T-110.5140 Network Application Frameworks (5 cr)

Spring 2010

This Lecture

- Course Info
- Lecture outline
- Sign up for the Course
- Topic and Goals
- Assignments

Description

- Fundamentals of modern distributed applications and services.
- A *Network Application Framework* contains services for distributed applications
- Focus on current and emerging topics in IETF and W3C
- Topics include the Internet Architecture, Web services and mobile middleware.
- Two assignments as pair-work for practical middleware experience.

Course Info

- Course structure
  - Lectures on Mondays 12.15-14 in T3
  - Two assignments as pair-work
  - Final exam on Tuesday 11.5. 9-12 in T1
- Grading
  - Assignment and exam graded 0-5
  - You must pass both
  - Total grade = (exam grade + assignment grade) / 2
- Study materials for the course
  - Lecture slides and handouts, scientific papers, and relevant standards
- Prerequisites
  - T-110.4100 Computer Networks
  - T-110.5100 Laboratory Work on Telecommunications Software

Contact information

- Lectures
  - Dr. Tancred Lindholm (@tkk.fi)
  - Guest lecturers
  - Assignments
  - Jani Heikkinen (@tkk.fi)
- Common questions to the newsgroup:
  - opinnot.tik.naf
  - use newsgroup / lectures to find pair for assignment
- Background
  - Eric Newcomer
    Understanding Web Services
  - Eric Greenberg's book "Network Application Frameworks" Chapter 1-9 and 12
  - Sanjiva Weerawarana et al. Web Services Platform Architecture. Prentice Hall.

Lecture Outline

Week	Topic
3	About course; Introduction and overview
4	Routing, multi-homing, mobility
5	Distributed Hash Tables (DHTs)
6	Middleware
7	Web services
8	SOAP
9	Securing Web services
10	Exam week, no lecture
11	Service federation
12	Host Identity Protocol, PLA, and PSIRP
13	Summary and conclusions

Please check the news section on the web page for updates!

Signing up

- Send email to the course assistant
  - jani.heikkinen@tkk.fi
- Include the following information
  - Student ID (Student #)
  - Name
  - Post-graduate student?

Topics Covered

- Distributed systems security
  - Threats, protected subnets, cryptography
- Mobility and multi-homing
- Building applications with XML
  - Distributed objects
  - Role of directory services
  - Mobile and wireless applications
  - XML-based presentation and RPC
- Scalability and performance issues

Starting Point

- Assume that you already know details of
  - TCP/IP and underlying technology
  - Basics of cryptography and cryptographic protocols
  - Java, C++, and OO programming
  - Basic client/server programming
- Adding to these, we look at
  - Distributed objects and distributed security
  - XML and Web services
  - Architectural overview and understanding
  - New directions in research and standardization

Course focus and goals

- General overview of most aspects involved in a Internet-scale distributed system
- Ability to implement distributed systems
  - Hands-on experience with SOAP (web services), XML, DHTs, network-level security
- Understanding of
  - Distributed and redundant systems
  - Crypto based security in distributed systems
  - XML and how it is used in practise
  - Performance issues
  - Architecture and why does it matter

Assignments

- SOAP
- XML Schema
- DHT + IPSEC
- Choose 2 of the above

Environment

- Virtualized Linux boxen
- OpenSwan IPSec support
- JDK
- Apache Axis, Xerces
- Bamboo DHT
- You use SSH to use the computers remotely

SOAP Assignment

- SOAP (formerly called Simple Object Access Protocol) is an XML-based lightweight RPC protocol
- In this assignment you need to deploy your own simple web service that provides text search service for clients using Apache Axis.
- Axis is a Java SOAP engine that includes a stand-alone server, support for WSDL, tools for generating Java classes from WSDL descriptions, and sample programs.

XML Schema Assignment

- The XML Schema specifications from W3C define an XML language for describing the syntax and structure of XML documents.
- In this assignment you create an XML schema for a catalog or a library that allows the description of items in the catalog

DHT + IPSEC Assignment

- A Distributed Hash Table (DHT) provides scalable distributed storage
- IPSEC is a technology that can be used to secure IP traffic between hosts
- In this assignment you use the Bamboo DHT to implement a simple distributed store and experiment on that store
- Further, you ensure the integrity and confidentiality of traffic between nodes using IPSEC

Assignment Details

- Please see course page for detailed instructions and requirements
- Deadline for returns are
  - 28.3
  - 15.5
  - Return in any order

Questions?