ECE 448/528 – Application Software Design

HOMEWORK #2

Due date: Thursday, March 6th, 2025, 11:59 PM

1. Describe the purpose of using a Java Interface in Project 2. Provide your own answer, not from the lecture notes *(5 points)*

2. Multiple users may control the same plug via the web page. If one of them requests to switch on the plug and another one requests to switch off the plug at the same time… *(5 points)*

i) What will they see on their web pages as responses?
ii) In the end, is the plug switched on or off?
iii) What is the proper mitigation to overcome this issue?

3. Below is an HTTP request received from a browser *(10 points)* :

```
GET /~wyi3/ece448/system-setup-work-flow.html HTTP/1.1
Host: ece.iit.edu
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8
Accept-Encoding: gzip, deflate
Accept-Language: en-US,en;q=0.9
Connection: keep-alive
User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML,
like Gecko) Chrome/133.0.0.0 Safari/537.36
If-Modified-Since: Fri, 17 Jan 2025 08:42:50 GMT
If-None-Match: "48000f-2960b-62be2e54e9680"
Referer: http://ece.iit.edu/~wyi3/ece448/system-setup-work-flow.html
```

i) Identify the HTTP method, the request resource (URI), and the HTTP version of this request.
ii) What roles do `If-Modified-Since` the and `If-None-Match` headers play in HTTP communications? You may need to look this up online.
iii) If the resource is unchanged, which HTTP response code would be received from the server?

4. Consider three actions “toggle”, “on”, and “off” that one may apply to a plug. If the actions need to be delivered via messages, discuss among the three delivery guarantees – at least one, exactly once, and at most once – which may or may not cause problems and why. *(5 points)*

5. In the Project code and/or in the Lecture code, HashMap, Map, TreeMap are used. Explain their differences in your own words. *(5 points)*

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6. Modify the 'MLB Scoreboard' codes introduced in the lecture by using the model introduced in "lec08-simple" from the lecture code package, where the output will be updated and printed to the screen every 2 seconds. As proof of your application is running as expected, you should include some sample inputs that would change the scores, and record a short demonstration video with your personal explanation of the code and displaying that your program is updating every 2 seconds. Submit your code and your recorded video (upload to Canvas or link it to your OneDrive) *(20 points).*