CS21: INTRODUCTION TO COMPUTER SCIENCE

Prof. Mathieson

Fall 2018

Swarthmore College

Outline Oct 24:

Sit somewhere new!

- Recap reading files
- String and List methods
- TDD: Top Down Design
  - **word_guesser.py**

Notes

•**Lab 6** due **Saturday** night
•Hand back stack diagram worksheet today
•Ninja session **tonight! 7-10pm**
•Office Hours **Friday 3-5pm**

CS after CS21

- Come talk to me if you’re interested in pursuing CS and have questions (31 vs. 35, etc)

- Even if you never take anything beyond CS21, takeaway: creativity under constraint

Screenshots and Videos: please email!

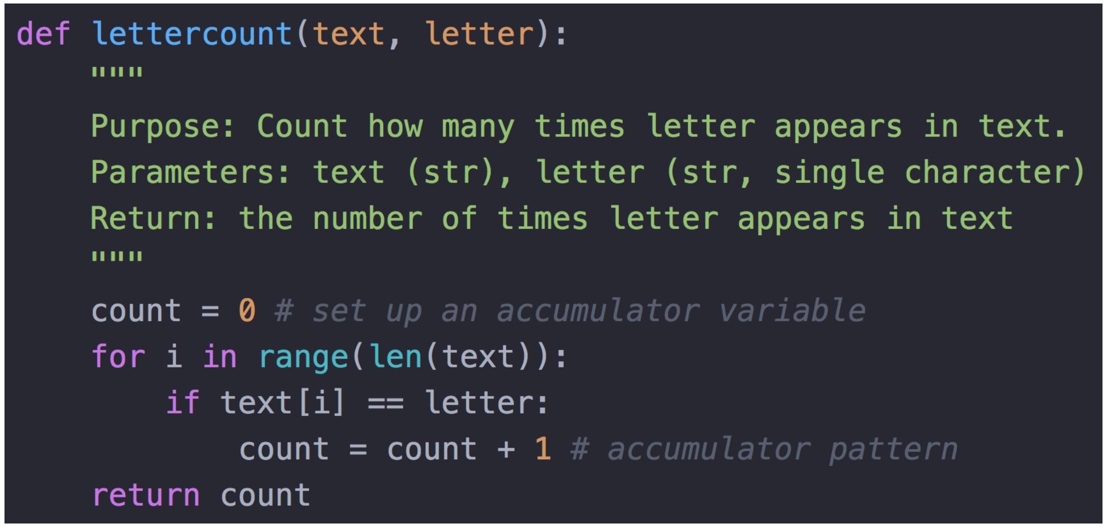
- Windows Videos: https://www.hongkiat.com/blog/win-screen-recording-softwares/
- Mac Videos: Quicktime
- Linux screenshot (camera icon on the bottom of screen)

Graphics on your own machine!
https://www.cs.swarthmore.edu/help/access.html
(need Xquartz (Mac) or Xming (Windows)

Recap reading files & Handout 4

Built-in vs. User-defined functions

- Both are ***functions***!
- User-defined example:



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    Parameters: text (str), letter (str, single character)
    Return: the number of times letter appears in text
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    count = 0 # set up an accumulator variable
    for i in range(len(text)):
        if text[i] == letter:
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    return count
```

- Built-in examples:
  - int(..)
  - print(..)
  - input(..)
  - random.choice(..)
  - random.randrange(..)
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Why are **random.choice(..)** and **random.randrange(..)** functions and not methods?

Answer: **random** is a library/module, not a specific instance of a class.

Mini-quiz, discuss with a partner

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c_file = open("colleges.txt",'r')
for line in c_file:
    tokens = line.split()
    name = tokens[0]
    enroll = int(tokens[1])
c_file.close()
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1) What is the *type* of **c_file**? (conceptually)

2) What is the *type* of **line**?

3) What does **split** do?

4) What is the type of tokens?

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list

Template for reading a file

1) Use a for loop to read the sequence of lines (recommended)

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c_file.close()
```
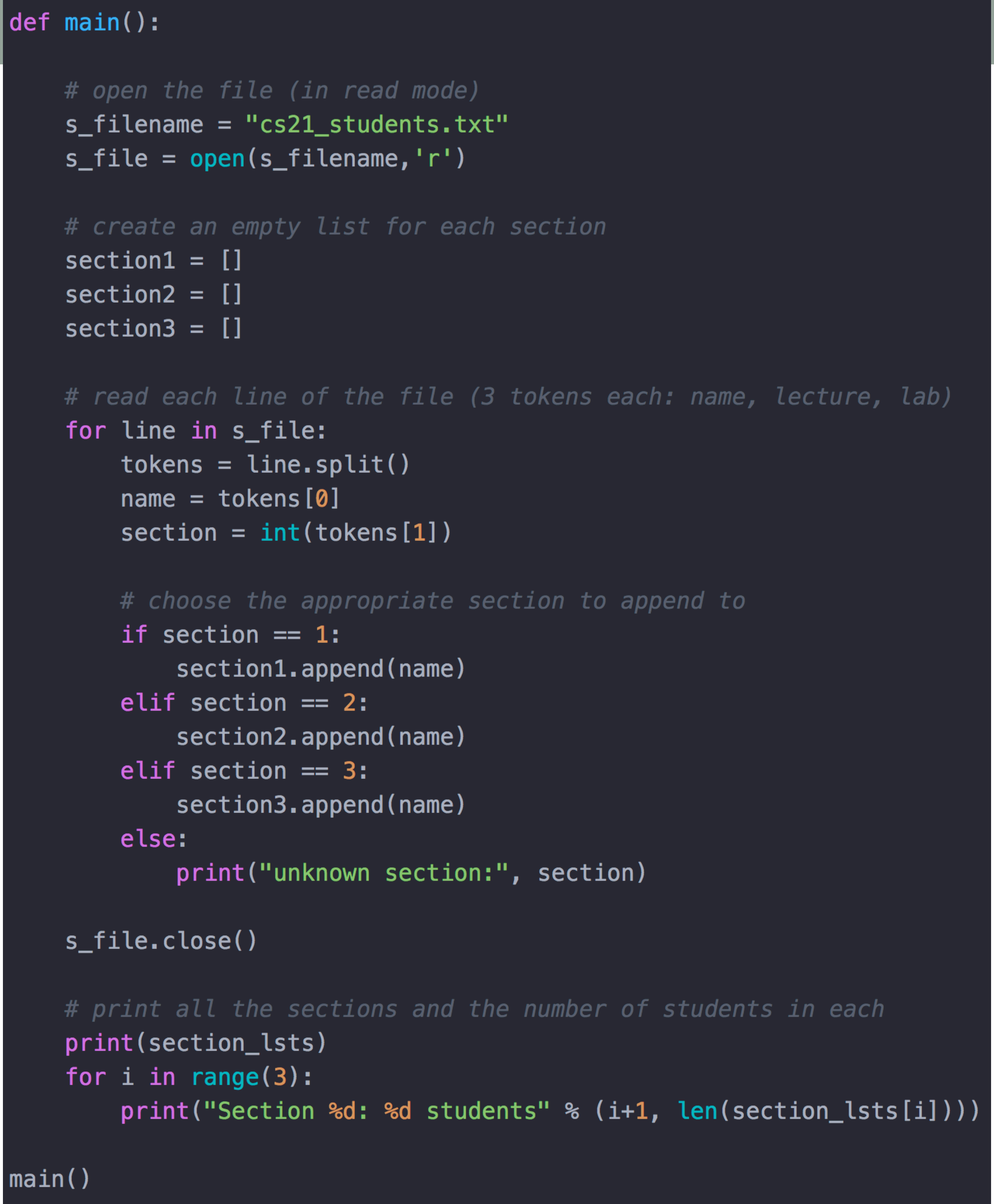

2) Loop over the line indices (using readline() to get the next line)

```
c_file = open("colleges.txt",'r')
for i in range(16):
    line = c_file.readline()
    tokens = line.split()
    name = tokens[0]
    enroll = int(tokens[1])
c_file.close()
```

students_file.py



```python
def main():

    # open the file (in read mode)
    s_filename = "cs21_students.txt"
    s_file = open(s_filename,'r')

    # create an empty list for each section
    section1 = []
    section2 = []
    section3 = []

    # read each line of the file (3 tokens each: name, lecture, lab)
    for line in s_file:
        tokens = line.split()
        name = tokens[0]
        section = int(tokens[1])

        # choose the appropriate section to append to
        if section == 1:
            section1.append(name)
        elif section == 2:
            section2.append(name)
        elif section == 3:
            section3.append(name)
        else:
            print("unknown section:", section)

    s_file.close()

    # print all the sections and the number of students in each
    print(section_lsts)
    for i in range(3):
        print("Section %d: %d students" % (i+1, len(section_lsts[i])))

main()
```

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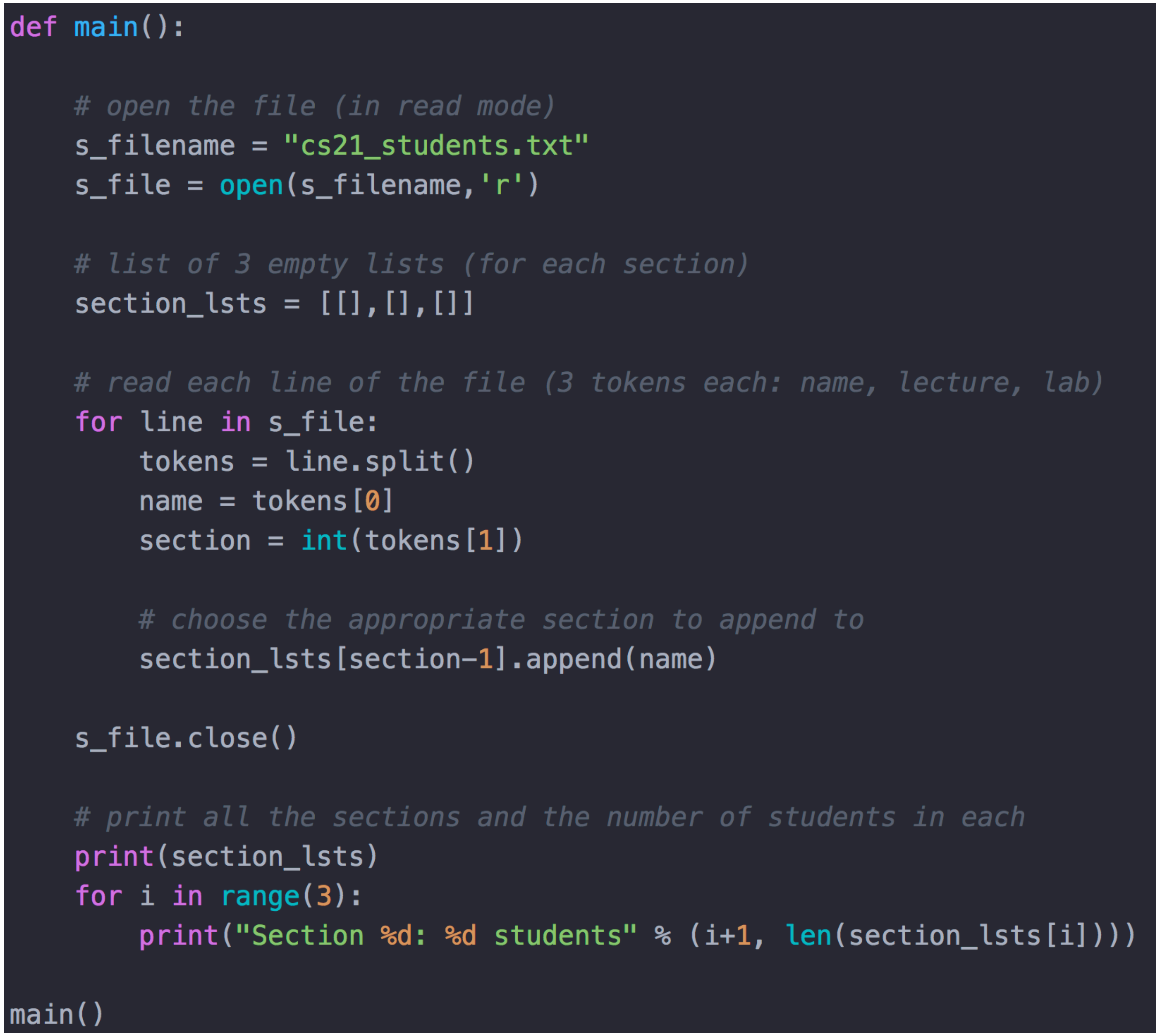

```python
def main():

    # open the file (in read mode)
    s_filename = "cs21_students.txt"
    s_file = open(s_filename,'r')

    # list of 3 empty lists (for each section)
    section_lsts = [[],[],[]]

    # read each line of the file (3 tokens each: name, lecture, lab)
    for line in s_file:
        tokens = line.split()
        name = tokens[0]
        section = int(tokens[1])

        # choose the appropriate section to append to
        section_lsts[section-1].append(name)

    s_file.close()

    # print all the sections and the number of students in each
    print(section_lsts)
    for i in range(3):
        print("Section %d: %d students" % (i+1, len(section_lsts[i])))

main()
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Non-printing (“whitespace”) characters

\n	newline (appears at the end of each line in a file)
\t	tab
\s or **“ ”**	space

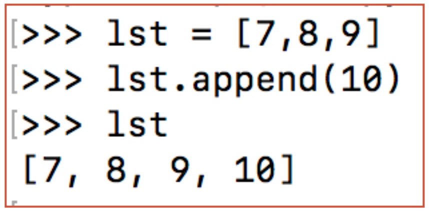
- Note: **<str>.strip()** removes leading and trailing whitespace

List and String Methods

Common List methods

Common List methods

- Add a single element to a list: lst.append(item)



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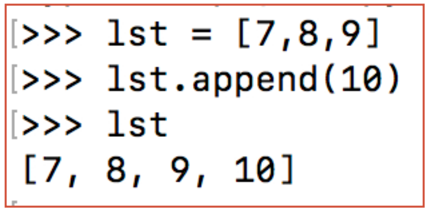

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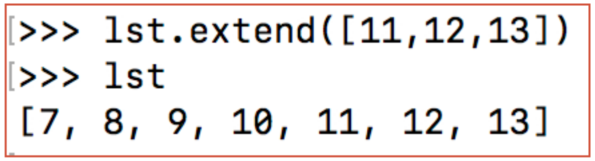
- Add a list to the end of a list: lst.extend(another_lst)



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>>> lst.extend([11,12,13])
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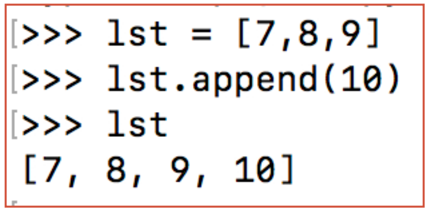

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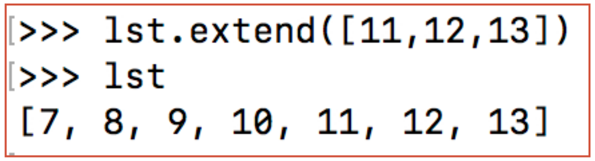

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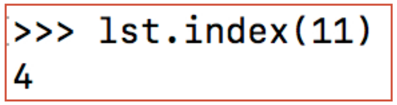
- Return the index of an element: idx = lst.index(item)



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4
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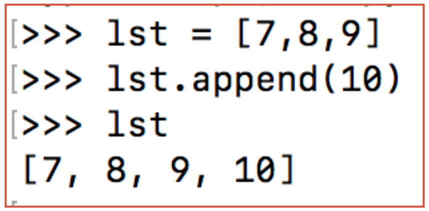

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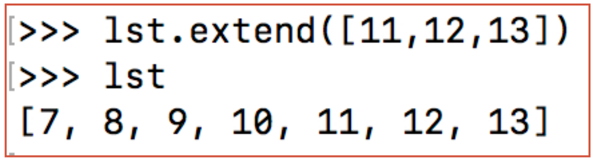

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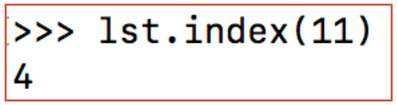

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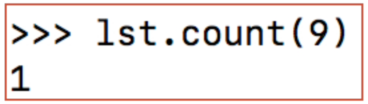
- Return the count of an element: c = lst.count(item)



```
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1
```

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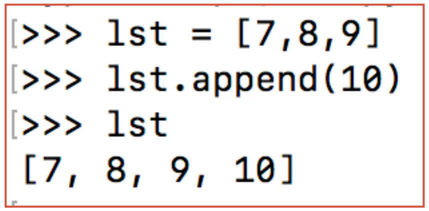

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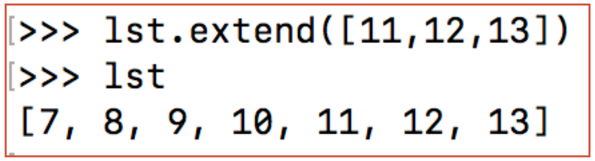

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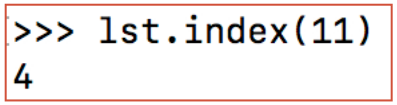

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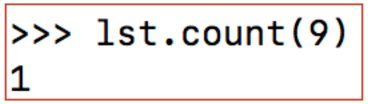

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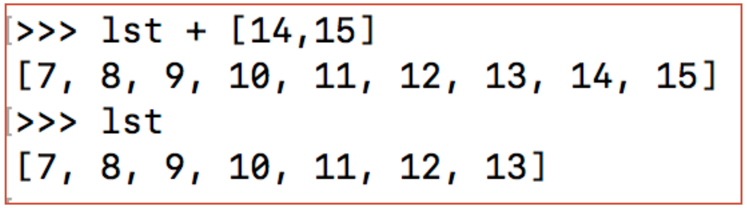
- List concatenation (not a method): lst + another_lst



```
>>> lst + [14,15]
[7, 8, 9, 10, 11, 12, 13, 14, 15]
>>> lst
[7, 8, 9, 10, 11, 12, 13]
```

Common String Methods: they all return something!

- string.index(smaller_string)
- string.count(smaller_string)
- string.isalpha()
- string.lower()
- string.upper()
- string.split(smaller_string)
- string.strip()

Common String Methods: they all return something!

string.index(smaller_string)	**int**
string.count(smaller_string)	**int**
string.isalpha()	**bool**
string.lower()	**string**
string.upper()	**string**
string.split(smaller_string)	**list**
string.strip()	**string**

TDD
Top Down Design

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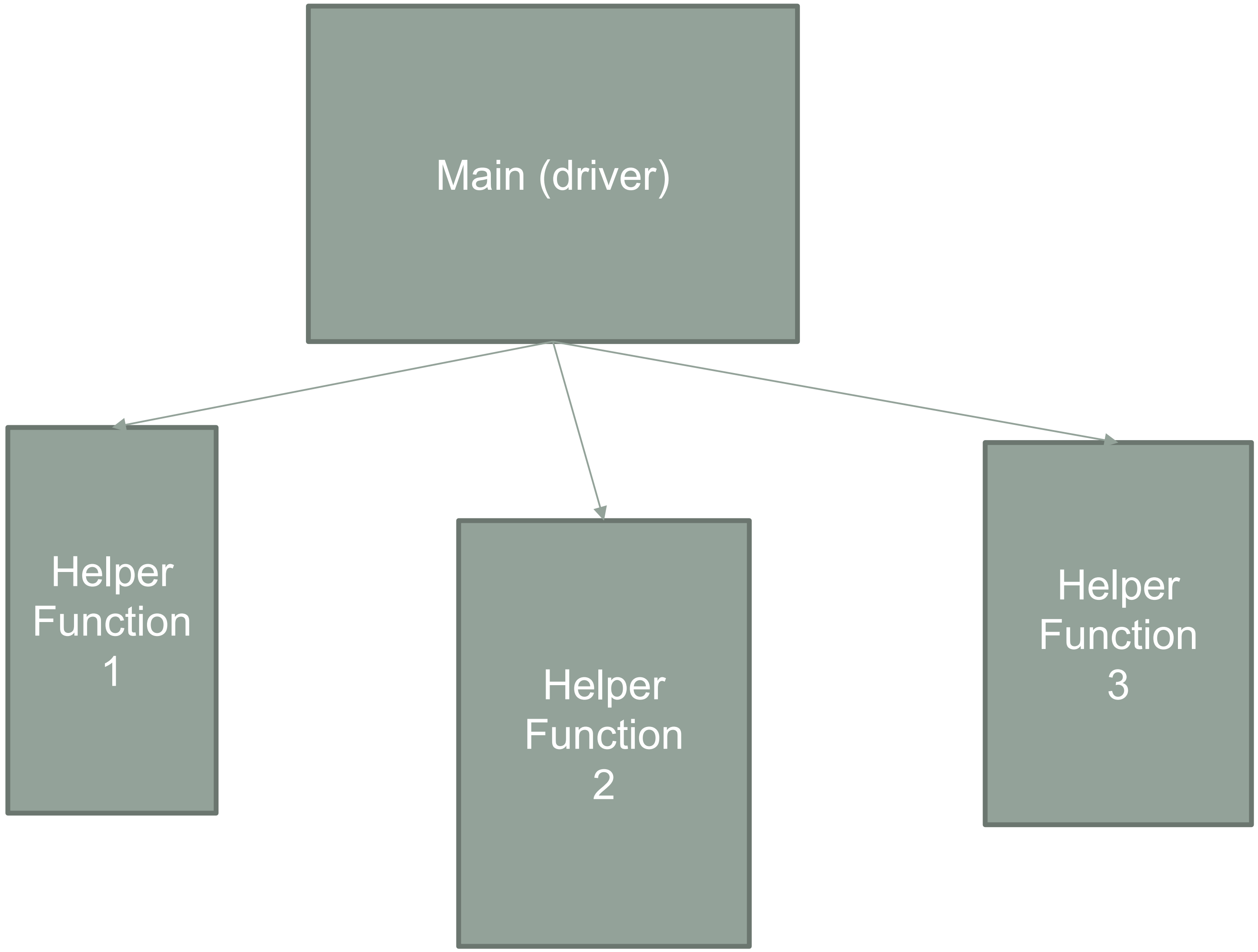

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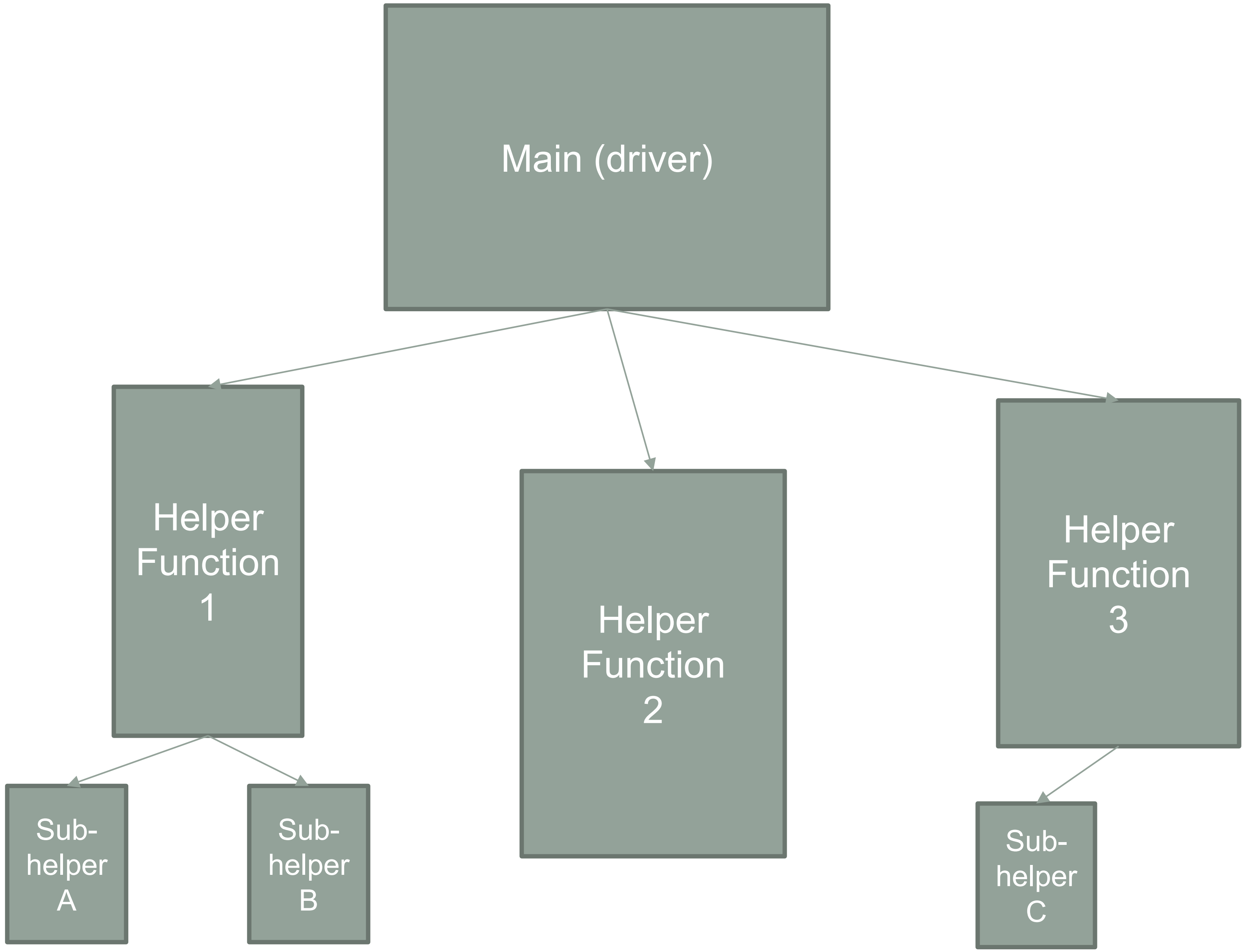

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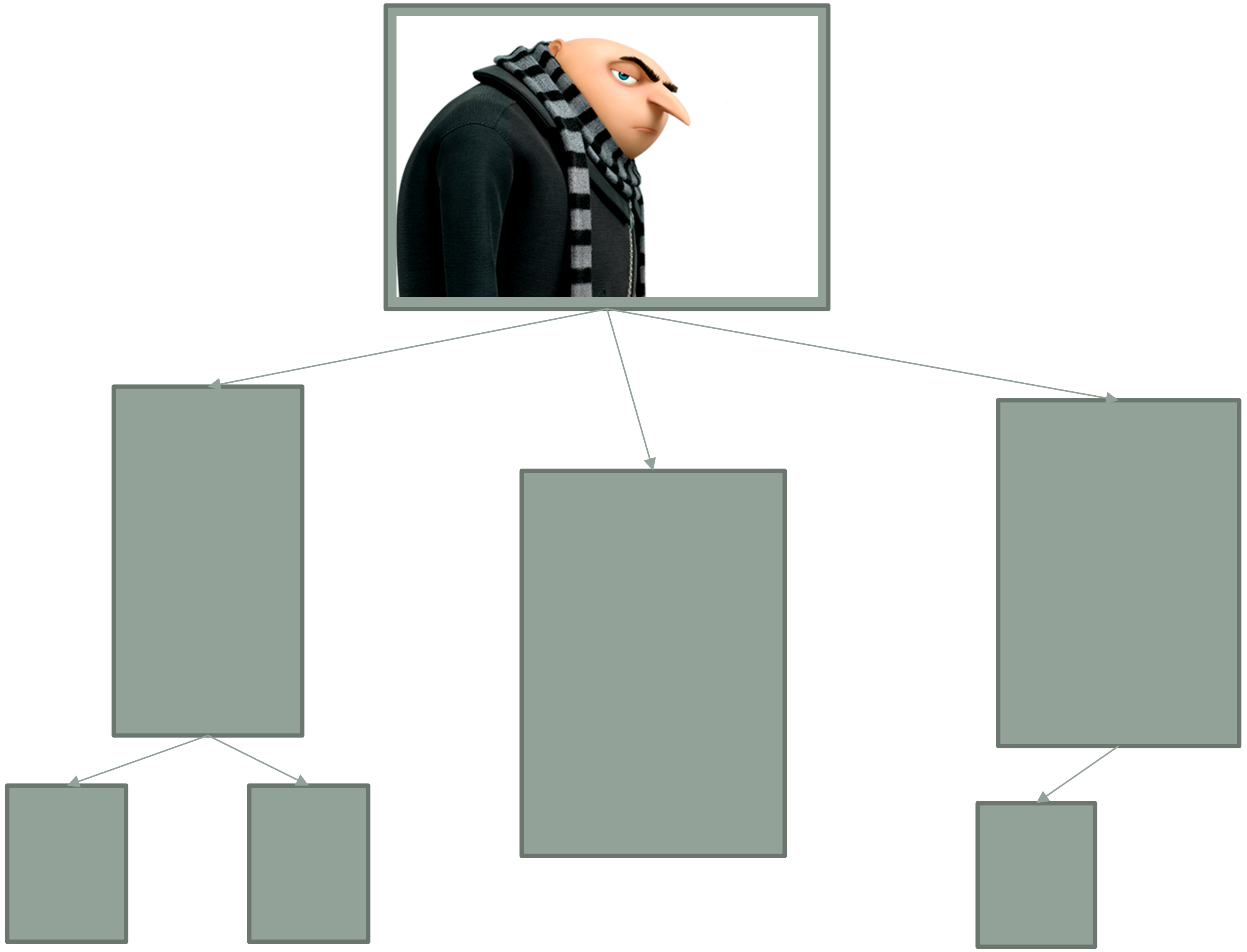

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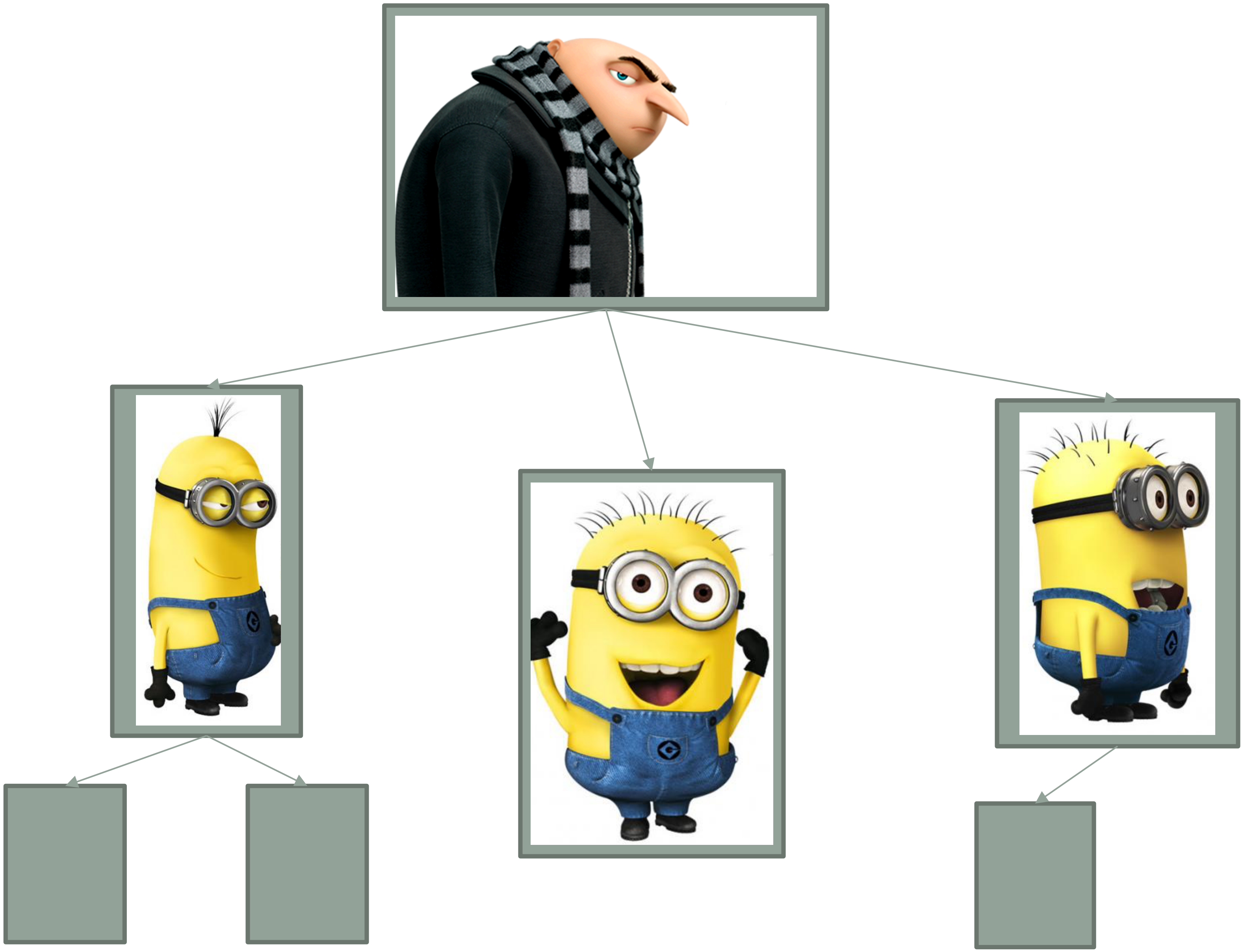

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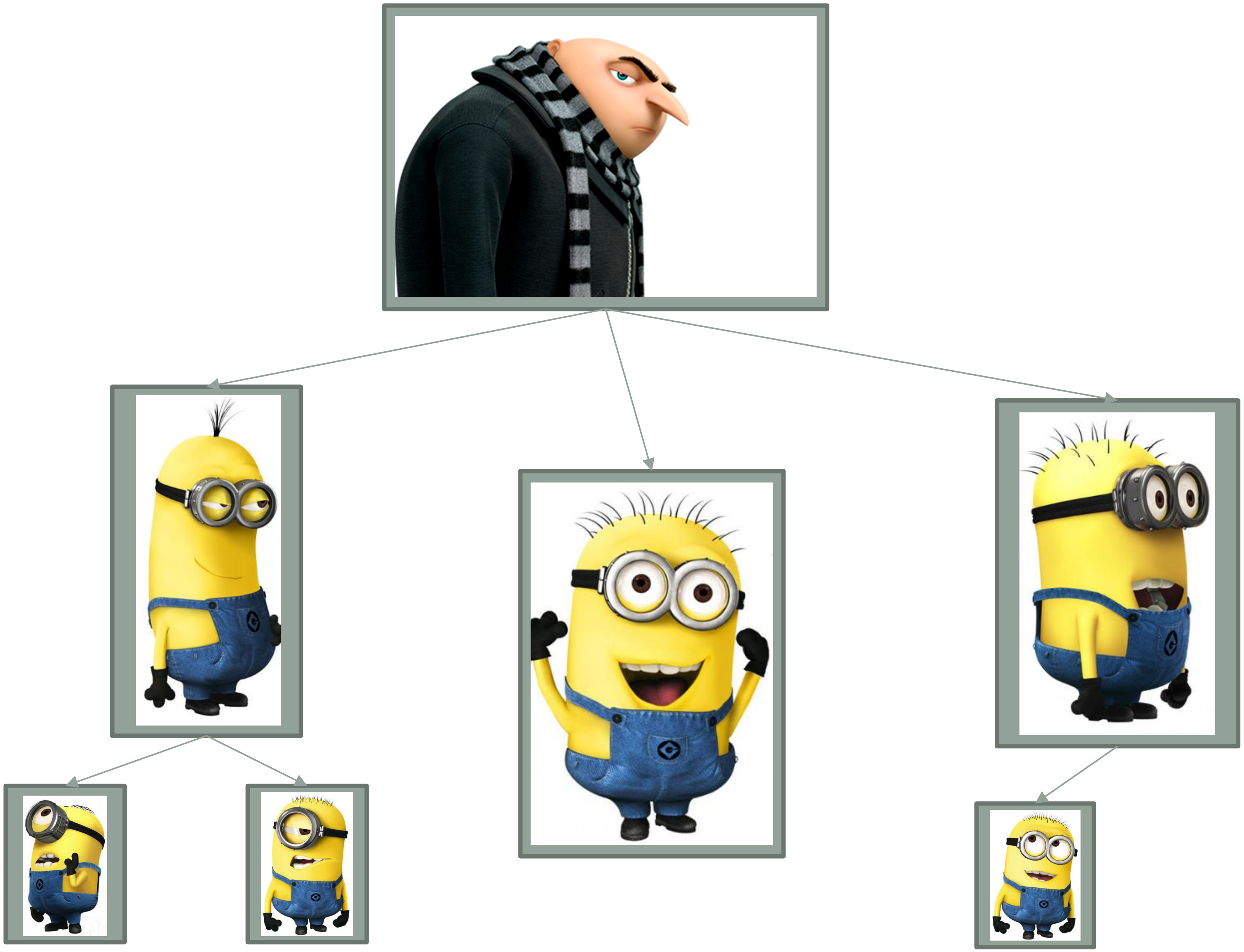

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4) Iterate on your design until you have a working main and stubbed out functions. Then start **implementing** the functions, starting from the “bottom up”.

Reasons to use TDD

- Creates code that is easier to implement, debug, modify, and extend
- Avoids going off in the wrong direction (i.e. implementing functions that are not useful or don't serve the program)
- Creates code that is easier for you or someone else to read and understand later on