**Part 1: Understanding APIs and REST APIs**

**Task 1: Research & Short Answers**

1. **What is an API?**
   * Provide a definition and give two real-world examples.
2. **What is a REST API?**
   * Explain the key principles (HTTP methods, statelessness, resources).
3. **List the common HTTP methods used in REST APIs and their purposes.**
   * (GET, POST, PUT, DELETE, PATCH)
4. **What is JSON? Why is it commonly used in APIs?**



**1. What is an API?**

**An API is essentially a messenger that allows different software applications to talk to each other. It defines how software components should interact, specifying the requests that can be made and the responses that can be expected.**

* **Definition:** An API is a set of rules, protocols, and data formats that allow different software applications to communicate and exchange data or functionality.
* **Example 1 (Payment Processing):** When you make an online purchase, the website uses an API to communicate with the payment processor (like PayPal or Stripe) to handle the transaction.
* **Example 2 (Weather App):** A weather application uses an API to fetch real-time weather data from a weather service provider.

**2. What is a REST API?**

**REST APIs are a popular architectural style for building APIs. They leverage the principles of REST to create flexible and scalable systems.**

* **Key Principles:**
  + **HTTP Methods:** REST APIs use standard HTTP methods (GET, POST, PUT, DELETE, PATCH) to perform operations on resources.
  + **Statelessness:** Each request from a client to the server must contain all the information needed to understand and process the request. The server does not store any session state between requests.
  + **Resources:** REST APIs treat data and functionality as resources that can be accessed and manipulated via URLs.

**3. Common HTTP methods in REST APIs:**

* **GET:** Used to retrieve data from a resource.
* **POST:** Used to create a new resource.
* **PUT:** Used to update an entire resource.
* **DELETE:** Used to delete a resource.
* **PATCH:** Used to partially update a resource.

**4. What is JSON? Why is it used in APIs?**

**JSON (JavaScript Object Notation) is a lightweight data-interchange format that is easy for humans to read and for machines to parse and generate.**

**Why JSON is used in APIs:**

* + **Simplicity and Readability:** JSON's syntax is straightforward and easy to understand, making it easier for developers to work with API data.
  + **Lightweight:** JSON is a compact format, which means less data needs to be transferred between the client and server, leading to faster performance.
  + **Language Independence:** JSON is not tied to any specific programming language, making it compatible with various systems and languages.
  + **Widely Supported:** Most programming languages and platforms have built-in support for JSON parsing and generation.