

Qualifying Exam: CS542 Internet System Technology

Date: Friday, January 9th, 2015

Time: 4:20-5:20pm (1 hour)

Instruction:

- Put your name and student number on all your answer sheets.
 - You have 60 minutes to complete the first part of the exam.
 - Show all your work. Partial credit is possible for an answer, but only if you show the intermediate steps in obtaining the answer.
1. (30 pts) What is CAP theorem? Name one system that the theorem applies in the design and describe the particular applications that the system targets. Argue the pros and cons of the system.
 2. (40 pts) Traditional LAN (local area network) technologies could not cope with the newly arising architectural demands in data center networking and novel L2 approaches have been proposed. Articulate the shortcomings of traditional LAN technologies. Describe new systems that have been proposed to address the weaknesses. Plot out the evolutionary path for datacenter-oriented networking with technical arguments.
 3. (30 pts) Since its first implementation, TCP has evolved from a simple end-to-end transport-layer protocol without congestion control to a sophisticated one with slow start, fast retransmission, and many more features. After BIC and CUBIC, what are the new technical challenges that force TCP modifications? How has TCP evolved in order to address the new challenges?