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COIMBATORE-641 035, TAMIL NADU

DEPARTMENT OF COMPUTER APPLICATIONS

23CAT605 – WEB STACK DEVELOPMENT

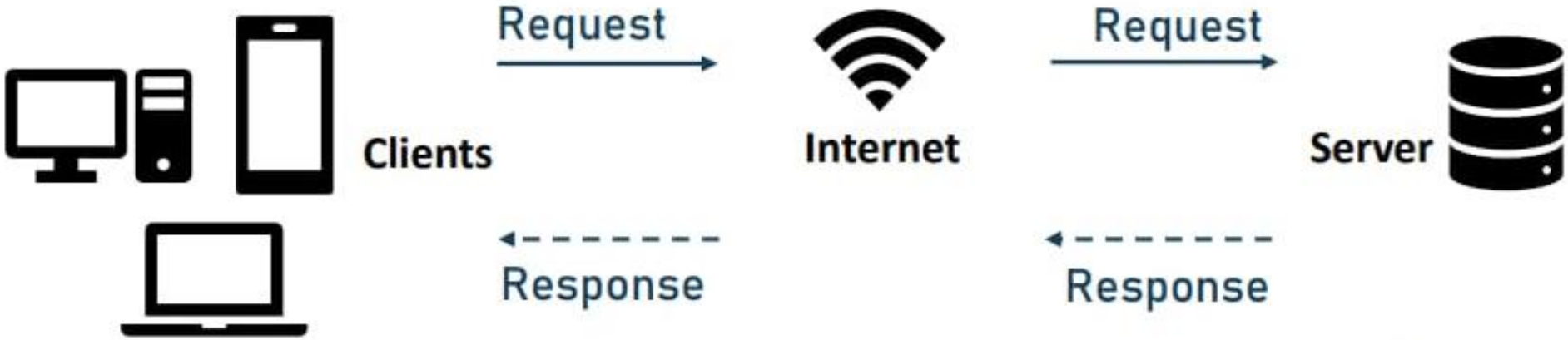
UNIT – I: OVERVIEW OF WEB TECHNOLOGIES & HTML 5

TOPIC: WEB SERVICES

WEB SERVICES

Web service is a standardized medium to **propagate communication between the client and server applications** on the WWW (World Wide Web).

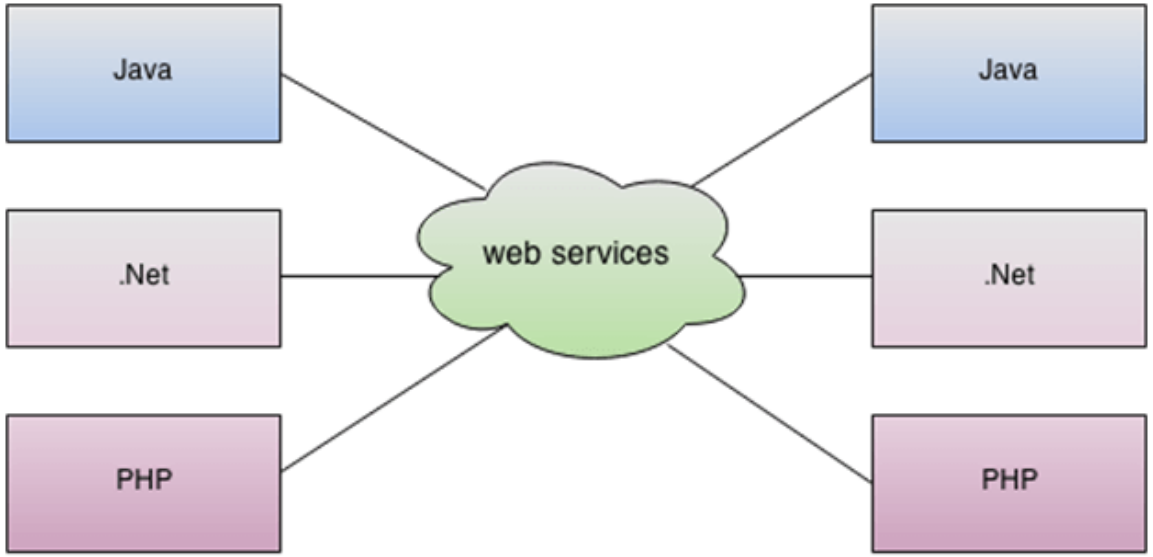
A web service is a software module that is designed to perform a certain set of tasks.



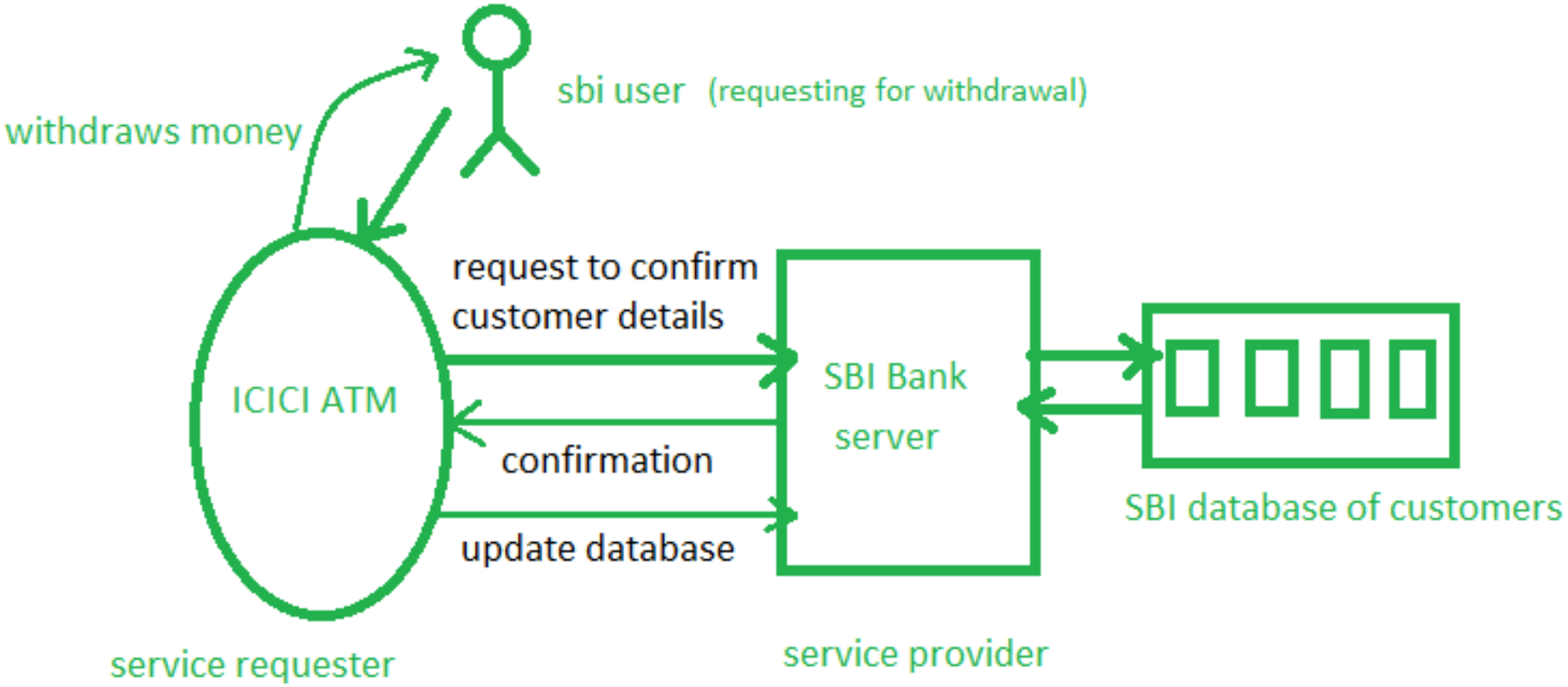
Web Services

A Web Service is can be defined by following ways:

- It is a **client-server application** or application component for communication.
- The method of communication between **two devices over the network**.
- It is a software system for the interoperable **machine to machine communication**.
- It is a **collection of standards or protocols for exchanging information** between two devices or application.



Why application needs to communicate?



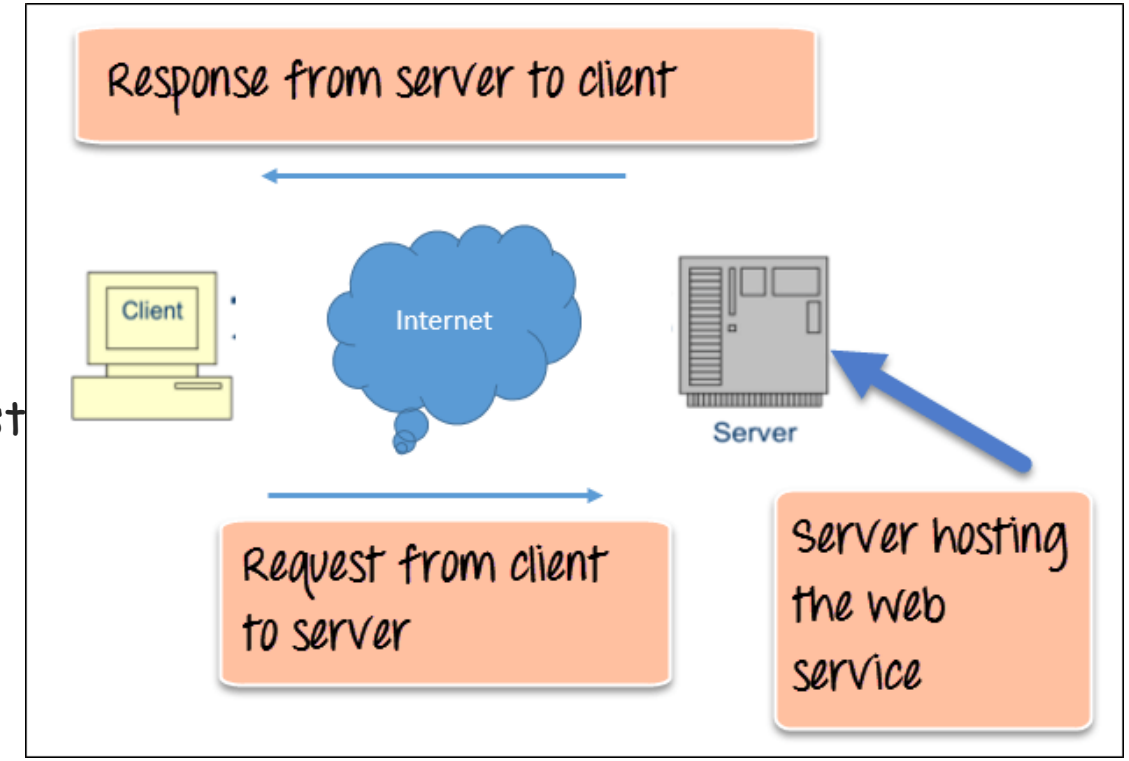
How do Web Services Work?

✓ Web services use the **request-response method** to communicate among applications.

✓ For any communication, we need a **medium and a common format** that can be understood by everyone, in the case of web services **medium is the internet** and the **common format is the XML** (Extensible Markup Language) format as every programming language can understand the XML markup language.

✓ A client is the one that requests **(RPC)** some service from the server that is known as the **service provider**.

✓ The request is sent through a **message which is in common XML format** and in response to that request the service provider will respond with a message in a common format (.i.e. XML).



Web Service Components

1. **SOAP**: SOAP stands for **Simple Object Access Protocol**. It is the protocol stating how the communication between the application is going to happen.
2. **WSDL**: It stands for **Web Services Description Language** which is the XML document containing the rules for communication among different software. It defines that:
   - **How that service can be accessed by the system requesting for it from other systems?**
   - **What is the name of the service?**
   - **What are the specific parameter needed for accessing that service, what would be the return type?**
   - **What are the error messages that would be displayed in case of any issue while accessing the data?**
3. **UDDI**: **Universal Description, Discovery, and Integration** is the full form for the UDDI. It is a directory that provides us the detail that which software needs to be contacted for the particular type of data.

Types of Web Services

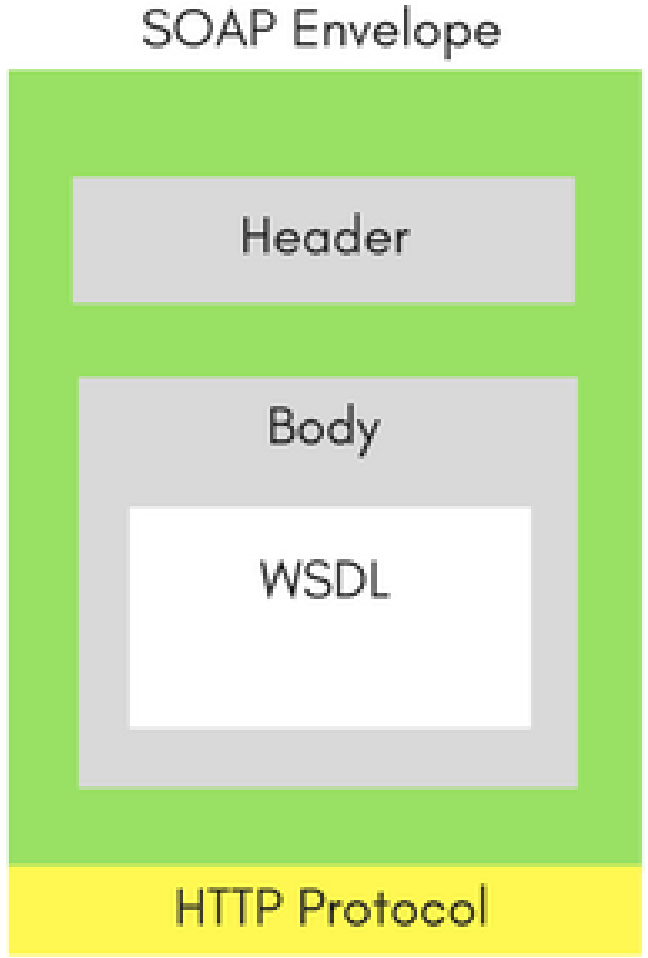
SOAP Web Services

- SOAP stands for **Simple Object Access Protocol**.
- These protocols are based on XML which is a lightweight data exchange language.
- These protocols are independent of language and can be run on any platform.
- SOAP supports both **stateful and stateless operations**.
- Stateful means that the **server keeps track of the information received from the client** on each request.

  Eg: Login activities, sessions in ecommerce or any sites.
- While Stateless means that **each request contains enough information about the state of the client and thus server does not need to bother about saving the state of the client thus increasing the speed of communication.** Eg: Weather services, Currency conversions.
- Many companies such as **IBM, Microsoft** are producing an implementation of SOAP into their systems.

SOAP

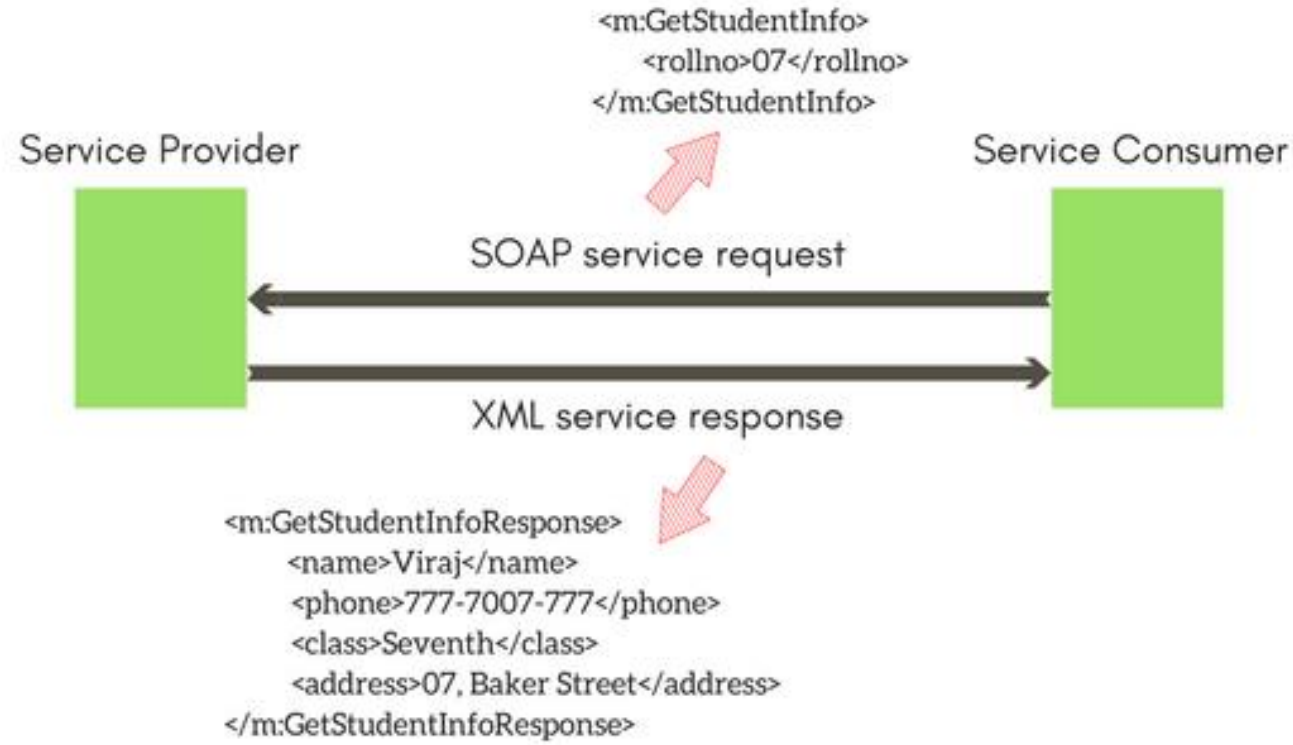
- Only the structure of the XML document, not the content, follows a pattern.
- The best thing about Web services and SOAP is that everything is sent through **HTTP**, the standard web protocol.
- A root element known as the element is required in every SOAP document. In an XML document, **the root element is the first element.**
- The "**envelope**" is separated into two halves. The header comes first, followed by the body. The routing data, or information that directs the XML document to which client it should be sent to, is contained in the header. The real message will be in the body.



Example

If a client wants to fetch a school's student data, by sending in the student's Roll No. in the request, he can do so using web services. But how will the client know, which URL to call and what to send in the request?

Every application serving SOAP requests, has a WSDL file. WSDL is an XML, and it stands for Web Service Description Language. WSDL describes all the methods available in the web service, along with the request and response types. It describes the contract between service and client. SOAP was intended to be a way to do remote procedure calls to remote objects by sending XML over HTTP.



REST Web Services

- It stands for **Representational State Transfer.**
- They are also language and platform-independent and are faster in comparison to SOAP.
- Nowadays RESTful web services are more used than SOAP.
- They treat the **data as resources.**
- REST is not a set of standards or rules, rather it is a style of software architecture. The applications which follow this architecture are referred to as **RESTful**
- Unlike SOAP which targets the actions, REST concerns more on the resources. REST locates the resources by using URL and it depends on the type of transport protocol(with HTTP - GET, POST, PUT, DELETE,...) for the actions to be performed on the resources. The REST service locates the resource based on the URL and performs the action based on the transport action verb. It is more of architectural style and conventions based.

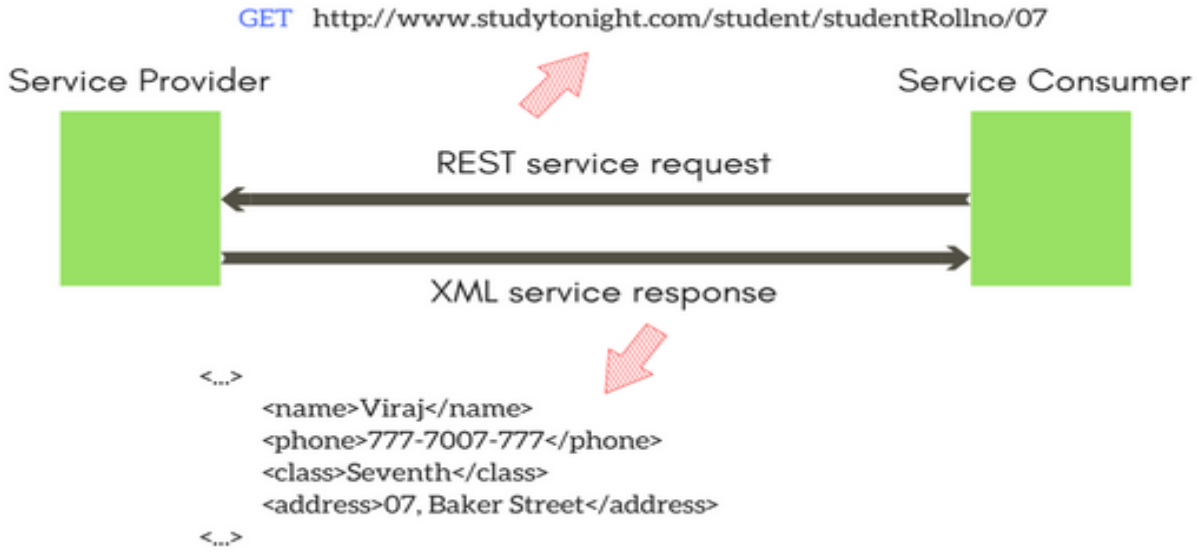
REST Web Services

For Example: in a RESTful architecture,

this URL **http://{serverAddress}/students/studentRollno/07** can be used to:

✓ To get student information by sending a REST call of GET type, and the service will return information of student with roll no as 07

✓ The same service can also be used to update the student data, by sending in the new values as Form data in a PUT request.



SOAP vs REST API

SOAP is like using an envelope

Extra overhead, more bandwidth required, more work on both ends (sealing and opening).

REST is like a postcard

Lighterweight, can be cached, easier to update.

SOAP vs REST

	SOAP	REST
What it stands for	Simple Object Access Protocol	Representational State Transfer
Resources	XML and HTTP	HTTP
Skill Level	High	Low to Medium
Data Format	Options include XML, JSON, CSV	Options include JSON, XML, CSV, and other structured formats
Design Focus	Standardization, performance, security, reliability, and transactional support	Flexibility, interoperability, scalability, simplicity, and statelessness
Architecture	SOAP APIs are independent and can work with any transport protocol. This makes them versatile, but also more complex and slow.	REST APIs rely on the underlying transport protocol, usually HTTPS. This means that they can perform better than SOAP APIs, but this can cause challenges with backward compatibility or security.
Request and Response format	Requires a standardized structure, including headers and a message body.	Doesn't require strict structure and usually includes an HTTP method, an endpoint, headers, and a body.
Security	Provides standards-based security measures	Offers several security measures, such as SSL, OAuth, and HTTP Basic Authentication
Used in	Web and non-web applications	Mostly web applications