

Προγραμματισμός Η/Υ

Παύλος Πέππας

www.bma.upatras.gr/staff/pavlos/

Μέθοδοι και Κλάσεις

```
public class GradeBook
{
    public void displayMessage( String courseName )
    {
        System.out.printf(“Welcome to the grade book for %s\n”, courseName);
    }
}
```

➔ GradeBook.java

```
import java.util.Scanner;

public class Test
{
    public static void main( String[ ] args )
    {
        Scanner input = new Scanner ( System.in )
        Gradebook myBook = new GradeBook ( );
        String name;

        System.out.println(“Enter the course name: “);
        name = input.nextLine( );
        myBook.displayMessage( name );
    }
}
```

➔ Test.java

Παρατηρήσεις

- Κάθε public κλάση αποθηκεύεται σε ξεχωριστό αρχείο με το όνομα της κλάσης.
- Μόνο η κλάση με την μέθοδο main μπορεί να εκτελεστεί (driver class).
- Κάθε κλάση δημιουργεί ένα νέο τύπο μεταβλητών/αντικειμένων (extensible language).
- Όλες οι κλάσεις μιας εφαρμογής πρέπει να μεταγλωτιστούν ταυτόχρονα, πχ. `javac GradeBook.java Test.java`
- Κλάσεις που είναι συμπληρωματικές μεταξύ τους τοποθετούνται μαζί σε ένα πακέτο (package).
- Το πακέτο `java.lang` περιέχει τις πιο χρήσιμες κλάσεις και ενσωματώνεται αυτόματα σε κάθε πρόγραμμα.
- Το πακέτο `java.util` που περιέχει την Scanner δεν ενσωματώνεται αυτόματα.
- Όλες οι κλάσεις που ανήκουν στο ίδιο directory με την driver class θεωρούνται πως ανήκουν στο ίδιο πακέτο (default package).

Instance Variables, Μέθοδοι *set* και *get*

```
public class GradeBook
{
    private String courseName;

    public void setCourseName ( String name )
    {
        courseName = name;
    }

    public String getCourseName ( )
    {
        return courseName;
    }

    public void displayMessage( )
    {
        System.out.printf("Welcome to the grade book for %s\n", getCourseName( ) );
    }
}
```

Instance Variables, Μέθοδοι *set* και *get* (2)

```
import java.util.Scanner;

public class Test
{
    public static void main( String[ ] args )
    {
        Scanner input = new Scanner ( System.in )
        Gradebook myBook = new GradeBook ( );
        String theName;

        System.out.printf("Initial course name: %s\n\n", myBook.getCourseName( ) );
        System.out.println("Enter the course name: ");
        theName = input.nextLine( );
        myBook.setCourseName( theName );
        System.out.println( );
        myBook.displayMessage( );
    }
}
```

Παρατηρήσεις

- Σε αντίθεση με τα local variable, τα instance variables παίρνουν αυτόματα μια δεδομένη αρχική τιμή.
- Τα instance variables μιας κλάσης είναι προσβάσιμα απ' όλες της μεθόδους της.
- Οι private μέθοδοι και μεταβλητές είναι προσβάσιμες μόνο μέσα στην κλάση που δηλώνονται (data hiding).
- Η σειρά με την οποία εμφανίζονται οι μέθοδοι σε μια κλάση δεν έχει σημασία.
- Οι κλάσεις που επιστρέφουν την τιμή private μεταβλητών, καλό είναι να αρχίζουν με get.
- Αντίστοιχα, οι κλάσεις που δίνουν τιμές σε private μεταβλητές, καλό είναι να αρχίζουν με set.

Κατασκευαστές

```
public class GradeBook
{
    private String courseName;

    public GradeBook ( )
    {
        courseName = "Java Programming";
    }

    public GradeBook ( String name )
    {
        courseName = name;
    }

    public void setCourseName ( String name )
    {
        courseName = name;
    }

    public String getCourseName ( )
    {
        return courseName;
    }

    public void displayMessage( String courseName )
    {
        System.out.printf("Welcome to the grade book for %s\n",
            getCourseName( ) );
    }
}
```

Κατασκευαστές

```
public class GradeBook
{
    private String courseName;

    public GradeBook ( )
    {
        courseName = "Java Programming";
    }

    public GradeBook ( String name )
    {
        courseName = name;
    }

    public void setCourseName ( String name )
    {
        courseName = name;
    }

    public String getCourseName ( )
    {
        return courseName;
    }

    public void displayMessage( String courseName )
    {
        System.out.printf("Welcome to the grade book for %s\n",
            getCourseName( ) );
    }
}
```

```
public class Test
{
    public static void main( String[ ] args )
    {
        Gradebook book1 = new GradeBook ( );
        Gradebook book2 = new GradeBook ( "Game Theory" );

        System.out.print("The name of the first course is: ");
        System.out.printf("%s\n\n", book1.getCourseName( ) );
        System.out.print("The name of the second course is: ");
        System.out.printf("%s\n\n", book2.getCourseName( ) );
    }
}
```


Κατασκευαστές

```
public class GradeBook
{
    private String courseName;

    public GradeBook ( )
    {
        courseName = "Java Programming";
    }

    public GradeBook ( String name )
    {
        courseName = name;
    }

    public void setCourseName ( String name )
    {
        courseName = name;
    }

    public String getCourseName ( )
    {
        return courseName;
    }

    public void displayMessage( String courseName )
    {
        System.out.printf("Welcome to the grade book for %s\n",
            getCourseName( ) );
    }
}
```

```
public class Test
{
    public static void main( String[ ] args )
    {
        Gradebook book1 = new GradeBook ( );
        Gradebook book2 = new GradeBook ( "Game Theory" );

        System.out.print("The name of the first course is: ");
        System.out.printf("%s\n\n", book1.getCourseName( ) );
        System.out.print("The name of the second course is: ");
        System.out.printf("%s\n\n", book2.getCourseName( ) );
    }
}
```

The name of the first course is: Java Programming
The name of the second course is: Game Theory

Μια Ολοκληρωμένη Εφαρμογή: GradeBook

```
public class DriverClass
{
    public static void main( String[ ] args )
    {
        int[ ] grades = { 87, 68, 94, 100, 83, 78 };
        String course = "Java Programming";

        GradeBook myBook = new Gradebook(course, grades);
        myBook.displayMessage();
        myBook.processGrades();
    }
}
```

Welcome to the grade book for
Java Programming!

The grades are:

Student 1: 87
Student 2: 68
Student 3: 94
Student 4: 100
Student 5: 83
Student 6: 78

Grade average is: 85.00
Lowest grade is: 68
Highest grade is: 100

Grade distribution

00 – 09:
10 – 19:
20 – 29:
30 – 39:
40 – 49:
50 – 59:
60 – 69: *
70 – 79: *
80 – 89: **
90 – 99: *
100: *

Μια Ολοκληρωμένη Εφαρμογή: GradeBook

```
public class GradeBook
{
    private String courseName;
    private int[] marks;

    public GradeBook( String name, int[] gradesArray ) {
        courseName = name;
        marks = gradesArray;
    }
}
```

Welcome to the grade book for
Java Programming!

The grades are:

Student 1: 87
Student 2: 68
Student 3: 94
Student 4: 100
Student 5: 83
Student 6: 78

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```
public class GradeBook
{
    private String courseName;
    private int[ ] marks;

    public GradeBook( String name, int[ ] gradesArray ) {
        courseName = name;
        marks = gradesArray;
    }

    public void displayMessage( )
    {
        System.out.println("Welcome to the grade book for");
        System.out.printf("%s!\n\n", courseName);
    }
}
```

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Μια Ολοκληρωμένη Εφαρμογή: GradeBook

```
public class GradeBook
{
    private String courseName;
    private int[ ] marks;

    public GradeBook( String name, int[ ] gradesArray ) {
        courseName = name;
        marks = gradesArray;
    }

    public void displayMessage( ) {
        System.out.println("Welcome to the grade book for");
        System.out.printf("%s!\n\n", courseName);
    }

    public void outputGrades( ) {
        int i;
        System.out.println("The grades are:\n");
        for (i=0; i<marks.length; i++)
            System.out.printf("Student %2d: %3d\n", i+1, marks[i]);
    }
}
```

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Μια Ολοκληρωμένη Εφαρμογή: GradeBook

```
public void processGrades( ) {  
    outputGrades( );  
    System.out.printf("\nClass average is: %.2f\n", getAverage( ) );  
    System.out.printf("Lowest grade is: %d\n", getMinimum( ) );  
    System.out.printf("Highest grade is: %d\n\n", getMaximum( ) );  
    outputBarChart( );  
}
```

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```
public void processGrades( ) {  
    outputGrades( );  
    System.out.printf("\nClass average is: %.2f\n", getAverage( ) );  
    System.out.printf("Lowest grade is: %d\n", getMinimum( ) );  
    System.out.printf("Highest grade is: %d\n\n", getMaximum( ) );  
    outputBarChart( );  
}  
  
public double getAverage( ) {  
    int i, sum=0;  
    for (i=0; i<marks.length; i++)  
        sum = sum+marks[i];  
    return ((double) sum)/marks.length;  
}
```

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    outputGrades( );
    System.out.printf("\nClass average is: %.2f\n", getAverage( ) );
    System.out.printf("Lowest grade is: %d\n", getMinimum( ) );
    System.out.printf("Highest grade is: %d\n\n", getMaximum( ) );
    outputBarChart( );
}

public double getAverage( ) {
    int i, sum=0;
    for (i=0; i<marks.length; i++)
        sum = sum+marks[i];
    return ((double) sum)/marks.length;
}

public int getMinimum( ) {
    int min, i;
    min = marks[0];
    for (i=1; i<marks.length; i++)
        if ( marks[i] < min ) min = marks[i];
    return min;
}
```

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```
public int getMinimum( ) {  
    int min, i;  
    min = marks[0];  
    for (i=1; i<marks.length; i++)  
        if ( marks[i] < min ) min = marks[i];  
    return min;  
}  
  
public int getMaximum( ) {  
    int max, i;  
    max = marks[0];  
    for (i=1; i<marks.length; i++)  
        if ( marks[i] > max ) max = marks[i];  
    return max;  
}
```

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