Problem Statement for a Mock Exam: Decentralised Online Shopping

E-commerce in Thailand is currently thriving and is projected to reach a market value of 700 billion baht by 2024. However, local sellers are facing challenges due to increased competition from cheaper imported goods. To address this issue, the creation of an online shopping platform specifically for Thai sellers has been proposed.

This platform will include features similar to popular apps like Shopee and Lazada, but with a focus on supporting local businesses.

At this stage in prototype development, security is a major concern. In order to verify the identity of local sellers, sensitive information such as bank statements and facial recognition data will be collected during the registration process. It is crucial that this information remains secure and protected from potential system breaches.

Based on the above information, your tasks are the following:

1. Compose a system with a maximum of 6 services/components which meet the security requirement via a structural diagram. Elaborate why your composition can achieve the requirement. *(Hint: Component diagram is structural diagram)*.
2. Rationalise whether the system should use REST, SOAP, ESB or any combination of them to help in achieving the above security requirement. Illustrate a case where the above communication techniques can help in the requirement with a behavioural diagram. *(Hint: Communication diagram and sequence diagram are considered behavioural diagrams)*
3. Elaborate your deployment decisions and testing strategies which support the above security requirement.

Problem Statement for a Mock Exam: Towards Decentralised Social Network

In a presentation at SIGGRAPH 2024 today (July 30th, 2024), Mark Zuckerberg, CEO of Meta, voiced his annoyance with the recent shift in the software landscape toward more closed systems. This trend is apparent in the evolution of Large Language Models (LLMs) and Apple's longstanding dominance of the smart device market in many countries over the past decade.

As a junior developer at Facebook, you have been assigned to construct a prototype that incorporates a third-party authentication system into Facebook. The purpose of this project is to explore the potential for Facebook to incorporate various authentication methods into its systems as part of an effort to transition toward a more decentralised social network. The primary focus of this prototype is security, given the varying security measures used by different platforms' authentication tokens and the potential vulnerabilities that could arise from 0-day exploits. Your responsibility is to ensure that if an attacker successfully breaches Facebook's system, there will be minimal or no disclosure of Facebook users' personal information.

Based on the above information, your tasks are the following:

1. Compose a system with a maximum of 6 services/components which meet the security requirement via a structural diagram. Elaborate why your composition can achieve the requirement. *(Hint: Component diagram is structural diagram)*.
2. Rationalise whether the system should use REST, SOAP, ESB or any combination of them to help in achieving the above security requirement. Illustrate a case where the above communication techniques can help in the requirement with a behavioural diagram. *(Hint: Communication diagram and sequence diagram are considered behavioural diagrams)*
3. Elaborate your deployment decisions and testing strategies which support the above security requirement.

Problem Statement for a Mock Exam: Universal Streaming Service

Because of the growing number of streaming services and their desire to offer exclusive contents, users often need to subscribe to multiple platforms to watch what they really want. This situation is similar to the cable TV era when viewers had to rely on TV guides to navigate different channels. To address this issue, a start-up streaming service aims to bring various streaming services (such as Netflix, HBO Max, and Disney+) together in one place, making it easier for users to access all their content from a single platform.

Your task is to design the back-end of this innovative streaming service. This system should be able to fetch catalogues (including series, movies, and anime) from different streaming libraries and deliver the content to the platform's streamer. The streamer then combines the raw stream with additional elements like subtitles and soundtracks before transmitting it to the user's browser. At this development stage, reachability is crucial; the platform's streamer must be capable of streaming content to users' browsers consistently, with minimal or no interruptions.

Based on the above information, your tasks are the following:

1. Compose a SOA system with a maximum of 6 services/components which meet the reachability requirement via a structural diagram. Elaborate why your composition can achieve the requirement. *(Hint: Component diagram is structural diagram)*.
2. Rationalise whether the system should use REST, SOAP, ESB or any combination of them to help in achieving the above reachability requirement. Illustrate a case where the above communication techniques can help in the requirement with a behavioural diagram. *(Hint: Communication diagram and sequence diagram are considered behavioural diagrams)*
3. Elaborate your deployment decisions and testing strategies which support the above reachability requirement.

Problem Statement for a Mock Exam: Hybrid Digital Wallet

Following reports that Donald Trump vows to stockpile Bitcoin if he becomes President of the United States again, the bitcoin's value has increased by 5% toward its record high. This situation also attracts the concept of "stablecoin," which had waned since Facebook proposed "Libra" a few years ago.

In your role as a junior developer at a FinTech firm, you have been assigned to design a digital-wallet prototype that can handle both traditional and cryptocurrency transactions, similar to TrueMoney Wallet. The main requirement is reachability; it is essential to ensure that the withdrawal and deposit systems are consistently available to users. Any downtime could result in missed opportunities and financial losses due to the commission percentage from each transaction.

Based on the above information, your tasks are the following:

1. Compose a SOA system with a maximum of 6 services/components which meet the reachability requirement via a structural diagram. Elaborate why your composition can achieve the requirement. *(Hint: Component diagram is structural diagram)*.
2. Rationalise whether the system should use REST, SOAP, ESB or any combination of them to help in achieving the above reachability requirement. Illustrate a case where the above communication techniques can help in the requirement with a behavioural diagram. *(Hint: Communication diagram and sequence diagram are considered behavioural diagrams)*
3. Elaborate your deployment decisions and testing strategies which support the above reachability requirement.

Problem Statement for a Mock Exam: Poppo's Recommendation System

Poppo, a (fictional) convenience store chain that has been in business since the early 1980s, is experiencing a gradual decline in customers at several locations due to shifts in consumer behaviour.

In an effort to move towards a digital retail model, you have been asked to create a recommendation system powered by artificial intelligence (AI). This system will be fueled by a large amount of data on customer preferences that Poppo has gathered over the course of 35 years. The main requirement for this system is adaptability, meaning that the database of consumer preferences and the AI algorithms should be separate from one another. This ensures that any updates or modifications to these components can be done independently.

Based on the above information, your tasks are the following:

1. Compose a SOA system with a maximum of 6 services/components which meet the adaptability requirement via a structural diagram. Elaborate why your composition can achieve the requirement. *(Hint: Component diagram is structural diagram)*.
2. Rationalise whether the system should use REST, SOAP, ESB or any combination of them to help in achieving the above adaptability requirement. Illustrate a case where the above communication techniques can help in the requirement with a behavioural diagram. *(Hint: Communication diagram and sequence diagram are considered behavioural diagrams)*
3. Elaborate your deployment decisions and testing strategies which support the above adaptability requirement.