COMP6231 Assignment 2

Distributed Appointment Management System using CORBA

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1. Overview

The Distributed Appointment Management System (DAMS) is a distributed system for health care; It is used by an admin of the hospitals who manages the information about the medical appointments and patients to book or cancel a medical appointment across three different hospitals Montreal (MTL), Sherbrooke (SHE), and Quebec (QUE) within a system.

Hospital admins and patients are uniquely identified by the admin id (e.g., MTLA0000) and patient id (QUEP2981) respectively. There are 3 types of appointment types for which slots can be created by the admin: Physician, Surgeon, Dental. There are three-time slots are available for each appointment type in a day. Each appointment type is a combination of city, appointment slot, and date.

Each server maintains its database using the HashMap. Client and Server are communicating using the CORBA. While inter-server communication is done by the UDP communication. Each server maintains a log file for all the operations performed by the server. Also, for each patient and admin client log file is maintained.

To make the system more robust, inter-server communication is done using the thread. Since there are multiple users are accessing the server concurrently, the proper synchronization of data is implemented in the code. All the user inputs are case insensitive.

G. Tools

- Java IDE Eclipse
- Java JDK version 1.8

2. Create & Run System in Eclipse

To create a Distributed system using CORBA there are 5 steps.

a. Create a Remote Interface (HospitalServer.idl) using the OMG's Interface Definition Language (IDL).
b. Compile the remote interface using the command "**idlj -fall HospitalServer.idl**". It will generate a skeleton to put together server application.
c. Implement a Server (MTLHospitalServer.java, SHEHospitalServer.java, QUEHospitalServer.java) by extending HospitalServerInterfacePOA class.
d. Implement the Client application (AdminClient.java and PatientClient.java).
e. Start the applications

Once we have implemented a server and a client, we can start the name service,

start orbd -ORBInitialPort 900

Run command of Server files

java MontrealServer -ORBInitialPort 900 -ORBInitialHost localhost
java SherbrookeServer -ORBInitialPort 900 -ORBInitialHost localhost
java QuebecServer -ORBInitialPort 900 -ORBInitialHost localhost

Run command of AdminClient.java file

java AdminClient <AdminId> -ORBInitialPort 900 -ORBInitialHost localhost

Run command of PatientClient.java file

java PatientClient <PatientId> -ORBInitialPort 900 -ORBInitialHost localhost

Order to run the system

- Start Montreal, Sherbrooke, and Quebec server in any order
- Start either AdminClient or PatientClient based on requirements.

3. Architecture

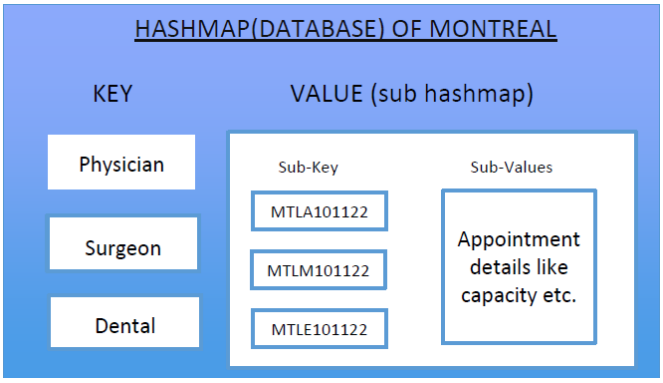
There are three different servers MTL, QUE, and SHE. When all these servers are started, all the servers start their own UDP servers for communicating with the patient-client and server client. These servers are running all the time to listen to requests from clients.

Depending on the client ID of the patient or admin, the client system will connect you to the respective server by doing look up from the NamingService and It allows client to call a service provided by the server.

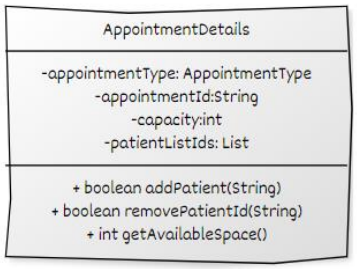
A client only communicates with their corresponding server. But there are multiple options (list appointment availability, book appointment, get schedule appointment of a patient, cancel appointment and Swap appointment) which have required to communicate with the other servers. This communication is done by the UDP socket communication. The client-server makes a UDP request to other servers concurrently and it will get the response from the other servers, and it is returned to the client.

4. Features

A. Server Database: each server has its own database, and it is implemented using HashMap.



B. Appointment Details are maintained by AppointmentDetails class object which has details of type of appointment, appointment id, capacity and list of patient id who has booked the slot.



C. Log has been implemented to track all the activities on each server as well as for each admin and patient who use the system.

Format of the log:
Request Date Time | Request Type | Request Parameters | Server Response | Status of Completion

```
11-02-2022 18:22:46 | Add appointment | [QUEA110222, SURGEON, 15] | Success: Appointment Added | false
11-02-2022 18:24:01 | Add appointment | [MTLA110222, DENTAL, 10] | Failed: Cannot book appointment Id - MTLA110222 by Quebec server | false
11-02-2022 18:35:33 | Add appointment | [QUEA110222, PHYSICIAN, 15] | Success: Appointment Added | false
11-02-2022 18:36:10 | Add appointment | [QUEE110222, PHYSICIAN, 15] | Success: Appointment Added | false
11-02-2022 18:37:03 | Add appointment | [QUEA120222, SURGEON, 10] | Success: Appointment Added | false
```

5. Test Case

Already Added Test Data

Server Name	Appointment Type	Appointment ID	Patient List
Montreal	Physician	MTLA030222	**MTLP2345, QUEP5465**
		MTLE030222	**MTLP1245, MTLP2463, MTLP9875**
		MTLM010222	**MTLP2345, MTLP9875, MTLP3246**
	Dental	**MTLM030222**	**MTLP2345, MTLP3246**
		MTLE030222	**MTLP2345**
		MTLA010222	**MTLP3246, MTLP1245, MTLP2463, MTLP5465**
		MTLA020222	**MTLP2345, MTLP5465**
	Surgeon	**MTLA030222**	**MTLP1245, MTLP2463**
		MTLM030222	**MTLP3246, MTLP9875**
Quebec	**Physician**	**QUEA040222**	**MTLP2345, QUEP5465**
	Dental	**QUEA010222**	**QUEP5465**
		QUEA020222	**QUEP5465**
Sherbrooke	**Physician**	**SHEE080222**	**MTLP2345, SHEP5565, SHEP2475**
	Dental	**SHEA050222**	**SHEP5565, SHEP2475**
	Surgeon	**SHEE070222**	**MTLP2345, SHEP5565, SHEP2475**

Test Data

Test Method	Expected Output	Actual Output
Add appointment	**Success: Appointment Added**	Enter your choice > 2 Enter appointmentID [(MTL|SHE|QUE)(A|E|M)(MMDDYY)] > QUE110222 Invalid ID Try again. Enter appointmentID [(MTL|SHE|QUE)(A|E|M)(MMDDYY)] > QUEA110222 Enter Capacity > 15 Success: Appointment Added
	Failed: Cannot book appointment Id of another server	Enter your choice > 3 Enter appointmentID [(MTL|SHE|QUE)(A|E|M)(MMDDYY)] > MTLA110222 Enter Capacity > 10 Failed: Cannot book appointment Id - MTLA110222 by Quebec server
Book Appointment	**Failed: Patient has already book appointment in the same day with**	Enter your choice > 1 Enter appointmentID [(MTL|SHE|QUE)(A|E|M)(MMDDYY)] > MTLA030222 Failed: Patient has already booked appointment in same day withPHYSICIAN

	same Appointment Type	
	Failed: No appointment available for selected slot	Enter your choice > 3 Enter appointmentID [(MTL|SHE|QUE)(A|E|M)(MMDDYY)] > MTLE110222 Failed: No appointment available for selected slot
	Failed: Patient has already booked 3 appointments other than its server	Enter your choice > 1 Enter appointmentID [(MTL|SHE|QUE)(A|E|M)(MMDDYY)] > QUEA120222 Failed: Patient has already booked 3 appointment other than Montreal Server
	Success: appointment successfully booked	Enter your choice > 1 Enter appointmentID [(MTL|SHE|QUE)(A|E|M)(MMDDYY)] > QUEA110222 Success: Appointment successfully booked
Remove appointment	**Success: Appointment is removed**	Enter your choice > 1 Enter appointmentID [(MTL|SHE|QUE)(A|E|M)(MMDDYY)] > QUEA120222 Success: Appointment is removed with appointmentId: QUEA120222
	Success: Appointment is removed with not available next appointment slot	Enter your choice > 1 Enter appointmentID [(MTL|SHE|QUE)(A|E|M)(MMDDYY)] > QUEA110222 Success: Not able to find available appointment and removed the appointmentId: QUEA110222
	Success: Appointment is removed with patient is transferred	Enter your choice > 3 Enter appointmentID [(MTL|SHE|QUE)(A|E|M)(MMDDYY)] > MTLA010222 Success: Patient is transferred to available appointment and removed the appointmentId: MTLA010222
	Failed: No slot available	Enter your choice > 1 Enter appointmentID [(MTL|SHE|QUE)(A|E|M)(MMDDYY)] > MTLA220222 Failed: No appointment is available with appointmentId: MTLA220222
List Appointment	**Success: All Appointment list**	Enter your choice > 3 ========== Appointment Type ========== 1. Physician 2. Surgeon 3. Dental 4. Exit Enter your choice > 2 List appointment SURGEON: [MTLA030222 0, MTLM030222 0, SHEE070222 0,]

Get Appointment Schedule	**Success: Empty appointment schedule**	Enter your choice > 2 Appointment Schedule of MTLP3574 []
	Success: Appointment Schedule	--- MENU === 1. Book Appointment 2. Get Appointment SChedule 3. Cancel Appointment 4. Exit Enter your choice > 2 Appointment Schedule of MTLP2345 [PHYSICIAN:MTLA030222,PHYSICIAN:MTLM010222,DENTAL:MTLE030222
Cancel Appointment	**Success: cancelled appointment**	Enter your choice > 3 Enter appointmentID [(MTL|SHE|QUE)(A|E|M)(MMDDYY)] > MTLA030222 Success: cancelled appointment with MTLA030222
	Failed: No record of appointment found	Enter your choice > 3 Enter appointmentID [(MTL|SHE|QUE)(A|E|M)(MMDDYY)] > QUEM110222 Failed: No record found of [MTLP2345, QUEM110222]
Swap Appointment	**Success: Appointment swapped**	Enter your choice > 4 OLD APPOINTMENT DETAILS Enter appointmentID [(MTL|SHE|QUE)(A|E|M)(MMDDYY)] > MTLA030222 === Appointment Type === 1. Physician 2. Surgeon 3. Dental 4. Exit Enter your choice > 1 NEW APPOINTMENT ID Enter appointmentID [(MTL|SHE|QUE)(A|E|M)(MMDDYY)] > MTLA230222 === Appointment Type === 1. Physician 2. Surgeon 3. Dental 4. Exit Enter your choice > 1 Success: appointment swapped

Swap Appointment	**Failed: No appointment booked of old Appointment ID**	Enter your choice > 4 OLD APPOINTMENT DETAILS Enter appointmentID [(MTL|SHE|QUE)(A|E|M)(MMDDYY)] > MTLA230222 ========== Appointment Type ========== 1. Physician 2. Surgeon 3. Dental 4. Exit Enter your choice > 2 NEW APPOINTMENT ID Enter appointmentID [(MTL|SHE|QUE)(A|E|M)(MMDDYY)] > MTLA030222 ========== Appointment Type ========== 1. Physician 2. Surgeon 3. Dental 4. Exit Enter your choice > 1 Failed: No record found of [MTLP2345, MTLA230222]
	Failed: No appointment available for new appointment Id	Enter your choice > 4 OLD APPOINTMENT DETAILS Enter appointmentID [(MTL|SHE|QUE)(A|E|M)(MMDDYY)] > MTLA230222 ========== Appointment Type ========== 1. Physician 2. Surgeon 3. Dental 4. Exit Enter your choice > 1 NEW APPOINTMENT ID Enter appointmentID [(MTL|SHE|QUE)(A|E|M)(MMDDYY)] > MTLE240222 ========== Appointment Type ========== 1. Physician 2. Surgeon 3. Dental 4. Exit Enter your choice > 1 Failed: No appointment available for selected slot