Web Server Report

Team RAJ – Angelica Rodriguez, John Krasich CSSE 477

Change History

MS2 – Plugin Support

The most significant changes made for this milestone were the addition of the PluginHandler class and Servlet Interface. The PluginHandler watches a Plugins directory for the addition of Jar files from which new servlets would be dynamically included into the web server. The ConnectionHandler communicates with the PluginHandler, passing along the request for the PlugHandler to process correctly. This is done through a HashMap, which relates the context root to a second HashMap that stores the servlets and their respective URIs. Any servlet must implement the Servlet interface, which contains information necessary for the PluginHandler as well as its custom request processing method. The basic GET, POST, PUT, and DELETE methods from MS1 became "static servlets" that will be run if no plugin is found for that kind of request.

MS3 – Applying Improvement Tactics for Server Attributes

At this point our server can handle/improve the following scenarios:

- Sending a 408 Response Timeout and disconnecting the socket when the server is hanging
- Handling when an incorrect plugin is dropped into the plugin folder without the server crashing
- Handling numerous requests
- Scheduling multiple requests in a queue by content-length
- Handling DDos Attacks
- Preventing blacklisted IP's from connecting to the server

The only new addition to our class structure was the Response408Timeout class that would generate a response if a response is not generated within 10 seconds of attempting to read the request. All other changes were internal to the classes; the details of which can be found in our tactic implementation specifications.

MS4 – Developing an Application to Run on the Server

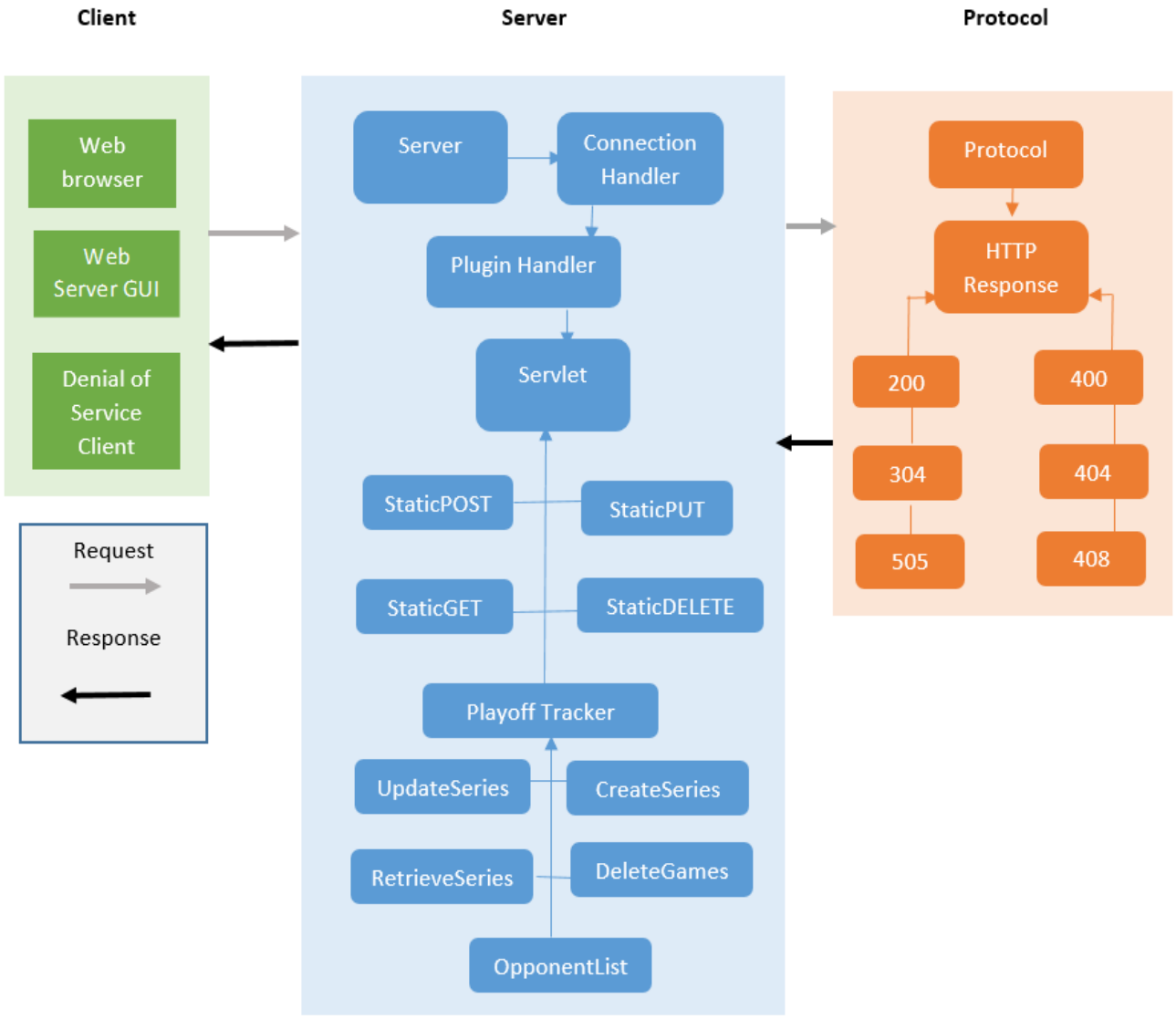
For this milestone we created a Playoff Tracker plugin that had the following servlets:

- CreateSeries (POST)
- DeleteGames (DELETE)
- OpponentList (GET)
- RetrieveSeries (GET)
- UpdateSeries (PUT)

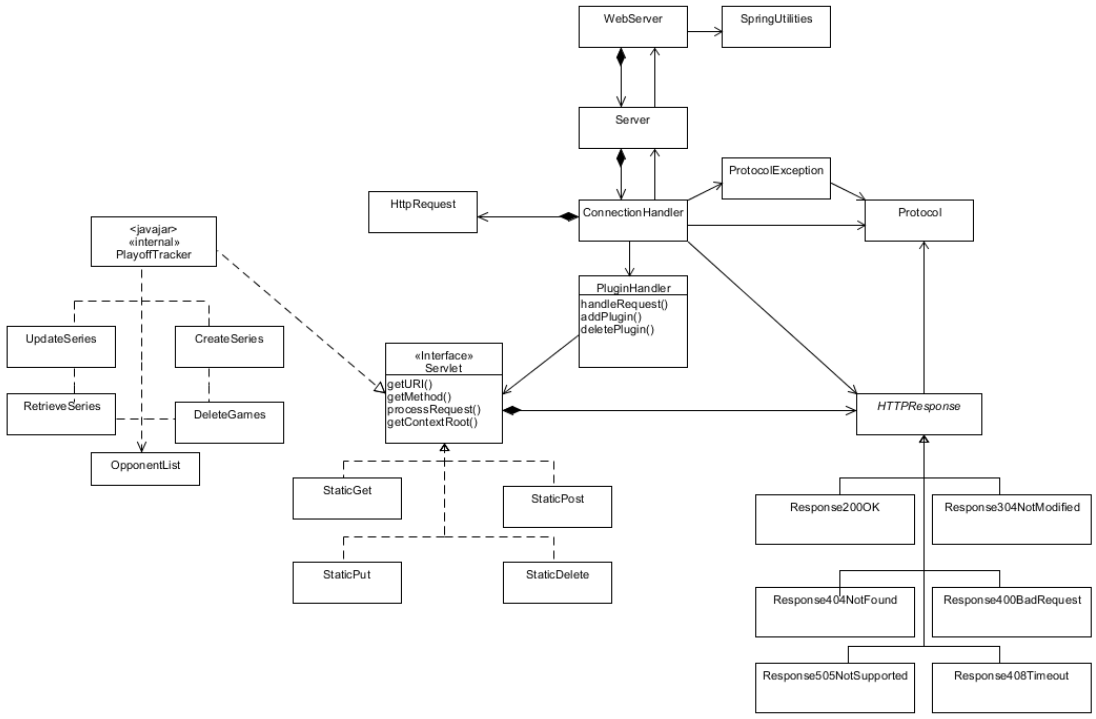
The plugin was added to the server's plugin directory. To the servers web folder we added the html pages needed to serve all of these requests, as well as a js file with the ajax calls needed, and a css file to make the page look nicer. Other than, no other classes or functionality was added to the server for this milestone. The architecture diagram and class diagram in the following sections have been updated to reflect the addition of the Playoff Tracker Plugin.

Architecture and Design

Updated Architecture Diagram



Updated and Detailed Design



Brief Explanation

The only addition to the UML diagram this time around was adding the Playoff Tracker plugin to demonstrate the servlets it has that we used during this milestone that implement our Servlet interface.

Tactics/Feature Listing

Anything with a * next to it indicates we worked on that feature together

Angelica Rodriguez

MS1

- F1 – Redesign and Refactor*
- F2 – Basic support for the POST request*

MS2

- W-1: GET Requests
- W-2: POST Requests
- W-3: PUT Requests
- W-4: DELETE Requests

MS3

- P1 – Handling Numerous Requests
- P2 – Scheduling Events
- S2 – Blacklisted IP Connection

MS4

- F1 – Retrieving a list of opponents*
- F2 – Retrieving series results
- F3 – Creating a series schedule*
- General design for plugin

John Krasich

MS1

- F1 – Redesign and Refactor*
- F2 – Basic support for the POST request*
- F3 – Basic support for the PUT request
- F4 – Basic support for the DELETE request

MS2

- P-1: Dynamic Loading
- E-1: Root Context and Configurable Route
- Test Report

MS3

- A1 – Request Timeout
- A2 – Incorrect Plugin Drop
- S1 – Handling DDoS Attacks

MS4

- F2 – Retrieving series results*
- F3 – Creating a series schedule*
- F4 – Editing a series schedule
- F5 – Deleting a game from a series

Architectural Evaluation and Improvements

The architecture of the web server allows for plugin extensions to be easily add that allows for custom request handling. However, when customization is unnecessary, the static servlets handle requests without any special features. The Playoff Tracker plugin was created without any knowledge of the behind the scenes functionality of the server required – instead, on the processRequest method was implemented for each servlet to handle requests in the custom style. Having a drop-and-go architecture provides usability for developers to quickly develop plugins and add them to the web server without any reboot needed.

2015 NBA Playoff Tracker for the Chicago Bulls

The Playoff Tracker is an application that allows the user to follow the Chicago Bull's NBA playoff run, keeping track of opponents, scores, and upcoming games.

API Design

F1 – Retrieving a list of opponents

Method: GET
URI: /PlayoffTracker/OpponentList/opponentList.html
Request Body:
<none>
Response Body:

{
"code": 200,
"message": "Ok",
"payload":
[

```
<!DOCTYPE html>
<html>
<head>
</head>
<body>
<h2>2015 Playoff Opponent List</h2>
<br>
<table class="customTable">
<thead>
<tr>
<th>Round</th>
<th>Team</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td id="r1">Evil Gobblins</td>
</tr>
<tr class=even>
<td>2</td>
<td id="r2"></td>
</tr>
<tr>
<td>3</td>
<td id="r3"></td>
</tr>
<tr class=even>
<td>4</td>
<td id="r4"></td>
</tr>
</tbody>
</table>
</body>
</html>
```

]
}

Development Status: DONE

F2 – Retrieving a series results

Method: GET

URI: /PlayoffTracker/RetrieveSeries/r1.html

Request Body:

<none>

Response Body:

```
{
    "code": 200,
    "message": "Ok",
    "payload":
    [
        <!DOCTYPE html>
        <html>
        <head>
        <body>
        <h1>Series Schedule </h1>
        <h2>Opponent: Evil Gobblins</h2>
        <table class='table'>
        <thead>
        <tr>
        <th>Game</th>
        <th>Date</th>
        <th>Location</th>
        <th>Result</th>
        <th>Score</th>
        <th id="remove" style="display:none">Remove</th>
        </tr>
        </thead>
        <tbody>
        <tr id="game1">
        <td>1</td>
        <td>5/1</td>
        <td>Home</td>
        <td name="result">W
        <select id="wL1" style="display:none">
        <option value=""></option>
        <option value="W">W</option>
        <option value="L">L</option>
        </select>
        </td>
        <td name="score">100-96
        <input id="score1" type="text" style="display:none">
        </td>
        <td value="game1" id="deleteButton1" style="display:none">
        <button class="btn btn-primary btn-sm sharp">
        <span class="glyphicon glyphicon-remove"></span>
        </button>
        </td>
        </tr>
        <tr id="game2">
        …
    ]
}
```

Development Status: DONE

F3 – Creating a series schedule

Method: POST

URI: /PlayoffTracker/CreateSeries/r1.html

Request Body:

{

opponent=Evil Gobblins
date=5/1
location=Home
date=5/3
location=Home
date=5/5
location=Away
date=5/7
location=Away
…

}

Response Body:

{

“code”: 200,
“message”: “OK”,
“payload”:
[

```
<!DOCTYPE html>
<html>
<head>
<body>
<h1>Series Schedule </h1>
<h2>Opponent: Evil Gobblins</h2>
<table class='table'>
<thead>
<tr>
<th>Game</th>
<th>Date</th>
<th>Location</th>
<th>Result</th>
<th>Score</th>
<th id="remove" style="display:none">Remove</th>
</tr>
</thead>
<tbody>
<tr id="game1">
<td>1</td>
<td>5/1</td>
<td>Home</td>
<td name="result">
<select id="wL1" style="display:none">
<option value=""></option>
<option value="W">W</option>
<option value="L">L</option>
</select>
</td>
<td name="score">
<input id="score1" type="text" style="display:none">
</td>
<td value="game1" id="deleteButton1" style="display:none">
<button class="btn btn-primary btn-sm sharp">
<span class="glyphicon glyphicon-remove"></span>
</button>
</td>
</tr>
```

```
                    <tr id="game2">
                    <td>2</td>
                    <td>5/3</td>
                    <td>Home</td>
                    <td name="result">
                    ...
            ]
    }
```

Development Status: DONE

F4 – Editing a series schedule

Method: PUT
URI: /PlayoffTracker/UpdateSeries/r1.html
Request Body:

{
wL=W
score=100-96
wL=
score=
…
}

Response Body:

{
“code”: 200,
“message”: “Ok”,
“payload”:
[

```
<!DOCTYPE html>
<html>
<head>
<body>
<h1>Series Schedule </h1>
<h2>Opponent: Evil Gobblins</h2>
<table class='table'>
<thead>
<tr>
<th>Game</th>
<th>Date</th>
<th>Location</th>
<th>Result</th>
<th>Score</th>
<th id="remove" style="display:none">Remove</th>
</tr>
</thead>
<tbody>
<tr id="game1">
<td>1</td>
<td>5/1</td>
<td>Home</td>
<td name="result">W
<select id="wL1" style="display:none">
<option value=""></option>
<option value="W">W</option>
<option value="L">L</option>
</select>
</td>
<td name="score">100-96
<input id="score1" type="text" style="display:none">
</td>
<td value="game1" id="deleteButton1" style="display:none">
<button class="btn btn-primary btn-sm sharp">
<span class="glyphicon glyphicon-remove"></span>
</button>
</td>
</tr>
<tr id="game2">
…
```

]
}

Development Status: DONE

F5 – Deleting a game from the series schedule

Method: DELETE

URI: /PlayoffTracker/DeleteGames/r1.html

Request Body:

```
{
    Id=”game7”
}
```

Response Body:

```
{
    “code”: 200,
    “message”: “Ok”,
    “payload”:
    [
        <!DOCTYPE html>
        <html>
        <head>
        <body>
        <h1>Series Schedule </h1>
        <h2>Opponent: Evil Gobblins</h2>
        <table class='table'>
        <thead>
        <tr>
        <th>Game</th>
        <th>Date</th>
        <th>Location</th>
        <th>Result</th>
        <th>Score</th>
        <th id="remove" style="display:none">Remove</th>
        </tr>
        </thead>
        <tbody>
        <tr id="game1">
        <td>1</td>
        <td>5/1</td>
        <td>Home</td>
        <td name="result">W
        <select id="wL1" style="display:none">
        <option value=""></option>
        <option value="W">W</option>
        <option value="L">L</option>
        </select>
        </td>
        <td name="score">100-96
        <input id="score1" type="text" style="display:none">
        </td>
        <td value="game1" id="deleteButton1" style="display:none">
        <button class="btn btn-primary btn-sm sharp">
        <span class="glyphicon glyphicon-remove"></span>
        </button>
        </td>
        </tr>
        <tr id="game2">
        …
    ]
}
```

Development Status: DONE

Future Improvements

As was mentioned before, having the servlets loaded via configuration file might have been easier, especially this time around when there were changes that needed to be made to the servlets every time we changed our mind about how it should work. Another improvement is that for our put and posts, instead of having the response be in plain text, we could have returned JSON or XML and made use of one of the parsers that worked with Java. That probably would have made the building of the response much easier. As with all web applications, we could have definitely added some input validation for all the fields that the user has to enter when creating a schedule, or updating one.