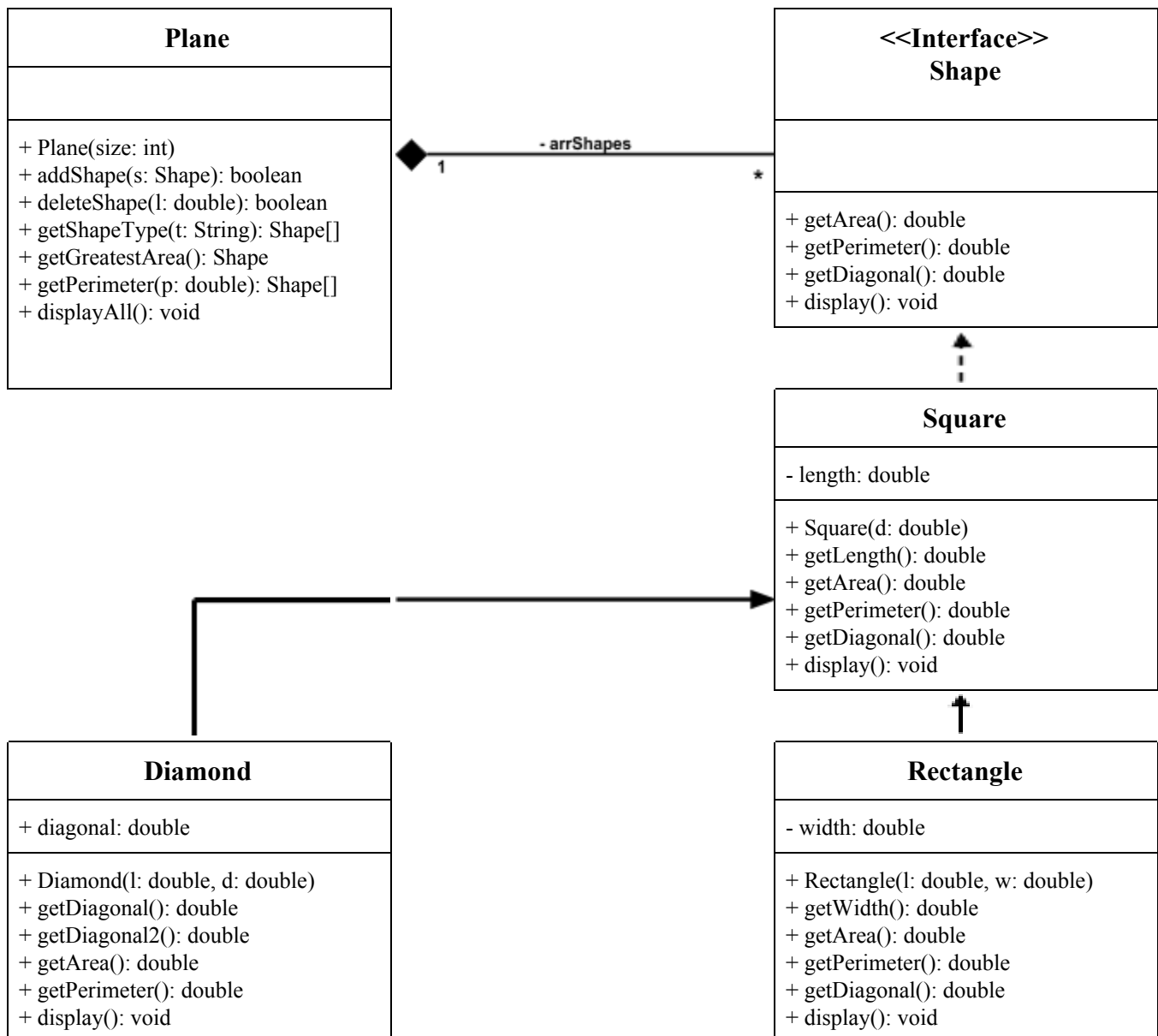


King Saud University
College of Computer & Information Science
CSC113 – Computer Programming II
Lab05: Abstract Classes and Interfaces

Submission rules:

- The project name must be: Lab05_ID_FirstName_LastName.zip. For example: Lab05_123456789_Marwan_Almaymoni.zip
- Use the default package.
- The due date is Wednesday 28/10/2020 11:59 PM via lms.ksu.edu.sa
- Email submissions will not be accepted.



Interface *Shape*:

- Methods
 - `getArea()`
 - `getPerimeter()`
 - `getDiagonal()`
 - `display()`

Class *Square*:

- Attributes:
 - `length`: the length of the square's edges.
- Methods:
 - `Square(l: double)`: Constructor.
 - `getLength()`: this method returns the length of the square's edges.
 - `getArea()`: this method returns the area of the square.
$$\text{Area} = \text{length} \times \text{length}$$
 - `getPerimeter()`: this method returns the perimeter of the square.
$$\text{Perimeter} = 4 \times \text{length}$$
 - `getDiagonal()`: this method returns the diagonal of the square.
$$\text{Diagonal} = \sqrt{2} \times \text{length}$$
 - `display()`: this method prints square information as follows:

Square. Length: 10, Area: 100, Perimeter: 40, Diagonal: 14.142135623730951
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Class *Rectangle*:

- Attributes:
 - `width`: the width of the rectangle.
- Methods:
 - `Rectangle(l: double, w: double)`: Constructor.
 - `getWidth()`: this method returns the width of the rectangle.
 - `getArea()`: this method returns the area of the rectangle.
$$\text{Area} = \text{length} \times \text{width}$$
 - `getPerimeter()`: this method returns the perimeter of the rectangle.
$$\text{Perimeter} = (\text{length} + \text{width}) \times 2$$
 - `getDiagonal()`: this method returns the diagonal of the rectangle.
$$\text{Diagonal} = \sqrt{\text{length}^2 + \text{width}^2}$$
 - `display()`: this method prints rectangle information as follows:

Rectangle. Length: 3, Width: 4, Area: 12, Perimeter: 14, Diagonal: 5.0

Class ***Diamond***:

- Attributes:
 - diagonal: one of the diamond's diagonals.
- Methods:
 - Diamond(l: double, d: double): Constructor.
 - getDiagonal(): this method returns the value in the variable diagonal.
 - getDiagonal2(): this method returns the value of the other diamond diagonal.
$$Diagonal2 = 2 \times \sqrt{(4 \times length^2) / diagonal^2}$$
 - getArea(): this method returns the area of the diamond.
$$Area = (diagonal \times diagonal2) / 2$$
 - getPerimeter(): this method returns the perimeter of the diamond.
$$Perimeter = 4 \times length$$
 - display(): this method prints the diamond information as follows:

Diamond. Length: 5, Area: 10, Perimeter: 20, Diagonal: 8, Diagonal2: 2.5

Class ***Plane***:

- Methods:
 - Plane(size: int): Constructor. Creates an array of Shapes with size *size*.
 - addShape(s: Shape): this method adds the Shape *s* to the array if there is a space, the returns true. Otherwise, returns false.
 - deleteShapes(l : double): this method deletes all the Shapes from the array with length smaller than *l*.
 - getShapeType(t: String): this method returns an array with all the Shapes of type *t*.
 - getGreatestArea(): this method returns the Shape with the greatest area.
 - getPerimeter(p: double): this method returns an array with all the Shapes that have a perimeter greater than or equal to *p*.
 - displayAll(): this method displays all the shapes in the array.