

CECS 327
Assignment 9
Total: 30 Points

General Instruction

- Submit your work in the Dropbox folder via BeachBoard (Not email or in class).
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1. (5 points) Fill out the following `google sheet`.

- **Due by the Lab session (4/16 for S3, 4/17 for S5)**
- Click here to visit the `google sheet`
- Find your CSULB ID.
- Note your Pastry ID.
- A Pastry ID (node ID) is a quaternary number, i.e., base-4 numeral system.
- Write down your AWS IPv4 address into the `google sheet`.

2. (25 points) Implement a Pastry routing server in Java on your AWS server.

- Read the section 10.5.1 carefully.
- Use the Pastry IDs and IP addresses of the `google sheet`.
- Build your own **leaf set** table as shown in Table 1.

Table 1: Pastry leaf set ($l = 2$) for Pastry ID: 1230. Each cell contains ID:IP.

SMALLER		LARGER	
1220:x.x.x.x	1223:x.x.x.x	1232:x.x.x.x	1300:x.x.x.x

- Build your own **routing** table as shown in Table 2.

Table 2: Pastry routing table for Pastry ID: 1230. Each cell contains ID:IP.

0-132:x.x.x.x	1-230:y.y.y.y	2-012:x.x.x.x	3-320:x.x.x.x
10-31:x.x.x.x	11-23:x.x.x.x	12-30:y.y.y.y	13-10:x.x.x.x
120-3:x.x.x.x	121-1:x.x.x.x	122-0:x.x.x.x	123-0:y.y.y.y
1230:y.y.y.y	1231:NULL	1232:x.x.x.x	1233:NULL

1. y.y.y.y is the IP address of Pastry ID: 1230.
 2. For the first, second, and third row, choose a node randomly. For instance, the **prefix 11**, select one of nodes whose ID has the **common prefix 11**. It can be one of 1100, 1101, 1102, ..., and 1133.
- Open inbound UDP port 32710 on the AWS server console.

- Refer Figure 4.3 and Figure 4.4 of the text book and the assignment 5.
- The program specification.
 1. It should use `Map` data structures to store Table 1 and Table 2.
 2. It should use `UDP datagram` (port 32710) **NOT** `TCP stream`.
 3. It should **reply** the (Node ID):(IP address) of a **request** Pastry ID.
 4. It should be able to handle request messages with white spaces. For instance, '1230 ', ' 123 ', ' 12', ... are all valid ones.
 5. It should replay 'INVALID REQUEST' when it receives request messages other than quaternary number whose length is less than or equal to 4.
 6. Request - Reply examples

```
1230 - 1230:y.y.y.y
123  - 1230:y.y.y.y
12   - 1230:y.y.y.y
1    - 1230:y.y.y.y
1231 - 1230:y.y.y.y or 1232:x.x.x.x (reply only one)
1300 - 1300:x.x.x.x (from Table 1)
122  - 1220:x.x.x.x
13   - 1310:x.x.x.x
2    - 2012:x.x.x.x
0123 - 0132:x.x.x.x
1030 - 1031:x.x.x.x
1123 - 1123:x.x.x.x
1210 - 1211:x.x.x.x
1211 - 1211:x.x.x.x
1212 - 1211:x.x.x.x
1213 - 1211:x.x.x.x
```
- Test the server program by implementing a simple `UDP` client on your local machine.
- Submit the source codes of the server and client.
- Leave your **Pastry** ID and **AWS** IP address on the comment section.
- Make sure that the server program is running on your **AWS** server after submitting your work by using the command `nohup java SERVER.PROGRAM &`.