Homework Assignment 1 (100 Points)
CSE 464, Fall 2022 SCAI,
Arizona State University
Due: By Saturday 17th 11:59 pm

Please see the submission instructions given in the first page

Note: This is an individual homework, DO NOT collaborate

Introduction: This assignment helps you to reinforce the topics discussed in the class including

a) Basic terminology of Testing and Quality Assurance, Software Quality, Software Quality Assurance, and Intro to Testing.
b) Categories of testing and equivalent class testing.

Submission Instruction: Prepare a PDF document with your answers to question 1, 2, 3, (a). For 3 (b) prepare a java program containing your Junit test cases. Then make a zip file containing your PDF and the java program submit Online to the canvas. This is an individual submission. No collaboration expected

1. **[Software Quality 30 Pts]** During lectures (WhatisSoftwareQaulity.ppt) we discussed the importance of software quality frameworks and specifics of the IOS 25010 quality framework. Read lecture notes and the following article before answering this question https://iso25000.com/index.php/en/iso-25000-standards/iso-25010

   a) Using your own words, describe each quality categories defined in the IOS 25010 quality framework

   b) Quality factors should be measurable and testable to assess the quality of a software system. For example, if the performance is an important quality factor, software designers need to define how to measure and test the performance. It can be the response time in milliseconds. Following is some of the measurable quality factors.

      Time behavior, adaptability, recoverability, Interoperability, data integrity, learnability, useful help features, availability, modifiability, confidentiality.

      i.) Group above quality factors based on the quality categories identified in (a) above

ii.) Briefly explain how to measure and test following quality factors for an online patient care system for a hospital. This website keeps medical record of patients that doctors and healthcare providers can use to determine the patient medical needs. It also has a patient portal where patient can view limited information about test results, treatment plan, and healthcare provider's contact information. Each user must have verified credentials to login to the system and only authenticated and authorized users can view medical records. Patients should be able to retrieve information after login to the system within 30 seconds and the system should not have downtime more than 30 minutes incases of the technical failure.

Time behavior, confidentiality, data integrity, and recoverability

2. **[Password Verification 20 Points]** One of functionalities of a password generator/verifier is to determine if a password user selected is strong enough.

a) Two essential password rules:

Following two rules are bare minimal that you should follow while creating a password.

Rule 1 – Password Length: Stick with passwords that are at least 8 characters in length. The more character in the passwords is better, as the time taken to crack the password by an attacker will be longer. 10 characters or longer are better.

Rule 2 – Password Complexity: Should contain at least one character from each of the following group. At least 4 characters in your passwords should be each one of the following.

1. Lower case alphabets
2. Upper case alphabets
3. Numbers
4. Special Characters

We can call the above two rules combined as **"8 4 Rule"** (Eight Four Rule):

- **8** = 8 characters minimum length
- **4** = 1 lower case + 1 upper case + 1 number + 1 special character.

(Source: http://www.thegeekstuff.com/2008/06/the-ultimate-guide-for-creating-strong-passwords/)

Suppose you are using equivalent partitioning technique for testing if the password user selected is acceptable.

a) Identify equivalent partitions based on the above description
b) Develop test cases in a tabular format given below based on your equivalent partitions above. Use Weak Normal form

Test case #	Partition Tested	Input(s)	Expected output

3.[50 Points] Equivalent Partitions: Finding roots of a quadratic equation
a) **[25 Pts]** Study the Roots.java and usingRoots.java programs given. Roots.java program finds the roots of a quadratic equation in the form ax^2 + bx + c=0. If you are to design test cases to test the Roots.java program using equivalence partitioning:

i) Identify equivalent classes to test the Roots program. Briefly describe your strategy first.

ii) Design test cases based on your equivalence classes. Use strong robust classification.

For this part you need submit

Equivalent partitions and test cases based on your equivalent partitions. Test cases should be in a tabular format discussed in the class.

b)[25 Pts] Develop JUnit test cases test to your program based on test cases above (a) **for equivalent partitions**. Develop a Junit test program based on equivalent partitions. Run your test cases and verify your program is error free.

For this part you need submit

i. Junit test programs with test cases implemented.