Creating Modern Web Applications
Computer Science 1320, Spring 2018
Out: May 7, 2018; Due: May 13 2018
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This exam is not collaborative. It should be your own work. Do not share or work with others. Please read and fill out the last page and attach it to your exam as part of the hand-in.

Please make sure your work is legible. Word-processed documents are preferable to hand-written ones. Diagrams can be hand- or program-drawn but should be easily understood and neat. Please make sure that your name is on all pages of your hand-in and that pages are clearly numbered.

You should be able to do this exam in 3-5 hours or so. If it takes more than 10 hours you are probably trying to do too much. If it takes under 2 hours, you are probably doing too little.

REMEMBER TO FILL OUT AND HAND IN THE LAST PAGE.

THE WEB APPLICATION

You just started serving as an independent contractor with a specialty in designing and creating web and mobile applications (based on your experience in the course). You are hoping to get your personal company off the ground. You advertised a lot and have finally obtained a client. Unfortunately, due to time constraints, you have to make a pitch to the client within a week (exactly when this exam is due) and you probably have other time commitments during that time. Your job is to put together the pitch.

The client is a team of experts who think they have a neat idea but have no idea how to implement it or exactly what they want. They include experts in genetics research, DNA testing, biometrics, psychology, and natural language processing. Note that they have no experts in either web application design. Neither are they or implementation perspective users of the application. They do have some (possibly contradictory) ideas in these areas, so you will have to justify your decisions.

Your task is to design a web or mobile (whichever is more appropriate) application that might meet their needs.

Their pitch:

Scientists have discovered that opposites attract, that is that people with different immunity genes are sexually attracted to each other even if they don’t know it, (See https://www.theguardian.com/science/2009/may/24/genes-human-attraction or https://geneticliteracyproject.org/2014/05/20/genes-matter-people-marry-mates-with-similar-dna-but-different-immune-systems/). Given this, and the advent of inexpensive genetic testing, they think they can implement a better dating/social application that puts people in touch with others that they are likely to be attracted to.
The company has cutting edge technology such as efficient databases and storage of genetic information, visualization of genomic data, and efficient search algorithms that can determine the ‘compatibility’ between two genomes. They also have collected a database of information from existing dating websites that tell them what questions might be important in terms of judging (non-genetic) compatibility.

You are also one of their target audience so they value your opinion as to what exactly the application should do and what it should target. They are somewhat flexible, with some of the company wanting a purely social networking application and others wanting a purely dating application. (Perhaps you can do both, or doesn’t that make sense?)

The business plan is somewhat up in the air, but they are thinking of using advertising or collaborating with a DNA testing service such as 23andMe and taking kickbacks, or a subscription model. Your design needs to accommodate any of these to give them flexibility.

Note that security and privacy are obvious concerns for this type of application. Be sure you address these in your design.

You should start by spending some time thinking about what you would want the application to do. You should think about potential users, potential uses, ways to make the application profitable, and what would differentiate it in the marketplace. What functionality is implied by the above description? What are the primary tasks? What might the web front end look like? What features would you like to see? What features are not important? What are the most important parts of the application? What can you contribute to the effort? How can you make the application functional, desirable, and unique? Do your initial ideas cover all the aspects mentioned in the client’s pitch?

Once you have an understanding of what you think the application should do, continue below.

**EVERYONE:**

1. (10%) Develop a list of requirements based on the above description and your own ideas. These should cover all aspects of the application. Start with a paragraph (or 2 or 3) that describe what your are planning to do to address their pitch.

2. (15%) Elaborate on this list by providing three scenarios showing reasonable uses of the system.

3. (10%) Develop a list of the basic functionality that the web site will have to provide (i.e. provide specifications). This should include all the principle tasks that will have to be accomplished either by the front end or the back end.

4. (5%) Enumerate any security concerns that you should make the clients aware of with respect to their application. Also provide suggestions as to what the application might do to mitigate these.

5. (5%) List the privacy concerns that clients should be aware of and enumerate what the privacy policy for the website should contain.
DESIGNERS ONLY:

6. (25%) Provide an initial design of what the pages (web or mobile) for one of the scenarios would look like. This should include an initial look-and-feel, sketches of the various pages, and a description of how the user interacts with the pages. If there are other pages that are key to the application (i.e. key pages from other scenarios or pages that you would be asked about when you meet with the client team), include sketches of them as well. If you have multiple ideas, feel free to present the alternatives.

7. (10%) Provide a description of the work flow between pages, showing the main flows based on the scenarios and detailing what other flows might be possible and accommodated. A flow diagram might be appropriate here.

8. (5%) Describe what you would recommend to handle internationalization and accessibility.

9. (15%) Describe a suite of user studies you would do to validate and improve your design ideas. Describe the studies you would recommend once the system was in prototype form.

DEVELOPERS ONLY:

10. (25%) Describe an implementation architecture for the system. This should be an initial system design. It should outline the different parts of the system, the functionality of each part, and the protocols for communicating between the parts (with examples). It should provide enough details so that one would believe the system could be implemented and that your design is feasible and appropriate.

11. (5%) For each of the tasks developed in Q3 above, specify where in the architecture that task is handled and what work will be done to implement it.

12. (10%) Describe what technologies you are recommending for implementing the front and back ends of the system. Be sure to justify your decision and to provide the pros and cons of different choices based on your architecture. You should at least consider Node.js, PHP, and Flask for the back end. You should consider plain HTML/CSS, frameworks such as angular or react, and content management systems for a web front end; consider native code (Java/Swift), HTML/CSS, Xamarin and NativeScript for a mobile front end.

13. (10%) What database technology or technologies would you recommend (in addition to what they are providing for storing genetic information) based on your architecture. Please justify your choices by considering the different alternatives. Your rationale should start by describing the types of information you that needs to be stored in the database, how it would be organized, and how it would be accessed.

14. (5%) What types of testing would you recommend. How does your design facilitate such testing?

HAVE A GOOD SUMMER!
CSCI1320 Final Exam

By signing this I affirm that the work represented here is my own and has not been done in consultation with others.

Below is a list of sources that I used in completing the exam. (Please include any texts, web sites, articles, etc., not including material directly from the class (i.e. notes, lectures, handouts, etc.):

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(Attach additional pages if needed.)

Signature: _______________________________________

Printed Name: ____________________________________

CLICKER ID: ____________________________________