Delivering Services on Today’s Internet—Fall 2013, 694a

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Today, large web providers such as Google and Netflix account for significant portions of the Internet’s traffic. In this course, we will investigate how these providers use (and abuse) the Internet’s protocols to deliver their services. Our goals include:

• Extend the simplified view of the Internet covered in standard breadth classes to a richer view of how it is used today.
• Understand how the protocols and networks fit together to deliver services. Much of the complexity and many of the problems on the Internet arise in these interactions.
• Understand how the protocols are—and are not—good fits for the big players on today’s Internet. The protocols were designed in a very different setting, and providers today go to great lengths to achieve their goals in the face of limited protocols.
• Identify open problems and investigate potential approaches, both from the literature and in our own research for class.

1 Basic Information

• Place and time: KAP145, Wed 3:30pm-6:20pm
• Instructor: Ethan Katz-Bassett
• email: ethan.kb@usc.edu
• phone: –
• office: SAL 236
• office hours: By appointment.
• Course homepage: http://www-bcf.usc.edu/~katzbass/teaching/csci694/2013FA/index.html
• Prerequisites: CS551 of permission of the instructor. This class is appropriate for graduate students or advanced undergraduates with previous classwork in networking. Students from non-systems/networking areas are welcome.
• Textbooks and course materials: No required textbook. We will read research papers, whitepapers from industry, and other similar documents. We will generally read the equivalent of 3-4 research papers a week.

2 Grading and Coursework

There are no exams in this class. The course grade will be determined based on:

Written paper responses and class presentations/discussion (50%): Students are expected to write responses to 2-4 papers a week. Each week, one or two students will give a presentation on the papers and lead the discussions in each class. Other students are expected to participate in the discussion.

1In focusing on the Internet’s role in these services, we will, for the most part, not cover issues that predominantly pertain to a service’s clients or servers but not the network between them.
For two weeks, instead of the standard course structure, we will instead conduct a Shadow Program Committee for NSDI 2014. We will read submitted papers and go through the reviewing process, ultimately arriving at a shadow conference program. This is an opportunity to learn about the peer-review process and gain experience as a reviewer. It will expose us to cutting-edge papers related to the course. Hopefully, the papers will include some from industry, as NSDI is having an Operational Systems track this year.

A research project, including 6 pg writeup and 20 minute presentation (50%): The semester-long project is an open-ended research project on one of the covered topics. The instructor will provide some possible project topics, or (with instructor approval) you can work on a project of your own devising. Projects should be done in groups of two (or get instructor approval for a different size).

3 Reading List and Class Schedule

Week 1  8/28: Course Overview and Introduction

Week 2  9/4: Content Delivery Infrastructures (Presented by Brandon and Zahaib)


Supplemental:


Week 3  9/11: DNS and Content Routing (Presented by Himanshu and Pramit)


Week 4  9/18: Interdomain Routing: Peering and Internet Exchange Points (IXPs) (Presented by Himanshu and Pramit)

Background (you are expected to read and understand these, but you do not need to write responses):


Papers to write responses to:

**P7** Wolfgang Mühlbauer, Steve Uhlig, Bingjie Fu, Mickael Meulle, and Olaf Maennel. In search for an appropriate granularity to model routing policies. In *SIGCOMM*, 2007.


Supplemental:


**Week 5** 9/25: Route Redistribution and Connecting Multiple Routing Instances (Presented by Nitish and Matt)


Supplemental:


**Week 6** 10/2: Transport I: Split and Multiplexed TCP (Presented by Zahaib and Brandon)


Supplemental


Week 7 10/9: Transport II: Beyond TCP (Presented by Nitish and Matt)


Week 8 10/16: NSDI Shadow PC meeting 1

Week 9 10/23: No class: Internet Measurement Conference

Week 10 10/30: NSDI Shadow PC meeting 2

Week 11 11/6: Traffic Engineering (Presented by Haonan and Xiyue)


Supplemental


Week 12 11/13: Video Delivery (Presented by Haonan)


Supplemental

• (Minlan will present this paper) Minlan Yu, Wenjie Jiang, Haoyuan Li, and Ion Stoica. Tradeoffs in CDN designs for throughput oriented traffic. In CoNEXT, 2012.

Week 13 11/20: Looking Across Boundaries for New Solutions (Presented by Xiyue and Matt)


Supplemental


Week 14 11/27: No class: Thanksgiving

Week 15 12/4: Class presentations

Week 16 12/14: Project report due

Week 17 12/16: Review another group’s project report

Statement for Students with Disabilities

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me as early in the semester as possible. DSP is located in STU 301 and is open 8:30 a.m.5:00 p.m., Monday through Friday. The phone number for DSP is (213) 740-0776.
Statement on Academic Integrity

USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one’s own academic work from misuse by others as well as to avoid using another’s work as one’s own. All students are expected to understand and abide by these principles. Scampus, the Student Guidebook, contains the Student Conduct Code in Section 11.00, while the recommended sanctions are located in Appendix A: http://www.usc.edu/dept/publications/SCAMPUS/gov/ Students will be referred to the Office of Student Judicial Affairs and Community Standards for further review, should there be any suspicion of academic dishonesty. The Review process can be found at: http://www.usc.edu/student-affairs/SJACS/

Emergency Preparedness/Course Continuity in a Crisis

In case of a declared emergency if travel to campus is not feasible, USC executive leadership will announce an electronic way for instructors to teach students in their residence halls or homes using a combination of Blackboard, teleconferencing, and other technologies.