National University of Computer and Emerging Sciences

Software Re-engineering (SE4001)

Date: April 1st 2024

Course Instructor: Dr. Syed Muazzam Ali Shah

Instructions:

- Questions comprehension is part of examination.
- Out of order questions will not be graded.
- Return the question paper and make sure to keep it inside your answer sheet.
- Read each question completely before answering it. There are **3 questions and 2 pages**.
- In case of any ambiguity, you may make assumption. However, your assumption should not contradict any statement in the question paper.

Sessional-II Exam

Total Time: 1 Hours
Total Marks: 30
Total Questions: 03

Semester: SP-2024
Campus: Karachi
Dept: Software Engineering

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Student Name Roll No Section Student Signature

***CLO # 2:* Demonstrate and utilize reengineering techniques to maintain and modify software systems.**

Q1: Consider the given case study, answer the questions at the end of the case study given below ..... [10 marks]

The SoftTech software industry is solely concerned with re-engineering software projects and recently won a software project to be re-engineered. The software project is related with the library management system of a university that was implemented in an old programming language that became obsolete nowadays with the advent of more advanced and emerging programming languages. Currently, they are at the middle of the re-engineering process, and they have completed sufficient working on the project and some significant activities still remaining to accomplish. The have performed several tasks including configuration management, analysis, parsing, isolation, procedural granularity, data reduction and representation, functionalization and program reading, object identification and interpretation. Now they are planning to perform activities associated with causation and regeneration tiers.

1. Identify the framework that the **SoftTech** industry selected for re-engineering. [01 mark]

Answer: Source code reengineering reference model.

2. Determine the phases of the identified framework in sequential order. [02 marks]

Answer:

i. **Function**
ii. **Documentation**
iii. **Repository database**
iv. **Metrication**

3. Specify the exact phase of the framework they are currently working on. [01 mark]

Answer: Function

4. Specify and briefly discuss all the activities that the technical team of the **SoftTech** industry must perform at the causation and regeneration tiers, respectively. [06 marks]

Answer:

❖ **Causation:**

This layer performs the following functions:

- **Specification of actions:**
  This refers to the services provided to the user.
- **Specification of constraints:**
  This refers to the limitations within which the software correctly operates.
- **Modification of specification:**
  The specification is extended and/or reduced to accurately reflect the user's requirements.

❖ **Regeneration:**

Regeneration means re-implementing the source code using the requirements and the functional specification. This layer performs the following functions:

- **Generation of design:**
  This refers to the production and documentation of the detailed design.
- **Generation of code:**
  This means generating new code by reusing portions of the original code and using standard libraries.
- **Test generation:**
  New tests are generated to perform unit and integration tests on the source code developed and reused.

CLO # 1: Define the concepts and techniques of software reengineering.

Q2: Briefly answer the following questions …… [10 marks]

1. Differentiate between low-level reverse engineering and high-level reverse engineering. [02 marks]

Answer:

❖ **High-Level Reverse Engineering:**
It means creating abstractions of source code in the form of design, architecture, and/or documentation.

❖ **Low-Level Reverse Engineering:**
It means creating source code from object code or assembly code.

2. What does program migration mean? [02 marks]

Answer:

Program migration accepts the source code for the system to be reengineered as input and produces new source code as output for the target system.

3. Discuss the technical and economic issues addressed by the analysis stage of the phase re-engineering model. [02 marks]

Answer:

Analysis addresses three technical and one economic issue.

Technical issues:

1. The first technical issue concerns the present state of the system to be reengineered and understanding its properties.
2. The second technical issue concerns the identification of the need for the system to be reengineered.
3. The third technical issue concerns the specification of the characteristics of the new system to be produced.

Economic issue:

The economic issue concerns a cost and benefit analysis of the reengineering project.
The economics of reengineering must compare with the Costs, Benefits, and Risks of developing a new system

As well as the costs and risks of maintaining an old system.

4. Discuss the advantages of the evolutionary approach to software re-engineering. [02 marks]

Answer:

Evolutionary Approach Advantages:

1. The resulting design is more cohesive.
2. The scope of individual components is reduced.

5. What does collect inventory mean? [02 marks]

Answer:

Form a base line for the knowledge about the operational system by locating all program files, documents, test plans, and history of maintenance.

CLO # 2: **Demonstrate and utilize reengineering techniques to maintain and modify software systems.**

Q3: Draw a system sequence diagram to withdraw amount from ATM machine by considering the given case study below…… [10 marks]

a. The customer arrives at the ATM machine booth and inserts the ATM card into the machine.
b. The ATM machine prompts to enter the pin code.
c. The customer enters the pin code.
d. The ATM machine remains busy while processing the validity of the pin code.
e. If the pin code is invalid, the machine will display a message showing that the pin code is invalid.
f. Repeat steps **c to e** until the customer enters a valid pin code.
g. If the pin code is valid, the ATM machine displays several options.
h. The customer selects the withdraw option.
i. The ATM machine prompts to enter the amount.
j. The customer enters the desired amount.
k. If the customer enters a valid amount, the ATM machine returns the requested amount, showing a message that the transaction was made successfully, and prints the receipt.
l. Otherwise, the ATM machine shows a message that the entered amount is invalid.

Solution: