COMP40550

Assignment: Performance Testing

Your team are doing some investigation into a new project. This project will involve building a REST API to perform CRUD operations (create, read, update, delete) & another API endpoint which will perform a CPU intensive operation. Half of the team want to use NodeJS to build the API the other half think a JVM (kotlin) Spring Boot web application would be a more appropriate technology choice.

You have been tasked with running some performance tests against proof of concept REST APIs built using both of these technology stacks.

You can build your own applications for this testing or use the ones we have provided:

- NodeJS - https://github.com/kriscfoster/PerformanceComparison/tree/master/node-express
- Kotlin - https://github.com/kriscfoster/PerformanceComparison/tree/master/kotlin-spring

These applications have endpoints to create, read, update & delete books. The book entity is extremely simple (only the book title is stored). The applications should use the same kind of persistence (postgreSQL database). There is also an endpoint which performs a CPU intensive operation.

The CPU intensive endpoint ([GET] /cpu-intensive?num={number}) performs a large amount of math calculations using a parameter provided:

```
function cpuIntensive(number) {
  let result = 0;
  for (let i=0; i<Math.pow(number, 7); i++) {
    result += Math.atan(i) * Math.tan(i);
  }

  return result;
}
```

The main thing we want to evaluate here is response time. Verify if there are any differences in response times between the two applications. You should use a load testing tool like JMeter to perform your load testing. Try to come up with a test plan which results in something of interest. For example, if you run the applications in a containerized environment, you could explore scaling the applications horizontally & see the impact this has on performance. You could also add a limit to the CPU/memory of the containers & see how this impacts performance.

This is a very open ended investigation so feel free to take it in whichever direction you'd like. The output of this investigation should be a report which describes your results does some analysis of those results.