Course: Software Technologies and Enterprise Architecture

WEEK 1: Introduction to Enterprise Architecture

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Course Description

- This course provides an exploration of Enterprise Architecture (EA) as a strategic framework for aligning information and communication technology (ICT) with business objectives.
- Students will learn how to design, implement, and maintain effective business models that drive organizational decision-making through ICT-enabled processes.
- Emphasizes the integration of Service-Oriented Architecture (SOA) with business logic to enhance agility, interoperability, and scalability.
- Key topics include EA frameworks (TOGAF, Zachman), the relationship between business architecture and ICT infrastructure, and practical methodologies for developing sustainable enterprise solutions.
- Through real-world case studies, students will analyze how global organizations leverage EA to optimize operations, manage digital transformation, and achieve strategic goals.

Week-1: Introduction to Enterprise Architecture

Contents

Week-1 : Lecture Learning Outcome

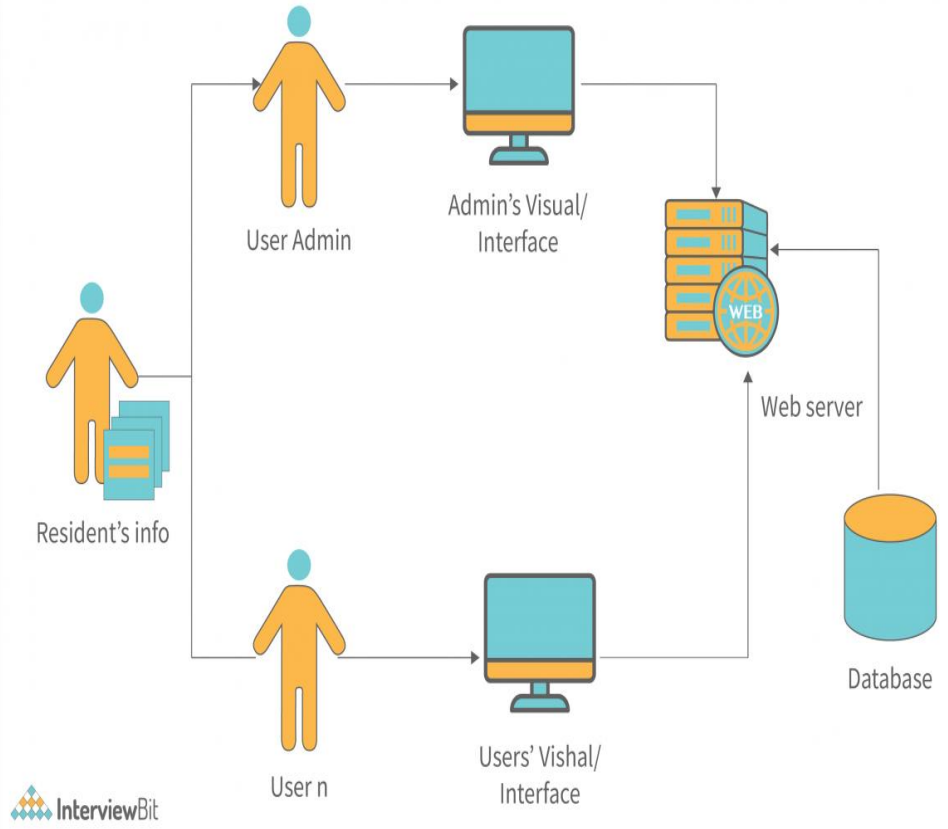
By the end of this lecture, the student will be able to

- Define and explain the concepts of system architecture, solution architecture, and enterprise architecture.
- Describe the role of enterprise architecture in aligning IT systems with business strategies and organizational goals.
- Identify the main domains of enterprise architecture, including business, application, data, and technology architecture.
- Explain the importance and benefits of Business–IT alignment in improving organizational efficiency and decision-making.
- Analyze different application architecture styles such as monolithic, microservices, event-driven, client-server, and layered architectures

1. Introduction to Enterprise Architecture

Systems architecture

- A system is an interconnected set of machines, applications, and network resources.
- The system architecture diagram is a visual representation of the system architecture.
- It shows the connections between the various components of the system and indicates what functions each component performs.
- The general system representation shows the major functions of the system and the relationships between the various system components.



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Cont’d … 1. Introduction to Enterprise Architecture

Enterprise architecture

- Enterprise Architecture (EA) is a practice that aims to align an organization's strategy and operating model.
- It outlines how an enterprise should organize and manage to achieve its objectives.
- A framework that helps businesses align their strategy, processes, and technology to achieve their goals.
- It's a way to ensure that everyone is on the same page regarding the organization's vision and mission.

[2]. What is Enterprise Architecture (EA), and Why is it Important?, Bizzdesign, Bizzdesign, 2026. https://bizzdesign.com/blog/what-is-enterprise-architecture-definition

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Solution Architecture

- Solution Architecture is more tactical and deals with addressing specific business needs.
- It may seek to solve existing business challenges or propose technical solutions to new problems.
- It defines how to structure a solution and make it happen within the context of an enterprise's architecture.

[3]. Enterprise Architecture vs. Solution Architecture: A Comparison, Ardoq, 2026. https://www.ardoq.com/knowledge-hub/enterprise-architecture-vs-solution-architecture.

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Enterprise Architecture vs. Solution Architecture

- Enterprise Architects, depending on organizational needs, usually work within the following domains :
  - **Application Architecture:** designing, mapping, and security.
  - **Business Architecture**: development, strategy, capabilities, and value chains.
  - **Data Architecture**: strategy and governance.
  - **Infrastructure Architecture**: automation, governance, and building reliability.

[3]. Enterprise Architecture vs. Solution Architecture: A Comparison, Ardoq, 2026. https://www.ardoq.com/knowledge-hub/enterprise-architecture-vs-solution-architecture.

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Responsibilities of Enterprise Architects

- Identify potential risks to IT systems.
- Create and oversee the execution of strategies.
- Utilize an Enterprise Architecture tool to achieve key outcomes.
- Facilitate digital transformation by introducing new technological solutions.
- Carry out gap analysis to ensure that business objectives are being met.
- Create a center of excellence to provide knowledge and expertise.

[3]. Enterprise Architecture vs. Solution Architecture: A Comparison, Ardoq, 2026. https://www.ardoq.com/knowledge-hub/enterprise-architecture-vs-solution-architecture.

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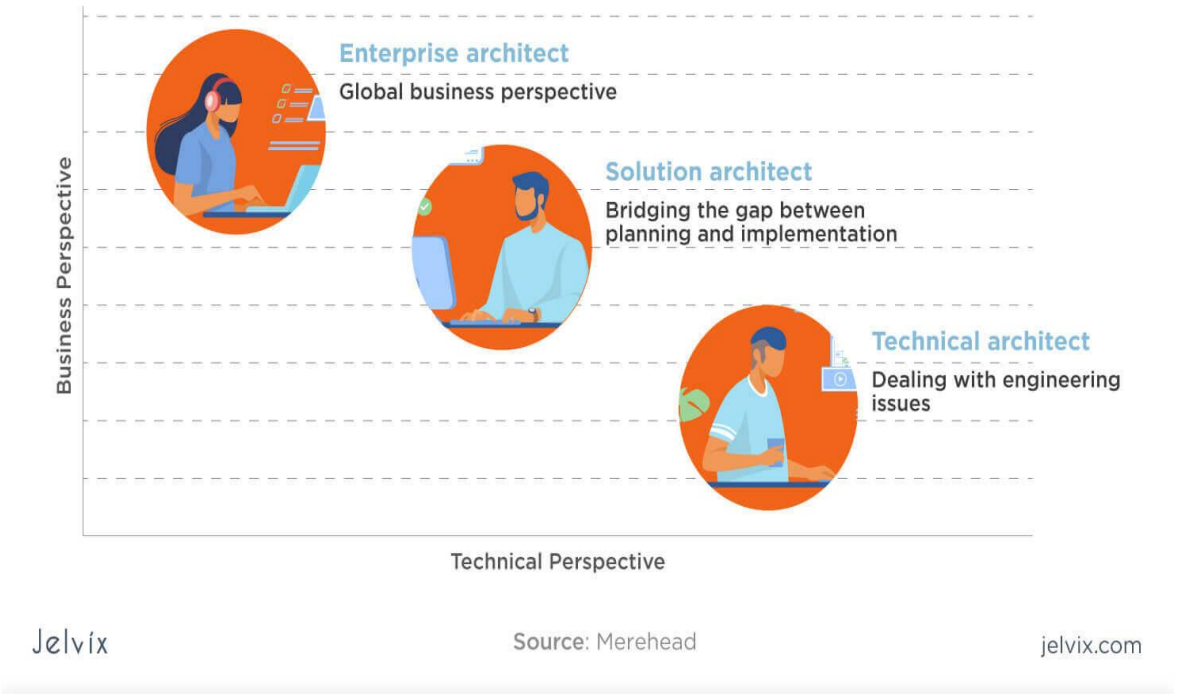
What Does a Solution Architect Do?

- It develops and integrates solutions and processes based on the enterprise's needs, depending on the individual's background and how the organization defines its solution architecture.
- Depending on the situation and after being presented with a business challenge, Solution Architects are focused on current technologies available and what needs to be developed to allow the business to meet specific business or project objectives.



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[3]. Enterprise Architecture vs. Solution Architecture: A Comparison, Ardoq, 2026. https://www.ardoq.com/knowledge-hub/enterprise-architecture-vs-solution-architecture.

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Responsibilities of Solution Architects

- Identify and select new technologies
- Build prototype models of solutions
- Understand business requirements
- Balance constraints
- Support project management teams
- Design a technical strategy
- Create technical documentation
- Manage and collaborate with software development teams

[3]. Enterprise Architecture vs. Solution Architecture: A Comparison, Ardoq, 2026. https://www.ardoq.com/knowledge-hub/enterprise-architecture-vs-solution-architecture.

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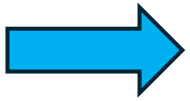
Enterprise Architecture Use Cases

- EA is used in sectors as diverse as healthcare, retail, and real estate, integrating systems for efficient operations and better user experiences.

- Some of the many sectors where EA performs well



- Education
- Healthcare
- Retail and Hospitality
- Food and Beverages
- Human Resources
- Management Consulting
- Market Research
- Transportation & Logistics, etc.

[3]. Enterprise Architecture vs. Solution Architecture: A Comparison, Ardoq, 2026. https://www.ardoq.com/knowledge-hub/enterprise-architecture-vs-solution-architecture.

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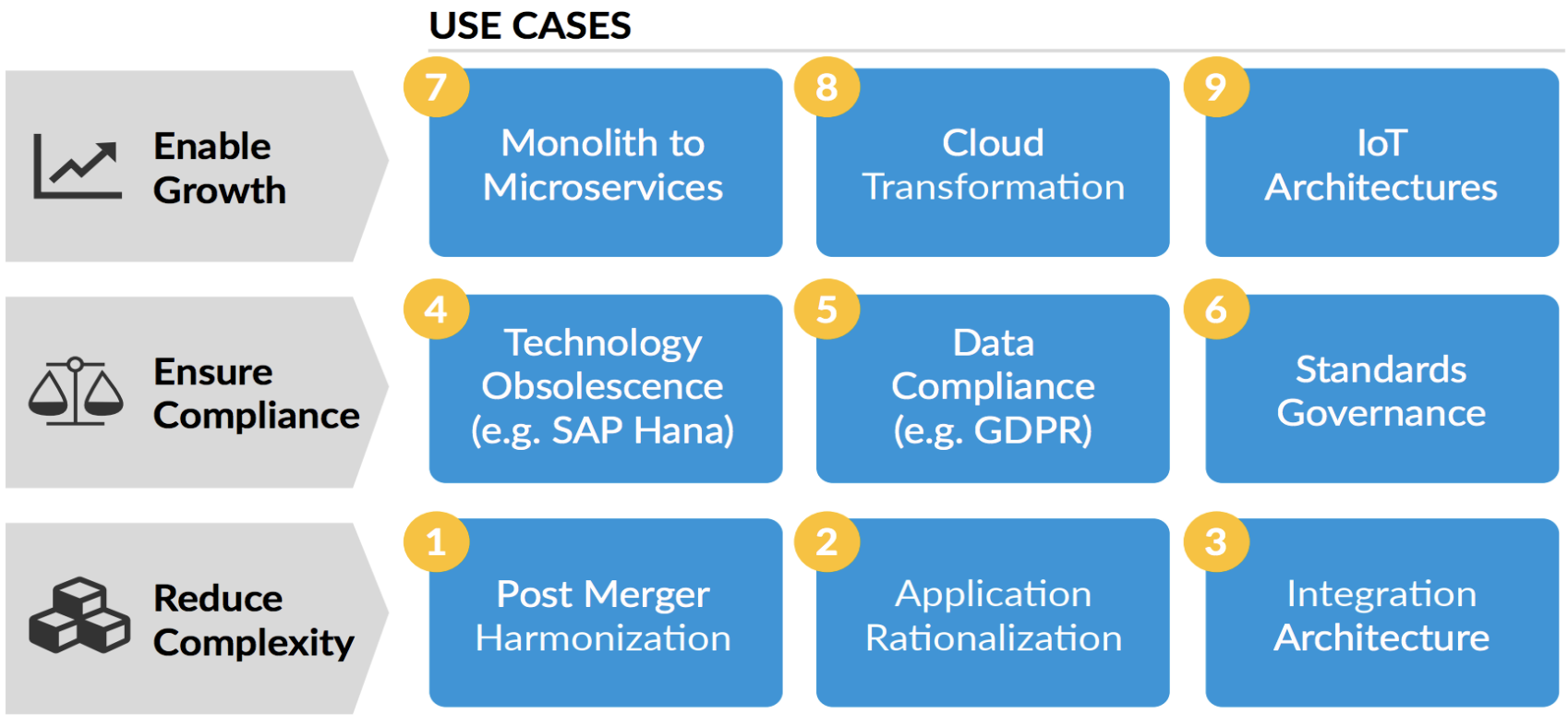
Use cases for Enterprise Architects.



[4]. Enterprise Architecture, LeanIX, LeanIX GmbH. https://www.leanix.net/en/wiki/ea/enterprise-architecture

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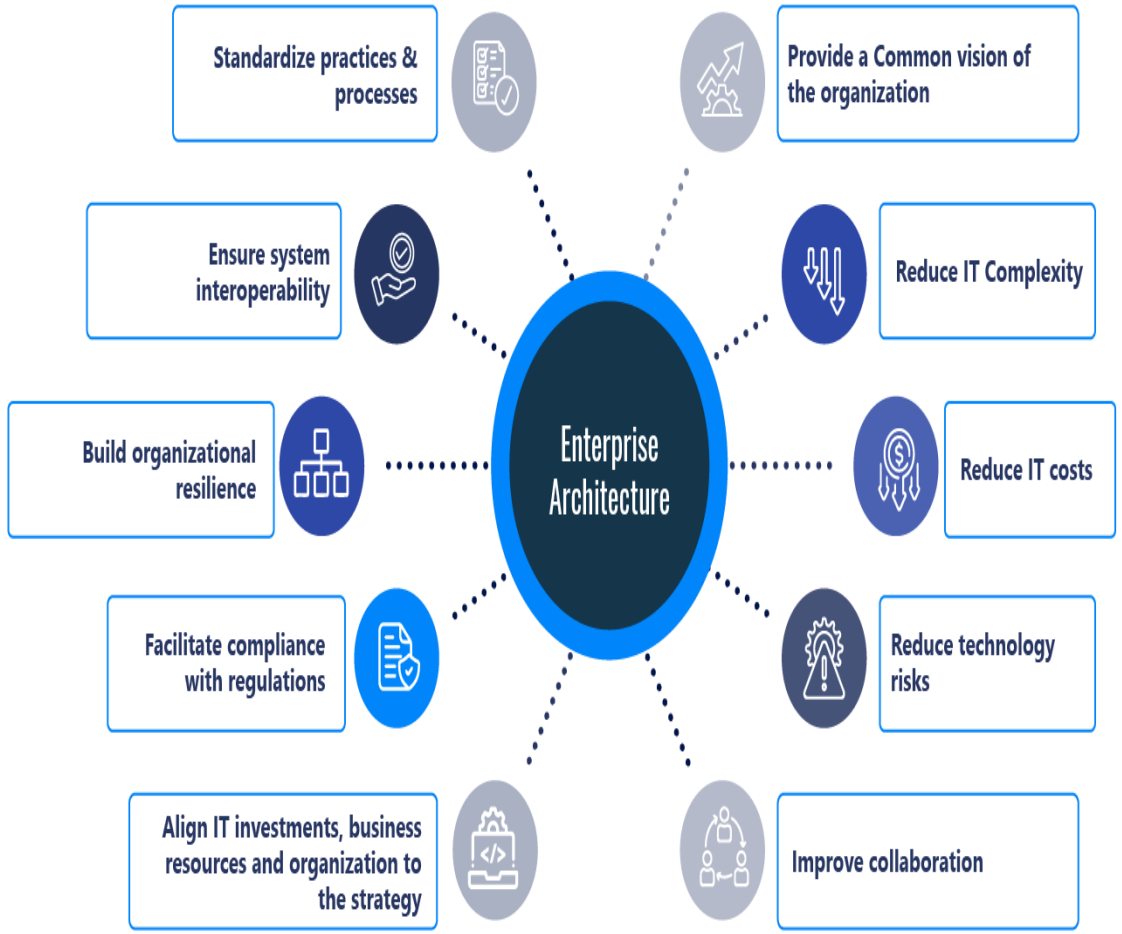
Benefits of Enterprise architecture

- It provides recommendations to business and IT teams to adapt current processes and IT assets, ensuring they are aligned with the company's strategy.
- The Enterprise Architecture tool makes it possible to implement actions to reduce the risks generated.



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Enterprise architecture stakeholders

- Several important enterprise architecture stakeholders are involved in acquiring and maintaining an enterprise architecture. The most important are the following:
  - Executives and business leaders.
  - IT teams and developers.
  - Project managers.
  - Security and compliance teams.
  - Operations and infrastructure teams.

[5]. What is Enterprise Architecture (EA)?, Nick Barney and Alexander S. Gillis, TechTarget, 2025. https://www.techtarget.com/searchcio/definition/enterprise-architecture

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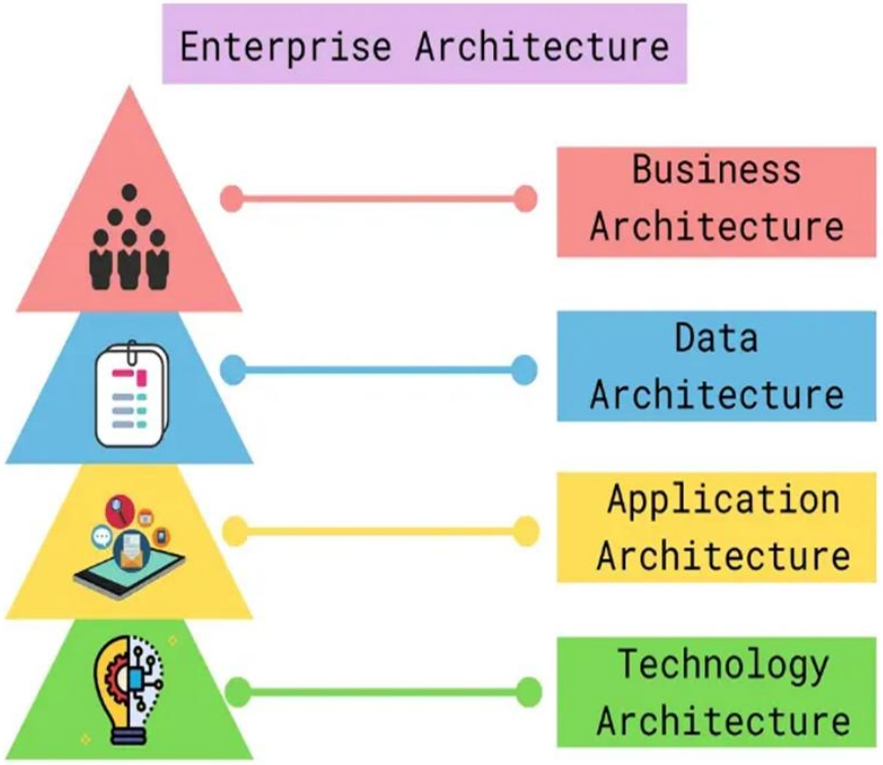
Enterprise architecture(EA) Domains

- *Microsoft's Michael Platt* describes EA as having four points of view:
  - **The business perspective.** The processes and standards by which the business operates daily.
  - **The application perspective**. The interactions among the processes and standards the organization uses.
  - **The information perspective:** The raw data – such as document files, databases, images, presentations, and spreadsheets – that the organization requires to operate efficiently.
  - **The technology perspective**. The hardware, operating systems, programming, and networking tools the organization uses.



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Challenges of Enterprise Architecture(EA)

- **Resistance to Change:** It is a significant challenge that organizations face when implementing EA.
- **Limited Resources:** Implementing EA requires a substantial investment of time, financial resources, and personnel.
- **Complex IT Environments:** Coordinating changes across multiple systems and ensuring compatibility can pose a significant challenge.
- **Lack of standards**: EA requires standardized processes and procedures across the organization.
- **Lack of Clarity and Consistency:** It's crucial to establish clear governance and standards for the EA framework.
- **Lack of Skills and Expertise:** Effective EA requires various specialized skills, including architecture design, data modeling, and technology infrastructure management.

[6] . Challenges of Enterprise Architecture, Bizzdesign, Bizzdesign B.V. https://bizzdesign.com/blog/challenges-of-enterprise-architecture

2. Business and IT Alignment

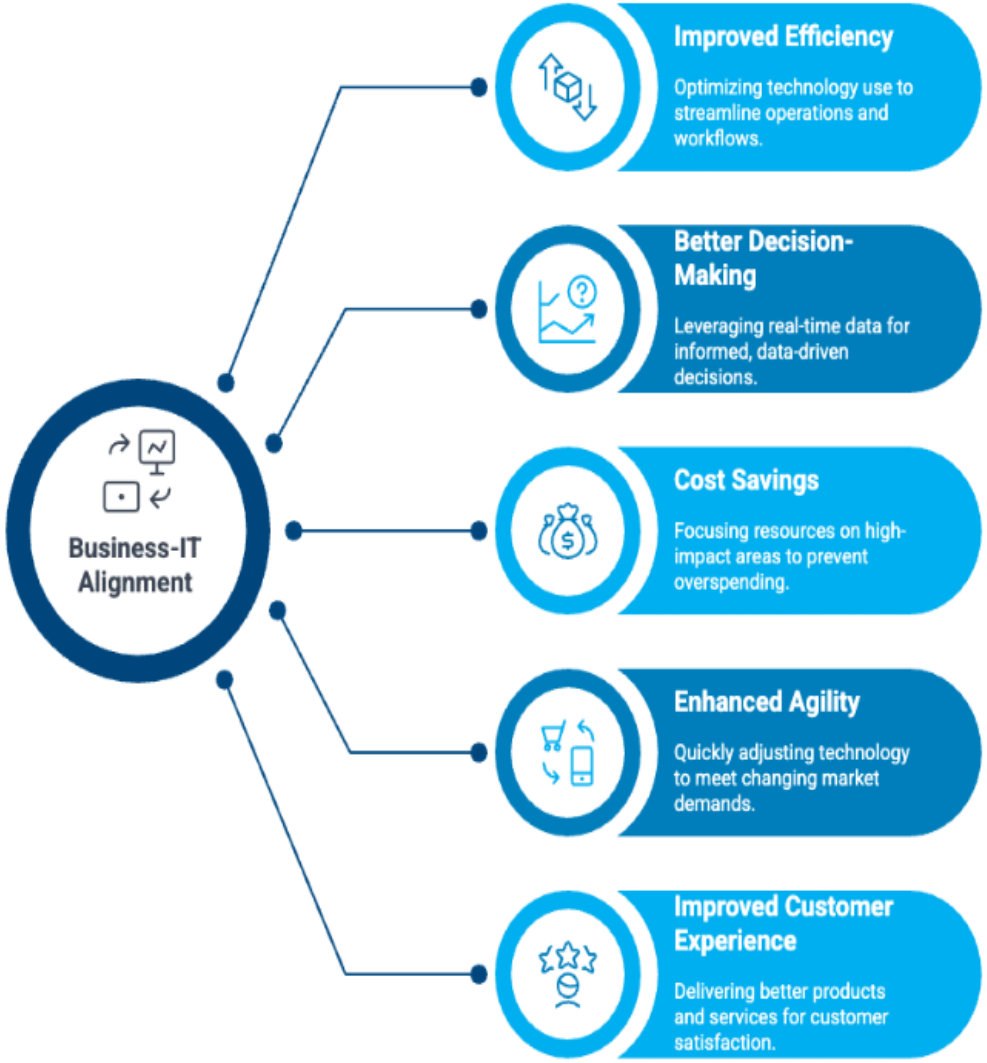
- Business-IT alignment is the process of ensuring that a company's technology strategy is fully synchronized with its overall business objectives.
- It's about making sure that IT initiatives directly support the company's goals, whether that's improving customer experience, reducing operational costs, or driving innovation.
- Rather than viewing IT as just a support function, aligned businesses treat is as an integral part of their strategy.
- This approach enables technology to be leveraged as a tool for competitive advantage, helping the business achieve its goals more efficiently.

[7]. Business and IT Alignment: Why is It So Important?, BJ Bradley, Davenport Group, 2024. https://davenportgroup.com/insights/business-and-it-alignment-why-is-it-so-important/

Cont'd.. 2. Business and IT Alignment

Benefits of Business-IT Alignment

- Improved Efficiency:
- Better Decision-Making:
- Cost Savings:
- Enhanced Agility:
- Improved Customer Experience.



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Cont'd.. 2. Business and IT Alignment

The 5 Steps to Aligning IT with Business Strategy

1. Understand Business Goals

- The first and most critical step in aligning IT with business objectives is ensuring that IT leaders have a solid understanding of the company's goals, mission, and overall strategy.
- This includes understanding both short-term strategic priorities and long-term visions, as well as recognizing the key challenges the business faces.

2. Collaborative Planning Between IT and Business Teams

- This ensures that IT strategies are built with a clear understanding of business needs, while business leaders are aware of how technology can support and enable their long-term goals.

[7]. Business and IT Alignment: Why is It So Important?, BJ Bradley, Davenport Group, 2024. https://davenportgroup.com/insights/business-and-it-alignment-why-is-it-so-important/

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3. Regular Monitoring and Adjustment

- Business needs change, and so do the demands on IT.
- Continuous alignment requires regular monitoring and adjustments to ensure IT strategies remain relevant and aligned with evolving business goals.

4. Invest in Scalable and Flexible Technology

- Business growth often brings unforeseen changes, from increased customer demand to entering new markets.
- To keep up, IT systems need to be scalable and adaptable.
- Investing in technology that can grow and change with the business helps ensure that IT infrastructure supports long-term business goals.

[7]. Business and IT Alignment: Why is It So Important?, BJ Bradley, Davenport Group, 2024. https://davenportgroup.com/insights/business-and-it-alignment-why-is-it-so-important/

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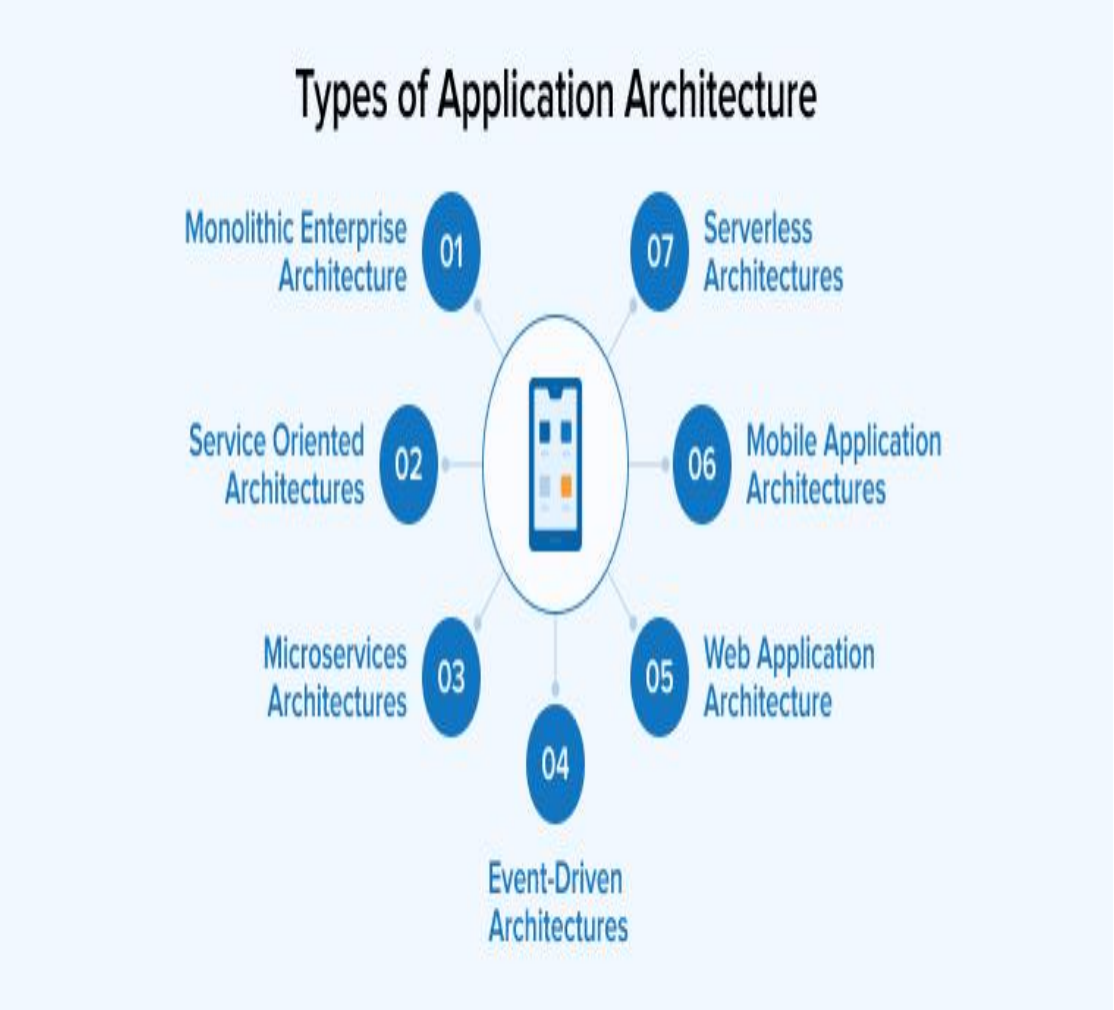
5. Focus on Building a Technology-Driven Culture

- Business-IT alignment is not just about business processes and IT systems—it also involves fostering a culture where technology is viewed as a strategic asset.
- When the entire organization values IT as a partner in achieving business success, alignment naturally follows.

[7]. Business and IT Alignment: Why is It So Important?, BJ Bradley, Davenport Group, 2024. https://davenportgroup.com/insights/business-and-it-alignment-why-is-it-so-important/

3. Types of Application Architecture

- Developer and enterprise architects have decided to use specific design elements that are characteristic of a particular style of ideas.
- There are multiple streams of ideas within enterprise architecture that, when pursued, yield similarly varied architectural outcomes.



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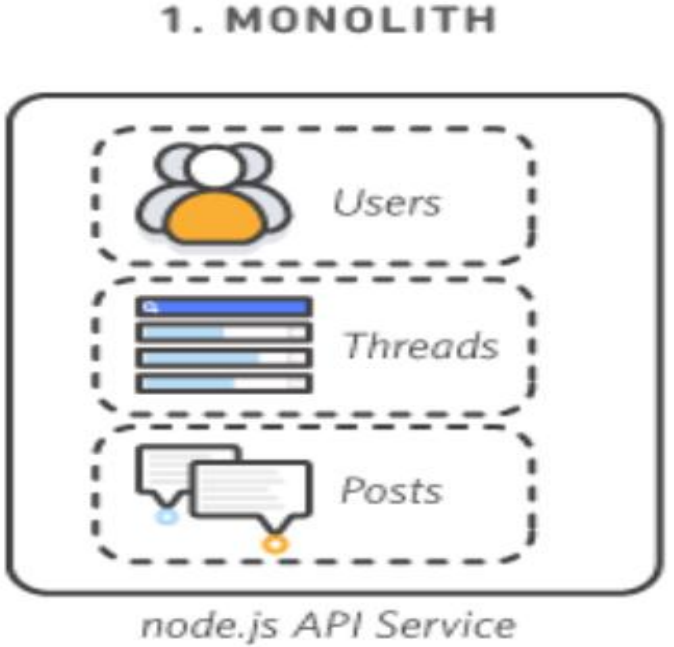
Monolithic vs. Microservices Architecture

a) Monolithic architectures



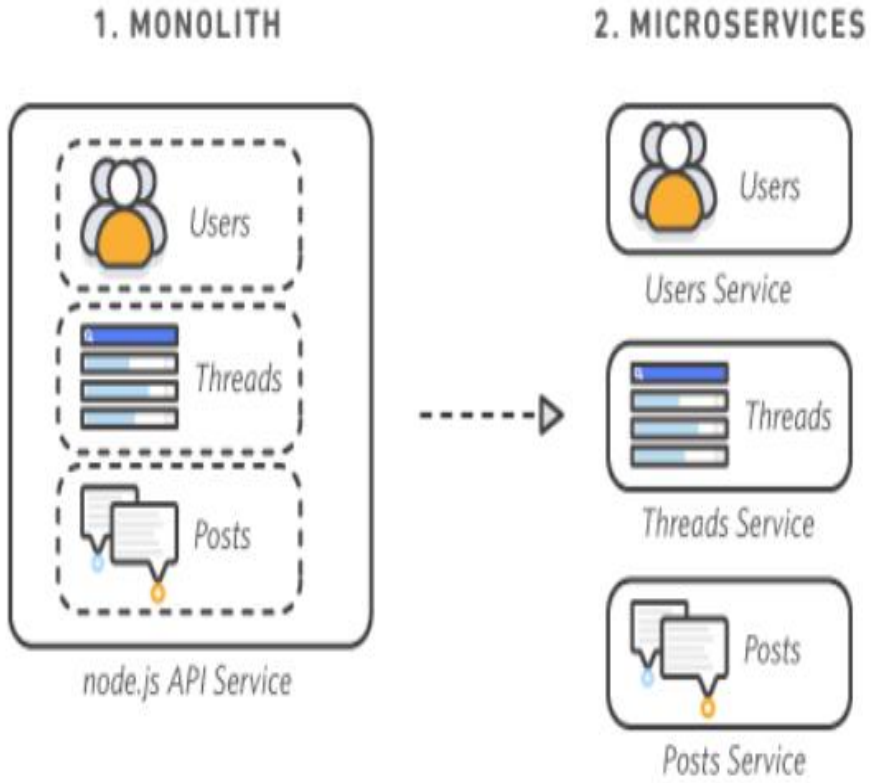
- All processes are tightly coupled and run as a single service. This means that if one process of the application experiences a spike in demand, the entire architecture must be scaled.
- Adding or improving a monolithic application's features becomes more complex as the code base grows. This complexity limits experimentation and makes it difficult to implement new ideas.
- Add risk for application availability because many dependent and tightly coupled processes increase the impact of a single process failure.

[9]. Microservices, Amazon Web Services (AWS), Amazon Web Services. https://aws.amazon.com/microservices/

Cont'd…. 3. Types of Application Architecture

b) Microservices architecture

- An application is built as independent components that run each application process as a service.
- These services communicate via a well-defined interface using lightweight APIs.
- Services are built for business capabilities, and each service performs a single function.
- Because they are independently run, each service can be updated, deployed, and scaled to meet demand for specific functions of an application.



[9]. Microservices, Amazon Web Services (AWS), Amazon Web Services. https://aws.amazon.com/microservices/

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Characteristics of Microservices

Autonomous

- Each component service in a microservices architecture can be developed, deployed, operated, and scaled without affecting the functioning of other services.

Specialized

- Each service is designed for a set of capabilities and focuses on solving a specific problem.
- If developers contribute more code to a service over time and the service becomes complex, it can be broken into smaller services.

[9]. Microservices, Amazon Web Services (AWS), Amazon Web Services. https://aws.amazon.com/microservices/

Cont'd…. 3. Types of Application Architecture

Benefits of Microservices

1. Agility
- Foster an organization of small, independent teams that take ownership of their services.

2. Easy Deployment
- enable continuous integration and continuous delivery, making it easy to try out new ideas and to roll back if something doesn't work.

3. Technological Freedom
- Don't follow a "one size fits all" approach. Teams building microservices can choose the best tool for each job.

4. Reusable Code
- A service written for a certain function can be used as a building block for another feature.

5. Resilience
- Service independence increases an application's resistance to failure.

6. Flexible Scaling
- Microservices allow each service to be independently scaled to meet demand for the application feature it supports.

[9]. Microservices, Amazon Web Services (AWS), Amazon Web Services. https://aws.amazon.com/microservices/

Cont'd…. 3. Types of Application Architecture

c) Event-Driven Architecture(EDA)

- A software design approach where system components communicate by producing and responding to events, such as user actions or system state changes.
- Components are loosely coupled, allowing them to operate independently while reacting to events in real time.
- This architecture improves scalability, flexibility, and responsiveness.
  - Enables real-time event processing and quick system responses
  - Promotes loose coupling between components
  - Improves scalability and system flexibility

[10]. Event-Driven Architecture (EDA) – System Design, GeeksforGeeks, GeeksforGeeks, 2026 . https://www.geeksforgeeks.org/system-design/event-driven-architecture-system-design

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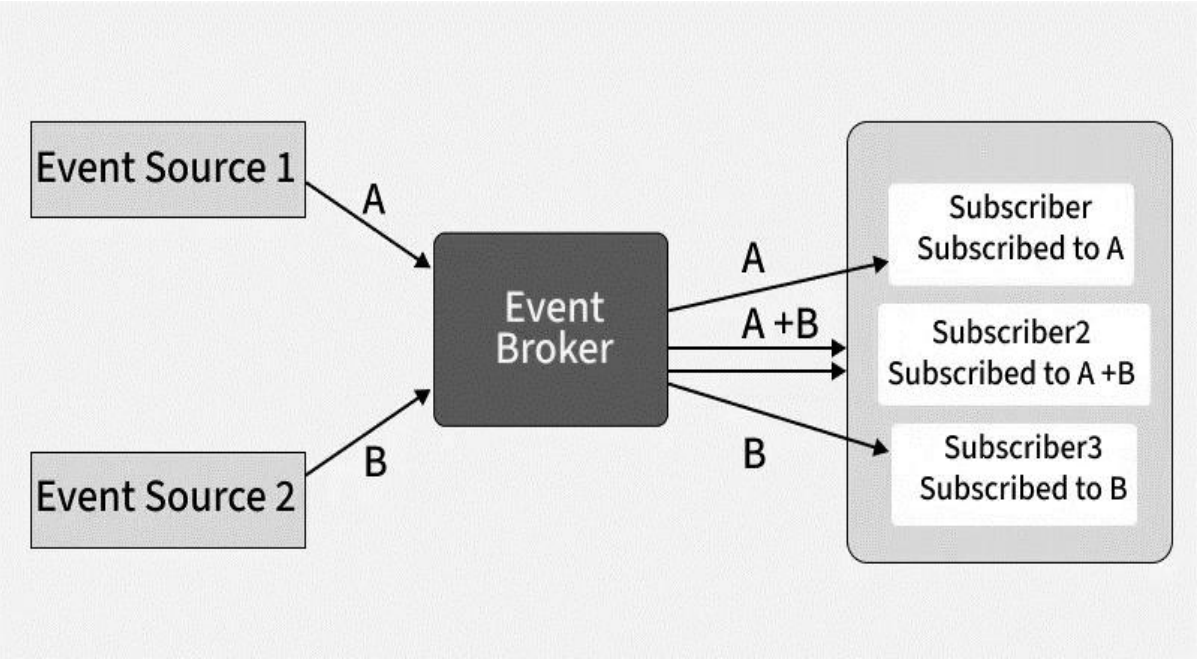
- Event Source 1 and Event Source 2 publish events (A and B) to a central Event Broker.
- The Event Broker receives, filters, and routes events based on subscriptions.
- Subscribers get only the events they subscribed to, such as A, B, or A + B.



Example: In an e-commerce system, when a customer places an order, an **Order Placed** event is generated.

- Different services like payment processing, inventory management, and email notifications don't constantly check the order system; instead, they independently respond when the event occurs.

[10]. Event-Driven Architecture (EDA) – System Design, GeeksforGeeks, GeeksforGeeks, 2026 . https://www.geeksforgeeks.org/system-design/event-driven-architecture-system-design/

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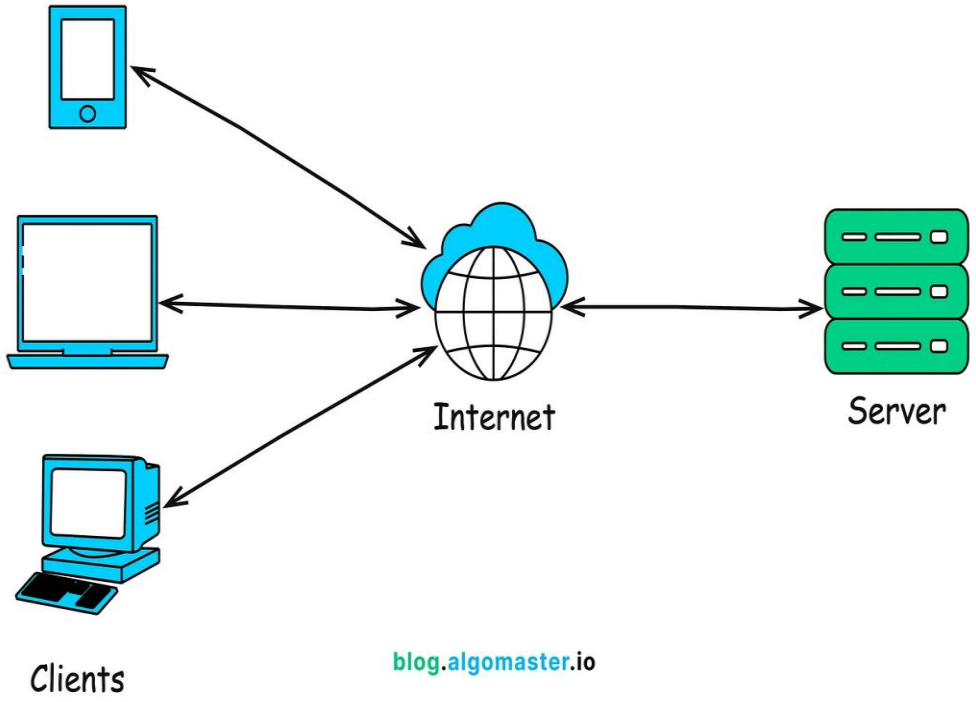
d) Client-Server Architecture - System Design

- A widely used system design where multiple clients request services or resources from a central server.
- The server handles processing, data storage, and resource management, while clients focus on user interaction, enabling efficient, scalable, and organized distributed systems.
- The architecture is scalable by upgrading servers or adding multiple servers.
- Commonly used in web applications, databases, and email systems.



[11]. Client-Server Architecture Explained, Ashish Pratap Singh, AlgoMaster Blog, 2025.https://blog.algomaster.io/p/client-server-architecture-explained

Cont'd…. 3. Types of Application Architecture

Types of Client-Server Architectures

- Client-server systems can vary significantly in complexity based on how many layers (or "tiers") are involved in processing and delivering data.

1-Tier Architecture (Monolithic Model)

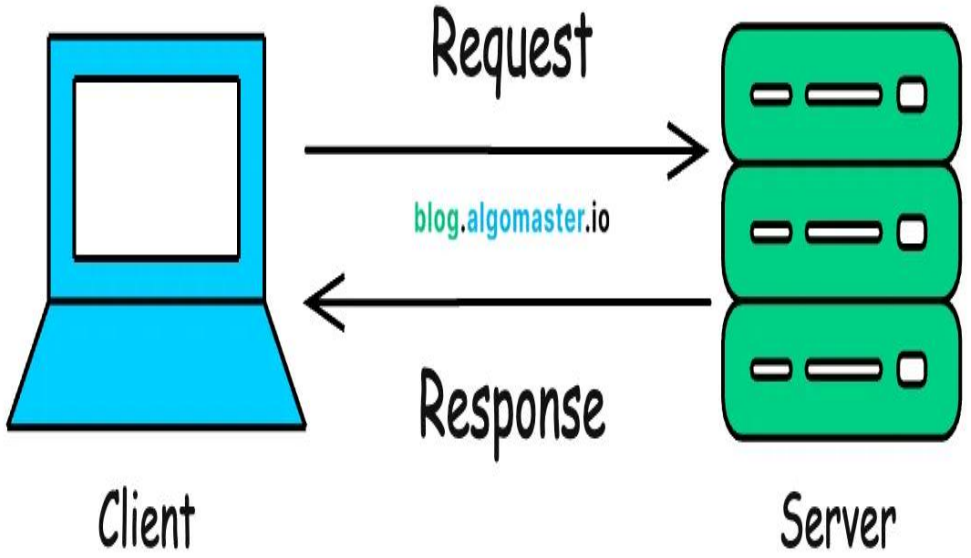
- Everything, the user interface, business logic, and data storage, resides in a single layer.
- All operations are handled on the same machine or within the same application.
- E.g, Use Cases: Personal finance tools that store and compute everything locally

[11]. Client-Server Architecture Explained, Ashish Pratap Singh, AlgoMaster Blog, 2025.https://blog.algomaster.io/p/client-server-architecture-explained

Cont'd…. 3.Types of Application Architecture

2-Tier Architecture

- In a **2-tier architecture**, the system is split into two parts:
  - The client, which handles the presentation layer (UI)
  - The server, which handles both the business logic and data storage
- The client directly communicates with the server to send requests and receive responses.
- The server runs the logic and interacts with the database to return results. Example Use Case:
- **E.g,** A desktop application that connects directly to a central database to retrieve and display data.

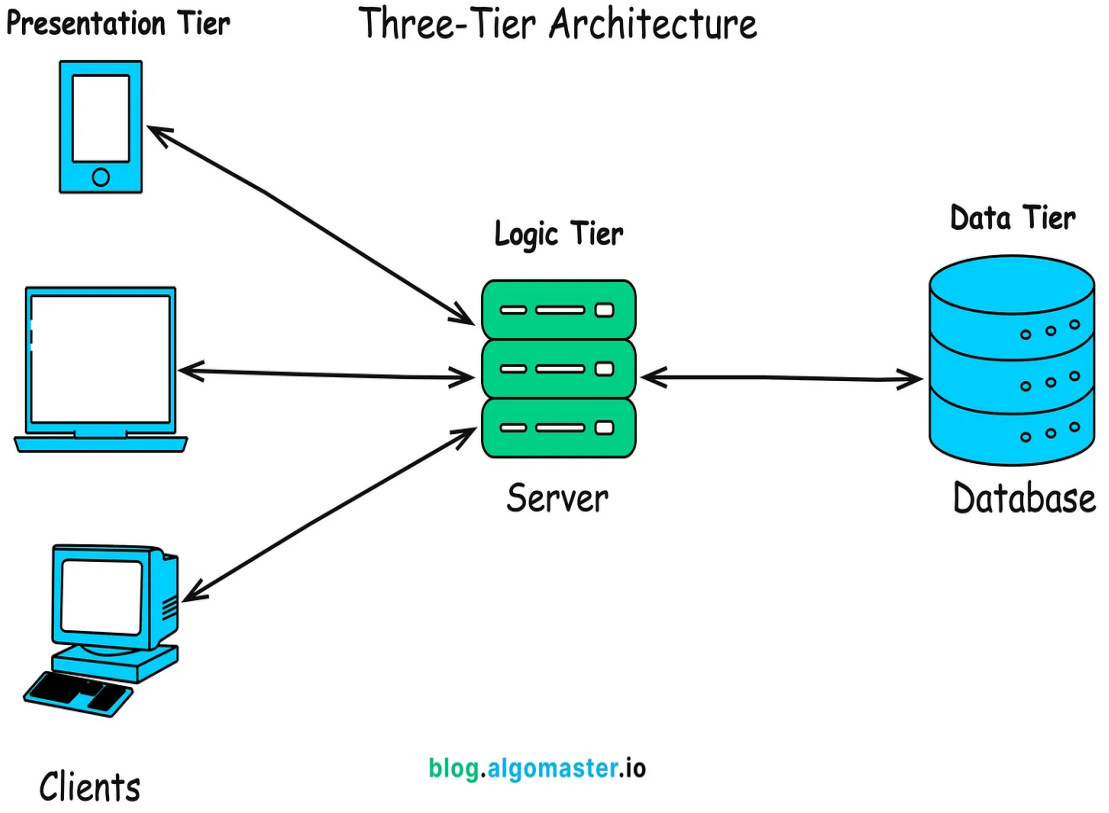


[11]. Client-Server Architecture Explained, Ashish Pratap Singh, AlgoMaster Blog, 2025.https://blog.algomaster.io/p/client-server-architecture-explained

Cont'd…. 3. Types of Application Architecture

3-Tier Architecture

- The 3-tier architecture introduces a dedicated Application Layer (also called the business logic layer) between the client and the data server.
- This creates a clear separation of concerns and is the most commonly used architecture for modern web and enterprise applications.
- **E.g:** A web application where the client (browser) interacts with a web server (application server) that then queries a database server to retrieve data.



[11]. Client-Server Architecture Explained, Ashish Pratap Singh, AlgoMaster Blog, 2025.https://blog.algomaster.io/p/client-server-architecture-explained

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d) Layered Architecture (N-Tier Architecture)

- A software design pattern that structures an application into multiple distinct layers, each responsible for specific tasks or concerns.
- This approach helps in separating different aspects of the application into modular, manageable, and reusable components.
- Each layer interacts with the one directly above or below it, but layers typically don't interact with each other directly, promoting a clear separation of concerns.

[12]. Software Architectural Patterns in System Design, GeeksforGeeks, GeeksforGeeks, 2025. https://www.geeksforgeeks.org/system-design/design-patterns-architecture/#layered-architecture-ntier-architecture

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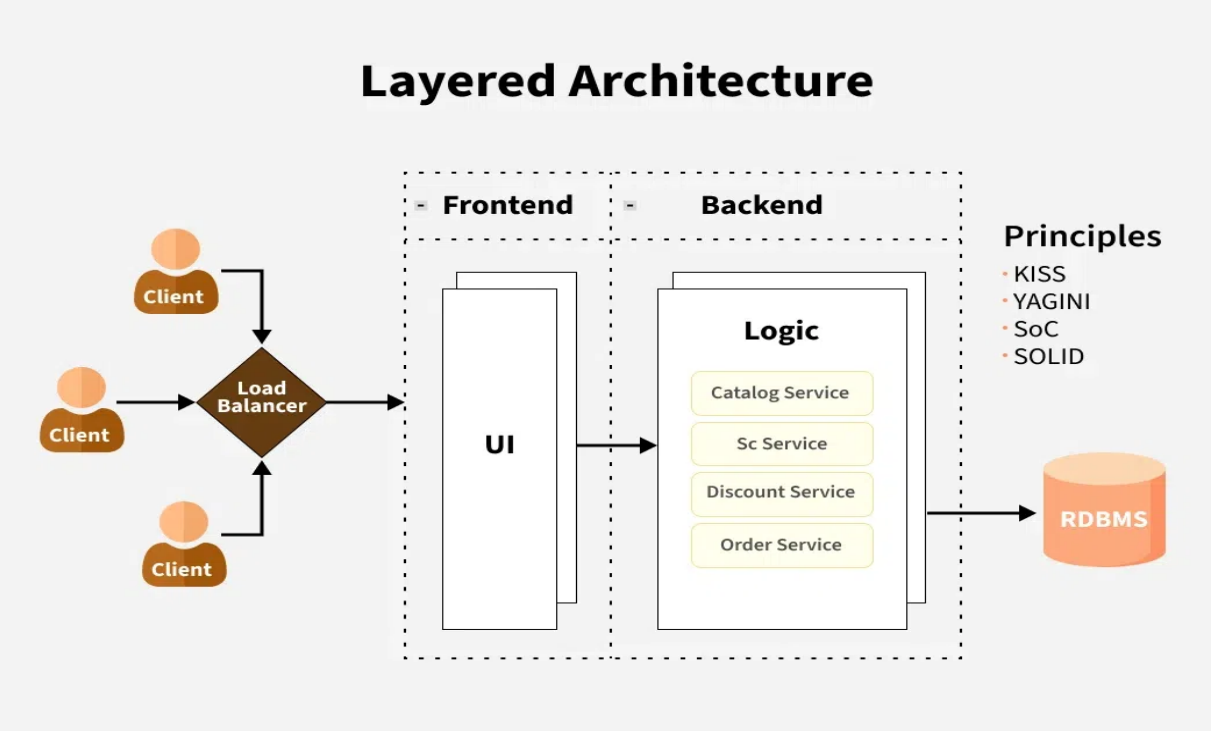
Layered Architecture

- ***Presentation Layer (UI)*** : This is where the user interacts with the application. It handles user input and displays information.
- ***Application Layer (Business Logic)*** contains the core logic of the application, such as processing user requests and managing business rules.
- ***Data Access Layer (Database)*** : Data is retrieved and stored. It interacts with the database, ensuring separation of data concerns.



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Drawbacks of the Layered Architecture Pattern

1. **High Coupling:** There is a potential for high coupling between layers, especially if lower layers depend on specific implementations of upper layers.
2. **Performance Overhead:** The strict separation of layers can introduce performance overhead due to additional layers of abstraction and inter-layer communication.
3. **Rigidity:** Changes in requirements may necessitate significant refactoring across multiple layers, making the system less flexible in adapting to new requirements.

[12]. Software Architectural Patterns in System Design, GeeksforGeeks, GeeksforGeeks, 2025. https://www.geeksforgeeks.org/system-design/design-patterns-architecture/#layered-architecture-ntier-architecture

Summary

- Enterprise Architecture is a strategic framework that aligns business goals, processes, and IT systems to support organizational objectives.
- System architecture describes how system components such as applications, networks, and hardware interact and function together.
- Solution architecture focuses on designing technical solutions to solve specific business problems or project requirements within an enterprise.
- EA domains include Business, Application, Data, and Technology architectures, which collectively support enterprise operations and strategy.
- Enterprise architects are responsible for strategy development, risk identification, technology planning, and supporting digital transformation.
- Business–IT alignment ensures that technology initiatives directly support business objectives, improving efficiency, innovation, and decision-making.
- Application architecture styles include Monolithic, Microservices, Event-Driven, Client-Server, and Layered (N-tier) architectures, each with different design characteristics.
- Benefits of EA include better IT governance and strategic alignment, while challenges may involve resistance to change, limited resources, and complex IT environments.

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