DISTRIBUTED SYSTEM DESIGN
COMP6231
Assignment 2

Distributed Event Management System (DEMS) using IDL(CORBA)

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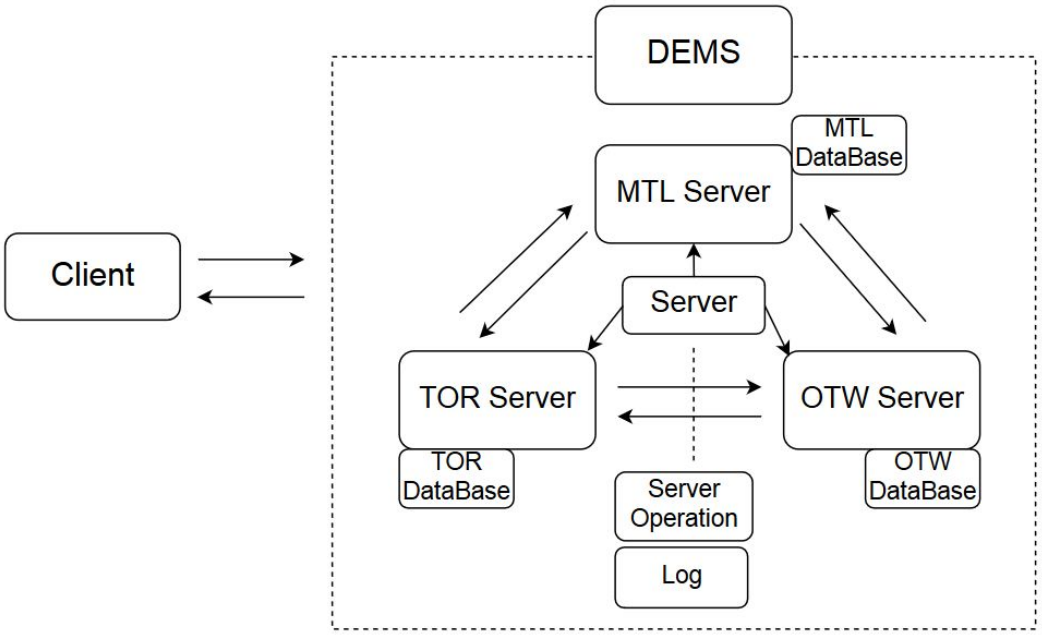
1.Techniques:

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

- We used **Java IDL** definition to define the CORBA interface, used IDL compiler to generate:_AdditionStub, AdditionOperations, AdditionHelper, AdditionHolder, Addition, AdditionPOA, which can realize platform transparency and language transparency. Such package can act as the interface to realize the communication between clients (customer and manager)and servers (MTL, OTW, TOR) like RMI.
- 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:



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

Server:
Client-Server communications are made through ORB.
Corba Objects extend POA class and implement the methods
Containing the Server class, providing remote method invocation by extends AdditionPOA, implemented by MTL,OTW and TOR servers.

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.

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.

Addition:
extends AdditionOperations, org.omg.CORBA.Object,
org.omg.CORBA.portable.IDLEntity

_AdditionStub:
The Java class _AdditionStub is the stub file, the client-side proxy,
which interfaces with the client object. It extends
org.omg.CORBA.portable.ObjectImpl and implements Addition.java interface.

AdditionHelper:
The Java class AdditionHelper provides auxiliary functionality
needed to support a CORBA object in the context of the Java language.

AdditionHolder:
The Java class called AdditionHolder holds (contains) a reference to an object that implements the Addition interface.

AdditionOperations:
It is a Java interface file that is equivalent to the CORBA IDL interface file(Addition.idl).

AdditionPOA:
The Java class AdditionPOA is the skeleton, the server-side proxy, combined with the portable object adapter. It extends org.omg.PortableServer.Servant, and implements AdditionOperations interface and the InvokeHandler interface.

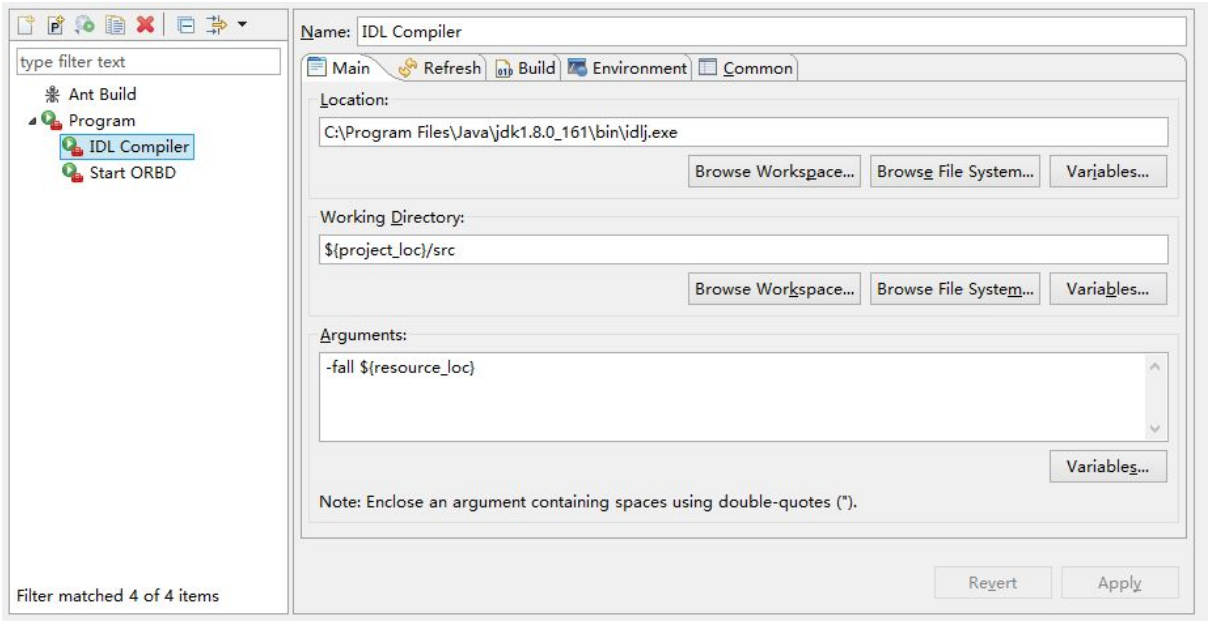
3.Data structure:

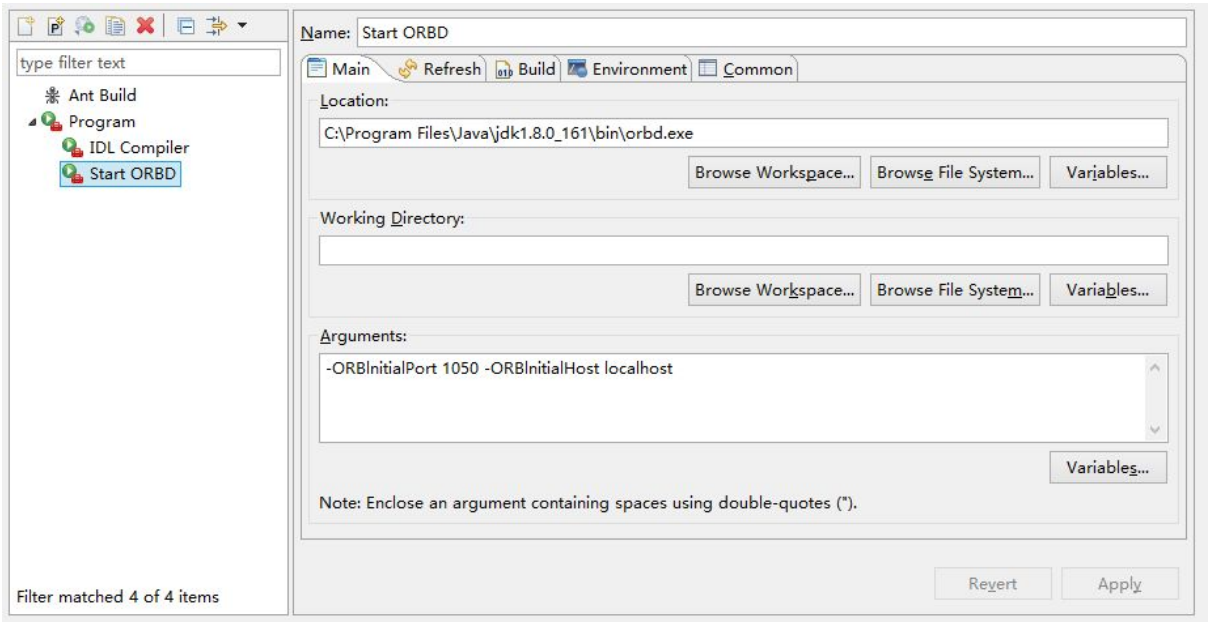
Linked List: userSchedule. Which is used to store the user schedule in each server. The component of this linked list is String consists of userID and eventID.

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:

- We firstly configure eclipse to ensure we can use CORBA without the plugin.





- Then we start ORBD and run the servers of three branches.

- For test 1: OTWM4560
  We add eventID OTWE080619 with eventType “Conferences” with booking capacity 1. The result shows added successfully.

```
4
Please Enter Event ID:
OTWE080619
Please Enter Event Type:
Conference
Please Enter Booking Capacity:
1
Added successfully.
```

  We add eventID OTWE110619 with eventType “Conferences” with booking capacity 1. The result shows added successfully.

```
**********
4
Please Enter Event ID:
OTWE110619
Please Enter Event Type:
Conference
Please Enter Booking Capacity:
1
Added successfully.
```

We add eventID TORE050619 with eventType “Conferences” with booking capacity 1. The result shows we cannot add events in other cities.

```
4
Please Enter Event ID:
TORE050619
Please Enter Event Type:
Conference
Please Enter Booking Capacity:
1
You cannot add events in other cities.
```

- For test 2: MTLM9087
  We add eventID MTLA090619 with eventType “Conferences” 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 2. The result shows added successfully.

```
4
Please Enter Event ID:
MTLA080619
Please Enter Event Type:
TradeShows
Please Enter Booking Capacity:
2
Added successfully.
```

We add eventID MTLE230719 with eventType “Seminars” with booking capacity 1. The result shows added successfully.

```
4
Please Enter Event ID:
MTLE230719
Please Enter Event Type:
Seminars
Please Enter Booking Capacity:
1
Added successfully.
```

- For test 3: TORM6785
  listEventAvailability for all the three event types.

```
Conference
ConferenceTORA100519 211 MTLA100619 2 MTLA090619 2 OTWA100617 25 OTWE110619 1 OTWA100618 23 OTWA100619 22 OTWE080619 1
------------------------------------
TradeShows
TradeShowsTORA100519 111 MTLA100617 3 MTLA080619 2 OTWM110419 23

Seminars
SeminarsTORA100519 311 MTLA100618 1 MTLE230719 1 OTWE090519 26
```

- For test 4: TORC1234
  We book eventID OTWE080619 with eventType “Conferences”. The result shows booked successfully.

```
1
Please Enter Event ID:
OTWE080619
Please Enter Event Type:
Conference
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 MTLA080619 with eventType “TradeShows”. The result shows booked successfully.

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

- For test 5: TORC1234
  We book eventID OTWE110619 with eventType “Conferences”. The result shows cannot book events from other cities more than 3 times 1 month.

```
1
Please Enter Event ID:
OTWE110619
Please Enter Event Type:
Conferences
TORC1234 cannot book OTWE110619from other cities more than 3 times 1 month
```

We book eventID MTLE230719 with eventType “Seminars”. The result shows booked successfully.

```
1
Please Enter Event ID:
MTLE230719
Please Enter Event Type:
Seminars
Booked successfully.
```

We book eventID TORE050619 with eventType “Conferences”. The result shows cannot book events from other cities more than 3 times 1 month.

```
1
Please Enter Event ID:
TORE050619
Please Enter Event Type:
Conference
TORC1234 cannot book TORE050619from other cities more than 3 times 1 month
```

- For test 6: TORM6785
  We cancel eventID MTLA090619 with eventType “Conferences” for TORC1234. The result shows canceled successfully.

```
3
Please Enter Customer ID:
TORC1234
Please Enter Event ID:
MTLA090619
Please Enter Event Type:
Conference
Canceled successfully.
```

- For test 7: OTWC7890
  We book eventID OTWE080619 with eventType “Conferences” . The result shows Capacity is full.

```
1
Please Enter Event ID:
OTWE080619
Please Enter Event Type:
Conference
Capacity is full.
```

- For test 8: MTLM9087
  We remove eventID MTLA080619 with eventType “TradeShows”. The result shows removed successfully.

```
5
Please Enter Event ID:
MTLA080619
Please Enter Event Type:
TradeShows
Removed successfully.
```

- For test 9: OTWC7890 & TORC1234
  We getBookingSchedule for OTWC7890 and TORC1234.
  for OTWC7890:

```
2
    No schedule
```

  for TORC1234 :

```
2
Schedule:Conference OTWE080619Seminars MTLE230719
```

- For test 10:OTWM4560
  listEventAvailability for all the three eventTypes.

```
6
Please Enter Event Type:
Seminars
SeminarsOTWE090519 26 MTLA100618 1 MTLE230719 0 TORA100519 311

6
Please Enter Event Type:
TradeShows
TradeShowsOTWM110419 23 MTLA100617 3 TORA100519 111
**********

6
Please Enter Event Type:
Conference
ConferenceOTWA100617 25OTWE110619 1OTWA100618 23OTWA100619 22OTWE080619 0 MTLA100619 2 MTLA090619 2
```

- For test 11: OTWC7890
  We swap old event:eventID MTLA100617 with eventType “TradeShows” to new event:eventID MTLA100720 with eventType “Conference”(doesn’t exist this event).The result shows cannot swap now.

```
4
Please Enter new Event ID:
MTLA100720
Please Enter new Event Type:
Conference
Please Enter old Event ID:
MTLA100617
Please Enter old Event Type:
TradeShows
You cannot swap now.
```

- For test 12: OTWC7890
  We swap old event:eventID MTLA100620 with eventType “TradeShows”(doesn’t exist this event) to new event:eventID TORA100519 with eventType “Seminars”.The result shows cannot swap now.

```
4
Please Enter new Event ID:
TORA100519
Please Enter new Event Type:
Seminars
Please Enter old Event ID:
MTLA100620
Please Enter old Event Type:
TradeShows
You cannot swap now.
```

- For test 13: OTWC7890

We swap old event:eventID TORA100519 with eventType “Conference” to new event:eventID MTLA100617 with eventType “TradeShows”. The result shows swapped successfully.

```
4
Please Enter new Event ID:
MTLA100617
Please Enter new Event Type:
TradeShows
Please Enter old Event ID:
TORA100519
Please Enter old Event Type:
Conference
Swapped successfully.
```

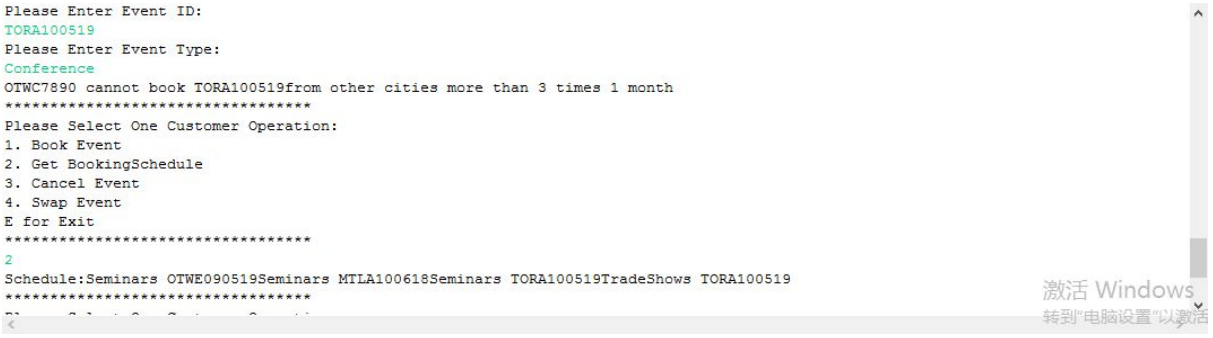
- For test 14: OTWM4560 swap for OTWC7890
  We swap old event:eventID MTLA100617 with eventType “TradeShows” to new event:eventID MTLA100618 with eventType “Seminars”(capacity is 0 now). The result shows user cannot swap now.

```
7
Please Enter Customer ID:
OTWC7890
Please Enter new Event ID:
MTLA100618
Please Enter new Event Type:
Seminars
Please Enter old Event ID:
MTLA100617
Please Enter old Event Type:
TradeShows
You cannot swap now.
```

- For test 15: OTWM4560 swap for TORC1234
  We swap old event:eventID MTLA100618 with eventType “Seminars” to new event:eventID TORA100519 with eventType “Seminars”.The result shows cannot swap now. (Because manager cannot swap for customer who is not at his city)

```
7
Please Enter Customer ID:
TORC1234
Please Enter new Event ID:
TORA100519
Please Enter new Event Type:
Seminars
Please Enter old Event ID:
MTLA100618
Please Enter old Event Type:
Seminars
You cannot swap now.
```

- For test 16:OTWC7890



- For test 17: 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 MTLA100619 successfully!
MTLC2344 :The capacity of MTLA100619 is full
MTLC2345 :The capacity of MTLA100619 is full
Schedule:Conference MTLA100619
    No schedule
    No schedule
MTLC2346 has swapped MTLA100619 with MTLA100618 successfully!
MTLC2344 doesn't book MTLA100619
MTLC2345 doesn't book MTLA100619
```

LogFile:
Operations are recorded in log files.

```
TORM6785 has listed Conference of TORServer
Sun Jul 07 15:36:57 CST 2019TORM6785 has listed TradeShows of TORServer
Sun Jul 07 15:37:11 CST 2019TORM6785 has listed Seminars of TORServer
Sun Jul 07 15:37:28 CST 2019TORC1234 cannot book OTWE110619from other cities more than 3 times 1 month
Sun Jul 07 15:48:17 CST 2019TORC1234 cannot book TORE050619from other cities more than 3 times 1 month
Sun Jul 07 15:53:22 CST 2019TORC1234 get the schedule
Sun Jul 07 16:03:05 CST 2019TORC1234 get the schedule
Sun Jul 07 16:07:34 CST 2019TORC1234 get the schedule
Sun Jul 07 16:08:37 CST 2019TORC1234 get the schedule
Sun Jul 07 16:20:58 CST 2019TORC1234 get the schedule
Sun Jul 07 16:21:39 CST 2019TORC1234 get the schedule
Sun Jul 07 16:32:40 CST 2019TORC1234 get the schedule
Sun Jul 07 16:45:19 CST 2019TORC1234 get the schedule
Sun Jul 07 16:46:06 CST 2019TORC1234 get the schedule
Sun Jul 07 16:46:31 CST 2019TORC1234 get the schedule
Sun Jul 07 16:48:59 CST 2019TORC1234 get the schedule
Sun Jul 07 16:52:45 CST 2019TORM6785 has listed Conference of TORServer
Sun Jul 07 16:54:04 CST 2019TORC1234 get the schedule
Sun Jul 07 16:59:34 CST 2019TORC1234 get the schedule
Sun Jul 07 17:03:13 CST 2019TORC1234 get the schedule
Sun Jul 07 17:04:35 CST 2019TORC1234 get the schedule
Sun Jul 07 17:08:32 CST 2019TORC1234 get the schedule
Sun Jul 07 17:08:36 CST 2019
```

5.Important part/ Difficulty:

Setting IDL and ORB properties, Concurrency, MultiThreading, UDP.

6.References:

https://www.youtube.com/watch?v=4Bpg5i4tUFg
https://www.javatpoint.com/RMI
Tutorial 2- UDP and TCPFile
Tutorial 2 - Java RMIFile
COMP 6231, Summer 2019 Distributed Objects and CORBA. slides from Prof. M.L. Liu, California Polytechnic State University