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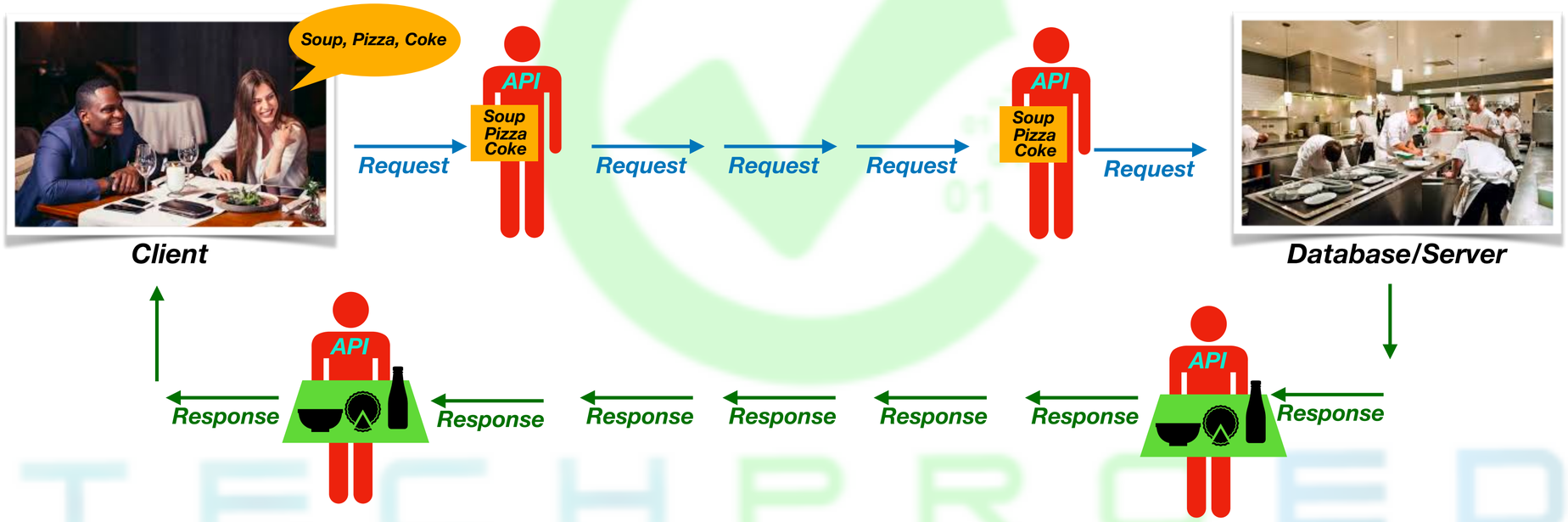
API TESTING COURSE SPRING 2020

What is API ?

API stands for **A**pplication **P**rogramming **I**nterface.

API is an application **without** **U**ser **I**nterface(**UI**).

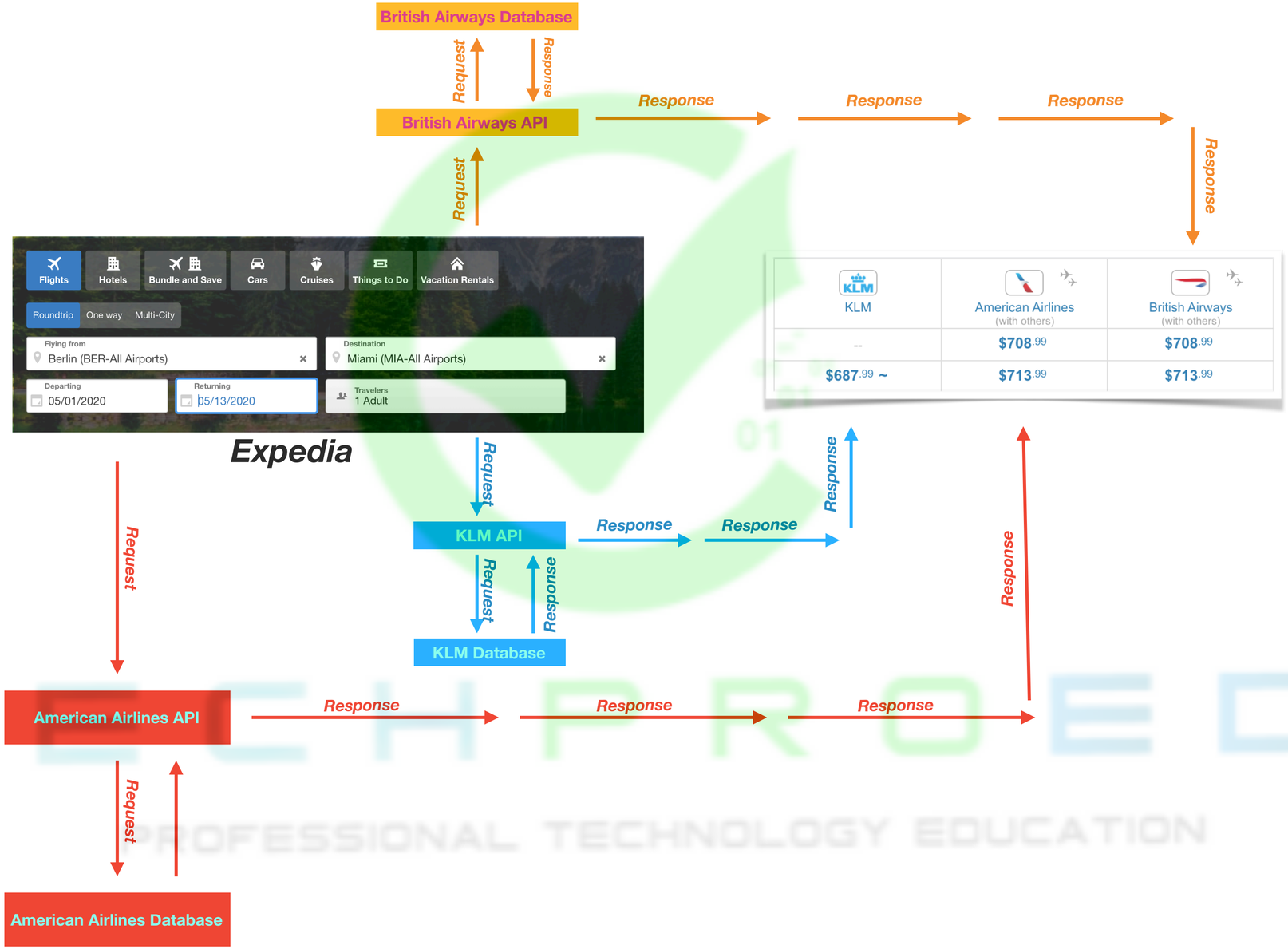
APIs specify **how** one software program should **interact with other** software programs.



Assume an **API** as a **Waiter** at a **Restaurant**.

As a waiter, the **API takes a request** from a client, takes that request to the database, fetches the requested data from the database and **returns a response** to the client.

How API Works ?

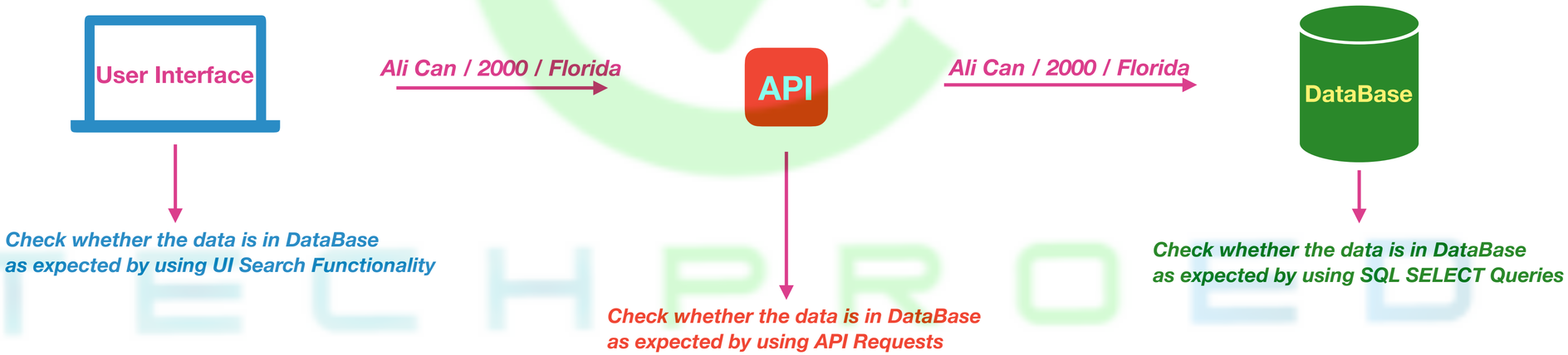


What is API Testing ?

API testing is done to check whether the **API** meets expectations in terms of **functionality**, **reliability**, **performance**, and **security** of an application.
API testing won't concentrate on look of the application.

End to End (E2E) Scenarios:

1) Create/Update/Delete a data in DataBase by using User Interface then,



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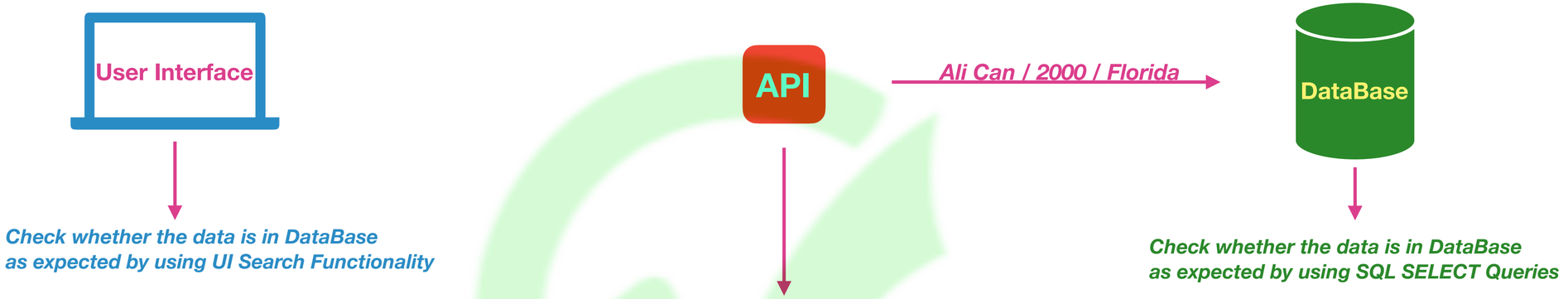
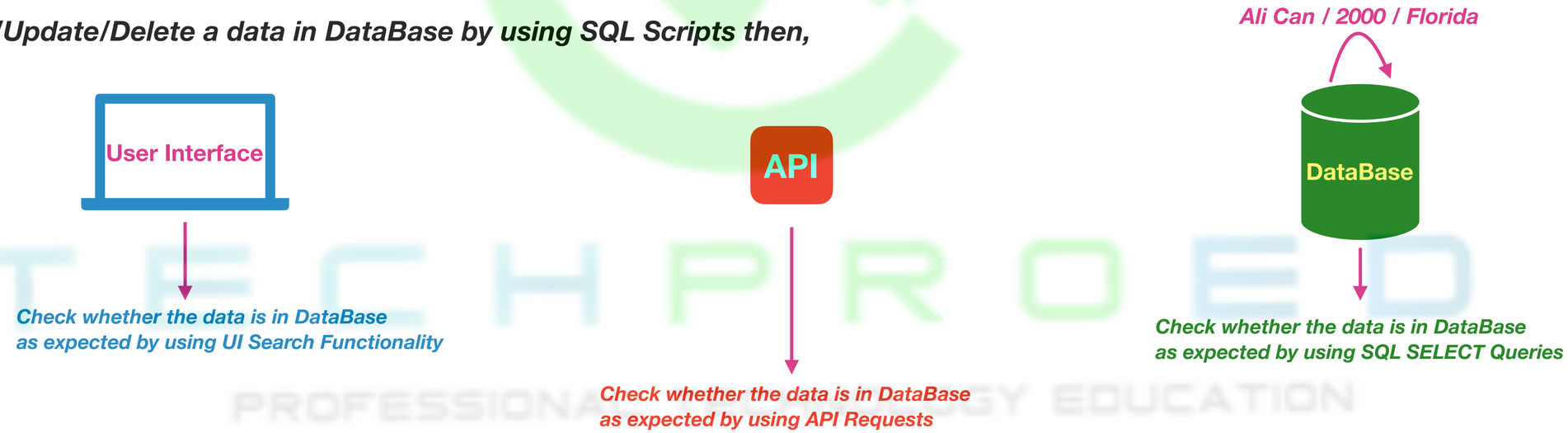
2) Create/Update/Delete a data in DataBase by using API then,



3) Create/Update/Delete a data in DataBase by using SQL Scripts then,



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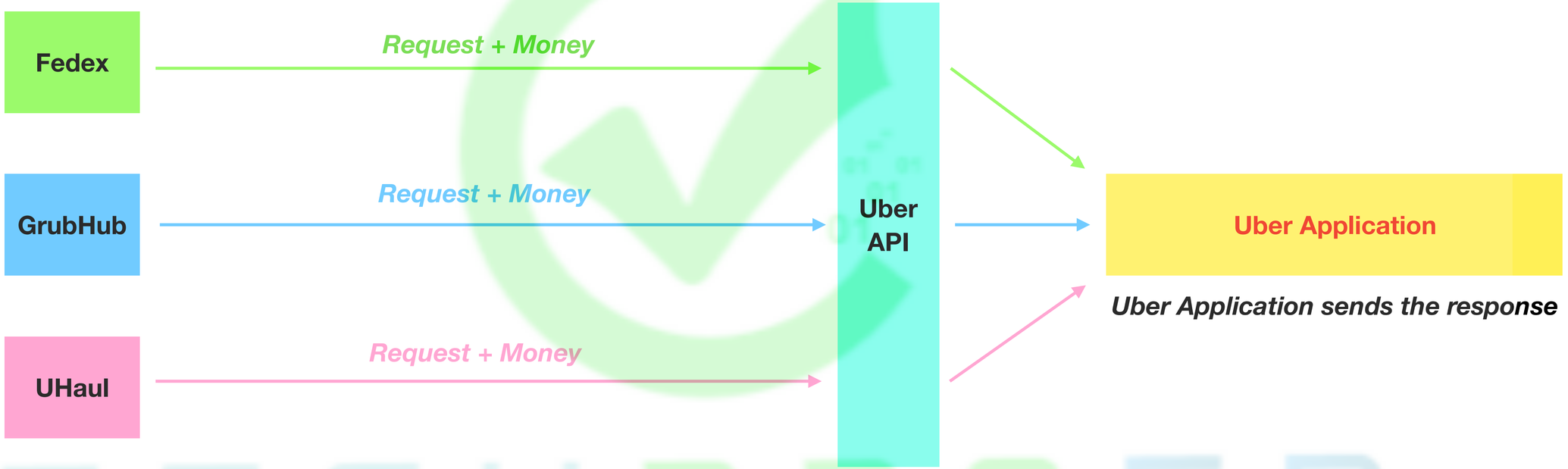
Note: Every company creates their own APIs and earns money by selling the services



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What is the difference between API and Web Services ?

API and Web Service create communication between applications.

Web Service

The only difference is that a Web Service creates interaction between two applications through internet.
For example, Expedia uses KLM Airlines DataBase through internet.
So Expedia is using **KLM Web Service**.

API

Desktop applications such as Microsoft Word use their own APIs which don't need internet.
So when we use Microsoft Word, we use **Microsoft Word API**

Note: All Web Services are APIs but all APIs are not Web Services.

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What is HTTP?

HTTP stands for **H**yper **T**ext **T**ransfer **P**rotocol

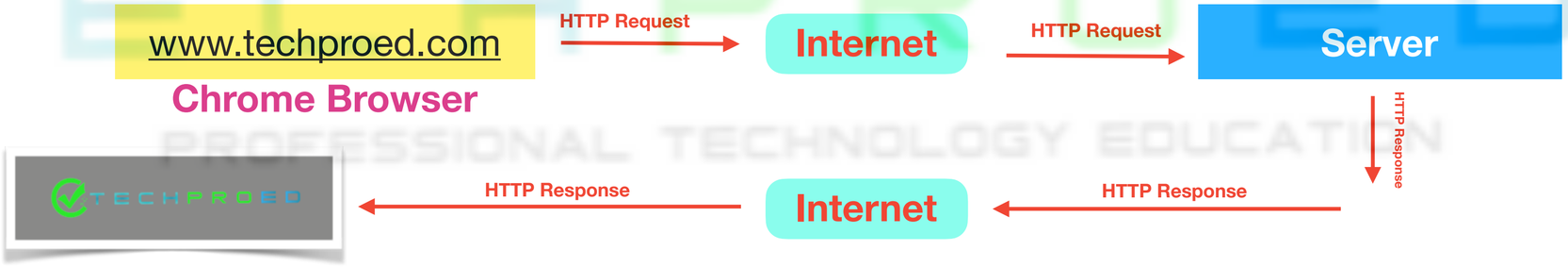
Communication between **client** computers and **web servers** is done by sending **HTTP Requests** and receiving **HTTP Responses**

Clients are often **browsers** (Chrome, Edge, Safari), but they can be any type of program or device.

Servers are most often computers in the cloud.

Communication between **clients** and **servers** is done by requests and responses:

1. A client (a browser) sends an **HTTP Request** to the web
2. A **Web Server** receives the request
3. The server runs an application to process the request
4. The server returns an **HTTP Response** (output) to the browser
5. The client (the browser) receives the response

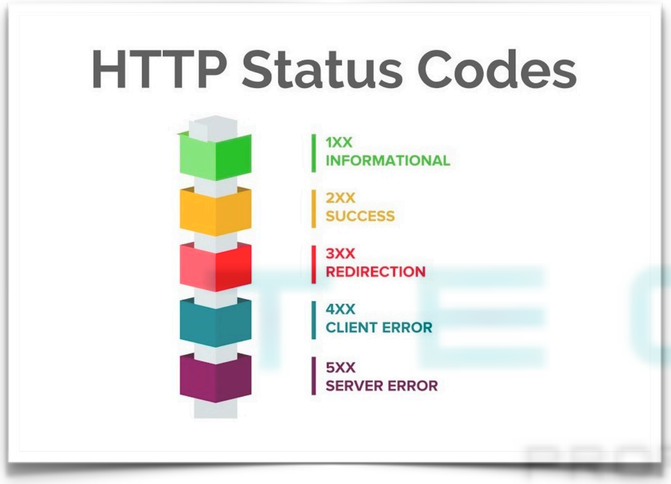


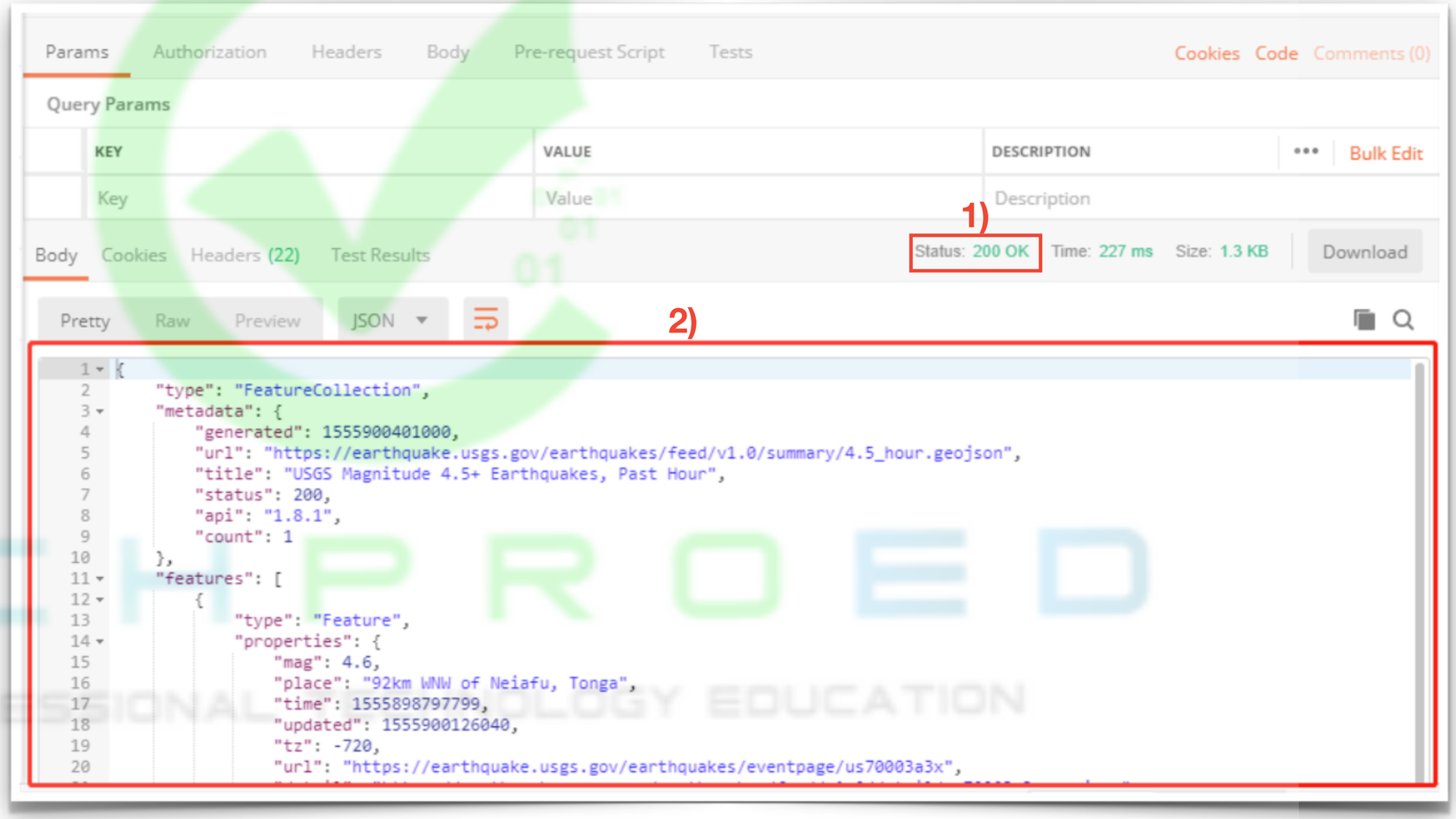
What exactly needs to be verified in API Testing?

On API Testing, we send a request to the API with the known data and we analyze the response.

1) **HTTP Status Codes**

2) **Data Accuracy**





Common HTTP Status Codes

1) 200 (OK) ==> This is the standard response for successful HTTP requests.

2) 201 (CREATED) ==> This is the standard response for an HTTP request that resulted in an item being successfully created.

3) 204 (NO CONTENT) ==> This is the standard response for successful HTTP requests, where nothing is being returned in the response body.

4) 400 (BAD REQUEST) ==> The request cannot be processed because of bad request syntax, excessive size, or another client error.

5) 403 (FORBIDDEN) ==> The client does not have permission to access this resource.

6) 404 (NOT FOUND) ==> The resource could not be found at this time. It is possible it was deleted, or does not exist yet.

7) 500 (INTERNAL SERVER ERROR) ==> The generic answer for an unexpected failure if there is no more specific information available.

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Tools Used for API Testing?

1) Postman

Postman is a popular API Tool that makes it easy for developers to create, share, "test" and document APIs.

2) SOAP UI

SOAP stands for Simple Object Access Protocol.

It is important for web applications to be able to communicate over the Internet.

The best way to communicate between applications is over HTTP, because HTTP is supported by all internet browsers and servers. SOAP was created to accomplish this.

SOAP provides a way or format to communicate between applications running on different operating systems, with different technologies and programming languages. SOAP is platform independent

SOAP is based on XML Format.

```
<customer>
      <customer_id> 1001 </customer_id>
      <customer_name> Mark Star </customer_name>
</customer>
```

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3) REST / RestFul

REST stands for REpresentational State Transfer

REST is making easier for systems to communicate with each other.

In the REST architecture, clients send requests to retrieve or modify resources, and servers send responses to these requests.

REST is able to use XML and JSON (Java Script Object Notation) Format; therefore, it is more common than SOAP

```
<customer>
      <customer_id> 1001 </customer_id>
      <customer_name> Mark Star </customer_name>
</customer>
```

XML Format

```
{
    "customer_id": 1001,
    "customer_name": "Mark Star"
}
```

JSON Format (key- value like maps)

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What does a REST request generally consist of ?

1) An HTTP method defines what kind of operation to perform

A) GET is for reading data ==>To search hotels from www.hotels.com

B) POST is for creating a new data ==>To make hotel reservation from www.hotels.com

C) PUT is for updating data completely ==>To change all reservation details from www.hotels.com

D) PATCH is for updating data partially ==>To change just reservation date from www.hotels.com

E) DELETE is for removing data ==>To cancel reservation from www.hotels.com

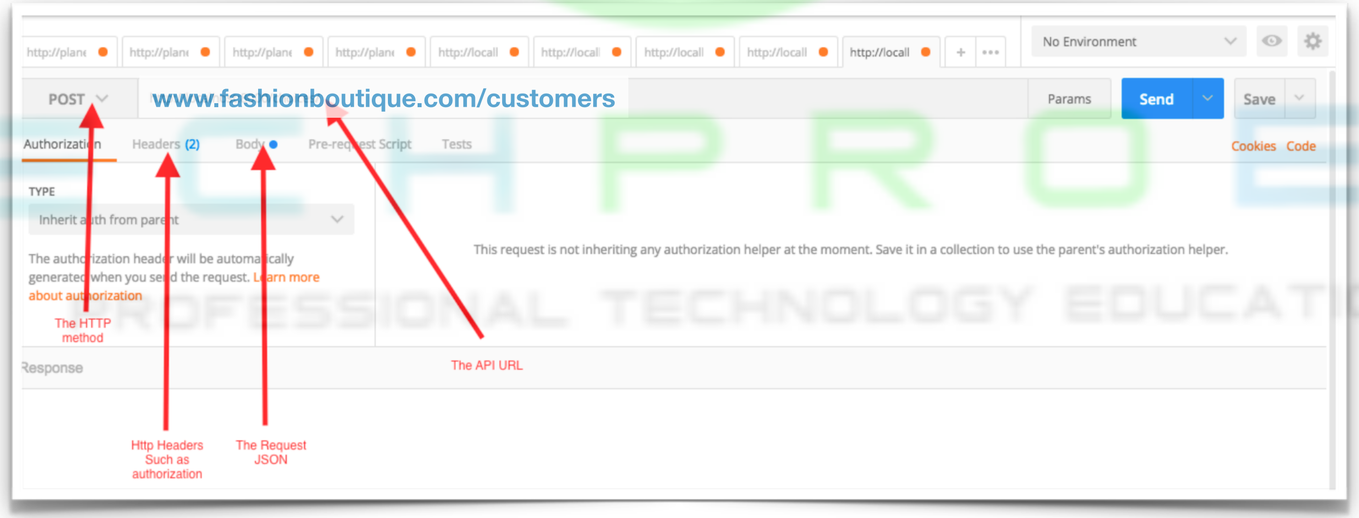
2) In HEADER, the client sends the type of content which will be received from the server.

Header ensures that the server does not send data that cannot be understood or processed by the client.

3) A PATH (Endpoint/URL/URI) to a resource:

Requests must contain a path to a resource that the operation should be performed on.

Endpoint** is like **www.fashionboutique.com/customers



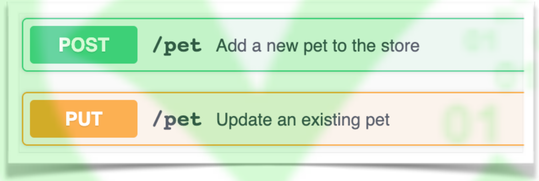
What is an API Endpoint?

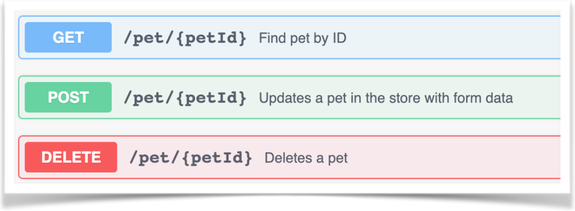
The place that APIs send requests and where the resource lives, is called an endpoint.

When API developers create an API, they create public Endpoints (URL) and decide which Endpoint will run with which HTTP Request Methods.

http://petstore.swagger.io/

Base URL / Method Name





Testers test every endpoints if they work as expected by using GET, POST, PUT, DELETE HTTP Request methods.

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What is Swagger?

Swagger is a framework for describing your API by using a common language that is easy to read and understand by developers and testers, even they have weak source code knowledge.

You can think of it as a blueprint for a house.
You can use whatever building materials you like, but you can't step outside the parameters of the blueprint.

I used SWAGGER for API documentation.
SWAGGER gives me API Endpoints and informs me about how to use them.

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Postman Panel

You can create collection to store all requests for organizing

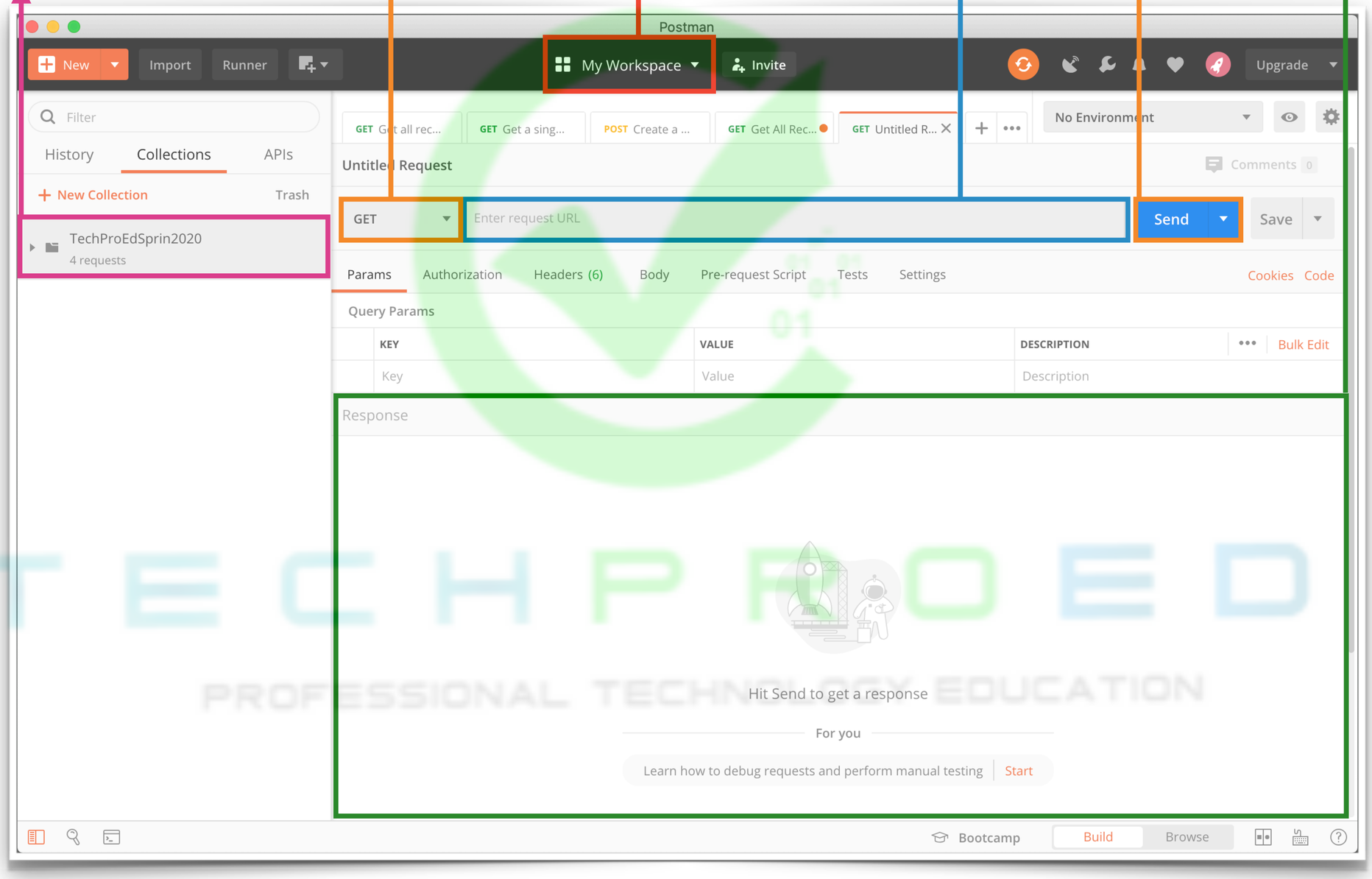
Request Method

Name of the workspace

Request URL bar

Send button

Response window



How to work with GET Request ?

***Postman** is used for **backend testing** where we enter the end-point URL, it sends the request to the server and receives the response back from the server.*

Base URL	Base URL	Method	Endpoints	Description
https://restful-booker.herokuapp.com	JSON	GET	/booking	Get all employee data
		GET	/booking/1	Get a single employee data
		POST	/booking? firstname=Suleyman&lastname=Alptekin&totalprice=123&depositpaid=true&additionalneeds=Wifi	Create new record in database
		PATCH	/booking/12	Update an employee record partially
		PUT	/booking/11	Update an employee record
		DELETE	/booking/11	Delete an employee record

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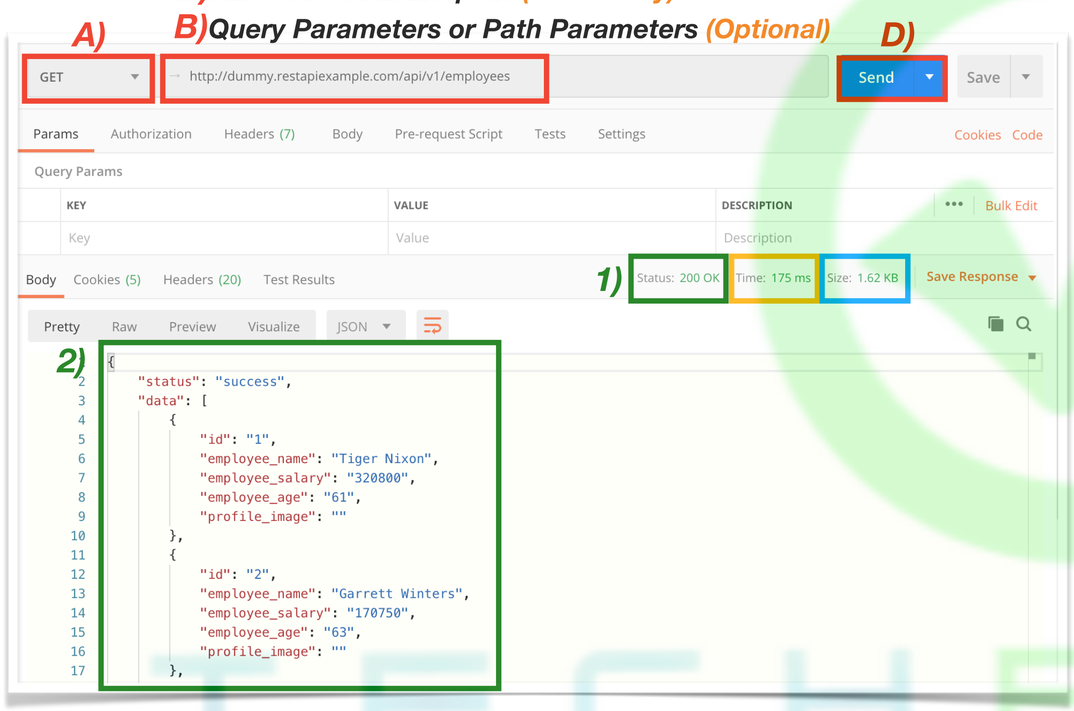
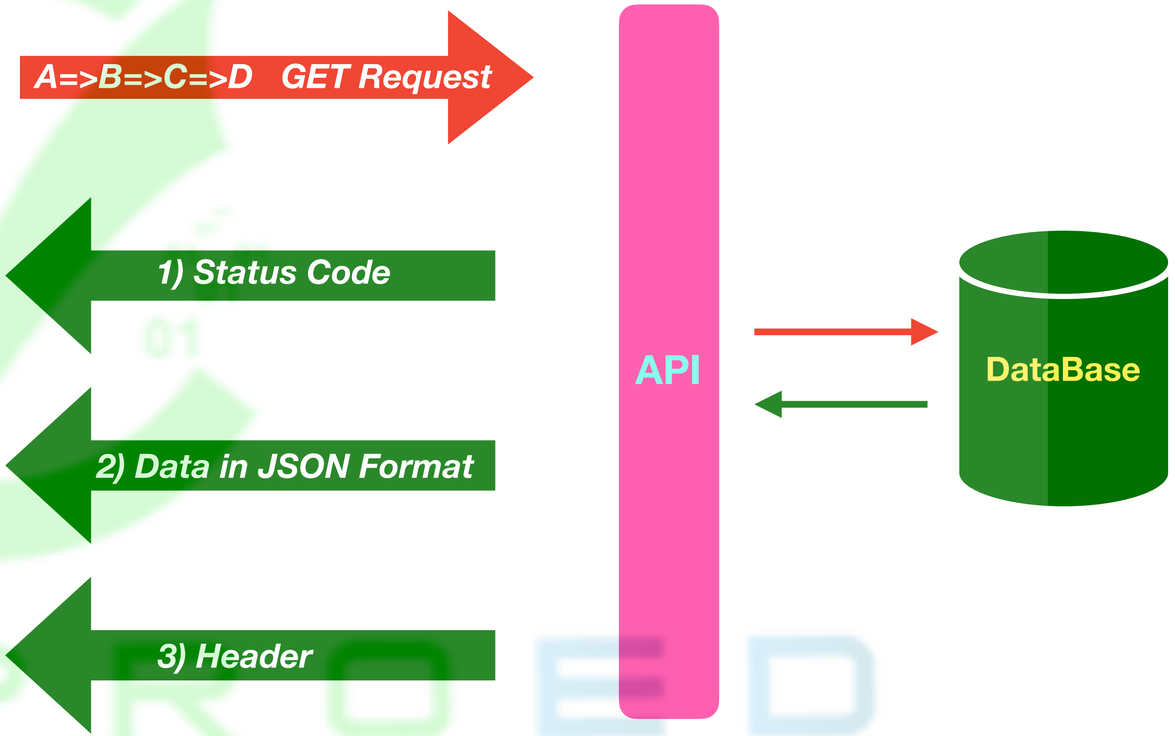
How to work with GET Request ?

C) In Headers use “Accept” to select response format.
The format can be XML or JSON (Optional)

B) REST API URL/Endpoint (Mandatory)
B) Query Parameters or Path Parameters (Optional)



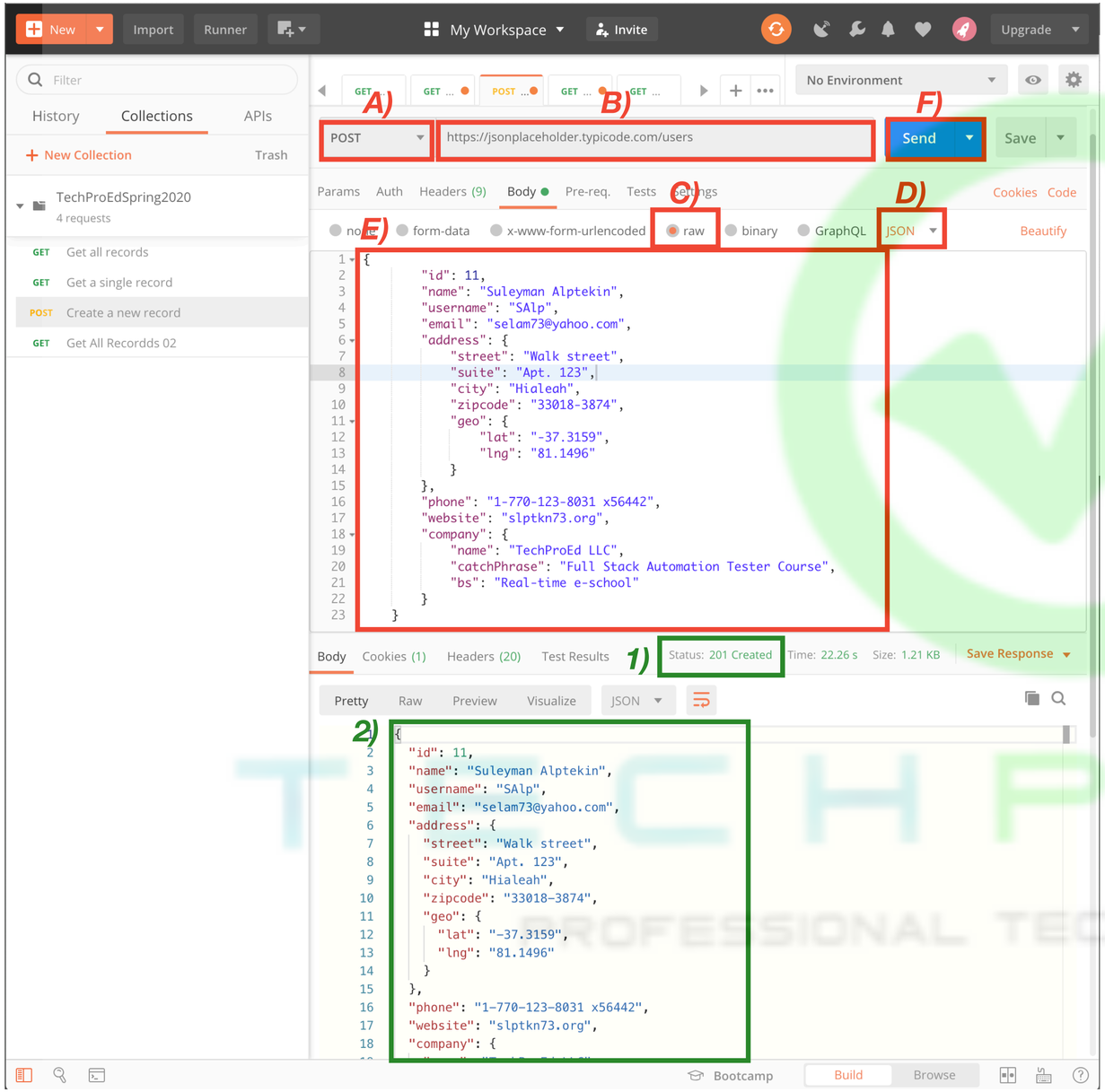


Note: After getting response we check status code first

Note: Accept indicates what kind of *response* *from the server* the client can accept.
But API should support the expected format, otherwise API sends the response in default format

Note: You will need Authorization to GET Request

How to work with POST Request ?



A=>B=>C=>D=>E=>F POST Request

1) Status Code

2) Data in JSON Format

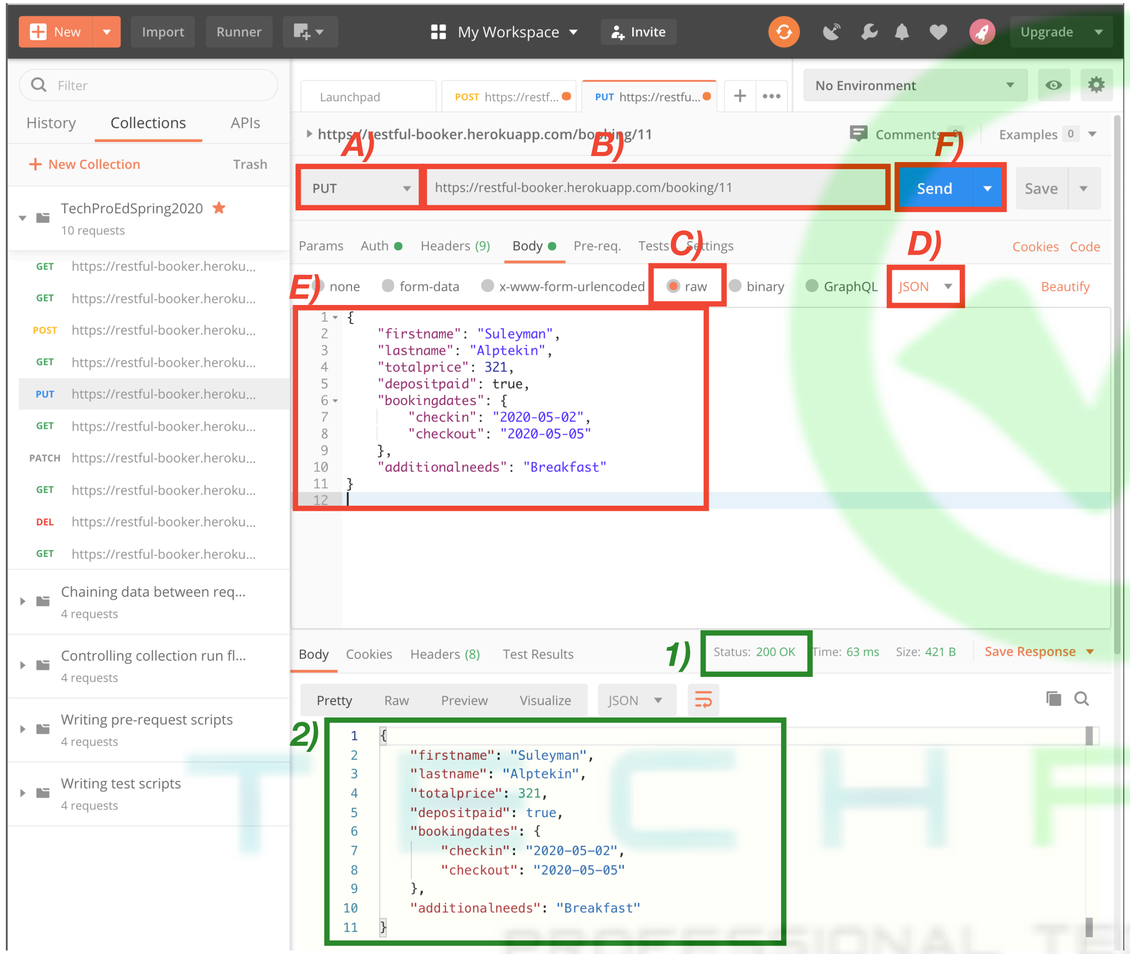
API

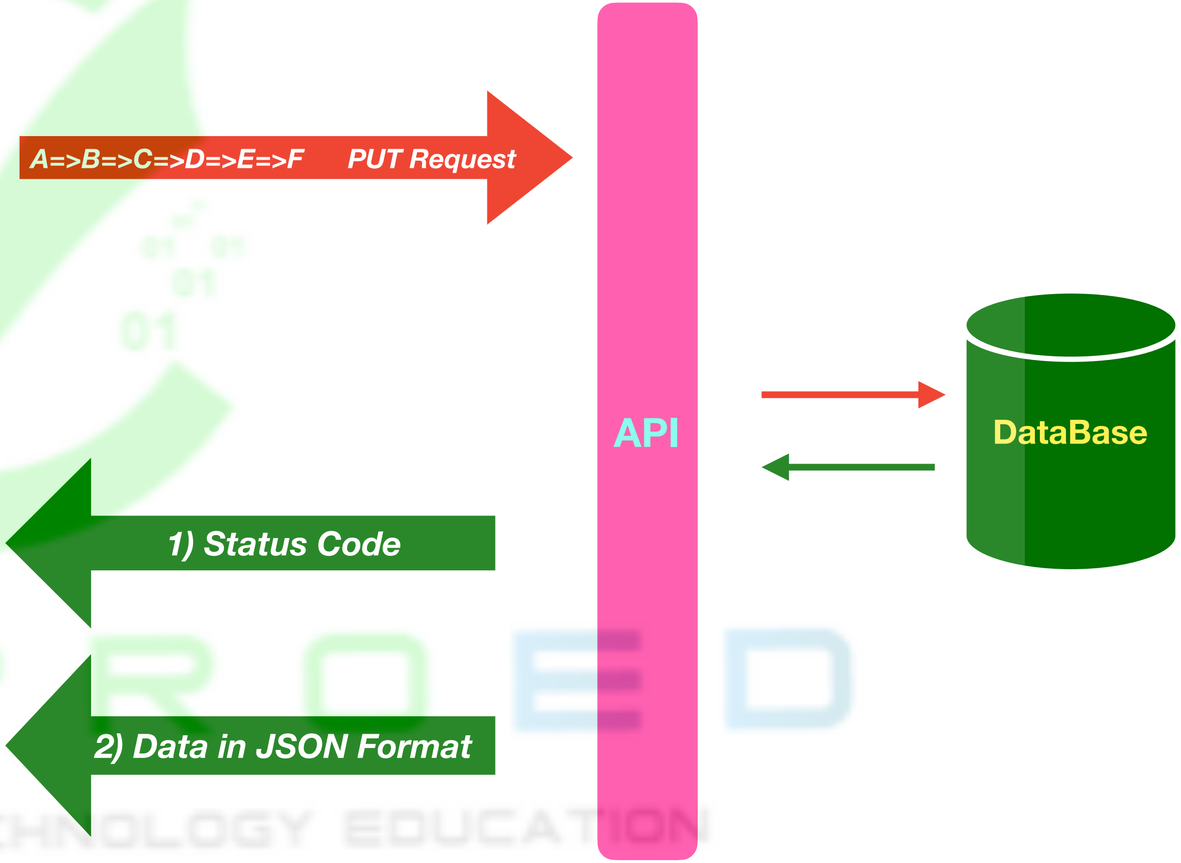
DataBase

Note: After getting response we check status code first

Note: You will need Authorization to POST Request

How to work with PUT Request ?

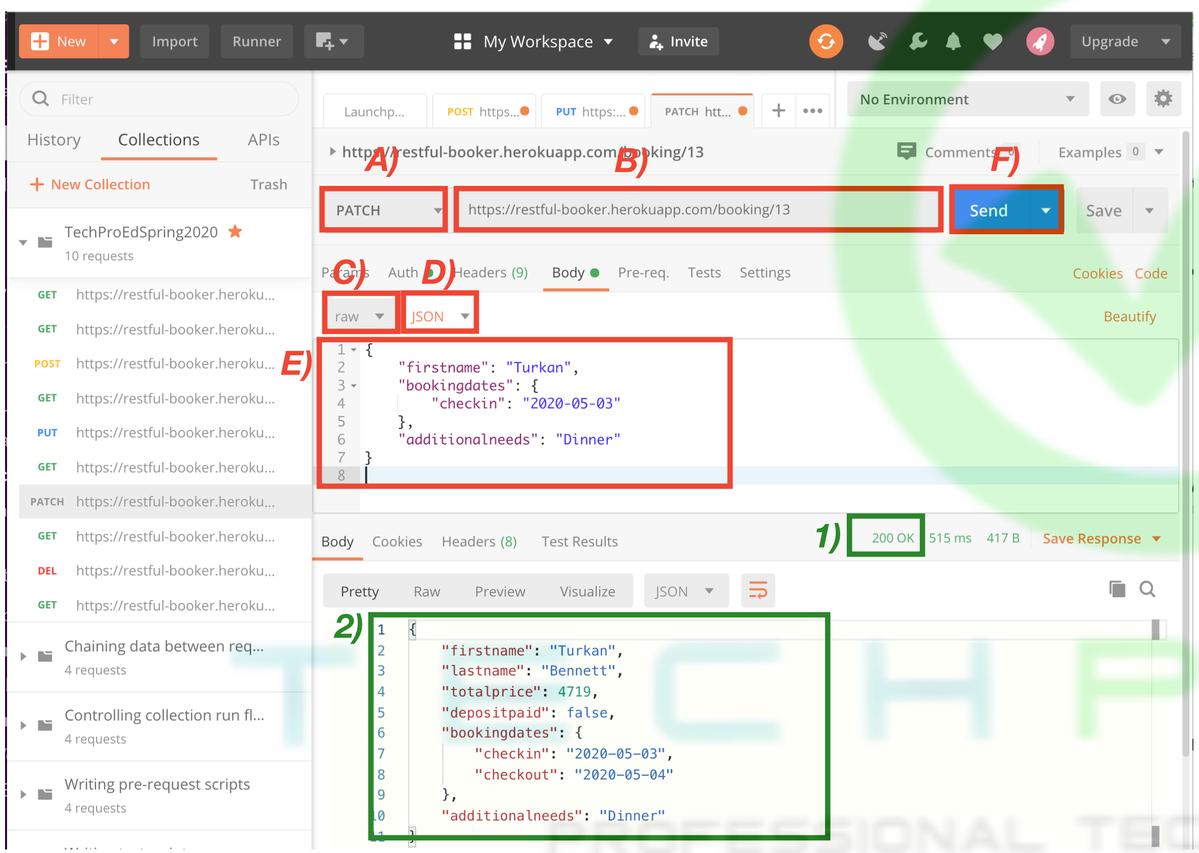


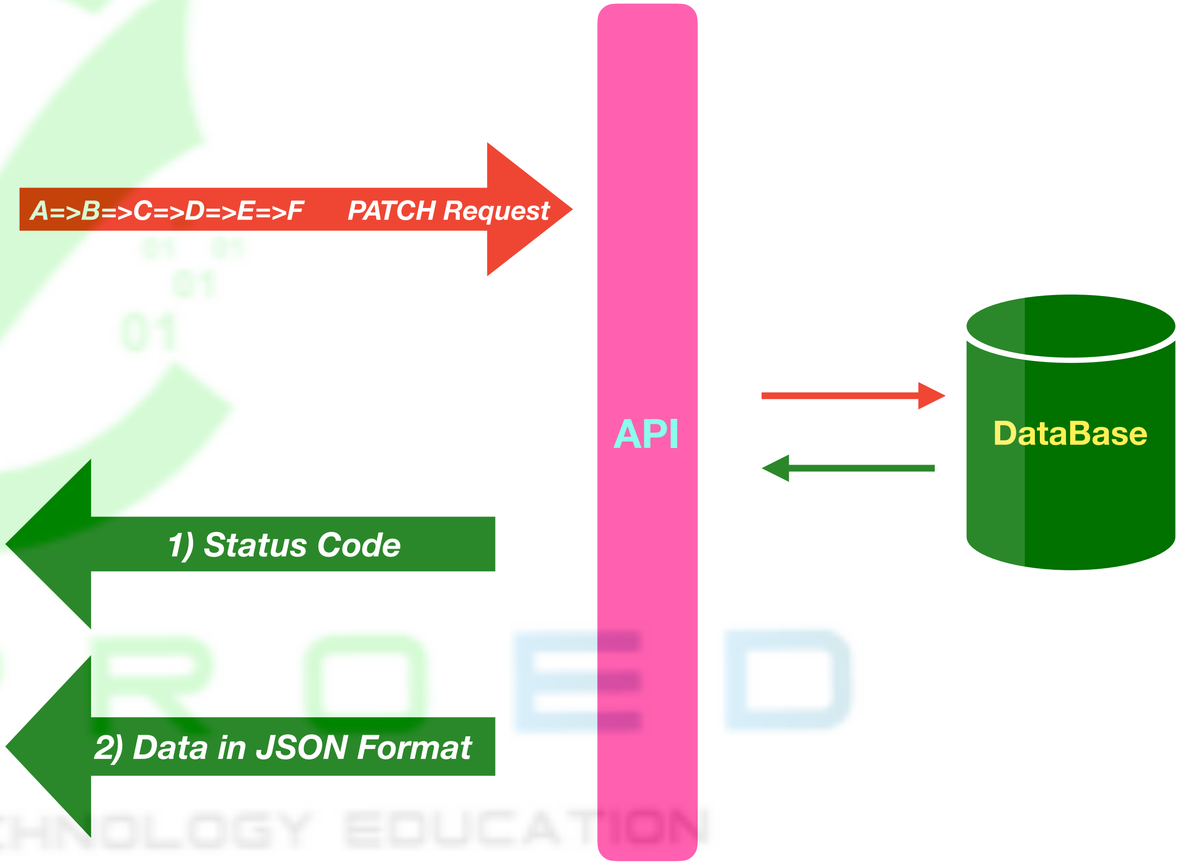


Note: After getting response we check status code first

Note: You will need Authorization to PUT Request

How to work with PATCH Request ?

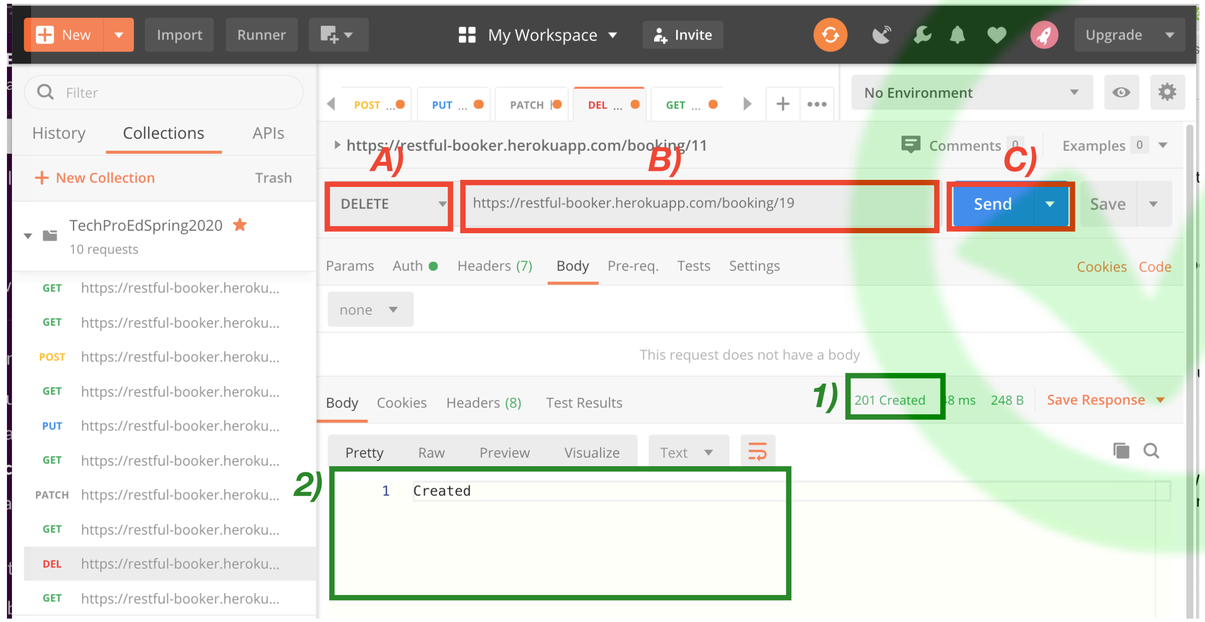


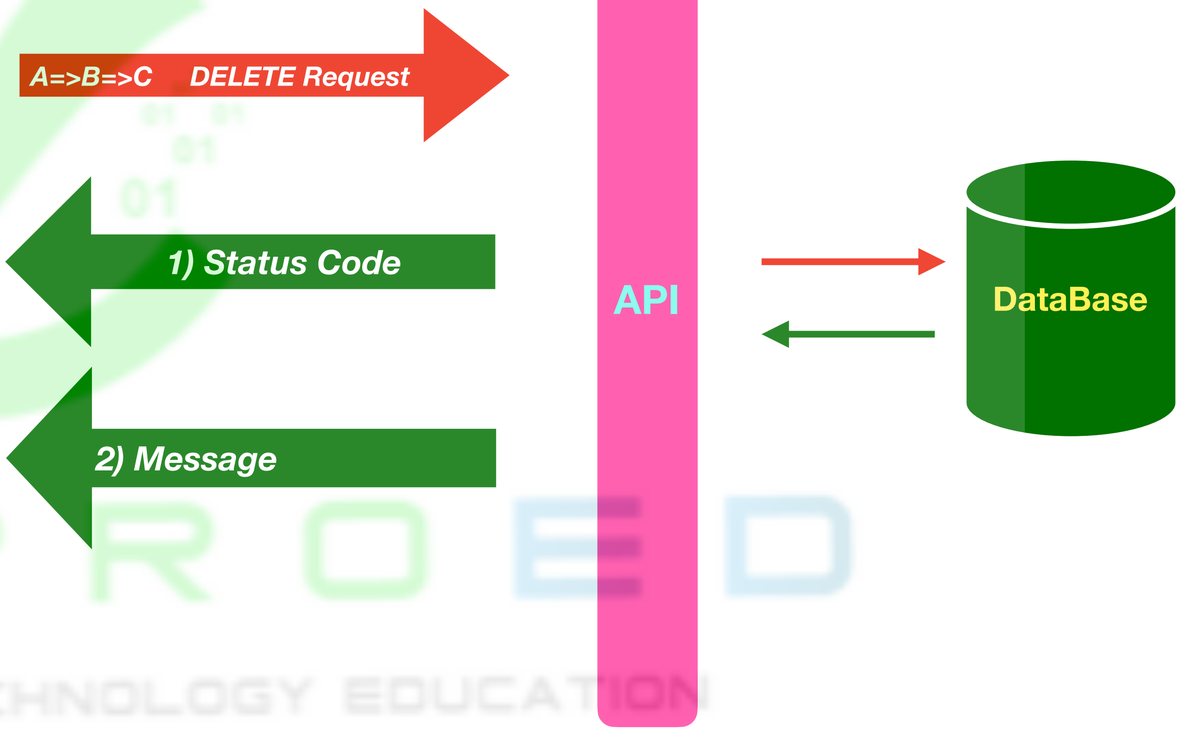


Note: After getting response we check status code first

Note: You will need Authorization to PATCH Request

How to work with DELETE Request ?





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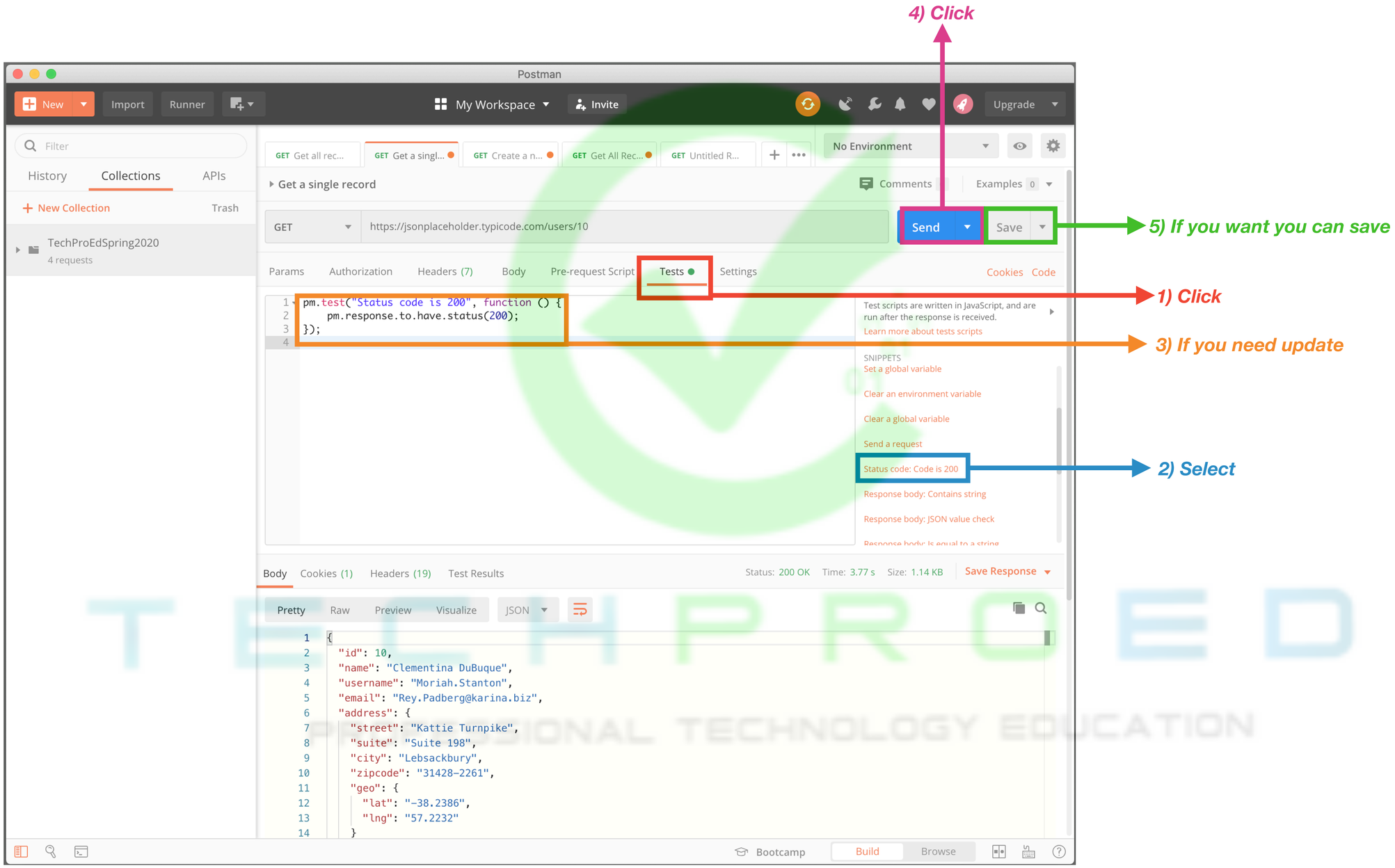
Note: After getting response we check status code first

Note: You will need Authorization to DELETE Request

How to Create Tests on Postman ?



How to Create API Test Cases ?

Test the following test cases by using Postman (Manually)

1) *When I send a GET request to REST API URL https://restful-booker.herokuapp.com/booking*
   And Accept type is “application/JSON”
   Then HTTP Status Code should be 200
   And Response format type should be "application/JSON"

2) *When I send a GET request to REST API URL https://restful-booker.herokuapp.com/booking/5*
   And Accept type is “application/JSON”
   Then HTTP Status Code should be 200
   And first name should be “Mary”
   And total price should be 814

3) *When I send a GET request to REST API URL http://dummy.restapiexample.com/api/v1/employees*
   And Accept type is “application/JSON”
   Then HTTP Status Code should be 200
   And “Gerret Winters” should be displayed among data

4) *When I send a GET request to REST API URL http://dummy.restapiexample.com/api/v1/employee/1*
   And Accept type is “application/JSON”
   Then HTTP Status Code should be 200
   And employee name should be “Tiger Nixon”
   And employee salary should be “320800”
   And employee age should be “61”

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Query and Path Parameters ?

Note 1: https://www.google.com/search?q=selenium
The meaning of "?" is URL finished.
After the "?", we type keys and values, they are called query(request) parameters.

In REST, there are 2 types of parameters

1)Query Parameters: BaseURL/users?occupation=programmer ==> Fetch a list of programmer user
It is not the part of the URL
It uses key-value format
Note 2: Those parameters must be defined by developers

2)Path Parameters: BaseURL/users/123 ==> Fetch a user whose id is 123
It is a part of the URL
BaseURL/users/:id ==> In here ":id" is path parameter.
When you enter id you get all data about the user who has the id

Note 3: If you want to sort or filter items, then you should use Query Parameter.

Note 4: If you want to identify a resource, you should use Path Parameter.

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What is JsonPath ?

Note: We use JsonPath to navigate and manipulate data in Json Format

1) $ will return all the nodes inside the JSON document.
2) In order to get children of a given node, we can use the *dot (.)* operator with $ use $.Countries
3) If you want to display the Data nodes of all the countries use $.Countries[*].Data
4) You can use the Array Index *[i, j, k…]* to identify an entry at a particular index like $.Countries[0]
   To get the last element use -1 as index like $.Countries[-1]
5) You can extract multiple items from the array at different indexes like $.Countries[0,3]
   It will return the countries whose indexes are 0 and 3

To Practice JsonPath Queries: https://jsonpath.herokuapp.com/

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How to create JsonPath Object ?

We can create JsonPath object in different ways.

1) JsonPath json = response.jsonPath( );

2) JsonPath json = new JsonPath(response.asString());

3) JsonPath json = new JsonPath(FilePath.json);

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Interview Questions

1) Explain what is a “Resource” in REST?

Answer: REST architecture treats every content as a resource.
These resources can be either text files, HTML pages, images, videos or dynamic business data.
REST Server provides access to resources and REST client accesses and modifies these resources.
Here each resource is identified by URIs.

2) What is the most popular way to represent a resource in REST?

Answer: REST uses different representations to define a resource like TEXT, JSON, and XML.
XML and JSON are the most popular representations of resources.

3) Which protocol is used by RESTful web services?

Answer: RESTful web services make use of HTTP protocol as a medium of communication between client and server.

4) State the core components of an HTTP Request?

Answer: Each HTTP request includes five key elements.
1. The Verb which indicates HTTP methods such as GET, PUT, POST, DELETE.
2. URI stands for Uniform Resource Identifier (URI). It is the identifier for the resource on the server.
3. HTTP Version which indicates HTTP version, for example-HTTP v1.1.
4. Request Header carries metadata (as key-value pairs) for the HTTP Request message. Metadata could be a client (or browser) type, the format that the client supports, message body format, and cache settings.
5. Request Body indicates the message content or resource representation.

5) State the core components of an HTTP response?

Answer: Every HTTP response includes four key elements.
1. Status/Response Code – Indicates Server status for the resource present in the HTTP request.
For example, 404 means resource not found, and 200 means response is ok.
2. HTTP Version – Indicates HTTP version, for example-HTTP v1.1.
3. Response Header – Contains metadata for the HTTP response message stored in the form of key-value pairs.
For example, content length, content type, response date, and server type.
4. Response Body – Indicates response message content or resource representation.

6) Name the most commonly used HTTP Request Methods supported by REST?

Answer: There are a few HTTP methods in REST which are more popular.
1. GET -It requests a resource at the request-URL. It should not contain a request body as it will get discarded.
Maybe it can be cached locally or on the server.
2. POST – It submits information to the service for processing; it should typically return the modified or new resource.
3. PUT – At the request URL it updates the resource.
4. DELETE – It removes the resource at the request-URL.
5. PATCH - At the request URL it updates the resource partially.

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7) Is there any difference between PUT and POST operations? Explain it.

Answer: PUT and POST operation are almost the same. The only difference between the two is in terms of the result generated by them.
A PUT operation is idempotent while the POST operation can give a different result.
Let's take an example.
1. PUT puts a file or resource at a particular URI and precisely at that URI.
If the resource already exists, then PUT updates it. If it's a first-time request, then PUT creates one.
2. POST sends data to a particular URI and expects the resource at that URI to deal with the request.
The web server at this point can decide what to do with the data in the context of the specified resource.

8) What do you understand by payload in RESTFul web service?

Answer: Request body of every HTTP message includes request data called as Payload.
This part of the message is of interest to the recipient.
We can say that we send the payload in the POST method but not in <GET> and <DELETE> methods.

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