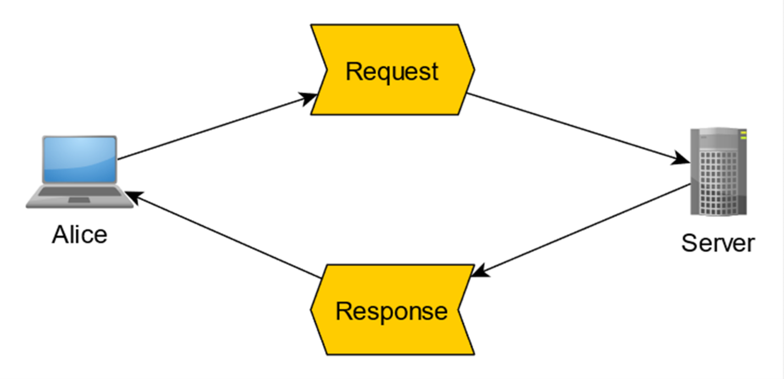
C: Web APIs

API: Application Programming Interface

- Client-server system for requesting data over the web

Typical API operation:



Requests have three components:

1. **Server**
2. **Endpoint** on the server (dataset or service)
3. **Parameters** (details about the request)

- Combined into a URL

Response:

- Varies with server and endpoint
- Often JSON for datasets

Example 1: Searching Google for Bigfoot

Request:

Server: www.google.com

Endpoint: /search

Parameters: q=bigfoot

URL: https://www.google.com/search?q=bigfoot

Question mark: shows start of parameters

Response:

HTML: web page of links

Example 2: Searching Google Maps for SU

Request:

Server: www.google.com

Endpoint: /maps/search/

Parameters: api=1 and query=syracuse+university

URL: https://www.google.com/maps/search/?api=1&query=syracuse+university

Ampersand: separates parameters

Plus: replaces spaces

Response:

HTML: web page with a map

Example 3: Census Bureau Surname Service

Request:

Server: api.census.gov

Endpoint: /data/2010/surname

Parameters: get=COUNT and NAME=ZUCKERBERG

URL: https://api.census.gov/data/2010/surname?get=COUNT&NAME=ZUCKERBERG

Result is JSON:

```
[["COUNT","NAME"],
["218","ZUCKERBERG"]]
```

Formatting the result more nicely:

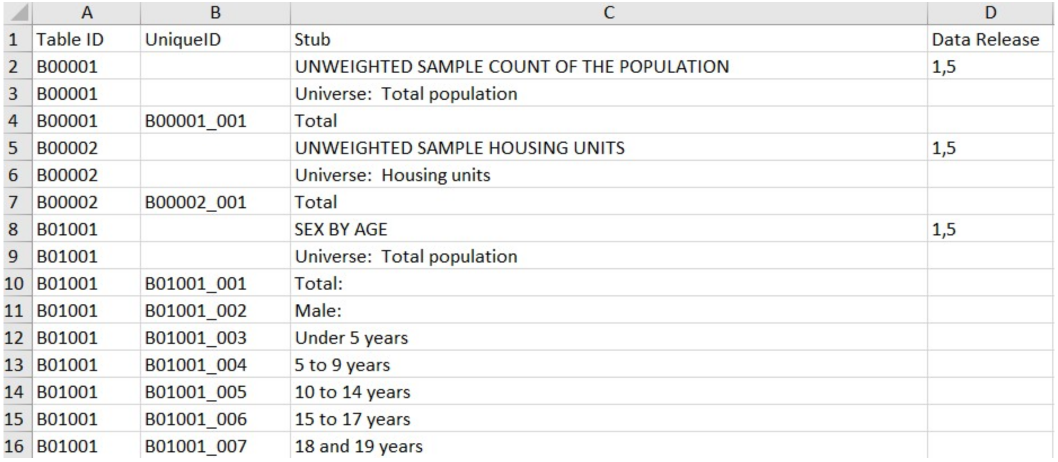
```
[
    ["COUNT","NAME"],
    ["218","ZUCKERBERG"]
]
```

Example 4: Census American Community Survey (ACS)

- Census API information in general:
  https://www.census.gov/developers/

- Documentation for the ACS 5-year data:
  https://www.census.gov/data/developers/data-sets/acs-5year.html

- Variable list:



	A	B	C	D
1	Table ID	UniqueID	Stub	Data Release
2	B00001		UNWEIGHTED SAMPLE COUNT OF THE POPULATION	1,5
3	B00001		Universe: Total population	
4	B00001	B00001_001	Total	
5	B00002		UNWEIGHTED SAMPLE HOUSING UNITS	1,5
6	B00002		Universe: Housing units	
7	B00002	B00002_001	Total	
8	B01001		SEX BY AGE	1,5
9	B01001		Universe: Total population	
10	B01001	B01001_001	Total:	
11	B01001	B01001_002	Male:	
12	B01001	B01001_003	Under 5 years	
13	B01001	B01001_004	5 to 9 years	
14	B01001	B01001_005	10 to 14 years	
15	B01001	B01001_006	15 to 17 years	
16	B01001	B01001_007	18 and 19 years	

Columns:

Table ID:	Topic and universe
UniqueID:	Row in table; add "E" for estimate
Stub:	Short description
Data release	ACS 1 year or 5 year estimates

Colons in stubs:

Indicate totals of subsequent categories

UniqueID	Stub	Details
B01001_001	Total:	Total of males & females (002, 026)
B01001_002	Male:	-> Total of males (003-025)
B01001_003	Under 5 years	-> -> Males under 5
…	…	-> -> …
B01001_025	85 years and over	-> -> Males 85+
B01001_026	Female:	-> Total of females (027-049)
B01001_027	Under 5 years	-> -> Females under 5
…	…	-> -> …
B01001_049	85 years and over	-> -> Females 85+

- One vs. Five year estimates:

1 year estimates: e.g., 2018

Most current

Less reliable (smaller sample)
Less geographic coverage (only areas with 65,000+ people)

5 year estimates: e.g, 2013-2018
Less current
More reliable (larger sample)
More geographic coverage and finer resolution (tracts and block groups)

- Request for ACS 5 data from 2018 release:

Server:	api.census.gov
Endpoint:	data/2018/acs/acs5

Parameter	Purpose
get	variables
for	unit of observation (counties, tracts, block groups, zip codes, etc.)
in	enclosing geographic area (state, county, etc.)

Example:

for=tract:*	Return information about all tracts
in=state:36 county:067	Restrict to those in Onondaga County

- Response:
    - Column names and data in JSON as a list of rows
    - **Very** convenient for loading into a dataframe

Try out live:

- Postman application
- Spyder using requests module

Note: URL hex encodings for key characters:

Character	Hexadecimal
,	%2C
:	%3A
*	%2A