Types of Software Architecture Patterns

Source: https://www.geeksforgeeks.org/types-of-software-architecture-patterns/

Software Architecture :

- Software architecture is the blueprint of building software.
- It shows the overall structure of the software, the collection of components in it, and how they interact with one another while hiding the implementation.
- This helps the software development team to clearly communicate how the software is going to be built as per the requirements of customers.

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1. Layered Pattern :

- As the name suggests, components(code) in this pattern are separated into layers of subtasks and they are arranged one above another.
- Each layer has unique tasks to do and all the layers are independent of one another. Since each layer is independent, one can modify the code inside a layer without affecting others.
- It is the most commonly used pattern for designing the majority of software.
- This layer is also known as '**N-tier architecture**'.

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Basically, this pattern has **4 layers.**

1. **Presentation layer** (The user interface layer where we see and enter data into an application.)
2. **Business layer** (this layer is responsible for executing business logic as per the request.)
3. **Application layer** (this layer acts as a medium for communication between the ‘presentation layer’ and ‘data layer’.
4. **Data layer** (this layer has a database for managing data.)

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- **Ideal for:** E-commerce web applications development like Amazon.

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2. Client-Server Pattern

- The client-server pattern has two major entities. They are a **server** and multiple **clients**.
- Here the server has resources(data, files or services) and a client requests the server for a particular resource. Then the server processes the request and responds back accordingly.
- Examples of software developed in this pattern:
  - **Email**
  - **WWW**
  - **File sharing apps**
  - **Banking, etc…**

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3. Event-Driven Pattern

- Event-Driven Architecture is an agile approach in which services (operations) of the software are triggered by events.
- *Well, what does an event mean?*
- When a user takes action in the application built using the Event Driven Architecture(EDA) approach, a state change happens and a reaction is generated that is called an event.
- **Eg:** A new user fills the signup form and clicks the signup button on Facebook and then a FB account is created for him, which is an event.
- **Ideal for:** Building websites with JavaScript and e-commerce websites in general.

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4. Microkernel Pattern

- Microkernel pattern has two major components.
  - core system
  - plug-in modules
- The **core system** handles the fundamental and minimal operations of the application.
- The **plug-in modules** handle the extended functionalities (like extra features) and customized processing.

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Example:

- you have successfully built a **chat application**.
- And the basic functionality of the app is that you can text with people across the world without an internet connection.
- After some time, you would like to **add a voice messaging** feature to the application, then you are adding the feature successfully.
- You can add that feature to the already developed application because the microkernel pattern facilitates you to add features as **plug-ins.**

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Microkernel pattern is ideal for:

- Product-based applications and scheduling applications.
- Such as Instagram reels, YouTube Shorts and a lot more that feasts us digitally.
- So this pattern is mostly preferred for app development.

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5. Microservices Pattern

- The collection of small services that are combined to form the actual application is the concept of microservices pattern.
- Instead of building a bigger application, small programs are built for every service (function) of an application independently.
- And those small programs are bundled together to be a full-fledged application.

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- So adding new features and modifying existing microservices without affecting other microservices are no longer a challenge when an application is built in a microservices pattern.
- Modules in the application of microservices patterns are loosely coupled.
- So they are easily understandable, modifiable and scalable.

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Example :

- Netflix is one of the most popular examples of software built-in microservices architecture.
- This pattern is most suitable for websites and web apps having small components.

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