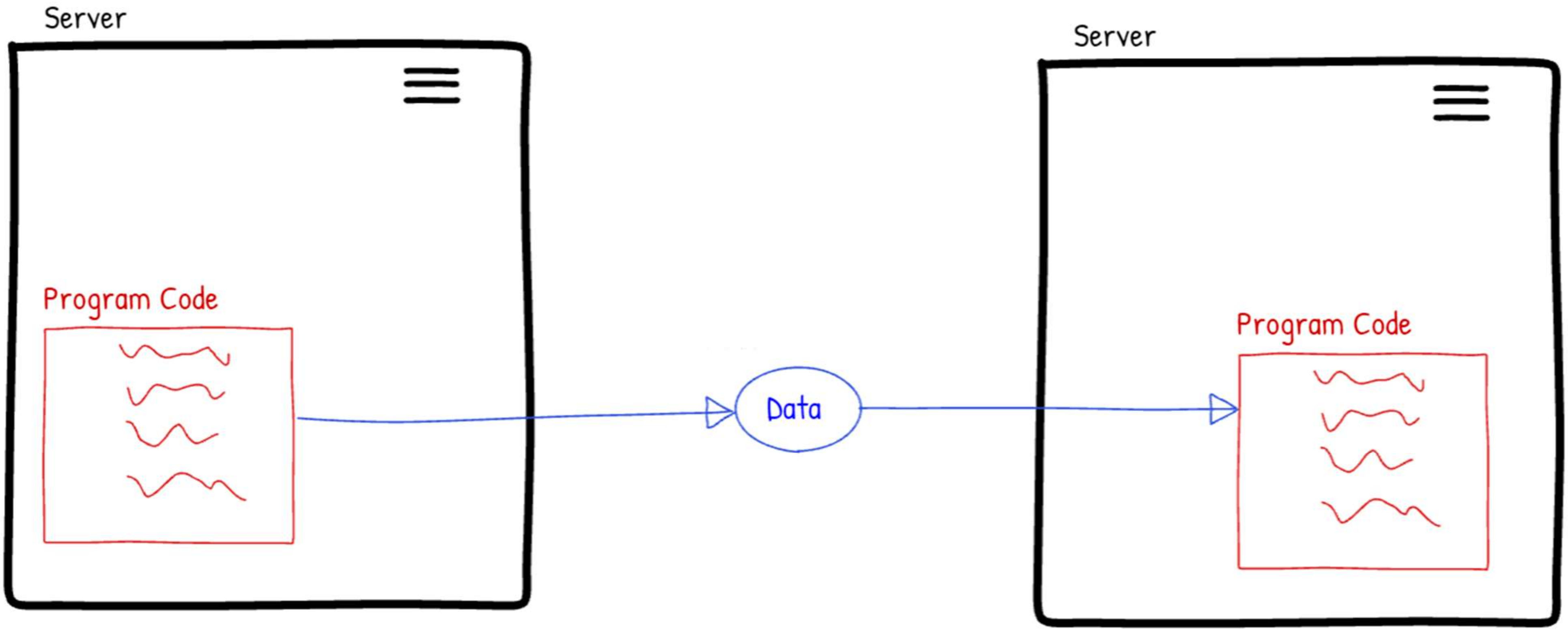
REST

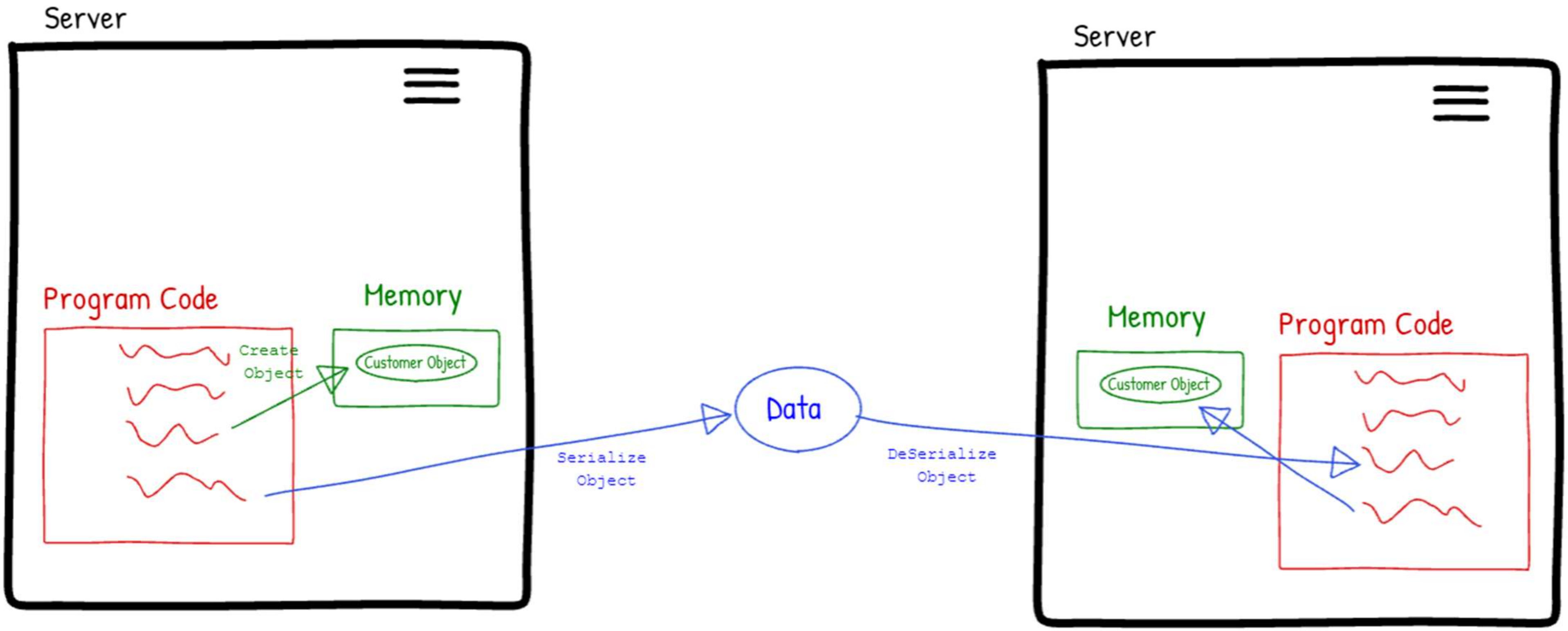
Representational State Transfer

by Mark Walsh (AIICT)

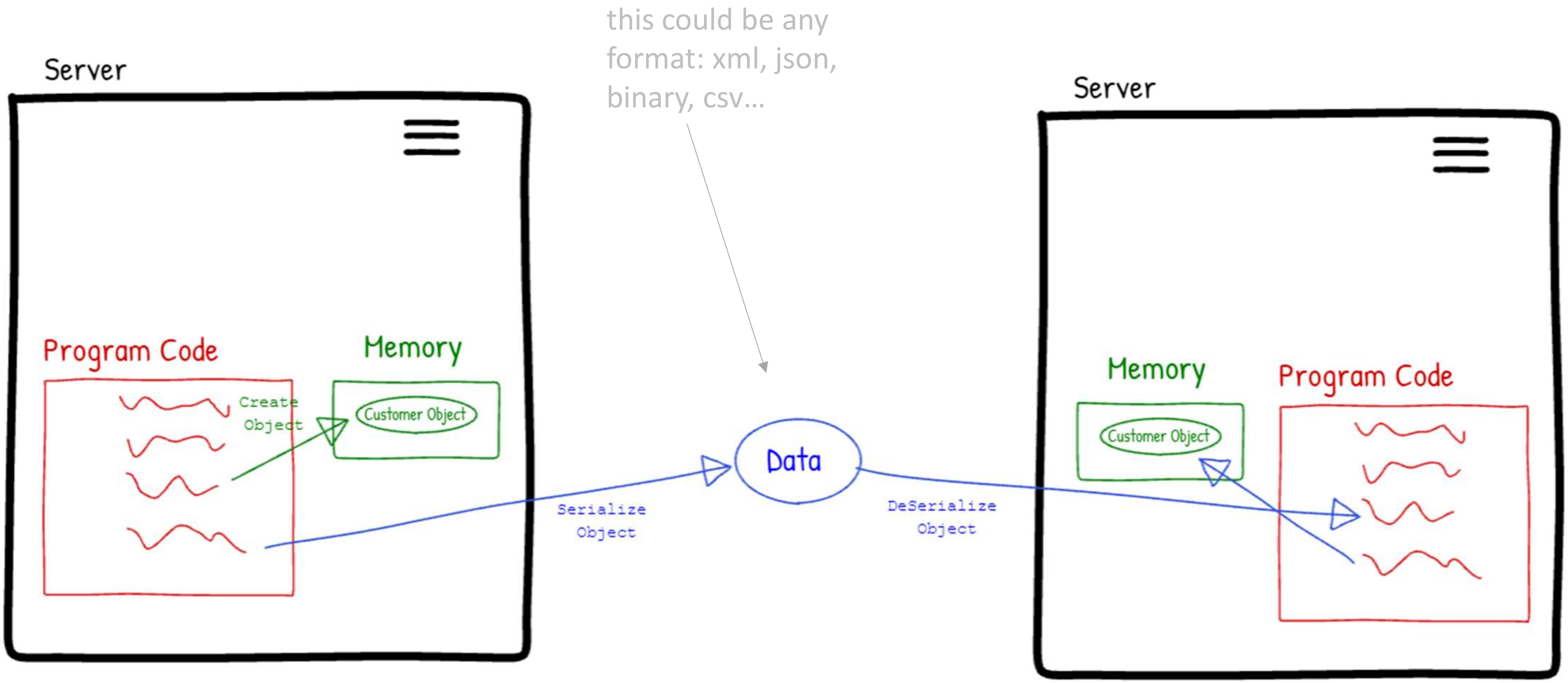
How does a program send an object to another program?



How does a program send an object to another program?



How does a program send an object to another program?



this could be any format: xml, json, binary, csv…

What is XML?

XML = eXtensible Markup Language

XML is not a language

Languages (e.g. Chemical Markup Language) use an XML syntax

XML is typically used to hold structured data

XML has a few key concepts:

- Elements
- Attributes
- Content

What is JSON?

JSON = JavaScript Object Notation

JSON is typically used to hold structured data

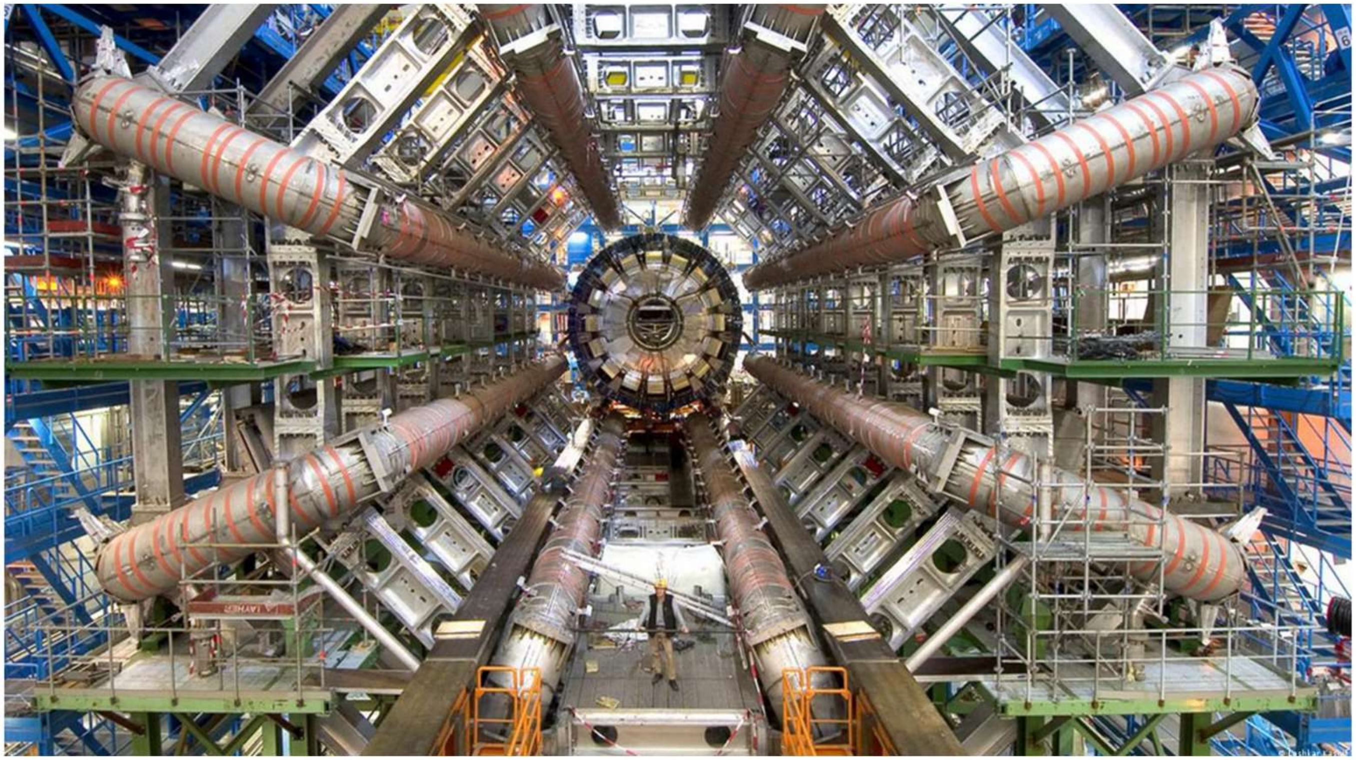
JSON has a few key concepts:

- Key-Value pairs
- DataTypes
  - strings
  - numbers
  - objects
  - arrays
  - Booleans (true or false)
  - null
- Nested Objects
- Nested Arrays

What is JSON?

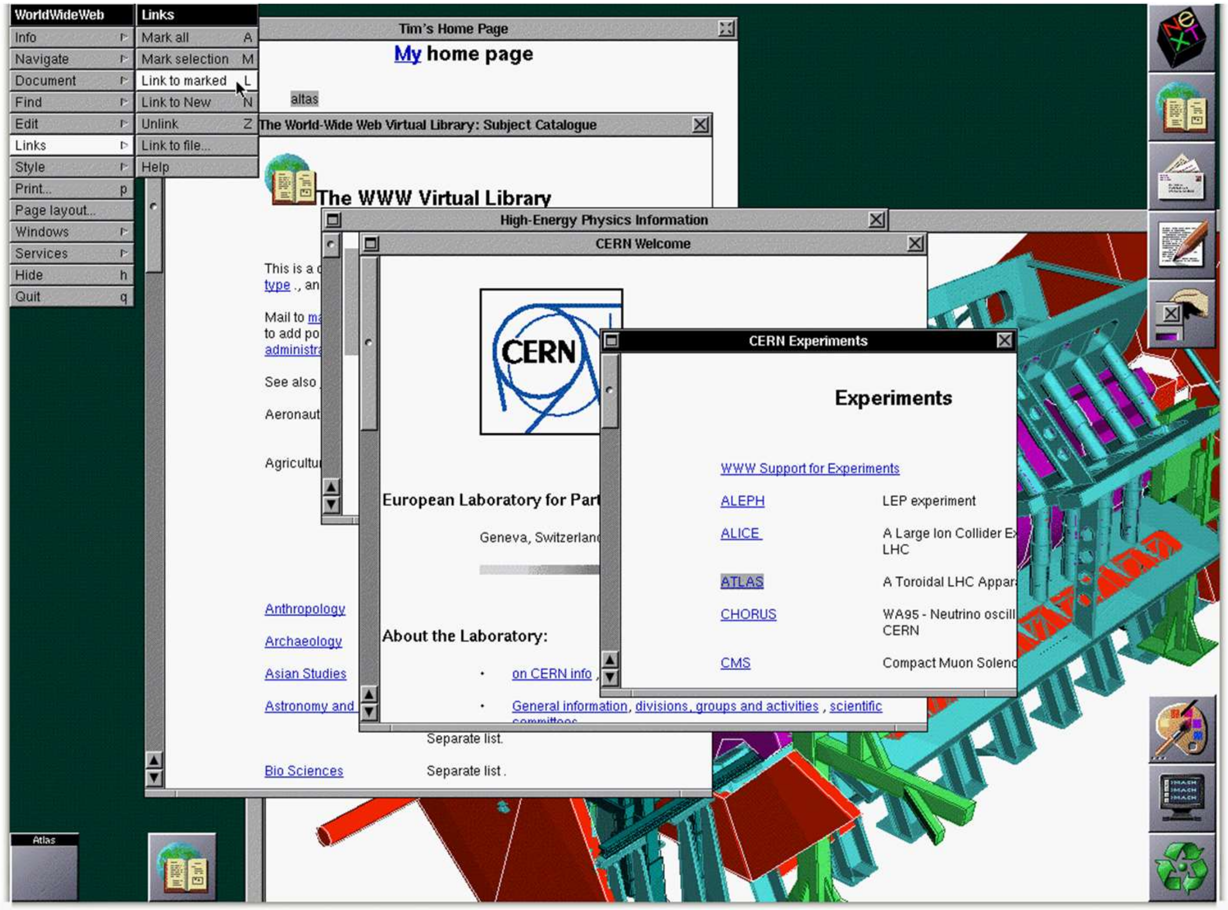
```
{
 "first_name" : “Hunstman",
 "last_name" : “Spider",
 "location" : “In Your Car",
 "websites" : [
  {
   "description" : "work",
   "URL" : "https://aiict.edu.au/"
  },
  {
   "desciption" : "tutorials",
   "URL" : "https://www.aiict.edu.au/community/tutorials"
  }
 ],
 "social_media" : [
  {
   "description" : "twitter",
   "link" : "https://twitter.com/aiict"
  },
  {
   "description" : "facebook",
   "link" : "https://www.facebook.com/aiictCloudHosting"
  },
  {
   "description" : "github",
   "link" : "https://github.com/aiict"
  }
 ]
}
```

What is ‘the Internet’? What is ‘the Web’



The large Hadron Collider, CERN

What is ‘the Internet’? What is ‘the Web’



My home page

altas

The WWW Virtual Library

This is a c
type ., an

Mail to ma
to add po
administra

See also

Aeronaut

Agricultu

Anthropology

Archaeology

Asian Studies

Astronomy and

Separate list.

Bio Sciences Separate list .

European Laboratory for Part

Geneva, Switzerlan

About the Laboratory:

- on CERN info
- General information, divisions, groups and activities , scientific committees

Experiments

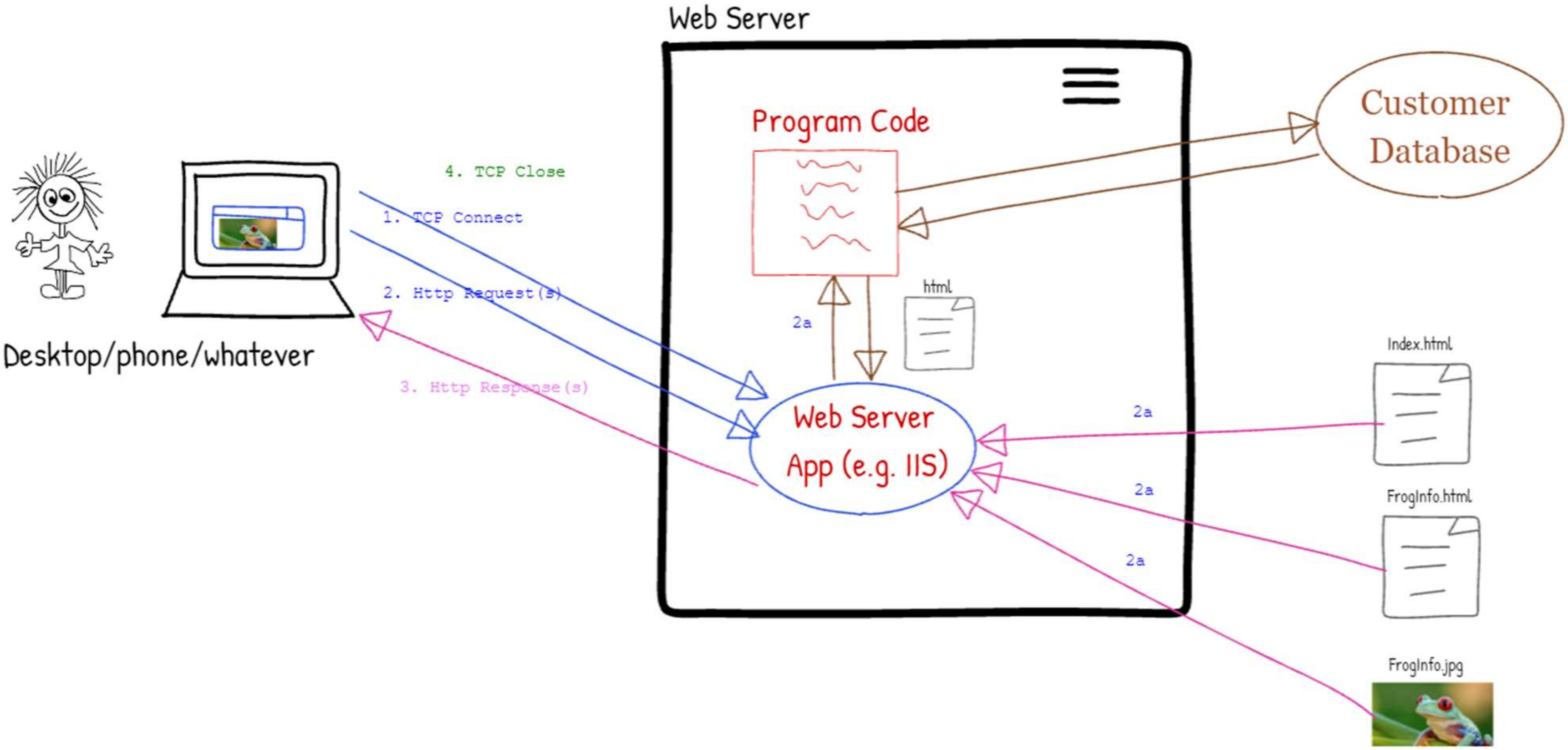
WWW Support for Experiments	
ALEPH	LEP experiment
ALICE	A Large Ion Collider E LHC
ATLAS	A Toroidal LHC Appar
CHORUS	WA95 - Neutrino oscill CERN
CMS	Compact Muon Solen

The first ‘browser’

1990:

A "hypertext project" called "WorldWideWeb" in which a "web" of "hypertext documents" could be viewed by “browsers”

Key elements of the ‘the Web’



What is an API?

API = Application Programmer Interface

Not just seen in Web Applications

Is for *Application Programmers* rather that *Users*

What is REST?

REST is not a protocol

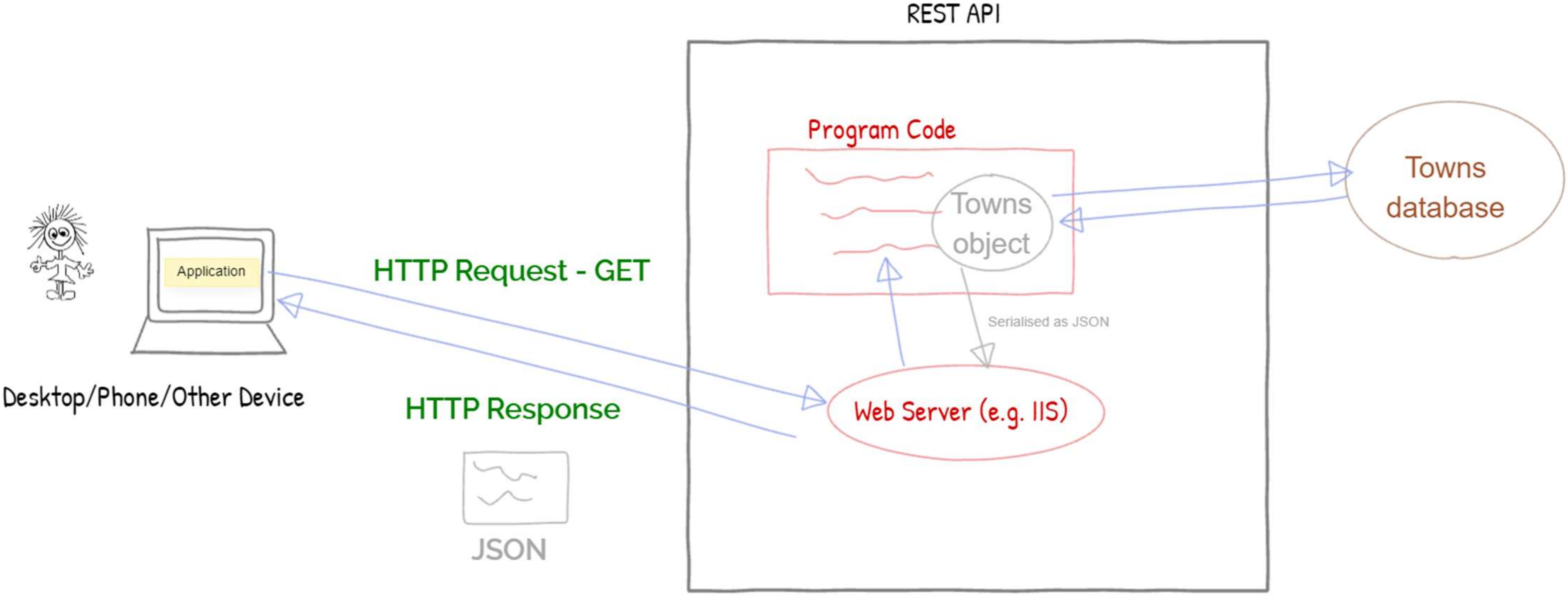
REST is not a standard

REST is not a new idea

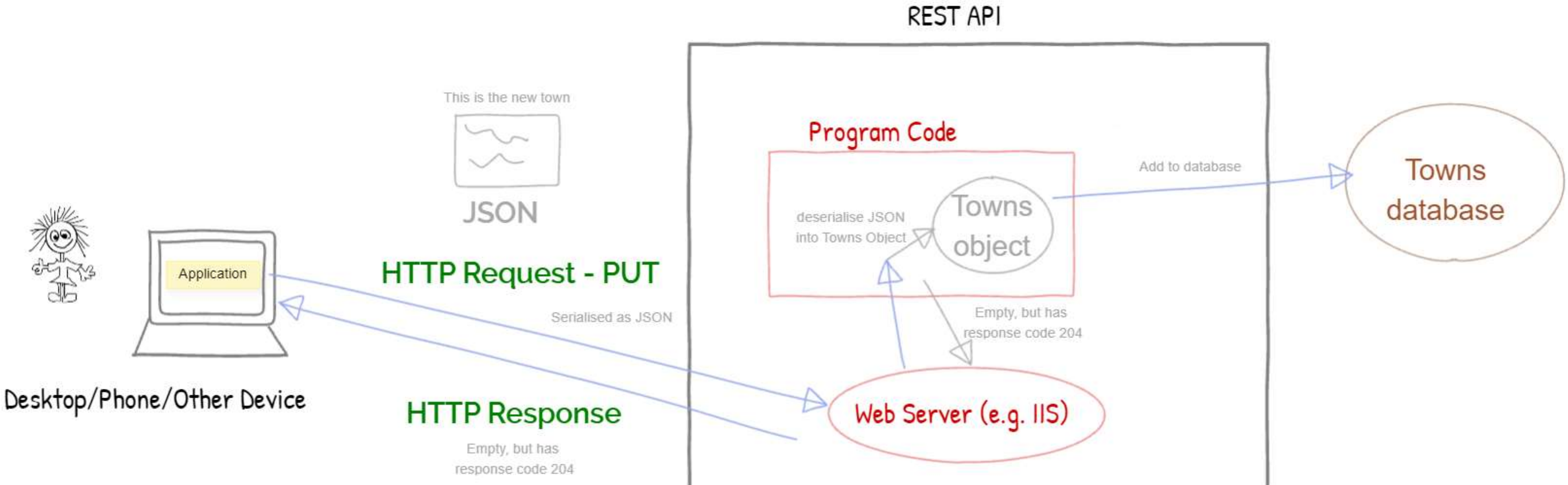
REST is not a formula

REST is a set of semantics, REST is a style

What is REST?


REST API
Program Code
Towns object
Towns database
Application
HTTP Request - GET
Serialised as JSON
Web Server (e.g. IIS)
Desktop/Phone/Other Device
HTTP Response
JSON

REST PUT Example



What is REST?

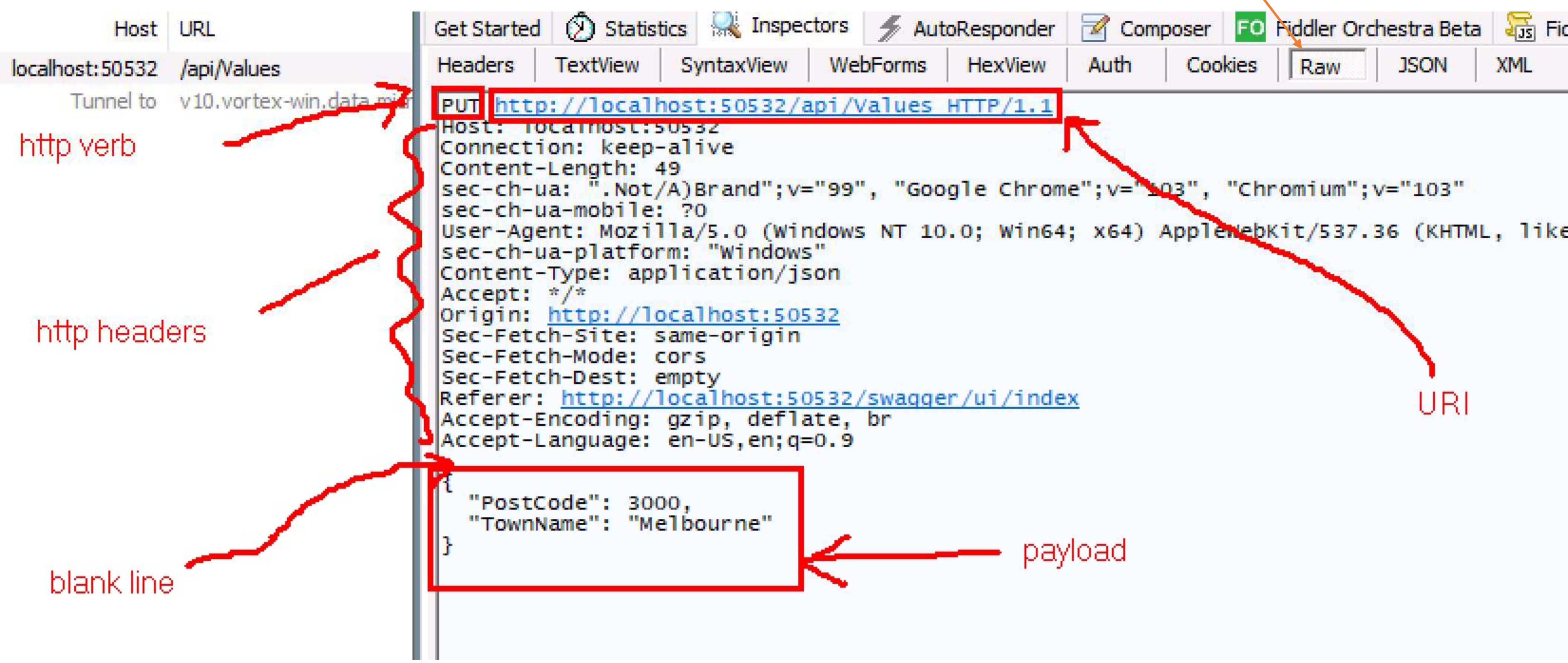
[What is REST? | Codecademy]

What is Swagger?

Run API, Show swagger

[API Documentation & Design Tools for Teams | Swagger]

Using Telerik Fiddler to Capture HTTP traffic



```
PUT http://localhost:50532/api/Values HTTP/1.1
Host: localhost:50532
Connection: keep-alive
Content-Length: 49
sec-ch-ua: ".Not/A)Brand";v="99", "Google Chrome";v="103", "Chromium";v="103"
sec-ch-ua-mobile: ?0
User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like
sec-ch-ua-platform: "Windows"
Content-Type: application/json
Accept: */*
Origin: http://localhost:50532
Sec-Fetch-Site: same-origin
Sec-Fetch-Mode: cors
Sec-Fetch-Dest: empty
Referer: http://localhost:50532/swagger/ui/index
Accept-Encoding: gzip, deflate, br
Accept-Language: en-US,en;q=0.9

{
  "PostCode": 3000,
  "TownName": "Melbourne"
}
```

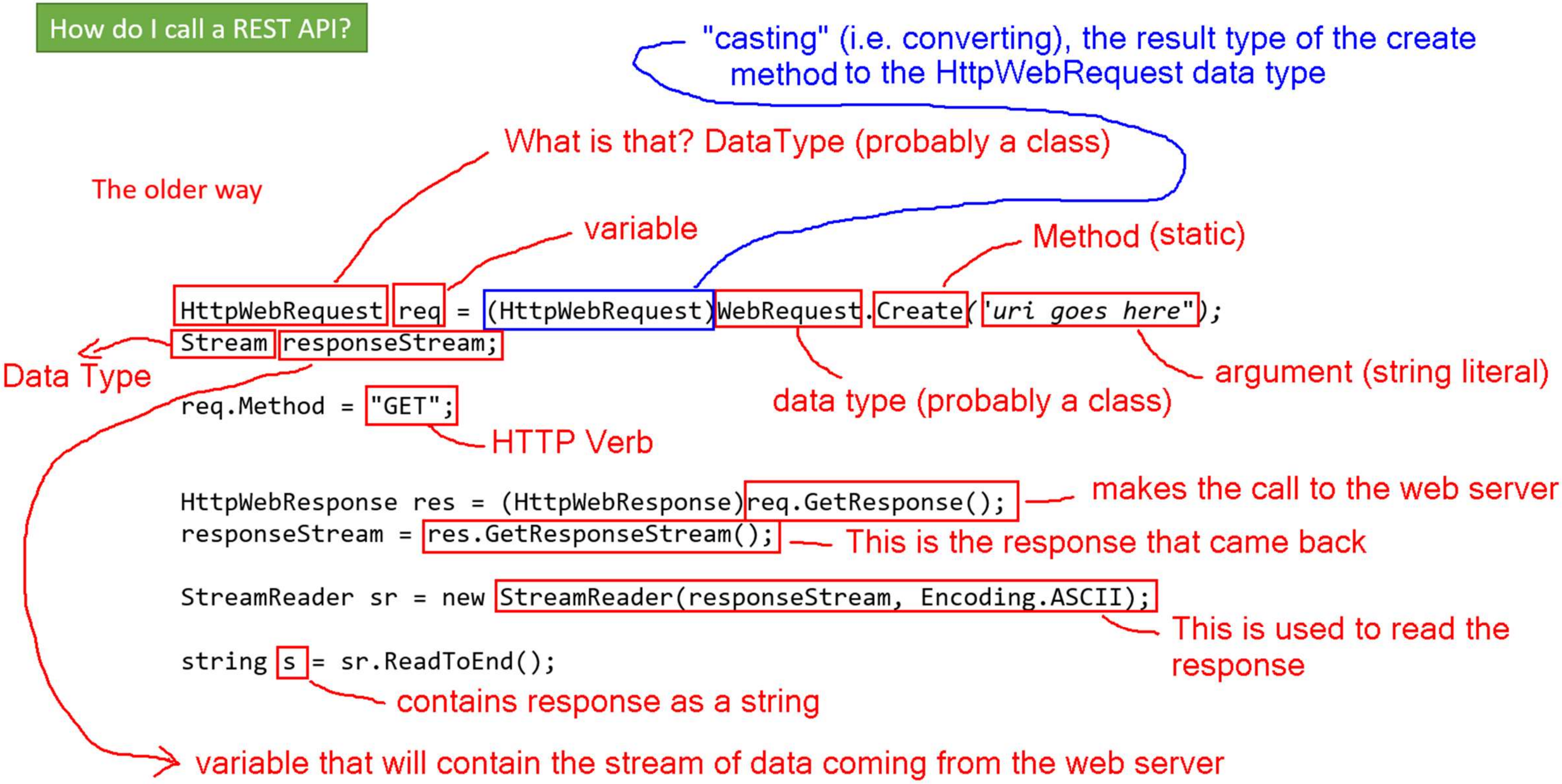
How do I call a REST API?

The older way

```
HttpWebRequest req = (HttpWebRequest)WebRequest.Create("uri goes here");
Stream responseStream;

req.Method = "GET";


HttpWebResponse res = (HttpWebResponse)req.GetResponse();
responseStream = res.GetResponseStream();

StreamReader sr = new StreamReader(responseStream, Encoding.ASCII);

string s = sr.ReadToEnd();
```

How do I call a REST API?

The older way



```
HttpWebRequest req = (HttpWebRequest)WebRequest.Create("uri goes here");
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req.Method = "GET";

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responseStream = res.GetResponseStream();

StreamReader sr = new StreamReader(responseStream, Encoding.ASCII);

string s = sr.ReadToEnd();
```

"casting" (i.e. converting), the result type of the create method to the HttpWebRequest data type
What is that? DataType (probably a class)
variable
Method (static)
Data Type
data type (probably a class)
argument (string literal)
HTTP Verb
makes the call to the web server
This is the response that came back
This is used to read the response
contains response as a string
variable that will contain the stream of data coming from the web server

Let’s Try it

Call Book API (the old way)

https://www.googleapis.com/books/v1/volumes?q=isbn:*isbn-goes-here*

How do I call a REST API?

The newer way

```
static void Main(string[] args)
        {
                Action task = new Action(RestCalls);
                Task.Run(task).Wait();
        }

static async void RestCalls()
        {
                HttpClient client = new HttpClient();

                Console.WriteLine("Retrieving....\n\n");
                var response = await client.GetAsync("uri goes here");
                var s = await response.Content.ReadAsStringAsync();

                Console.WriteLine($"s={s}");
        }
}
```

Let’s Try it

Call Book API (the new way)

https://www.googleapis.com/books/v1/volumes?q=isbn:*isbn-goes-here*

Let’s Try it

Draw picture of Towns & Postcodes app

Let’s Try it, HTTP Get

Run API, Write Code, get one town

Let’s Try it, HTTP Get

Run API, Write Code, get all towns

Let’s Try it, HTTP delete

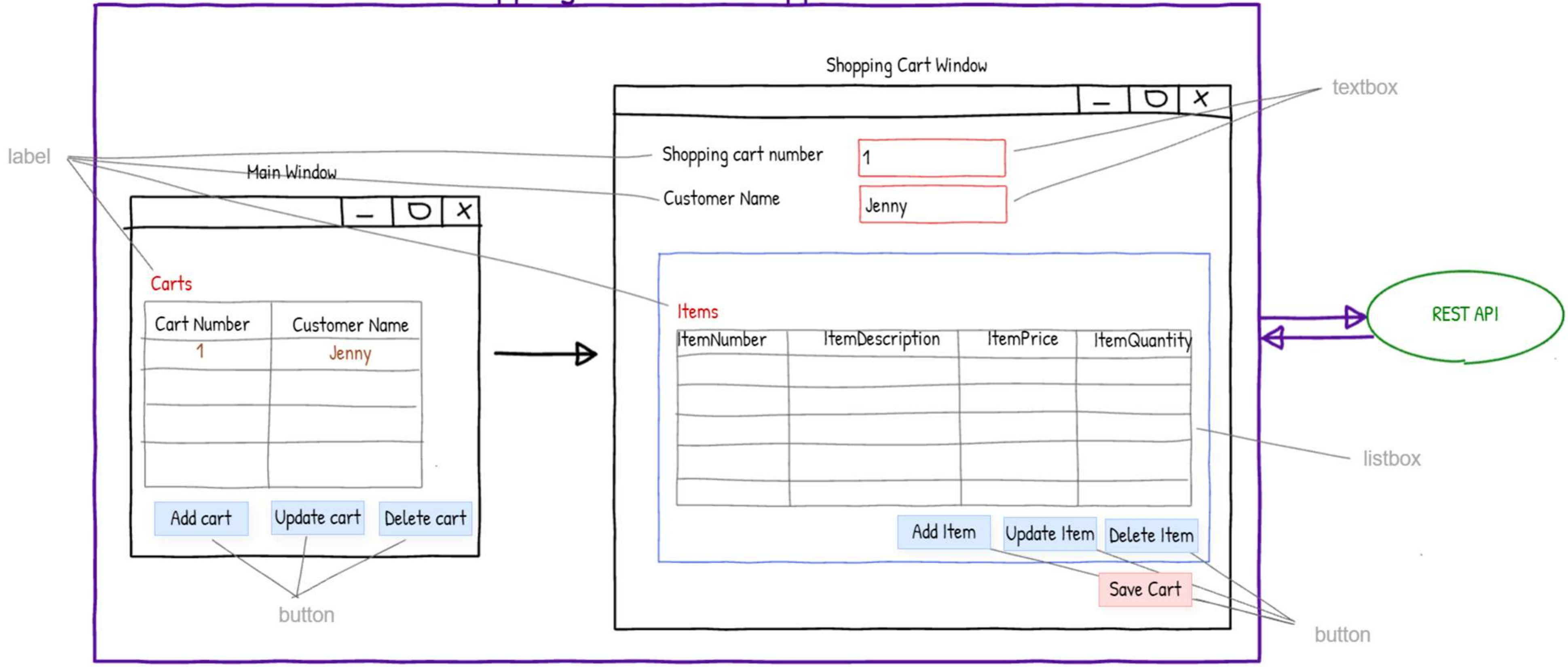
Run API, Write Code, Remove a Town

Let’s Try it, HTTP Patch

Run API, Write Code, update a Town

Exercise

Shopping.exe (A WPF Application)



Carts

Cart Number	Customer Name
1	Jenny

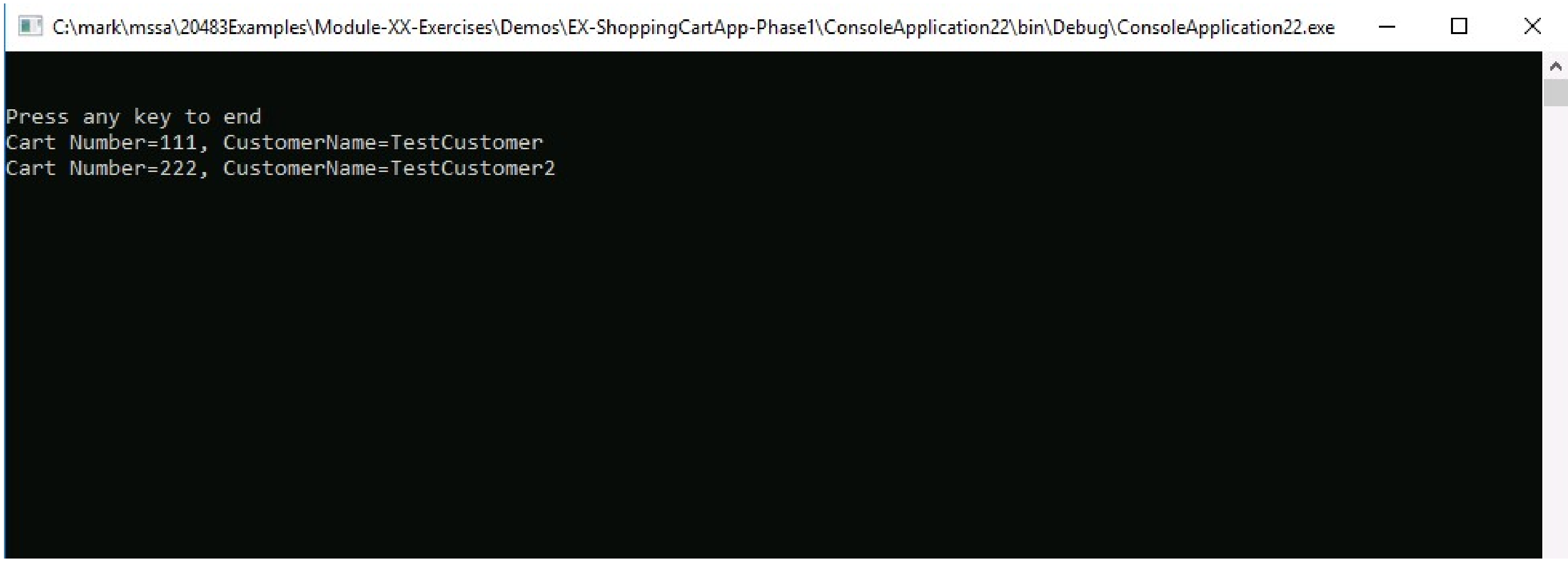
Shopping cart number: 1

Customer Name: Jenny

Items

ItemNumber	ItemDescription	ItemPrice	ItemQuantity

Exercise Phase - 1

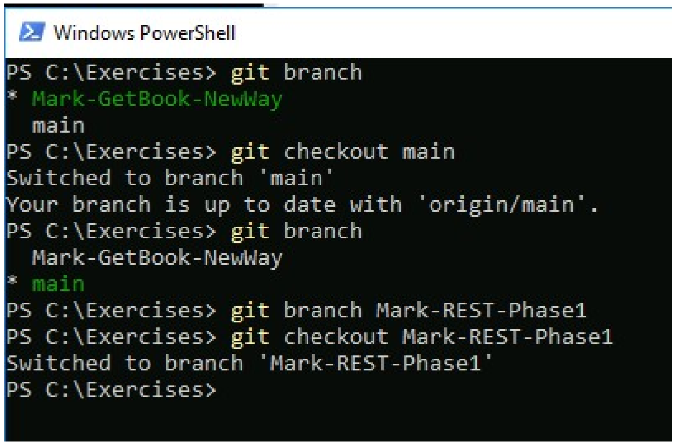


C:\mark\mssa\20483Examples\Module-XX-Exercises\Demos\EX-ShoppingCartApp-Phase1\ConsoleApplication22\bin\Debug\ConsoleApplication22.exe

```
Press any key to end
Cart Number=111, CustomerName=TestCustomer
Cart Number=222, CustomerName=TestCustomer2
```

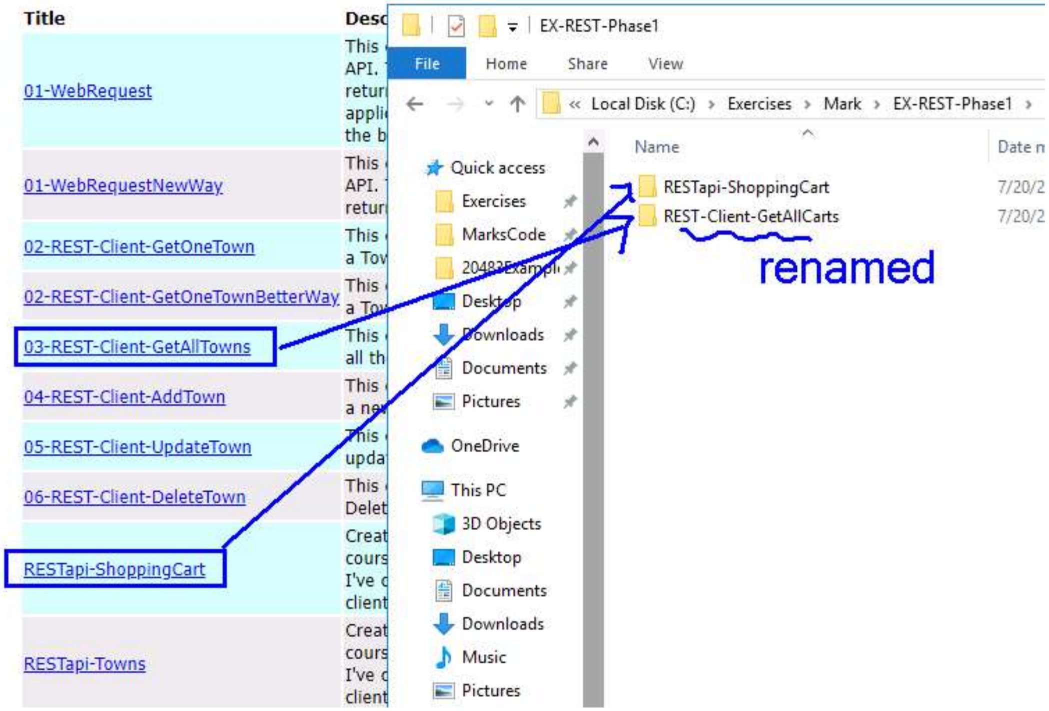
Exercise Phase - 1

1. Create new git branch for new work



```
PS C:\Exercises> git branch
* Mark-GetBook-NewWay
  main
PS C:\Exercises> git checkout main
Switched to branch 'main'
Your branch is up to date with 'origin/main'.
PS C:\Exercises> git branch
  Mark-GetBook-NewWay
* main
PS C:\Exercises> git branch Mark-REST-Phase1
PS C:\Exercises> git checkout Mark-REST-Phase1
Switched to branch 'Mark-REST-Phase1'
PS C:\Exercises>
```

2. Copy ShoppingCart RestAPI and “getAllTowns” demo
3. Rename Folder



Title	Desc
01-WebRequest	This API. retur appli the b
01-WebRequestNewWay	This API. retur
02-REST-Client-GetOneTown	This a Tov
02-REST-Client-GetOneTownBetterWay	This a Tov
03-REST-Client-GetAllTowns	This all th
04-REST-Client-AddTown	This a ne
05-REST-Client-UpdateTown	This upda
06-REST-Client-DeleteTown	This Delet
RESTapi-ShoppingCart	Creat cours I've c client
RESTapi-Towns	Creat cours I've c client

4. Open the RESTapi-ShoppingCart application in Visual Studio and run it.

5. Learn about it using Swagger.

6. Change the code in the REST api client, start with the *Model.cs* file.

Exercise Phase - n

Clean-up your Remote Branch

1. Merge into the main branch on GitHub with a PR

Clean-up your local branches

1. git checkout main
2. git remote prune origin
3. git branch
4. *for each local branch where you have finished work*
   git branch –delete *branchname*

That’s all I’ve written