SOFT 437
Quiz #1
January 29, 2015

Do not turn this page until the quiz officially begins.

STUDENT NUMBER ____ ____ ____ ____ ____ ____ ____ ____

Please do not write your name anywhere on this quiz. I recommend writing your student number at the top of each page.

You are expected to behave considerately towards your fellow students. Noisy or disruptive behavior will not be tolerated. **Turn your phone off.** If you finish early, you may quietly leave the room after handing in your quiz. **However, nobody will be permitted to leave during the last 10 minutes of the quiz.**

If you leave the quiz early, do not stand around outside the exam room talking. This is extremely distracting for students still working.

Academic dishonesty will not be tolerated. Keep your eyes on your own paper or the blackboard at the front of the room. You may bring one sheet of paper to the quiz. You may not refer to other notes or books during the quiz. You may not use a calculator or computer during the quiz.

Please try to write your answers in the space provided. If you need to write your answers elsewhere, please indicate clearly where on the quiz your answers are to be found.

You have 50 **minutes** to complete the quiz. Good luck!

Question 1	/8
Question 2	/8
Question 3	/8
Question 4	/8
Total	/32

Student Name: **Student ID:**

Question 1 – Software Performance **(8 marks)**

1) What are **response time** and **throughput** in software performance terminology? Give an example of each. (2 marks)
2) Describe the two important folds of Software Performance Engineering (SPE): ***responsiveness*** and ***scalability.*** (2 marks)
3) What is the "**fix-it-later**" approach? How does it affect software performance? (2 marks)
4) What is **Performance Balance**? (2 marks)
(Hint: in light of the trade-offs between resource requirements and capacity)

Answer:

1)
- Response time is the time required to respond to a request. For example, time required for an ATM withdraw transaction.
- Throughput is the number of requests that can be processed in some specified time interval An ATM network may be required to process 100,000 transactions per hour.

2)
- Responsiveness is the ability of a system to meet its objectives for response time or throughput. Scalability is the ability of a system to continue to meet its response time or throughput objectives as the demand for its functionality increases.

3)
Fix-it-later is the approach of overlooking the performance of software systems to quickly release the system to the market (or intended users). Performance issues are addressed later when they arise.

4)
Performance balance is to trade-off between the benefits that SPE may bring and the cost it might incur, so that resources are adequately sufficient to achieve the performance objective but not too much than required.

Student Name: **Student ID:**

Question 2 – Software Life Cycle **(8 marks)**

There are several well-known models of the software life cycle. During the course, we studied the waterfall model.

1) List and briefly describe each stage of the waterfall model. (4 marks)
2) Identify where performance awareness typically occurs in the traditional software development process. (1 marks)
3) Identify where performance awareness should occur in the life cycle. (1 marks)
4) Justify your choice for 3. (2 marks)

Answer:

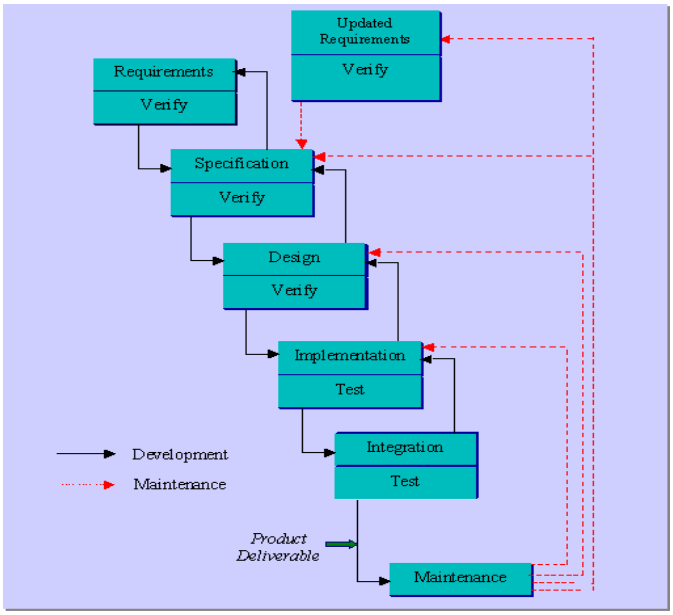


Fig. 1.2 - Schematic illustrating the Waterfall Model

2)
Performance awareness typically occurs in the integration stage of the traditional software development process

3)
Performance awareness should occur in the early stage, such as requirement, specification and design stage

4)
Benefits of beginning SPE in early lifecycle steps:

- Increased productivity — don't need to throw bad design
- Improved quality and usefulness of the resulting software product — selecting suitable design choices
- Controlled costs of the supporting hardware and software — identifying necessary equipment
- Enhanced productivity during the implementation, testing, and early operational stages — ensuring that sufficient computing power is available

Student Name: **Student ID:**

Question 3 – Software Performance Engineering (SPE) **(8 marks)**

An e-store displays catalogs of items online. The catalog includes pictures of items, detailed item specification, prices, and promotions. All the product information is stored in a central database and displayed on the client's browser upon requests. The e-store website encrypts all transmitted data to the user using Secure Sockets layer (SSL)*. Every time a browser makes an https request for a page, the server that the user is connecting to encrypts the transmitted data. During the sale seasons, such e-stores experience a significant high volume of requests. The current market is very competitive and e-stores must maintain a competitive edge over competitors.

1) Describe the SPE concept. (4 marks)
2) Is SPE necessary for this kind of software? Justify your answer. (4 marks)

Answer:
1)
Software Performance Engineering (SPE) is a ***systematic***, ***quantitative*** approach to constructing software systems to meet performance objectives

- Begins early in the software lifecycle
- Uses quantitative methods
- Identifies problems before developers invest significant time in implementation
- Used through detailed design, coding, and testing

2)
Yes
A large number of users can use the web site at the same time. The encryption is the bottleneck of the performance. The performance of the encryption directly impact a user's perception about the responsiveness of the website.

*SSL is identified by a little gold lock symbol that appears in the Web address bar which also shows "https" instead of "http".

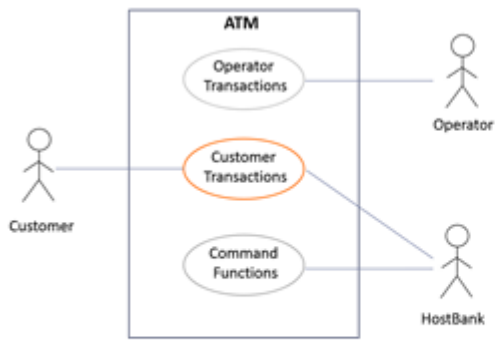
Student Name: **Student ID:**

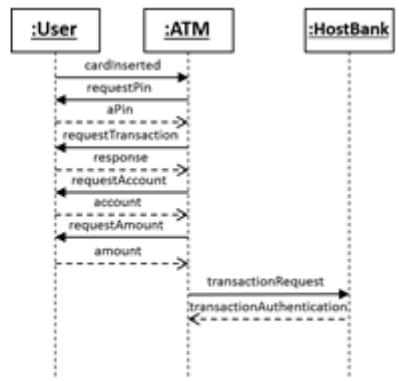
Question 4 –Use Cases and Key Performance Scenario (8 marks)

In the ATM example that we have studied in class, there are three possible use cases: operator transactions (e.g., loading cash), customer transactions (e.g., checking balance and withdrawal), functional commands (e.g., taking the ATM offline).

1) Draw the use case diagram, identify critical cases to performance and explain why. (2 marks)
2) Select key performance scenarios and justify your choice. (2 marks)
3) Draw the UML sequence diagram of the selected performance scenario. (2 marks)
4) Draw the execution graph showing all alternative paths. You may assume any arbitrary probability of execution to alternatives. (2 marks)

Answer:





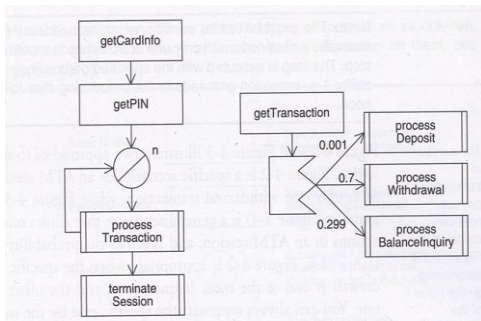


Figure 4-3: Execution Graph for General ATM Scenario

Figure 4-4: Subgraph for processTransaction Expanded Node