

COMP/EECE 7012

Exam 2

Spring 2015

Name: _____,
Last name First name

Rules:

- No potty breaks.
- Turn off cell phones/devices.
- Closed book, closed note, closed neighbor.
- WEIRD! Do not write on the backs of pages. If you need more pages, ask me for some.

Reminders:

- Verify that you have all pages.
- Don't forget to write your name.
- Read each question carefully.
- Don't forget to answer every question.

1. [3pts] In the _____ development process, the various phases of development are completed sequentially, one after the other (e.g., gather all the requirements, then design the whole system, then implement the whole system, and so on).
 - a. iterative
 - b. waterfall
 - c. agile
 - d. spiral
 - e. None of the above

2. [3pts] True or false? In iterative software development, iterations should be 2 to 6 days in length.
 - a. True
 - b. False

3. [3pts] Which of the following problems does the iterative development process address more effectively than the waterfall development process?
 - a. Design erosion
 - b. Unstable requirements
 - c. Program comprehension
 - d. All of the above
 - e. None of the above

4. [3pts] Who knows the value of a requirement and who knows the cost of implementing the requirement? (The answer to this question motivates the need for certain developer-customer communications in the development process covered in class.)
 - a. The developers know both the value and the cost of requirements
 - b. The customer knows both the value and the cost of requirements
 - c. The customer knows the value of requirements, and the developers know the cost
 - d. The developers know the value of requirements, and the customers know the cost
 - e. Both the developers and the customer know the value and the cost of requirements

5. [9pts] Of the two user stories below, which was better written? Explain your answer, citing two specific reasons one is better than the other.

Title: Rails Project
Description: The system should be developed using Ruby on Rails, so that it will be less costly to develop and maintain.
Estimate: 120 days

Title: Manage Ads
Description: As a system administrator, I want to be able to manage ads, so that I can remove expired and erroneous ads.
Estimate: 2 days

6. [14pts] Create a domain model (using class diagram notation) based on the following description. Model only things that are specifically described. Include all conceptual classes, attributes, associations, and generalization relationships mentioned. Label all associations and include all multiplicities. Do not model “the system.”

You have been asked to build a conference-management system. Each conference has a name, start and end dates, and a venue. Conference venue has a name and an address. The venue also has rooms, each with a location description (e.g., “room 511”) and a seating capacity. A conference can have several tracks, each with a topic (e.g., “research”, “tutorial”, “industry”) and a designated room. Each track has one or more sessions. A session has title, a start time and an end time, and one or more presentations. There are three types of presentation: paper talk, tutorial, and demo. All presentations have a presenter name, title, and duration. A paper talk has a DOI code. A tutorial has a textbook description. A demo has a download URL.

7. [3pts] Which of the following are most vulnerable to injection attacks?

- a. Session IDs
- b. Registry keys
- c. Network communications
- d. SQL queries based on user input
- e. None of the above are vulnerable to injection attacks

8. [3pts] True or false? Authorization aims to determine who the user is, and authentication aims to restrict what operations/data the user can access.

- a. True
- b. False

9. [8pts] Consider a web app that displays user posts, similar to Twitter and Facebook. The developers of the web app have accidentally left it vulnerable to cross-site scripting attacks. Explain how you would perform a cross-site scripting attack against the web app. Be thorough in your explanation.

10. [3pts] Which of the following is not a difference between unit tests and integration tests?
- a. Unit tests should not perform I/O, whereas integration tests may do so
 - b. Unit tests should be deterministic, whereas integration tests may have non-determinism
 - c. Unit tests should be fast (less than half a second), whereas integration tests may be slower
 - d. Unit tests must be black-box tests, whereas integration tests must be white-box tests
 - e. None of the above (they are all differences)
11. [3pts] Which of the following is not a difference between black-box and white-box testing?
- a. Black-box tests are based only on the interface of a component, whereas white-box tests are based on the implementation
 - b. Black-box tests often focus on boundary cases, whereas white-box tests tend not to
 - c. White-box tests often aim to achieve particular levels of code-coverage, whereas black-box tests do not
 - d. In test-driven development, the developers generally write black-box tests, and not white-box tests
 - e. None of the above (they are all differences)
12. [3pts] In _____, you hook everything together and treat the system like a black box.
- a. test-driven development
 - b. system testing
 - c. unit testing
 - d. integration testing
 - e. None of the above

13. [7pts] Fill in the table below with a test suite that provides condition coverage of the gcd function from the Figure 1. In the Covers column, list the relevant labeled edges in the CFG that each test case covers. Some cells in the table may be left blank.

Input		Expected Output	Covers
x	y		

14. [7pts] Fill in the table below with a test suite that provides path coverage of the gcd function from the Figure 1. In the Covers column, list the relevant labeled edges in the CFG that each test case covers. Some cells in the table may be left blank. You need only cover executions that involve 1 iteration of the loop.

Input		Expected Output	Covers
x	y		

15. [14pts] Consider the following execution of a ticket-vendor system with the class diagram in Figure 2. There are two customers, Alice (Alice Adder, 901-555-1234) and Bob (Bob Bobby, 901-555-4321). Alice purchases a subscription-series reservation (date: 01/01/2015; series: 616) for a performance of the show, *Les Miserables*, on 03/03/2015 at 9:00pm. Note that there is also a 5:00pm performance on that same day. Alice's reservation includes two tickets (seats 5D and 5E). Because she's purchased them, neither ticket is available. Bob doesn't purchase any reservations at this time. Create an object diagram that depicts the model objects after this execution. Although there are no doubt many tickets/seats, you need only diagram the ones that Alice has purchased. Note that Figure 3 shows how to diagram instances of the seat qualifier.

16. [10pts] Match the design pattern to the situation to which you should apply it.

- | | |
|-----------------------------------|---|
| Observer <input type="radio"/> | <input type="radio"/> Your program must support switching among several different relational database APIs (e.g., MySQL, SQLite, Postgres), and each one varies slightly from the others. |
| Builder <input type="radio"/> | <input type="radio"/> Your program has to create and configure some big, complicated record objects before inserting them into a database. |
| Adapter <input type="radio"/> | <input type="radio"/> Sending an SMS message requires lots of big, ugly code, involving connection, message, and other objects. |
| Mediator <input type="radio"/> | <input type="radio"/> Your font-selector interface has many interrelated buttons and other widgets (e.g., such that when one button is pressed many other GUI widgets must be updated). |
| Memento <input type="radio"/> | <input type="radio"/> You're developing a server that must "listen" for request messages from the internet and process them as they arrive. |
| Interpreter <input type="radio"/> | <input type="radio"/> Your word-processing application must store data about each editing action so as to allow users to undo actions. |
| Facade <input type="radio"/> | <input type="radio"/> You want to let users create and run scripts inside your application. |

17. [3pts] Software components with tighter _____ are generally more difficult to maintain than those with looser _____.

- a. responsibilities
- b. cohesion
- c. interfaces
- d. coupling
- e. None of the above

Figures

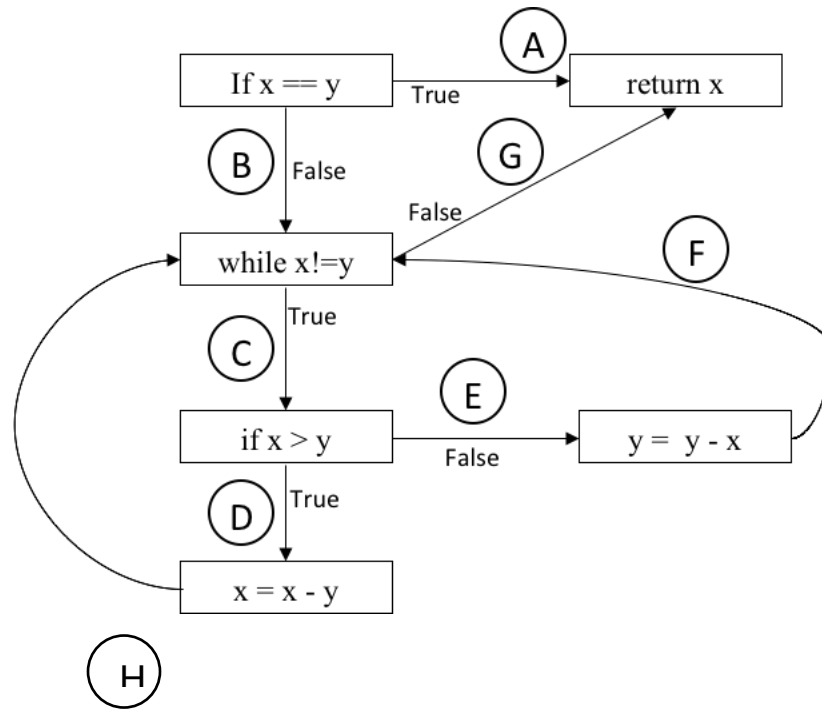


Figure 1. Control flow graph for the function `gcd(x, y)` that computes the greatest common divisor of `x` and `y`.

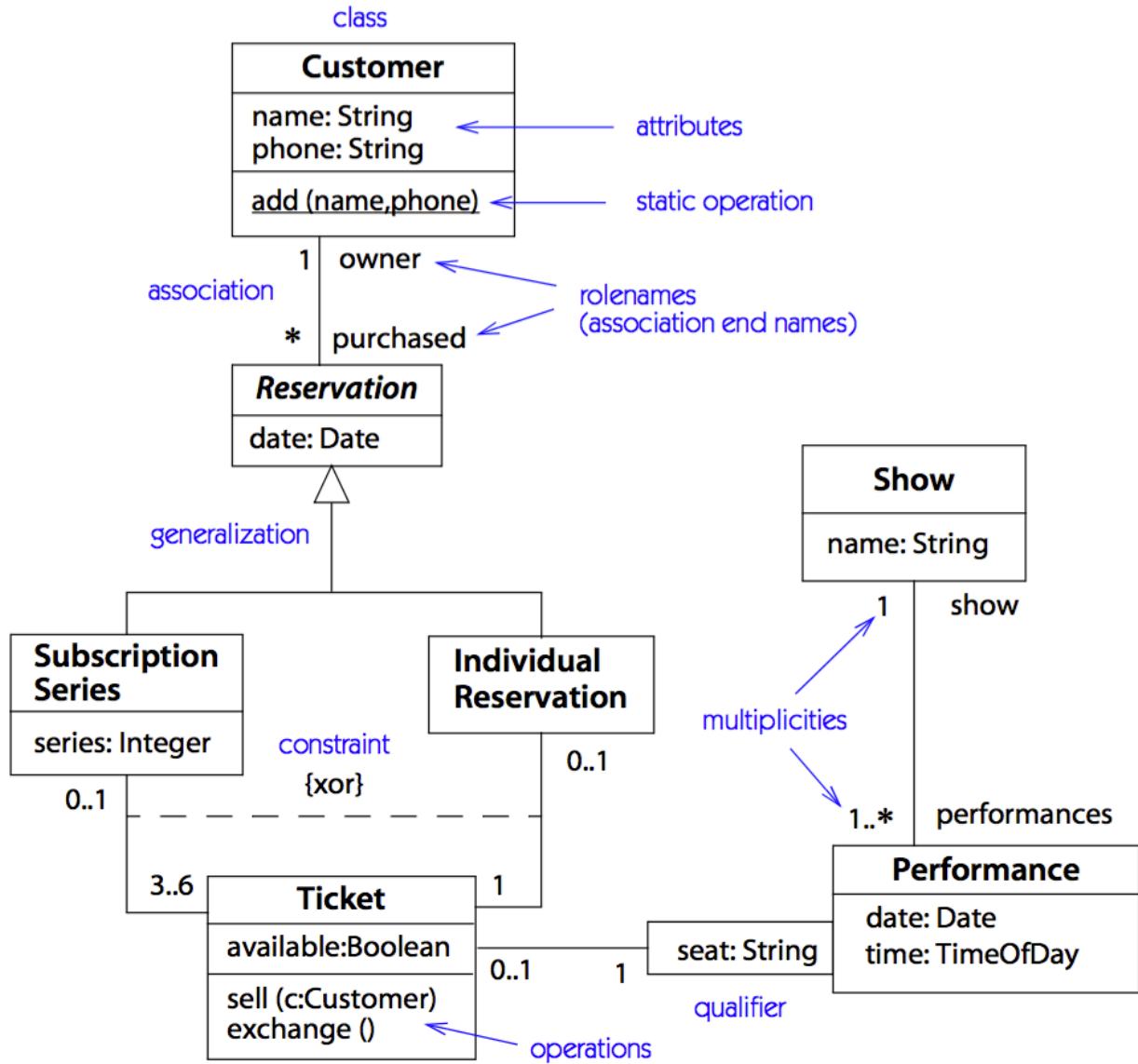


Figure 2. Class diagram for ticket-vendor system.

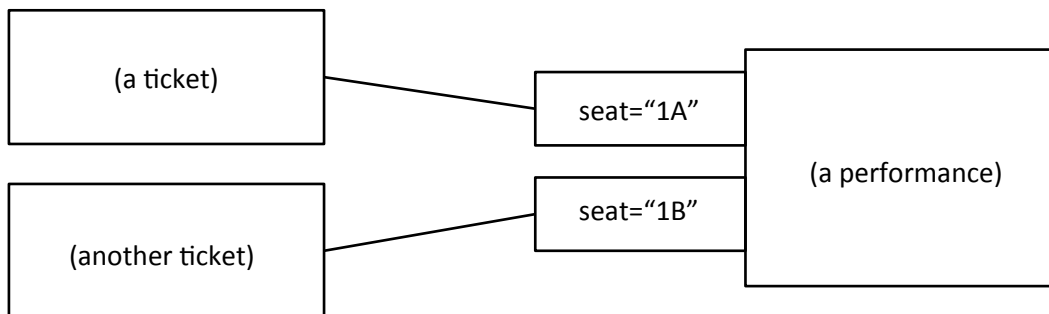


Figure 3. Example of how to diagram instances of the seat qualifier.