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REST API FUNDAMENTALS

A Beginner's Guide

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API

Application Programming Interface

A software intermediary that allows two applications to talk to each other. APIs are an accessible way to extract and share data within and across organizations.

API is a collection of communication protocols and subroutines used by various programs to communicate between them.

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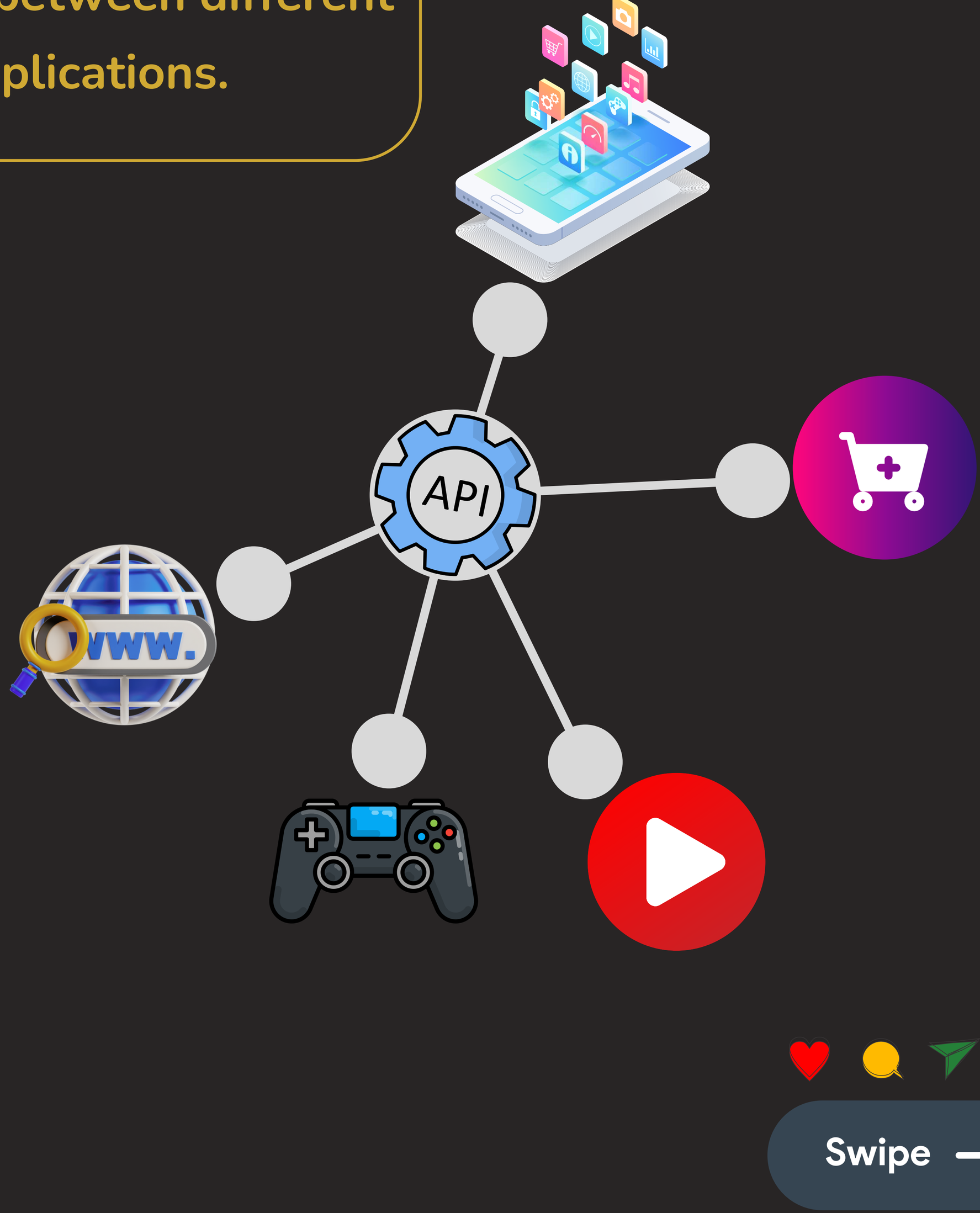
API acts as an interface between different applications.



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REST API

Representational State Transfer

REST is an architectural style for networked applications that uses HTTP requests to access and manipulate data.

It's an architectural style to develop web applications

It uses Hyper Text Trasnsfer Protocol as communication interface

It transfers data through HTTP methods

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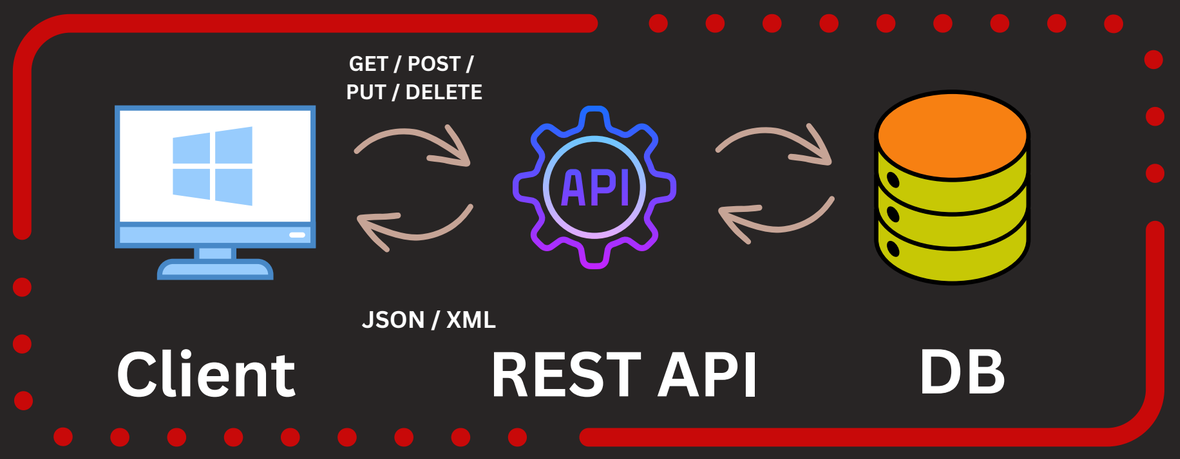
Diagram

REST API Example



- The user interacts with an application, triggering an HTTP request (GET or POST) to the API.
- The API receives the request, verifies the client, and connects to the database.
- The API executes queries based on the request (retrieve or update data).
- The retrieved or modified data is formatted in JSON or XML.
- The API sends the formatted data back to the client.
- The client application parses the JSON/XML data and displays or uses it within the application.

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Request Anatomy

REST API Request

URL

Uniform Resource Locator

It is the address to identify a resource and specify how to access it

In an API, the URL can be named as Base URL, which means that is the base address used in every request

Example: http://sefism.vercel.app

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Request Anatomy

REST API Request

Every URL is a URI, but not every URI is also a URL

URI

Uniform Resource Identifier

It is used in URL to specify whichce and sp the client would like to access in a request

Example: http://sefism.vercel.app/emails?community=slack

URI highlighted in white

Here, the client actually communicates to the server that the request is to retrieve emails with community equals to slack

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Body Params

Request Body Params

Only used in requests that must send information such as create or delete

Body of the request which contains all the data that the server needs to successfully process the request

Request Example

```
{
“email”:”support@sefism.org
”
“community”:”sefism”
“isJoined”:”true”
}
```

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Parameters

There are two types of parameters, Query & Path.

Request Parameters

Information that can be sent in a request by the client in order to get the response from the server

Example: http://sefism.vercel.app/emails?community=slack

Example: http://sefism.vercel.app/helpful-resources/beginner/interviewtips

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Query Parameters

Request Parameters
Type

community=slack is a query paramter (variable) which retrieves emails for slack community

A variable in URI path that helps in querying / filtering through a list of resources.

Example: http://sefism.vercel.app/emails?community=slack

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Path Parameters

Request Parameters
Type

beginner is the path parameter (variable) which points to interviewtips of beginner levels

A variable in URI path that helps in pointing towards specific resource.

Example: http://sefism.vercel.app/helpful-resources/beginner/interviewtips

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Headers

Request Headers

Used to send extra data, specifying proper format and data to retrieve

Body of the request which contains all the data that the server needs to successfully process the request

Request Header

```
Authorization: Bearer token
Accept: Application/json
```

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REST Methods

REST API Methods

Others REST API Methods are HEAD, TRACE, CONNECT and OPTIONS

GET

Retrieve information about an API resource.

POST

Create an API resource.

PUT

Update an API resource.

PATCH

Modifies an API resource.

DELETE

Deletes an API resource.

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HTTP Status Codes

Response/Status Codes

With every request made to the server, we get http status / response codes in return

```
1XX : Information
2XX : Success
3XX : Redirection
4XX : Client Error
5XX : Server Error
```

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Why REST APIs

Advantages of RESTful APIs

Simplicity and Clarity

RESTful APIs follow a straightforward architectural style based on familiar web concepts like HTTP methods (GET, POST, PUT, DELETE) and resource representations (JSON, XML). This makes them intuitive to learn and use for developers of all skill levels.

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Why REST APIs

Advantages of RESTful APIs

Flexibility and Scalability

RESTful APIs can be adapted to a wide range of applications, from simple web services to complex enterprise systems. They can also be easily scaled to handle increasing traffic and data volumes as your needs grow.

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Why REST APIs

Advantages of RESTful APIs

Interoperability and Openness

RESTful APIs are based on open standards and widely used protocols, making them compatible with diverse software and hardware platforms. This fosters collaboration and simplifies integration with existing systems.

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Why REST APIs

Advantages of RESTful APIs

Maintainability and Reliability

The clear separation of concerns in RESTful APIs (client, server, resources) promotes modularity and code reusability. This leads to improved maintainability and reduced development costs in the long run.

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REST API Usage

Things to consider before RESTful APIs

Simple data access: Need to expose simple data for use by other applications, especially web and mobile clients.

Integration with existing systems: Easy to integrate with existing platforms due to familiar HTTP and JSON/XML format.

Scalability and flexibility: Can handle various applications and scale with increasing traffic and data volumes.

Open standards and interoperability: Promotes collaboration and simplifies integration with diverse software and hardware.

Real-time communication: Not ideal for applications requiring continuous data updates like chat or streaming, consider WebSockets or event-driven messaging.

Complex workflows: Intricate operations requiring multiple chained requests might be less efficient than custom protocols.

Highly secure environments: If security is paramount, custom protocols with stronger authentication and authorization might be preferred.

Resource-intensive tasks: Transferring large files or data streams may be more efficient with specialized protocols like FTP or WebDAV.

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API Architectures

Other available API Architectural Styles

GraphQL

Declarative data fetching with precise control, ideal for complex data structures

gRPC

High-performance remote procedure calls optimized for microservices communication.

Event-Driven

Loosely coupled, real-time data exchange through event streams and messaging.

Soap

Mature, XML-based protocol emphasizing security and interoperability.

Web Sockets

Continuous bi-directional communication between client and server.

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