

**BOWIE STATE UNIVERSITY
COMPREHENSIVE EXAMINATION FOR
MANAGEMENT INFORMATION SYSTEMS
15 October 2005**

Instructions:

The Comprehensive Examination for Management Information Systems is a three hour examination. You are required to answer **three questions**. You must respond to one question from Part A (the technical portion of the curriculum) and one question from part B (the management-related portion of the curriculum). Finally, respond to a third question from either part A or part B.

Grading the comprehensive exam requires approximately six weeks. No results will be released until all examinations, in all degree programs, have been graded. Answers to each question are graded "blind" by three faculty members with expertise in the subject matter.

Answers are graded as either "pass" or "fail." "Pass" indicates a minimum grade of B. In the event of a "fail" on the exam written comments from the graders explaining why the student's response was insufficient and what would be required for a passing grade will be supplied to the student. A student must pass two of three questions to receive a grade of "pass" for the comprehensive examination.

A set of URL's previously provided describe the general scenario, described in summary below. While the URL's provide additional background to the scenario, the summary below provides sufficient background for good responses to the comprehensive examination questions. (Note that the url for the scenario is <http://faculty.ed.umuc.edu/~meinkej/comps/comcontextoct05.pdf>)

General Scenario:

For this exam, all questions will be within the context of the Mapquest company and its presence on the Internet.

The links provided gave approximately 15 pages of background information on Mapquest. As you answer the questions on the comprehensive exam, please remember that the scoring of your response will be based on how well you can *apply* what you have learned in the core courses and additional reading of professional literature to specific questions, some of which invite reasonable speculation that outsiders cannot know as fact about what has taken and is taking place as Mapquest has evolved over the years from being a provider of paper maps to being a huge interactive and available resource on the Internet. The information provided in this introduction, and within the questions themselves, should be sufficient to allow you to demonstrate your knowledge and your ability to apply it to what is asked, whether or not you have read the background material.

The company was founded in 1967 as the Cartographic Services division of R. R. Donnelley & Sons in Chicago, and produced printed road maps for free distribution at gas stations. In February, 1996, the Mapquest website was launched. At this time, the Mapquest company has many corporate partners, and can be accessed via links from many governmental web sites.

MapQuest locates addresses through a process known as geocoding, which assigns a latitude-longitude coordinate to an address so it can be displayed on a map or used in a spatial search.

There are three basic methods of calculating a geocode: address interpolation, intersection matching and ZIP codes. Address interpolation will fail in certain cases, such as when an address is ambiguous or new. If that happens, the program will attempt to assign coordinates to an address based on the ZIP code. The system may choose one data set over another depending upon what action users take on the site -- whether they are zooming in on a neighborhood or looking at a broad view of a city and surrounding highways, for example.

Much of MapQuest's address information is derived from postal information. But the U.S. Post Office doesn't officially recognize a street until it is dedicated, so it can take up to year or longer to add a new road to the database. MapQuest does a major data update at least once every three months, which may include thousands of street segments. MapQuest encourages users to report driving direction inaccuracies and missing data, such as address errors and new roads. In response, MapQuest's data vendors will often drive the streets to improve local coverage of the area. The company currently has both print and online map divisions. Ironically, its website is one of the most printed on the Net.

Part of the company's MapQuest Mobile service lets users send driving instructions to their handsets. The feature is called Send to Phone. MapQuest Mobile, which is priced at \$3.99 per month from most wireless carriers, already lets users request and access maps and directions directly from their phones. MapQuest said its service is available on a number of compatible cell phones from major wireless carriers in the United States.

MapQuest also has a significant international presence, offering its services in many countries throughout the world, including Iraq (but "Map not available" at when one tries to zoom to level 8 in Baghdad, so obviously some service is not yet there!), Germany, France, and the United Kingdom.

Comprehensive Examination Questions:

Part A

(answer at least one question from Part A)

1. The MapQuest routing system must store a large amount of data, and be able to access that data in whatever order is needed to form a routing from one address to another. The system is capable of displaying maps of the desired location at a detailed street level (zoomed in) or at the level of the state or country (zoom out).
 - (a) Discuss characteristics of modern storage devices that support fast access of the needed data.
 - (b) Describe in convincing detail how the hardware and software work together to accomplish the zooming in or out to display the desired level of detail (or lack thereof).

2. There are many programming languages that could be used to develop systems such as the one supporting Mapquest's routing capability, and the one supporting Mapquest's map display.
 - (a) Propose a suitable language in which to program the routing capability. Justify your proposal, including contrasting your proposed language with some other language which would be less suitable.

- (b) Explain how an object-oriented language could be more suitable than an imperative/procedural language for programming the display of the maps.
3. Mapquest as launched in 1996 relied on communications through the Internet. In January, 2005, MapQuest announced a new feature designed to let subscribers send color maps to their mobile phones.
- (a) Discuss three network issues regarding Mapquest's communications via the network that existed before MapQuest announced this new feature.
 - (b) Discuss three different network issues regarding the wireless networking used to send the maps to the mobile phones.

Part B

(answer at least one question from Part B)

4. In 1967 MapQuest (under another name) was printing maps which were distributed free at gas stations. In 1996 MapQuest was providing online maps that were available for free via the Internet. Obviously, the Mapquest employees in 1967 or 1996 were not working for free.
- (a) Discuss a marketing strategy that the company could have used to support itself in both 1967 and 1996. Include discussion of the role of information systems in this strategy.
 - (b) Discuss a marketing strategy that the company could use in 1996, but not in 1967, to help support itself. Include discussion of the role of information systems in this strategy.
 - (c) Discuss two potential ethical issues in 1996 that would not have been issues in 1967.
5. Much of MapQuest's address information is derived from postal information. But the U.S. Post Office doesn't officially recognize a street until it is dedicated, so it can take up to year or longer to add a new road to the database. MapQuest does a major data update at least once every three months, which may include thousands of street segments. MapQuest encourages users to report driving direction inaccuracies and missing data, such as address errors and new roads. In response, MapQuest's data vendors will often drive the streets to improve local coverage of the area.
- (a) Discuss the place(s) in the SDLC where there would be major responsibility for making sure that this information is properly brought into the system.
 - (b) Describe (a) likely use(s) of prototyping as the capability to send instructions and maps to mobile phones was being developed.
6. MapQuest locates addresses through a process known as geocoding, which assigns a latitude-longitude coordinate to an address so it can be displayed on a map or used in a spatial search. There are three basic methods of calculating a geocode: address interpolation, intersection matching and ZIP codes. Address interpolation will fail in certain cases, such as when an address is ambiguous or new. If that happens, the program will attempt to assign coordinates to an address based on the ZIP code. The system may choose one data set over another depending upon what action users take on the site -- whether they are zooming in on a neighborhood or looking at a broad view of a city and surrounding highways, for example.
- (a) Propose a relational database structure that would support this process. Describe the tables, primary keys, and foreign keys. You do not need to draw diagrams, but do give a clear depiction of what would be in the tables and how they would be related.

- (b) Discuss the extent to which there are database concurrency issues when multiple users are requesting directions at the same time.