Course Description

This advanced course aims to provide in-depth knowledge about proposed architectures and protocols for the future Internet, including the Named Data Networking, MobilityFirst, NEBULA, and XIA projects. In order to prepare for a project related to future Internet architectures (FIAs), we will study current Internet (TCP/IP) protocols in a real network setting, i.e., hands-on experience using networking equipment.

Prerequisites: CSE 434, or equivalent.

Required Reading


Papers and material on future internet architectures posted on the myASU Blackboard site.

Evaluation Procedure

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participation</td>
<td>10%</td>
<td>leading and participating in discussion of papers</td>
</tr>
<tr>
<td>Labs</td>
<td>20%</td>
<td>4 TCP/IP labs are planned</td>
</tr>
<tr>
<td>FIA Project</td>
<td>30%</td>
<td>future internet architecture project, including presentation, results, paper</td>
</tr>
<tr>
<td>Midterm</td>
<td>20%</td>
<td>Thursday, February 23, 2012, in class</td>
</tr>
<tr>
<td>Final Exam</td>
<td>20%</td>
<td>Tuesday, May 1, 2012, 12:10–2:00pm</td>
</tr>
</tbody>
</table>

100%

Use of Blackboard on myASU

Among other things, myASU uses Blackboard to provide online material and a discussion group for CSE 534. myASU is accessible from a browser at http://my.asu.edu. Use your ASUrite user-id to access the course. Use the forums of the Discussion Group to ask any questions related to the course. The strength of a discussion group comes from everyone seeing all the questions and answers; you are expected to check it often. Note that some announcements may only be posted on myASU. Class policies are posted on the site.

ASU Code of Conduct and Academic Integrity Policy

Plagiarism or any form of cheating in labs or the project is subject to serious academic penalty; this may range from a grade of zero for the work to failure of the course. To understand your responsibilities read:

- The ASU Student Code of Conduct: http://students.asu.edu/srr/code
- The ASU Student Academic Integrity Policy: http://provost.asu.edu/academicintegrity

Important Lab Information

The lab equipment is located in BYENG 217 and is under 24/7 video surveillance. After the end of the first week of classes, you will be granted permission to enter the lab using your ASU SUN card. The lab equipment is not connected to the Internet because you will have root privileges; this avoids security issues and prevents interference with the production network.
Rules for using the lab:

- Find a lab partner.
- Each group signs up for two 3-hour lab time slots; these time slots are allocated for the entire semester.
- You are guaranteed access to the lab during your time slot.
- If a time slot is not used 15 minutes after the slot start time, it becomes available on a FCFS basis.
- Outside your assigned lab slots you may use the lab any time you want if the equipment is available.

Before a lab session: Do the related reading to prepare.

During a lab session:

- Show up for your assigned time slot.
- Bring a USB flash drive and the lab manual.
- Complete the exercises of the assigned lab (1 hour to several hours; average 3 hours).
- Take measurements and save data to USB flash drive.

After a lab session:

- Write lab report, using saved data on flash drive.
- Submit lab report on Blackboard by the posted due date.

What to submit with your lab report?

- Lab reports must be typed. Allowed file formats: .pdf, .doc, .docx, or plain text.
- Indicate the lab name, and the names of the team members.
- Truncate long output, and insert relevant supporting output into the place where you answer the lab questions; the data you use must support your answers. Significant points will be deducted if collected data is included that is not needed to support the answer.
- Organize your lab report according to the lab exercise part number. Do not use your own numbering system. Type each of the lab questions briefly, so that it is clear which question you are answering.
- Only include answers to exercises listed on the course website.

Grading of lab reports: Completeness and correctness: 80%; Quality of presentation: 20%

Future Internet Architectures

Research papers describing the deficiencies of the current internet architecture and protocols, as well as proposed future internet architectures and protocols are required reading. You are expected to read the paper(s) before the class in which they will be discussed. You will be required to lead an in-class presentation of a paper, and participate in discussion of the papers.

Future Internet Architectures (FIA) Project

A variety of project ideas, requirements of the project, and a project schedule will be posted on the myASU Blackboard site. Teams are also welcome to propose their own project idea.

The instructor must approve each team project. Each team is required to meet with the instructor regularly to update the project status.

You will be expected to:

- demonstrate your project,
- give a short presentation in class about your project, and
- write a short (maximum 10 page) report on your project.
Lecture Schedule

**Week 1: January 5**
Course Introduction

To do list:

- Find a lab partner; e-mail me at least 4 slots by Sunday, 01/08/2012, 7:00pm
- Read: A Survey of the Research on Future Internet Architectures, IEEE Communications Magazine, July 2011 before next class, Tuesday, 01/10/2012

**Week 2: January 10 and 12**
Tuesday, January 10: Our Lab #1

Thursday, January 12: Start discussion about the Named Data Networking project

**Week 3: January 17 and 19**
Tuesday, January 17: Continue discussion about the Named Data Networking project

Thursday, January 19: Our Lab #2

**Week #4: January 24 and 26**
Tuesday, January 24: Group 12 is presenting the VOCCN paper

Thursday, January 26: Group 1 is presenting the Ad Hoc Networking via Named Data paper

**Week #5: January 31 and February 2**
Tuesday, January 31: Starting discussion of the Mobility First project

Thursday, February 2: Class cancelled

**Week #6: February 7 and 9**
Tuesday, February 7: Cache-and-Forward Network Architecture

Thursday, February 9: Augmenting Mobile 3G using WiFi

**Week #7: February 14 and 16**
Tuesday, February 14: Orbit
Week #8: February 21 and 23
Tuesday, February 21: Coverage of the paper "NEBULA – A Future Internet that Supports Trustworthy Cloud Computing"
Thursday, February 23: Midterm (in class, closed book, no aids allowed)

Week #9: February 28 and March 1
Tuesday, February 28: Above the Clouds : A Berkeley View of Cloud Computing
Thursday, March 1: Class cancelled due to Personnel Committee meeting with the Dean

Week #10: March 6 and 8
Tuesday, March 6: Service-Centric Networking with SCAFFOLD
Thursday, March 8: Dispersity Routing

Week #11: March 13 and 15
Tuesday, March 13: Declarative Routing
Thursday, March 15: Project discussion in class

Week #12: Spring Break!

Week #13: March 27 and 29
Tuesday, March 27: XIA: An Architecture for an Evolvable and Trustworthy Internet
Thursday, March 29: Accountable Internet Protocol (AIP)

Week #14: April 3 and 5
Tuesday, April 3: Segment based Inter-networking to Accommodate Diversity at the Edge
Thursday, April 5: SCION: Scalability, Control, and Isolation on Next Generation Networks

Week #15: April 10 and 12
Tuesday, April 10: Packet Caches on Routers: The Implications of Universal Redundant Traffic Elimination
Thursday, April 12: Social Clouds

Week #16: April 17 and 19
Tuesday, April 17: Untangling Attribution
Thursday, April 19: Odd numbered FIA Teams each to present a short project overview

Last day of classes: Tuesday, April 24!

Tuesday, April 24: Even numbered FIA Teams each to present a short project overview.