# Homework 6: APIs, JSON, and Caching

In this assignment, you will get data using the Star Wars API (SWAPI). You will also store the data in a cache file so that you can retrieve the data from the cache instead of requesting data from the API repeatedly.

This assignment does not require you to generate an API key, but we strongly recommend reading the SWAPI documentation first. For this assignment, you will mostly be working with the People resources, which has different information on characters within the Star Wars universe.

## Strongly Recommended

Choose an online JSON viewer. We recommend printing the API data/cache data and pasting it in the viewer to examine the structure of the data. Here are few of the many available options for JSON viewers:

1. https://jsonformatter.org/
2. https://jsoneditoronline.org/

## Tasks

### *def load_json(filename):*

This function reads a cached JSON file (*filename*) and returns a dictionary with JSON data or an empty dictionary if the cache does not exist. Hint: use a *try except*

### *def write_json(filename, dict):*

This function encodes the cache dictionary into JSON format and writes the JSON to the cache file (*filename*) to save the search results.

### *def get_swapi_info(url, params=None):*

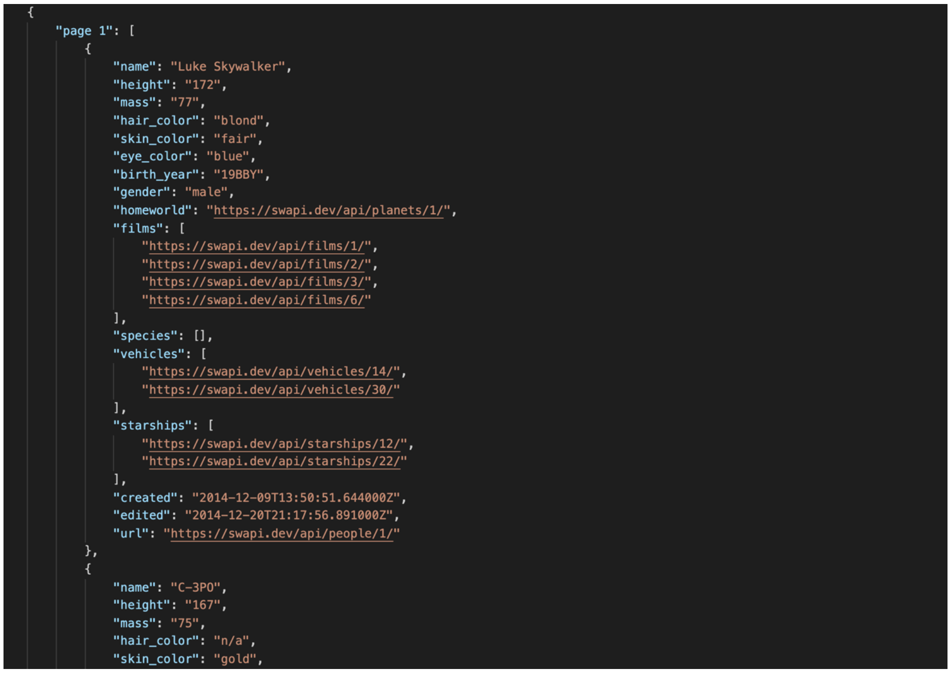
This function checks whether the *params* dictionary has been specified, then makes a request to access data with the *url* and *params* given, if any. If the request is successful, it returns a dictionary representation of the decoded JSON. If the request is unsuccessful, it prints out **"Exception!"** and returns **None**.

Sample Output:

```
{'count': 82, 'next': 'https://swapi.dev/api/people/?page=2', 'previous': None,
'results': [{'name': 'Luke Skywalker', 'height': '172', 'mass': '77',
'hair_color': 'blond', 'skin_color': 'fair', 'eye_color': 'blue', 'birth_year':
'19BBY', 'gender': 'male', 'homeworld': 'https://swapi.dev/api/planets/1/',
'films': ['https://swapi.dev/api/films/1/', 'https://swapi.dev/api/films/2/',
'https://swapi.dev/api/films/3/', 'https://swapi.dev/api/films/6/'], 'species':
[], 'vehicles': ['https://swapi.dev/api/vehicles/14/',
'https://swapi.dev/api/vehicles/30/'], 'starships':
['https://swapi.dev/api/starships/12/', 'https://swapi.dev/api/starships/22/'],
'created': '2014-12-09T13:50:51.644000Z', 'edited':
'2014-12-20T21:17:56.891000Z', 'url': 'https://swapi.dev/api/people/1/'},
{'name': 'C-3PO', 'height': '167', 'mass': '75', 'hair_color': 'n/a',
'skin_color': 'gold'
```

### ***def cache_all_pages(people_url, filename):***

The SWAPI People resources has multiple pages. This function uses the passed url to get information from each page and write it out to a cache file. It first checks if the page number is a key in the dictionary returned by the function ***load_json and if so returns the data for that key***. If the page number does not exist in the dictionary it makes a request to get the data (using ***get_swapi_info***), then adds the data to the dictionary (the key is the page number (ex: **page 1**)) and the value is the **results** (see the example below), finally it writes out the dictionary to a file(*filename*) using ***write_json***.



```
{
    "page 1": [
        {
            "name": "Luke Skywalker",
            "height": "172",
            "mass": "77",
            "hair_color": "blond",
            "skin_color": "fair",
            "eye_color": "blue",
            "birth_year": "19BBY",
            "gender": "male",
            "homeworld": "https://swapi.dev/api/planets/1/",
            "films": [
                "https://swapi.dev/api/films/1/",
                "https://swapi.dev/api/films/2/",
                "https://swapi.dev/api/films/3/",
                "https://swapi.dev/api/films/6/"
            ],
            "species": [],
            "vehicles": [
                "https://swapi.dev/api/vehicles/14/",
                "https://swapi.dev/api/vehicles/30/"
            ],
            "starships": [
                "https://swapi.dev/api/starships/12/",
                "https://swapi.dev/api/starships/22/"
            ],
            "created": "2014-12-09T13:50:51.644000Z",
            "edited": "2014-12-20T21:17:56.891000Z",
            "url": "https://swapi.dev/api/people/1/"
        },
        {
            "name": "C-3PO",
            "height": "167",
            "mass": "75",
            "hair_color": "n/a",
            "skin_color": "gold",
```

***def get_starships(filename):***

This function accesses the starships' url for each character (if any) from the cache file and passes it to the ***get_swapi_info*** function to get data about a character's starship. It returns a dictionary with the character's name as a key and a list of the names of their starships as the value. Do not include characters that don't have starships in the dictionary.

**Note:** It might take a bit longer than usual to run the unit tests as you are making multiple requests.

Sample Output:

```
{'Luke Skywalker': ['X-wing', 'Imperial shuttle'], 'Darth
Vader': ['TIE Advanced x1'], 'Biggs Darklighter':
['X-wing'], 'Obi-Wan Kenobi': ['Jedi starfighter', ...}
```

## Extra Credit - 6 points

***def fetch_population_by_species(species_name, species_filename):***

*Objective:*

Using the Star Wars API (SWAPI), create a dictionary that maps each species in the Star Wars universe to the population of their home world.

*Requirements:*

- Use the provided list of species.
- For each species, find out their home world.
- Fetch the population for each home world.
- Return a dictionary where the keys are species names and the values are the respective home world populations.

*Tips:*

Not all species might have associated home worlds or populations. In such cases, make a note that no data is available for that species.

Always check for 'null' or missing values in the API responses and handle them appropriately.

Sample Output:

```
{'Droid': 'Homeworld unknown', 'Wookie': '45000000',
'Human': '1000000000000', 'Hutt': '7000000000', "Yoda's
species": 'unknown', 'Ewok': '30000000'}
```

## Grading Rubric

| ***Item*** | ***Points*** |
|---|---|
| ***load_json*** | ***10*** |
| ***write_json*** | ***10*** |
| ***get_swapi_info*** | ***10*** |
| ***cache_all_pages*** | ***15*** |
| ***get_starships*** | ***15*** |
| ***Extra Credit*** | ***6*** |