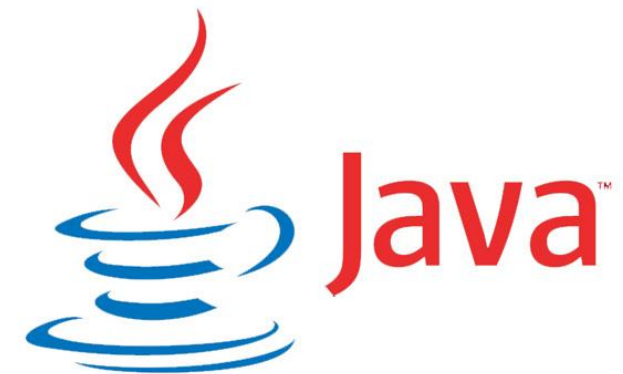


Pengantar Pemrograman dengan Bahasa Java

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 populer untuk mengembangkan aplikasi, termasuk aplikasi berbasis web.

Language Rank	Types	Spectrum Ranking	Spectrum Ranking
1. Java	🌐 📱 🖥️	100.0	100.0
2. C	📱 🖥️ 🖨️	99.9	99.3
3. C++	📱 🖥️ 🖨️	99.4	95.5
4. Python	🌐 🖥️	96.5	93.5
5. C#	🌐 📱 🖥️	91.3	92.4
6. R	🖥️	84.8	84.8
7. PHP	🌐	84.5	84.5
8. JavaScript	🌐 📱	83.0	78.9
9. Ruby	🌐 🖥️	76.2	74.3
10. Matlab	🖥️	72.4	72.8










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

- Pada tahun 2017, Bahasa Java turun ke peringkat 3

Language Rank	Types	Spectrum Ranking
1. Python	 	100.0
2. C	  	99.7
3. Java	  	99.5
4. C++	  	97.1
5. C#	  	87.7
6. R		87.7
7. JavaScript	 	85.6
8. PHP		81.2
9. Go	 	75.1
10. Swift	 	73.7

Gambar 2. Sepuluh (10) bahasa pemrograman top 2017

- 2018

Language Rank	Types	Spectrum Ranking
1. Python	  	100.0
2. C++	  	99.7
3. Java	  	97.5
4. C	  	96.7
5. C#	  	89.4
6. PHP		84.9
7. R		82.9
8. JavaScript	 	82.6
9. Go	 	76.4
10. Assembly		74.1

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/>

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

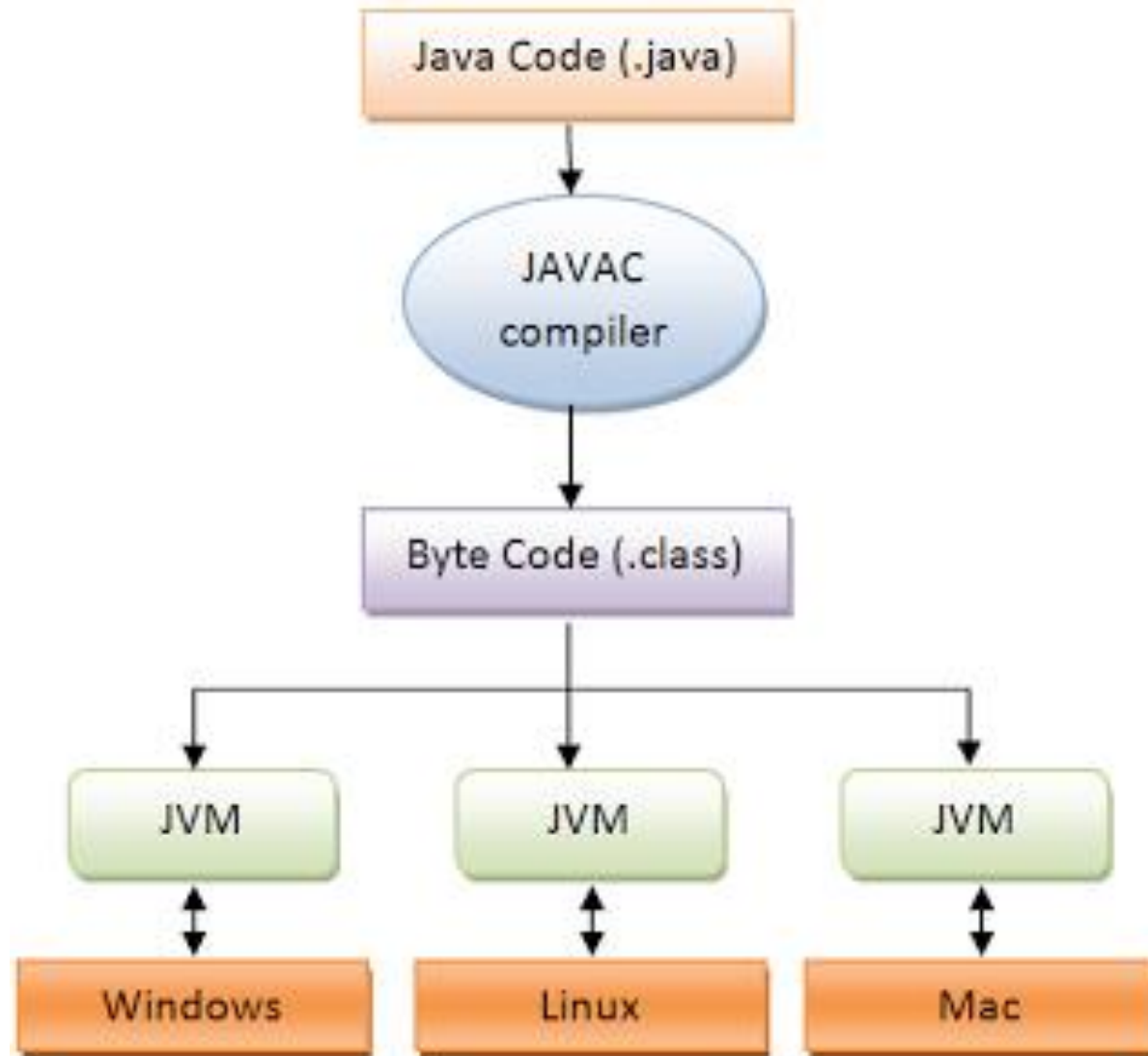
Rank	Language	Type	Score
1	Python	  	100.0
2	Java	  	95.4
3	C	  	94.7
4	C++	  	92.4
5	JavaScript		88.1
6	C#	   	82.4
7	R		81.7
8	Go	 	77.7
9	HTML		75.4
10	Swift	 	70.4

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

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.
- *Platform* 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 *bytecode* 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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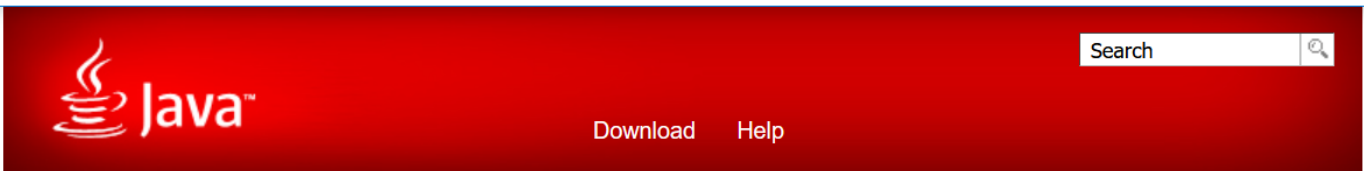
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Linux x86 Compressed Archive	136.81 MB	 jdk-8u261-linux-i586.tar.gz
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Commercial license and support is available with a low cost [Java SE Subscription](#).

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 kakas pengembangan java yang mengintegrasikan:
 - JDK
 - Editor teks
 - Editor antarmuka pengguna (GUI = *Graphical User Interface*)
 - Manajemen aplikasi
 - *Debugger*
- Contoh kakas pengembangan java: *Netbeans* dan *Eclipse*

Netbeans

The screenshot shows the NetBeans IDE interface for a project named "ECMAScript6Sales". The interface includes a menu bar (File, Edit, View, Navigate, Source, Refactor, Run, Debug, Team, Tools, Window, Help), a toolbar with various icons, and a status bar at the bottom showing "9:1" and "INS".

The left sidebar contains a "Projects" view showing the project structure:

- ECMAScript6Sales
 - Site Root
 - js
 - 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 main editor area displays the code for three files:

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

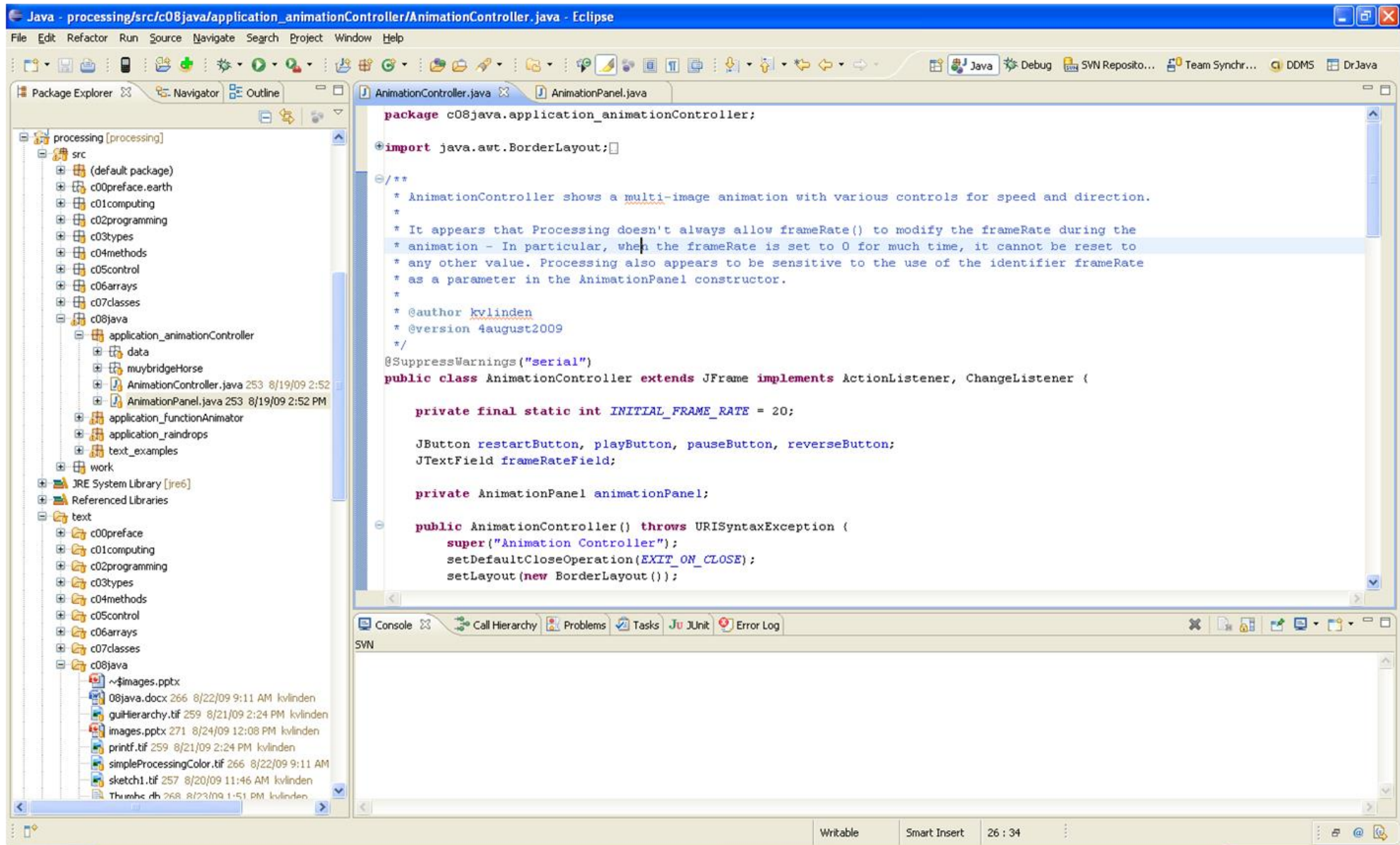
```
1  /**
2   * Verifier for name.
3   * @param {type} name
4   * @returns {undefined}
5   */
6  export function verifyName(name) {
7   var requiredNameLength = 1;
8   console.log("authenticating " + name);
9   return name.length > requiredNameLength;
10 }
```

thing.js

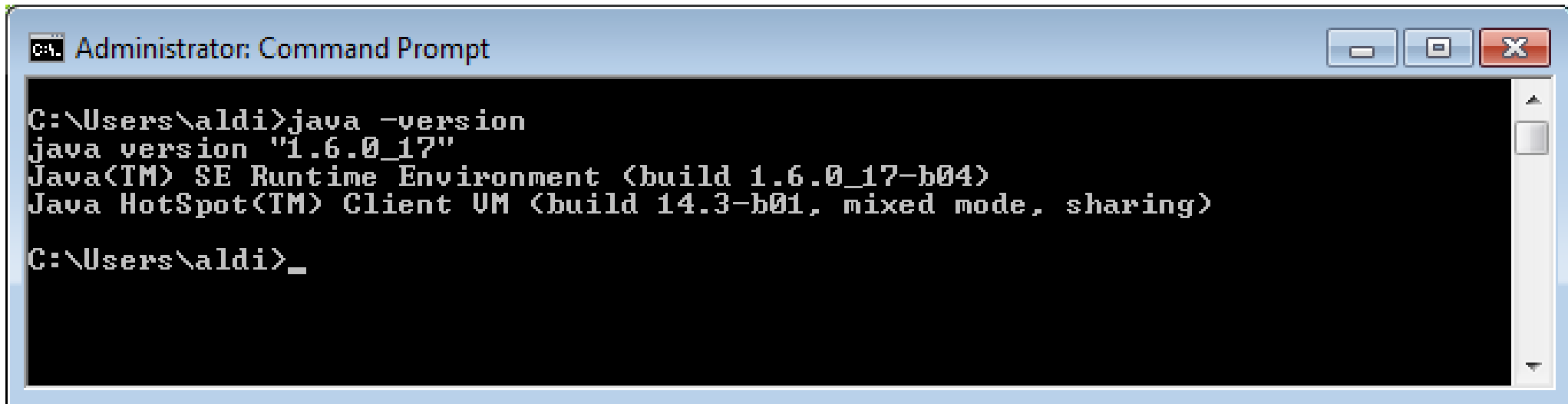
```
1  /**
2   * Send thing if authentication succeeds.
3   * @param {type} name
4   * @returns {undefined}
5   */
6  export function sendThing(name){
7   console.log("send thing to " + name);
8  }
9
10 export function sendApology(name){
11   console.log("say sorry to " + name);
12 }
```

The bottom-left corner shows a "Navigator" view with a list of variables: buyThing(name) : Boolean|undefined, sendApology, sendThing, and verifyName. The bottom-right corner shows a "Filters" view with icons for file, error, and lock.

Eclipse

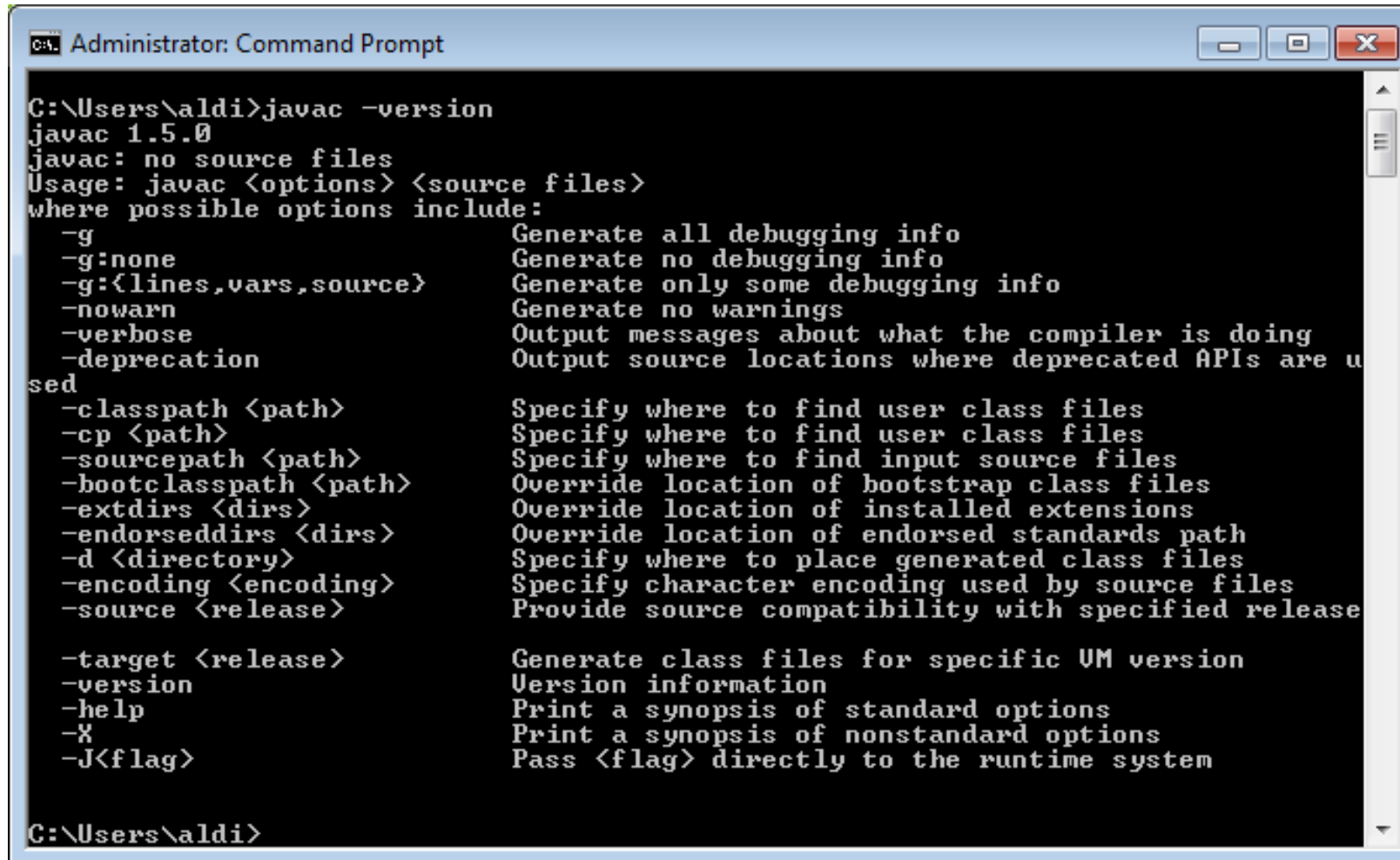


- Instalasilah JDK ke komputer anda dan ikuti semua instruksi untuk menginstalasinya.
- Aturlah nilai *environment variable* PATH melalui Control Panel > System > Advanced > Environment Variables
- Untuk mengetahui versi JRE (*java runtime environment*) yang terinstal:



```
Administrator: Command Prompt
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:



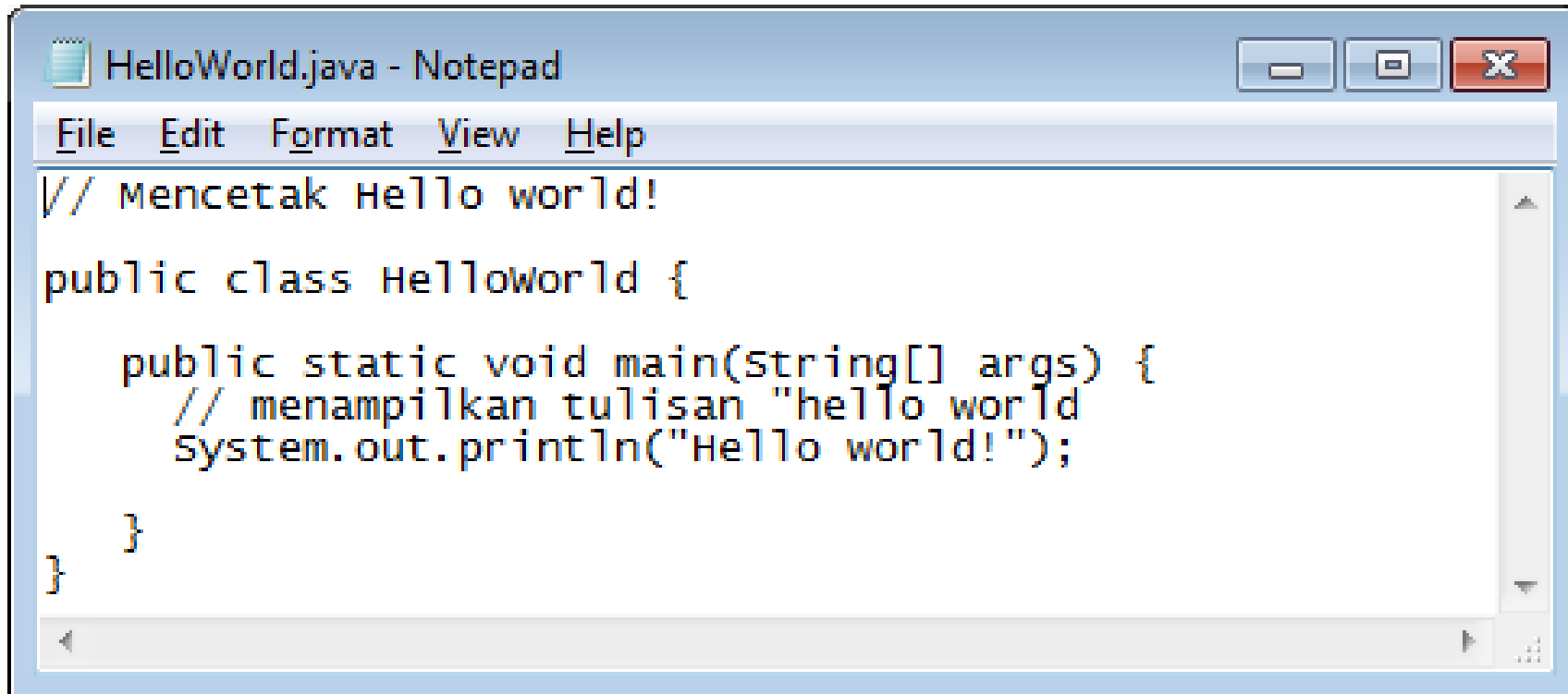
```
Administrator: Command Prompt
C:\Users\aldi>javac -version
javac 1.5.0
javac: no source files
Usage: javac <options> <source files>
where possible options include:
  -g                Generate all debugging info
  -g:none           Generate no debugging info
  -g:{lines,vars,source}  Generate only some debugging info
  -nowarn           Generate no warnings
  -verbose          Output messages about what the compiler is doing
  -deprecation      Output source locations where deprecated APIs are used
  -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)

A screenshot of a 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!");  
    }  
}
```

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

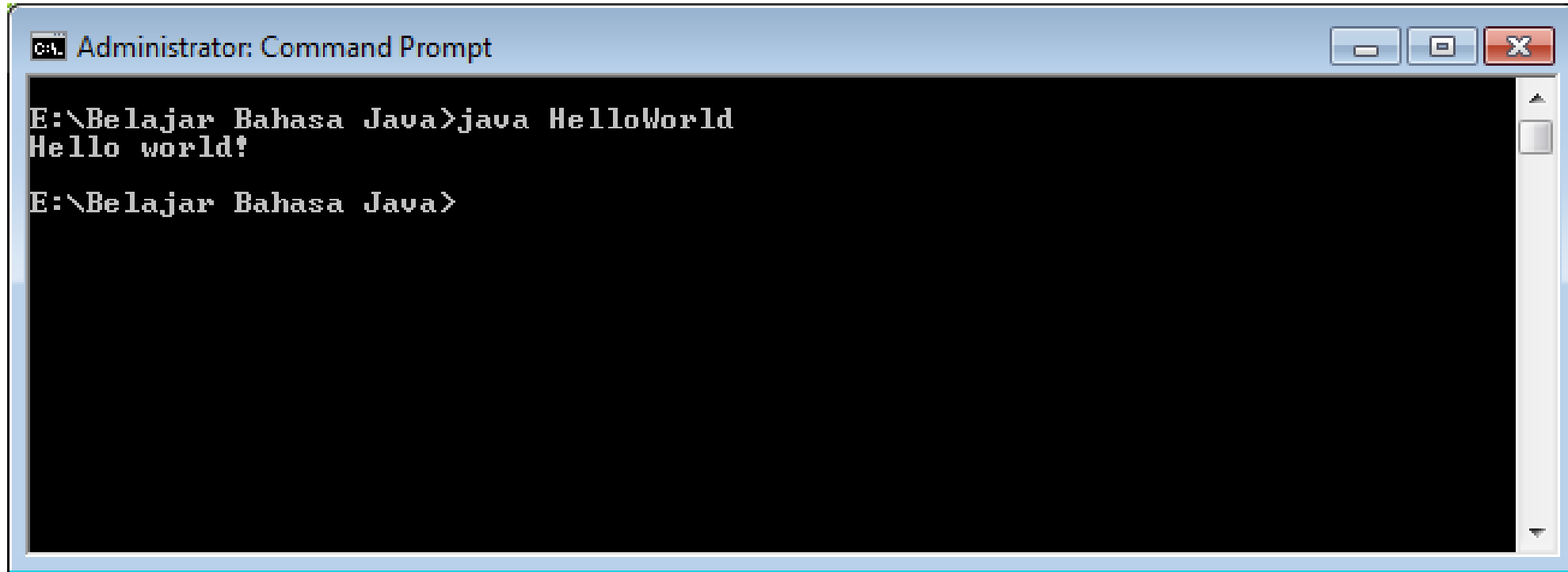


The image shows a screenshot of a Windows Command Prompt window titled "Administrator: Command Prompt". The window has a blue title bar with standard minimize, maximize, and close buttons. The main area is black with white text. The text shows the current directory as "E:\Belajar Bahasa Java" and the command "javac HelloWorld.java" being executed. The prompt returns to "E:\Belajar Bahasa Java" after the command is run.

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

- Hasilnya sebuah arsip bernama `HelloWord.class`

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

A screenshot of a Windows Command Prompt window titled "Administrator: Command Prompt". The window has a blue title bar with standard minimize, maximize, and close buttons. The main area is black with white text. The text shows the current directory as "E:\Belajar Bahasa Java", the command "java HelloWorld" being entered, and the output "Hello world!". The prompt returns to "E:\Belajar Bahasa Java>".

```
Administrator: Command Prompt
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

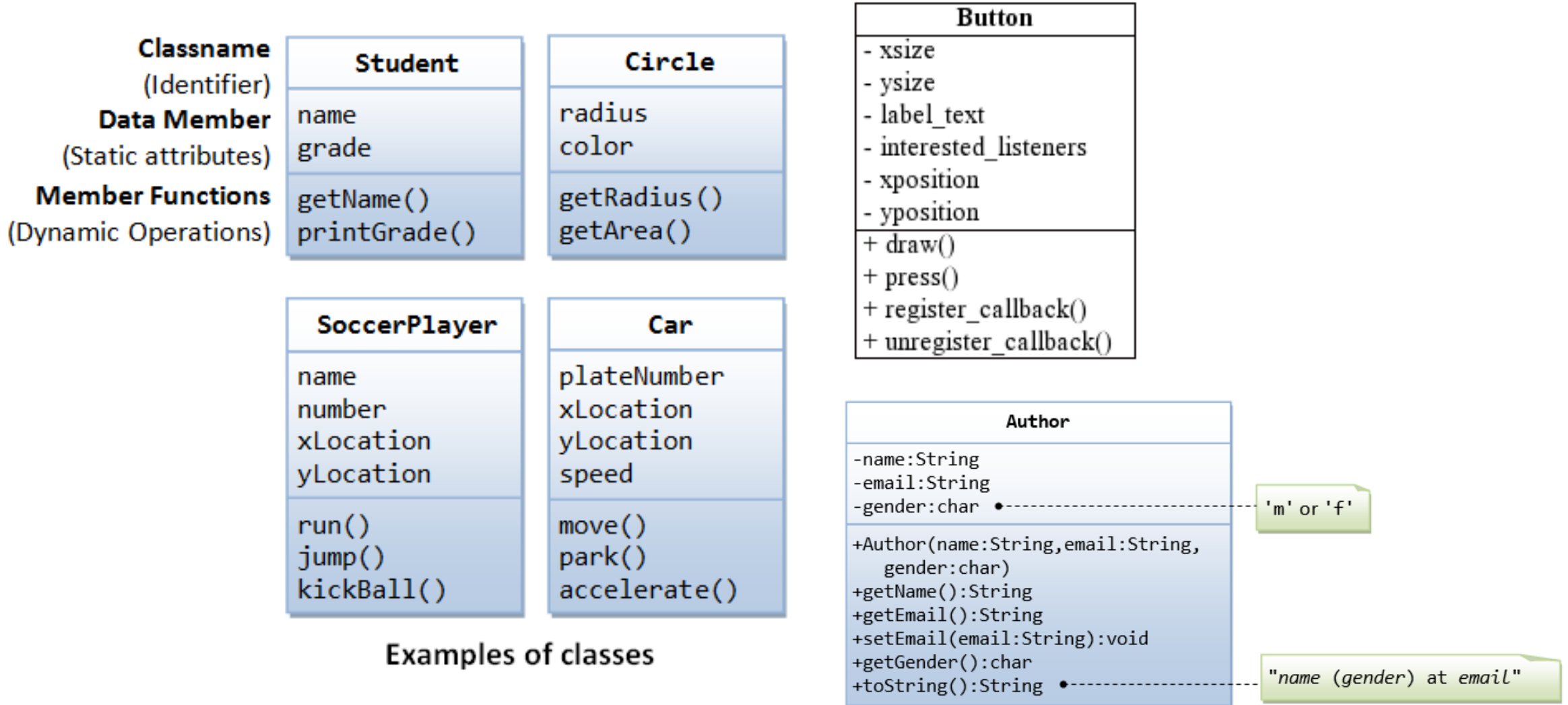


Class

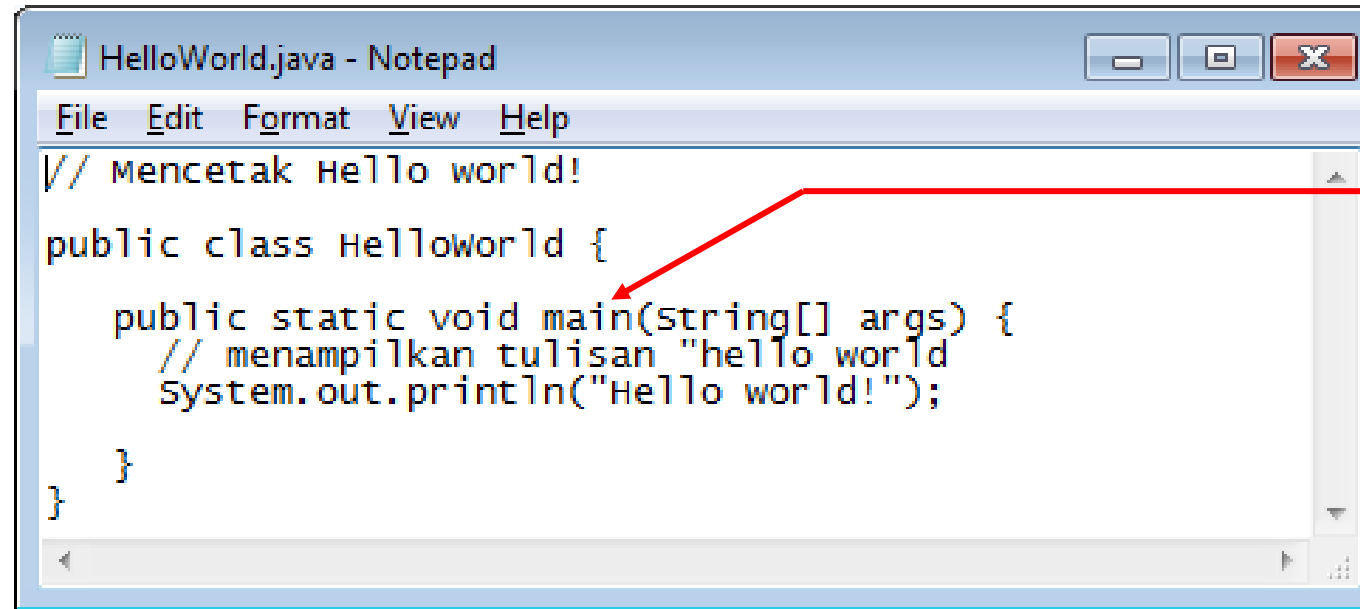
- Bahasa java adalah berorientasi objek. Struktur bahasa java terdiri dari kelas-kelas objek.
- Kelas adalah *blue-print* dari objek, sedangkan objek adalah instans dari kelas pada saat ruuning.
- Setiap kelas di dalam java memiliki *template*:

```
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`:

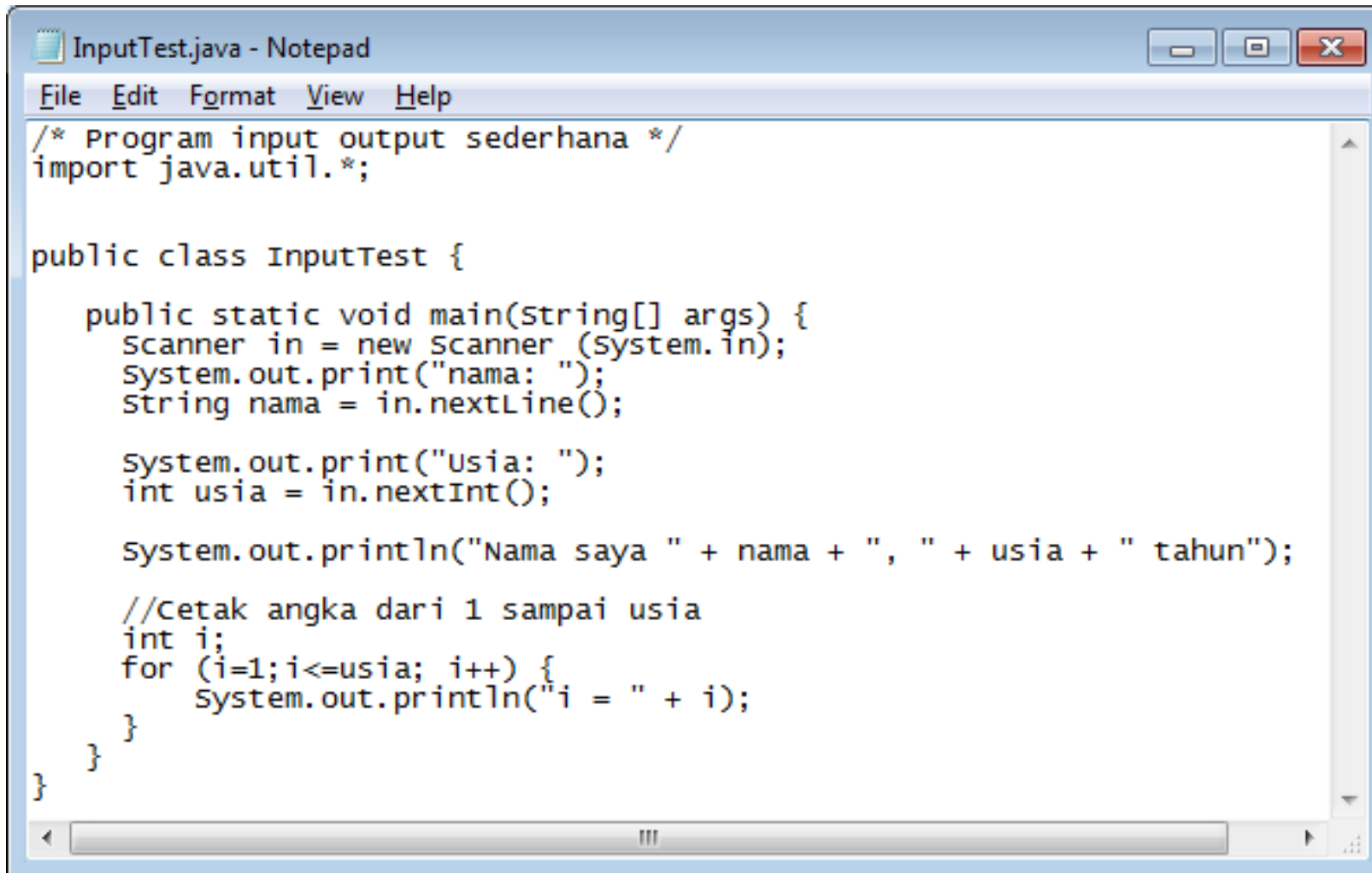


```
>HelloWorld.java - Notepad
File Edit Format View Help
// mencetak Hello world!
public class HelloWorld {
    public static void main(String[] args) {
        // menampilkan tulisan "hello world"
        System.out.println("Hello world!");
    }
}
```

Method/function

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

Program Input/Output Sederhana



```
InputTest.java - Notepad
File Edit Format View Help
/* Program input output sederhana */
import java.util.*;

public class InputTest {

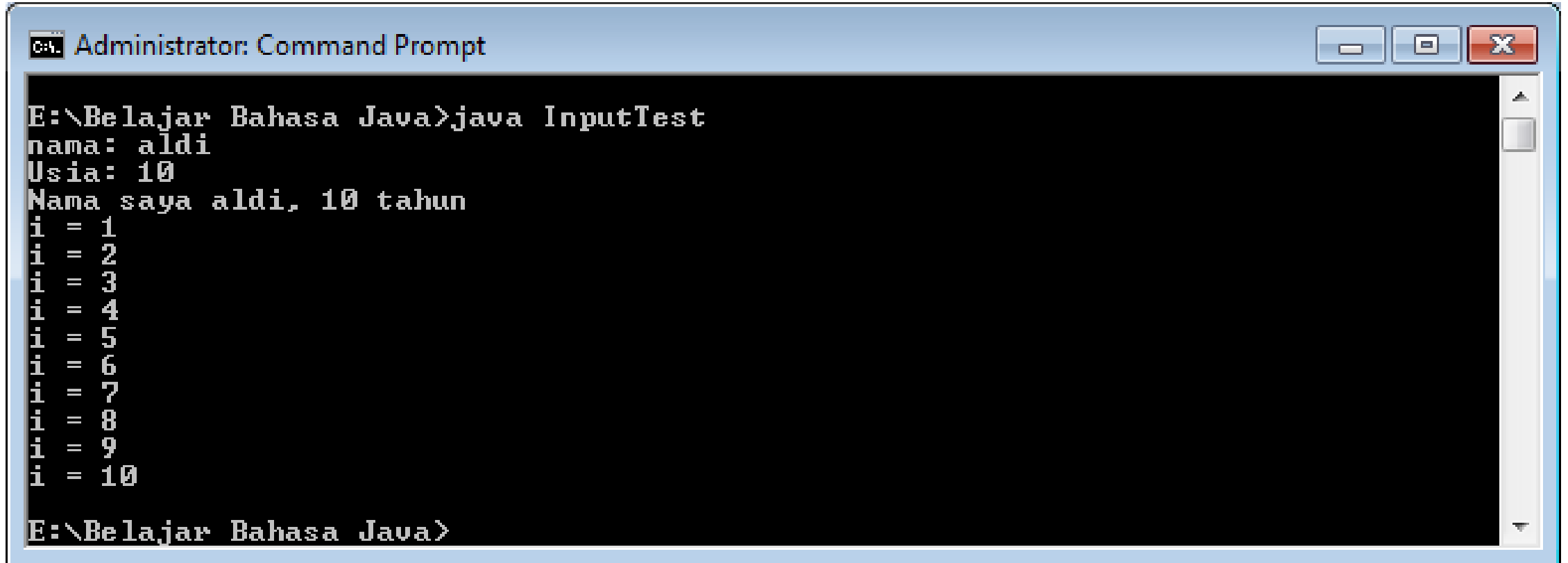
    public static void main(String[] args) {
        Scanner in = new Scanner (System.in);
        System.out.print("nama: ");
        String nama = in.nextLine();

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

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

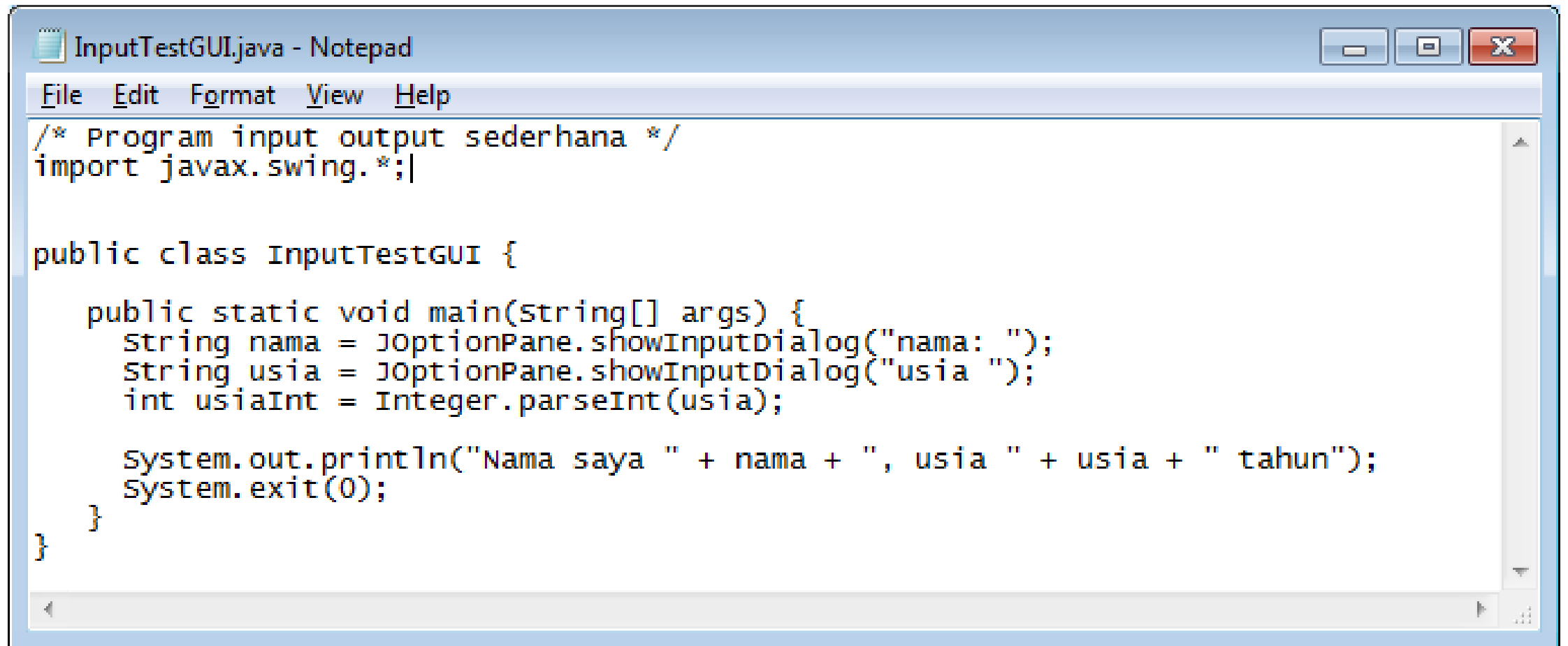
        //Cetak angka dari 1 sampai usia
        int i;
        for (i=1;i<=usia; i++) {
            System.out.println("i = " + i);
        }
    }
}
```

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



```
Administrator: Command Prompt
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>
```

Program Input dengan GUI



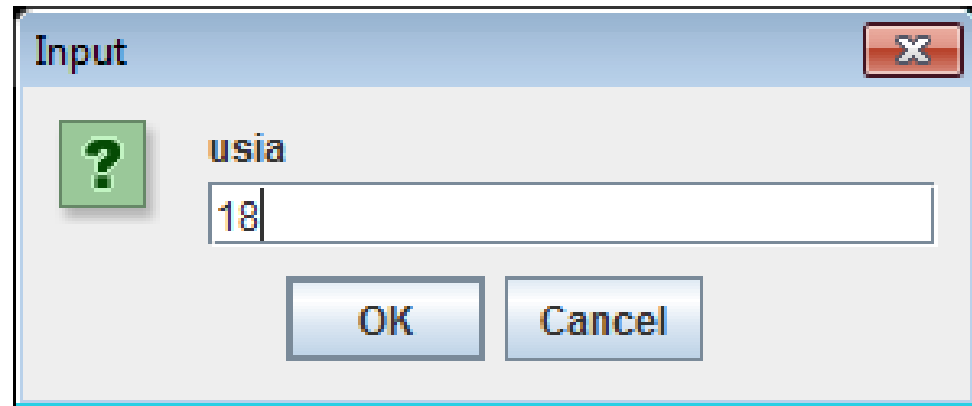
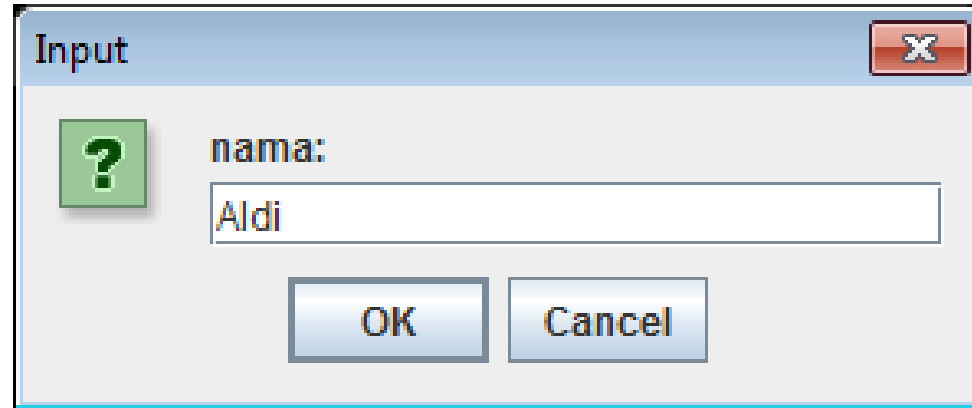
```
InputTestGUI.java - Notepad
File Edit Format View Help
/* Program input output sederhana */
import javax.swing.*;

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

```
*FindMonth - Notepad
File Edit Format View Help
/* Program input output sederhana */
import javax.swing.*;

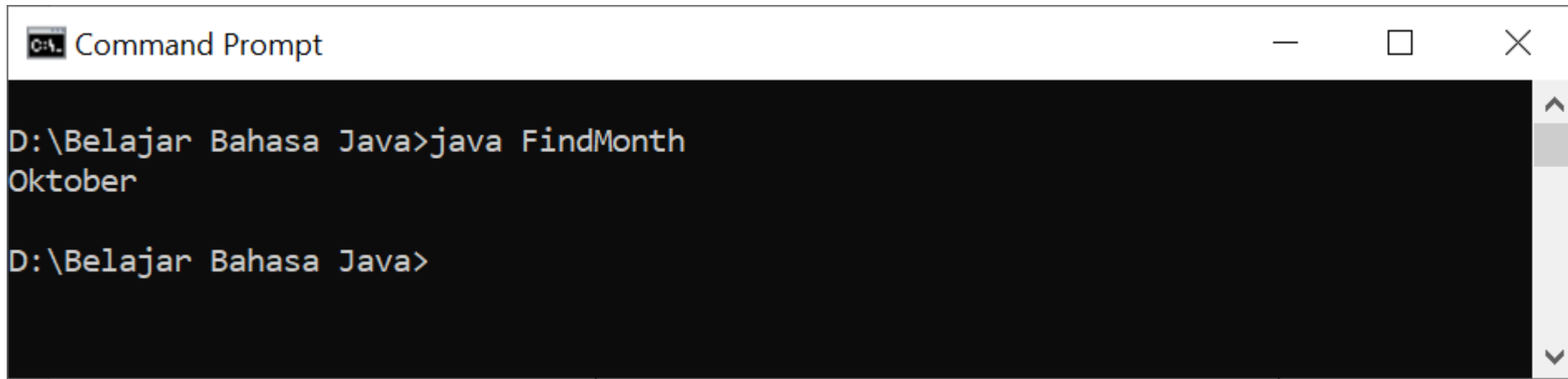
public class FindMonth {

    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);
    }
}

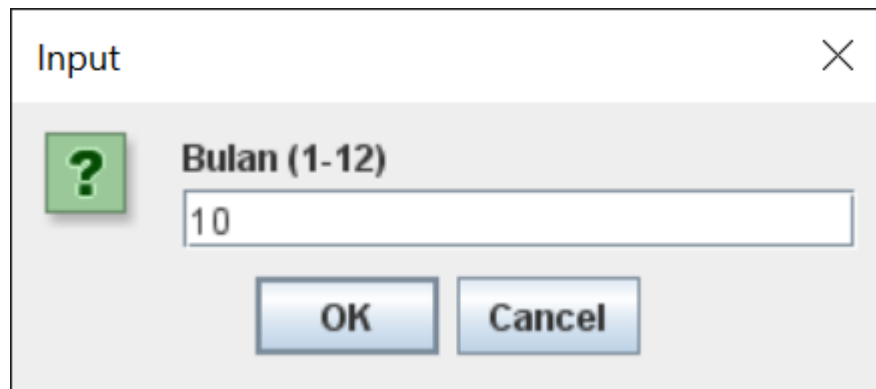
Ln 4, Col 1    100%    Windows (CRLF)    UTF-8
```




Command Prompt

```
D:\Belajar Bahasa Java>java FindMonth
Oktober

D:\Belajar Bahasa Java>
```

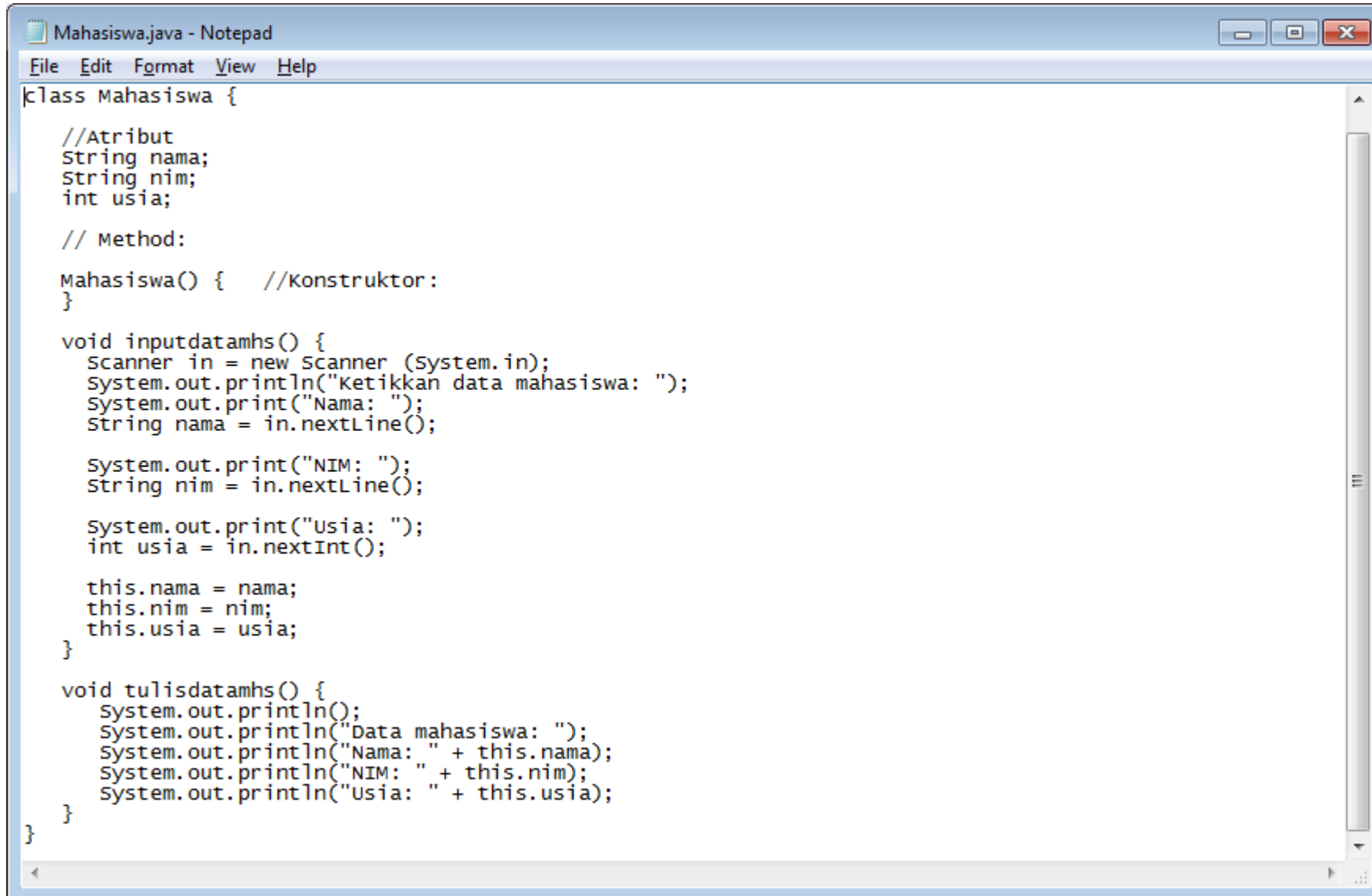


Input

 Bulan (1-12)

OK Cancel

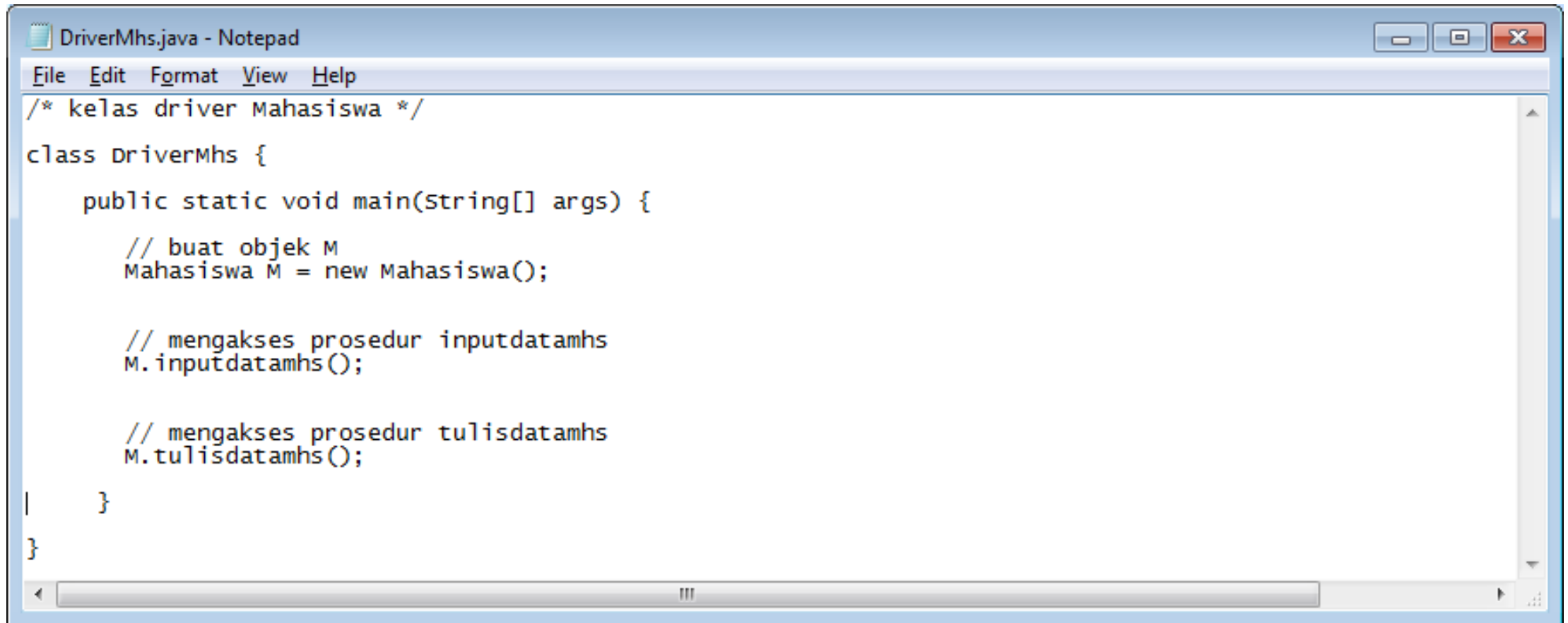
Kelas Mahasiswa

A screenshot of a Notepad window titled "Mahasiswa.java - Notepad". The window contains Java code for a class named "Mahasiswa". The code includes attributes for name, NIM, and age, and methods for inputting and writing data. The code is as follows:

```
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)

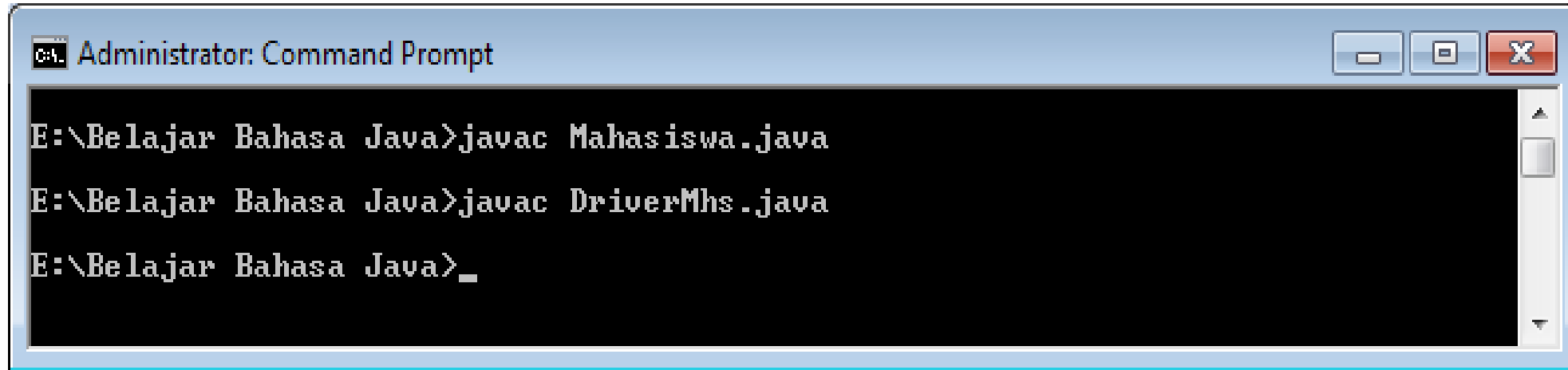


```
DriverMhs.java - Notepad
File Edit Format View Help
/* kelas driver mahasiswa */
class DriverMhs {
    public static void main(String[] args) {
        // buat objek M
        Mahasiswa M = new Mahasiswa();

        // mengakses prosedur inputdatamhs
        M.inputdatamhs();

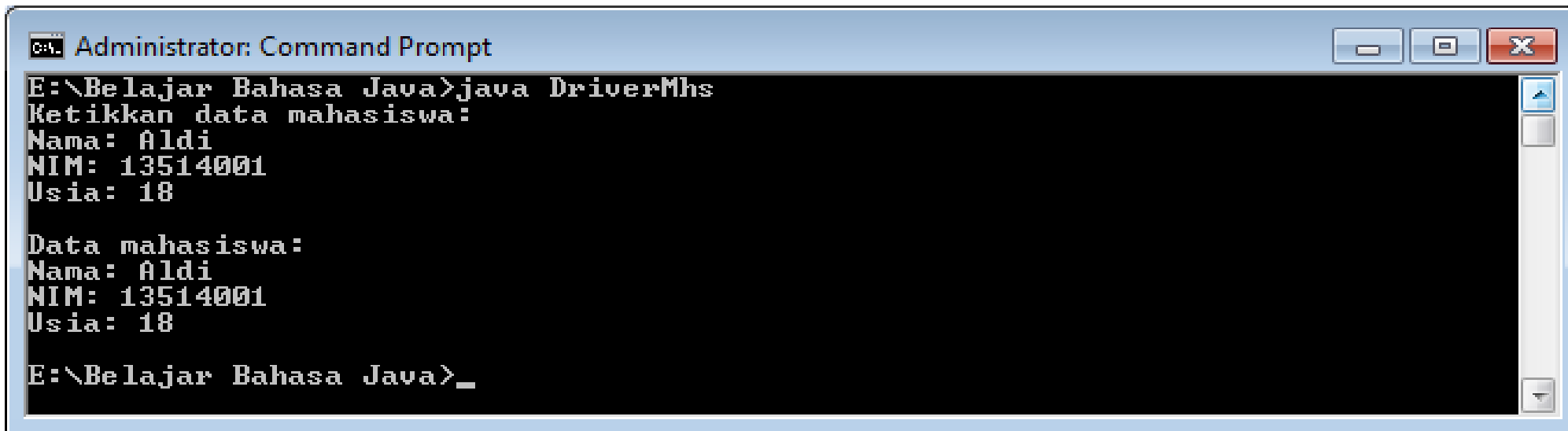
        // mengakses prosedur tulisdatamhs
        M.tulisdatamhs();
    }
}
```

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



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

- Jalankan kelas DriverMhs.class

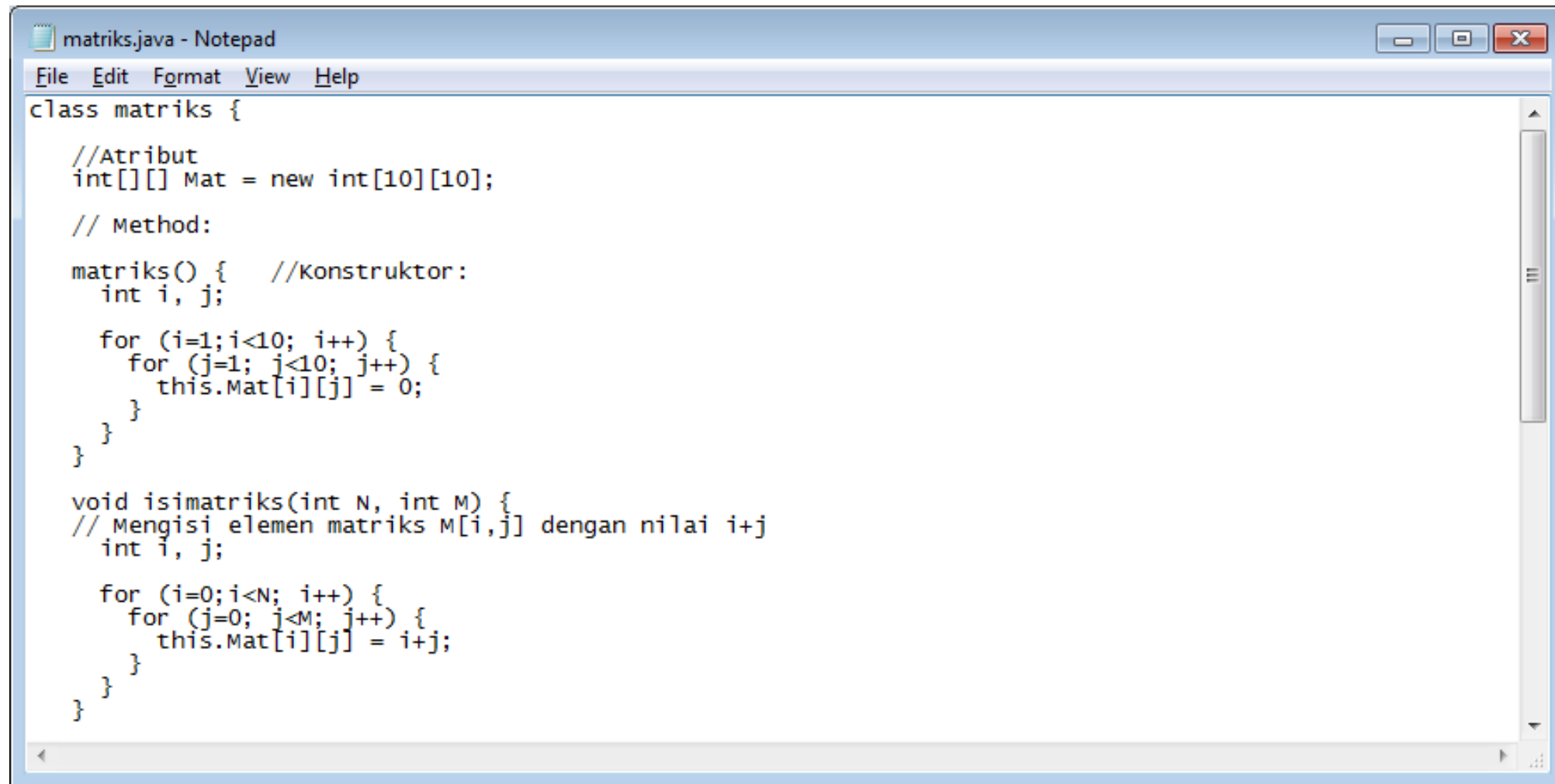


```
Administrator: Command Prompt
E:\Belajar Bahasa Java>java DriverMhs
Ketikkan data mahasiswa:
Nama: Aldi
NIM: 13514001
Usia: 18

Data mahasiswa:
Nama: Aldi
NIM: 13514001
Usia: 18

E:\Belajar Bahasa Java>_
```

Kelas Matriks



```
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)

```
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();

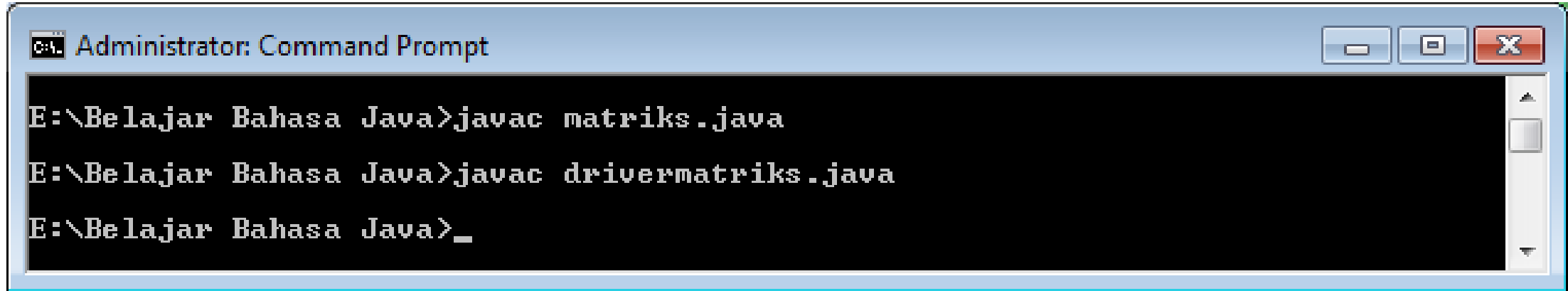
        // mengisi matriks
        M.isimatriks(3,4);

        // 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);

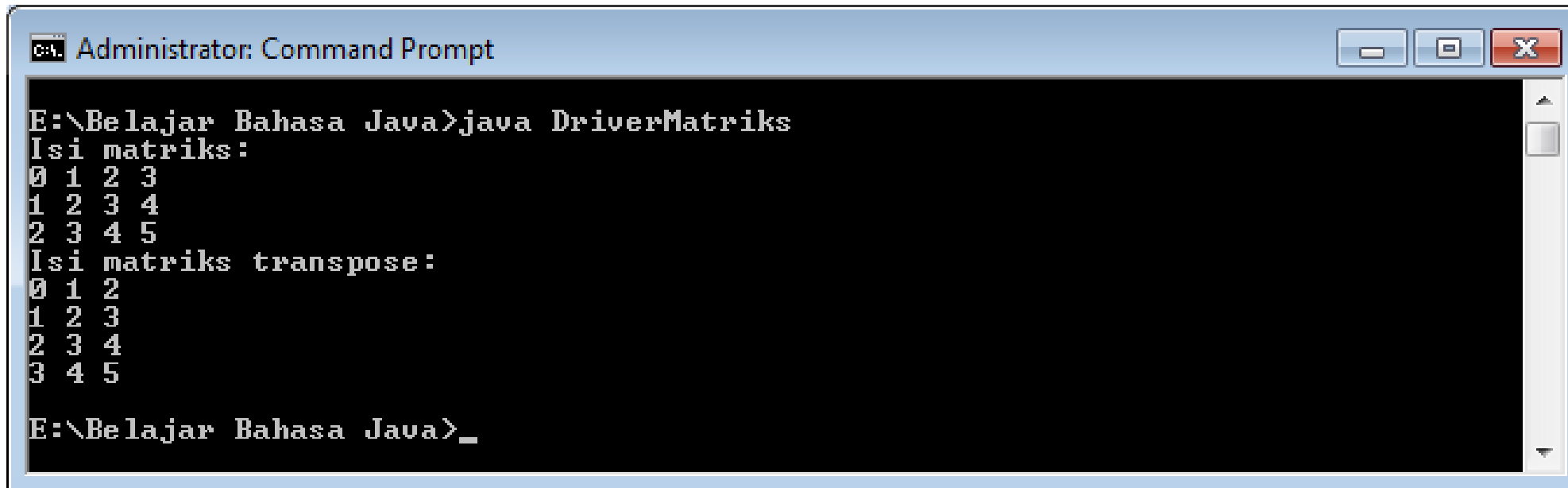
        // Tulis matriks transpose
        System.out.println("Isi matriks transpose: ");
        int i, j;
        for (i=0; i<4; i++) {
            for (j=0; j<3; j++) {
                System.out.print(M2[i][j] + " ");
            }
            System.out.println();
        }
    }
}
```


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



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

- Jalankan kelas `DriverMatriks.class`



```
Administrator: Command Prompt
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>_
```

Kelas Stack

```
Stack - Notepad
File Edit Format View Help
/* 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);
    }
}

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

```
Stack - Notepad
File Edit Format View Help

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

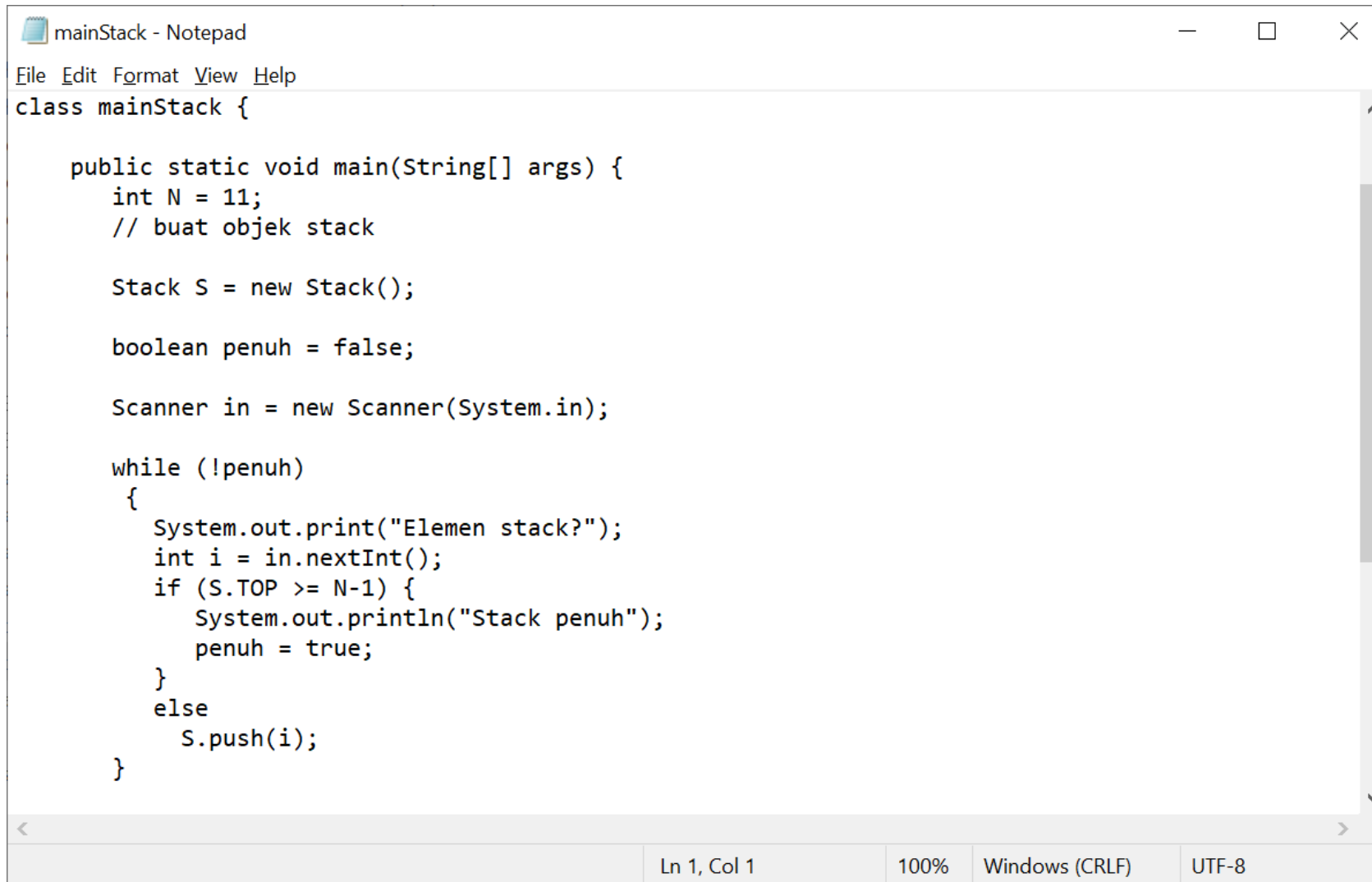
void push(int x){
    this.TOP ++;
    //if (this.TOP > N-1)
    //    System.out.println("stack penuh");
    // else
    s[TOP] = x;
}

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

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

Kelas mainStack

(yang menggunakan kelas 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

```
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;
}

}
```

```
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:

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3. Wikipedia