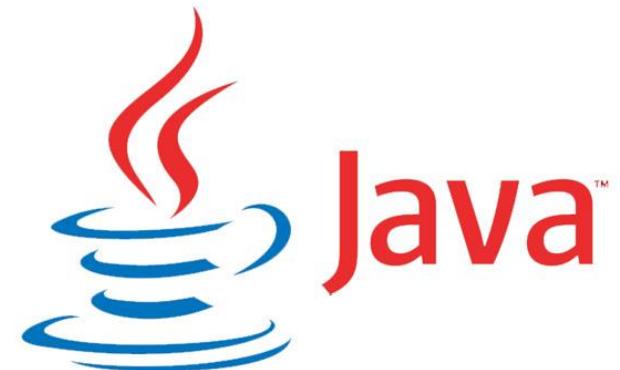


Pengantar Pemrograman dengan Bahasa Java

IF2123 Aljabar Geometri

Oleh: Rinaldi Munir

Sekolah Teknik Elektro dan Informatika
ITB



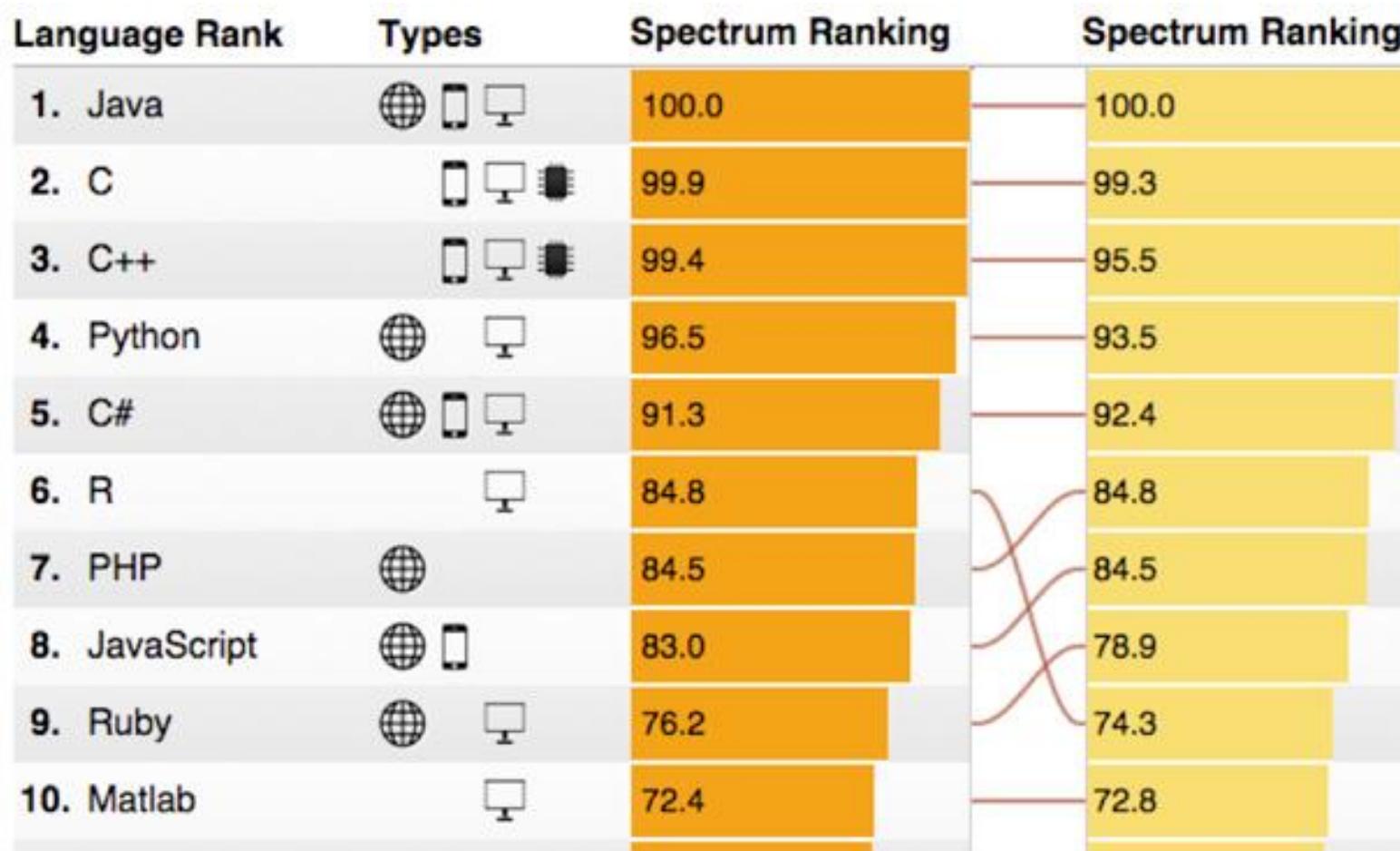
Sejarah Bahasa Java



James Gosling

- Bahasa java dibuat oleh James Gosling saat masih bergabung di *Sun Microsystems* dan dirilis tahun 1995.
- Bahasa Java dapat dijalankan pada berbagai komputer dan *platform* sistem operasi.
- Slogan Java: *Write once, run anywhere!* (Tulis sekali, jalankan di manapun)
- Java adalah bahasa pemrograman bersifat umum (*general purpose*)
- Sintaks Bahasa Java diadopsi dari Bahasa C dan C++ tetapi lebih sederhana
- Nama “java” diambil dari jenis kopi yang diminum oleh James Gosling saat itu.

- Java termasuk Bahasa pemrograman yang popular untuk mengembangkan aplikasi, termasuk aplikasi berbasis web.



Gambar 1. Sepuluh (10) bahasa pemrograman top 2015:

Sumber: http://spectrum.ieee.org/computing/software/the-2015-top-ten-programming-languages/?utm_source=techalert&utm_medium=email&utm_campaign=072315

- Pada tahun 2017, Bahasa Java turun ke peringkat 3



Gambar 2. Sepuluh (10) bahasa pemrograman top 2017

- 2018



Gambar 3. Sepuluh (10) bahasa pemrograman top 2018

IEEE Ranked the Top Programming Languages of 2019.

2019

Rank	Language	Type	Score
1	Python	🌐💻⚙️	100.0
2	Java	🌐📱💻	96.3
3	C	📱💻⚙️	94.4
4	C++	📱💻⚙️	87.5
5	R	💻	81.5
6	JavaScript	🌐	79.4
7	C#	🌐📱💻⚙️	74.5
8	Matlab	💻	70.6
9	Swift	📱💻	69.1
10	Go	🌐💻	68.0

Sumber:
[https://learnworthy.net/
ieee-ranked-the-top-
programming-languages-
of-2019/](https://learnworthy.net/ieee-ranked-the-top-programming-languages-of-2019/)

2020

IEEE Ranked the Top Programming Languages of 2020

Rank	Language	Type	Score
1	Python ▾	🌐 💻⚙️	100.0
2	Java ▾	🌐 📱💻	95.3
3	C ▾	📱💻⚙️	94.6
4	C++ ▾	📱💻⚙️	87.0
5	JavaScript ▾	🌐	79.5
6	R ▾	💻	78.6
7	Arduino ▾	⚙️	73.2
8	Go ▾	🌐 💻	73.1
9	Swift ▾	📱💻	70.5
10	Matlab ▾	💻	68.4

2021

IEEE Ranked the Top Programming Languages of 2020

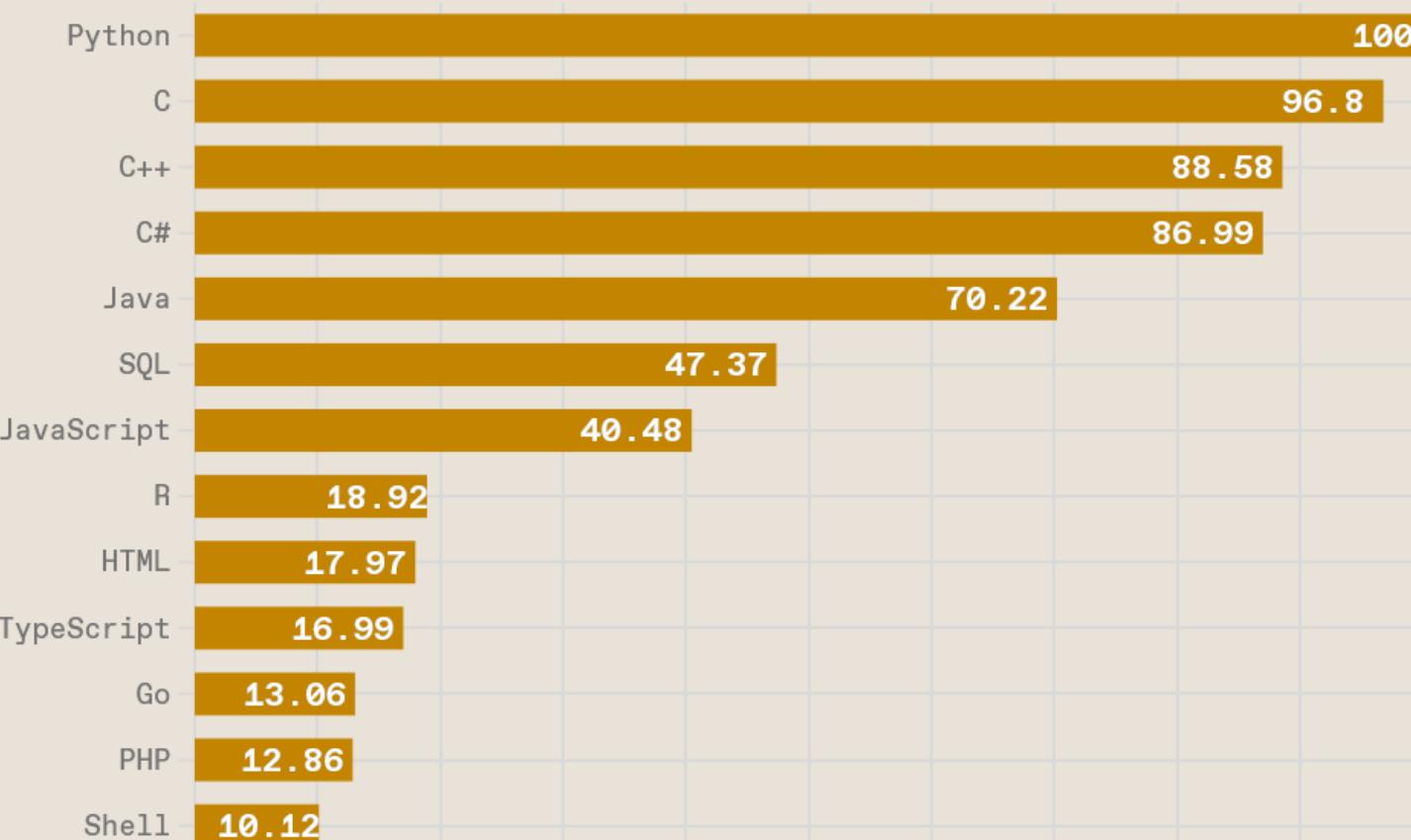
Rank	Language	Type	Score
1	Python▼	🌐💻⚙️	100.0
2	Java▼	🌐📱💻	95.4
3	C▼	📱💻⚙️	94.7
4	C++▼	📱💻⚙️	92.4
5	JavaScript▼	🌐	88.1
6	C#▼	🌐📱💻⚙️	82.4
7	R▼	💻	81.7
8	Go▼	🌐💻	77.7
9	HTML▼	🌐	75.4
10	Swift▼	📱💻	70.4

Sumber: <https://spectrum.ieee.org/top-programming-languages-2021>

Top Programming Languages 2022

Click a button to see a differently weighted ranking

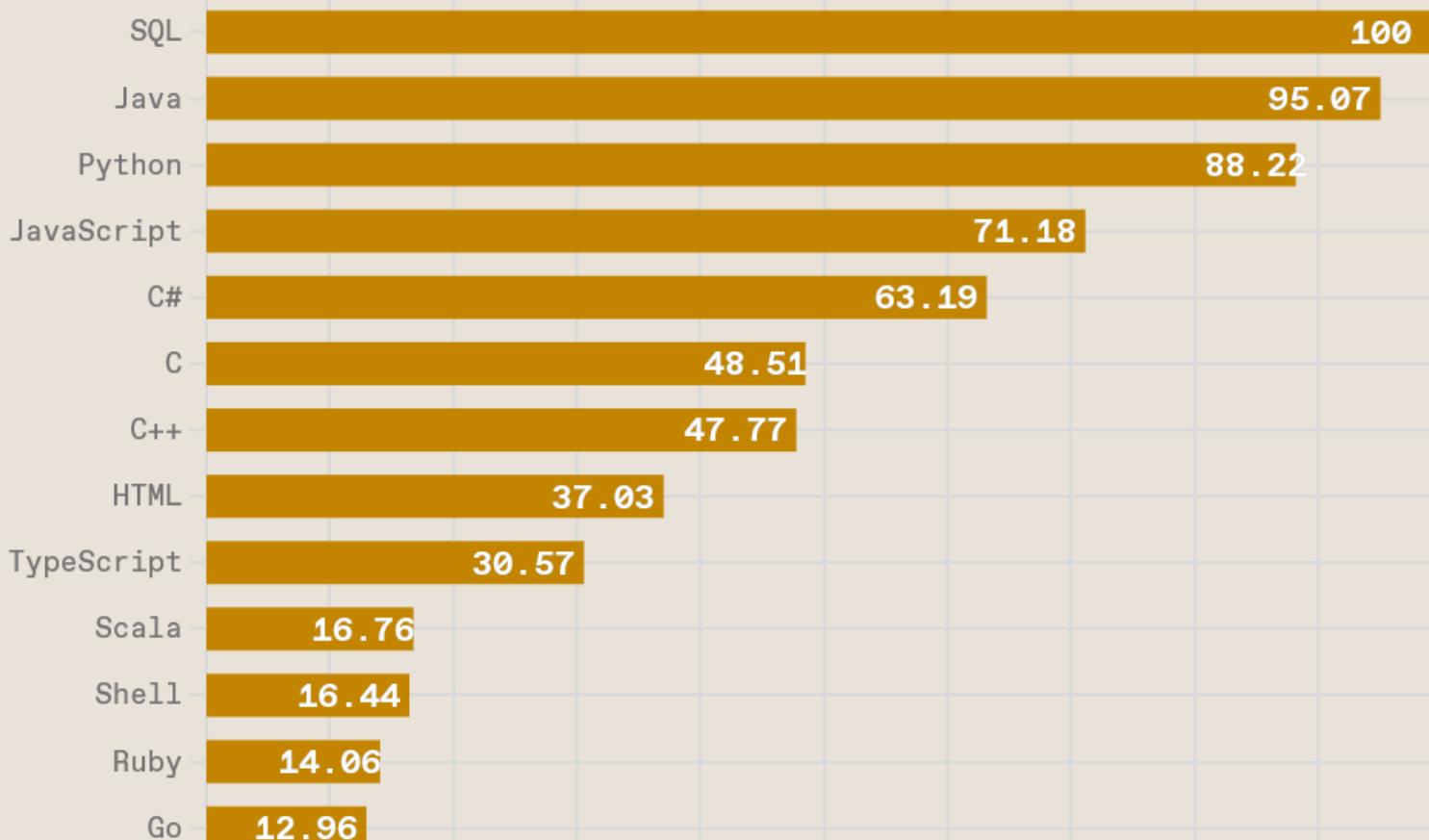
Spectrum Jobs Trending



<https://spectrum.ieee.org/top-programming-languages-2022>

Top Programming Languages 2022

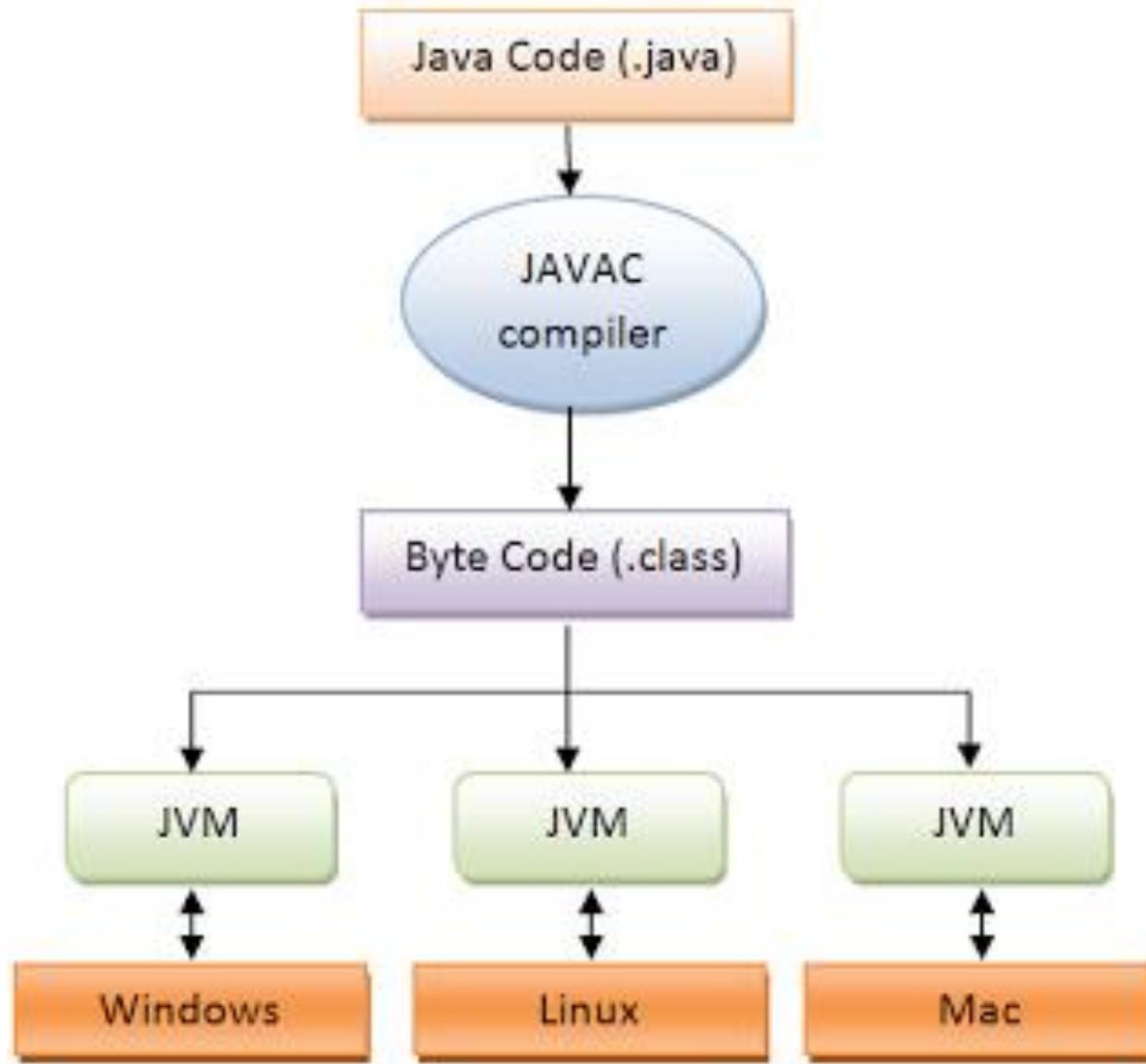
Click a button to see a differently weighted ranking



Teknologi Java = Bahasa pemrograman + platform

Java Sebagai Bahasa Pemrograman

- Bahasa java memiliki karakteristik: *sederhana, berorientasi objek, interpreted, terdistribusi, tangguh, portable, memiliki kinerja tinggi, aman, dinamis.* (Baca di: <http://java.sun.com/docs/white/langenv/>)
- *Compiler* java mengubah kode program menjadi bahasa *intermediate* yang disebut *java bytecode*. Kemudian *interpreter* Java bernama JVM (*Java Virtual Machine*) melakukan interpretasi *bytecode* setiap kali *bytecode* tersebut dijalankan.



Gambar 2. Proses kompilasi dan interpretasi program Java
(Sumber gambar: <http://belajarjava-19.blogspot.co.id>)

Java Sebagai Sebuah *Platform*

- *Platform* adalah lingkungan perangkat keras dan perangkat lunak untuk menjalankan program.
- Java adalah *platform* perangkat lunak untuk menjalankan program java.
- *Paltform* java terdiri dari dua komponen:
 1. *Java Virtual Machine* (JVM)
 2. *Java Application Programming Interface* (Java API)
- JVM pada dasarnya adalah aplikasi sederhana yang ditulis dalam bahasa C untuk mengeksekusi program yang ditulis dalam bahasa Java.

- Cara kerja JVM: Pada saat eksekusi, JVM membaca *bytecode*, lalu mengubahnya ke bahasa mesin yang sesuai dengan komputer yang menjalankannya.
- Proses kompilasi bahasa java menghasilkan *bytecode* yang selalu sama untuk setiap sistem operasi atau jenis mesinnya, tetapi JVM akan mengubah *byetecode* menjadi bahasa mesin tujuannya.
- Java API merupakan *library* yang disediakan java untuk mengembangkan program java. Java API berisi sekumpulan komponen perangkat lunak yang memudahkan pemrogram java mengembangkan aplikasi.

Kakas Java

Untuk menulis program java, diperlukan beberapa kakas:

1. *Java Development Kit (JDK)*

Unduh paket JDK (*Java Development Kit*) java terbaru dari situs:

<https://www.oracle.com/java/technologies/javase/javase-jdk8-downloads.html>

atau <https://www.java.com/en/download/>

2. Editor teks

Sembarang editor teks seperti *Notepad*, *Ultraedit*, *Wordpad*, *Vi*, atau *Joe*

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← → ↻ ⌂ https://www.oracle.com/java/technologies/javase/javase-jdk8-downloads.html

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Commercial license and support is available with a low cost [Java SE Subscription](#).

Oracle also provides the latest OpenJDK release under the open source [GPL License](#) at [jdk.java.net](#).

Java Download



- Untuk pengembangan aplikasi visual (*visual programming*), anda membutuhkan kertas pengembangan java yang mengintegrasikan:
 - JDK
 - Editor teks
 - Editor antarmuka pengguna (GUI = *Graphical User Interface*)
 - Manajemen aplikasi
 - *Debugger*
- Contoh kertas pengembangan java: *Netbeans* dan *Eclipse*

Netbeans

The screenshot shows the NetBeans IDE interface with the title "ECMAScript6Sales - NetBeans IDE Dev 201606170002". The menu bar includes File, Edit, View, Navigate, Source, Refactor, Run, Debug, Team, Tools, Window, Help, and a Search field. The toolbar has icons for file operations like New, Open, Save, and Run.

The Projects panel on the left lists the project structure:

- ECMAScript6Sales
- Site Root
- gen:
 - authenticator.js
 - buyer.js
 - main.js
 - thing.js
- src:
 - authenticator.js
 - buyer.js
 - main.js
 - thing.js
 - bundle.js
 - index.html
- Unit Tests
- Important Files
- package.json
- npm Libraries:
 - babel-cli
 - babel-preset-es2015
 - webpack

The Navigator panel shows symbols defined in the project:

- buyThing(name): Boolean|undefined
- sendApology
- sendThing
- verifyName

The main workspace contains four code editors:

- buyer.js**:

```
1  /**
2   * Buyer for obtaining Thing
3   * for an authenticated name.
4   * @param {type} name
5   * @returns {undefined}
6   */
7  import { verifyName } from './authenticator';
8  import { sendThing } from './thing';
9  import { sendApology } from './thing';

10 export function buyThing(name) {
11     console.log(name + " is trying to buy");
12     var verified = verifyName(name);
13     if(verified){
14         sendThing(name);
15     } else {
16         sendApology(name);
17     }
18     return verified;
19 }
20 }
```
- main.js**:

```
1  import { buyThing } from './buyer';
2
3  name = 'John Smith';
4  console.log(name + " enters the system");
5  var result = buyThing(name);
6  console.log("sale success " + result);
```
- authenticator.js**:

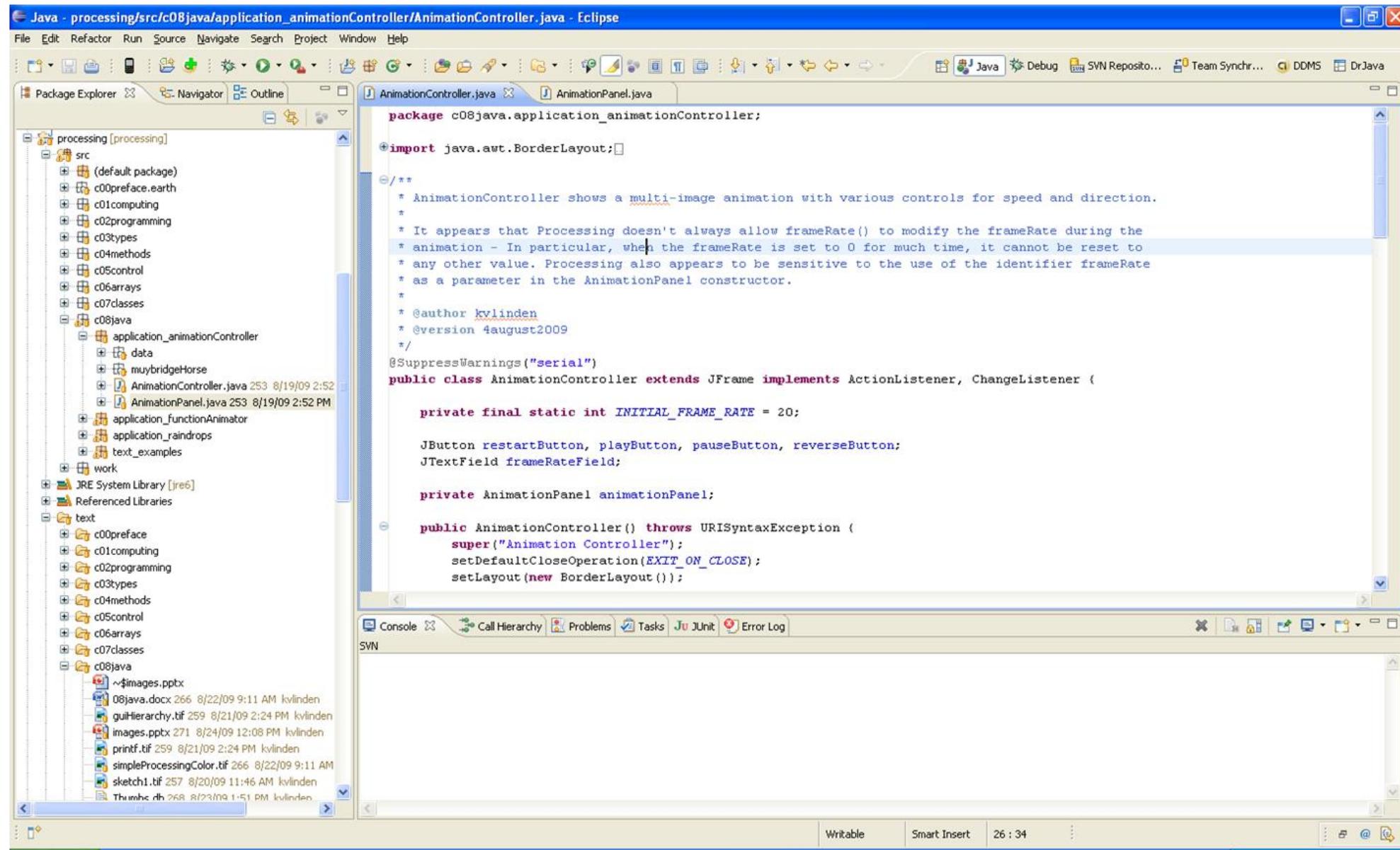
```
1  /**
2   * Verifier for name.
3   * @param {type} name
4   * @returns {undefined}
5   */
6  export function verifyName(name) {
7      var requiredNameLength = 1;
8      console.log("authenticating " + name);
9      return name.length > requiredNameLength;
10 }
```
- thing.js**:

```
1  /**
2   * Send thing if authentication succeeds.
3   * @param {type} name
4   * @returns {undefined}
5   */
6  export function sendThing(name){
7      console.log("send thing to " + name);
8  }

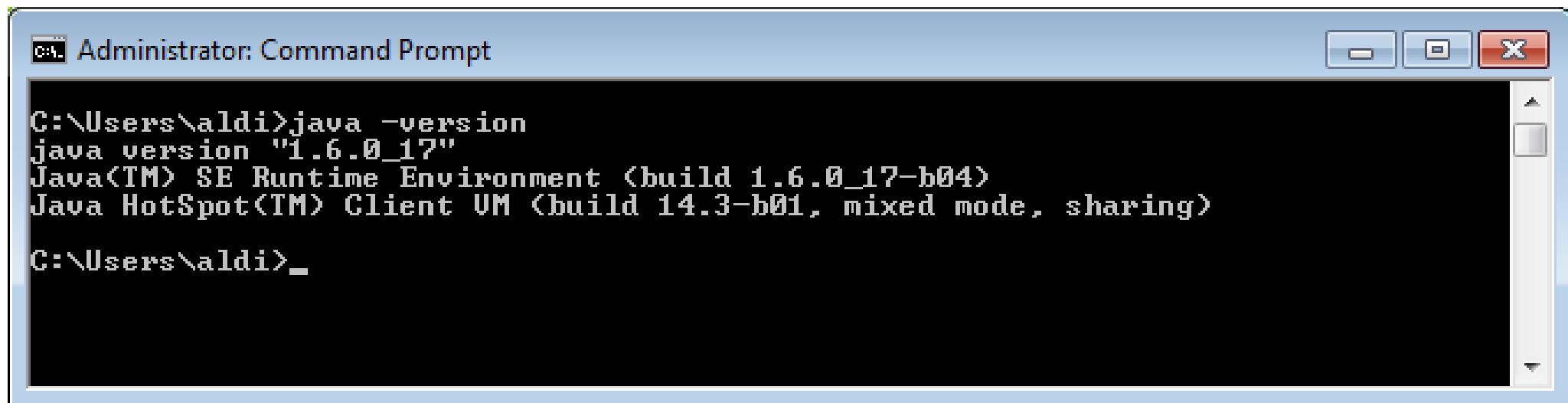
10 export function sendApology(name){
11     console.log("say sorry to " + name);
12 }
```

At the bottom, the status bar shows "9:1 INS" and the number "20".

Eclipse



- Instalasih JDK ke komputer anda dan ikuti semua instruksi untuk menginstalasinya.
- Aturlah nilai *environment variable* PATH melalui Control Panel > System > Advanced > Environment Variables
- Untuk mengetahui versi JRE (*java runtime environment*) yang terinstal:

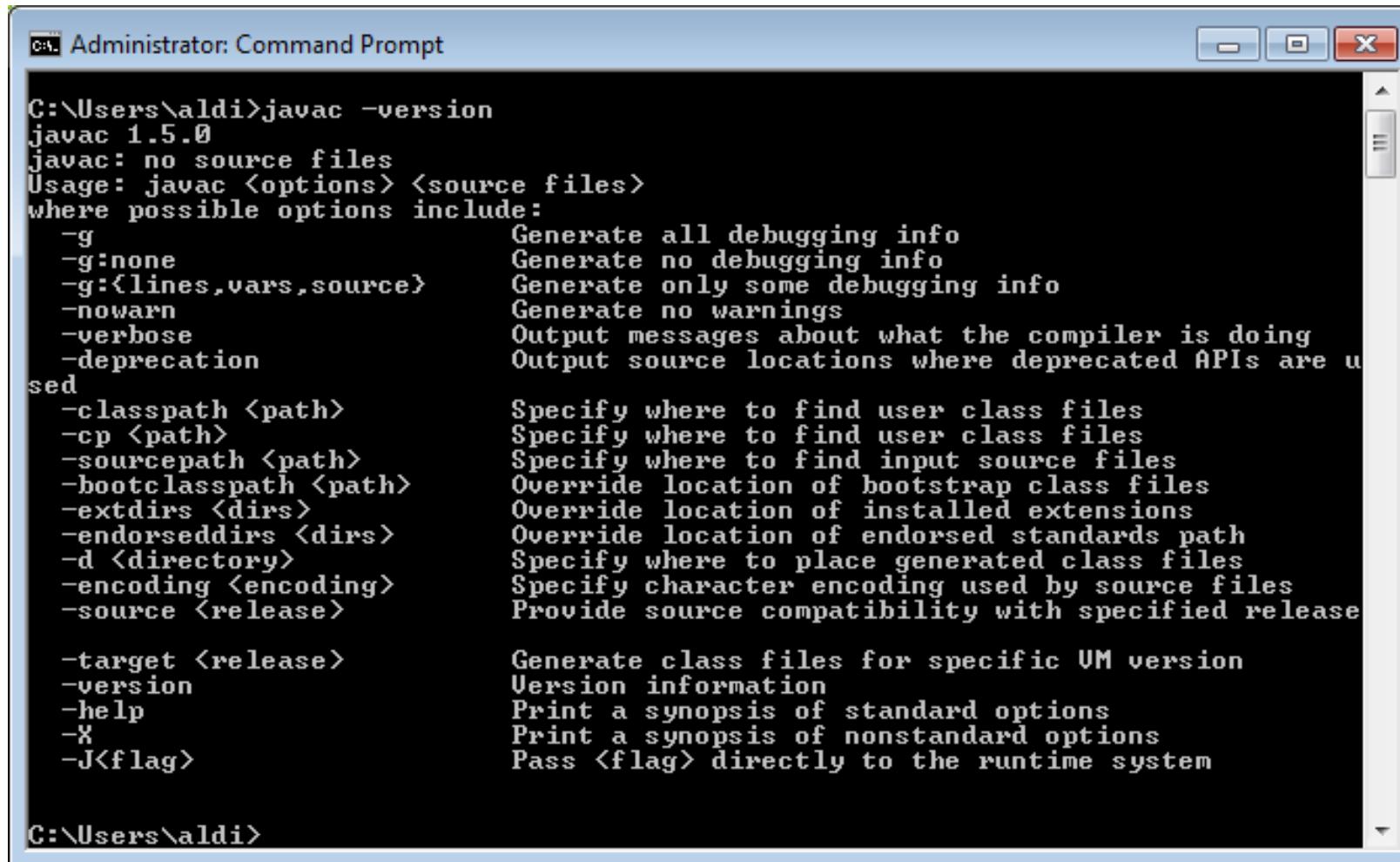


The screenshot shows an 'Administrator: Command Prompt' window. The command 'java -version' is entered, and the output displays the Java version as '1.6.0_17' and the Java Runtime Environment details. The window has a blue title bar and standard Windows-style buttons (minimize, maximize, close) at the top right.

```
C:\Users\aldi>java -version
java version "1.6.0_17"
Java(TM) SE Runtime Environment (build 1.6.0_17-b04)
Java HotSpot(TM) Client VM (build 14.3-b01, mixed mode, sharing)

C:\Users\aldi>
```

- Untuk mengetahui versi JDK yang terinstal:



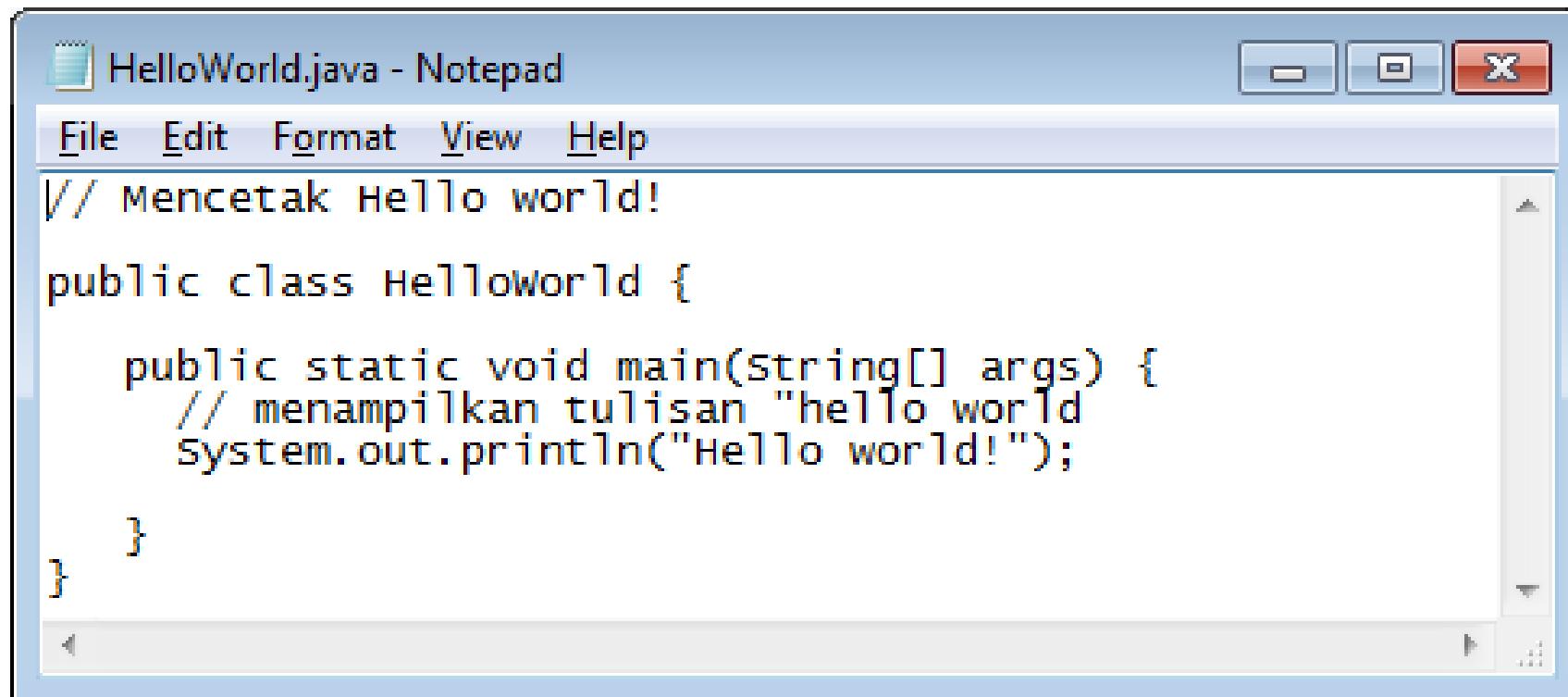
```
C:\Users\aldi>javac -version
javac 1.5.0
javac: no source files
Usage: javac <options> <source files>
where possible options include:
  -g                      Generate all debugging info
  -g:none                 Generate no debugging info
  -g:{lines,vars,source}   Generate only some debugging info
  -nowarn                 Generate no warnings
  -verbose                Output messages about what the compiler is doing
  -deprecation            Output source locations where deprecated APIs are u
sed
  -classpath <path>        Specify where to find user class files
  -cp <path>               Specify where to find user class files
  -sourcepath <path>       Specify where to find input source files
  -bootclasspath <path>   Override location of bootstrap class files
  -extdirs <dirs>          Override location of installed extensions
  -endorseddirs <dirs>    Override location of endorsed standards path
  -d <directory>          Specify where to place generated class files
  -encoding <encoding>     Specify character encoding used by source files
  -source <release>        Provide source compatibility with specified release

  -target <release>        Generate class files for specific VM version
  -version                 Version information
  -help                   Print a synopsis of standard options
  -X                      Print a synopsis of nonstandard options
  -J<flag>                Pass <flag> directly to the runtime system

C:\Users\aldi>
```

Program java-ku yang pertama

- Ketik program *HelloWorld* di bawah ini dengan editor teks, simpan dengan nama file HelloWorld.java (harus sama persis dengan nama class)



The image shows a screenshot of a Windows-style Notepad window titled "HelloWorld.java - Notepad". The window has a standard title bar with minimize, maximize, and close buttons. Below the title bar is a menu bar with "File", "Edit", "Format", "View", and "Help". The main content area contains the following Java code:

```
// Mencetak Hello world!
public class HelloWorld {
    public static void main(String[] args) {
        // menampilkan tulisan "hello world"
        System.out.println("Hello world!");
    }
}
```

- Kompilasi program *HelloWorld* dari *command prompt*:

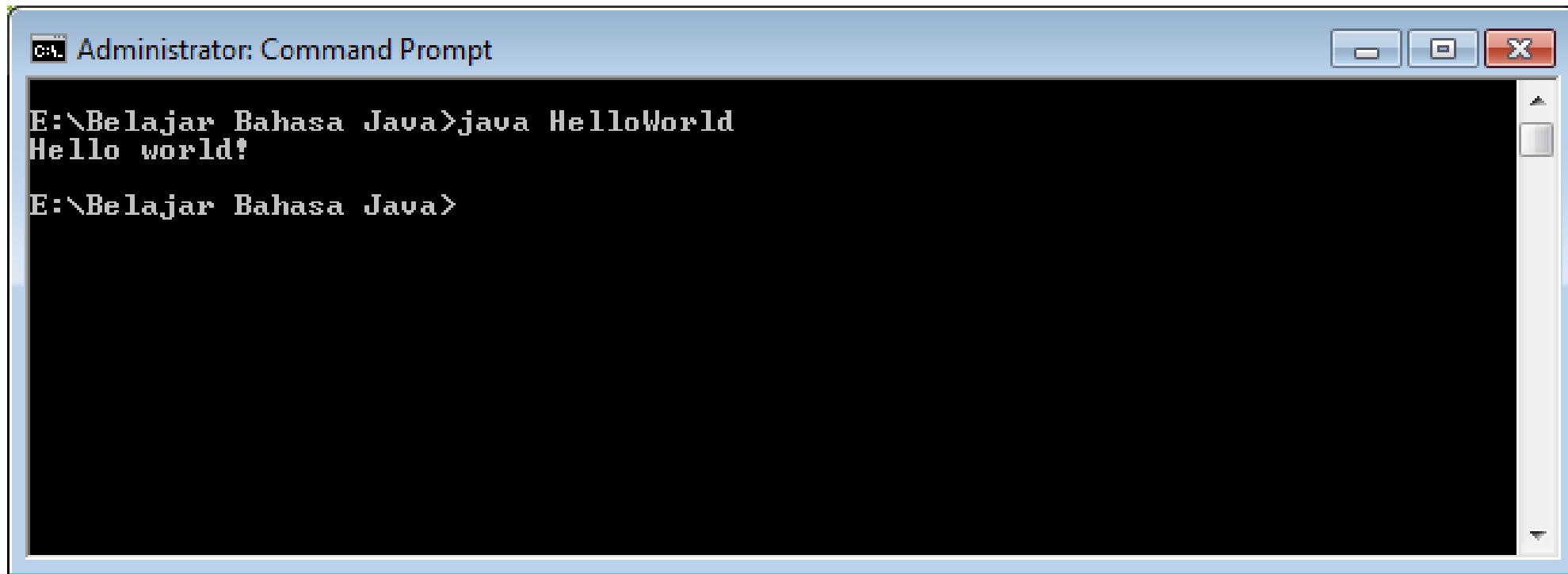


The screenshot shows an 'Administrator: Command Prompt' window. The title bar is blue with white text. The main area is black with white text. The command 'javac HelloWorld.java' is typed in, followed by a new line. The window has standard Windows-style controls (minimize, maximize, close) in the top right corner.

```
E:\Belajar Bahasa Java>javac HelloWorld.java
E:\Belajar Bahasa Java>
```

- Hasilnya sebuah arsip bernama *HelloWord.class*

- Jalankan arsip HelloWorld.class melalui *command prompt*:



The screenshot shows a Windows Command Prompt window titled "Administrator: Command Prompt". The window has a blue title bar and a black body. Inside, the command "java HelloWorld" is typed and executed, resulting in the output "Hello world!". The command prompt then returns to the prompt "E:\Belajar Bahasa Java>".

```
E:\Belajar Bahasa Java>java HelloWorld
Hello world!
E:\Belajar Bahasa Java>
```

- Horeeee..., saya sudah bisa membuat program java!

Yang gue rasakan saat berhasil
menulis program "Hello World"
tanpa ada bug atau error

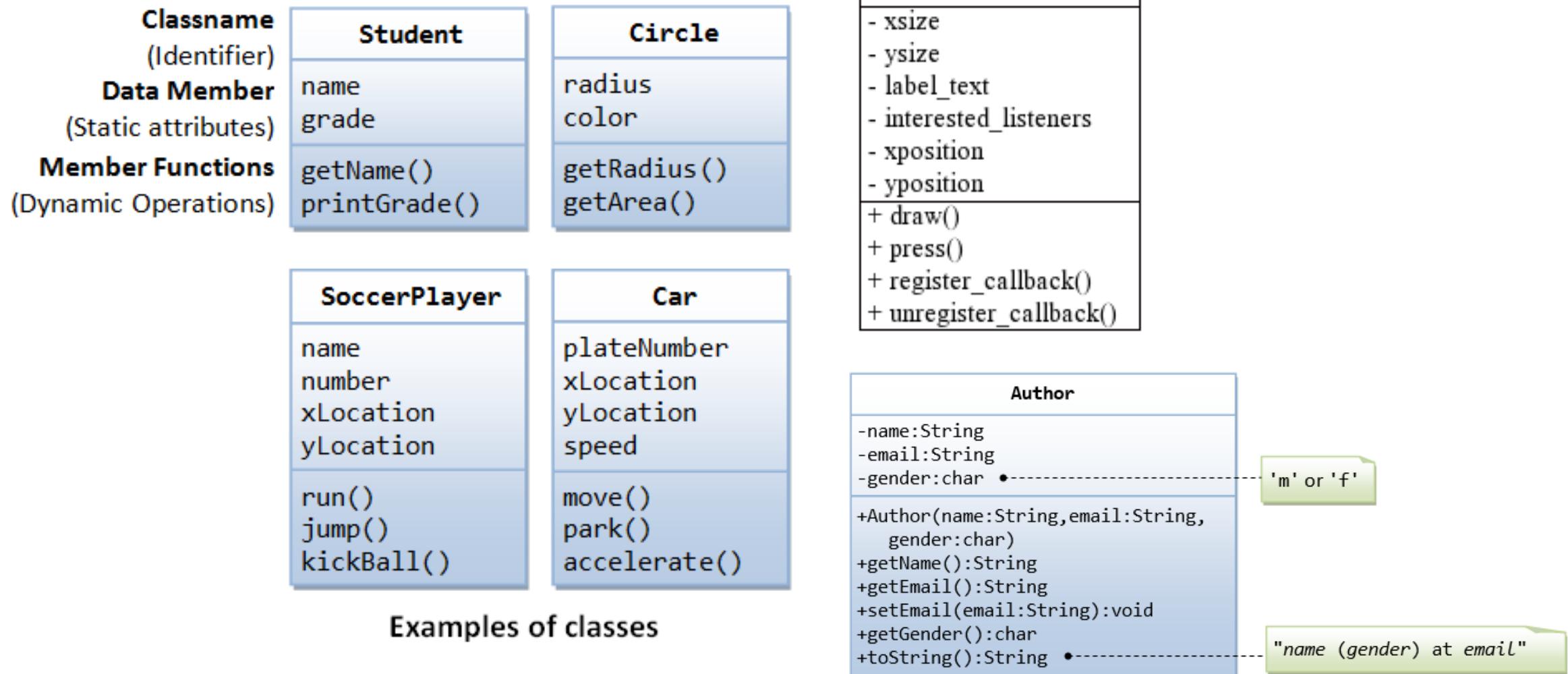


Class

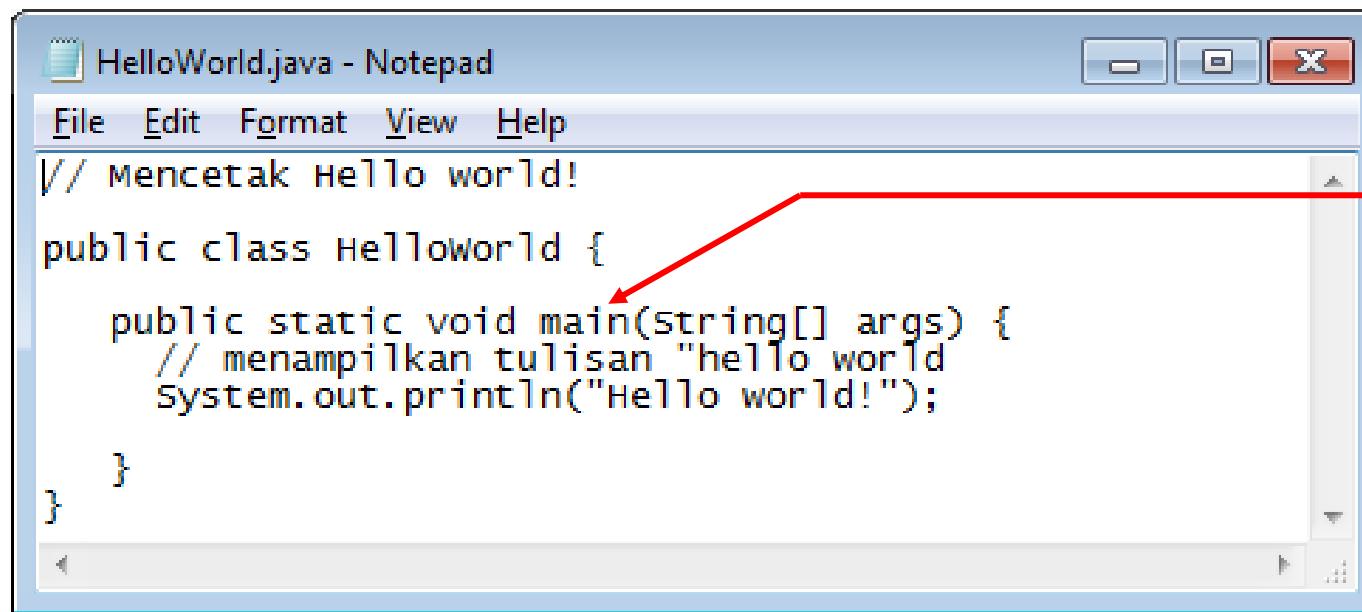
- Bahasa java adalah berorientasi objek. Struktur bahasa java terdiri dari kelas-kelas objek.
- Kelas adalah *blue-print* dari objek, sedangkan objek adalah instans dari kelas pada saat ruuning.
- Setiap kelas di dalam java memiliki *template*:

```
class NamaKelas {  
    // body kelas ditulis di sini  
}
```

- Di dalam kelas terdapat *atribut (data)* dan *method (function)*.
- Salah satu atau keduanya mungkin tidak terdapat di dalam kelas.



- Atribut di dalam kelas dinyatakan dengan variabel atau objek kelas lain.
- *Method* adalah operasi (prosedur, fungsi, atau konstruktor) yang dimiliki oleh sebuah kelas.
- Kelas HelloWorld tidak mempunyai atribut tetapi hanya mempunyai satu *method, yaitu main*:



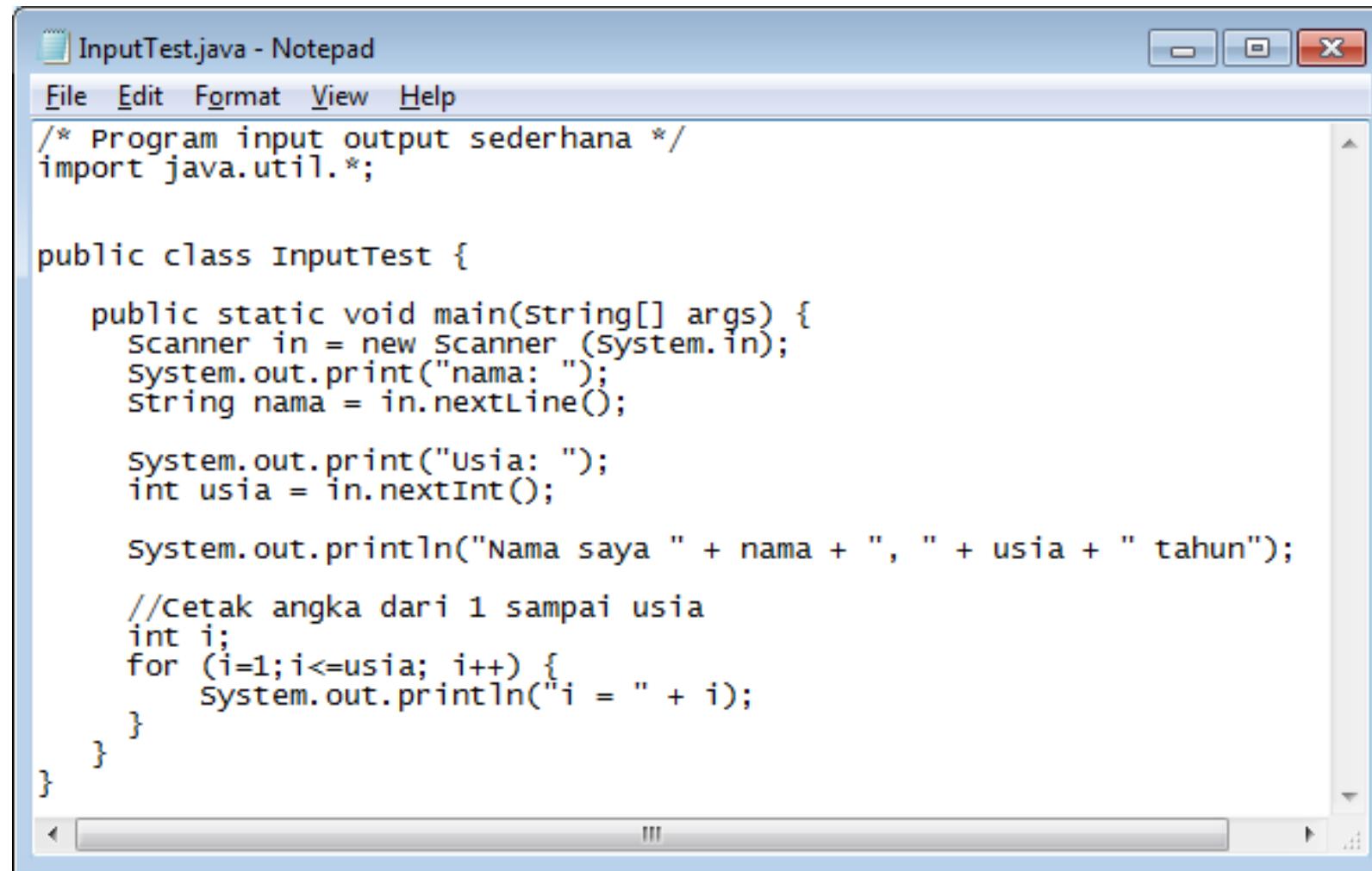
The image shows a screenshot of a Windows Notepad window titled "HelloWorld.java - Notepad". The window contains the following Java code:

```
// Mencetak Hello world!
public class HelloWorld {
    public static void main(string[] args) {
        // menampilkan tulisan "hello world"
        System.out.println("Hello world!");
    }
}
```

A red arrow originates from the word "main" in the line "public static void main(string[] args)" and points to the text "Method/function" located to the right of the window.

- Lebih lanjut mengenai kelas dan objek akan dipelajari di dalam kuliah *Pemrograman Berorientasi Objek* (di semester 4)

Program Input/Output Sederhana



The screenshot shows a Windows Notepad window titled "InputTest.java - Notepad". The window contains Java code for a simple input/output program. The code uses Scanner to read input from the user and System.out.println to display output. It includes a for loop that prints numbers from 1 to the user-specified age.

```
/* Program input output sederhana */
import java.util.*;

public class InputTest {

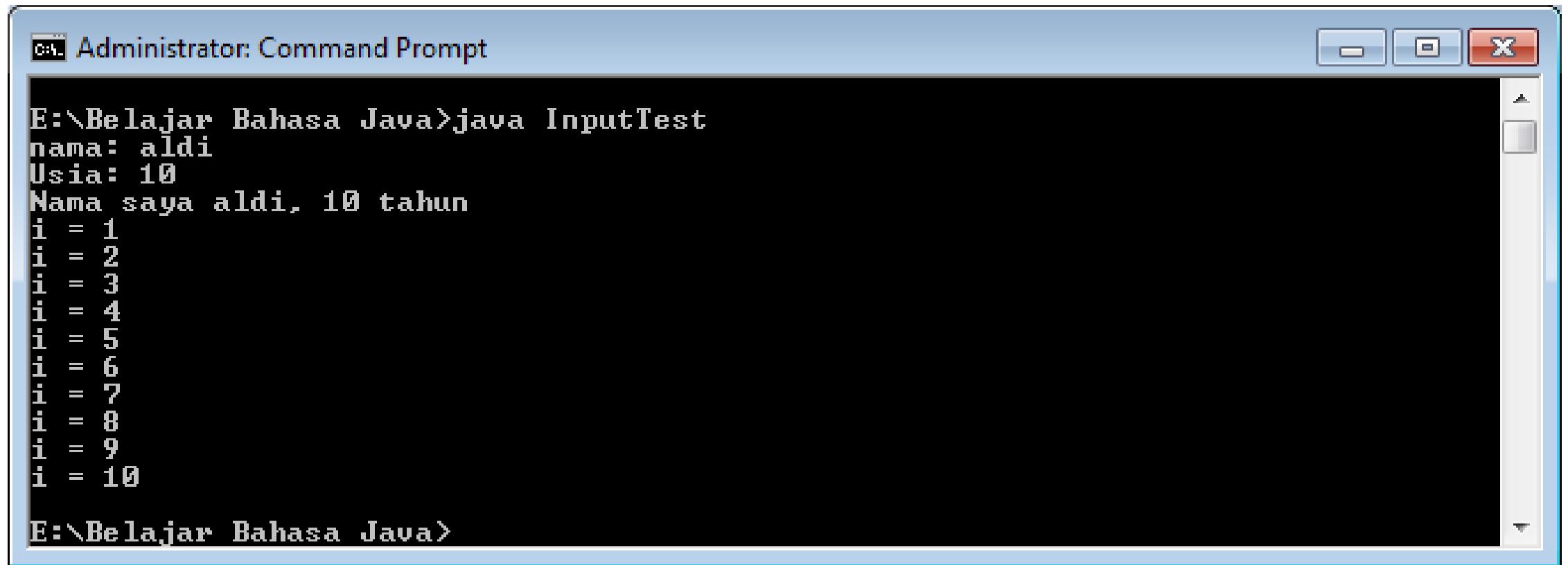
    public static void main(String[] args) {
        Scanner in = new Scanner(System.in);
        System.out.print("nama: ");
        String nama = in.nextLine();

        System.out.print("Usia: ");
        int usia = in.nextInt();

        System.out.println("Nama saya " + nama + ", " + usia + " tahun");

        //cetak angka dari 1 sampai usia
        int i;
        for (i=1; i<=usia; i++) {
            System.out.println("i = " + i);
        }
    }
}
```

- Kompilasi InputTest.java dan jika sudah benar jalankan programnya:

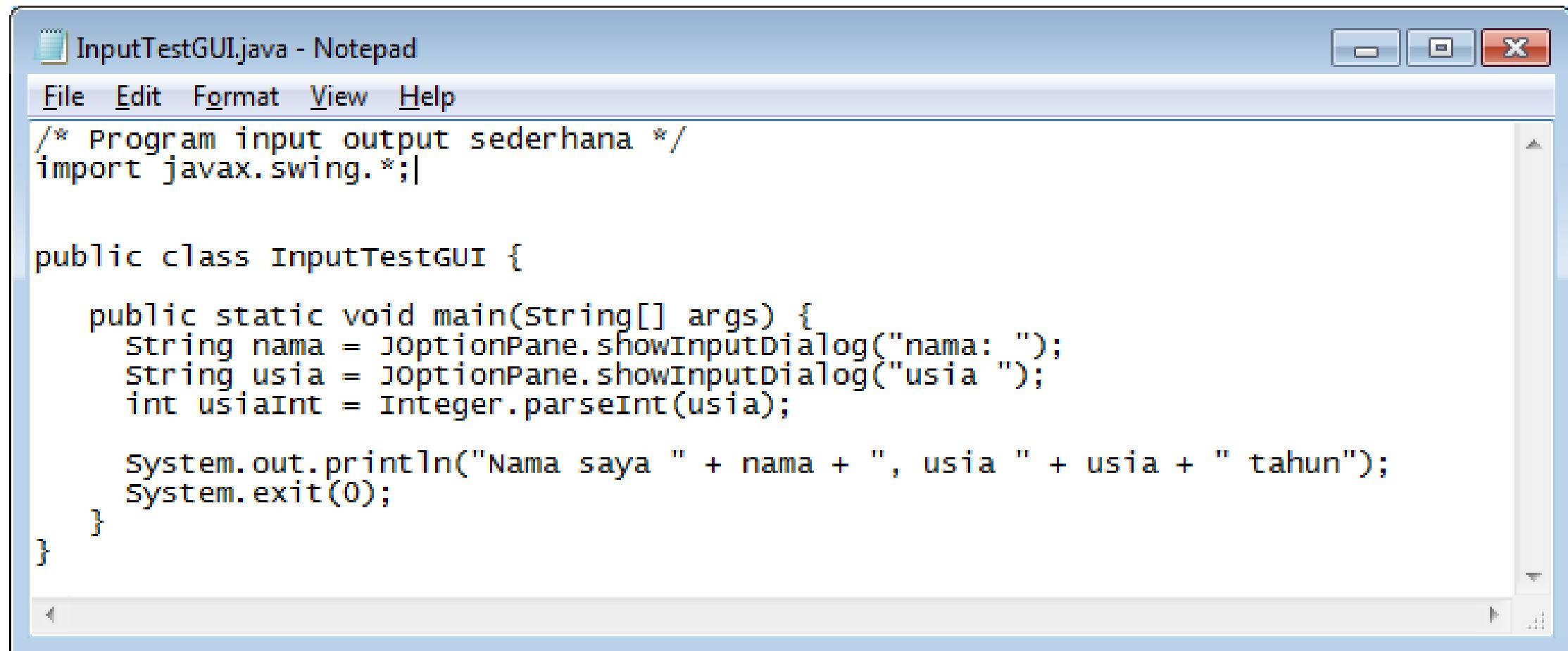


The screenshot shows a Windows Command Prompt window titled "Administrator: Command Prompt". The window contains the following text output:

```
E:\Belajar Bahasa Java>java InputTest
nama: aldi
Usia: 10
Nama saya aldi, 10 tahun
i = 1
i = 2
i = 3
i = 4
i = 5
i = 6
i = 7
i = 8
i = 9
i = 10
E:\Belajar Bahasa Java>
```

The window has a standard Windows title bar with minimize, maximize, and close buttons. The text area is black with white text, and the command prompt area at the bottom is also black with white text.

Program Input dengan GUI



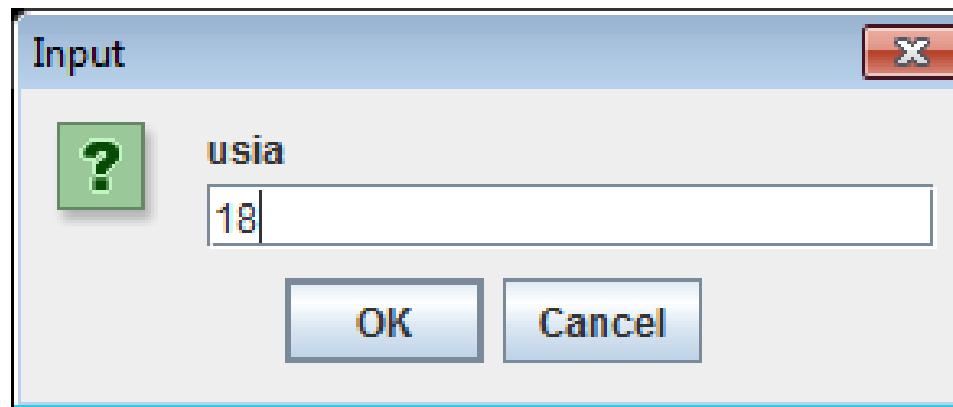
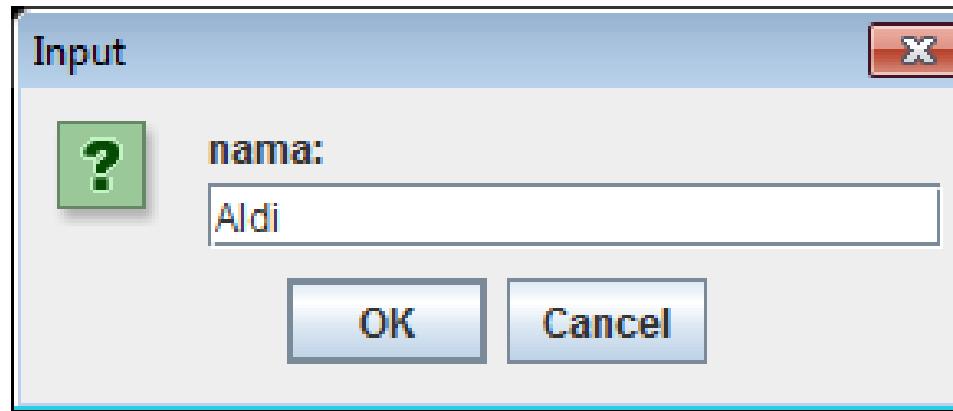
The image shows a screenshot of a Windows-style Notepad window titled "InputTestGUI.java - Notepad". The window contains Java code for a simple GUI input program. The code uses JOptionPane.showInputDialog to get user input for name and age, converts the age string to an integer, and then prints the name and age to the console.

```
/* Program input output sederhana */
import javax.swing.*;

public class InputTestGUI {
    public static void main(String[] args) {
        String nama = JOptionPane.showInputDialog("nama: ");
        String usia = JOptionPane.showInputDialog("usia ");
        int usiaInt = Integer.parseInt(usia);

        System.out.println("Nama saya " + nama + ", usia " + usia + " tahun");
        System.exit(0);
    }
}
```

- Kompilasi InputTestGUI . java dan jika sudah benar jalankan programnya:



Program FindMonth

The screenshot shows a Windows Notepad window titled "FindMonth - Notepad". The window contains Java code for a simple program named "FindMonth". The code uses a switch statement to map integers from 1 to 12 to their corresponding Indonesian month names. It includes imports for javax.swing.JOptionPane and java.lang.Integer, and uses System.out.println for output. The code ends with System.exit(0). The Notepad interface includes standard menu options like File, Edit, Format, View, and Help, and status bar information like line and column counts, zoom level, and encoding.

```
/* Program input output sederhana */
import javax.swing.*;

public class FindMonth {

    public static void main(String[] args) {

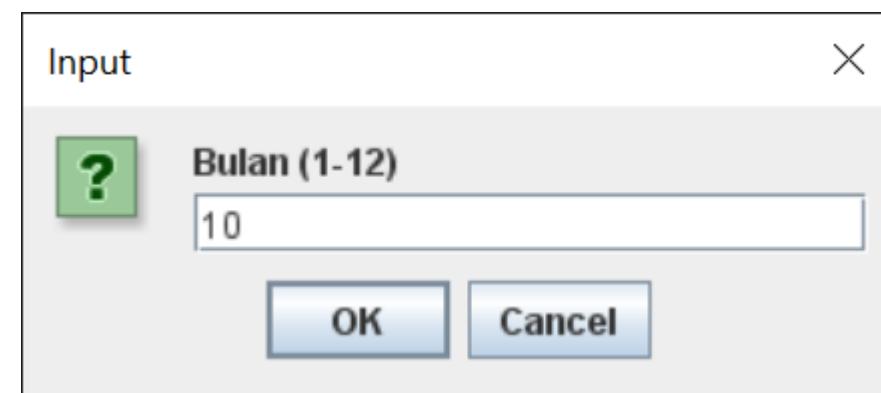
        String bulan = JOptionPane.showInputDialog("Bulan (1-12) ");
        int n = Integer.parseInt(bulan);
        switch (n) {
            case 1 : System.out.println("Januari"); break;
            case 2 : System.out.println("Februari"); break;
            case 3 : System.out.println("Maret"); break;
            case 4 : System.out.println("April"); break;
            case 5 : System.out.println("Mei"); break;
            case 6 : System.out.println("Juni"); break;
            case 7 : System.out.println("Juli"); break;
            case 8 : System.out.println("Agustus"); break;
            case 9 : System.out.println("September"); break;
            case 10 : System.out.println("Oktober"); break;
            case 11 : System.out.println("November"); break;
            case 12 : System.out.println("Desember"); break;
            default : System.out.println("Input tidak valid"); break;
        }

        System.exit(0);
    }
}
```

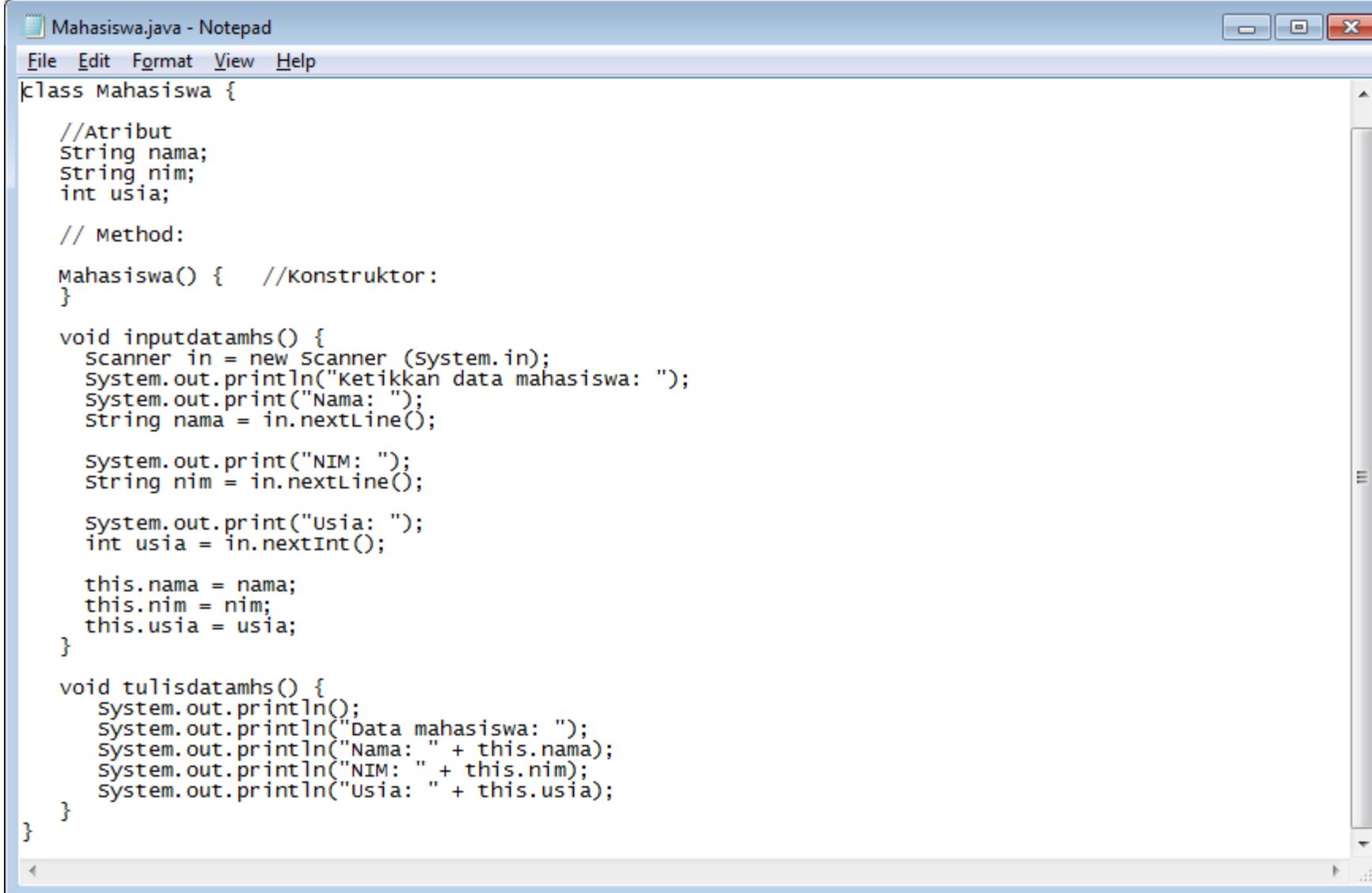
File Edit Format View Help

Ln 4, Col 1 100% Windows (CRLF) UTF-8

```
c:\ Command Prompt
D:\Belajar Bahasa Java>java FindMonth
Oktober
D:\Belajar Bahasa Java>
```



Kelas Mahasiswa



The screenshot shows a Windows-style Notepad window titled "Mahasiswa.java - Notepad". The window contains Java code for a class named "Mahasiswa". The code includes a constructor, two methods for inputting and displaying student data, and the use of Scanner and System.out.println statements.

```
File Edit Format View Help
class Mahasiswa {
    //Atribut
    String nama;
    String nim;
    int usia;

    // Method:
    Mahasiswa() {    //Konstruktor:
    }

    void inputdatamhs() {
        Scanner in = new Scanner (System.in);
        System.out.println("Ketikkan data mahasiswa: ");
        System.out.print("Nama: ");
        String nama = in.nextLine();

        System.out.print("NIM: ");
        String nim = in.nextLine();

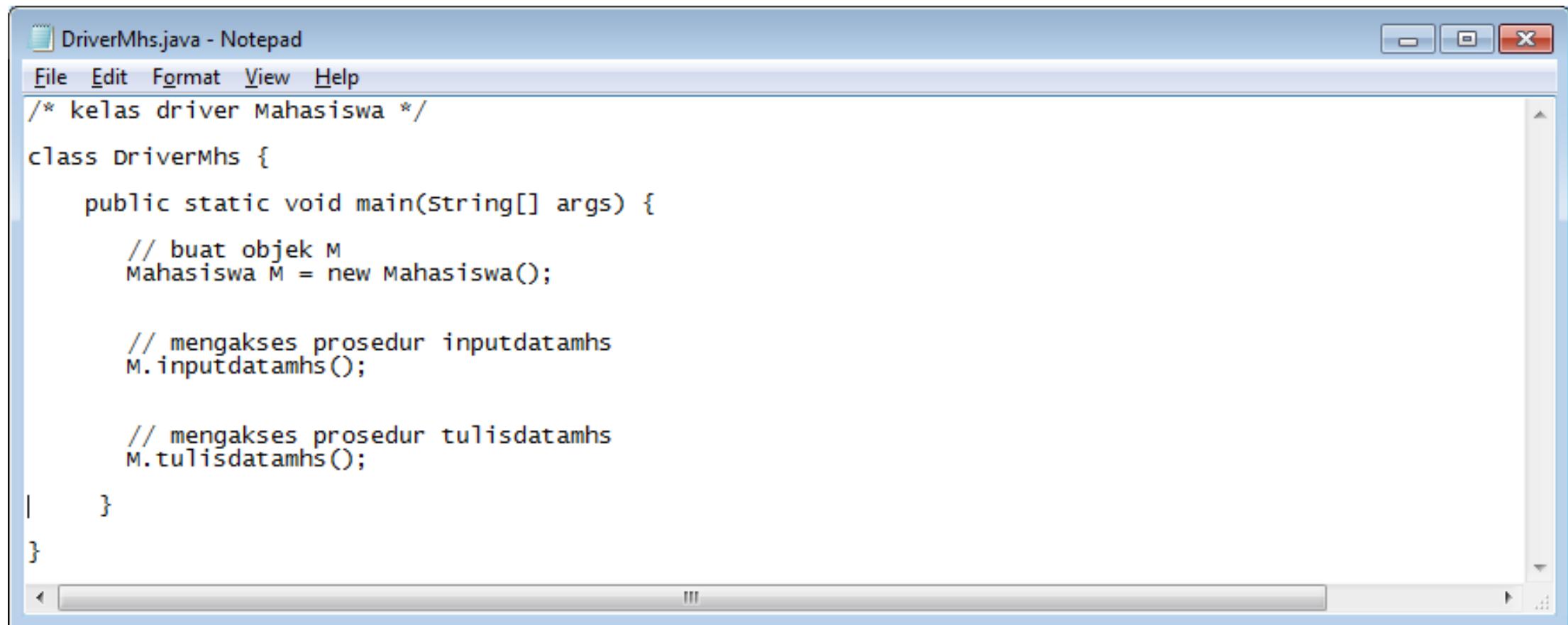
        System.out.print("Usia: ");
        int usia = in.nextInt();

        this.nama = nama;
        this.nim = nim;
        this.usia = usia;
    }

    void tulisdatamhs() {
        System.out.println();
        System.out.println("Data mahasiswa: ");
        System.out.println("Nama: " + this.nama);
        System.out.println("NIM: " + this.nim);
        System.out.println("Usia: " + this.usia);
    }
}
```

Kelas DriverMhs

(yang menggunakan kelas Mahasiswa)



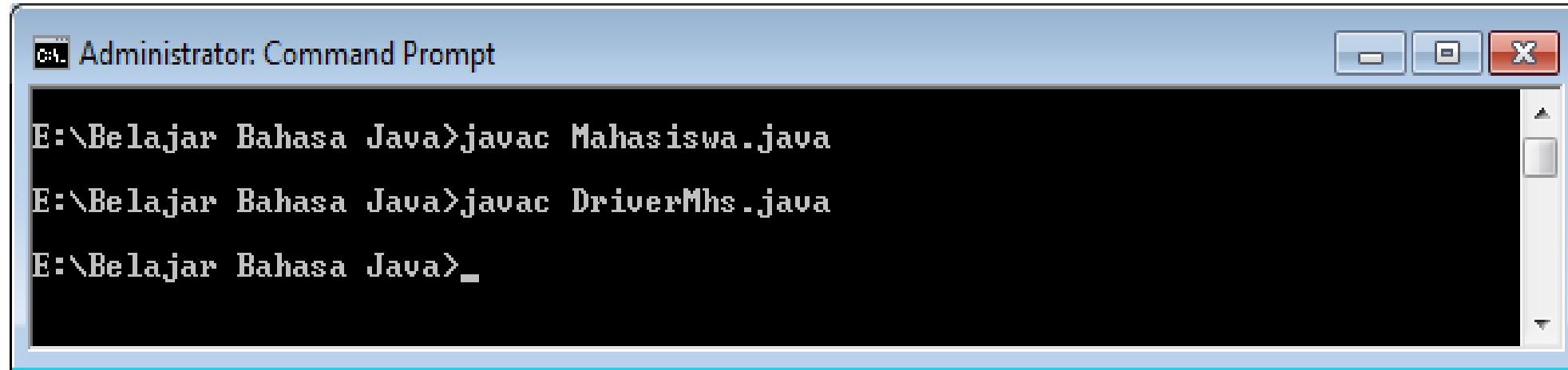
The screenshot shows a Windows Notepad window titled "DriverMhs.java - Notepad". The window contains the following Java code:

```
DriverMhs.java - Notepad
File Edit Format View Help
/* kelas driver Mahasiswa */
class DriverMhs {
    public static void main(string[] args) {
        // buat objek M
        Mahasiswa M = new Mahasiswa();

        // mengakses prosedur inputdatamhs
        M.inputdatamhs();

        // mengakses prosedur tulisdatamhs
        M.tulisdatamhs();
    }
}
```

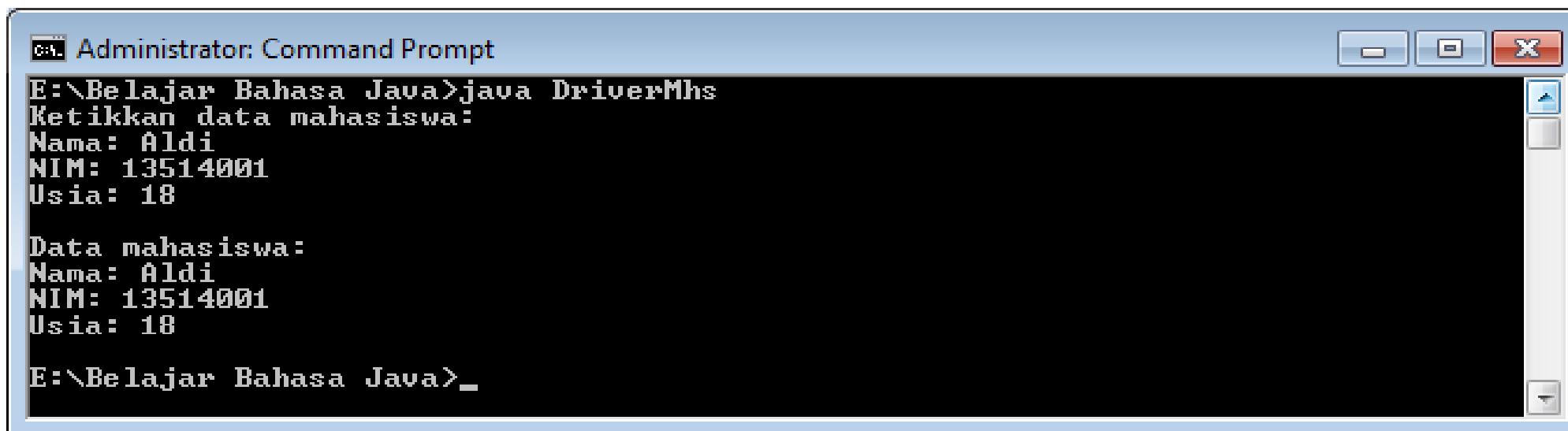
- Kompilasi masing-masing Mahasiswa.java dan DriverMhs.java



```
c:\ Administrator: Command Prompt
E:\Belajar Bahasa Java>javac Mahasiswa.java
E:\Belajar Bahasa Java>javac DriverMhs.java
E:\Belajar Bahasa Java>_
```

A screenshot of a Windows Command Prompt window titled "Administrator: Command Prompt". The window shows two compilation commands being run: "javac Mahasiswa.java" and "javac DriverMhs.java", both of which return no output. The prompt ends with a single underscore.

- Jalankan kelas DriverMhs.class

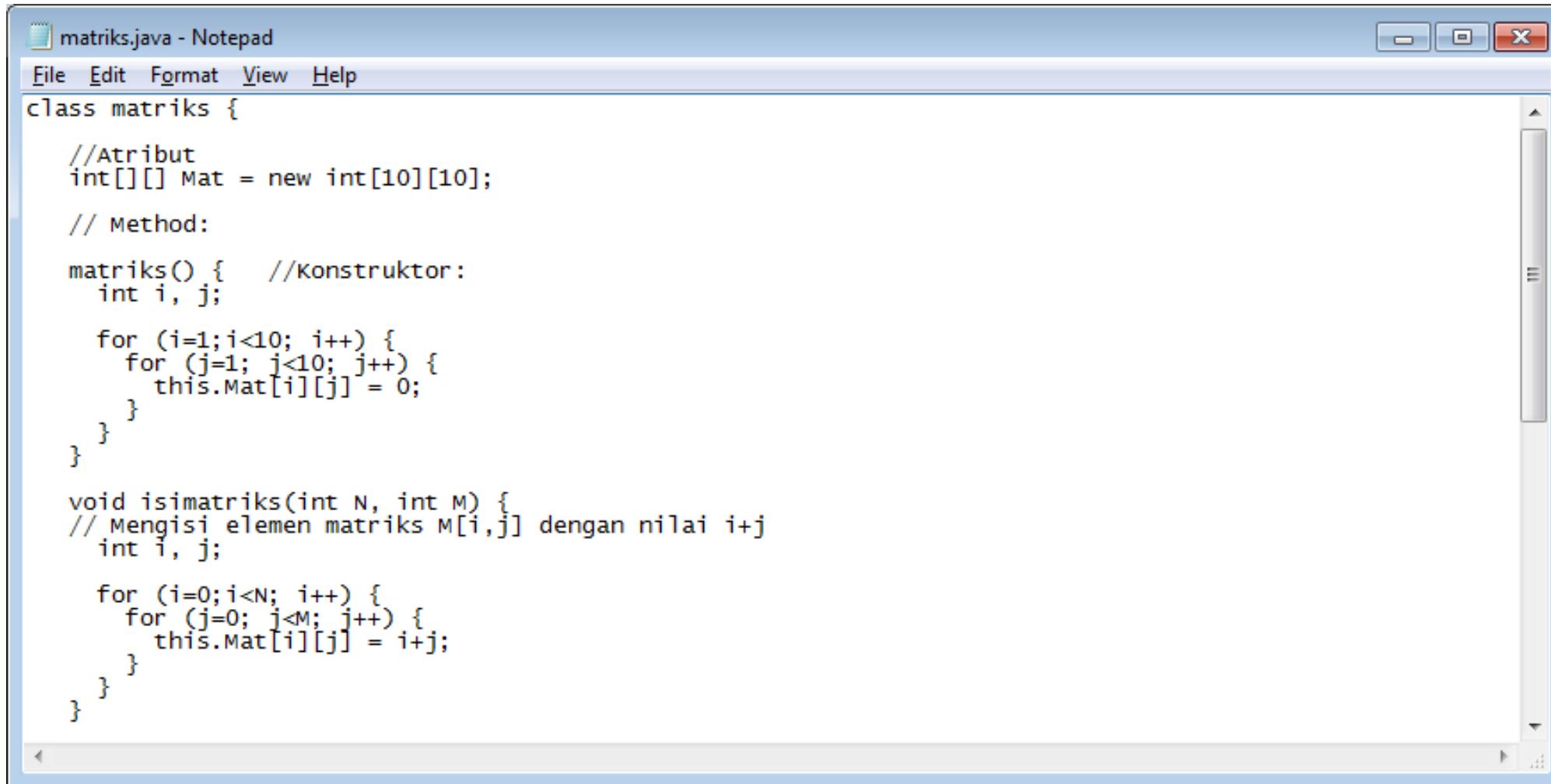


```
c:\ Administrator: Command Prompt
E:\Belajar Bahasa Java>java DriverMhs
Ketikkan data mahasiswa:
Nama: Aldi
NIM: 13514001
Usia: 18

Data mahasiswa:
Nama: Aldi
NIM: 13514001
Usia: 18
E:\Belajar Bahasa Java>_
```

A screenshot of a Windows Command Prompt window titled "Administrator: Command Prompt". The window shows the execution of the "DriverMhs" class. It prompts the user to enter student data (Nama, NIM, Usia) and then displays that data back to the user. The prompt ends with a single underscore.

Kelas Matriks



The screenshot shows a Windows Notepad window titled "matriks.java - Notepad". The window contains Java code for a matrix class. The code includes a constructor that initializes a 10x10 matrix to zero, and a method to fill the matrix with values where each element M[i,j] is equal to i+j.

```
matriks.java - Notepad
File Edit Format View Help
class matriks {
    //Atribut
    int[][] Mat = new int[10][10];
    // Method:
    matriks() {    //Konstruktor:
        int i, j;
        for (i=1; i<10; i++) {
            for (j=1; j<10; j++) {
                this.Mat[i][j] = 0;
            }
        }
    }
    void isimatriks(int N, int M) {
        // Mengisi elemen matriks M[i,j] dengan nilai i+j
        int i, j;
        for (i=0; i<N; i++) {
            for (j=0; j<M; j++) {
                this.Mat[i][j] = i+j;
            }
        }
    }
}
```

matriks.java - Notepad

File Edit Format View Help

```
void tulismatriks(int N, int M) {
    // Mencetak elemen-elemen matriks
    int i, j;

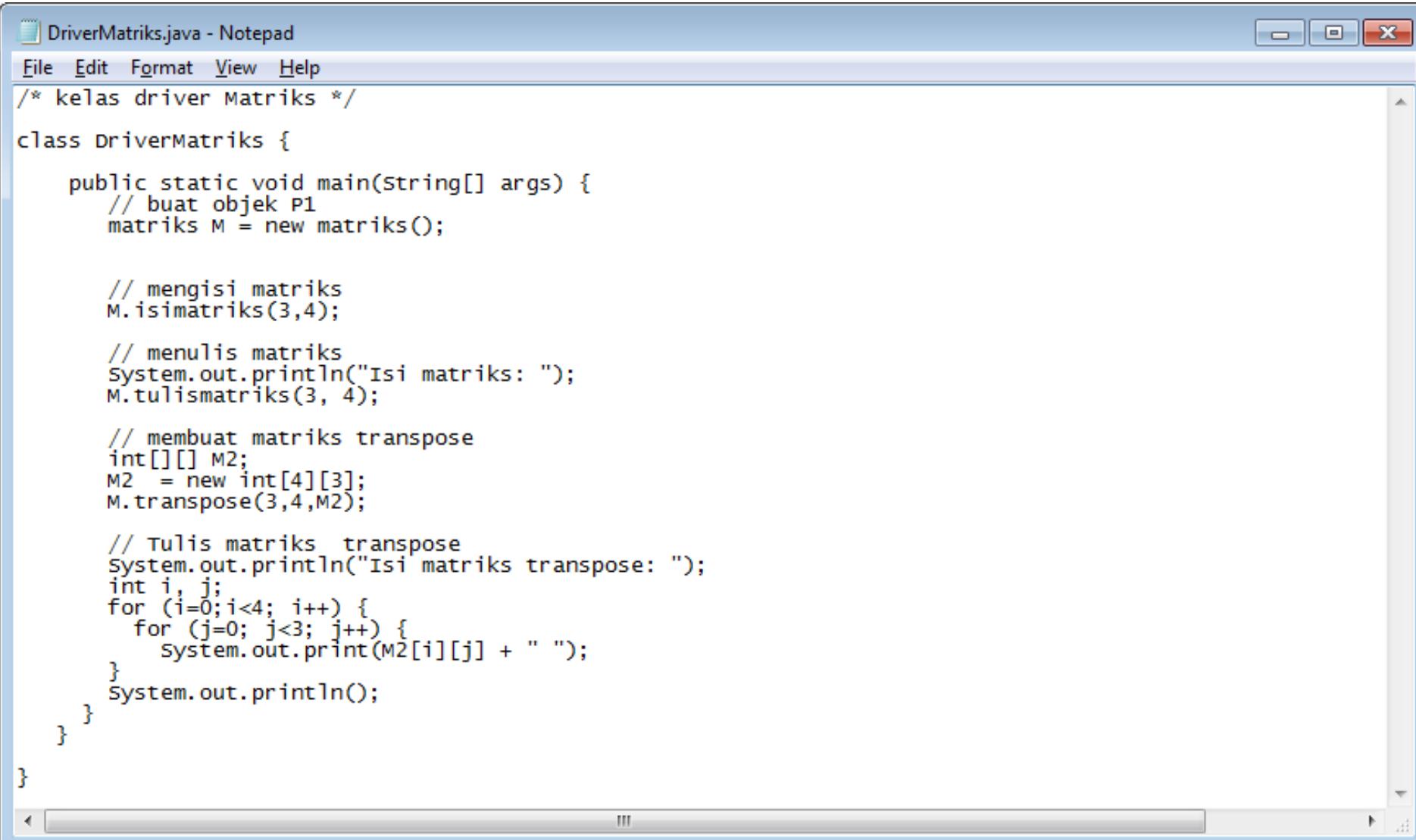
    for (i=0; i<N; i++) {
        for (j=0; j<M; j++) {
            System.out.print(this.Mat[i][j] + " ");
        }
        System.out.println();
    }
}

void transpose(int N, int M, int Matt[][])
{
    // Membuat matriks transpose;
    int i, j;

    for (i=0; i<N; i++) {
        for (j=0; j<M; j++) {
            Matt[j][i] = this.Mat[i][j];
        }
    }
}
```

Kelas DriverMatriks

(yang menggunakan kelas Mahasiswa)



The screenshot shows a Windows Notepad window with the title "DriverMatriks.java - Notepad". The window contains the following Java code:

```
DriverMatriks.java - Notepad
File Edit Format View Help
/* kelas driver Matriks */
class DriverMatriks {
    public static void main(string[] args) {
        // buat objek P1
        matriks M = new matriks();

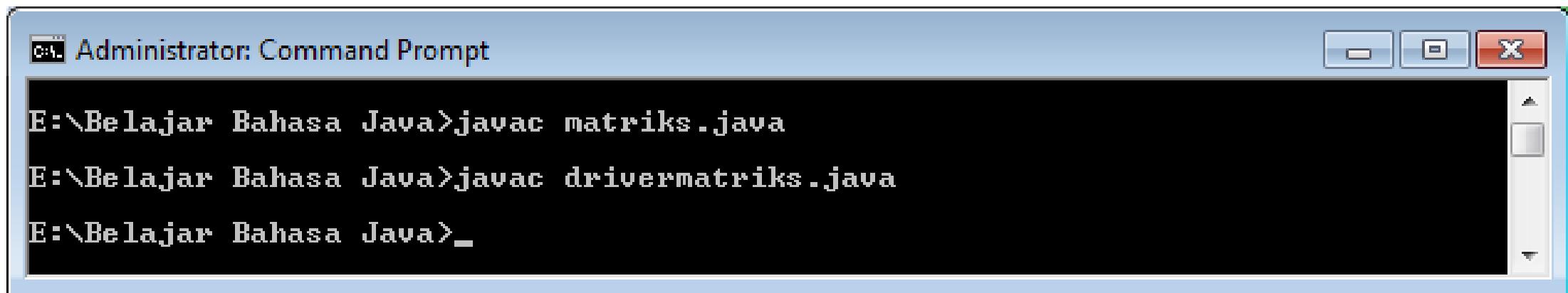
        // mengisi matriks
        M.isimatriks(3,4);

        // menulis matriks
        System.out.println("Isi matriks: ");
        M.tulismatriks(3, 4);

        // membuat matriks transpose
        int[][] M2;
        M2 = new int[4][3];
        M.transpose(3,4,M2);

        // Tulis matriks transpose
        System.out.println("Isi matriks transpose: ");
        int i, j;
        for (i=0;i<4; i++) {
            for (j=0; j<3; j++) {
                System.out.print(M2[i][j] + " ");
            }
            System.out.println();
        }
    }
}
```

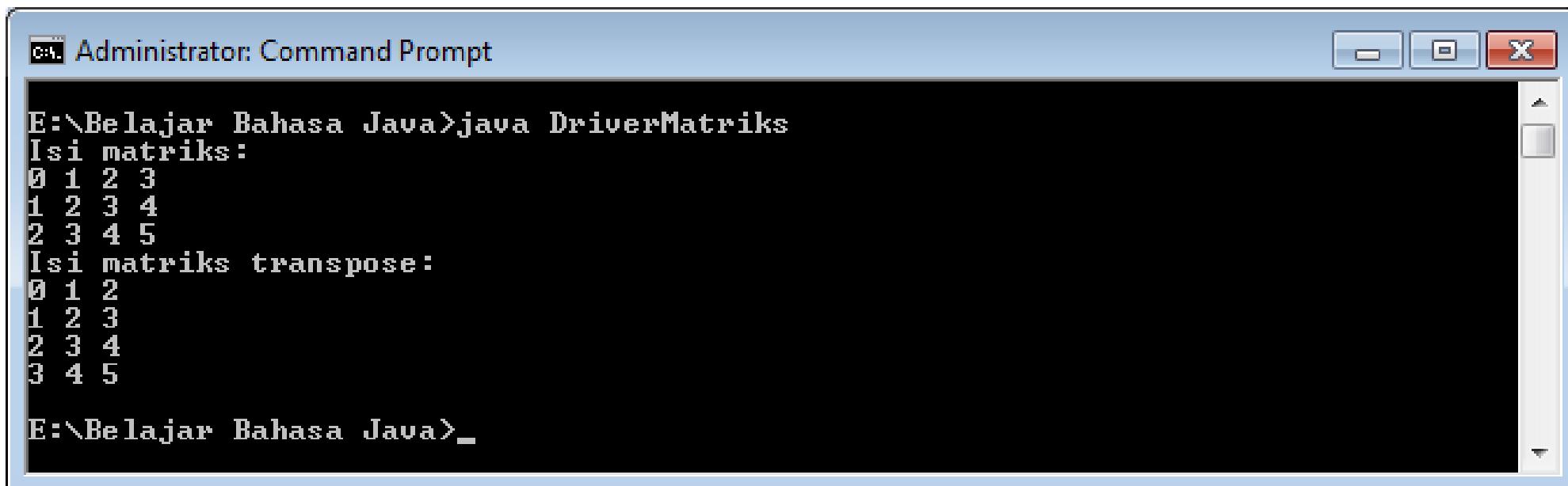
- Kompilasi masing-masing matriks.java dan DriverMatriks.java



```
E:\Belajar Bahasa Java>javac matriks.java
E:\Belajar Bahasa Java>javac drivermatriks.java
E:\Belajar Bahasa Java>_
```

A screenshot of a Windows Command Prompt window titled "Administrator: Command Prompt". The window has a blue title bar and a black body. It contains three lines of text in white font: "E:\Belajar Bahasa Java>javac matriks.java", "E:\Belajar Bahasa Java>javac drivermatriks.java", and "E:\Belajar Bahasa Java>_". The window is surrounded by a light blue border.

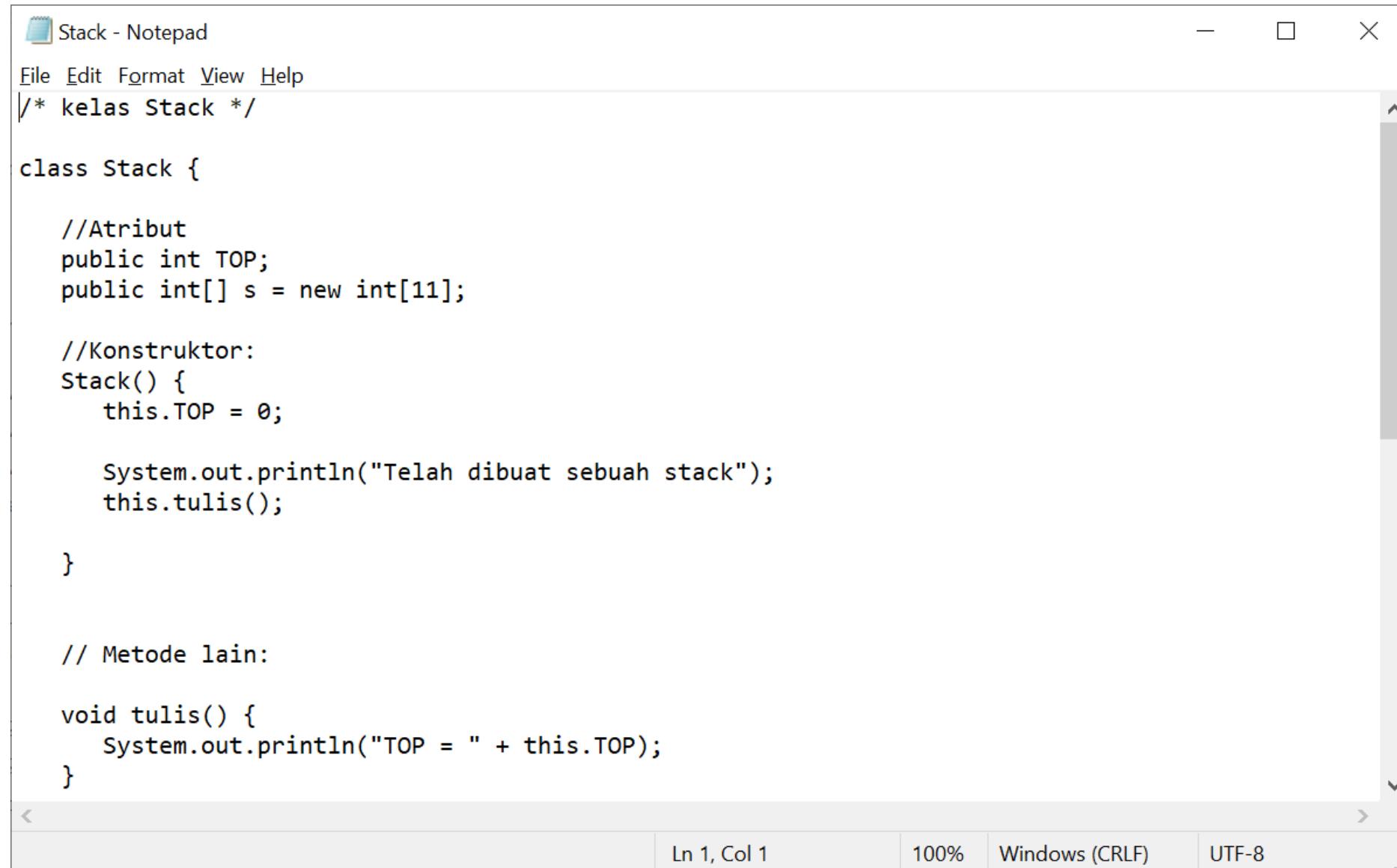
- Jalankan kelas DriverMatriks.class



```
E:\Belajar Bahasa Java>java DriverMatriks
Isi matriks:
0 1 2 3
1 2 3 4
2 3 4 5
Isi matriks transpose:
0 1 2
1 2 3
2 3 4
3 4 5
E:\Belajar Bahasa Java>_
```

A screenshot of a Windows Command Prompt window titled "Administrator: Command Prompt". The window has a blue title bar and a black body. It contains five lines of text in white font: "E:\Belajar Bahasa Java>java DriverMatriks", "Isi matriks:", followed by a 3x4 matrix of numbers (0-5), "Isi matriks transpose:", followed by its transpose (a 4x3 matrix of numbers 0-5), and "E:\Belajar Bahasa Java>_". The window is surrounded by a light blue border.

Kelas Stack



The screenshot shows a Windows-style Notepad window titled "Stack - Notepad". The window contains Java code for a stack class. The code includes comments, attribute declarations, a constructor, and a method. The Notepad window has standard window controls (minimize, maximize, close) and status bar at the bottom showing file path, line/col count, zoom level, encoding, and character set.

```
/* kelas Stack */

class Stack {

    //Atribut
    public int TOP;
    public int[] s = new int[11];

    //Konstruktor:
    Stack() {
        this.TOP = 0;

        System.out.println("Telah dibuat sebuah stack");
        this.tulis();

    }

    // Metode lain:

    void tulis() {
        System.out.println("TOP = " + this.TOP);
    }
}
```

 Stack - Notepad

File Edit Format View Help

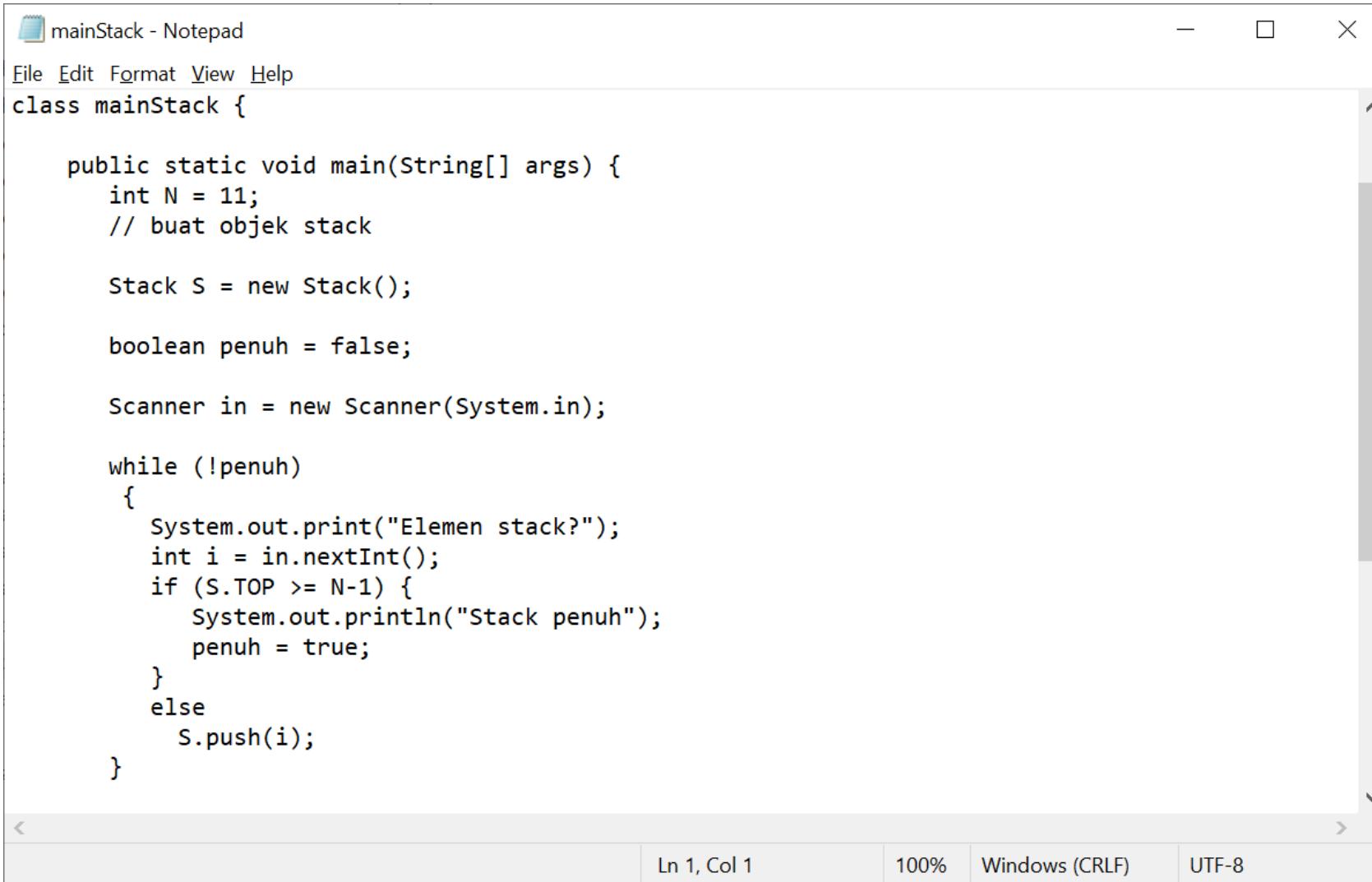
```
void tulis() {
    System.out.println("TOP = " + this.TOP);
}

void push(int x){
    this.TOP++;
    //if (this.TOP > N-1)
    //    System.out.println("stack penuh");
    // else
    s[TOP] = x;
}

int pop(){
    if (this.TOP == 0) {
        System.out.println("stack kosong");
        return 0;
    }
    else {
        int x = s[TOP];
        this.TOP--;
        return x;
    }
}
```

Kelas mainStack

(yang menggunakan kelas Stack)



The screenshot shows a Windows Notepad window titled "mainStack - Notepad". The window contains Java code for a class named "mainStack". The code includes a main method that creates a stack, reads integers from standard input until the stack is full, and then pushes them onto the stack.

```
mainStack - Notepad
File Edit Format View Help
class mainStack {

    public static void main(String[] args) {
        int N = 11;
        // buat objek stack

        Stack S = new Stack();

        boolean penuh = false;

        Scanner in = new Scanner(System.in);

        while (!penuh)
        {
            System.out.print("Elemen stack?");
            int i = in.nextInt();
            if (S.TOP >= N-1) {
                System.out.println("Stack penuh");
                penuh = true;
            }
            else
                S.push(i);
        }
    }
}
```

Ln 1, Col 1 100% Windows (CRLF) UTF-8

 mainStack - Notepad

File Edit Format View Help

```
s.tulis();

// mengakses elemens stack
int j = S.TOP;
while (j != 0)
{
    int x = S.pop();
    System.out.println("Nilai yang di-pop: " + x);
    j = S.TOP;
}

}
```



Ln 1, Col 1

100%

Windows (CRLF)

UTF-8

Command Prompt

```
D:\Belajar Bahasa Java>java mainStack
Telah dibuat sebuah stack
TOP = 0
Elemen stack?5
Elemen stack?7
Elemen stack?29
Elemen stack?12
Elemen stack?7
Elemen stack?18
Elemen stack?90
Elemen stack?23
Elemen stack?45
Elemen stack?44
Elemen stack?10
Stack penuh
TOP = 10
Nilai yang di-pop: 44
Nilai yang di-pop: 45
Nilai yang di-pop: 23
Nilai yang di-pop: 90
Nilai yang di-pop: 18
Nilai yang di-pop: 7
Nilai yang di-pop: 12
Nilai yang di-pop: 29
Nilai yang di-pop: 7
Nilai yang di-pop: 5
D:\Belajar Bahasa Java>
```

Referensi

Materi “Pengantar Pemrograman Bahasa Java” diambil dari berbagai sumber, antara lain:

1. Arief Bahtiar S.T, M.T, Ivan Kurniawan, *Fundamental Java 2 Platform Application Developer*, ComLabs IT Course ITB.
2. Adi Nuralim, *Java Virtual Machine*, <http://belajarjava-19.blogspot.co.id/2011/05/java-virtual-machine-jvm.html>, tanggal akses 3 September 2015
3. Wikipedia