**ASSIGNMENT 3**

**SOFTWARE DESIGN & ARCHITECTURE**

**COURSE INSTRUCTOR: ENGR. MAJID KALEEM**

**GROUP MEMBERS:**

Muhammad Daud Mehboob 02-131212-046

Muhammad Shoaib Akhter Qadri 02-131212-009

Muhammad Zeeshan Ali 02-131212-080

* **ATAM (ARCHITECTURE TRADEOFF ANALYSIS METHOD):**

**MERITS:**

ATAM helps identify and evaluate architectural risks and trade-offs, considering multiple quality attributes. It provides a structured approach to assess the architecture's suitability, performance, and scalability. ATAM encourages early identification of potential issues and supports informed decision-making.

**DEMERITS:**

ATAM can be time-consuming and resource-intensive. It requires skilled evaluators to conduct the analysis effectively. Large-scale applications may pose challenges in managing complexity and ensuring comprehensive coverage.

* **FMEA (FAILURE MODE AND EFFECTS ANALYSIS):**

**MERITS:**

FMEA identifies and assesses potential failures in the architecture, focusing on their effects and criticality. It helps prioritize risks and enables proactive risk mitigation. FMEA provides a systematic approach to identify vulnerabilities and enhance the system's reliability and fault tolerance.

**DEMERITS:**

FMEA relies heavily on the knowledge and experience of evaluators. It may be challenging to anticipate all possible failure modes accurately. FMEA may not adequately address non-functional requirements beyond reliability and fault tolerance.

* **QUANTITATIVE EVALUATION:**

**MERITS:**

This technique involves using quantitative metrics and models to evaluate the architecture's performance, scalability, and other quality attributes. It provides objective data for decision-making, supports performance optimization, and enables capacity planning. Quantitative evaluation allows for precise analysis and prediction of system behavior.

**DEMERITS:**

Quantitative evaluation requires expertise in statistical analysis and modeling. It can be challenging to define accurate metrics and models for certain architectural qualities. Gathering relevant data for analysis may also be time-consuming

* **PRA (PATTERN-BASED REVIEW AND ANALYSIS):**

**MERITS:**

PRA leverages known architectural patterns and best practices to evaluate the architecture. It helps ensure architectural alignment with industry standards and proven solutions. PRA facilitates reuse of successful patterns and promotes consistency and maintainability in the architecture.

**DEMERITS:**

PRA heavily relies on the availability of suitable patterns and may limit innovation and flexibility. It may not address specific domain or application requirements that deviate from established patterns. PRA should be complemented with other techniques to cover the entire architecture adequately.

* **SCENARIO-BASED EVALUATION:**

**MERITS:**

Scenario-based evaluation focuses on creating and analyzing realistic usage scenarios to assess the architecture's fitness for purpose. It helps identify architectural strengths and weaknesses, supports requirements validation, and facilitates user-centered design. Scenario-based evaluation encourages a holistic understanding of the system's behavior and user experience.

**DEMERITS:**

Scenario-based evaluation relies on the accuracy and completeness of the created scenarios. It can be time-consuming to cover all possible scenarios comprehensively. Evaluators need a good understanding of user needs and system behavior to create meaningful scenarios.

**Conclusion:**

For an online collaborative application, a combination of ATAM and Scenario-Based Evaluation would be well-suited. ATAM would provide a systematic evaluation of architectural risks and trade-offs, considering multiple quality attributes relevant to the application. Scenario-Based Evaluation would complement it by assessing how well the architecture supports collaborative features, user interactions, and the desired user experience. This combination would provide a comprehensive evaluation, covering both functional and non-functional aspects of the architecture.