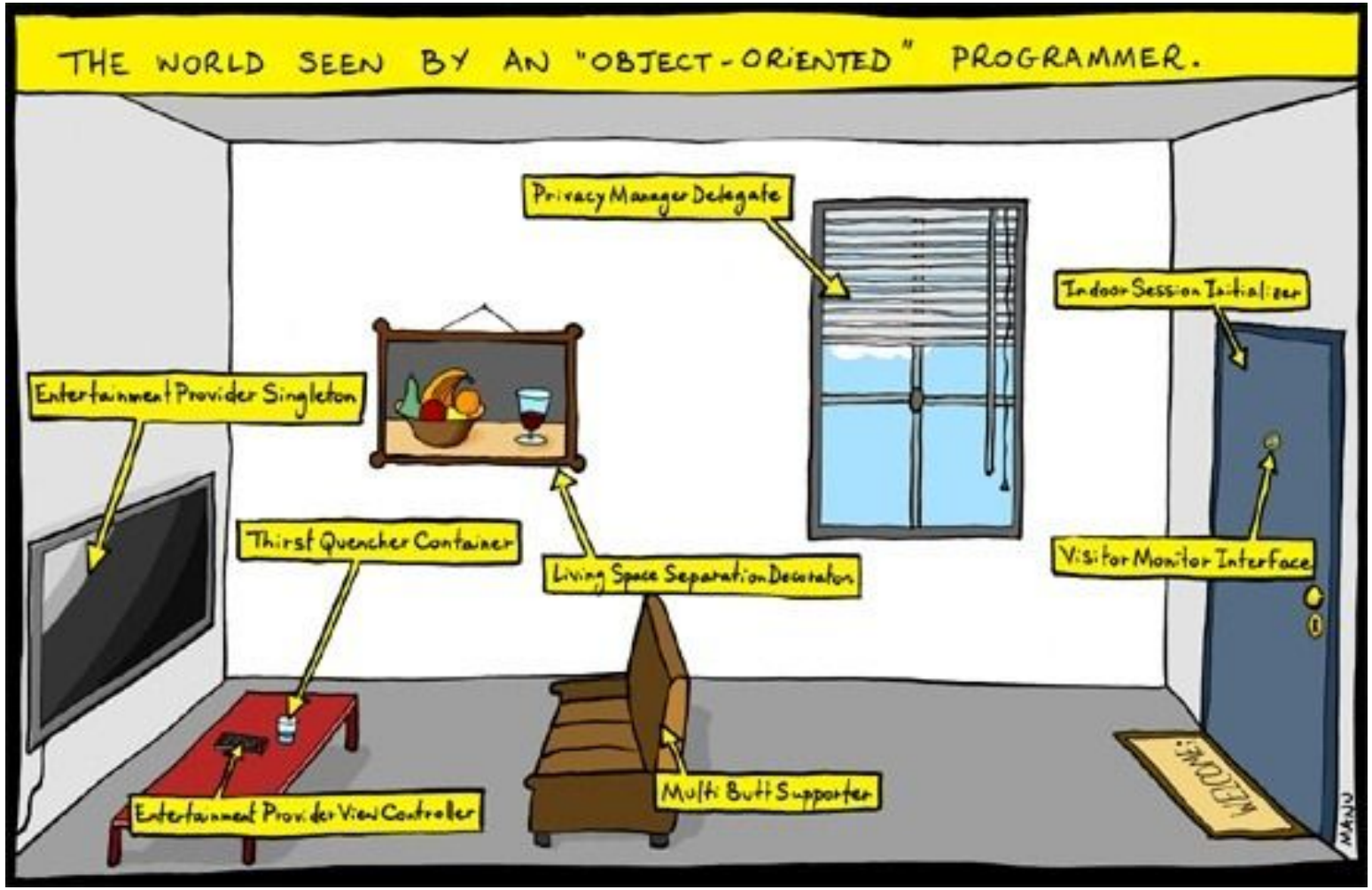
Object Oriented Programming (OOP)



Procedural vs. Object-Oriented Programming

- Procedural programming specifies a *procedure*: what steps to do in what order.
  - Programs organized as collection of **functions** that call each other.
  - That's what we've been doing up to now.
- Object-oriented programming specifies what objects exist and what each object can do.
- Usually we mix the two styles of programming:
  - Define object-types (i.e., classes) in a separate .py file (module).
  - Write functions (e.g. ***main()*** function) to create objects & tell them what to do.

Programming with Objects

Actually, we've used objects all semester!

- Files & file methods
  - f.read(), f.readline(), f.readlines(), f.write(s), f.close()
- Strings & string methods
  - str.isalpha(), str.isupper(), str.strip(), str.lstrip(ch), str.upper()
- Lists & list methods
  - list.append(item), list.sort(), list.reverse(), list.remove(item)
- Dictionaries & dictionary methods
  - dict.get(key), dict.keys(), dict.items(), dict.popitem(), dict.clear()

What are the parts of a house?

The nouns of a house

- windows
- doors
- plumbing

What do the parts of a house DO?

The verbs of a house

- The windows open and close
- The doors open and close
- The faucets turn on and off

Variables are the nouns of programming

Functions are the verbs of programming

Objects are just related nouns and verbs packaged together.

New terms

- Class - a template with nouns and verbs
- Instance/object - a single, specific example of a class
- Attribute - a variable attached to an instance
- Method - a function attached to an instance

New keywords

- def __init__ - short for initialize; a constructor is a special function to build an instance of a class
- self - a placeholder that refers to the current instance

House as an object

```
class House():
        def __init__(self):
            self.n_windows = 1
            self.window_status = 'closed'

        def open_window(self):
            self.window_status = 'open'

def main():
        my_house = House()                  #house object
        print(my_house.window_status)
        my_house.open_window()
        print(my_house.window_status)
        print(my_house.n_windows)

main()
```