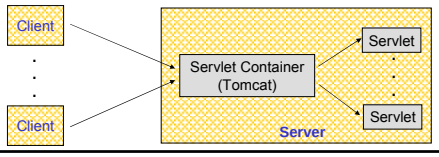
Servlets

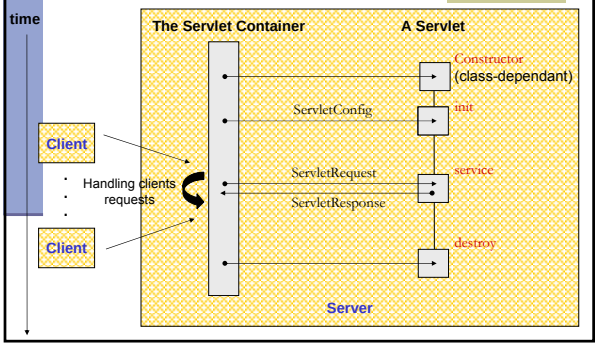
- Java modules that run on a Web server to answer client requests
- For example:
  - Processing data submitted by a browser
  - Providing dynamic content



Software 1 with Java

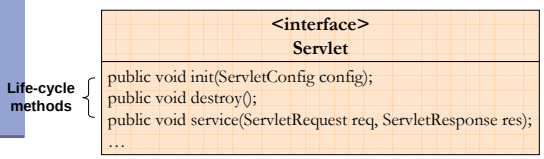
Recitation No. 7
(Servlets, Inheritance)

The Servlet Life Cycle



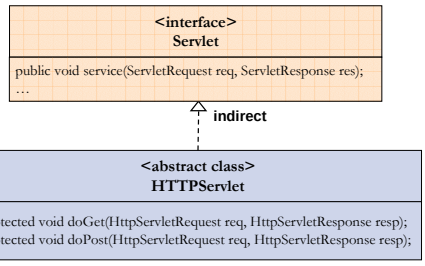
The Servlet Interface

- An interface in the javax.servlet package



HTTP Servlets

- Extend the HTTPServlet abstract class in the javax.servlet.http package



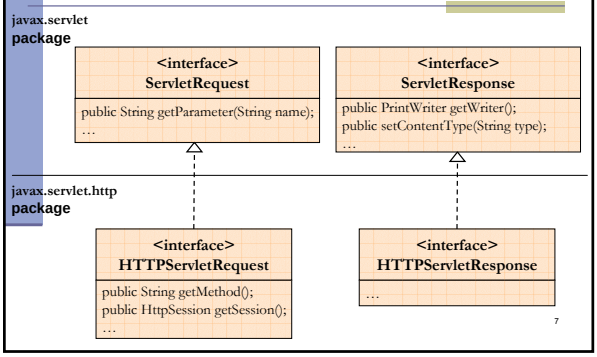
HTTP Servlets

- HTTP (**H**ypertext **T**ransfer **P**rotocol):
  - A protocol used by a WWW client like a browser to send requests to a Web Server
  - A request-response oriented protocol
  - Most common HTTP requests:
    - GET – the parameters are passed in the URL
    - POST – for posting unlimited data to server
- Extend the abstract class `HTTPServlet` in the `javax.servlet.http` package

HTTP Sessions

- Session: A server-side context associated with a user when visiting a Web site.
- The session is kept for a specified period of time across more than one page request or visit of the user.
- Most common ways for servers to maintain sessions:
  - using cookies
  - rewriting URLs

Requests and Responses



The HTTPSession Interface

- Holds information about a session, e.g.
  - the session identifier
  - creation time
  - last accessed time
- Binds objects to a session:
  - Object **getAttribute**(String name)
  - void **setAttribute**(String name, Object value)

HTTP Sessions

- The servlet container tracks sessions
- A combined mechanism for tracking a session:

if the client supports and enables cookies
    use them
otherwise
    automatically revert to URL rewriting

Software 1 with Java

Inheritance
(Example: Geometric Shapes)

Online Resources

- Sun tutorial on servlets:

  http://java.sun.com/j2ee/tutorial/1_3-fcs/doc/Servlets.html
- http://www.novocode.com/doc/servlet-essentials/
- Tomcat and Servlet API:

  http://tomcat.apache.org

Class Polygon

```
/**
 * @inv count() >=3,
 */
public class Polygon {
  /** @pre vertices.size() >=3,
      @pre vertices is a list of Point Objects
  */
  public Polygon(List vertices) {
      this.vertices = vertices;
  }
  ...
  /**
   * Successive points making up the polygon
   */
  private List vertices;
}
```


Class Polygon

Polygon

`public Polygon(List vertices)`
`public double perimeter()`
`public void display()`
`public void rotate(Point center, double angle)`
`public void translate(Point p)`
`public int count()`
`...`

Method Implementation

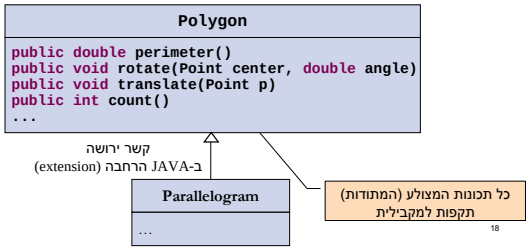
```
/**
 * Rotate by angle around center
 */
public void rotate(Point center, double angle) {
  for (Object p : vertices) {
      ((Point) p).rotate(center, angle);
  }
}
```


Class Polygon

```
public class Polygon {
   ...

   /** Length of the perimeter */
   public double perimeter() { ... }

   /** Display polygon on screen */
   public void display() { ... }

   /** Rotate by angle around center */
   public void rotate(Point center, double angle) {     ... }

   /**
    * Move by p.x() horizontally and p.y() vertically
    */
   public void translate(Point p) { ... }

   /** Returns the number of sides */
   public int count() { return vertices.size(); }
}
```


Class Parallelogram

- מקבילית היא סוג של פוליגון
- `Parallelogram` היא מקרה פרטי של `Polygon`

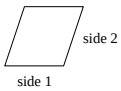


Method Implementation

```
/** Returns the polygon's perimeter */
public double perimeter() {
  double  result = 0.0;

  for (int i = 0 ; i < count() ; i++) {
     Point curr = (Point) verices.get(i);
     Point next = (Point) vertices.get((i+1)%count());
      result += curr.distance(next);
  }

  return result;
}
```

Class `Parallelogram`

```
/**
 * @inv count() == 4
 * @inv vertices.get(0).distance(vertices.get(1)) ==
       side1
 * Similar invariants for the other 3 sides.
 */
public class Parallelogram extends Polygon {
   ...

  /** The two side lengths */
  private double side1, side2;

}
```



The Constructor

```
public class Parallelogram extends Polygon {
  /**
   * @pre vertices.size() == 4
   * @pre vertices.get(0).distance(vertices.get(1))
   * == vertices.get(2).distance(vertices.get(3))
   * @pre vertices.get(1).distance(vertices.get(2))
   * == vertices.get(0).distance(vertices.get(3))
   */
  public Parallelogram(List vertices) {
      super(vertices);
      // Setting side1, side2
      ...
  }

  ...
}
```