# HSBC Technology Graduate Training

## Programming Fundamentals: Java Servlets

Day 4 (Afternoon)

Thursday 29 October 2020 | 2pm

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- Client and Servers
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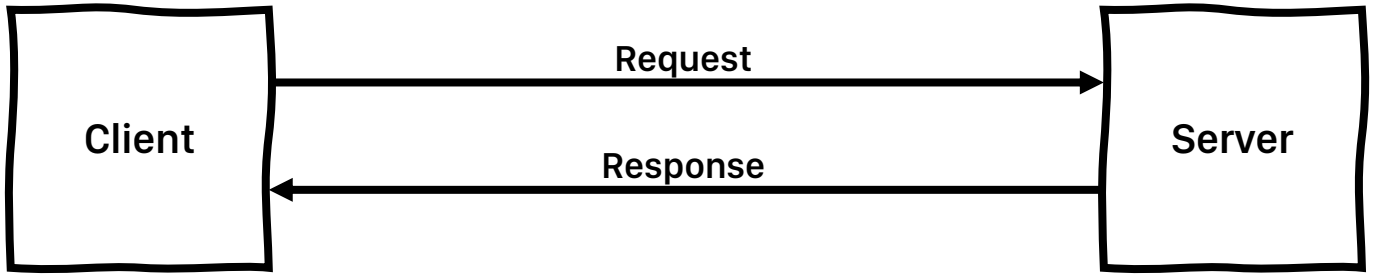
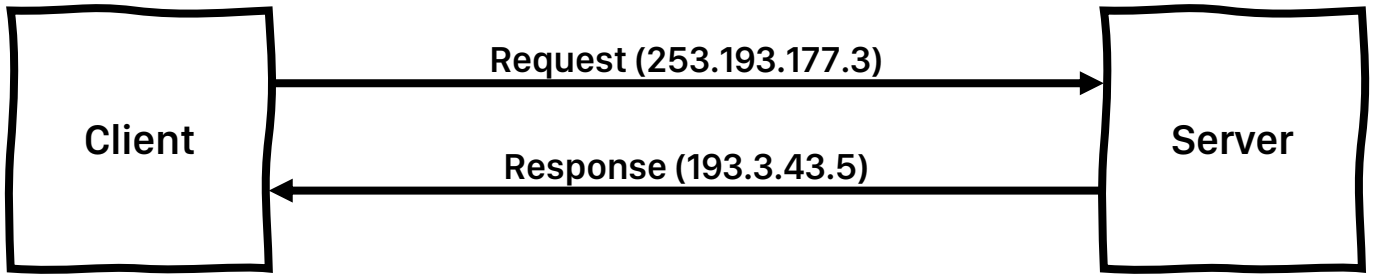
# CLIENT & SERVERS

- The internet is a network of networks.
- In each network, there are devices: phones and computers.
- These devices act as clients or servers.
- Clients and servers are software. Not hardware.
- An example of a client software is Google Chrome or Internet Explorer.
- An example of a server software is Apache (for PHP) or Tomcat (for Java).
- In general, a client makes requests to a server and a server satisfies requests by responding to a client.



# CLIENT & SERVERS

- Devices on the internet have a unique address called an IP address.
- When a client sends a request to the server, it is sending the request to the IP address of the server.
- Similarly, when a server responds to a request, it sends the response to the IP address of the client.



# Static vs. Dynamic Webpages

# STATIC VS. DYNAMIC WEBPAGES

- **A static webpage is a webpage from which its HTML does not change. It is generated by a human and remains static (fixed).**

- **A dynamic webpage is a webpage from which its HTML changes. The HTML file is generated by a program on the server-side.**

# Forms

# FORMS

- We can use a form tag in HTML to POST some data to a server.
- The example below shows a form with two fields, name and address.
- When you click the submit button, a form will be POSTed to form.java.

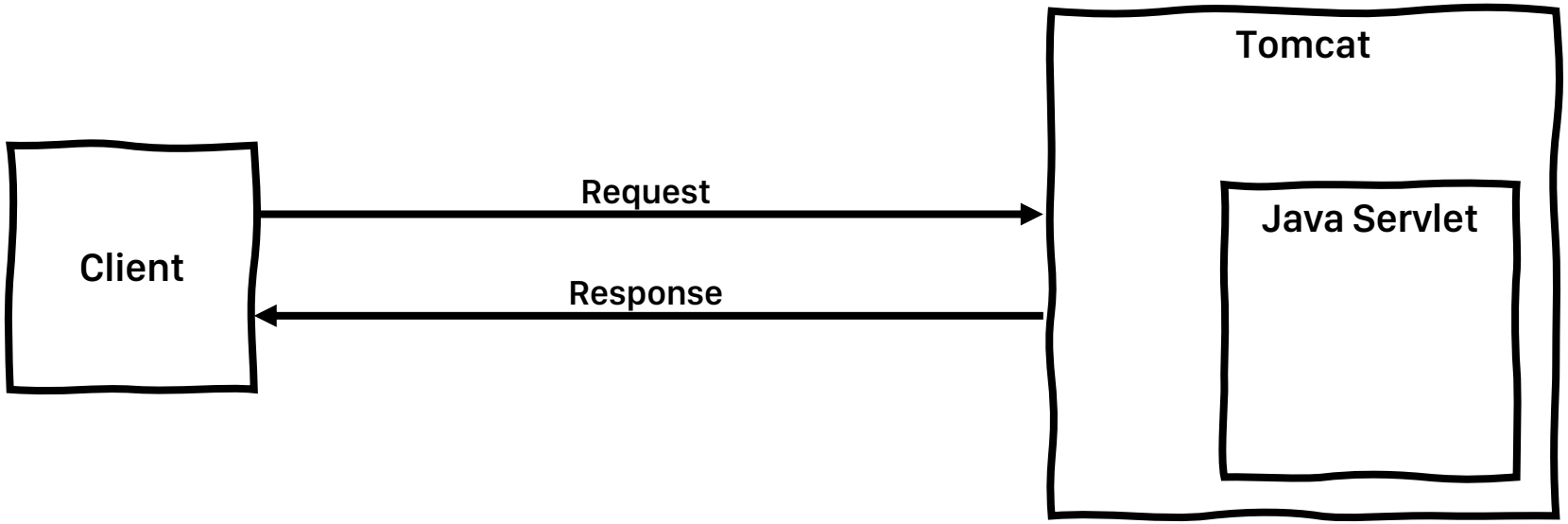
```html
<html>

  <form action="form.java" method="POST">

    Name: <input type="text">
    Address: <input type="text">
    <input type="submit">

  </form>

</html>
```

- We can also send a GET request to the server using URLs/Anchor tags.
- We can send data in the form of parameters in the URL.
- Parameters must be placed after a ? Symbol.
- We separate parameters with an ampersand &.
- When we visit a webpage, we are performing a GET request asking the server for a HTML file. For instance, when we type facebook.com into our browser, the browser we go to the IP address behind the domain name facebook.com and return a HTML file.

# Java Servlet

# JAVA SERVLET INTRODUCTION

- A Java Servlet program is a program that is executed on the server-side.
- A server-side program is designed to respond to requests.
- Such requests may originate from a browser.
- The server-side program generates a HTML file and returns the HTML file to the client.
- Java Servlets are programs that will run within Tomcat (a server software).



# JAVA SERVLET INTRODUCTION

- When a request from a client reaches the Tomcat server, Tomcat creates two objects.
  - A request object of type HttpServletRequest
  - A response object of type HttpServletResponse
- The request object contains all parameters from the client (e.g from the form).
- Both request and response objects will be passed onto the relevant Java Servlet method.

# JAVA SERVLET INTRODUCTION

- A Java Servlet class is a Java class that inherits the built-in class HttpServlet.
- A HttpServlet class can have methods for various HTTP methods, the main two are:
  - GET request: doGet(HttpResponseServlet res, HttpRequestServlet req)
  - POST request: doPost(HttpResponseServlet res, HttpRequestServlet req)
- Within these methods, we can define some logic and generate a response to return to the client.
- These methods take two object references as inputs, the request and response object references created by Tomcat (the server software).

```java
public class FirstServlet extends HttpServlet {

  protected void doGet(HttpResponseServlet res, HttpRequestServlet req) {
    // Get data from database.
    // Return data from database.
  }

  protected void doPost(HttpResponseServlet res, HttpRequestServlet req) {
    // Write data to database.
  }

}
```

- **Below is a diagram of what happens when we send a GET request to facebook.com.**