

CISC 7500X Midterm Exam

Short-answer questions. Each question is worth 5-points. Leaving an answer blank earns 1-point (writing a wrong answer earns 0-points).

Answers must be emailed in plain text (no formatting, no attachments). Email *must* have your *full name* at the *top*. Answers to questions must be clearly marked (question number before each answer), and be in sequence (question 1 should come before question 2, etc.).

Note, most questions are short answer: 1-4 sentences max. For the research questions, 1-4 paragraphs max.

Email must arrive by midnight on 2020-12-17.

1. Describe the underlying principles of SDLC.
2. Describe the underlying principles of agile systems development methodologies. Contrast with SDLC.
3. What are the primary characteristics of a declarative language such as SQL?
4. Describe the fundamental differences between batch processing and online processing. What is in-line processing?
5. Discuss the advantages and disadvantages of the four primary types of local area networks—contention bus, token bus, token ring, and wireless.
6. What is a data model? What does it contain? What are the objectives of data modeling? What are some different approaches to data modeling?
7. Explain why, given the benefits of a consolidated, integrated data architecture, some organizations still maintain multiple databases?
8. What factors are pushing organizations to adopt service-oriented architectures, and what factors are holding them back?
9. Explain the concept of virtualization. Explain at least one type of virtualization that is being used in IT shops today. Why is virtualization becoming important.
10. Explain the concept of Software-as-a-Service (SaaS) and describe at least one application area in which SaaS is becoming important. Do you think the use of SaaS will expand, and why or why not?
11. Differentiate between a two-tier client/server system and a three-tier client/server system. Differentiate between a fat client and a thin client. Why would a firm choose one of these approaches over the others when implementing a client/server system?
12. Describe the primary components of a decision support system, and how they interact.
13. Explain both data warehousing and data mining. How are they related?
14. What technological innovations are pushing for separation of processing from data storage (e.g. Hadoop vs Spark). What aspects of that will likely continue to exist?
15. Research 1: Amazon.com manages millions of shopping carts (subsequent order processing of products in those shopping carts) at any given moment. Explain potential database architectures that would be capable of that use case. Is there a commercial product that satisfies that use case on that scale?

16. Research 2: Google Photos manages billions of user images. Explain potential database/data-storage architectures that would be capable of that use case. Is there a commercial product that satisfies that use case on that scale?
17. Research 3: Youtube manages billions of videos. Explain potential database/data-storage architectures that would be capable of that use case. Is there a commercial product that satisfies that use case on that scale?
18. Research 4: WhatsApp manages billions of real-time messages between users. Explain potential database/data-storage architectures that would be capable of that use case. Is there a commercial product that satisfies that use case on that scale?
19. Research 5: Explain potential architectures for how MTA metrocards operate. Note: The cards need to maintain a balance, be relatively anonymous (equivalent to paying for a ride with cash), and allow entry into the system even when communication with central office is interrupted.
20. Research 6: Explain how ATM machines work, specifically how an ATM card from one bank can take money out of an ATM from another bank. What hand-shakes must be in place for this system to work. How does this work for foreign ATMs (a tourist taking cash out in local currency)?