

Midterm Examination

Wednesday November 6, 5pm to 6:20pm

Your full name:

Instructions: Look through the whole exam and answer the questions that you find easiest first. Answer each question in the space below the question, using the backs of the pages for extra space as necessary. There are four questions, four pages, and 50 points in total. Whenever you make an assumption, state it clearly.

You may bring and use the following materials: one PHP book and one MySQL book, your own personal hand-written notes, documents handed out in lecture or section, and a printed copy of the published lecture and section notes. You may not use any other materials.

(Question 1) [10 points]

(a) [4 points] Write a regular expression that will match only U.S. telephone numbers, formatted like these examples:

555-1076 858 555-1076 (619) 555-1076 760-555-1076

Make your regular expression easy to understand and efficient.

(b) [6 points] Write a regular expression that will match only dollar amounts that are correctly formatted. Your regular expression must enforce the following rules:

- The amount begins with a dollar symbol.
- The amount has either no decimals, or exactly two, as in \$13 and \$13.20.
- Commas appear correctly to separate thousands, millions, etc., as in \$1,234,567.89.

Make your regular expression easy to understand and efficient.

(Question 2) [15 points] This question is adapted from a sample exam written by Dr. Terry Weymouth at the University of Michigan.

Assume we have a MySQL database named db containing the following table named person:

PersonID	FirstName	LastName	Email
1	Mary	Criller	mcril@umich.edu
2	Berry	Backer	bback@umich.edu
3	Alice	Appleton	aapple@umich.edu
4	Dwaine	Drogen	ddrog@umich.edu

(a) [9 points] Write simple, understandable PHP code that uses the database to generate the following HTML:

```
<html><head><title>Us!</title></head>
<body>
(1) Alice Appleton -- aapple@umich.edu <br>
(2) Berry Backer -- bback@umich.edu <br>
(3) Mary Criller -- mcril@umich.edu <br>
(4) Dwaine Drogen -- ddrog@umich.edu <br>
</body>
</html>
```

Your PHP code should include typical function calls for connecting to the database. Error-checking is not required.

(b) [3 points] Suppose that the person table contains tens of thousands of rows. On which field should you create an index to make your code from part (a) efficient? Why?

(c) [3 points] When you are testing the speed of an SQL query with and without an index, it is important to run each version of the query several times. Explain why.

(Question 3) [15 points]

The description of the current project says “The content browser should use the information already in the database at the time of each request. You should not implement any real-time retrieval of news” (Design A). This design uses a central database.

Alternatively, to answer a user’s query, your software could gather information directly from other web sites, in real-time (Design B). This design does not need a database for storing information from the other web sites.

Neither design is always better. Each design has advantages and disadvantages.

Along each of the following dimensions, explain at least one important advantage or disadvantage for Design A. Also explain at least one important advantage or disadvantage for Design B.

If an advantage for one corresponds to a disadvantage for the other, you should still give a brief explanation separately for each design.

- (a) [3 points] scalability;
- (b) [3 points] convenience of implementing alternative presentation media (for example web-based and telephone-based);
- (c) [3 points] privacy for users;
- (d) [3 points] one important aspect of response quality (any aspect of the service that makes users happy or unhappy);
- (e) [3 points] a second different aspect of response quality, also important.

(Question 4) [10 points]

- (a) [3 points] “Most dynamic web sites have three tiers.” Explain what this statement means, and exactly what each tier is.
- (b) [3 points] In class on Monday October 30, we talked about a possible traffic report appliance, where a wireless gadget would execute VoiceXML scripts sent by a web server. Does this system have a three-tier architecture? If yes, explain how. If no, explain why not.
- (c) [2 points] Suppose that you can’t use cookies or form variables. How can you still do session propagation?
- (d) [2 points] Do sessions make sense for VoiceXML applications, like they do for HTML-based applications? Explain your answer.