = customers.get(k);
        }
        return temp;
    }

    public void addCustomer(Customer t)
    {
        customers.add(t);
    }

    public int amount()
    {
        return customers.size();
    }
```

```
    public void removeCustomer(Customer t)
    {
        customers.remove(t);
    }
}
```

And main code:Customer cust;

```
private void jButton1ActionPerformed
(java.awt.event.ActionEvent evt) {

    cust = new Customer();
    jLabel1.setText("OK");
}

CustomerRegister cr;

private void jButton2ActionPerformed
 (java.awt.event.ActionEvent evt) {

    cr = new CustomerRegister();

    cr.addCustomer(new Customer("Aki"));
    cr.addCustomer(new Customer("Tea"));
    cr.addCustomer(new Customer("Lea"));
    cr.addCustomer(new Customer("Pia"));
    // just for getting info
    jLabel2.setText("OK");

}

private void jButton3ActionPerformed
(java.awt.event.ActionEvent evt) {

    String names = cr.returnCustomerNamesAsString();

    jTextArea1.append(names);
}

private void jButton4ActionPerformed
(java.awt.event.ActionEvent evt) {

       String[] names = cr.returnCustomerNamesAsArray();

       int amount = cr.amount();
```

```
        jComboBox1.removeAllItems();
        for (int i = 0; i < amount; i++)
        {
              jComboBox1.addItem(names[i]);
        }

}

private void jButton5ActionPerformed
(java.awt.event.ActionEvent evt) {

    String takeaway =       jComboBox1.getItemAt(1);

    Customer vek = cr.returnCustomer(takeaway);

    cr.removeCustomer(vek);
}

private void jButton6ActionPerformed
(java.awt.event.ActionEvent evt) {
  Clip clip = null;
  try
    {
        // check: where is your sound file?
        URL url = new File
          ("c:\\sounds\\bossanova.wav").toURI().toURL();
        File audioFile = new File(url.getFile());
        AudioInputStream audioInputStream =
        AudioSystem.getAudioInputStream(audioFile);
        clip = AudioSystem.getClip();
        clip.open(audioInputStream);
        clip.start();

    }
  catch(Exception e)
    {
        System.out.println
        ("HELLO, something wrong... " + e.getMessage());
    }
}

private void jButton7ActionPerformed
  (java.awt.event.ActionEvent evt) {

File f1 = new File("persons.txt");
String line = new String();
String lines[] = new String [100];
```

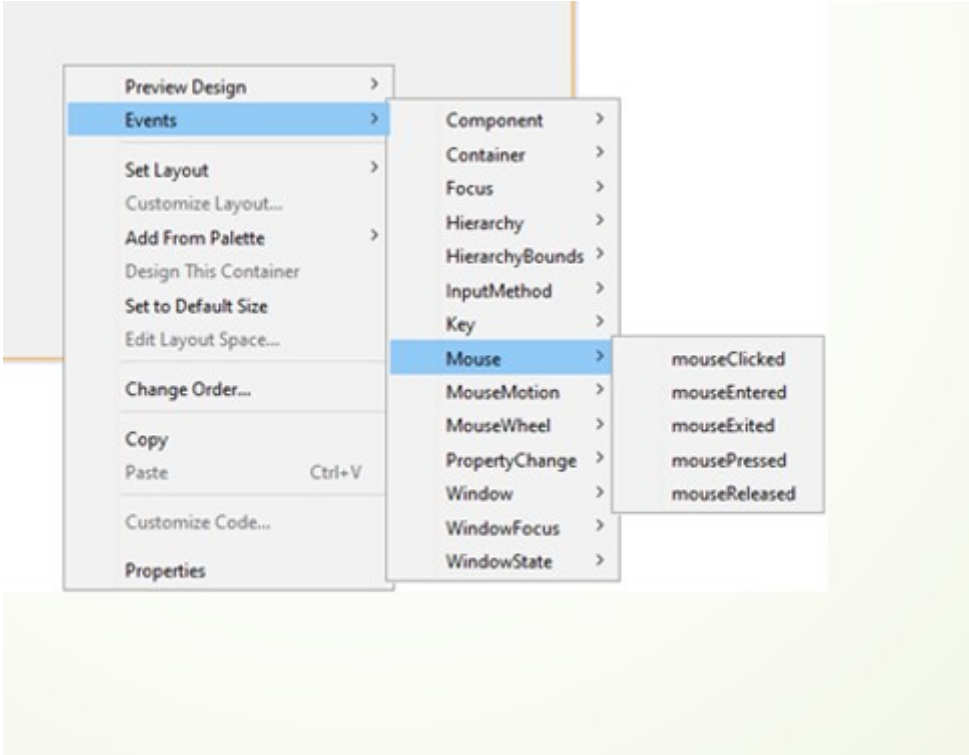
```
int v = 0;
   try
   {
    FileReader fr1;
    fr1 = new FileReader(f1);
    BufferedReader in1 = new BufferedReader(fr1);
    while (true)
    {
      if ( (line =  in1.readLine()) == null)
          break;
      lines[v] = line;
      v++;
    }
   }
    catch (FileNotFoundException f)
   {
        System.out.println(f.getMessage());
     }
       catch (IOException i)
       {}

   // for testing purposes only
    for (int k = 0; k < v; k++)
      System.out.println(lines[k]);
}
```

Task 98

Follow this example below and create an app that allows user to draw on a java frame.

Add a new frame.

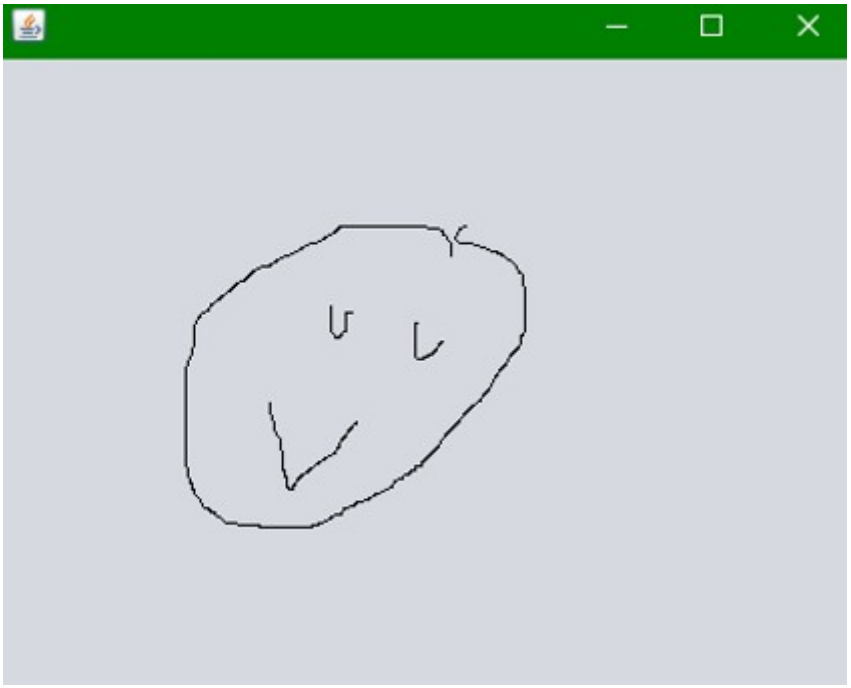
Add mouse events



Add codes

```
private void formMousePressed(java.awt.event.MouseEvent evt) {
    x = evt.getX();
     y = evt.getY();
}

Graphics g;
int x, y, xx, yy;

private void formMouseDragged(java.awt.event.MouseEvent evt) {
     g = getGraphics();
    xx = evt.getX();
    yy = evt.getY();

    g.drawLine(x, y, xx, yy);

    x = xx;
    y = yy;
}
```

Try



You can freely use the drawing above!

(Drawing could be better ;))

Task 99

Follow instructions and create an own game. In this game user has to guess what is the object that is revealed...

GUI

Image

Here is the original image (OpenOffice)

zebra0.png

Principle

We read the original picture and

take width and height

take color values

Then we create new white image that is then filled randomly step by step.

Pixel class

Now it is a good idea to create a class that contains pixel info:

```
public class PixelClass {

    public int x;
    public int y;
    public int colorValue;
}
```

We add all color values from the original image to an PixelClass array.

Then we shuffle the array.

And finally we star showing those pixels by drawing them to an empty white image.

Delay

Delay is generated with TimeUnit:

```
        try
        {
          TimeUnit.SECONDS.sleep(1);
        }
        catch (Exception e) {   }

    }
```

Code 1

```
private void jButton2ActionPerformed(java.awt.event.ActionEvent evt) {
    PixelClass[] pixels;

    Graphics gg = this.getGraphics();
    BufferedImage img = null;
    try {

        img = ImageIO.read(new File("zebra0.png"));
    }
    catch (IOException e) {     }

     BufferedImage empty  = null;
     try {
          empty = ImageIO.read(new File("empty.png"));
         }
          catch (IOException e)  {   }

    int index = 0;
    int xx = img.getWidth();
    int yy = img.getHeight();
    int amount = xx * yy;
    pixels = new PixelClass[amount];   // pixelarray

    for (int i = 0; i < xx; i++)
        for (int j = 0; j < yy; j++)
        {
          int p = img.getRGB(i,j);
          pixels[index] = new PixelClass();
          pixels[index].x = i;
          pixels[index].y = j;
          pixels[index].colorValue = p;
          index++;
        }
```

Code 2

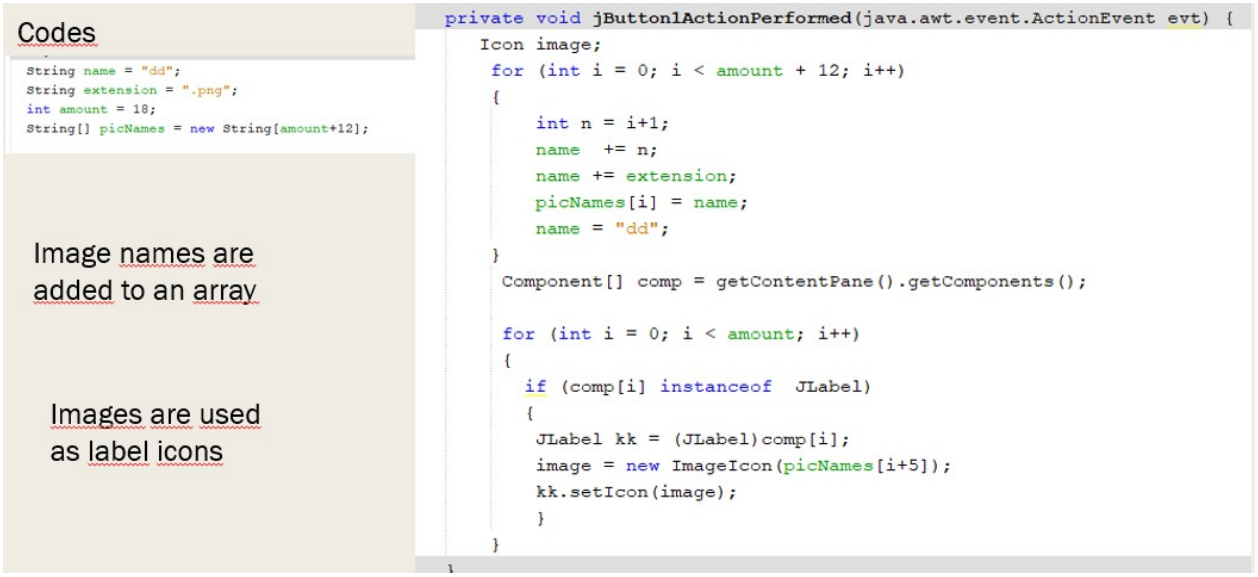
```
// shuffling
 for (int k = 0; k < 100000; k++)
 {
    int i1 =(int) (Math.random() * amount);
    int i2 =(int) (Math.random() * amount);
    PixelClass temp =  pixels[i1];
    pixels[i1] = pixels[i2];
    pixels[i2] = temp;
 }

 // printing for testing purposes
 for (int k = 0; k < amount; k++)
 {
     jTextArea1.append("kk: " + pixels[k].x + "  " + pixels[k].y + "  " + pixels[k].colorValue  + "\n");
 }

int set = 0;  // we collect some pixels before printing
for (int k = 0; k < amount; k++)
 {
     empty.setRGB(pixels[k].x,pixels[k].y, pixels[k].colorValue );
     set++;
     if (set >= 1000)
     {
         gg.drawImage(empty, 10, 10, rootPane);
         set = 0;
         try
         {
           TimeUnit.SECONDS.sleep(1);
         }
          catch (Exception e) {  }
     } }
```

AND test

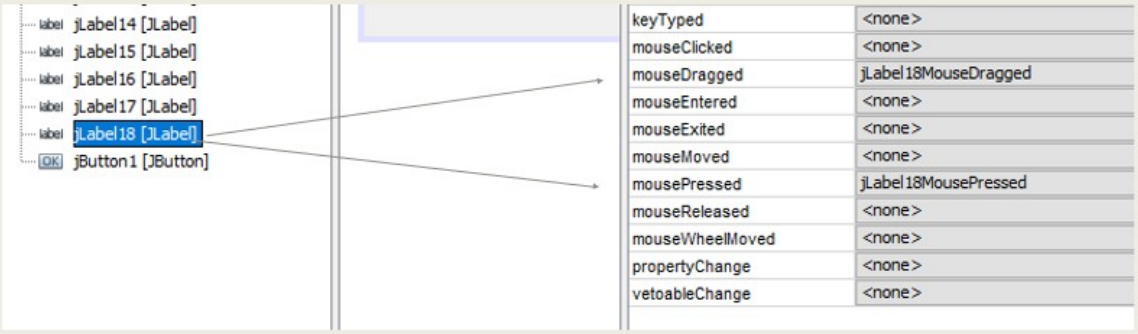
Task 99

Create a Java puzzle: follow steps here below!

Main idea: images are added to labels.

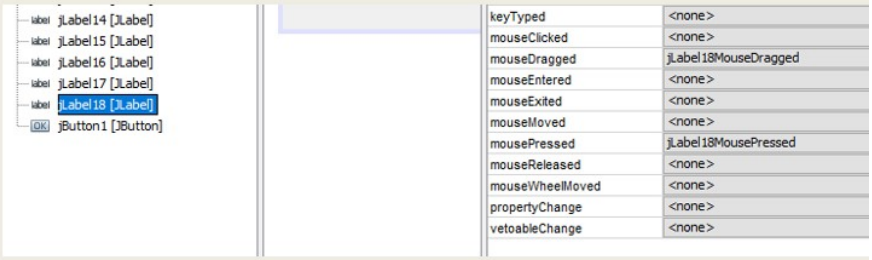


Labels & mouse events



Codes

Labels & mouse events




```
private void jLabel8MouseDragged(java.awt.event.MouseEvent evt) {
    doItDrag(evt);
}

private void jLabel8MousePressed(java.awt.event.MouseEvent evt) {
    doItPress(evt);
}
```

Codes

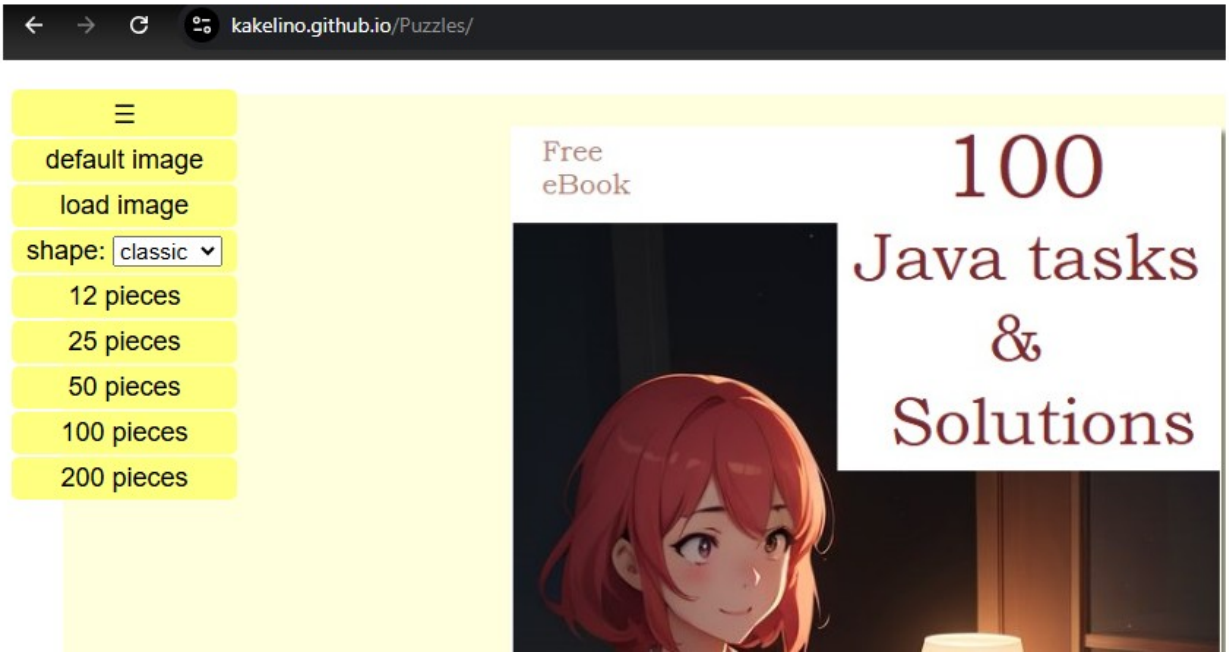
Functions that are executed with label events

```
int left, top;
private void doItPress(java.awt.event.MouseEvent evt)
{
    int x = evt.getX();
    int y = evt.getY();
    left = x;
    top = y;
}
 private void doItDrag(java.awt.event.MouseEvent evt)
{
    Component comp = evt.getComponent();
    Point p = comp.getLocation();
    p.x += evt.getX() - left;
    p.y += evt.getY() - top;
    comp.setLocation(p);
}
```

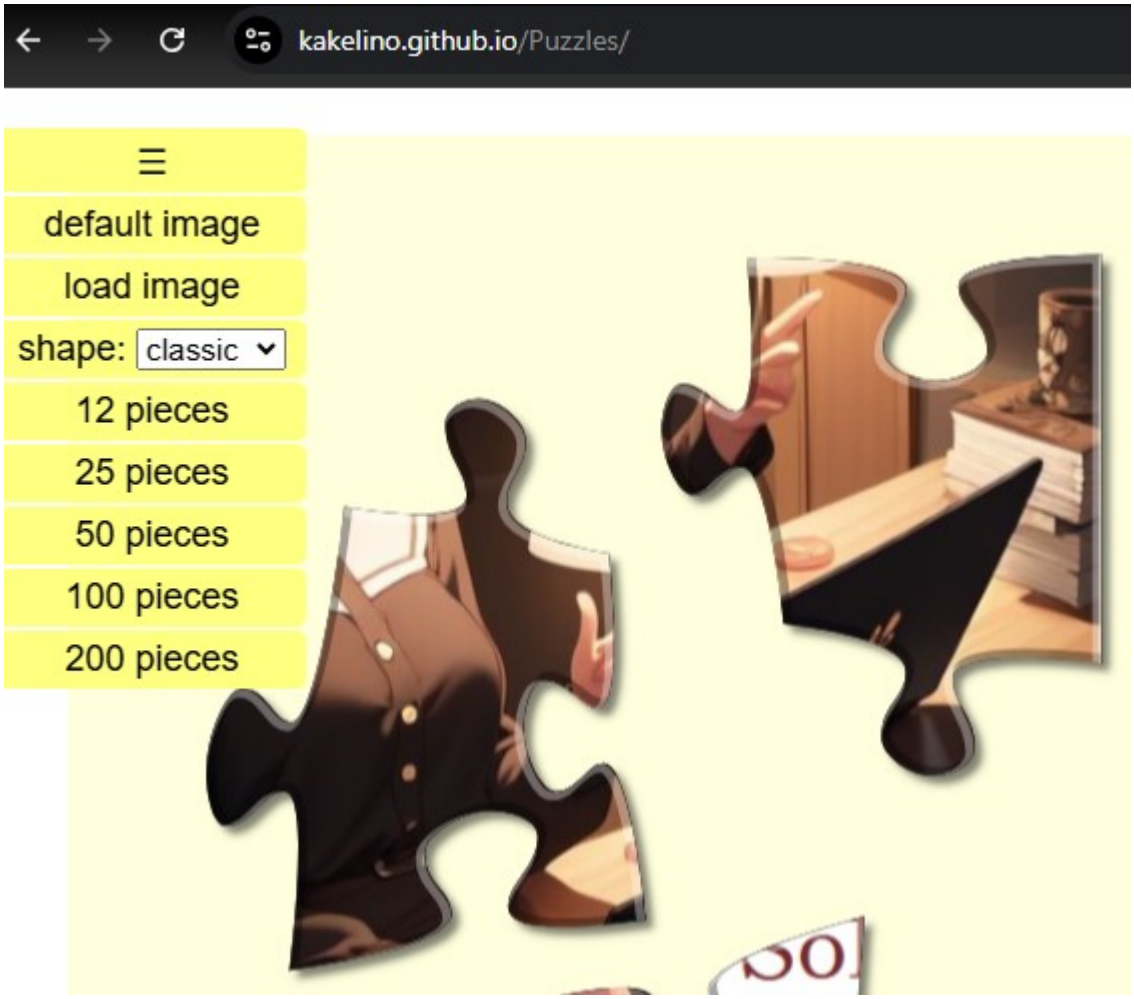
Try it!!¨

Hint: how to get puzzle part?
There are many places in Internet that offer puzzles with own pictures.
e.g here is one place (the code is not created by the writer, the webpage is a copy of original site page...) Original URL is:
URl is https://codepen.io/Dillo/pen/QWKLYab

This is the image that is to be puzzle:



Here are the parts



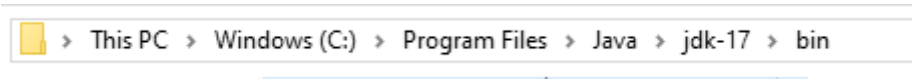
Now you can take puzzle parts from this page, remove the background color and use in Java app...

Task 100

a) Compiling and running java app without any special tool: just using Java's own javac and java.

Here is an example: try to follow steps.

First you have to know where your java is installed. In my machine it is here:



The folded "bin" contains executable files.

Now we open command prompt, create a java code, compile it and run it.

I have already one codefile in that folder:

Command Prompt

```
C:\javat>type example1.java
public class example1{
    public static void main(String[] args) {

      int t1 = 999999;
     double t2 = 5.55555555555;
     char t3 = 'x';
     float t4 = 2.33f;
     short t5 = 10;
     short t6 = 300;
     long t7 = 9000000000L;
     boolean t8 = true;

        System.out.println(t1);
        System.out.println(t2);
        System.out.println(t3);
        System.out.println(t4);
        System.out.println(t5);
        System.out.println(t6);
        System.out.println(t7);
        System.out.println(t8);
    }

    }
```

Now we compile that .java file:

```
C:\javat>"C:\Program Files\Java\jdk-17\bin\javac"  example1.java
```

File example1.class is compiled file:

```
C:\javat>dir *.class
 Volume in drive C is Windows
 Volume Serial Number is 686A-31B8

 Directory of C:\javat

30.12.2024  08.41               646 example1.class
```

We can now run it:

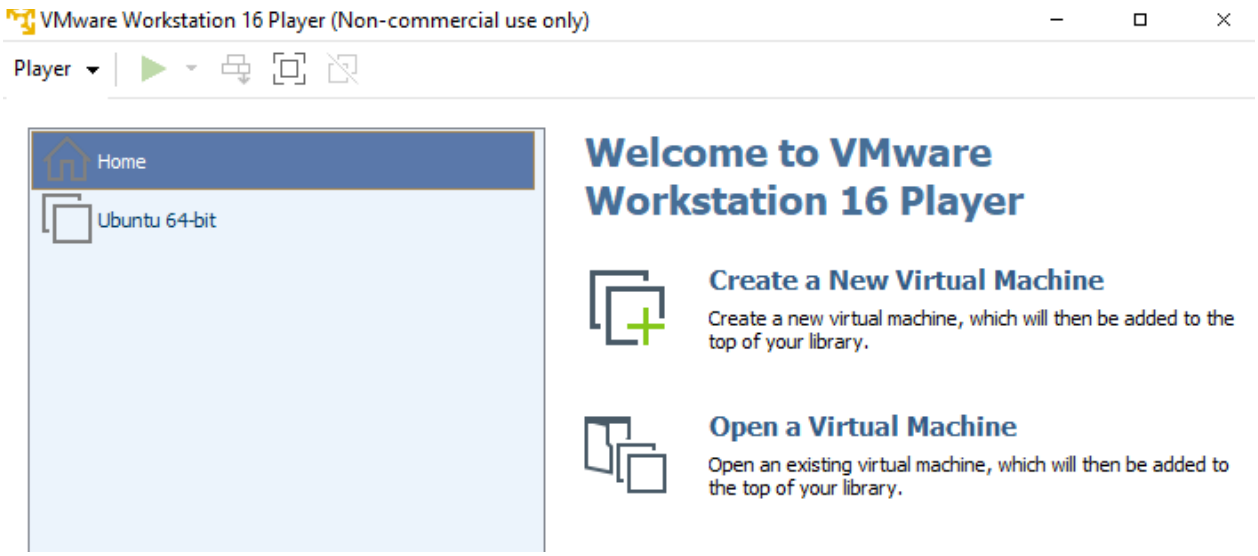
```
C:\javat>"C:\Program Files\Java\jdk-17\bin\java"  example1
999999
5.55555555555
x
2.33
10
300
9000000000
true
```

Try it!

b)
Create and run java codes in Windows or Mac machine.
MacOs already has Unix inside. With Windows you can use e.g some virtual machine (WmWare workstation is one choice).
You can install VMware and maybe Ubuntu package.

110

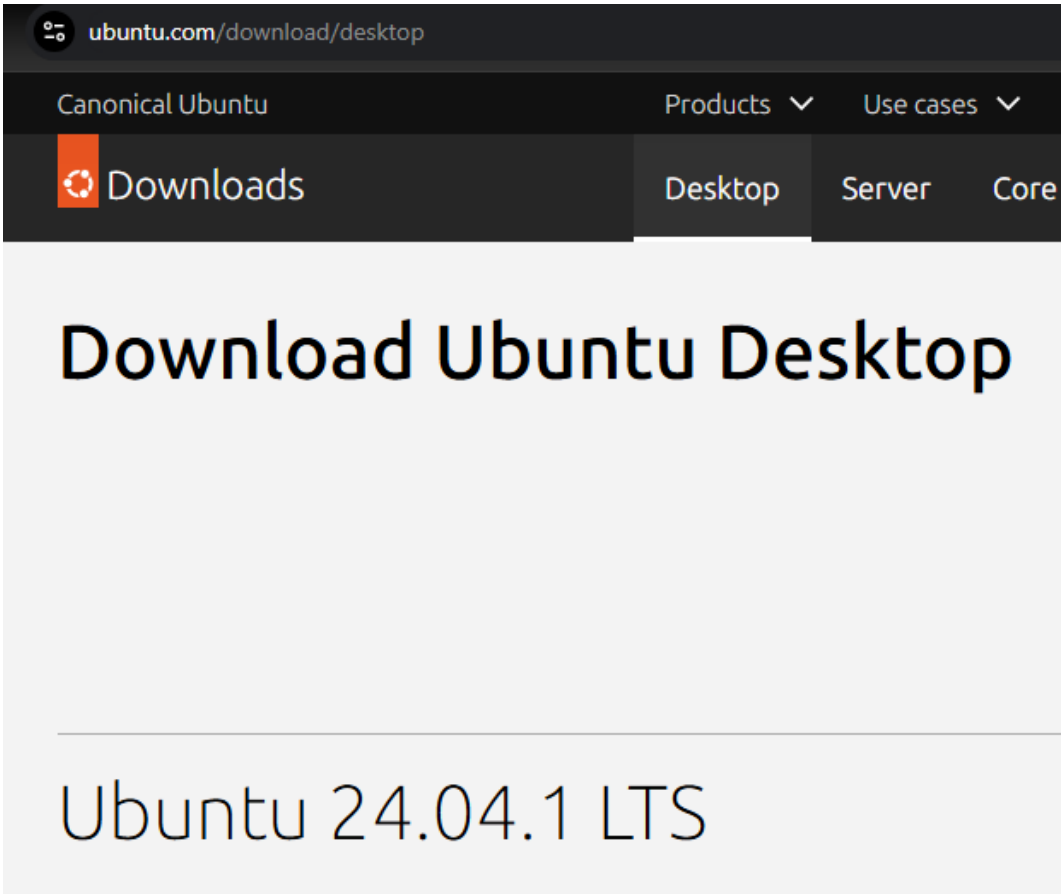
Example here



Create a short demoapplication using Linux or Unix. Show steps and results.

111

Solution
Follow these steps:
Download Linux package (.ISO package can be download vie net).



Create a new Virtual Machine

Start it

First. install java:
https://ubuntu.com/tutorials/install-jre#2-installing-openjdk-jre

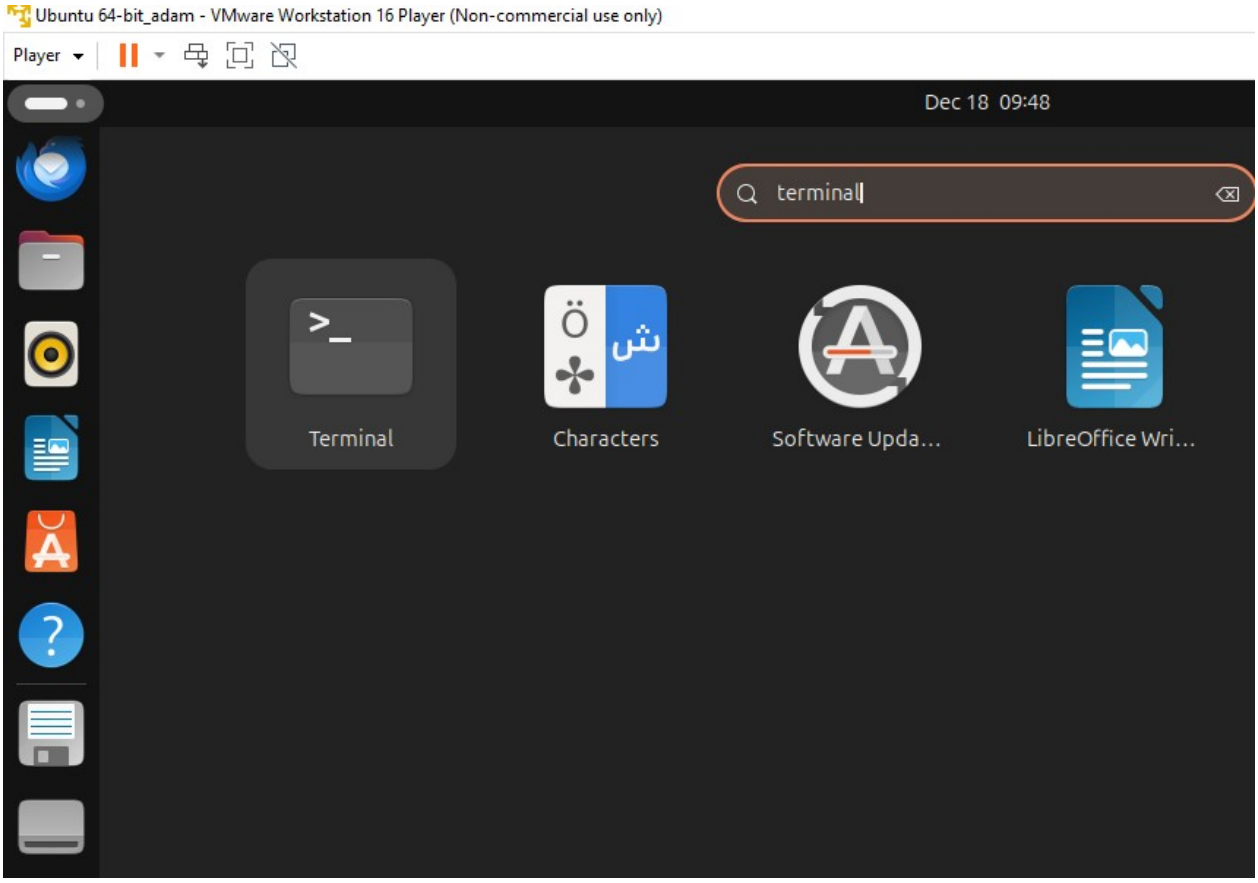
To install the OpenJDK JRE, we run:

```
sudo apt install default-jre
```

We can check if OpenJDK JRE was properly installed by running:

```
java -version
```

Open terminal.



If needed create a folder for java codes.

Use e.g. nano editor to create a code.

Compile and run the code.

Try to do it yourself!!

SO this is it!

This ebook uses Java language.

But later we use also JavaScript!

I hope you can give me comments: how to improve this book?

Thank You!