

# Report for Programming Assignment

## System Design

```
msahitya14@dhcp-10-8-036-214 cs-253p-hw-hampr-machine-service % npm test

PASS  test/simulation.test.ts
  ● Console

    console.log
    

| (index) | Resource                 | Run 1 Units | Run 1 % | Run 2 Units | Run 2 % | Run 3 Units | Run 3 % | Run 4 Units | Run 4 % |
|---------|--------------------------|-------------|---------|-------------|---------|-------------|---------|-------------|---------|
| 0       | 'IdentityProviderClient' | 3840256     | '69.47% | 3840256     | '69.47% | 3840256     | '69.09% | 3840256     | '69.44% |
| 1       | 'SmartMachineClient'     | 32256       | '0.58%  | 32256       | '0.58%  | 32256       | '0.58%  | 32256       | '0.58%  |
| 2       | 'MachineStateTable'      | 1635200     | '29.58% | 1635200     | '29.58% | 1635200     | '29.42% | 1635200     | '29.57% |
| 3       | 'DataCache'              | 22216       | '0.40%  | 22216       | '0.40%  | 22216       | '0.40%  | 22216       | '0.40%  |



    at Object.<anonymous> (test/simulation.test.ts:160:13)

    console.log
    

| (index) | Run | Cache Hits | Cache Misses | Hit Rate |
|---------|-----|------------|--------------|----------|
| 0       | 1   | 3837       | 2101         | '64.62%  |
| 1       | 2   | 3839       | 2110         | '64.53%  |
| 2       | 3   | 3726       | 2177         | '63.12%  |
| 3       | 4   | 3829       | 2076         | '64.84%  |



    at Object.<anonymous> (test/simulation.test.ts:161:13)

    console.log
    

| (index) | Run | Cache Hits | DB Accesses | Hit/Access Ratio |
|---------|-----|------------|-------------|------------------|
| 0       | 1   | 3837       | 6671        | '0.5752'         |
| 1       | 2   | 3839       | 6671        | '0.5755'         |
| 2       | 3   | 3726       | 6671        | '0.5585'         |
| 3       | 4   | 3829       | 6671        | '0.5740'         |



    at Object.<anonymous> (test/simulation.test.ts:162:13)

PASS  test/api.test.ts

Test Suites: 2 passed, 2 total
Tests:       12 passed, 12 total
Snapshots:   0 total
Time:        0.613 s, estimated 1 s
Ran all test suites.
```

In this, it is observed that the cache is used extensively, and the hit rate is around 64% - which is good, however it can be better if data processing and managing the pipeline better. However since we don't keep everything in the cache, certain database requests are necessary.

This being a simulation, changing the values in units.ts will change these values, however I have uploaded the logs with the default configuration.

To implement the functions, I looked through the classes and their functions in

```
MachineStateTable
IdentityProviderClient
```

To get the cache methods, I looked for the cache declaration as given in the constructor of the ApiHandler:

```
this.cache = DataCache.getInstance<MachineStateDocument>();
```