**HTTP Methods in RESTful APIs**

HTTP methods are fundamental to RESTful APIs, defining the actions to be performed on resources. Below is a detailed explanation of the common HTTP methods: **GET**, **POST**, **PUT**, **PATCH**, **DELETE**, **HEAD**, and **OPTIONS**.

**1. GET**

**Purpose:**

* Retrieve data from the server.
* Safe and idempotent (repeated requests produce the same result).

**Characteristics:**

* **Request Body**: Not allowed.
* **Cacheable**: Yes, responses can be cached.
* **Use Case**: Fetch resources or data.

**Example:**

**Request**:

GET /users/1 HTTP/1.1

Host: example.com

**Response**:

{

"id": 1,

"name": "John Doe",

"email": "john.doe@example.com"

}

**2. POST**

**Purpose:**

* Create new resources or perform server-side processing.

**Characteristics:**

* **Request Body**: Contains the data to be created or processed.
* **Cacheable**: No.
* **Use Case**: Creating new entities or submitting forms.

**Example:**

**Request**:

POST /users HTTP/1.1

Host: example.com

Content-Type: application/json

{

"name": "Jane Doe",

"email": "jane.doe@example.com"

}

**Response**:

{

"id": 2,

"name": "Jane Doe",

"email": "jane.doe@example.com"

}

**3. PUT**

**Purpose:**

* Update an existing resource or create it if it does not exist.
* Replaces the entire resource.

**Characteristics:**

* **Request Body**: Contains the full data for the resource.
* **Idempotent**: Yes.
* **Use Case**: Full updates to resources.

**Example:**

**Request**:

PUT /users/1 HTTP/1.1

Host: example.com

Content-Type: application/json

{

"name": "John Smith",

"email": "john.smith@example.com"

}

**Response**:

{

"id": 1,

"name": "John Smith",

"email": "john.smith@example.com"

}

**4. PATCH**

**Purpose:**

* Partially update an existing resource.

**Characteristics:**

* **Request Body**: Contains the data to be updated.
* **Idempotent**: Yes (if implemented properly).
* **Use Case**: Partial updates to resources.

**Example:**

**Request**:

PATCH /users/1 HTTP/1.1

Host: example.com

Content-Type: application/json

{

"name": "John A. Smith"

}

**Response**:

{

"id": 1,

"name": "John A. Smith",

"email": "john.smith@example.com"

}

**5. DELETE**

**Purpose:**

* Remove a resource from the server.

**Characteristics:**

* **Request Body**: Usually not required.
* **Idempotent**: Yes (deleting the same resource multiple times has the same effect).
* **Use Case**: Deleting entities.

**Example:**

**Request**:

DELETE /users/1 HTTP/1.1

Host: example.com

**Response**:

HTTP/1.1 204 No Content

**6. HEAD**

**Purpose:**

* Similar to GET, but only retrieves headers (no response body).

**Characteristics:**

* **Request Body**: Not allowed.
* **Cacheable**: Yes.
* **Use Case**: Checking resource availability or metadata.

**Example:**

**Request**:

HEAD /users/1 HTTP/1.1

Host: example.com

**Response**:

HTTP/1.1 200 OK

Content-Type: application/json

Content-Length: 123

**7. OPTIONS**

**Purpose:**

* Describe the communication options for the target resource (e.g., allowed methods, headers).

**Characteristics:**

* **Request Body**: Not required.
* **Use Case**: Pre-flight checks for CORS (Cross-Origin Resource Sharing).

**Example:**

**Request**:

OPTIONS /users HTTP/1.1

Host: example.com

**Response**:

HTTP/1.1 204 No Content

Allow: GET, POST, PUT, DELETE, OPTIONS

**Comparison Table**

| **HTTP Method** | **Purpose** | **Request Body** | **Cacheable** | **Idempotent** | **Use Case** |
| --- | --- | --- | --- | --- | --- |
| **GET** | Retrieve data | No | Yes | Yes | Fetch resources |
| **POST** | Create resources | Yes | No | No | Submit forms, create new entities |
| **PUT** | Update/replace resource | Yes | No | Yes | Full updates |
| **PATCH** | Partially update | Yes | No | Yes | Partial updates |
| **DELETE** | Remove resources | No | No | Yes | Delete entities |
| **HEAD** | Metadata check | No | Yes | Yes | Resource availability |
| **OPTIONS** | Get allowed options | No | No | Yes | Pre-flight checks |