API Structure and RESTful-ness

What is API? :

API is short for Application Programming Interface, a set of protocols and tools for building software applications. An API defines the way the components of software should interact with each other so that the interactions of the components can run smoothly.

API structures:

API structures consist of client and server. Applications that send requests are clients and applications that receive requests are servers. There are 4 different structures for API (SOAP, RPC, Websocket, REST). The following is a brief explanation of the 4 different structures of APIs and how they are used. SOAP APIs use Simple Object Access Protocol where the client and server communicate using XML. This results in SOAP API being less flexible and losing popularity compared to the past. RPC APIs are APIs that handle client requests on the server and the server sends the output back to the client. WebSocket APIs are APIs that usually use JSON objects to pass data. This type of API structure supports two-way communication between the client and server, and because this API structure can send callback messages to connected clients, it is the most efficient of the four APIs. Finally, REST API, REST API is the API with the greatest popularity today because of its simplicity, scalability, speed, and ability to handle all data types. This API uses the Hypertext Transfer Protocol (HTTP) to allow clients to send requests to the server as data, and the server uses the data to run internal functions, returns output data, and sends it back to the client. Because of the simplicity and efficiency of this API, we will look at it in depth in this technical report.

What are REST APIs and how to define RESTful-ness:

REST is a set of structural constraints of APIs and it is not a protocol or standard for APIs, which means developers can implement REST in many ways. When a client request is made by a RESTful API it can transfer the data to the requester endpoint (server) by Hypertext Transfer Protocol (HTTP) with JSON, HTML, XLT, PHP or TXT, despite all of them would work, JSON is the most popular one to use because it is readable by humans and machines. So we have talked about RESTful-ness a lot above, so what do we need to consider an API to be RESTful? For an API to be considered RESTful it needs to be client-server structured that is made up of clients, servers and data with requests through HTTP, no client data is stored between requests and each request should be separated, Cacheable data that streamlines client-server interactions, consistent interface between software components for data to transfer, and a layered system structure that uses the APIs on server A, store data on server B, verify requests in Server C but the process should be invisible to the client.

Hypertext Transfer Protocol (HTTP) requests methods:

To implement a REST API we would use HTTP to transfer data, but how can we use HTTP? For HTTP are some defined request methods to indicate the action to be performed for a given data. They are: GET(to request specific data, and only receive data), HEAD(same as GET but the response would only go to head), POST(send an entry to a specific place ad it always makes the state of the server change as a side effect), PUT(replaces all current representations with of targeted data with request data), DELETE(delete specific data), CONNECT(builds a tunnel to the server and identify it by the targeted data), OPTIONS(list out the communication options of target data), TRACE(do a message loop-back test at the path of the targeted data) and PATCH(puts partial modifications to a resource).

Citations:

RedHat (2020). What is a REST API? [online] www.redhat.com. Available at: https://www.redhat.com/en/topics/api/what-is-a-rest-api [Accessed 5 Mar. 2023].

Amazon Web Services (n.d.). What is an API? - API Beginner's Guide - AWS. [online] Amazon Web Services, Inc. Available at: https://aws.amazon.com/what-is/api/ [Accessed 3 May 2023].

Gupta, L. (2022) Rest architectural constraints, REST API Tutorial. Available at: https://restfulapi.net/rest-architectural-constraints/#:~:text=5.-,Layered%20system,an%20intermediary%20along%20the%20way. (Accessed: March 8, 2023).

HTTP request methods - http: MDN (no date) HTTP | MDN. Available at: https://developer.mozilla.org/en-US/docs/Web/HTTP/Methods (Accessed: March 8, 2023).