COMP 4081

Exam 2

Fall 2015

Name: Solutions ,
Last name First name

Rules:

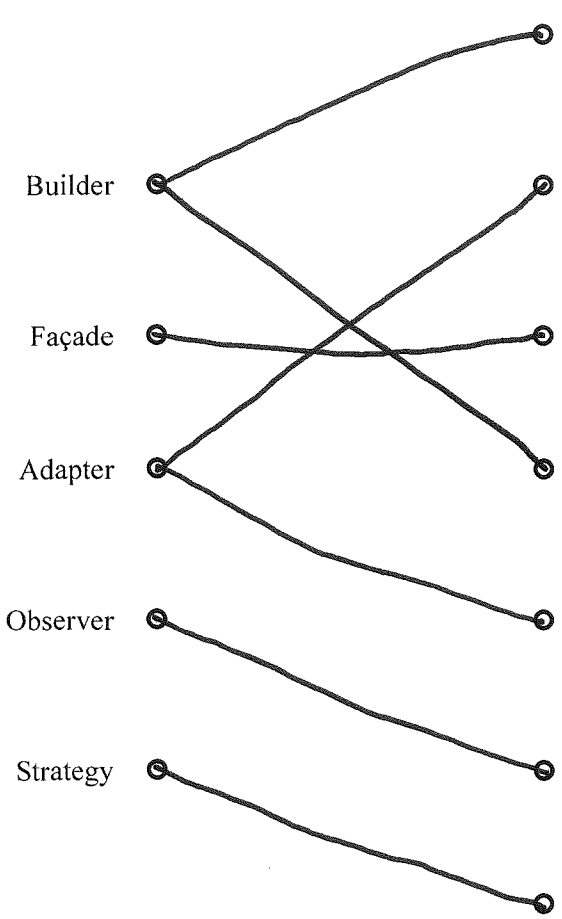
- No potty breaks.
- Turn off cell phones/devices.
- Closed book, closed note, closed neighbor.

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



Your application needs to generate large, complex XML files (from scratch).

Your program must support switching among several different database management system libraries (e.g., MySQL, PostgreSQL, SQLite), but each one has a slightly different interface.

Using a compiler subsystem requires lots of big, ugly code, involving scanner, parser, byte-code stream, and other objects.

Your program has to create a complex RTF (Rich Text Format) document object based on user input.

Your application code was written to expect a TextShape interface; however, the 3rd-party library provides a TextView object with a slightly different interface.

Your Call of Duty program needs to listen for keyboard and mouse clicks to manipulate how a player character moves, shoots, etc.

You need to implement a family of algorithms such that each algorithm provides a different way to break a stream of text into lines.

2. [2pts] True or false? In the agile development process taught in class, the development team estimates each user story and decides the priority for each story.

a. True

(b.) False

Customer decides

3. [2pts] True or false? It is better to discover defects later in the development process. That way, you can have more of the system finished before you worry about fixing things.

a. True

(b.) False

4. [9pts] Answer the following 3 related questions:

- What often-false assumption does the waterfall software engineering process make?
- Why does this false assumption cause considerable problems for waterfall?
- How does iterative development overcome these problems?

- Waterfall makes the often-false assumption that requirements are mostly stable and can be known from the start.
- This false assumption causes problems b/c the whole system may be developed before problems w/ the requirements are discovered. Furthermore, the later defects are discovered in a software product, the more expensive the are to fix.
- Iterative development overcomes these problems by maintaining a tight feedback loop. That is, feedback on the system is collected at regular intervals, revealing problems early in the process.

For the next two questions, consider the GitHub web app.

5. [4pts] Reverse engineer a user story for some functionality provided by GitHub. You may omit the estimate and priority. Use the full template and style guidelines given in class.

Many possible answers. Here's the template:

Title: <verb> <noun>

Description: As a <who>, I want <what> <why>.

6. [4pts] Describe two things that are wrong with this user story for GitHub functionality.

> AJAX Profile Form
> The update-profile form should use AJAX so that when the user presses the "Update profile" button, the data is saved, but the page does not reload.

(1) Mentions specific implementation technology (AJAX)

(2) Uses technical jargon (AJAX) that the customer might not understand

(3) Mention specific features of the user-interface design (button)

7. [2pts] Which of the following should a user story not do?

   a. Be short

   b. Describe one thing the software needs to do for the customer

   c. Discuss specific technologies

   d. Be written using language the customer understands

   e. None of the above

Consider these code fragments.

a. `end`
b. `get :index`
c. `assert_redirected_to car_path(assigns(:car))`
d. `assert_template :index`
e. `assert_template :new`
f. `assert_not_nil assigns(:cars)`
g. `get :new`
h. `test "should get index" do`
i. `post :create, car:{make:@car.make, model:@car.model, year: @car.year}`
j. `assert_response :success`

8. [6pts] Using the above fragments, create a functional test for the "index" page of a car-themed web app. The test should make sure (1) that the HTTP response does not report an error, (2) that the correct ERB is rendered (index.html.erb), and (3) that the call to `Car.all` in the controller, which sets the `@cars` instance variable, does not fail and return nil. Note that your answer should use only 6 of the above fragments.

h
b
j
d
f
a

order may vary

9. [2pts] Which of the following is true of exhaustive testing?

   a. Tests all possible inputs

   b. Generally infeasible in practice

   c. Typically results in an intractably large set of test cases even for small programs

   (d.) All of the above

   e. None of the above

10. [2pts] Which of the following is not a difference between unit tests and integration tests?

   a. Unit tests should be fast (less than half a second), whereas integration tests may be slower

   b. Unit tests should not perform I/O, whereas integration tests may do so

   c. Unit tests should be deterministic, whereas integration tests may have non-determinism

   (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. [2pts] Which of the following is not a difference between black-box and white-box testing?

   a. White-box tests often aim to achieve particular levels of code-coverage, whereas black-box tests do not

   b. Black-box tests are based only on the interface of a component, whereas white-box tests are based on the implementation

   c. Black-box tests often focus on boundary cases, whereas white-box tests tend not to

   (d.) White-box tests are made by programmers, whereas black-box tests are made by ordinary users.

   e. None of the above (they are all differences)

See labels added to Figure 1

Consider the following test cases for the `binary_search` function in Figure 1.

	array	key	imin	imax	Statements Covered	Edges Covered
a.	[1]	0	0	0	ABDFAG	23581
b.	[1]	1	0	0	ABC	24
c.	[1]	2	0	0	ABDEAG	23671
d.	[1, 2, 3]	1	0	2	ABDFABC	235824
e.	[1, 2, 3]	2	0	2	ABC	24
f.	[1, 2, 3]	3	0	2	ABDEABC	236724
g.	[1, 2, 3]	1	2	0	AG	1
h.	[1, 2, 3]	2	2	0	AG	1
i.	[1, 2, 3]	3	2	0	AG	1

12. [5pts] Select tests from the above to create a test suite that provides statement coverage of the `binary_search` function. Your suite should contain the minimum number of tests to provide the coverage.

a, F or c, d

(Need to cover statements A, B, C, D, E, F, G)

13. [5pts] Select tests from the above to create a test suite that provides condition coverage of the `binary_search` function. Your suite should contain the minimum number of tests to provide the coverage.

a, F or c, d

(Need to cover edges 1, 2, 3, 4, 5, 6)

14. [5pts] Select tests from the above to create a test suite that provides path coverage of the `binary_search` function. Cover only paths that contain one loop iteration or fewer (i.e., no path should enter the loop more than once). Your suite should contain the minimum number of tests to provide the coverage.

(g|h|i), (b|e), c, a

Any 1 of these — Any 1 of these

Possible paths	Tests that cover
1	g, h, i
24	b, e
23671	c
23581	a

15. [2pts] How do you prevent SQL injection?

(a.) Escape queries

b. Merge tables

c. Interrupt requests

d. All of the above

e. None of the above

16. [2pts] Which of the following does authorization aim to accomplish?

(a.) Restrict what operations/data the user can access

b. Flag the user if he/she misbehaves

c. Determine if the user is an attacker

d. Determine who the user is

e. None of the above

17. [2pts] Which of the following is an authentication method?

a. Secret question

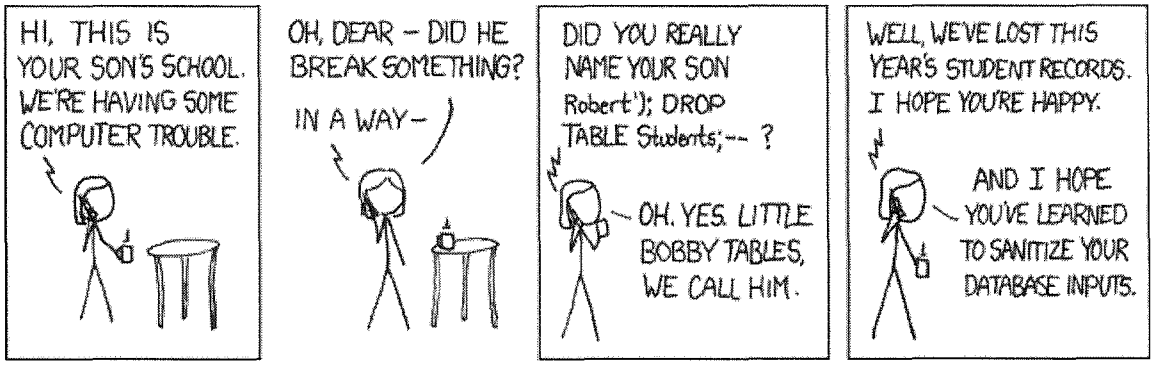
b. Password

c. Retinal scanner

d. SMS code

(e.) All of the above

18. [2pts] What type of attack did the parents in this XKCD comic perform?



a. Cross-site scripting

(b.) SQL injection

c. Reverse lookup

d. Child endangerment

e. Mask and shift

19. [2pts] Which of the following is <u>not</u> a security exploit?

a. Cross-site scripting

b. Eavesdropping

(c.) Authentication

d. SQL Injection

e. None of the above (i.e., they are all security exploits)

20. [2pts] Where does the packet sniffing happen?

(a.) Over the network

b. In the database

c. On GitHub

d. All of the above

e. None of the above

Figures

```
def binary_search(array, key, imin, imax)
  while imin <= imax
      imid = (imin + ((imax - imin) / 2)).to_i;
      if array[imid] == key
        return imid
      elsif array[imid] < key
        imin = imid + 1
      else
        imax = imid - 1
      end
  end
  return -1
end
```

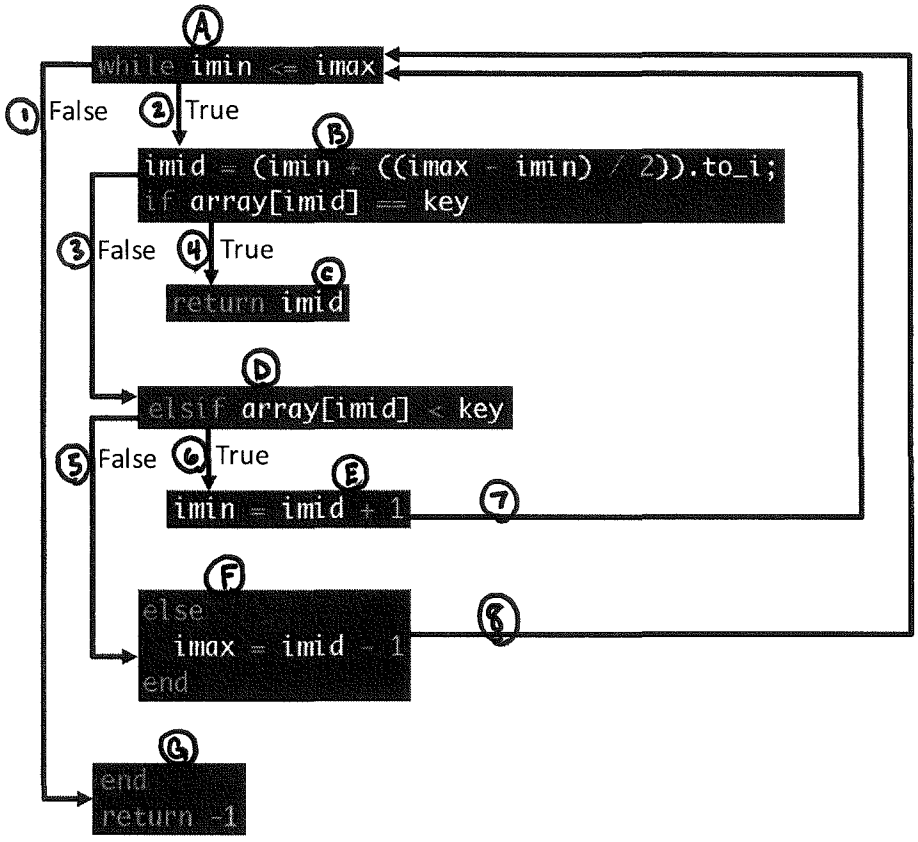


Figure 1. Binary search function and its associated control-flow graph.