The Case of Deadly Healthcare

Irony Intended

Our Team

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The Problem

Solve the ever deteriorating healthcare system in Canada

Currently, the healthcare system struggles with determining when to admit or reject a patient in the ER

Our Solution

Our team solves that problem by removing two key factors:

1. Assessing a patient solely via nurses
2. The accidental admittance of a patient who is fine

The Implementation

Our code is written in **Python** utilising the JSON package to parse data

Python is:

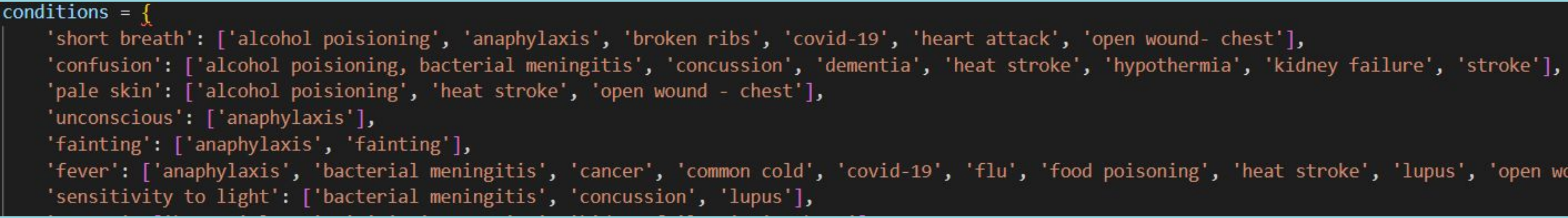
- **Lightweight**
- **Flexible**
- **Maintainable**
- **Scalable**

Django and Flask are some great examples of Full Stack frameworks that allow our project to be easily integrated into an application.

Python and R are the two most powerful tools for managing data.

The Code - Data

To manage our data, we mainly use dictionaries

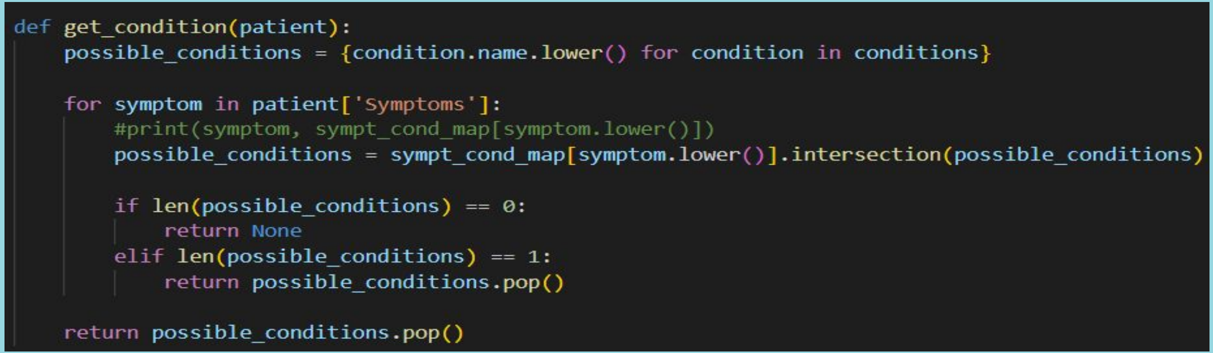


```
conditions = {
    'short breath': ['alcohol poisioning', 'anaphylaxis', 'broken ribs', 'covid-19', 'heart attack', 'open wound- chest'],
    'confusion': ['alcohol poisioning, bacterial meningitis', 'concussion', 'dementia', 'heat stroke', 'hypothermia', 'kidney failure', 'stroke'],
    'pale skin': ['alcohol poisioning', 'heat stroke', 'open wound - chest'],
    'unconscious': ['anaphylaxis'],
    'fainting': ['anaphylaxis', 'fainting'],
    'fever': ['anaphylaxis', 'bacterial meningitis', 'cancer', 'common cold', 'covid-19', 'flu', 'food poisoning', 'heat stroke', 'lupus', 'open wo
    'sensitivity to light': ['bacterial meningitis', 'concussion', 'lupus'],
```

We use symptoms as the keys and store the conditions as the values to boost runtime

The Code - Algorithm

- We use a process of elimination to match a patient's symptoms to the correct conditions



```python
def get_condition(patient):
    possible_conditions = {condition.name.lower() for condition in conditions}

    for symptom in patient['Symptoms']:
        #print(symptom, sympt_cond_map[symptom.lower()])
        possible_conditions = sympt_cond_map[symptom.lower()].intersection(possible_conditions)

        if len(possible_conditions) == 0:
            return None
        elif len(possible_conditions) == 1:
            return possible_conditions.pop()

    return possible_conditions.pop()
```

For each symptom -> match with possible conditions as set

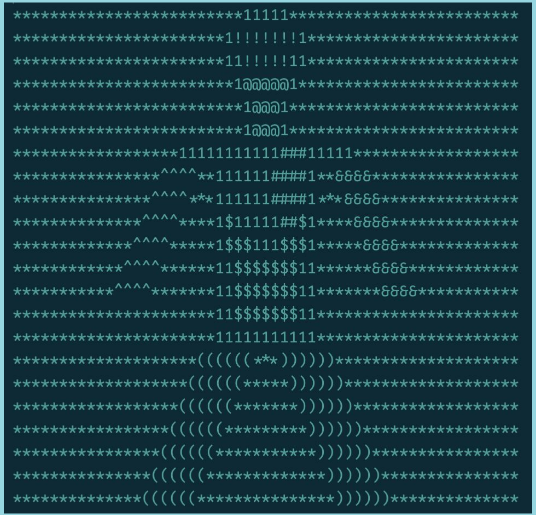
- We calculate intersections of sets to diagnose the patient

The Code - Algorithm cont.

To display the affected areas, we utilize a template string

We use a dictionary to map each body part to a specific character so that it can be replaced in the template string

We fill in the appropriate areas based on the affected areas of the given condition



```
*************************11111*************************
***********************1!!!!!!!1***********************
***********************11!!!!!11***********************
************************1@@@@@1************************
*************************1@@@1*************************
*************************1@@@1*************************
******************11111111111###11111******************
****************^^^^**111111####1**&&&&****************
***************^^^^***111111####1***&&&&***************
**************^^^^****1$11111##$1****&&&&**************
*************^^^^*****1$$$111$$$1*****&&&&*************
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```
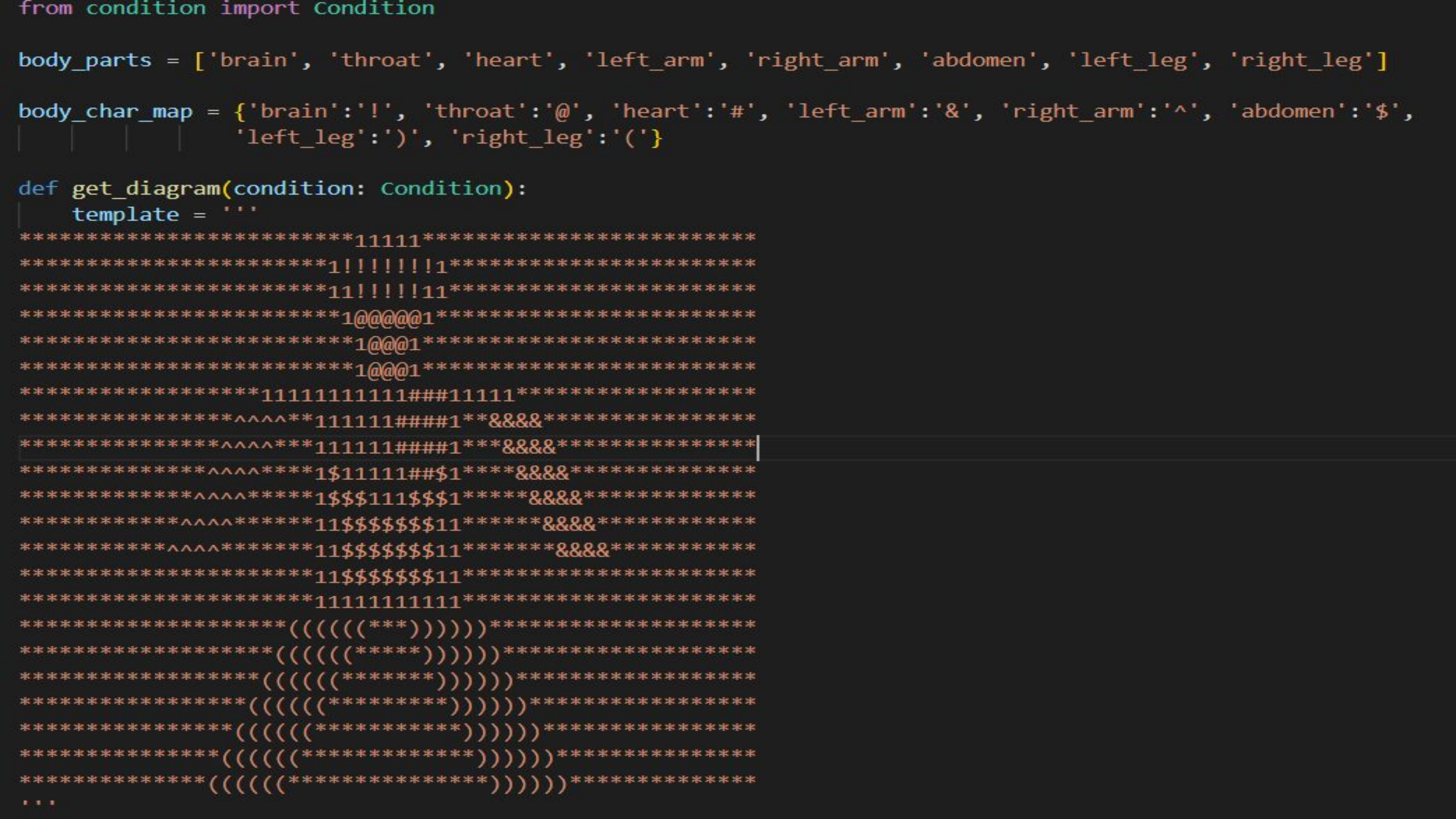

The Code - Output

-To output our result, we convert the JSON string to a Python string, manipulate it, then convert it back to JSON

-This allows us to perform operations using Python



```python
from condition import Condition

body_parts = ['brain', 'throat', 'heart', 'left_arm', 'right_arm', 'abdomen', 'left_leg', 'right_leg']

body_char_map = {'brain':'!', 'throat':'@', 'heart':'#', 'left_arm':'&', 'right_arm':'^', 'abdomen':'$',
                'left_leg':')', 'right_leg':'('}

def get_diagram(condition: Condition):
    template = '''
*************************11111*************************
***********************1!!!!!!!1***********************
***********************11!!!!!11***********************
************************1@@@@@1************************
*************************1@@@1*************************
*************************1@@@1*************************
******************11111111111###11111******************
****************^^^^**111111####1**&&&&****************
***************^^^^***111111####1***&&&&***************
**************^^^^****1$11111##$1****&&&&**************
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**************((((((***************))))))**************
'''
```

Real Life Implementation

- Scalability and maintenance is quite simple
- CI/CD pipeline to alter database/algorithm
- Data storage scaled to either cache or database depending on whether we want to keep user data.
- Implement frontend in a website with a ‘waiting line’ and ticket format that automatically assigns the patient their sector
    - Wait time for the sector reduced due to automation

Thank you!

Any questions?