

# CONCORDIA UNIVERSITY

## DEPARTMENT OF COMPUTER SCIENCE AND SOFTWARE ENGINEERING

SOEN 423, Fall 2018

Instructor: R. Jayakumar

### ASSIGNMENT 2

Issued: Oct. 9, 2018

Due: Oct. 22, 2018

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***Note:** The assignments must be done individually and submitted electronically.*

### **Distributed Employee Management System (DEMS) using Java IDL (CORBA)**

In this assignment, you are going to design and implement the simple Distributed Employee Management System (DEMS) from Assignment 1 in CORBA using Java IDL. In addition to the 4 operations introduced in Assignment 1, the following operation also needs to be implemented.

- *transferRecord (managerID, recordID, remoteCenterServerName):*

When a HR manager invokes this method from his/her center, the server associated with this manager (determined by the managerID prefix) searches its hash map to find if the record with recordID exists. If it exists, then it checks with the remoteCenterServer if a record with recordID does not exist in that remoteCenterServer. If the record does not exist in the remoteCenterServer, then the entire record is transferred to the remoteCenterServer. ***These checking and transfer requires server to server communication which should be implemented using UDP/IP.*** Note that the record should be removed from the hash map of the initial server and should be added to the hash map of the remoteCenterServer atomically. The server informs the manager whether the operation was successful or not and both the server and the manager store this information in their logs.

In addition to this operation, the previous operations (createMRecord, createERecord, getRecordCounts, and editRecord) shall now have one additional parameter: managerID (as first parameter). This is used by the CenterServers to identify which HR manager invoked the operation.

In this assignment you are going to develop this application in CORBA using Java IDL. Specifically, do the following:

- Write the Java IDL interface definition for the modified DEMS with all the 5 specified operations.
- Implement the modified DEMS. You should design a server that maximizes concurrency. In other words, use proper synchronization that allows multiple managers to correctly perform operations on the same or different records at the same time.
- Test your application by running multiple clients with the 3 servers. Your test cases should check correct concurrent access of shared data, and the atomicity of transferRecord operation (e.g. what if a record being edited needs to be transferred and both operations were initiated at the same time?).

Your submission will be graded for correct and efficient implementation of the transferRecord operation in addition to correct use and implementation of mutual exclusion in accessing shared data and proper exploitation of concurrency to achieve high performance.

### Marking Scheme

- [30%] **Design Documentation:** Describe the techniques you use and your architecture, including the data structures. Design proper and sufficient test scenarios and explain what you want to test. Describe the most important/difficult part in this assignment. You can use UML and text description but limit the document to 10 pages.
- [70%] **DEMO in the Lab:** You have to register for the demo. Registration for a demo will be done through Moodle. You cannot demo without registering, and your assignment will not be marked without a demo. Your demo should focus on the following.
  - [50%] **The correctness of code:** Demo your designed test scenarios to illustrate the correctness of your design. If your test scenarios do not cover all possible issues, you will lose part of marks up to 40%.
  - [20%] **Questions:** You need to answer some simple questions (from what is discussed during tutorials) during the demo. They can be theoretical related directly to your implementation of the assignment.

### Submission

Submit the document and code electronically on the ENCS Electronic Assignment Submission (EAS) system by midnight on the due date; print the documentation and bring it to your DEMO.

### Questions

If you are having difficulties understanding sections of this assignment, feel free to email/contact any of the TA Shivaraj Alagond at shivaraj.alagond@gmail.com. It is strongly recommended that you attend the tutorial sessions, as various aspects of the assignment will be covered.