# System Integration and Architecture (SIA301)

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**Section: 3 - IT 5**

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1. What are the key stages in the system integration process, and how do they contribute to the overall success of integrating disparate systems within an organization? (15 points)

The five key stages for system integration process are requirements gathering, analysis, architecture design, system integration design, and implementation. All of these stages are done one-by-one. It cannot go from another stage without finishing the current stage. These key stages contribute to the overall success of integrating disparate systems within the organization by making sure that it has an excellent integration. In every stage, it helps ensure that there are no room for errors before going onto the next stage to help mitigate risks, resolve issues early, and guarantees compatibility across components.

2. Discuss the challenges and risks associated with the system integration process, and propose strategies to mitigate these challenges in large-scale integration projects. (15 points)

A lot of risks and challenges pops out when it comes to integrated systems. Security challenges is one thing that put the integrated systems at risk. Some examples of security challenge for integrated system are data breaches, man-in-the-middle attacks, and vulnerable APIs. For data breaches, it can be mitigated by imposing regular security audits and encryption. That is because regular security audits can detect vulnerabilities and address them early and encryption codes each data to make sure that only authorized person can open it. Man-in-the-middles attacks can be mitigated using a secure middleware because it manages communication between systems, and ensure data integrity. Lastly, vulnerable APIs can be mitigated by using an API gateway to manage, to authenticate, and to monitor traffic in API. All of these challenges can be mitigated by doing all the solutions. Even if it is in a large-scale integration project, it doesn't matter.

3. How do Application Programming Interfaces (APIs) enable communication and data exchange between software systems, and what are the best practices for designing a secure and efficient API? (15 points)

APIs enable communication between software systems by using a set of definitions and protocols. It has a standardized communication that that provides a common language through defined protocols like HTTP and HTTPS and data formats like JSON or XML. To make sure that APIs are secure and efficient, one way is to use HTTPS and Secure Communication Protocols because it protects data in transit and it prevents interception from unauthorized person. Another practice is to implement a strong authentication and authorization through industry-standard methods like API keys or OAuth 2.0, by doing this it can assure that only authorized users can access or interact with the API. Additionally, limiting data exposure can be a best practice for a secure and efficient API. By using parametized queries, it can avoid over exposure of data.

4. Analyze the impact of API-driven architectures on modern software development, highlighting the advantages and potential drawbacks of this approach. (15 points)

Traditional web applications were tightly integrated that it leads to scalability issues together with challenges it maintaining and updating the system. API driven architectures on modern development helps address these issues. API driven development are more scalable, flexible to use different technologies and frameworks for every layer of the application, promotes code reusability, and more secured. However, with these advantages there are also potential drawbacks. One of it is added management burden because APIs used within businesses can quickly add up. Second potential drawback is security because as APIs become common in all businesses, it will catch the attention of hackers. Lastly is the skills of a team, API-driven architectures can only succeed if everyone has the right set of knowledge and skills about APIs.

5. Evaluate the role of Integration Service Platforms in facilitating enterprise application integration (EAI) and the adoption of digital transformation strategies. What are the key features and benefits of such platforms? (20 points)

The role of Integration service platform  is a critical part in facilitating enterprise application integration and supporting digital transformation strategies. It serves as a central hub that lets diverse applications, data sources, and services to communicate, exchange data, and work together seamlessly. The key features are data transformation and mapping to make sure that all data are compatible across systems. Another feature is its scalability and cloud compatibility because it enables easy integration with cloud services, supporting both on-premises and cloud-based applications. Security and compliance is another feature of Integration Service Platform, it has data encryption, access control, authentication, and audit logging. There are still many key features for Integration Service Platform but the mentioned above are main features. On the benefits of Integration Service Platform, it improves efficiency and productivity, it enhanced data consistency and quality, it is more agile and flexible, it saves cost and has ROI and many more.