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ID2212 Network Programming with Java

Offered by ICT/Software and Computer Systems

URL: https://www.kth.se/social/course/ID2212/
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Aim and Learning Outcomes

- The aim is to introduce advanced network programming tools and techniques provided in Java SDKs (Standard, and Enterprise editions) as well as the Android SDK.
  - Gives hands-on experience in writing distributed applications in Java.

- After completion of the course, students should be able to
  - know and design architectures of distributed applications;
  - develop GUI-controlled clients; program concurrent threads in Java;
  - develop distributed applications using Java networking APIs
    - sockets, RMI, Java IDL (CORBA), Java Messaging Service (JMS),
    - Java Database Connectivity (JDBC) and Java Persistence API (JPA);
  - develop Web-based enterprise applications using the Enterprise Java technologies
    - Enterprise JavaBeans (EJB),
    - Servlets and Applets,
    - Java Server Faces (JSF);
  - develop mobile applications for hand-held devices (e.g. mobile phones) using the Android SDK

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Course Staff

- Course leader, lecturer and examiner
  - Vladimir Vlassov, PhD, Assoc. Prof.
- Lecturer and examiner
  - Leif Lindbäck, Assist. Prof.
- Teaching assistants
  - Hooman Peiro Sajjad, PhD student
  - Alexandra Stagkopoulou, MSc student
  - Robin Andersson, MSc student
  - Vasileios Giannokostas, MSc student

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Email Addresses

- Teachers:
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- Students:
  id2212_students@ict.kth.se
- Students and teachers:
  id2212@ict.kth.se

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Course Layout

- 14 lectures
- 5 exercises
- 5 labs – not-mandatory
  - Lab sessions are mostly for reporting programming assignments – homework and projects
- 5 homework sets
  - 4 are required to pass the course
- 1 course project

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Tentative Lecture Layout

1. Basic network concepts. Architectures of distributed applications.
2. GUI Programming with Java
3. Multithreading and monitors in Java.
4. Networking with sockets. Client-server applications
5. Java basic I/O. Overview of the New I/O (NIO)
6. Working with web resources and URL connections. Java applets.
7. Distributed computing with Java IDL (CORBA) and Java RMI.
8. Java Message Service (JMS) API. JNDI. JavaMail API.
9. Java Database Connectivity (JDBC). Java Persistence API (JPA)
10. Overview of Enterprise Java Technologies (Java EE). Servlets
11. JavaServer Faces (JSF).
12. Enterprise Java Beans (EJB). Java API for WebSocket.
13. A guest lecture
14. Overview of the Android SDK.

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Exercises

At the 5 exercise sessions We will consider in detail examples of applications

Topics

1. Design of client-server applications
2. Distributed objects: Java RMI, Java IDL (CORBA)
3. Working with databases using JDBC or JPA
4. Enterprise Java Technologies (JSF, servlets, EJB)
5. Distributed applications the Android SDK.

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Labs (not-mandatory)

- Self-Practice network programming with Java by studying and modifying given examples

Topics

1. Socket Communications. Clients and Servers
2. Java RMI and Java IDL (CORBA)
3. Working with Databases using JDBC and JPA
4. Enterprise Java technologies (Java EE)
5. Distributed applications the Android SDK.

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Homework Sets

- There will be 5 homework sets (1 hw/week)
  - **4 out of the total 5 hw sets are required to pass**
  - can be done in groups of 2 students
  - report and demonstration on lab/reporting sessions

Topics

1. Developing Client - Server Applications with Sockets
2. Java RMI and Java IDL (CORBA)
3. Working with databases using JDBC or JPA
4. Enterprise Java (Java EE)
5. Distributed applications using the Android SDK.

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Examination Requirements

- The examination consists of
  - Reports on programming assignments each can be done and reported in groups of 2 students:
    - Homework sets (4)
    - Programming project (1)
  - A written exam (4 hours).

- Distribution of 7,5 ECTS:
  - Homework and project assignments (ANN1) – 4,5 ECTS
  - Written examination (TEN1) – 3 ECTS

Bonus Policy

- Assignments turned in (reported) before or on the dates they are due, give bonus on your first ID2212 exam, if your solutions are accepted.

Project	up to 10 % of the total of 100 points
Each Homework	up to 3 % of the total of 100 points

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Suggested Projects

- NOG: Nordic Olympic Games – an information system for NOG
- 007: Information is all around us – thread migration
- FISH: FIle SHaring – a distributed file system
- APG Web-shop: Acme Plastic Gnomes Web shop using Java EE technologies
- DHT: Distributed Hash Table (a key-value store)
- A distributed (Web-based, P2P) application

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Software to Perform Assignments

- Java Platform, Standard Edition (Java SE)
- Java Platform, Enterprise Edition (Java EE)
- Java Platform, Micro Edition (Java ME)
- A Java Integrated Development Environment (IDE)
  - Eclipse (http://www.eclipse.org/)
  - NetBeans (http://netbeans.org/)
- Other Java APIs.

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Course Material

- URL: https://www.kth.se/social/course/ID2212/
- All course material is (will be) available on the course Web site for browsing and printing:
  - Course information;
  - Lecture slides;
  - Project assignments;
  - Exercises;
  - Labs;
  - Homework sets;
  - Examples of Java code

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Additional Information Sources

- The course is not based on any specific book.
- Java technologies and documentation at the Oracle web site
  - http://www.oracle.com/technetwork/java/index.html
  - http://docs.oracle.com/javase/
  - http://docs.oracle.com/javaee/
  - http://docs.oracle.com/javame/
- Java online Tutorials
  - http://docs.oracle.com/javase/tutorial/
  - https://docs.oracle.com/javaee/7/tutorial/index.html

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Recommended Books

- *An Introduction to Network Programming with Java*, 3rd Edition, by Jan Graba, Springer, 2013, ISBN: 978-1-4471-5253-8 (Print) 978-1-4471-5254-5 (Online)

- *Java Network Programming*, 4th Edition, by Elliotte Rusty Harold, O'Reilly & Ass., Inc., 2013

- *TCP/IP Sockets in Java*, 2nd Edition, by Kenneth Calvert, and Michael Donahoo, Morgan Kaufmann, 2008 (ISBN: 978-0-12-374255-1)
  - Covers key sockets programming techniques; an introduction to NIO

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To access password-protected course Web pages

- User name: **student**
- Password: **nescafe**