Seminar on Network Protocols in Operating Systems (5 cr)

Objectives

The goal is to understand design approaches and protocol implementation techniques in operating systems, such as Linux or FreeBSD. After the seminar the participant understands some of the common issues in kernel-level protocol design and implementation. Secondarily, the participant will learn writing scientific text documenting and analyzing the selected OS component. An additional objective for the seminar as a whole is to produce a coherent collection of papers that describe the state of the art in communications functionality of the modern operating systems.

Description of work

The seminar takes a hands-on approach in getting familiar with the OS kernel level networking code. We will start by installing a recent version of Linux or FreeBSD operating system kernel, and identifying the key software modules relevant for the seminar. Each student takes one module for closer investigation and writes a 6-page paper describing and analyzing it. The seminar simulates a peer-reviewed workshop: each paper is reviewed (anonymously) by two fellow participants, for a final version that will be published in seminar proceedings. The seminar proceedings will be made publicly available as Aalto University technical report.

The seminar ends with a workshop, where students present their work. Participation to the workshop is mandatory for the seminar attendees, and open to other audience.

We will have regular bi-weekly meetings to discuss the progress and to find solutions to open problems.

Target group and pre-requisites

The seminar is targeted for graduate students or M.Sc students close to graduation. Participants should know C language fluently, should have completed the Network Programming course (or have corresponding good understanding of network application programming using sockets), and should be familiar with the basics of Internet protocols. The maximum number of participants may be limited.
**Topic areas**

The seminar topics are composed as a combination of an operating system and a protocol module inside it. As a basis for topic selection, we will apply the following table.

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<th>Linux</th>
<th>FreeBSD</th>
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<td>TCP and transport</td>
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<td>IPv4</td>
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<td>IPv6</td>
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<td>NAT/firewall functions</td>
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<td>Device driver interactions</td>
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<td>API interactions</td>
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Suitable topics could be, for example: “TCP implementation in Linux”, “TCP implementation in FreeBSD”, or “NAT/firewall operation in Linux”. Own topics can be proposed (even if not in the table above), but they should fit in the overall scope of the seminar.

**Schedule**

- **Monday, September 17th, 14:15 – 16:00**: First meeting, organizing work
- **Every two weeks until early November**: Informal meetings discussing the progress of work
- **Early November**: Draft version of paper by each participant
- **Mid-November**: Comments by two peer reviewers (other participants) for each paper
- **Early December**: Final version of papers, addressing the comments
- **Mid-December**: Workshop, presentations by everyone

Exact times for the above events will be agreed in the first meeting.

**Evaluation**

The seminar will be graded. Evaluation is based on the technical quality and readability of the seminar papers, quality of peer reviews, and active participation to the seminar activities.

**Want to participate?**

If you want to participate, or have further questions, send Email to pasi.sarolahti@aalto.fi by September 7th, 2012. In Email, indicate 2-3 preferred topics you’d like to work on.