**COSC 412 Summer 2018 Midterm**

**\*\* Due 6/19/2018 by 7PM \*\***

**\*\* SUBMIT TO BLACKBOARD \*\***

Fill out this section before submitting your exam (Automatic 25% deduction for not filling it out):

I, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, acknowledge that I have reviewed and fully understand the rules at the beginning of this exam as well as directions provided in each question, and that all work submitted is 100% my own.

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**Rules**

1. This is an exam.
   * It is an individual assignment. No sharing of answers or collaborating. **This includes, in any way, using a response or part of a response provided by other faculty or staff.**
   * Everything is to be written in your own words. If you have any doubts please ask me for further direction.
   * Unless otherwise stated **absolutely** nothing should be copied from your group project or any other assignment from this class (current or past semesters).
   * If any of these rules in #1 are violated I will stop reading your exam and you get a 0%. No extra credit will be awarded.
2. Any submissions received after the due date stated above (6/19/2018 @ 7PM) are subject to a 20% grade reduction per day late along with no extra credit.
   * No submissions accepted more than 5 days past due date which is 6/24/2018 @ 7PM.
3. Please answer all questions including diagrams directly in this document.
   * **Leave all original questions intact**.
   * Submit a single word document only - to be clear this should a Microsoft word document with the file extension .docx.
   * Failure to follow this rule will result in an automatic deduction of **10%** off of your final exam grade and no extra credit will be awarded.
4. No assumptions on functionality should be made unless explicitly stated in a question. Please ask me if you unsure.
   * If a specific question allows you to make assumptions then they must be clearly documented.
   * Failure to follow this rule will result in an automatic deduction of **10%** off of your final exam grade.
5. No handwritten drawings or photos.
   * Failure to follow this rule will result in an automatic deduction of **5%** off of your final exam grade.
6. Exams will be submitted to blackboard.
   * You will be allowed a single submission.
7. There are hints in each section to get you started – use them!
8. If you are at all uncertain about any part of the exam or the rules above please ask me.

**The Situation**

***Note: This situation is fictional. Use it to answer ALL questions in Parts I, II & III of the midterm.***

You have recently been hired as a software developer at a large international technology company headquartered in northern Virginia called TopTech Enterprises. TopTech Enterprises is best-known for providing high-tech solutions to the US government, however they are also well-respected worldwide. One of the key differentiating factors about TopTech is that most of their high-level management team are also founders of the company and come from various technical backgrounds in both government and commercial industries. The management team has found that this diverse background gives them an edge over the competition.

Recently the US Air Force released a Request for Proposal (RFP) for their mandatory employee training programs; this training could include both general and job-specific training. The Air Force is looking to explore what options are available to meet their needs.

They are looking to take their training programs entirely online and, as one high-level official stated, “it’s time to bring things into the 21st century!” It is the goal of the Air Force to retire the existing antiquated system over the next three years as they are fed up with the level of paperwork required by the current system.

The Air Force mandates that the new system shall have the following features:

1. Support all training for all staff. This would not include administering “field” training however it would provide a way for “field” training to be monitored and evaluated by all appropriate personnel.
2. Allow appropriate staff the ability to create or modify training programs.
3. Control access to training – meaning a given training program should only be available to people needing the training.
4. Permit staff with subordinates to enroll their subordinates in appropriate programs. The enrollee should be notified that they were enrolled while the enroller would be notified of completion.
5. Allow any staff member the ability to view their past training results, current training requirements, and upcoming training. They would also be able to set notifications to remind them of training that needs to be completed.
6. Unless the training program contains classified information, then enrollees should be able to complete it on approved mobile devices where it should be presented in a clear, “easy-to-read” format. Enrollees should also have the ability to download training modules to their approved devices given that the download is also secured.
7. While it is not necessary to make all past testing results available with the system, this new system should have a way to allow designated personnel to add prior results as they are accessed. This will facilitate faster access to old records that are viewed more frequently.

TopTech made the decision to bid on this large contract however they acknowledge that they will have a stronger solution if they partner with another company called Cyber Solutions. Cyber Solutions is widely-known to be the leader in cybersecurity for the US government; they have led over 90% of any efforts in the past 10 years for the US government requiring the management of sensitive information. They have yet to have any major issues and would handle the challenging task of managing all the users in this new system.

The Air Force is fully aware of the challenges that will go along with this task and have mandated that they be involved throughout the development process. They do not wish to micro-manage day-to-day activities however they have mandated that the product be delivered in phases throughout the duration of the contract.

*\*\* This scenario is fictional. \*\**

**Part I – 40% - Requirements and Use Cases**

**Your Task**: Using the situation above, define the requirements and use cases. Also include any assumptions; assumptions may be made for this question or you may ask me for clarification on functionality – please see details below.

**Grading Criteria**: Requirements and Use Cases are weighted equally; each is worth 20%.

I will be looking for the following:

* Did you document assumptions (if applicable) OR provide answers to any questions you ask me (if applicable)? One of the two must be included – automatic deduction of 10% for not including either one.
* Thoroughness of requirements
  + Do you have any holes or oversights?
  + Have you made undocumented assumptions?
* Do use cases cover all required functionality?
* Are requirements organized into meaningful sections and numbered?

You may ask me questions to clarify the situation as needed (like I am the client) or you may make your own assumptions. - both **MUST** be thoroughly documented and explained at the beginning of this document under a section that is clearly labelled “Assumptions”. Do not just write down random requirements or use cases with no explanation. I also expect that any assumptions adhere to the rules above.

**What to Submit**: Typed requirements and use cases. Your use cases should be well-explained should you elect to use a visual depiction.

**Part II – 40%**

**Your Tasks:**

* Use the OO Identification trick from lecture to generate a table like below for the situation described at the beginning of the document. **(10%)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Candidate Term** | **Not a class because** | **Class Name** | **Class Purpose** |
| Auditorium |  | Auditorium | The facility in which the events are held  and for which tickets are sold |
| Event |  | Event | A performance negotiated by the event planner and  presented in one or more shows |
| Basketball game | It is a type of event |  |  |
| Show |  | Show | A single presentation of an event |
| Play | It is a type of event |  |  |
| Concert | It is a type of event |  |  |

* Lay out your class diagram. (Include properties and methods). **(20%)**
  + Include a description for each class. **(5%)**
  + Explain why and how your design follows the guideline of “loose coupling and tight cohesion”.
    - Do not just provide a definition for coupling/cohesion – explain how your design adheres to the rule “loose coupling and tight cohesion”. **(15%)**
* Lay out a high-level architecture (HLA) diagram. **(5%)**
  + It should capture how your product will be structured.
  + Briefly explain each piece.
* Create a single high-level sequence diagram(s) that encompasses the system functionality. **(5%)**

**Grading Criteria:**

I will be looking for the following for Part II:

1. Have you identified objects correctly using the OO identification trick?
2. Does your class diagram adhere to best practices for OO design, and do you explain each class?
3. Have you explained how/why your design shows loose coupling and tight cohesion?
4. Does your high level architecture capture the overall structure of the system?
5. Is your sequence diagram complete and covers all functionality?
6. Documentation of assumptions (if applicable) OR answers to any questions you ask me (if applicable).

**What to Submit for Part II:** All items above (no handwritten drawings) in this document.

**PART III – 20%**

Your Task:

In a roughly one-page essay (single-spaced) please discuss:

* Which software process or combination of processes TopTech should use to manage the project and why. **(10%)**
  + Justify your choice(s) and why it is appropriate. I am not looking for just a definition.
  + Simply providing a definition will result in an automatic deduction of 5%.
* Five risks and how to mitigate each risk. **(5%)**
* How you will support the concept of continuous integration. Again – I am not looking for just a definition. **(5%)**
  + How change to both documentation and code will be managed?
  + Be specific and detailed.

Grading Criteria:

I will be looking for the following for Part III:

1. How well you justified your choice of process. Did you reword the process definition or did you tell me why it is appropriate for your team?
2. Thoroughness in identifying risks and their mitigation?
3. How you will support continuous integration? How will you control change?
4. Documentation of assumptions (if applicable) OR answers to any questions you ask me (if applicable)

**Extra Credit – (Added to midterm grade)**

**Option A**

**Additional 3% plus priority in grading order/grade return** - Submit midterm by 6/15 @ midnight – Absolutely no exceptions.

**Option B**

**Additional 3%:** *Note: The situation described here in the extra credit is NOT related to the situation used for the other parts of the midterm. Again – you may make assumptions or you may ask me for clarification – both must be clearly documented in the Extra Credit section. Failure to do so will result in no extra credit being awarded.*

**Situation**:

You work for a development company who just won a contract to design a website promoting tourism for a new resort that has just opened on a tropical island in the Caribbean; this resort happens to be the first all-inclusive resort on the island. The general idea of the site is to attract tourists by differentiating this resort from others on the island. After several meetings to develop the requirements with different stakeholders, your team has decided on a .NET site written in C#. The site will be hosted on a server running Windows Server 2012. One of the key requirements of the site is to allow visitors the ability to book various fun activities; these activities would be managed by the resort. Your lead has tasked you with identifying several vendors that provide scheduling candidates that would be compatible with the new site.

**Your Task**: **Identify the criteria** to use as a comparison for scheduling products. **Find at least three products** that will fit the requirements with minimal customization…meaning it should work right out of the box. Part of the task involves creating the comparison criteria so that you are comparing “apples to apples”; your team lead wants a minimum of 10 different criteria.

What to Submit for Extra Credit: A chart or spreadsheet comparing your three candidates using your criteria.

Grading Criteria for Extra Credit:

1. Thoroughness of comparison and your selection of comparison criteria. *Note: See me if you want to know if you are headed in the right direction with your comparison criteria.*