Project 3 - Chord Peer to Peer System

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Problem Statement: -

The problem statement requires the design and implementation of the Chord protocol in F# using the AKKA actor framework. Network join and routing is to be implemented as described in the paper reference.

Running the Code: -

dotnet fsi --langversion:preview project.fsx numNodes numrequests

Where:

numNodes is the number of nodes that are present in the chord peer to peer system and numRequests represents the number of requests each peer makes.

What is working: -

The chord protocol with a distributed hash table has been implemented in F# using the actor model. Keys are placed at the nearest successor node of their hashed value. Whenever nodes enter or leave the network, finger tables and predecessors, successors are recomputed. Finger tables allow logarithmic lookup of keys. We look at the key ID, compare it with the finger table and forward the request to the highest node (that we are aware of - present in the finger table) that has an ID that is less than the resource key. All the functions described in the paper such as createChord(), stabilize() [to ensure that node points to the right predecessor], notify, and updateFingerTable() have been implemented. Requests are passed until number of requests is equal to the specified number in the command line.

Largest Network dealt with: -

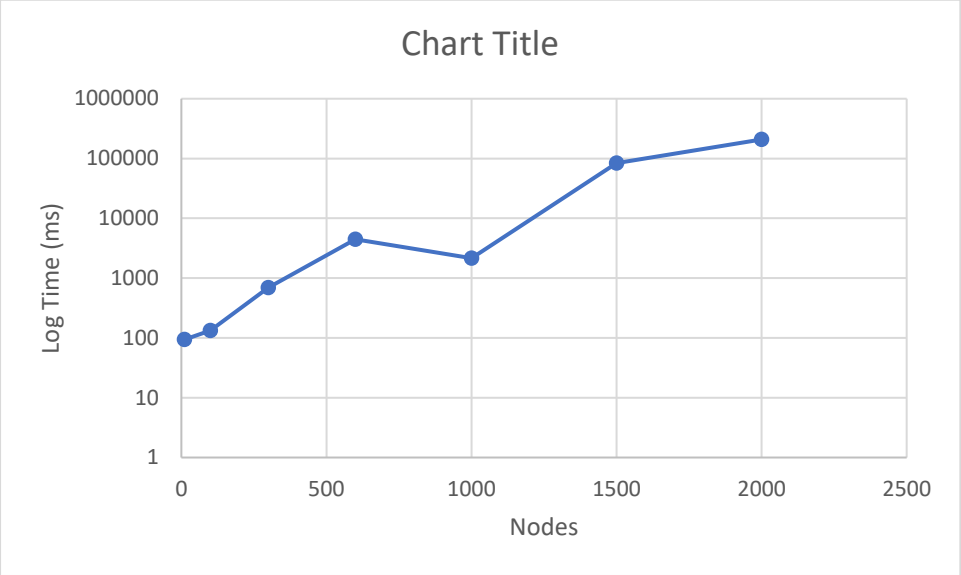
Largest Number of nodes tested: 2047

Largest Number of Requests: 100

Average Hops: 4.998534

Running Time: 193974.74 ms

Number of nodes with respect to log of time:



nodes	times	finger table	hops	time
10	5	4	1.24	93.618
100	5	7	2.86	132.97
300	5	9	3.78	691.031
600	5	10	4.343	4470.48
1000	5	10	4.565	2149.008
1500	5	11	4.931	84027.55
2000	5	11	5.066	207989.3

```
PS C:\Users\ksrik\Desktop\DOSP\Project\Project3\Project_3_Trials> dotnet fsi --langversion:preview Trial6.fsx 10 5

Requests To be Checked: 5

Finger Table contains 4 tupeles.

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Hop average: 1.240000

Time taken time is: 93.618200 ms


PS C:\Users\ksrik\Desktop\DOSP\Project\Project3\Project_3_Trials> dotnet fsi --langversion:preview Trial6.fsx 100 5

Requests To be Checked: 5

Finger Table contains 7 tupeles.

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Hop average: 2.868000
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Time taken time is: 132.970300 ms


PS C:\Users\ksrik\Desktop\DOSP\Project\Project3\Project_3_Trials> dotnet fsi --langversion:preview Trial6.fsx
300 5

Requests To be Checked: 5

Finger Table contains 9 tupeles.

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Hop average: 3.780667

Time taken time is: 691.031900 ms


PS C:\Users\ksrik\Desktop\DOSP\Project\Project3\Project_3_Trials> dotnet fsi --langversion:preview Trial6.fsx
600 5

Requests To be Checked: 5

Finger Table contains 10 tupeles.

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Hop average: 4.343000

Time taken time is: 4470.480900 ms


PS C:\Users\ksrik\Desktop\DOSP\Project\Project3\Project_3_Trials> dotnet fsi --langversion:preview Trial6.fsx
1000 5

Requests To be Checked: 5

Finger Table contains 10 tupeles.

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Hop average: 4.565000

Time taken time is: 21497.008800 ms


PS C:\Users\ksrik\Desktop\DOSP\Project\Project3\Project_3_Trials> dotnet fsi --langversion:preview Trial6.fsx
1500 5

Nodes To Be Checked: 1500

Requests To be Checked: 5

Finger Table contains 11 tupeles.

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Hop average: 4.931200

Time taken time is: 84027.551700 ms
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```
PS C:\Users\ksrik\Desktop\DOSP\Project\Project3\Project_3_Trials> dotnet fsi --langversion:preview Trial6.fsx 2000 5

Nodes To Be Checked: 2000

Requests To be Checked: 5

Finger Table contains 11 tupeles.

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Hop average: 5.066300

Time taken time is: 207989.322400 ms
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