Simple Chord Ring Implementation in Python

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Introduction

Node

A node is a chord in the ring. every node starts a Websocket server (connection information will be saved in an AccessInfo Object), by which one can connect to the node and execute commands (Eg. ask the node to locate a specific key in the ring) on it

AccessInfo

contain information such as address, port, and id of a node using access info, we can connect to a node and execute commands (Eg: locate a key)

Network

network.py is a mini terminal that provides basic utility to connect to and run commands on the nodes of a ring

Network test

network_test.py start an automated test, to quickly test the ring network and node functionality

test structure

in this test, we will create a ring of 4 nodes

These are the nodes

Node	address	port	ID	chord
node 1	localhost	1212	1	N/A
node 2	localhost	4545	4	1
node 3	localhost	6565	13	1
node 4	localhost	7878	20	1

*chord indication the node id, the given node will use to connect to the ring

first we define AccessInfo objects for each of the above nodes and the run the nodes

Test Criteria

1. Position of each node in the ring
2. Finger Table of each node
3. Storage location (node) of a given key

Position of each node in the ring

according to the nodes table and their ids:

node id	next node in the ring(id)	previous node in the ring
1	4	20
4	13	1
13	4	20
20	13	1

the first part of network test will assert the correctness of the ring according to the above table

Finger Table Of each node

according to the nodes table, this is how the finger tables should be

node id	finger table
1	4, 4, 13, 13, 20
4	13, 13, 13, 13, 20
13	20, 20, 20, 1, 1
20	1, 1, 1, 1, 4

the second part of network_test.py will assert the correctness of finger tables according the above table

Storage location (node) of a given key

key to locate	node id that initiates the key location	location of the key
3	1	4
13	20	13
26	4	1
39	13	13

the third part of the network_test.py asserts the correctness of key locations

how run

this project is created and tested with python 3.8.2 first, install the requirements by running the following command

`pip install -r requirements.text`

```
python network_test.py
```

if the last output of network_test.py is: "[NETWORK TEST] ALL TESTS PASSED" it means that the system is working correctly