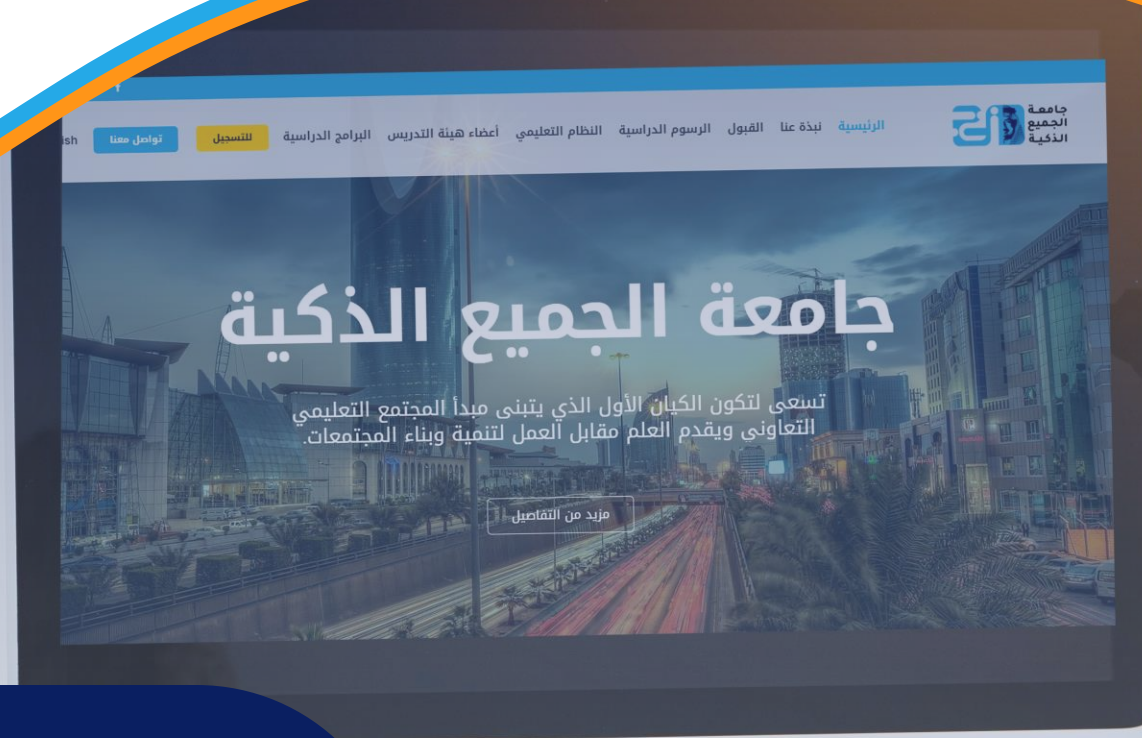




جامعة الجميع الذكية
EVERYONE'S SMART UNIVERSITY

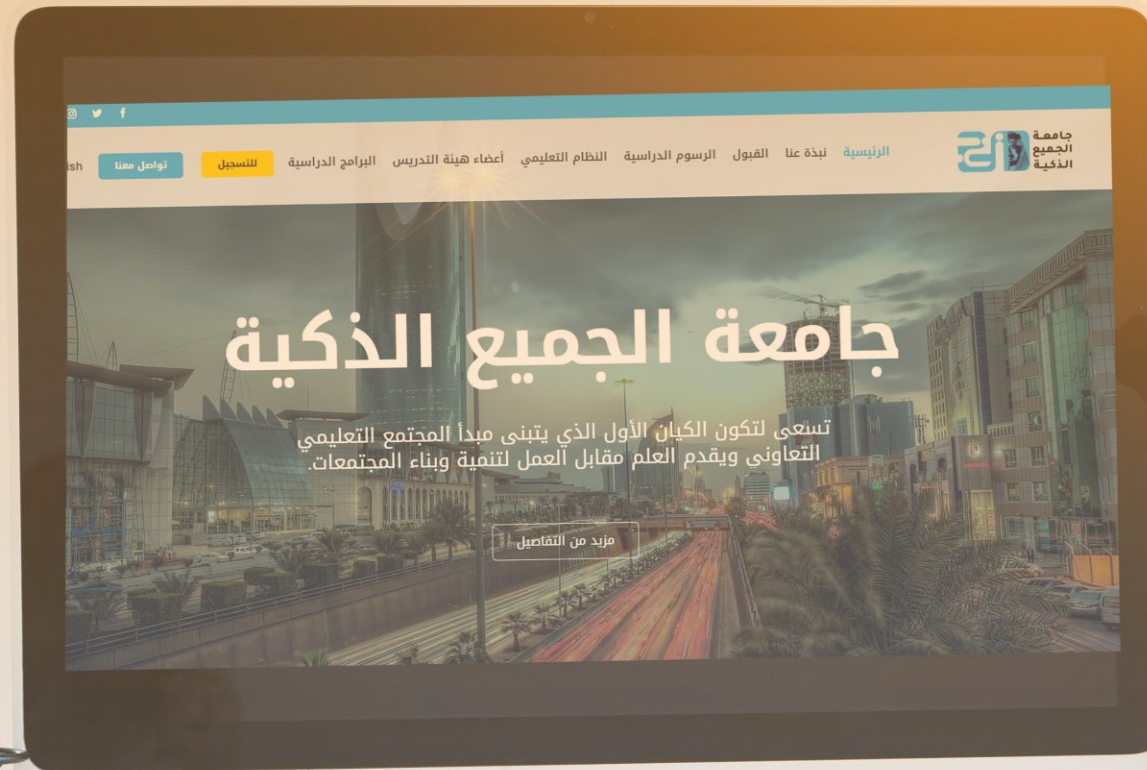


Prepared by
Dr. Hamada I. AbdulWakel
Lecture 2

CYB615
Network Programming



جامعة الجميع الذكية
EVERYONE'S SMART UNIVERSITY



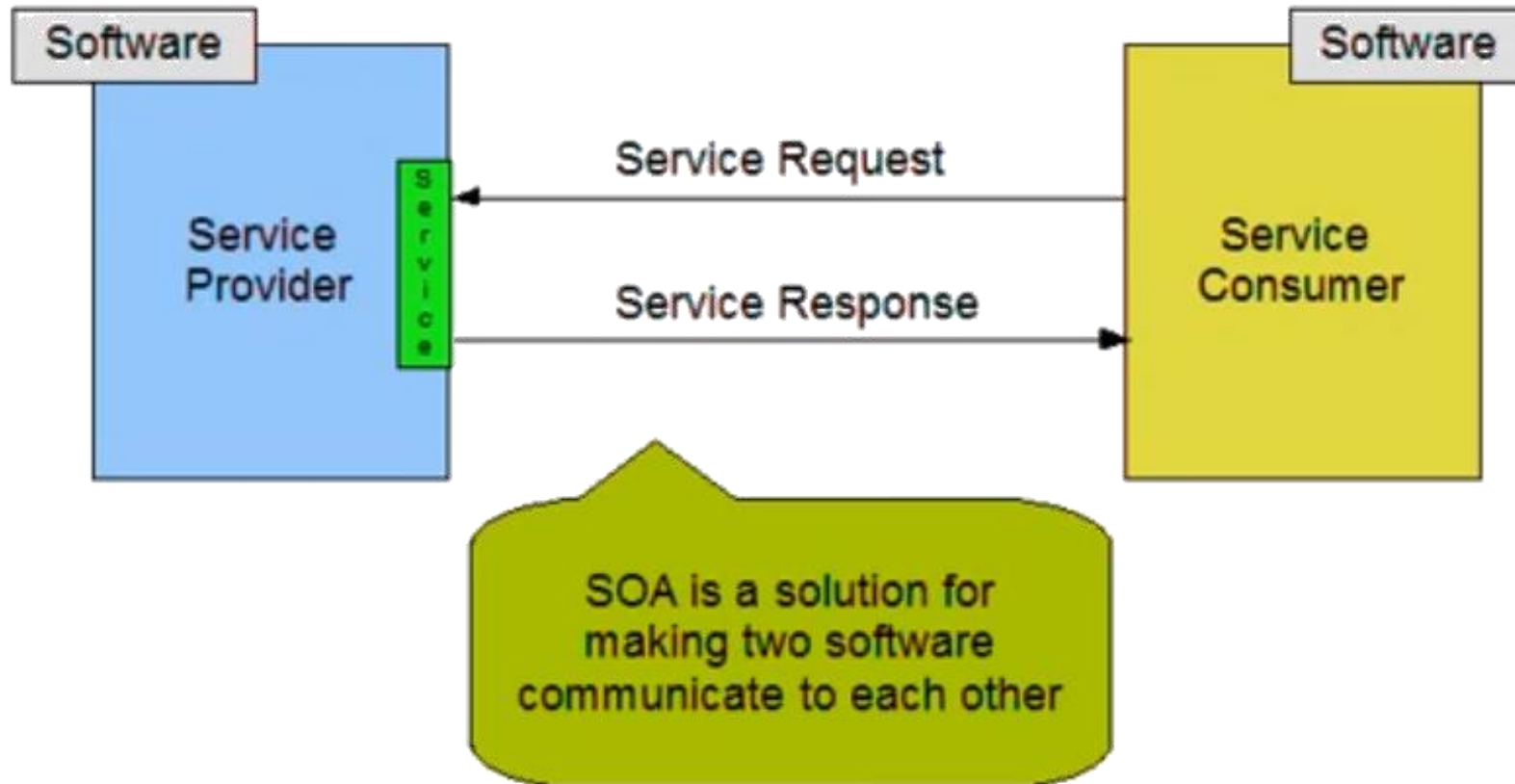
Module2: Network Programming using Python

- Service Oriented Architecture (SOA).
- Application Program Interface (API).
- Wire Protocol Formats.
- API Modules in Python.



- As the data/service becomes useful, multiple applications want to use the information/application.
- Use services from other applications (non-homogeneous systems).
- Main Idea:
 - Services are provided to the other components by application components, through a communication protocol over a network.

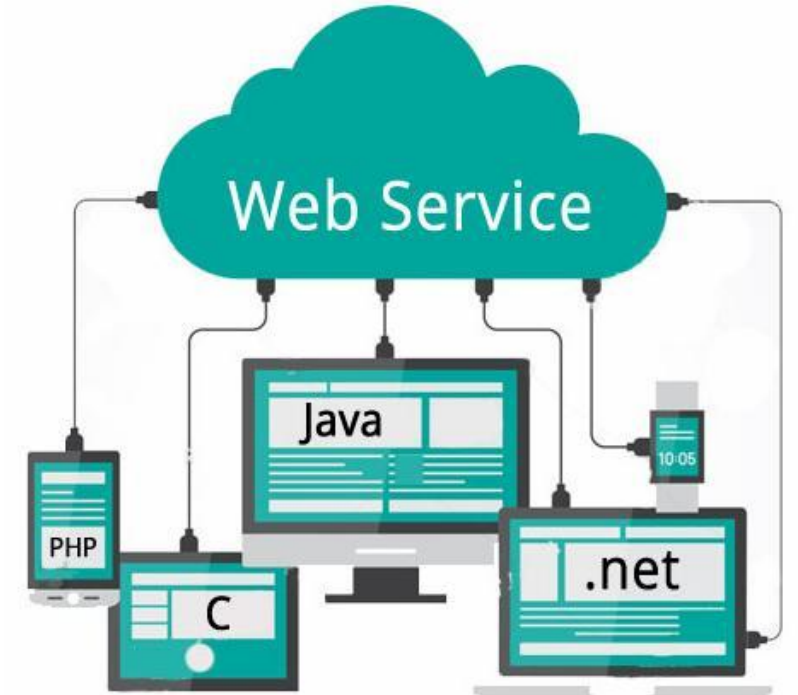




- Services publish the "**rules**" applications must follow to make use of the service.
- SOA is a stage in the evolution of application development and/or integration. It defines a way to make software components reusable using the interfaces.
- SOA is an architectural approach in which applications make use of services available in the network.



- A service offered by an electronic device to another electronic device, communicating with each other via the Internet.
- Web service is a **function** that can be accessed by other programs over the web.



- An interface that defines interactions between multiple software applications.
- It defines the kinds of calls or requests that can be made, how to make them, the data formats that should be used, the conventions to follow, etc.
- API says: "If you do this, we will give you the data in this way".



Lecture 2

SOA Service Example: Flow of The Process

- Retrieving a credit card statement online.
- Reservation in a hotel.
- Car renting.



API



DB



- We need to unify the format between programs so that program can expect this format and thus extract the information from it easily.
- A **wire protocol** refers to a way of getting data from point to point.

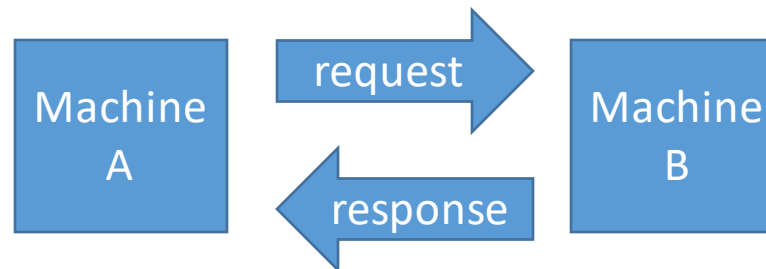
Python program
uses a dictionary
data structure

← Data written in wire protocol →

PHP program
uses an array
data structure



- A protocol is a set of rules that all parties follow , so that we can predict each other's behavior.
- HTTP is a set of rules that allow browsers to retrieve documents from the servers over the Internet.
 - The Request/Response Cycle.



Lecture 2

eXtensible Markup Language (XML) Wire Format

Python program
uses a dictionary
data structure

```
<car>  
  <type>  
    Mercedes  
  </type>  
  <color>  
    Black  
  </color>  
</car>
```

PHP program
uses an array
data structure



Lecture 2

JavaScript Object Notation (JSON) Wire Format

Python program
uses a dictionary
data structure

```
{  
  "type": "Mercedes",  
  "color": "Black"  
}
```

PHP program
uses an array
data structure



- Code:

```
import json
data = '''
    { "name": "Hamada", "phone": 123123,
      "email": { "value": "hamada.ac.ae", "hide": "yes"} }'''
info = json.loads(data)
print("Name:", info["name"])
print("Email", info["email"]["value"])
```



Lecture 2

Web Page Accessing & Reading

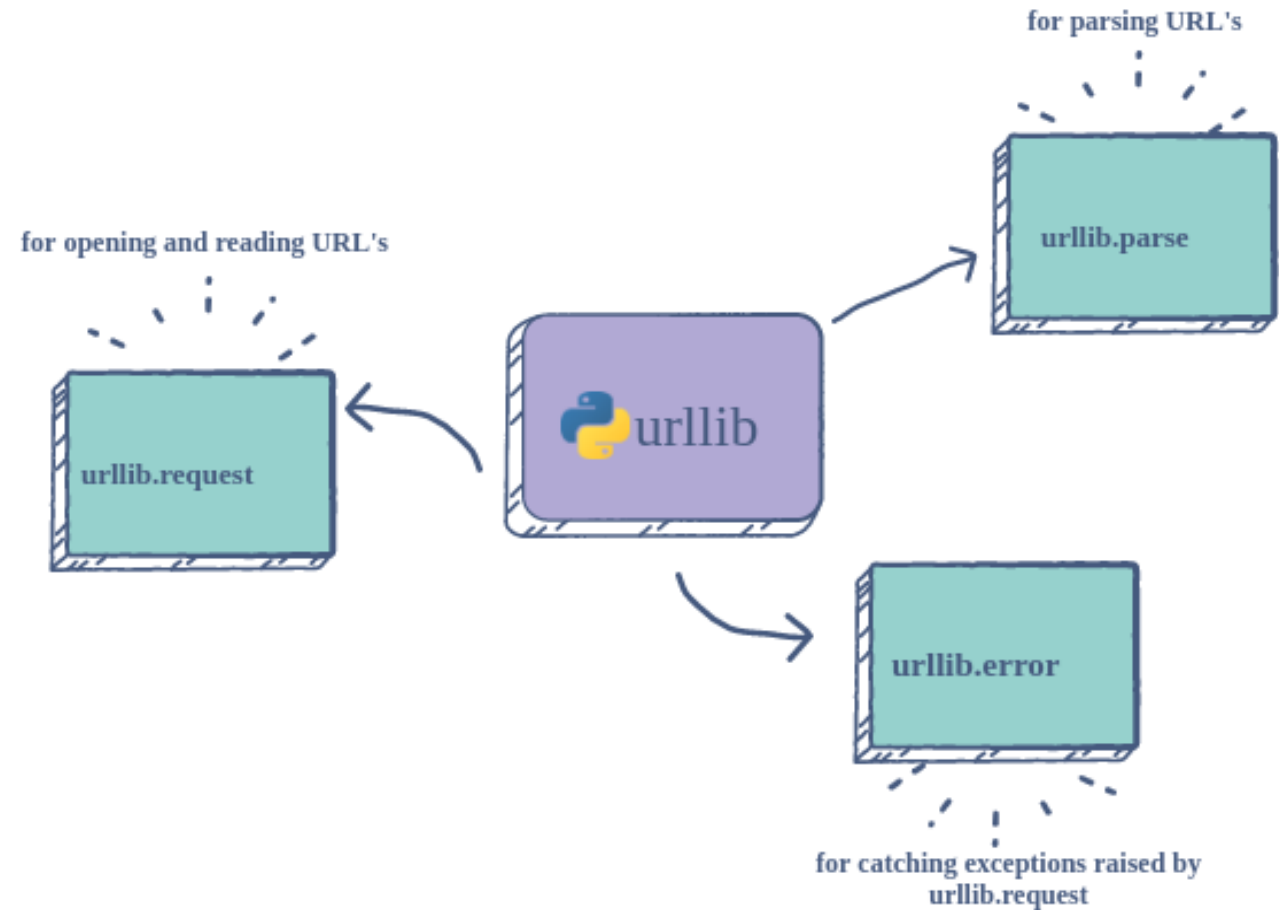


`https://en.wikipedia.org/wiki/URL?key=value&life=42#History`

- Web pages are full of original, high-quality content that could be used for different reasons.
- URL parts:
 - Protocol part.
 - Host name part.
 - Port number part.
 - Path part.
 - Querystring.
 - Fragment.



- **Urllib** is a Python package that allows you to access, and interact with, websites using their URL's (Uniform Resource Locator).



- **Urllib.request**
 - Using it with **urlopen()** to open the specified URL.
- **Urllib.parse**
 - Used to split into its components such as the protocol scheme used, the network location **netloc** and the path to the webpage.
- **Urllib.error**
 - Used to catch exceptions encountered from **url.request**.
- Urllib module install.

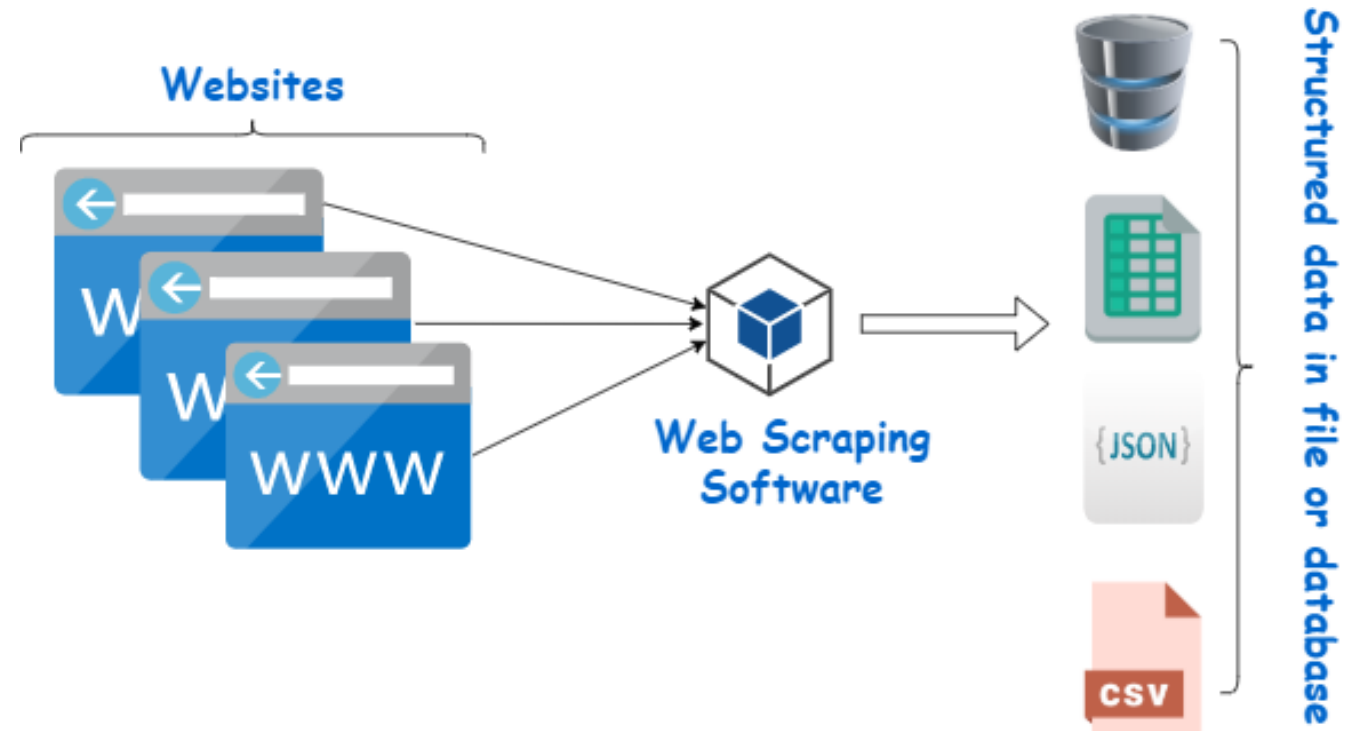


- Code:

```
#import urllib          #print(dir(urllib))
from urllib import request
#print(dir(request))
resp = request.urlopen('https://www.wikipedia.org')
print(type(resp)); print(dir(resp)); #print(resp.code);
#print(resp.length); #print(resp.peek()) #page as binary
#data = resp.read(); #print(type(data))
#html = data.decode(); #print(type(html))
#print(html) #page as html code
```



- A web scraping software will automatically load, crawl and extract data from multiple pages of websites based on your requirement.

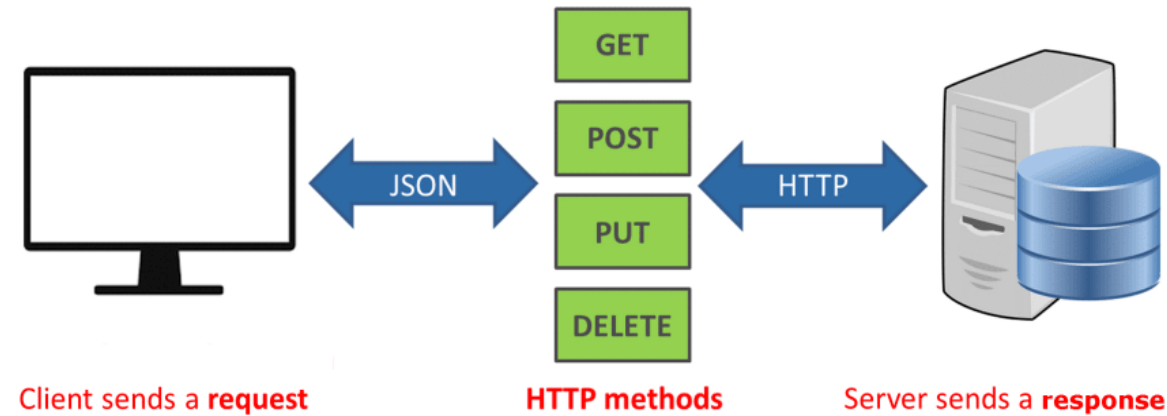


- Code:

```
from urllib.request import urlopen
file_handler = urlopen('http://data.pr4e.org/romeo.txt')
my_count = dict()
for line in file_handler:
    words = line.decode().split()
    for word in words:
        my_count[word] = my_count.get(word, 0) + 1
print(my_count)
```



- The de facto standard for making HTTP requests in Python.
- It abstracts the complexities of making requests behind a beautiful, simple API so that you can focus on interacting with services and consuming data in your application.



- One of the most common HTTP methods is **GET**. The GET method indicates that you're trying to get or retrieve data from a specified resource.
- To install the requests library, use PyPi.
`pip install requests`



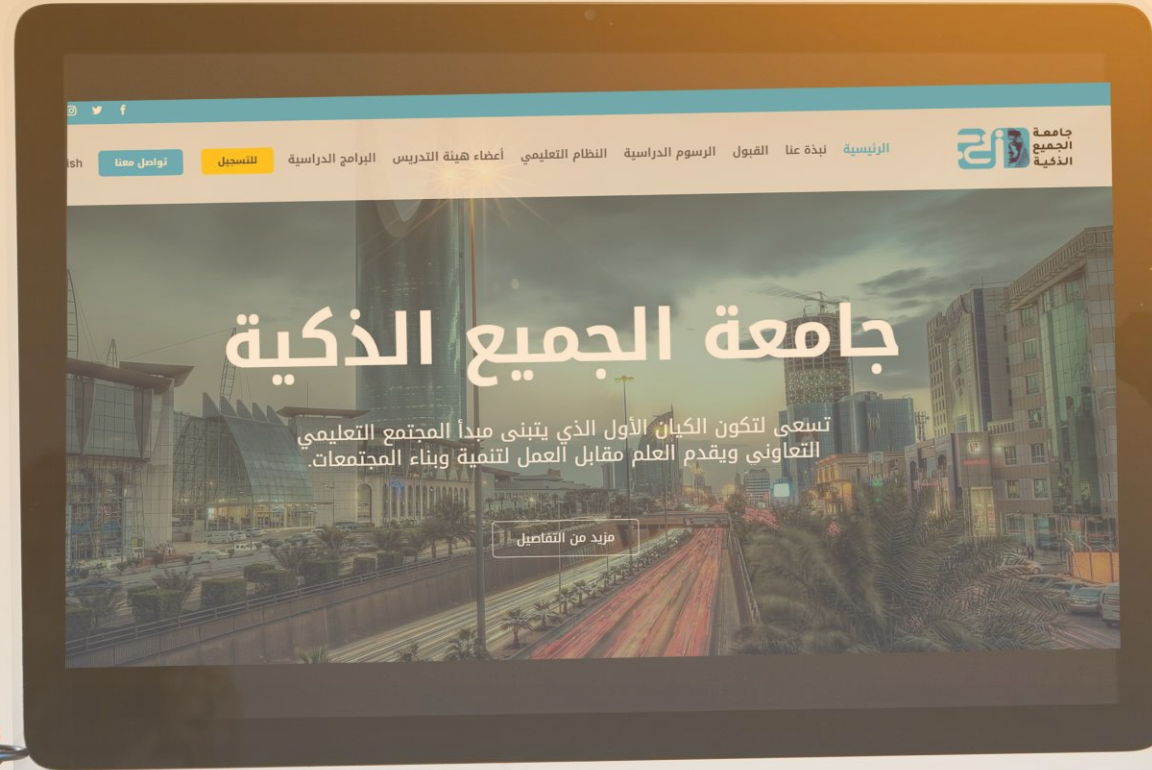
- Code:

```
import requests, json, pprint
url = "https://api.tvmaze.com/singlesearch/shows"
params = {"q":"the flash"} #use this to get specific data
response = requests.get(url, params)
if response.status_code == 200:
    #print(response.text) #without json
    data = json.loads(response.text)
    #print(data) #without pprint
    #pprint.pprint(data)
```



```
if response.status_code == 200:
    data = json.loads(response.text)
    name = data['name']    #to get specific data from json
    premiered = data['premiered']
    summary = data['summary']
    print(f"{name} premiered on {premiered}.")
    print(summary)
else:
    print(f"Error: {response.status_code}")
```





جامعة الجميع الذكية
EVERYONE'S SMART UNIVERSITY

THANK YOU