

Python/Web Data Course

Structured Data

{JSON}

Let's watch a short video on JSON



<https://www.youtube.com/watch?v=7mj-p1Os6QA>

Review JSON



1. JavaScript Object Notation
2. Originally to transmit data on www, now **language independent**
3. Structure is **easy to read** for humans and computers
4. **Compact** to send through Internet

What is JSON?



Data types in JSON

← → ↻ https://jsoneditoronline.org

Apps DCI PowerSchool Lear... Upper Canada Col... On call submission Course outline IC... y8 websites year9 sites

JSON Editor Online

1 {
2 "name": "Jason",
3 "age": 18,
4 "killer": true,
5 "weapons": [
6 "sword",
7 "knife",
8 "bat"
9],
10 "victim1": {
11 "name": "jody",
12 "age": 16
13 },
14 "victim2": {
15 "name": "jenn",
16 "age": 17
17 }
18 }

Visit this site and
make a JSON

object ▶ victim2 ▶
object {6}
name : Jason
age : 18
killer : ☒ true
weapons [3]
0 : sword
1 : knife
2 : bat
victim1 {2}
name : jody
age : 16
victim2 {2}
name : jenn
age : 17

<https://jsoneditoronline.org/>

Review Questions

1. What does the acronym JSON stand for?
2. What is JSON?
3. What is the main purpose of JSON?
4. What languages can JSON be used with?
5. What tool can be used to ensure JSON validity?
6. Which data types can be inside a JSON structure?

Ex. 1 - Download student data (data.json)

1. Navigate to <https://mdjhoel.github.io/datacourse/>
2. Right click and download data.json to your new “work” folder

Ex. 1 - Read in text file and load as a JSON object

1. Type the following commands into the Python interpreter shell

```
>>> import os
>>> chdir("/Users/mhoel/Desktop/work")
>>> json_fo = open("data.json","r")
>>> import json
>>> json_data = json.load(json_fo)
>>> json_data["students"]
>>> json_fo.close( )
```

00

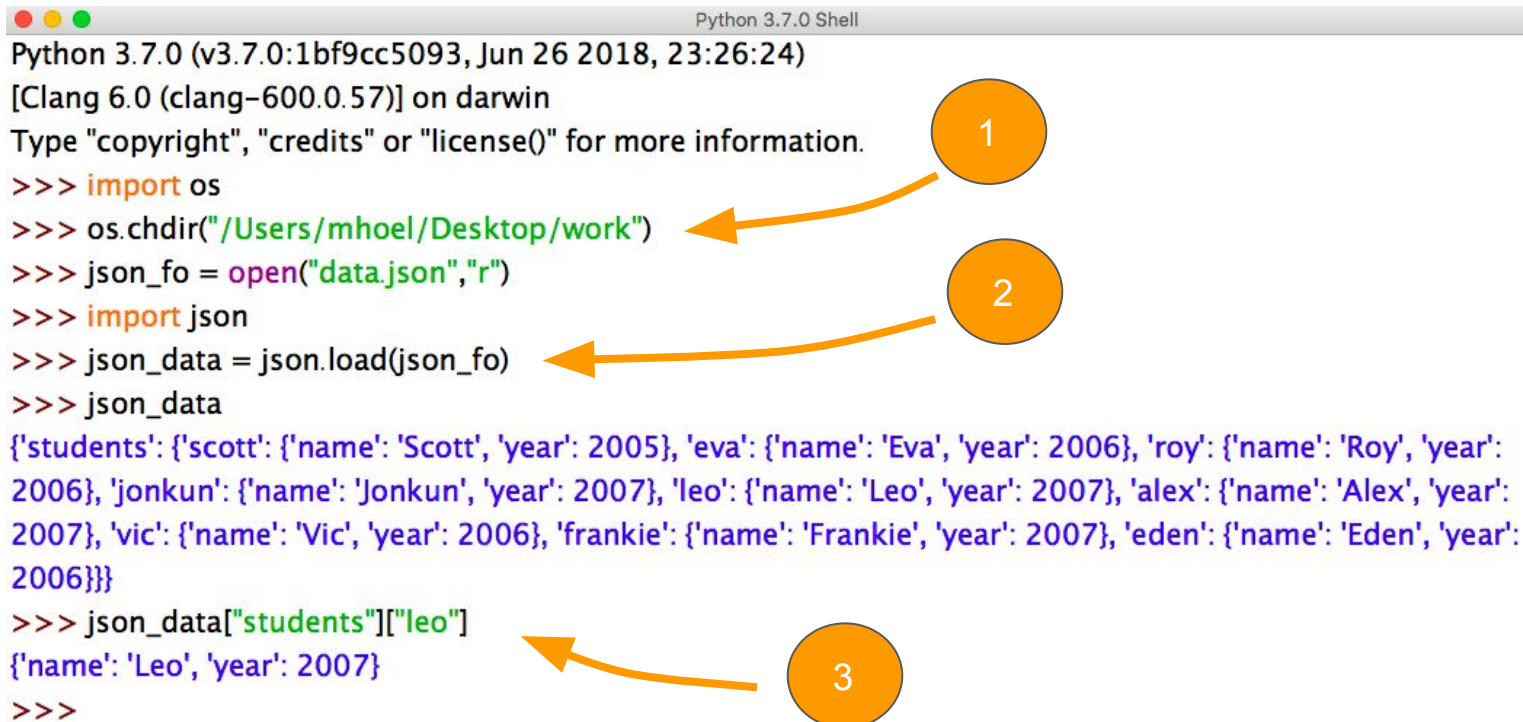
01

02

03

3. What do you think will happen at each stage?

Ex 1. Results and Questions



A screenshot of a Python 3.7.0 Shell window. The window title is "Python 3.7.0 Shell". The terminal output shows the following code and its results:

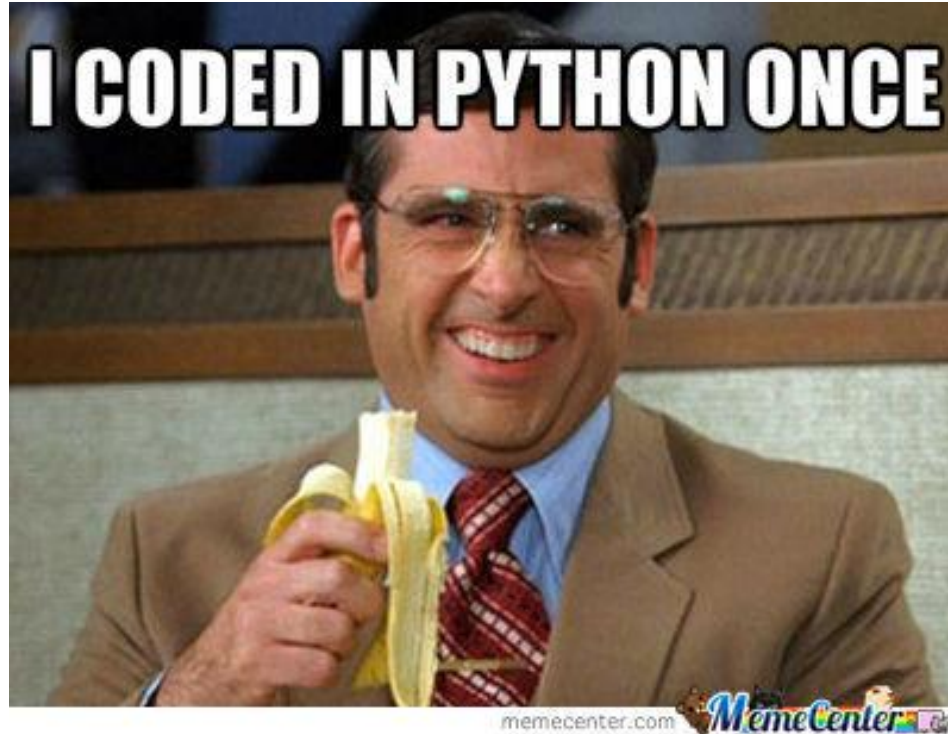
```
Python 3.7.0 (v3.7.0:1bf9cc5093, Jun 26 2018, 23:26:24)
[Clang 6.0 (clang-600.0.57)] on darwin
Type "copyright", "credits" or "license()" for more information.
>>> import os
>>> os.chdir("/Users/mhoel/Desktop/work")
>>> json_fo = open("data.json", "r")
>>> import json
>>> json_data = json.load(json_fo)
>>> json_data
{'students': {'scott': {'name': 'Scott', 'year': 2005}, 'eva': {'name': 'Eva', 'year': 2006}, 'roy': {'name': 'Roy', 'year': 2006}, 'jonkun': {'name': 'Jonkun', 'year': 2007}, 'leo': {'name': 'Leo', 'year': 2007}, 'alex': {'name': 'Alex', 'year': 2007}, 'vic': {'name': 'Vic', 'year': 2006}, 'frankie': {'name': 'Frankie', 'year': 2007}, 'eden': {'name': 'Eden', 'year': 2006}}}
```

Three orange circles with numbers 1, 2, and 3 are placed to the right of the code. Orange arrows point from these circles to specific lines of code:

- Circle 1 points to `os.chdir("/Users/mhoel/Desktop/work")`.
- Circle 2 points to `json_data = json.load(json_fo)`.
- Circle 3 points to `json_data["students"]["leo"]`.

```
>>> json_data["students"]["leo"]
{'name': 'Leo', 'year': 2007}
>>>
```

Good Job! Now it time for a harder one!



Ex. 2 - Problem

Write a program that will **input** data.json, **process** the data to find students who were born in years equal or less than 2006 and **output** only these names to the screen.

HINT:

You need to use an ***if statement*** and maybe use `int()` to convert string data to numbers to do the math

Ex. 2 Results and Questions

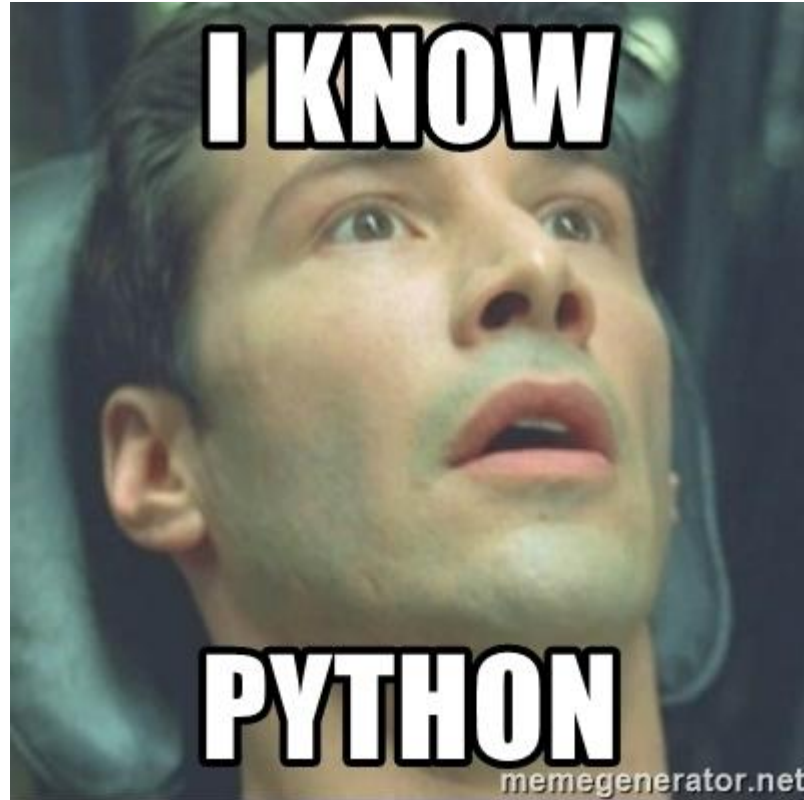
```
>>> import os
>>> os.chdir("/Users/mhoel/Desktop/work")
>>> file_input = open("data.json")
>>> import json
>>> data = json.load(file_input)
>>> data
>>> for student in data["students"]:
    if (int(data["students"][student]["year"]) <= 2006):
        print(student)
```

0

1

scott
eva
roy
vic
eden

Good Job! Now it time for writing files!



Adding and deleting elements to json in Python

1. To open a file object for reading & **add element** and then **delete it**

```
>>> import os
>>> chdir("/Users/mhoel/Desktop/work")
>>> json_fo = open("data.json", "r")
>>> import json
>>> json_data = json.load(json_fo)
>>> json_fo.close( )
>>> json_data
>>> json_data["students"]["joe"] = {"name": "joe", "year": 2007}
>>> json_data
>>> del json_data["students"]["joe"]
>>> json_data
```

Review and questions

```
>>> data["students"]["joe"] = {"name": "joe", "year": 2007}
```

```
>>> data
```

```
{'students': {'scott': {'name': 'Scott', 'year': 2005}, 'eva': {'name': 'Eva', 'year': 2006}, 'roy': {'name': 'Roy', 'year': 2006}, 'jonkun': {'name': 'Jonkun', 'year': 2007}, 'leo': {'name': 'Leo', 'year': 2007}, 'alex': {'name': 'Alex', 'year': 2007}, 'vic': {'name': 'Vic', 'year': 2006}, 'frankie': {'name': 'Frankie', 'year': 2007}, 'eden': {'name': 'Eden', 'year': 2006}, 'joe': {'name': 'joe', 'year': 2007}}}
```

```
>>>
```

```
>>>
```

```
>>> del data["students"]["joe"]
```

```
>>> data
```

```
{'students': {'scott': {'name': 'Scott', 'year': 2005}, 'eva': {'name': 'Eva', 'year': 2006}, 'roy': {'name': 'Roy', 'year': 2006}, 'jonkun': {'name': 'Jonkun', 'year': 2007}, 'leo': {'name': 'Leo', 'year': 2007}, 'alex': {'name': 'Alex', 'year': 2007}, 'vic': {'name': 'Vic', 'year': 2006}, 'frankie': {'name': 'Frankie', 'year': 2007}, 'eden': {'name': 'Eden', 'year': 2006}}}
```

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1

2

“Pretty” write json to a new file with Python

1. Convert a json object to a string and write to a new file with 3 char indent

```
>>> import os
>>> chdir("/Users/mhoel/Desktop/work")
>>> json_fo = open("data.json","r")
>>> import json
>>> data = json.load(json_fo)
>>> json_fo.close( )
>>> data["students"]["joe"] = {"name": "joe", "year": 2007}
>>> newfile = open("newdata.json","w")
>>> dumper = json.dumps(data,indent=3)
>>> newfile.write(dumper)
>>> newfile.close( )
```


Review and questions

0

```
>>> dumper = json.dumps(data,indent=3)
```

```
>>> dumper
```

```
{\n  "students": {\n    "scott": {\n      "name": "Scott",\n      "year": 2005\n    },\n    "eva": {\n      "name": "Eva",\n      "year": 2006\n    },\n    "roy": {\n      "name": "Roy",\n      "year": 2006\n    },\n    "jonkun": {\n      "name": "Jonkun",\n      "year": 2007\n    },\n    "leo": {\n      "name": "Leo",\n      "year": 2007\n    },\n    "alex": {\n      "name": "Alex",\n      "year": 2007\n    },\n    "vic": {\n      "name": "Vic",\n      "year": 2006\n    },\n    "frankie": {\n      "name": "Frankie",\n      "year": 2007\n    },\n    "eden": {\n      "name": "Eden",\n      "year": 2006\n    },\n    "joe": {\n      "name": "joe",\n      "year": 2007\n    }\n  }\n}
```

```
>>> newfile = open("newdata.json","w")
```

```
>>> newfile.write(dumper)
```

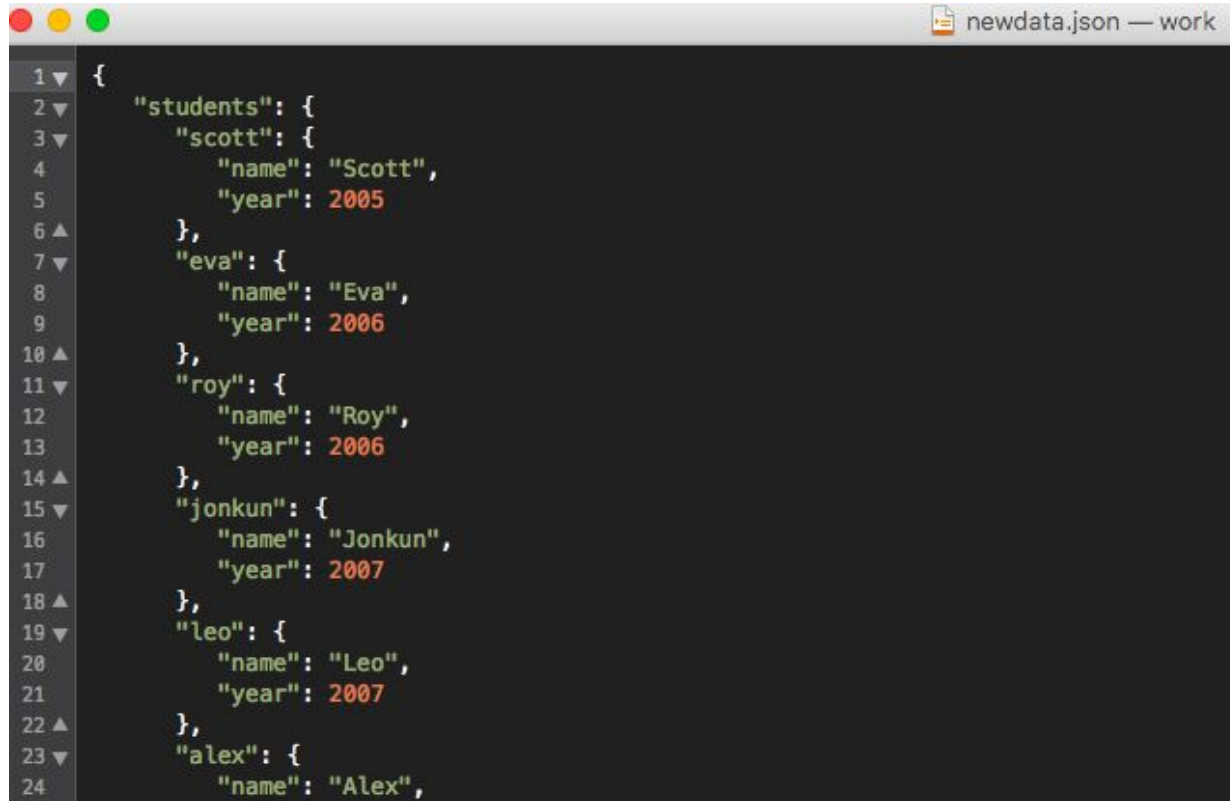
```
746
```

```
>>> newfile.close()
```

1

2

Notice the pretty indent (3 characters)

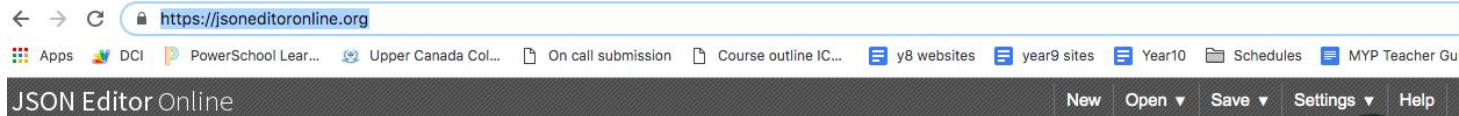


```
1 {  
2   "students": {  
3     "scott": {  
4       "name": "Scott",  
5       "year": 2005  
6     },  
7     "eva": {  
8       "name": "Eva",  
9       "year": 2006  
10    },  
11    "roy": {  
12      "name": "Roy",  
13      "year": 2006  
14    },  
15    "jonkun": {  
16      "name": "Jonkun",  
17      "year": 2007  
18    },  
19    "leo": {  
20      "name": "Leo",  
21      "year": 2007  
22    },  
23    "alex": {  
24      "name": "Alex",
```

Homework

1. Navigate to <https://github.com/jdorman/awesome-json-datasets>
2. Review the available json datasets online
3. Right click and download your favourites to your “work” folder
4. Paste the json data into <https://jsoneditoronline.org/> and review it
5. Prepare to talk about your favourite json dataset next class

Homework - Pokemon Video Game Example



```
1 { "abilities": [ { "ability": { "name": "chlorophyll", "url": "https://pokeapi.co/api/v2/ability/34/" }, "is_hidden": true, "slot": 3 }, { "ability": { "name": "overgrow", "url": "https://pokeapi.co/api/v2/ability/65/" }, "is_hidden": false, "slot": 1 }, { "base_experience": 64, "forms": [ { "name": "bulbasaur", "url": "https://pokeapi.co/api/v2/pokemon-form/1/" } ], "game_indices": [ { "game_index": 1, "version": { "name": "white-2", "url": "https://pokeapi.co/api/v2/version/22/" } }, { "game_index": 1, "version": { "name": "black-2", "url": "https://pokeapi.co/api/v2/version/21/" } }, { "game_index": 1, "version": { "name": "white", "url": "https://pokeapi.co/api/v2/version/18/" } }, { "game_index": 1, "version": { "name": "black", "url": "https://pokeapi.co/api/v2/version/17/" } }, { "game_index": 1, "version": { "name": "soulsilver", "url": "https://pokeapi.co/api/v2/version/16/" } }, { "game_index": 1, "version": { "name": "heartgold", "url": "https://pokeapi.co/api/v2/version/15/" } }, { "game_index": 1, "version": { "name": "platinum", "url": "https://pokeapi.co/api/v2/version/14/" } }, { "game_index": 1, "version": { "name": "pearl", "url": "https://pokeapi.co/api/v2/version/13/" } }, { "game_index": 1, "version": { "name": "diamond", "url": "https://pokeapi.co/api/v2/version/12/" } }, { "game_index": 1, "version": { "name": "leafgreen", "url": "https://pokeapi.co/api/v2/version/11/" } }, { "game_index": 1, "version": { "name": "firered", "url": "https://pokeapi.co/api/v2/version/10/" } }, { "game_index": 1, "version": { "name": "emerald", "url": "https://pokeapi.co/api/v2/version/9/" } }, { "game_index": 1, "version": { "name": "sapphire", "url": "https://pokeapi.co/api/v2/version/8/" } }, { "game_index": 1, "version": { "name": "ruby", "url": "https://pokeapi.co/api/v2/version/7/" } }, { "game_index": 1, "version": { "name": "crystal", "url": "https://pokeapi.co/api/v2/version/6/" } }, { "game_index": 1, "version": { "name": "silver", "url": "https://pokeapi.co/api/v2/version/5/" } }, { "game_index": 1, "version": { "name": "gold", "url": "https://pokeapi.co/api/v2/version/4/" } }, { "game_index": 153, "version": { "name": "yellow", "url": "https://pokeapi.co/api/v2/version/3/" } }, { "game_index": 153, "version": { "name": "blue", "url": "https://pokeapi.co/api/v2/version/2/" } } ] }, "base_experience": 64, "height": 7, "id": 1, "is_default": true, "location_area_encounters": "https://pokeapi.co/api/v2/pokemon/1/encounters", "moves": [ { "move": { "name": "tackle", "url": "https://pokeapi.co/api/v2/move/35/" }, "order": 1 }, { "move": { "name": "growl", "url": "https://pokeapi.co/api/v2/move/36/" }, "order": 2 }, { "move": { "name": "vine whip", "url": "https://pokeapi.co/api/v2/move/37/" }, "order": 3 }, { "move": { "name": "leech seed", "url": "https://pokeapi.co/api/v2/move/38/" }, "order": 4 }, { "move": { "name": "poison powder", "url": "https://pokeapi.co/api/v2/move/39/" }, "order": 5 }, { "move": { "name": "razor leaf", "url": "https://pokeapi.co/api/v2/move/40/" }, "order": 6 }, { "move": { "name": "sleep powder", "url": "https://pokeapi.co/api/v2/move/41/" }, "order": 7 }, { "move": { "name": "stun spore", "url": "https://pokeapi.co/api/v2/move/42/" }, "order": 8 }, { "move": { "name": "poison sting", "url": "https://pokeapi.co/api/v2/move/43/" }, "order": 9 }, { "move": { "name": "poison powder", "url": "https://pokeapi.co/api/v2/move/39/" }, "order": 10 }, { "move": { "name": "razor leaf", "url": "https://pokeapi.co/api/v2/move/40/" }, "order": 11 }, { "move": { "name": "leech seed", "url": "https://pokeapi.co/api/v2/move/38/" }, "order": 12 }, { "move": { "name": "vine whip", "url": "https://pokeapi.co/api/v2/move/37/" }, "order": 13 }, { "move": { "name": "growl", "url": "https://pokeapi.co/api/v2/move/36/" }, "order": 14 }, { "move": { "name": "tackle", "url": "https://pokeapi.co/api/v2/move/35/" }, "order": 15 } ], "species": { "name": "bulbasaur", "url": "https://pokeapi.co/api/v2/species/1/" }, "stats": { "base": { "hp": 45, "attack": 49, "defense": 65, "special_attack": 65, "special_defense": 65, "speed": 45 }, "effort": { "hp": 10, "attack": 5, "defense": 5, "special_attack": 5, "special_defense": 5, "speed": 5 } }, "types": [ { "type": { "name": "grass", "url": "https://pokeapi.co/api/v2/type/12/" } }, { "type": { "name": "poison", "url": "https://pokeapi.co/api/v2/type/4/" } } ], "weight": 69 }
```

