DISTRIBUTED SYSTEM DESIGN
COMP6231
Assignment 3

Distributed Event Management System (DEMS) using web service

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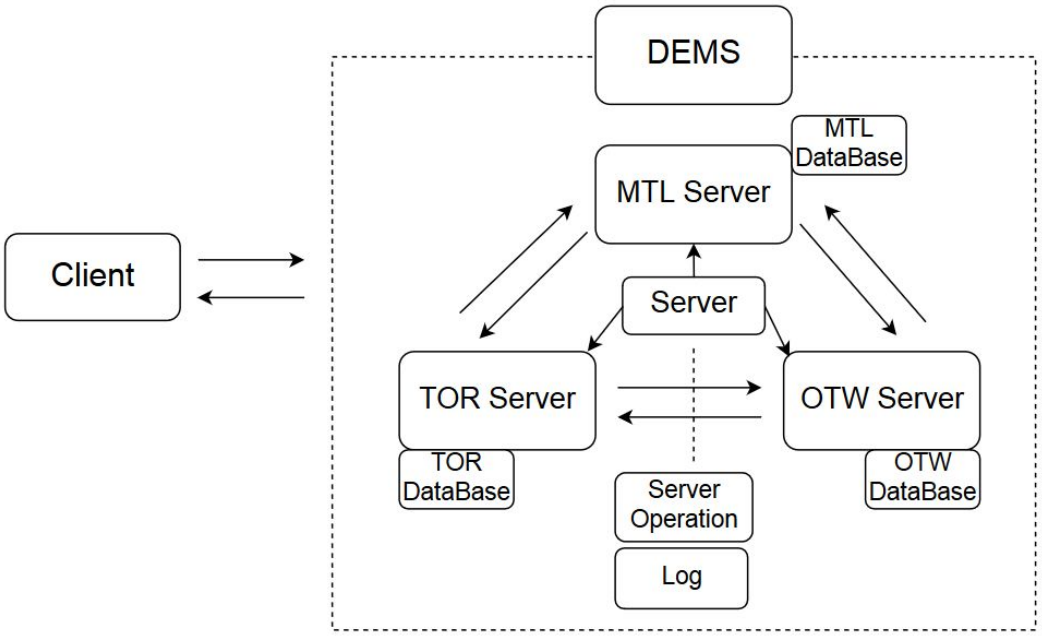
1.Techniques:

In this assignment different techniques are leveraged to meet the requirements:

- We used **wsgen** command to generate end point files , then import wsdl files using **wsimport** command.
- We used **UDP** to implement the communication between servers.
- We used three different **HashMap** to store the records performing database for each server.
- We used **multithreading** technique to implement that multiple clients can act simultaneously.
- We used **synchronization** technique to keep the integrity of data while modifying it, so the server can maximize the concurrency.

2. Design architecture:



- package com.web.server:
  MTLServer, TORServer, OTWServer :
  Store the hash map of each server and some initial information of each server.

- package com.web.service.impl:
  Server:
  Implements some methods of WebInterface, providing remote method invocation.
  Log:
  Used to write the log to the corresponding log file, it makes each server maintains a log file which contains the history of all the operations that have been performed on that server. And provides information about what operations are performed, at what time and who performed the operation. The detail information contains date and time the request was sent, request type, request parameters, request successfully completed or failed, server response for the particular request.

- package com.web.client:
  ClientUI:
  The class is designed for customers and managers to interact with our DEMS, containing the information of user(ID and passwords of manager/customer),Can be run simultaneously.
  Client:
  Implements several threads of clients and perform operations simultaneously.

- package com.web.service:
  WebInterface:
  Defines interface to be implemented in the servers. Methods include: add event, remove event, list availability of event, book event, get book schedule, cancel event and swap event.

3.Data structure:

Linked List: userSchedule. Which is used to store the user schedule in each server. The component of this linked list is String consists of userID and eventID.

Hash map: The MTLServer, TORServer, OTWServer maintain their own HashMap, here eventType is the key, while the value is again a sub-HashMap. The key for

sub-HashMap is the *eventID*, while the value of the sub-HashMap is the information about the event.

4.Scenarios/Demo:

- Firstly we run the servers of three branches.

```
Montreal Server is running
UDP Online

Ottwa Server is running
UDP Online

Toronto Server is running
UDP Online
```

- For test 1: TORM3456
  We add eventID TORE080619 with eventType “Conference” with booking capacity 2. The result shows added successfully.

```
4
Please Enter Event ID:
TORE080619
Please Enter Event Type:
Conference
Please Enter Booking Capacity:
2
Added successfully.
```

  We add eventID TORE110619 with eventType “Seminars” with booking capacity 1. The result shows added successfully.

```
4
Please Enter Event ID:
TORE110619
Please Enter Event Type:
Seminars
Please Enter Booking Capacity:
1
Added successfully.
```

- For test 2: MTLM9000
  We add eventID MTLA090619 with eventType “Conference” with booking capacity 2. The result shows added successfully.

```
4
Please Enter Event ID:
MTLA090619
Please Enter Event Type:
Conference
Please Enter Booking Capacity:
2
Added successfully.
```

We add eventID MTLA080619 with eventType “TradeShows” with booking capacity 1. The result shows added successfully.

```
4
Please Enter Event ID:
MTLA080619
Please Enter Event Type:
TradeShows
Please Enter Booking Capacity:
1
Added successfully.
```

- For test 3: OTWM9000
  We add eventID OTWA190619 with eventType “Conference” with booking capacity 1. The result shows added successfully.

```
4
Please Enter Event ID:
OTWA190619
Please Enter Event Type:
Conference
Please Enter Booking Capacity:
1
Added successfully.
```

We add eventID OTWA250619 with eventType “Seminars” with booking capacity 1. The result shows added successfully.

```
4
Please Enter Event ID:
OTWA250619
Please Enter Event Type:
Seminars
Please Enter Booking Capacity:
1
Added successfully.
```

- For test 4: OTWM6785
  listEventAvailability for all the three event types.

```
Conference
ConferenceOTWA190619 1 OTWE190617 1  MTLE090617 2 MTLA090619 2 TORE080619 2

      TradeShows
      TradeShowsOTWE110417 23  MTLE080617 1 MTLA080619 1

 Seminars
 SeminarsOTWE250617 1 OTWA250619 1  MTLE100617 1 TORE110619 1
```

- For test 5: OTWC1234
  We book eventID TORE080619 with eventType “Conference”. The result shows booked successfully.

```
1
Please Enter Event ID:
TORE080619
Please Enter Event Type:
Conference
Booked successfully.
```

  We book eventID TORE110619 with eventType “Seminars”. The result shows booked successfully.

```
1
Please Enter Event ID:
TORE110619
Please Enter Event Type:
Seminars
Booked successfully.
```

  We book eventID MTLA090619 with eventType “Conferences”. The result shows booked successfully.

```
1
Please Enter Event ID:
MTLA090619
Please Enter Event Type:
Conference
Booked successfully.
```

  We book eventID OTWA190619 with eventType “Conferences”. The result shows booked successfully.

```
1
Please Enter Event ID:
OTWA190619
Please Enter Event Type:
Conference
Booked successfully.
```

- For test 6: OTWC1234
  We Swap new eventID MTLA080619 with eventType “TradeShows” with oldeventID OTWA190619 with eventType “Conference”. The result shows cannot book event from other cities more than 3 times 1 month.

```
4
Please Enter new Event ID:
MTLA080619
Please Enter new Event Type:
TradeShows
Please Enter old Event ID:
OTWA190619
Please Enter old Event Type:
Conference
Swapped res.-1
OTWC1234 cannot book MTLA080619from other cities more than 3 times 1 month
```

  We Swap new eventID OTWA250619 with eventType “Seminars” with oldeventID TORE080619 with eventType “Conference”. The result shows swapped successfully.

```
4
Please Enter new Event ID:
OTWA250619
Please Enter new Event Type:
Seminars
Please Enter old Event ID:
TORE080619
Please Enter old Event Type:
Conference
Swapped res.1
Swapped successfully.
```

  getBookingSchedule for OTWC1234.

```
Schedule:  Conference MTLA090619  Seminars TORE110619 Conference OTWA190619 Seminars OTWA250619
```

- For test 7: TORM3456 manage for TORC1234
  We book eventID MTLA080619 with eventType “TradeShows” . The result shows booked successfully.

```
1
Please Enter Customer ID:
TORC1234
Please Enter Event ID:
MTLA080619
Please Enter Event Type:
TradeShows
Booked successfully.
```

We Swap new eventID OTWA250619 with eventType “Seminars” with oldeventID MTLA080619 with eventType “TradeShows”. The result shows cannot swap now.

```
7
Please Enter Customer ID:
TORC1234
Please Enter new Event ID:
OTWA250619
Please Enter new Event Type:
Seminars
Please Enter old Event ID:
MTLA080619
Please Enter old Event Type:
TradeShows
OTWA250619 is full.
**********
```

We Swap new eventID TORE080619 with eventType “Seminars” with oldeventID MTLA090619 with eventType “Conference”. The result shows cannot swap now.

```
7
Please Enter Customer ID:
TORC1234
Please Enter new Event ID:
TORE080619
Please Enter new Event Type:
Seminars
Please Enter old Event ID:
MTLA090619
Please Enter old Event Type:
Conference
You cannot swap now.
**********
```

getBookingSchedule for TORC1234.

```
2
Please Enter Customer ID:
TORC1234
Schedule:  TradeShows MTLA080619
**********
```

- For test 8: MTLM9000
  listEventAvailability for all the three event types.

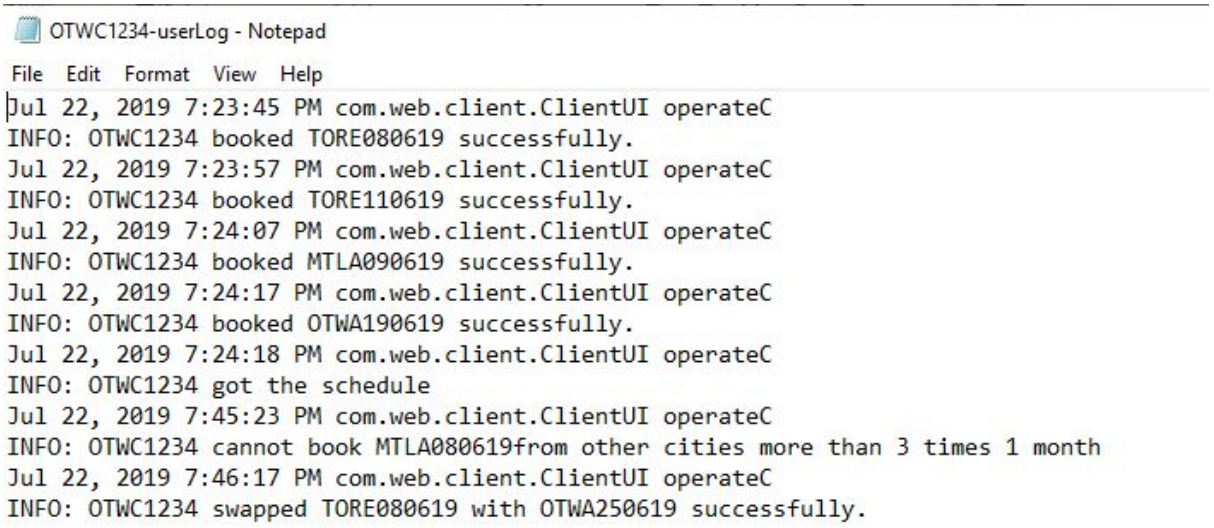
```
Conference
ConferenceMTLA090619 1  OTWA190619 0 TORE080619 2
**********************************
Please Select One Manager Operation:
1. Book Event
2. Get BookingSchedule
3. Cancel Event
4. Add Event
5. Remove Event
6. List Event Availability
7. Swap Event
E for Exit
**********************************
6
Please Enter Event Type:
Seminars
SeminarsMTLA100617 1  OTWA250619 0 TORE110619 0
**********************************
Please Select One Manager Operation:
1. Book Event
2. Get BookingSchedule
3. Cancel Event
4. Add Event
5. Remove Event
6. List Event Availability
7. Swap Event
E for Exit
**********************************
6
Please Enter Event Type:
TradeShows
TradeShowsMTLA080619 0  OTWE110417 23 TORA080617 2
**********************************
```

- For test 9: Multithread
  We book events and swap events for several threads at the same time.

```
response from server:Welcome to MTL Server!
response from server:Welcome to MTL Server!
response from server:Welcome to MTL Server!
MTLC2346 booked MTLA090619 successfully!
MTLC2345 booked MTLA090619 successfully!
MTLC2344 :The capacity of MTLA090619 is full
MTLC2345 has swapped MTLA090619 with MTLA080619 successfully!
MTLC2345     Schedule: TradeShows MTLA080619
MTLA080619 is full.
MTLC2344 cannot swap MTLA090619 with MTLA080619
MTLC2346     Schedule: Conference MTLA090619
MTLC2344     No schedule
```

LogFile:

Operations are recorded in log files.



5.Important part/ Difficulty:

Webservice Concurrency, MultiThreading, UDP.

6.References:

https://www.youtube.com/watch?v=4Bpg5i4tUFg
https://www.javatpoint.com/RMI
http://www.thejavageek.com/2015/01/27/web-service-hello-world-example-explained/