

Instructions for TDTS11/TDTS04 home exam May 17, 13:00-17:00

1. In this exam, you will answer one of ten question sets, the one which number corresponds to the last digit (least significant) of your LiU login id.
2. Please type-in your answers in English. Each question has the target answer length listed (0.5-2 pages). The average one spaced page usually contains about 3000 characters or 500 words. Do not attach hand-written answers nor figures but submit answers as a single ASCII .txt file (spell checking encouraged). You can draw in ASCII characters if needed.
3. You can use any printed and online materials available, but you must answer all questions yourself. No group work or outside help is allowed. Do not copy-paste text from other sources, as the answers will be checked through Urkund for plagiarism. By taking the exam, you accept a solemn obligation not to cheat.
4. The questions will be available in course Lisam (<https://lisam.liu.se/>) room "Submissions" after the exam starts. The duration of the exam is 4 hours, and results must be submitted in the course Lisam room before the deadline.
5. No last-minute participation is allowed, pre-registration is required.
6. Please join a zoom meeting during the exam with video on, mic muted. You can use a smartphone with camera, for example. If you need to ask a question, type a message in the private chat to the examiner. Short breaks are ok, but it is expected that most of the time you will be clearly alone in front of a camera. Otherwise, the examiner can contact you afterwards with oral questions to make sure the exam is written by you.
<https://liu-se.zoom.us/j/65845365621?pwd=bllrS2V5b1ljU1Zmb0xTdmNmcXoxQT09>
7. The grading is U, 3, 4, 5 based on the correctness and clarity of answers, displayed understanding of the material, and how close are the answers to indicated page limit. 2-page questions are worth 20 points, 1-page questions - 10 points, 0.5 page – 5 points. Grade limits 20; 28; 36 points out of 40.
8. The exam is not anonymous due to the exceptional situation of COVID-19. Please show understanding and tolerance of potential grading delays and technical issues as we switch to the remote examinations.
9. Emergency contact: Prof. Andrei Gurtov, gurtov@acm.org, +46700850566, skype: gurtov
10. Good luck!

Home exam questions

1. Question set
 - 1.1. Why do we need protocol layering? Describe the role of each layer (1 page)
 - 1.2. Describe the role of HTTP protocol. Summarize different versions (1 page)
 - 1.3. How does a self-learning switch make its table? (0.5 page)
 - 1.4. How do config errors made in OSPF vs BGP affect Internet operation? (0.5 page)
 - 1.5. Describe how confidentiality and integrity is provided for email messages. (1 page)
2. Question set
 - 2.1. Describe the need and architecture of DNS? What are security challenges? (1 page)
 - 2.2. Compare go-back-N vs selective repeat mechanisms. Which one is used in TCP? (1 page)
 - 2.3. What is encapsulation/decapsulation and tunneling (0.5 page)
 - 2.4. Compare P2P versus client-server model. What are strong & weak sides? (0.5 page)
 - 2.5. List most common Internet applications and explain which transport protocol they use and why. (1 page)
3. Question set
 - 3.1. Describe possible "bad things" that can happen with a packet on the Internet. What are countermeasures? (1 page)
 - 3.2. What is packet fragmentation and how it is handled in IPv4 vs IPv6? (0.5 page)
 - 3.3. Compare packet switching with circuit switching (1 page)
 - 3.4. Describe the differences between flow and congestion control (0.5 page)
 - 3.5. Explain the role and functioning of ARP (1 page)
4. Question set
 - 4.1. Describe typical architectures and role of a router (1 page)
 - 4.2. What is multicast, is it deployed in the Internet? (1 page)
 - 4.3. What is an MTU, typical values, difference to MSS? (0.5 page)
 - 4.4. Explain the concept of SDN (1 page)
 - 4.5. Explain the functioning of HTTP Adaptive Streaming (0.5 page)
5. Question set
 - 5.1. Compare link state vs distance vector routing (1 page)
 - 5.2. Describe slow start and fast retransmit mechanisms in TCP Reno (1 page)
 - 5.3. Which protocols are used for intra-domain routing and why? (0.5 page)
 - 5.4. Why is IPv6 needed, differences to IPv4, what is adoption status? (1 page)
 - 5.5. How bit errors are detected in link vs network layer protocols? (0.5 page)
6. Question set
 - 6.1. Describe CSMA/CD and difference with CSMA/CA. (1 page)
 - 6.2. Describe the role and working of BGP. (1 page)
 - 6.3. What are pro and cons of SSL vs IPsec? (0.5 page)
 - 6.4. Compare the use of TCP vs UDP for streaming. (1 page)
 - 6.5. Which problem is the poison reverse solving and how? (0.5 page)
7. Question set
 - 7.1. What are most popular standards for WiFi in use now and why? (1 page)
 - 7.2. Why is CDMA a popular method? (0.5 page)
 - 7.3. What are classes of multimedia applications? (0.5 page)
 - 7.4. How certificates are used to secure WWW? (1 page)
 - 7.5. Compare how mobility is provided in cellular vs IP networks? (1 page)
8. Question set
 - 8.1. Describe and compare QoS and QoE. (1 page)

- 8.2. How is the hidden terminal problem solved? (0.5 page)
- 8.3. What are different approaches for Medium Access Control? (1 page)
- 8.4. What are pro and cons of Generalized Forwarding? (0.5 page)
- 8.5. What is the longest prefix matching and how it is used? (1 page)
9. Question set
 - 9.1. Compare the properties of symmetric vs asymmetric cryptography. (1 page)
 - 9.2. What are CDNs, why those are needed, what are common examples? (0.5 page)
 - 9.3. Describe the source and effect of queuing, propagation, transmission delays. (1 page)
 - 9.4. Describe the principle behind store-and-forward (0.5 page)
 - 9.5. Describe the evolution of telecommunication networks from 1G to 5G (1 page)
0. Question set (TDTS11)
 - 0.1 Describe in detail what happens when you connect a laptop via WiFi to an open network and open a browser to access <https://www.google.com> (2 pages)
 - 0.2 Explain how is a web page with 3 local and 3 remote images is downloaded by a web browser using persistent connections with pipelining? (1 page)
 - 0.3 Summarize modern standards for encryption and hash algorithms (0.5 page)
 - 0.4 What are pros and cons of using 2.4GHz (IEEE 802.11b) versus 5Ghz (IEEE 802.11a)? (0.5 page)
0. Question set on Distributed systems (TDTS04)
 - 0.1 What are main design goals in DS? (1 page)
 - 0.2 What are main types of communication in DS? (1 page)
 - 0.3 Explain the concept of time in DS and how clocks are synchronized. (1 page)
 - 0.4 Describe functioning of Map-Reduce. (0.5 page)
 - 0.5 Compare structured vs unstructured P2P systems (0.5 page)