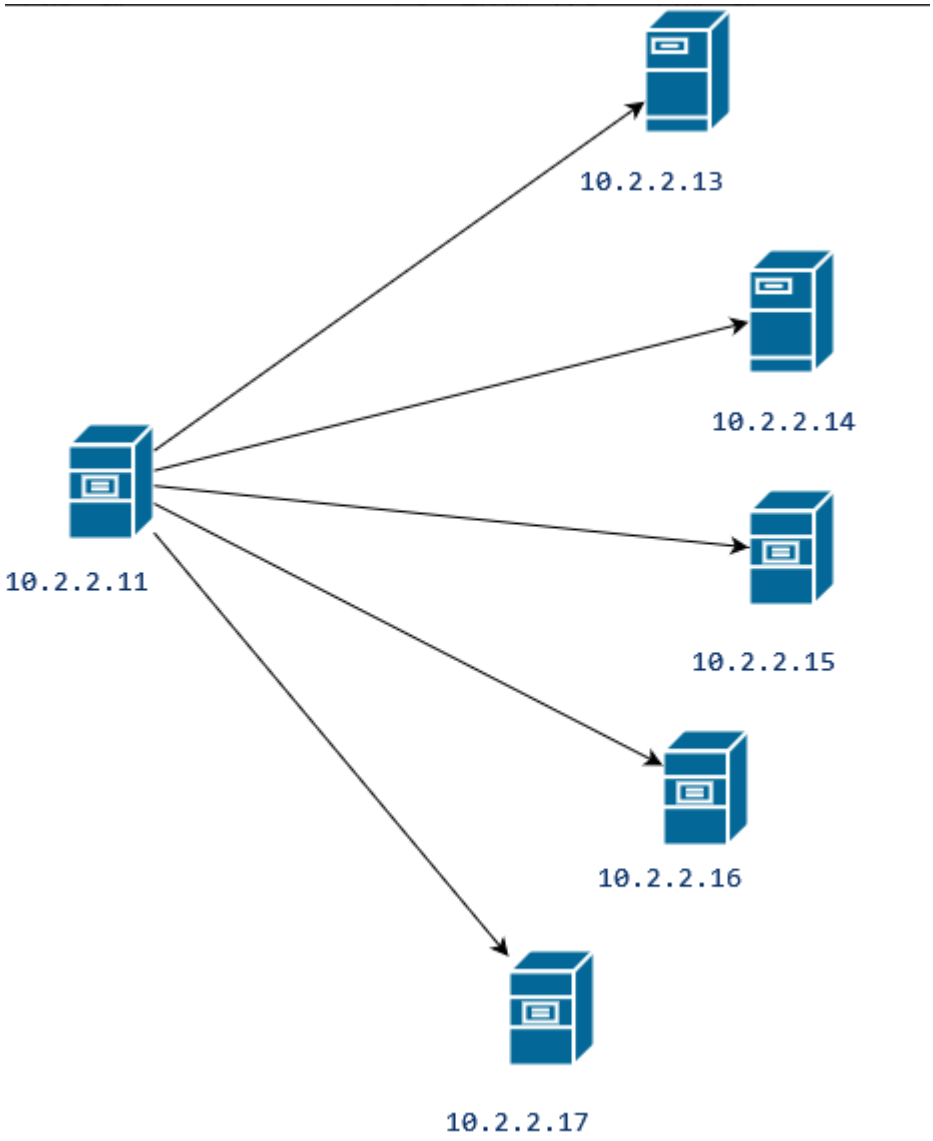
Distributed system report,.

1. System architecture.



- The server 10.2.2.11 will be the server that send queries to 5 other servers in the network.
- Servers that have IP address 10.2.2.13-17 store the same database.

2. The guideline to build and run the test for sql servers.

Node.js environment setup.

Download Node.js on Ubuntu 22.04.4 LTS:

```
#Installs nvm (node version manager)
curl -o- https://raw.githubusercontent.com/nvm-sh/nvm/v0.39.7/install.sh | bash

#Download and install node.js
nvm install 21
```

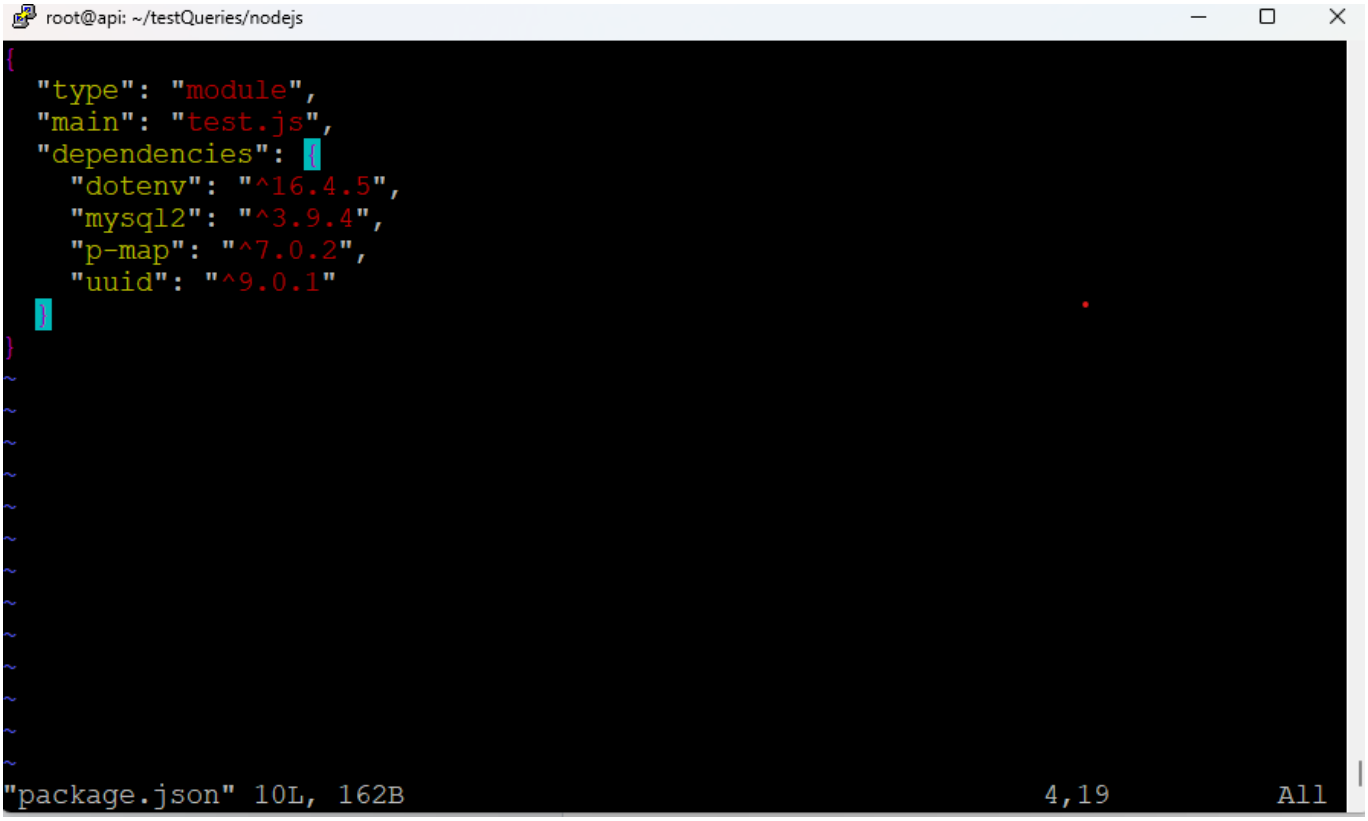
```
#verifies the right node.js version is in the environment
node -v # should print "v21.7.3"

#verifies the right npm version is in the environment
npm -v # should print "10.5.0"
```

Guideline to run script.

1. Create a folder named testQueries.

```
mkdir testqueries
cd testqueries
```

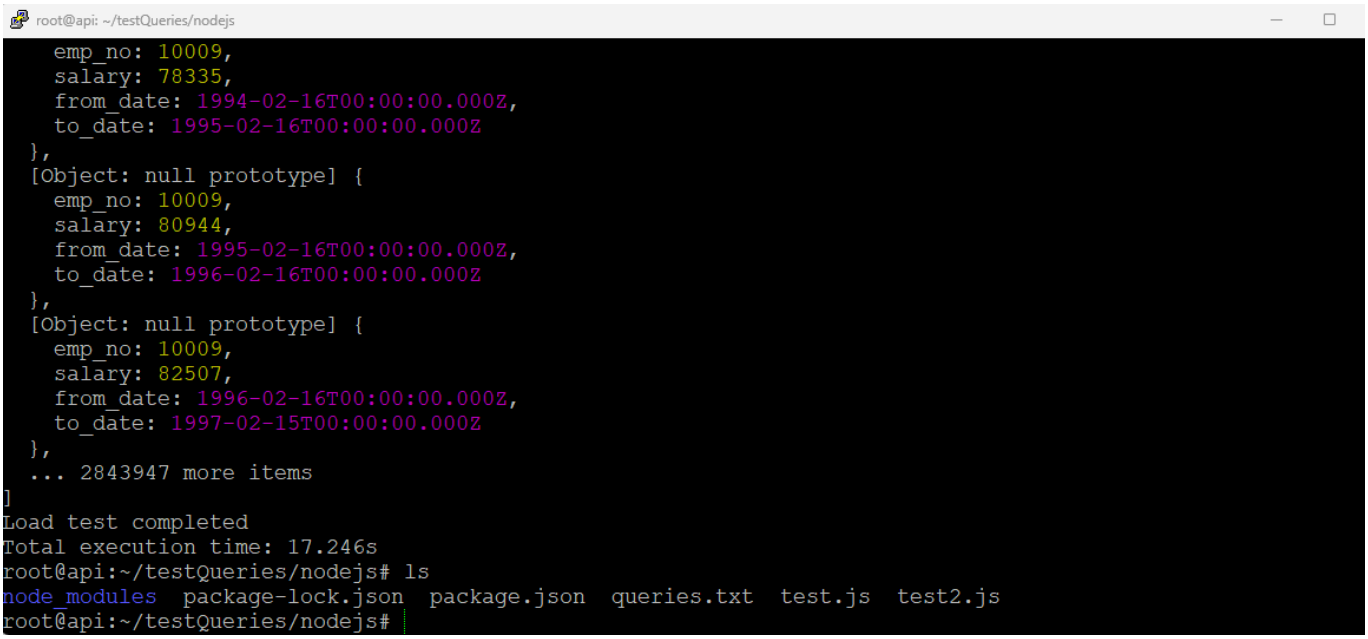
2. Clone this Github repository: .
3. Stand at the current folder run `npm i` it will install all necessary package for the project .



4. Run command `node --max-old-space-size=4096 test1.js` to test the performance of the program in multithreading way without any load-balancer.
5. Run command `node --max-old-space-size=4096 test2.js` to test the performance of the program in multithreading way with the load-balancer using Round Robin algorithm.
6. Run command `node --max-old-space-size=4096 test3.js` to test the performance of the program in multithreading way without the load-balancer using Least Connection algorithm.

3. Explain about the scripts.

- This script will run the queries in a queries.txt file concurrently and then log out how log it takes to run all the queries.



- Here I let the script run all the queries one time and there are 2 queries will be started at the same time

```
async function loadTest(queries) {
    const queriesArray = new Array(1).fill(queries).flat(); // Flatten the array
    await pMap(queriesArray, query => executeQuery(query), { concurrency: 2 }); //
Reduce concurrency
    console.log('Load test completed');
}
```

- Here is the queries in the queries.txt file:

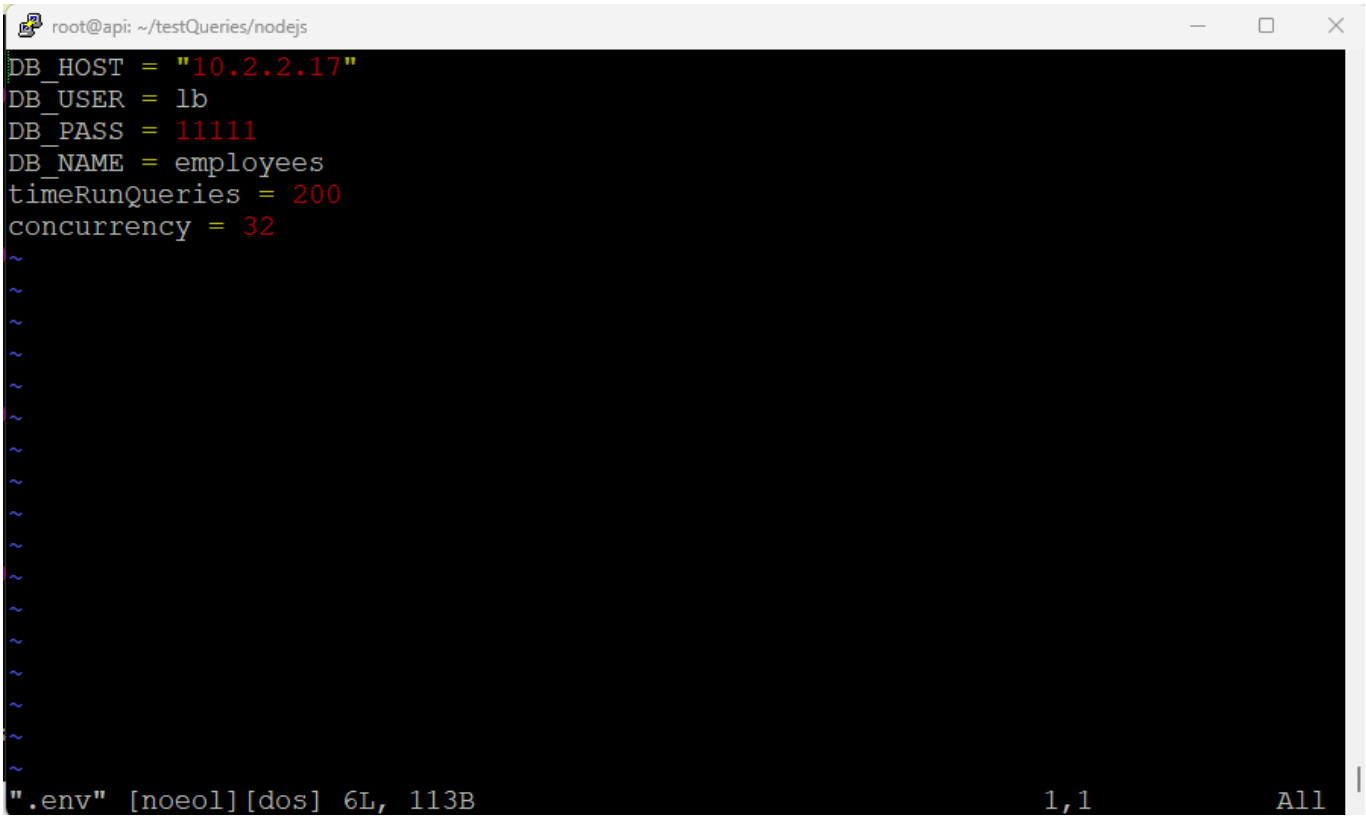
```
-- Query 1: Get all employees with their department numbers from the
current_dept_emp table
SELECT emp_no, dept_no FROM current_dept_emp;
```

- The function that implement load balancer, the mechanic here is that the function will return the pool that has the least connections:

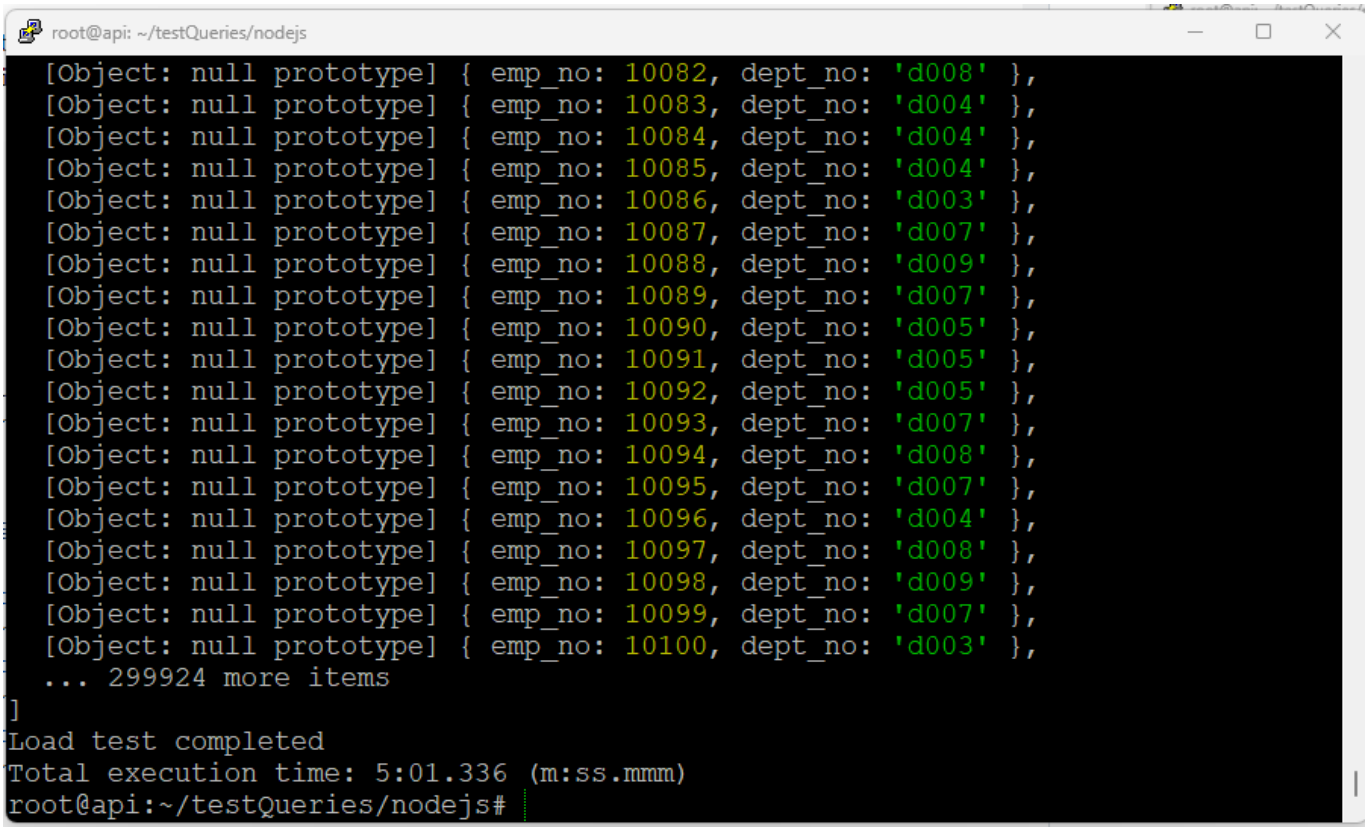
```
function getLeastConnectionPool() {
    // Sort the pools by the number of active connections and select the one with
the least connections
    return pools.sort((a, b) => a.activeConnections - b.activeConnections)[0];
}
```

4. The scenario.

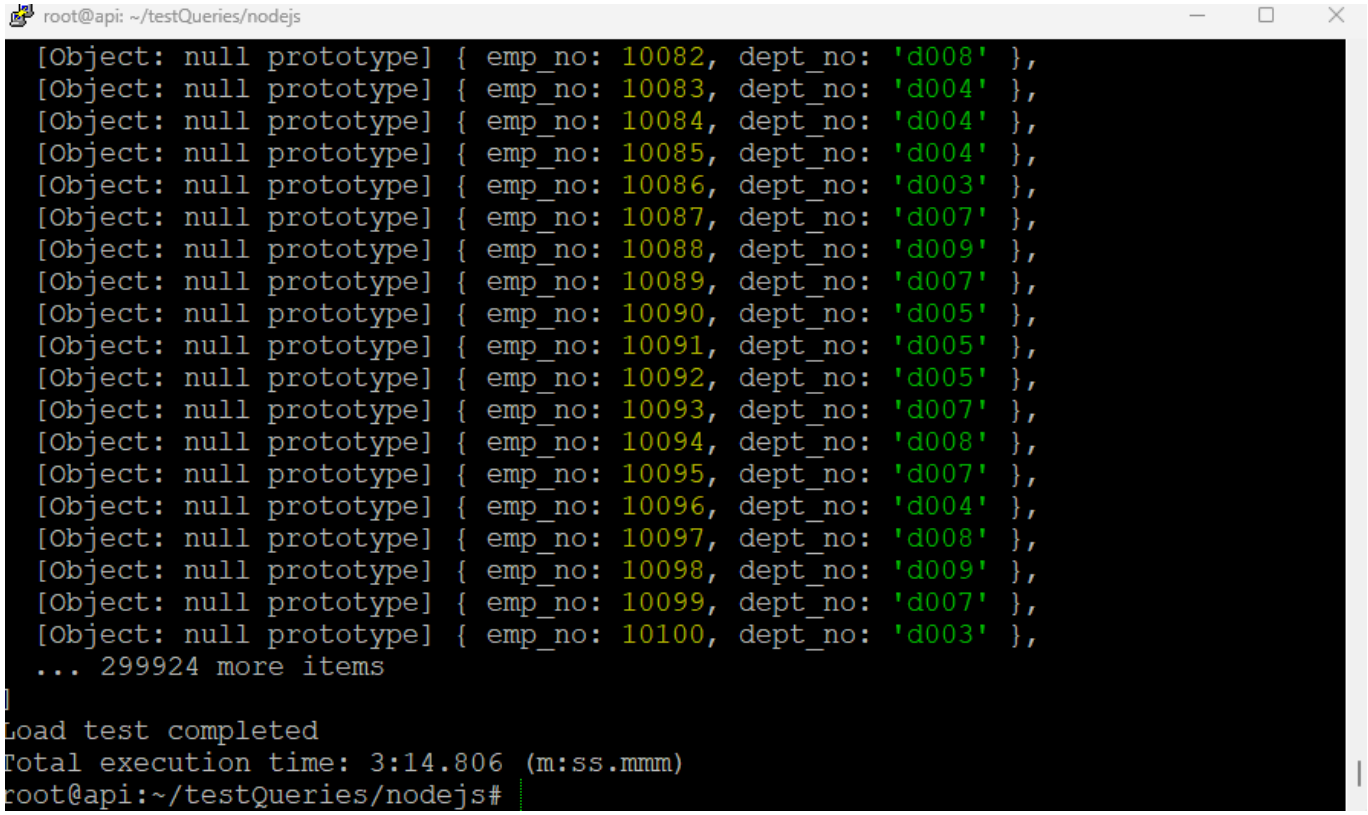
All the scripts will run the queries in the queries.txt file 200 times and they can excecute 32 queries at the same time.



- Run script test1.js will have the result as following:



- Run script test2.js will have the result as following:



==> The result show that the time it do the same amount of queries.