Lund University	Faculty of Engineering – LTH	Course Program
Dept. of Computer Science	*Study periods HT1+HT2*	*2016-08-29*

EDA040: Concurrent Programming / Realtidsprogrammering

Contacts

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Expedition-time: 9.30-11.30 and 12.45-13.30.

Notice-board

Close to the secretary, second floor in the E building.
Rarely used; please refer to the home page and links.

Home page

http://cs.lth.se/EDA040

Prerequisites

Prior to starting this course, you should have passed EDAA01 (Programming - Second Course, or the earlier EDA027 Algorithms and data structures) or (for exchange/other students) have the corresponding documented knowledge of object oriented programming in Java.

Schedules

Scheduled sessions (each 2 hours)

HT1: Lectures 8. Exercises 6. Labs 3.
HT2: Lectures 1. Project-guidance 4 (2 intro and 2 final, in computer room).

Groups

You register for a certain scheduled session electronically using a web form found via the course homepage. The same grouping applies to both the exercises and (most important) to the labs.
The labs are done pairwise (with resulting individual solutions), the project in groups of four.

Lectures

HT1: Tu 13-15, all in room MA:2. Lecture 2-8 in Swedish; in English as agreed (see web).
HT2: Tu 31/10 during 8-10 in room E:B.

Exercises

HT1: Group A-C: We 8-10, Group D-E: We 10-12,and Group F-G: We 15-17 (groups as for labs).
HT2: Project guidance corresponding to one exercise per week, according to later schedule.

Labs

The laboratory sessions take place in computer rooms, where the final part of the lab work is carried out. There should be seven lab (and exercise) groups scheduled according to the official LTH-schedule, including room numbers. Not to depend on the enumeration in the LTH schedule, we enumerate groups A-G (instead of 1-7). You sign up for the lab sessions electronically, and you should join the corresponding exercise session (initially, but exercise groups may be merged later).
The lab groups are scheduled for the computer rooms during the following hours:
Group A-C [in room E:Varg]: Fr 8-10, Fr 10-12, Fr 15-17 respectively.
Group D-G [in room E:Beta]: Mo 8-10, Mo 10-12, Mo 13-15, Mo 17-19 respectively.

Preparation starts with theory as presented during a preceding lecture, more detailed preparation and problem analysis then follows during an exercise session prior to the lab session. Then home work (in the range of 1 to 10+ hours depending on skill and luck) constitutes a main part of the work, then followed by the lab session. That session may start with a test on the required corresponding knowledge as covered by the exercises. Then either a fully working solution is examined, or the remaining problems are analyzed and guidance towards an acceptable implementation is given.

Week #; day/month:	#1; 29/8-2/9	#2; 5-7/9	#3; 12-16/9	#4; 19-23/9	#5; 26/9-30/9	#6; 3-7/10	#7; 10-14/10	#8; 17-21/10
Lecture (Tu):	F1	F2	F3	F4	F5	F6	F7	F8
Exercise (We):		Ö1	Ö2	Ö3	Ö4	Ö5	Ö6	
Lab (Grp A-C; Fr):			**L1**		**L2**		**L3**	
Lab (Grp D-G; Mo):				**L1**		**L2**		**L3**

Fn = Lecture #n (Swe: Föreläsning nr n); F1 in English, then F2-F8 in Swedish & English.
Ön = Exercise #n (Swe: Övning nr n), Wednesday.
Ln = Lab. #n (Swe: Laboration nr n), Friday-Monday [Note: **Mandatory**; Swe: Obligatorisk!]

Schedule for second study period (HT2)

The detailed schedule for HT2 is provided during the **mandatory lecture F9**, which is the first HT2 lecture covering requirements and content for the course project.

Examination (written during 5 hours)

The ordinary (prior to the course project) examination is Tuesday **2016-10-25** during **14-19**.
First retake (can be considered being ordinary) examination is Thursday **2016-12-22** during **14-19.**

Content

The content is formally covered during the first study period. The project, which takes about 2/5 (that is 1/4-1/2 depending on yourself) of the total efforts in time, should give the practical engineering skills needed for the exam and for your future (software-oriented) profession.

Lectures

The content of the lectures during **the first study period** define the theoretical content of the course. For each of the eight lectures F1 to F8 this means:

1. Introduction. Concurrent execution, something about semaphores.
2. Synchronization, mutual exclusion, more on semaphores.
3. More on Java Threads and introduction to Lab 1.
4. Monitors; synchronized methods. Design with respect to concurrency and state.
5. Messages and event processing. Deadlock detection and avoidance.
6. Scheduling and bounded response times. Priority inversion and priority inheritance.
7. Real-time scheduling analysis. More on computation of response times.
8. More on real-time scheduling. Implementation of run-time systems. Exam hints.

During **the second study period**, the lecture covers:
   • Information about the project. This lecture is mandatory.

Literature

The booklet (Java-based real-time programming, with exercise and lab material) is provided electronically. Additional material is provided through a supplementary course book (Real-Time Embedded Systems - Open-Source Operating Systems Perspective, 2012) available via Lund University digital library and extra reading material via web links.

Exercises and labs

Content as for the lectures, focused on practical design and programming based on lectures 1 to 4. *Scheduling analysis* is covered by the last exercise (but no lab), whereas the *Implementation of run-time systems* as of the final lecture has no corresponding exercise or lab (in theory part of exam).

Project

The project deals with design and implementation of a distributed real-time video surveillance system. Your experiences from the labs will be most valuable. A completed project results in runnable software, a manual-oriented on-line report, and an oral presentation.