An Efficient Cloud Based Approach for Decentralized DNS System

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Problem Statement

We propose a solution which is cloud based and decentralized. This advantages of cloud based approach with services like(e.g AWS) include

- **Resource Pooling and Elasticity**
- **On-Demand & Self Services**
- **QoS (Quality of Service)**

The Cloud Service could be private entities or large TLD (Top Level Domain) companies.

Approach

Pruning Algorithm

The list of Trusted Entities are listed in a tree structure. We employ the **Alpha-Beta Pruning** which is adversarial graph search algorithm to identify the nearest and best trusted entity for the user.

Need for Alpha-Beta Pruning

- Faster record fetching for the local DNS servers.
- Minimizes the latency and erases the need of finding a best match trusted server.

The algorithm takes into account the following:

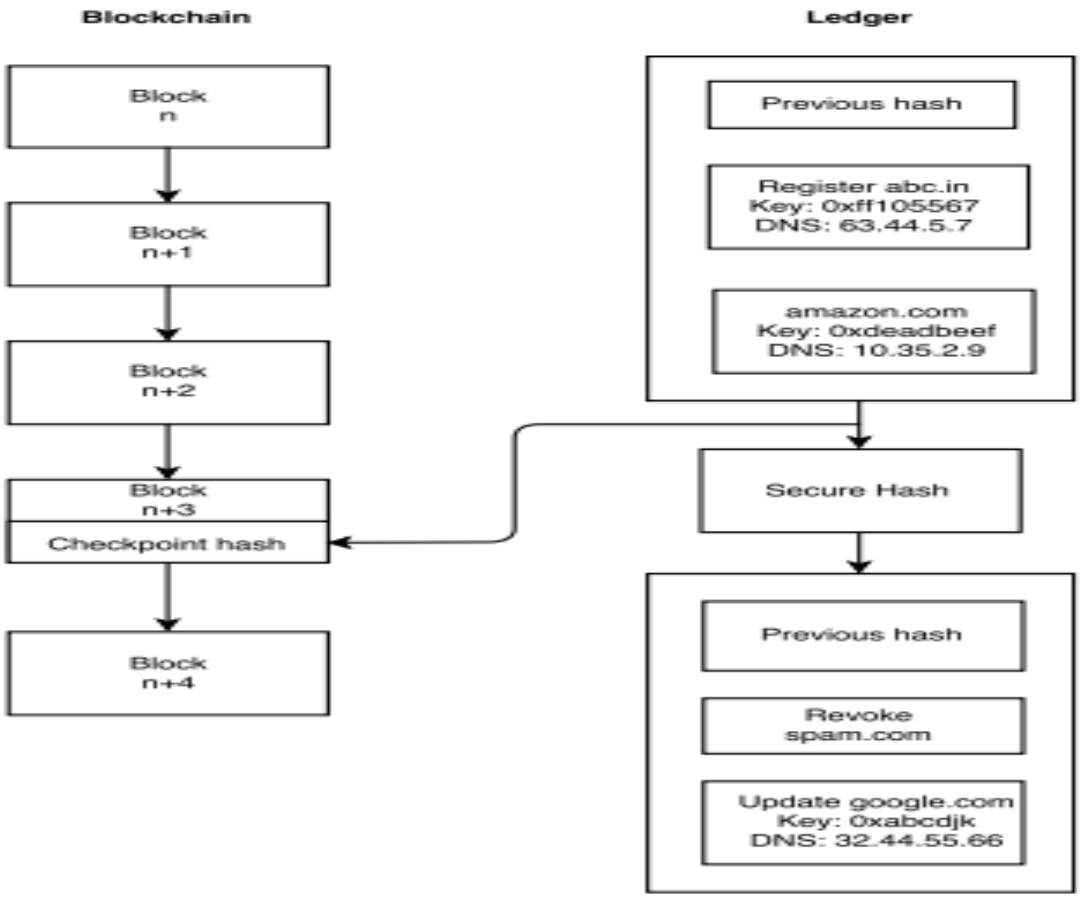
- Geographic Location
- Latency

The pseudo-code for the above Algorithm is shown below:

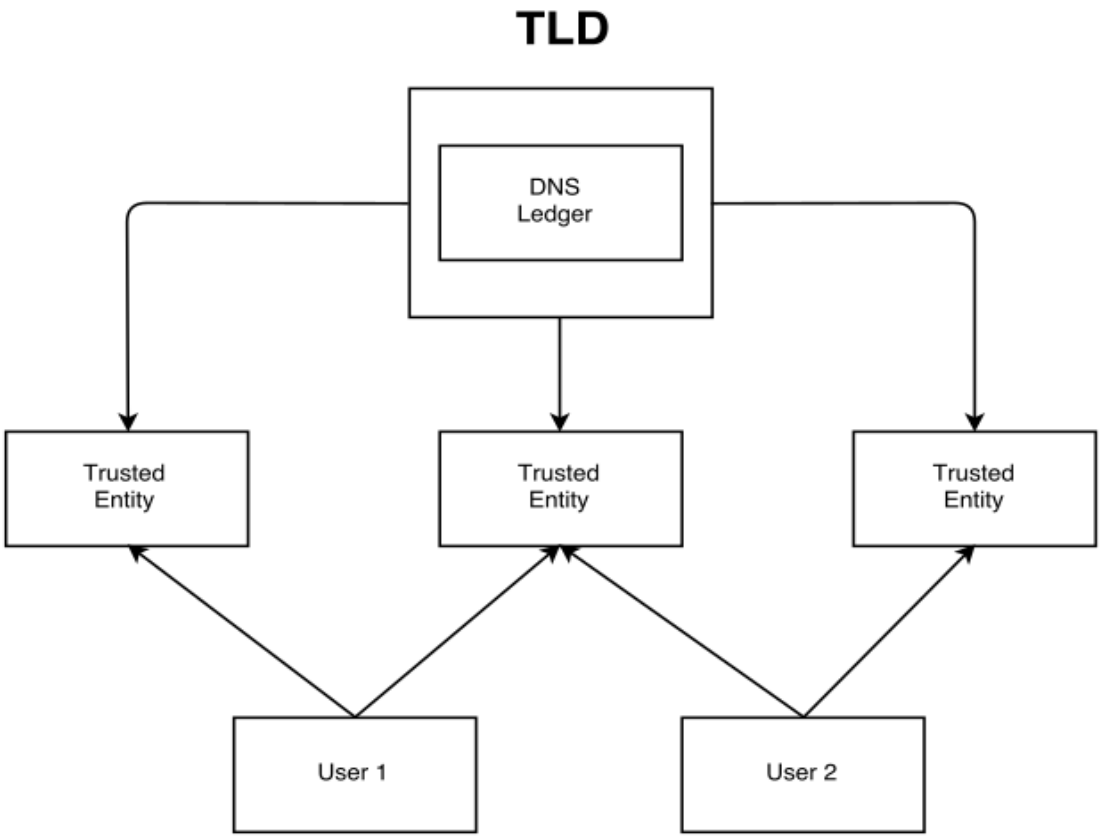
```
function BestDataCenter(listOfDataCenters) returns the best data center
state inputs:
requestTime , responseTime , serviceTime
for each dataCenter in ListOfDataCentres do
        if len of ClosestDataCenter[] > 1:
            Find bestResponseTime()
        else Find Lowest Latency()
end
return mostSuitableDataCenter
```

Approach (cont'd)

DNS BlockChain with Ledger



System Architecture



Implementation

We used the following tools and languages to implement the following:

Blockchain Ledger & Best DC Algorithm

- Python

Cloud Simulation

- CloudSim & CloudAnalyst (Java)

Achieved Results

BlockChain (Adding records)

```
File  Edit  View  Search  Terminal  Help
sin9yt@l0n3w0lf:~/Documents/Project/blockchain$ ./blockchain
Select the Operation you want to perform
1.Register domain
2.Update Record
3.Revoke Record
1
Enter the data in the following format
[1]Domain Name
[2]Key
[3]DNS Records(IP)
pesitbsc.com
0xab4893hah
162.34.5.1
Operation Succesful.
Domain Registered!
sin9yt@l0n3w0lf:~/Documents/Project/blockchain$
```

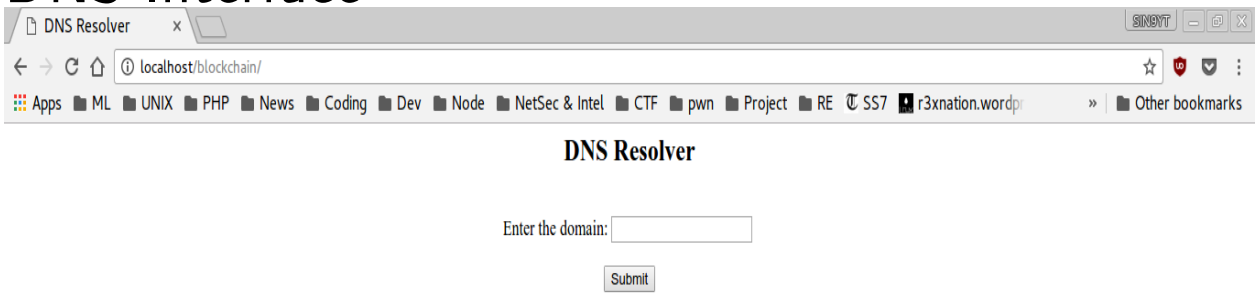
Achieved Results

Ledger

```
File  Edit  View  Search  Terminal  Help

height...... 5
magic....... d5e8a97f
version..... 1
timestamp... 1488902864 (16:07:44 03/07/2017)
prevhash.... 38c975134ce342440d4e29afc76925544b6d9ebcdcb287775fbfc51622021bde
blockhash... 7a04aaeb56ec45aa04f7cc85c35db4cf117a3607fb59373c271712275a915bae
datalen..... 31
data........
                a.com
                0x1387937
                1.1.1.1

------------------------------------------------------------------------------

height...... 6
magic....... d5e8a97f
version..... 1
timestamp... 1488946192 (04:09:52 03/08/2017)
prevhash.... 7a04aaeb56ec45aa04f7cc85c35db4cf117a3607fb59373c271712275a915bae
blockhash... 241d99ed6ae14a79c70fe776bad62eeeaeed99ddd39c08083793b641ca24d2e1
datalen..... 43
data........
                pesitbsc.com
                0xab4893hah
                162.34.5.1

------------------------------------------------------------------------------
```

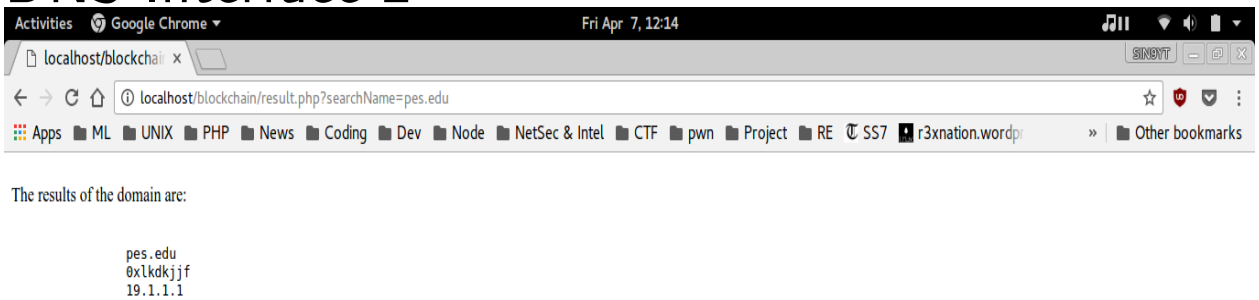
Achieved Results

DNS Interface



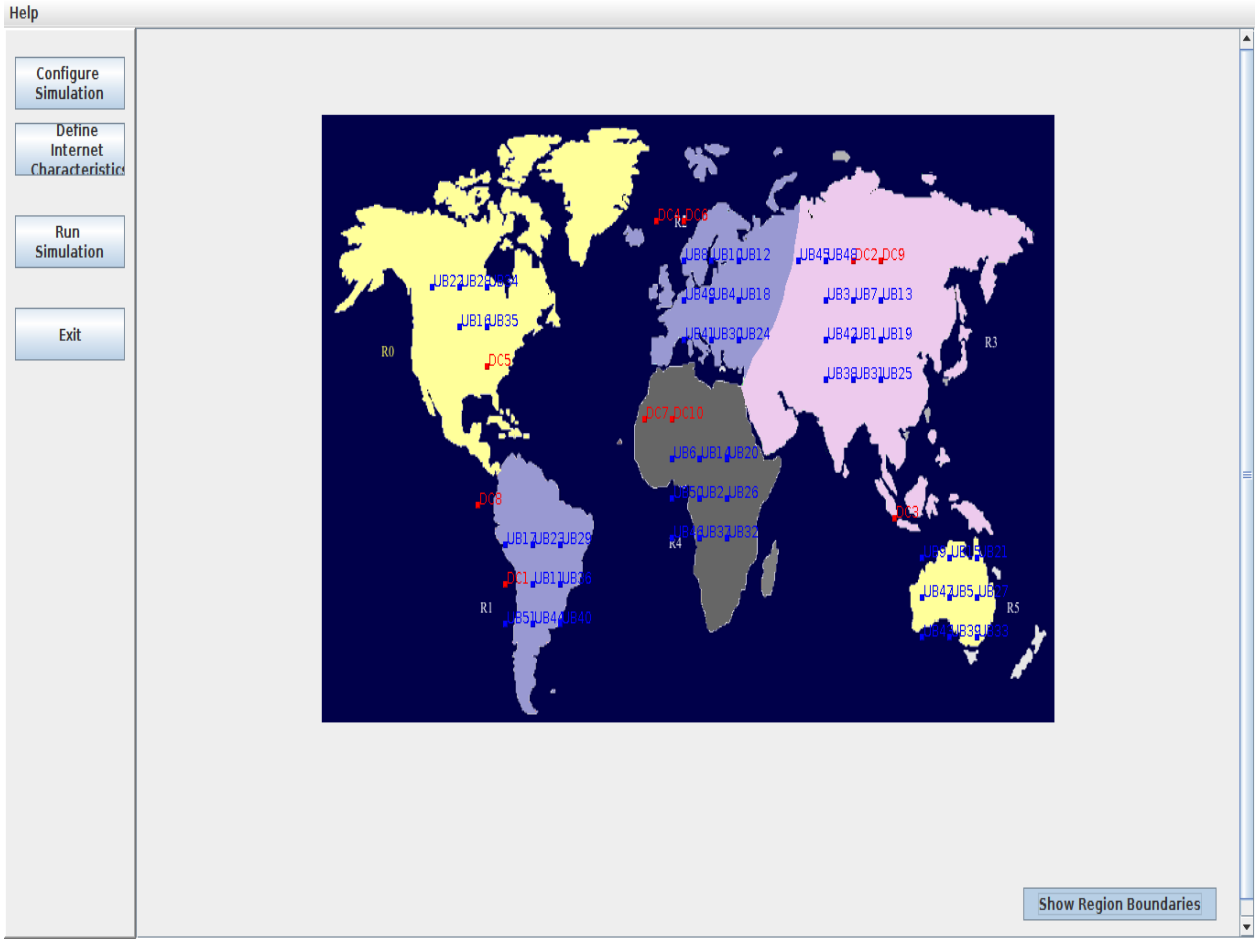
Achieved Results

DNS Interface 2



Achieved Results

Cloud Simulation



Achieved Results

Cloud Simulation Results

Achieved Results

Algorithm O/P 1

```
File  Edit  View  Search  Terminal  Help
sin9yt@l0n3w0lf:~$ ./bestDCAlgorithm
Enter the case file name: case2.sim
Enter the no. of users: 51
The best datacenter for UB 1 is  DC 9
The best datacenter for UB 2 is  DC 7
The best datacenter for UB 3 is  DC 9
The best datacenter for UB 4 is  DC 6
The best datacenter for UB 5 is  DC 3
The best datacenter for UB 6 is  DC 7
The best datacenter for UB 7 is  DC 9
The best datacenter for UB 8 is  DC 6
The best datacenter for UB 9 is  DC 3
The best datacenter for UB 10 is  DC 6
The best datacenter for UB 11 is  DC 1
The best datacenter for UB 12 is  DC 6
The best datacenter for UB 13 is  DC 9
The best datacenter for UB 14 is  DC 7
The best datacenter for UB 15 is  DC 3
The best datacenter for UB 16 is  DC 5
The best datacenter for UB 17 is  DC 1
The best datacenter for UB 18 is  DC 6
The best datacenter for UB 19 is  DC 9
The best datacenter for UB 20 is  DC 7
The best datacenter for UB 21 is  DC 3
```

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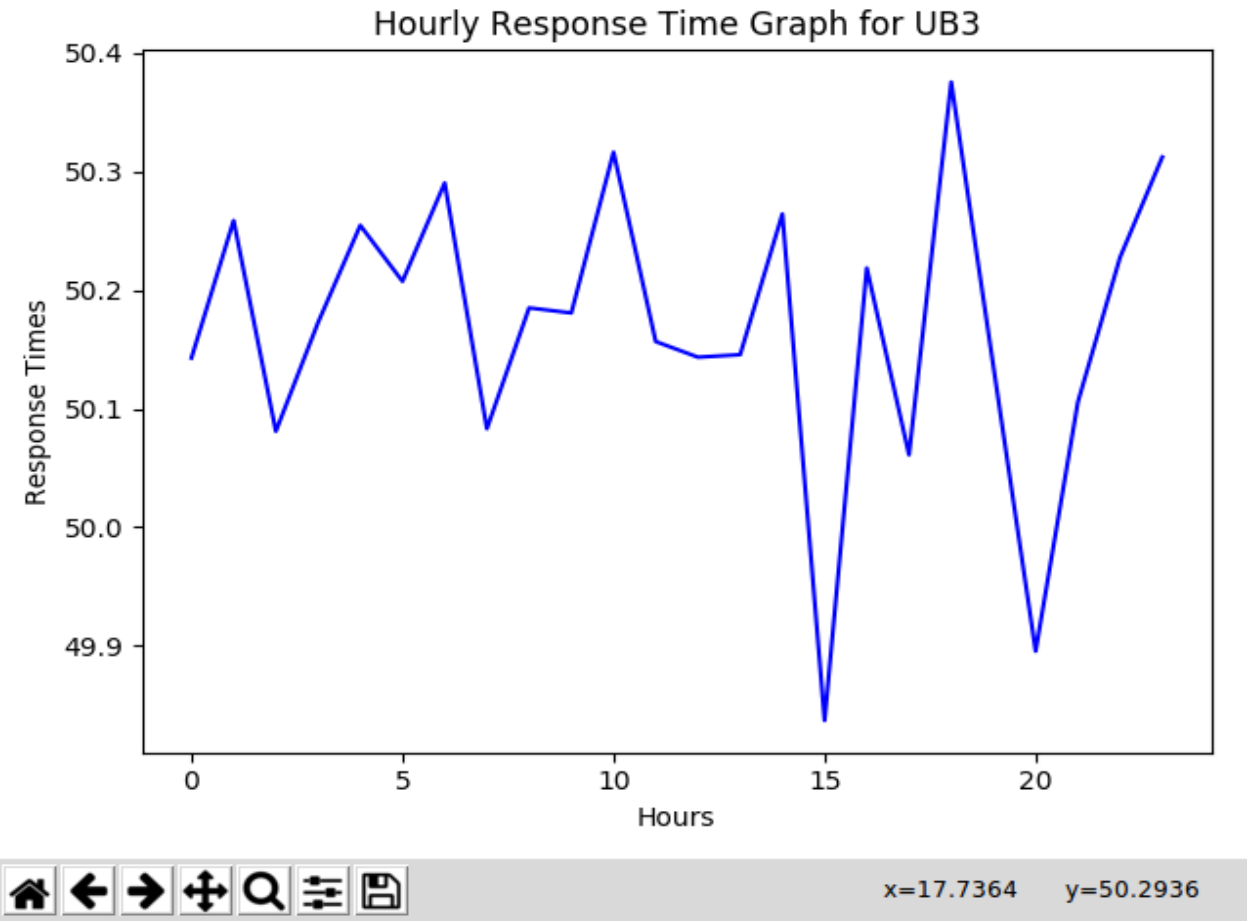
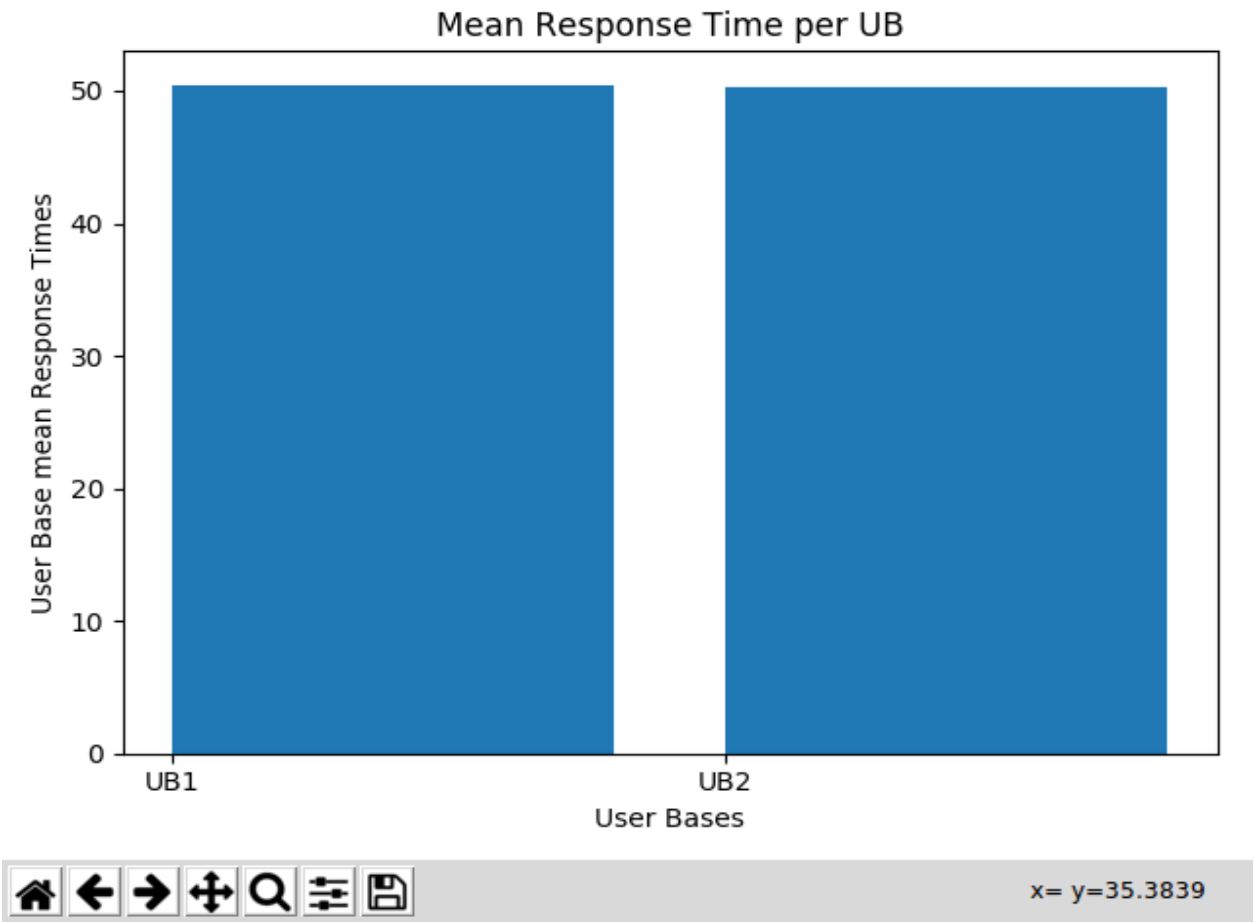
Achieved Results

Algorithm O/P Graph 1



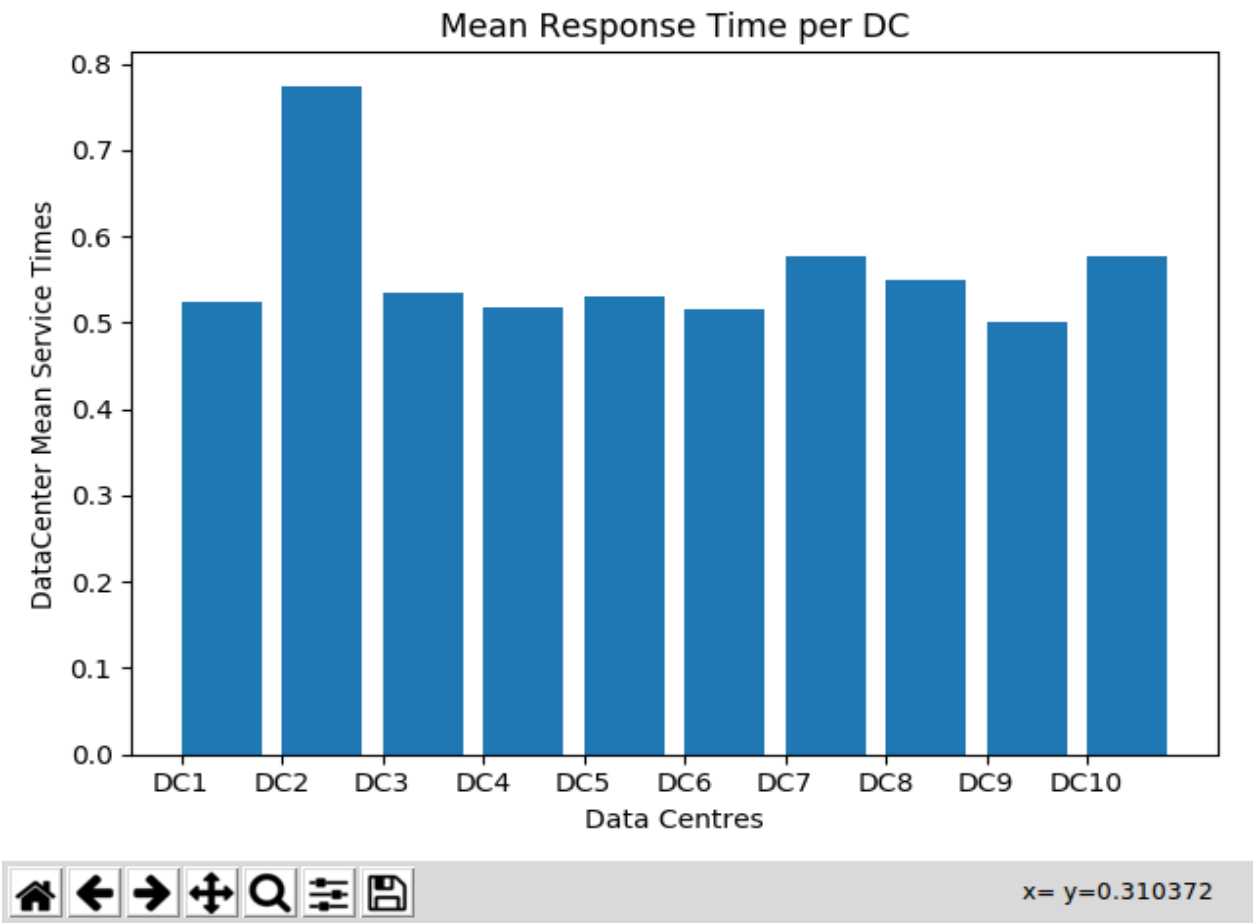
Achieved Results

Graph 2



Achieved Results

Graph 3



Conclusion

The main contribution in our project is to solve the problem of centralized DNS system using cloud based infrastructure.

Bibiliography

- **Francesca Musiani**,A Decentralized Domain Name System? User-Controlled Infrastructure as Alternative Internet Governance,MA:The MIT Press.
- **Harry Kalodner, Miles Carlsten, Paul Ellenbogen, Joseph Bonneau, Arvind Narayanan**,An empirical study of Namecoin and lessons for decentralized namespace design, Princeton University.
- **Aaron Wright,Primavera De Filippi**,Decentralized blockchain technology and the rise of lex cryptographia, intGovt Forum.

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