1. What is an API?

API stands for **Application Programming Interface**.
It's like a **messenger** that takes requests from one software, delivers them to another, and then brings the response back.

Simple example:

Imagine you're at a restaurant:

- You (the user) want food (data/service).
- The **menu** lists what you can ask for (API documentation).
- The **waiter** is the API — you tell him what you want, he takes the order to the kitchen (server), brings your food back.
- You never go inside the kitchen or see how food is cooked — same with APIs; you don't see the backend code, you just use it.

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2. How Does an API Work?

Think of it as **request → processing → response**:

1. **Request**: You send some information (like "Give me today's weather in Islamabad") to the API.
2. **Processing**: The API talks to the backend/server/database and finds the right data.
3. **Response**: The API sends back the answer (like temperature, humidity, weather conditions) in a format your app can understand — usually **JSON**.

◇ **Flow Example (Weather App)**:

Your App → Weather API → Weather Database → API → Your App

Your app doesn't need to know **how** the weather is calculated, it just gets the result.

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3. Why Do We Use APIs?

- **Save Time** – You don't have to build everything yourself.
- **Connect Systems** – Different apps can talk to each other.
- **Secure Access** – Only the API is exposed, not the whole system.
- **Scalable** – APIs allow big apps to connect with millions of users.

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4. Types of APIs

A. Based on Access

1. **Open APIs (Public)**
    - Anyone can use them.
    - Example: OpenWeather API, NASA API.
2. **Partner APIs**
    - Shared with specific partners/businesses.
    - Example: API given to a company's suppliers.
3. **Internal APIs (Private)**
    - Used inside a company only.
    - Example: Company HR system API.
4. **Composite APIs**
    - Combine data from multiple APIs in one request.
    - Example: Travel app fetching flights, hotels, and weather together.

B. Based on Functionality

1. **Web APIs** – APIs over the internet (most common).
2. **Hardware APIs** – Let apps talk to devices (e.g., camera API).
3. **OS APIs** – Allow apps to use operating system features (e.g., Android API).

C. Based on Communication Style

1. **REST API**
    - Uses **HTTP** methods (GET, POST, PUT, DELETE).
    - Returns data in JSON/XML.
    - Example: GET https://api.github.com/users/salman
2. **SOAP API**
    - Older, uses XML format.
    - More strict and secure (used in banking).
3. **GraphQL API**
    - Client decides exactly what data to get.
    - Saves bandwidth.
4. **gRPC API**
    - Super fast, used in microservices.

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5. Real-Life Examples of APIs

- **Google Maps API** – Embedding maps into your app.

- **Payment APIs (Stripe, PayPal)** – Handle payments without building your own payment system.
- **Social Media APIs** – Posting to Instagram/Twitter from other apps.
- **AI APIs** – OpenAI GPT, Google Gemini for AI chatbots.