June 19, 2020

Graphical User Interface

Take Home Midterm Examination Due June 23, 2020

- This is the written part of a take home midterm. It is open book, notes, and online resources.
- In the Verbal part, conducted individually between me and the students, a randomly selected set of students will have to thoroughly explain their solution.
- Show all the details of your work. And carefully explain the way you have solved problems. Failure to comply with this requirement will automatically and deterministically place you on the list of students that have to explain their solution.
- You can answer in soft form or scan extremely legible written answers.
- Write your name on each page you submit.
- Your exam will be graded for accuracy, precision, and thoroughness not for length
- **Graduate students have to complete all the parts of the questions including bold font.** Undergraduate students are exempt from bold font parts.
- Please use the last digit of your student ID for details related to your personalized questions.

Background:

Your company has developed and released a new product that corresponds to the last digit of your student ID. For example, if the last digit of your student ID is nine, then your company has developed a computer managed interactive system that enables setting an appointment with a physician online

Systems

0) Your task is to develop a computer managed interactive system that enables ordering a prescription medication and / or obtaining the results of a medical lab test online.
1) Your task is to develop a computer managed interactive system that enables users to find rental apartments online.
2) Your task is to develop a computer managed interactive system that enables online setting of an appointment with a car dealership / car-shop staff member.
3) Your task is to develop a computer managed interactive system that enables online users to send presents and greeting cards to their friends and loved ones. Presents should include flowers, books, and edibles. A greeting card and present wrap are optional for the user.
4) Your task is to develop a computer managed online interactive system that enables users to buy, sell, or lease a new or used car.
5) Your task is to develop a computer managed interactive system that enables buying or selling Bitcoins (if you do not know what Bitcoins are, then please design a system for online foreign currency exchange) using several different currencies and paying methods.
6) Your task is to develop a computer managed online interactive system that enables automating parts of the operations of the TX State library system (reserving books, renewing books, paying fines etc.).
7) You task is to develop an Automatic Teller Machine (ATM).
8) Your task is to develop a computer managed online interactive system that enables automating the operation of a USPS mail office. The system should automate several of the activities performed in a USPS office (e.g., buying stamps, finding service rates, registering for passport services etc.).
9) Your task is to develop a computer managed interactive system that enables setting an appointment with a physician online.

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Test Questions

Interaction

1. (30%) Consider a device that generates events periodically. Your task is to count these events and save the number of events occurred so far (from the beginning of an execution session) into a variable (you do not have to take care of overflow). Use C++ and Qt for your implementation. You should supply only the essential code snippets. The implementation should address the following event handling programming approaches:
    a. Polling – assume that all of the system events are stored in a queue
    b. Call back functions – assume that the operating system is calling your call back functions
    c. Signals and Slots – assume that the device generates a signal every time that an event occurs
2. (10%) Write a detailed routine snippet in C++ and QT. The routine records the number of key-board clicks of lower-case characters performed by the user throughout the execution of a program

Usability evaluation

2. (60%) Assume that you have access to two versions of your company product implementation. A new version (Version A) and a previous version (version B). Your goal is to produce a detailed "system A vs. System B" usability evaluation report for the system / product assigned to you (based on your id).
    a. Design a procedure for producing a detailed "system A vs. System B" usability evaluation report of the Effectiveness and learnability of the system assigned to you.
    b. Design a detailed procedure for threshold-based pinpoint analysis of the operability of the system assigned to you.
    c. **Graduate students only**: **Checking your pinpoint analysis error rate, it looks like your system is generating a high rate of false-positive errors (where positive means that a segment is classified as an excessive effort segment). Consider your pinpoint analysis procedure and propose a way to reduce the rate of these errors. Explain, how will your adjustment affect the error of false alarm errors in your system?**