

# CSE 513: Programming Assignment 1

## Replicated Key-Value Store with Two Different Consistency Models

Chandan Akiti, Parth Natu  
Department of Computer Science  
{chandan.reddy, pzn5087}@psu.edu

### 1 Introduction

Linearizability and Causal Consistency are two memory consistency models of different strictness and performance. This project aims to implement both of these and compare their performance metrics and correctness. The Linearizability model is constructed using the ABD algorithm and the Causal Consistency model is constructed using the algorithm proposed by Ahmad et. al.

### 2 Implementation

Linearizability(ABD) and Causal Consistency(Ahmad's) are implemented in *client.cpp* and *server.cpp*.

Logs are generated in the *logs* folder after running the clients. The knossos conversion of our logs are available in the *knossos\_outputs* folder.

The project run instructions are detailed in *README.md* file in the project folder.

### 3 Performance

**ABD with 3 clients** Average latency in *milli seconds* for **3 clients** as shown in the table below.

r/w ratio	read lat	write lat	avg lat
0.50	3.447	7.244	5.979
2.00	4.372	4.797	4.514
all reads	6.038	NaN	6.038

**ABD with 5 clients** Average latency in *milli seconds* for **5 clients** as shown in the table below.

r/w ratio	read lat	write lat	avg lat
0.25	15.435	31.475	28.267
1.25	18.416	22.259	19.953
4.00	22.896	18.907	22.098

**CM with 3 clients** Average latency in *milli seconds* for **3 clients** as shown in the table below.

r/w ratio	read lat	write lat	avg lat
0.50	5.240	4.222	4.561
2.00	4.848	4.951	4.882
all reads	4.600	NaN	4.600

**CM with 5 clients** Average latency in *milli seconds* for **5 clients** as shown in the table below.

r/w ratio	read lat	write lat	avg lat
0.25	7.614	7.097	7.201
1.25	7.907	8.537	8.159
4.00	8.052	8.409	8.124

### 4 Correctness

**Knossos correctness** : for ABD algorithm with 3 clients is True.

```
night@CHAWLA:~/knossos (master)$ lein run compiled.edn
compiled.edn true
```

### 5 Conclusion

The latencies are expected to be lower for **CM** algorithm as the message complexity for *put* and *get* calls is smaller for **CM**. We observe this behavior in our latencies.