CSCI 127: Joy and Beauty of Data

Lecture 13: OOP

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Summer 2021

https://reesep.github.io/classes/summer2021/127/main.html

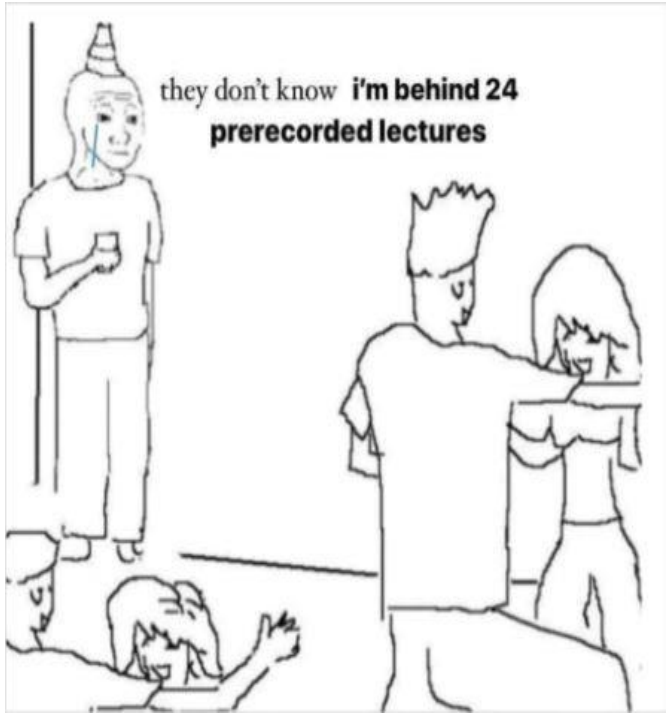
Announcements

Program 3 due **tonight** @ 11:59 PM

Lab 7 (Dictionaries) due **tomorrow** @ 11:59 PM

Lab 8 due on **Thursday** @ 11:59 P.M.
- After today, you will be able to finish it

Program 4 due on **Sunday** 6/13 @ 11:59 PM
- After today, you will be able to finish it



Everyone is eligible for full access to PyCharm!

FYI: You can use late passes on any remaining lab/program

If you have not signed up for a 1 on 1 meeting time with me yet, **make sure to do that sometime this week**

Me if I have to take off 5% of your final because you never signed up for a time to meet with me

Object Oriented Programming

So far, we have used **procedural programming** to solve problems. We have written **functions** that do things

Now, we will talk about a different way to solve problems…

Object Oriented Programming (OOP) is a paradigm of solving problems using objects, which represent *something*

The objects we create usually have data (**states/attributes**) and behaviors (**methods**)

Object Oriented Programming Example

There are many different kinds of cars…

Images stolen from the internet

Object Oriented Programming Example

There are many different kinds of cars…

However, all cars share similar features

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All cars have:

- A color
- Wheels
- Engine
- Windshield
- Windows
- Seating
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All cars can:

- Accelerate
- Slow down
- Stop
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Attributes

All cars can:

- Accelerate
- Slow down
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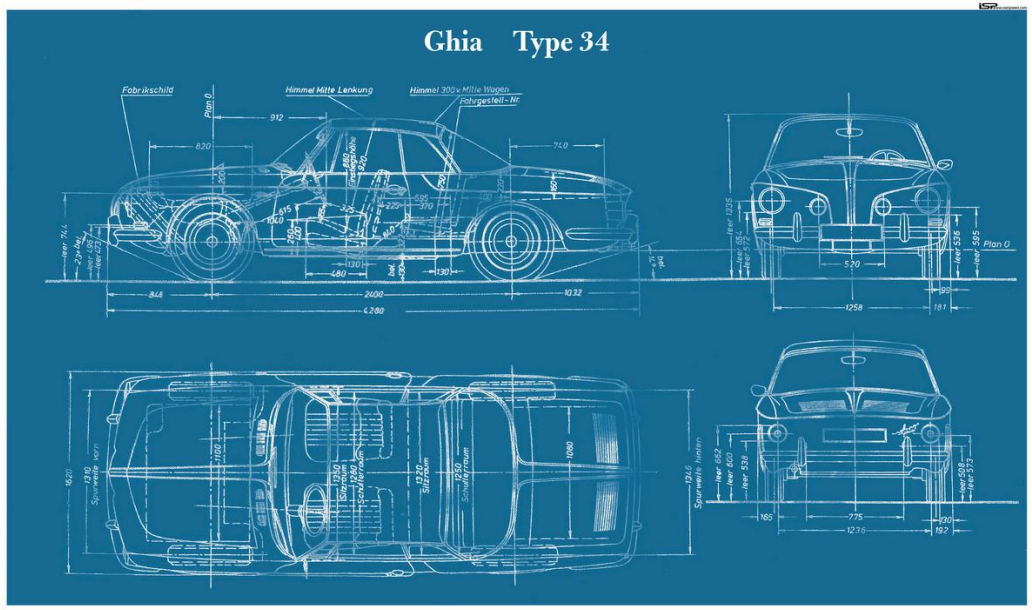
Functionality/Behavior

Object Oriented Programming Example

If we can create a **blueprint** for a generic car, then we can use that blueprint to create many different cars

When we create a car using that blue print, we can specify the different **attributes** (color, # of seats, speed, etc)

When we create a car, we give the car access to different kinds of **behavior** (accelerating, stopping, turning, etc)



Object Oriented Programming Example

If we can create a ~~**blueprint**~~ class for a generic car, then we can use that ~~blueprint~~ class to create many different cars

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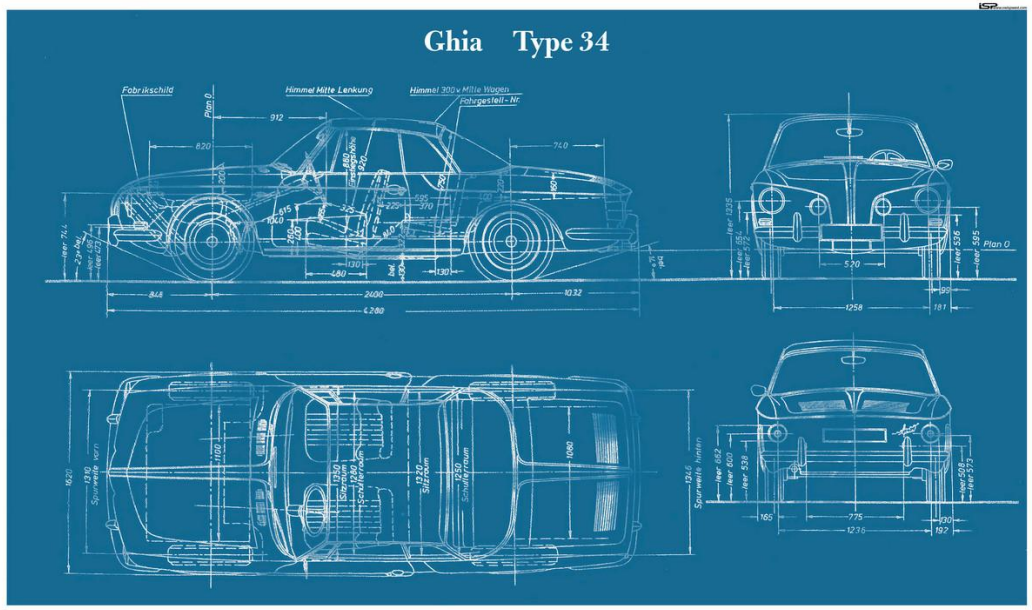
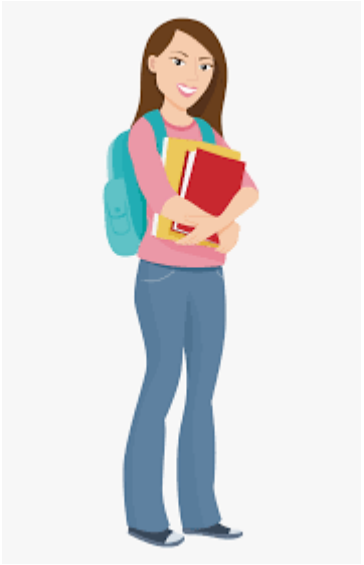


Student Example

Consider a college student at MSU…

What sort of attributes may a college student have?



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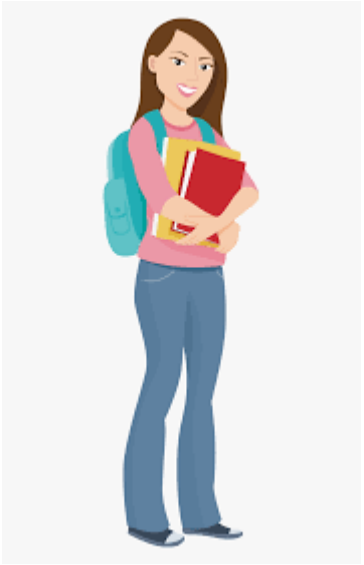


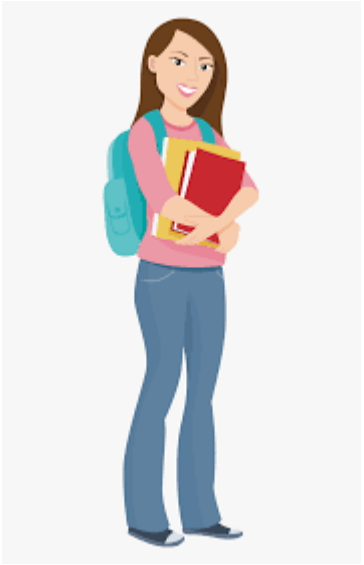
Consider a college student at MSU…

What sort of attributes may a college student have?

- Name
- Major
- GPA
- Student ID Number
- Year (freshman, sophomore, junior, senior)

And much more ….

Student Example



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And much more ….

Lets create our blueprint!

OOP in Python

Define classes using the **`class`** keyword

- All class names should be capitalized

All classes need a constructor. A constructor is the method that will create the object

- Constructor will **always** be:

```
def __init__(<insert parameters here>):
```

All methods need to go inside of the class

Reader methods: getName(), getMajor(), etc

Writer methods: setName(), setMajor(), etc

OOP Review

We create and use objects using **classes**

```
student1 = Student("James","Computer Science","04293401",4.0,"Junior")
```

We start off in our **constructor**

```
def __init__(self,name,major,student_id,gpa="Undefined",year="Freshman"):
    self.name = name
    self.major = major
    self.student_id = student_id
    self.gpa = gpa
    self.year = year
    self.champ_change = 0
    self.minor = "N/A"
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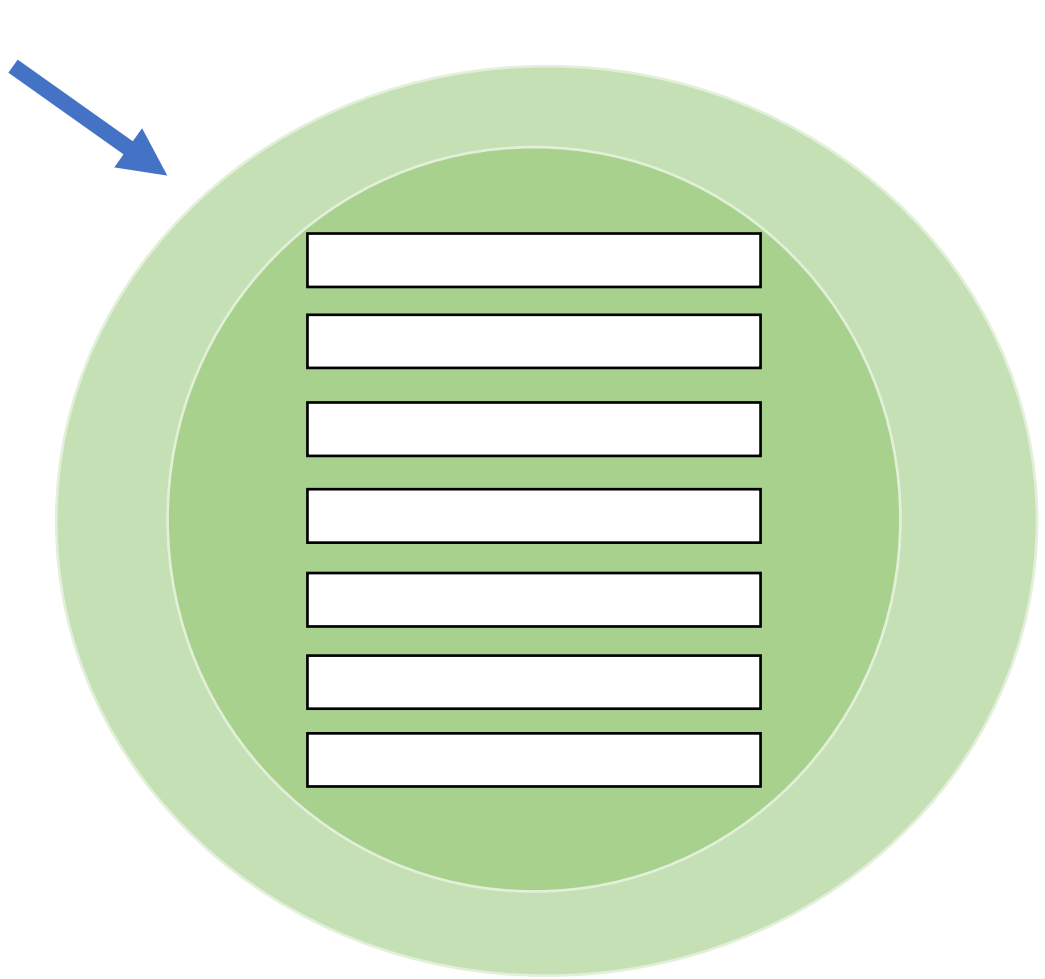

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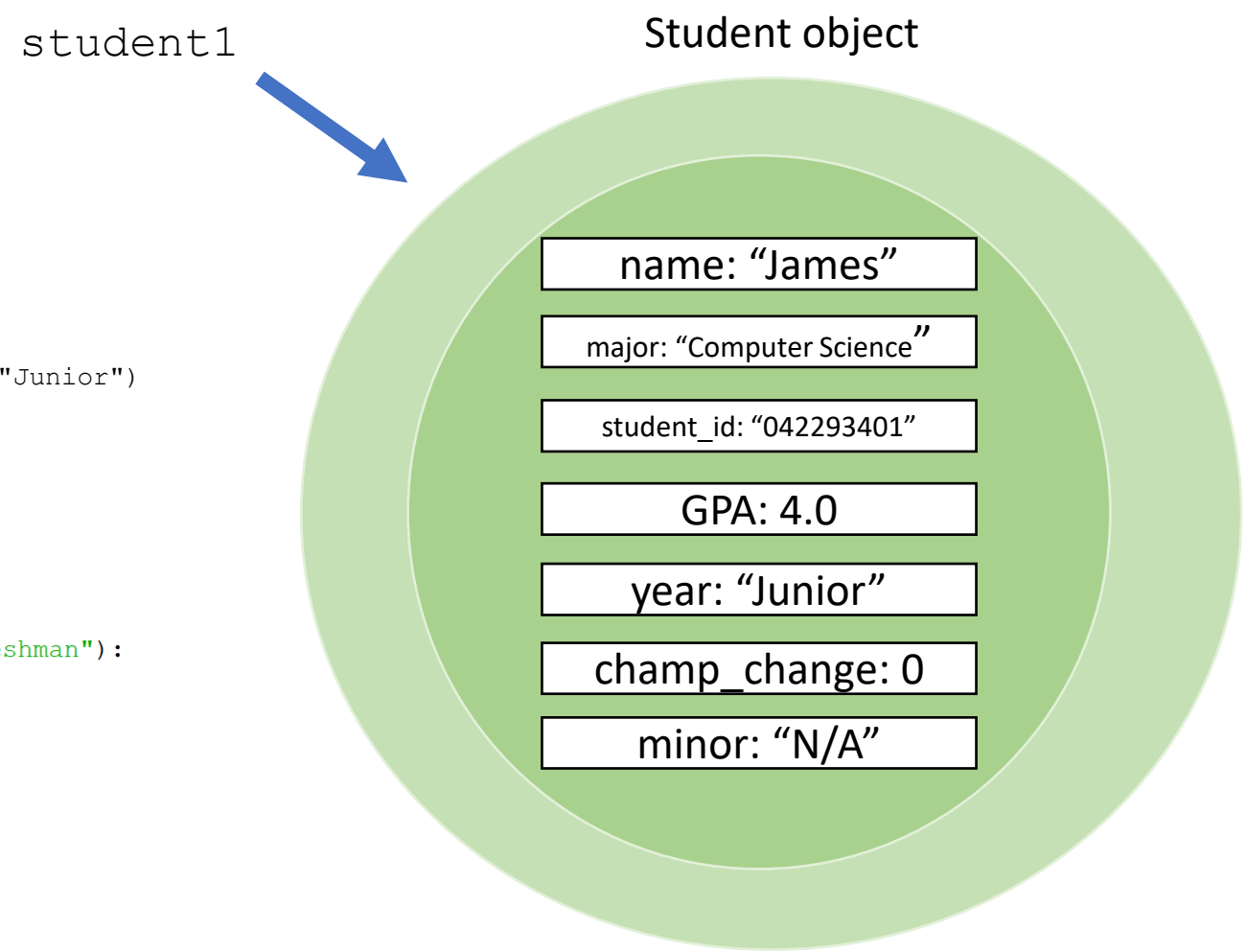

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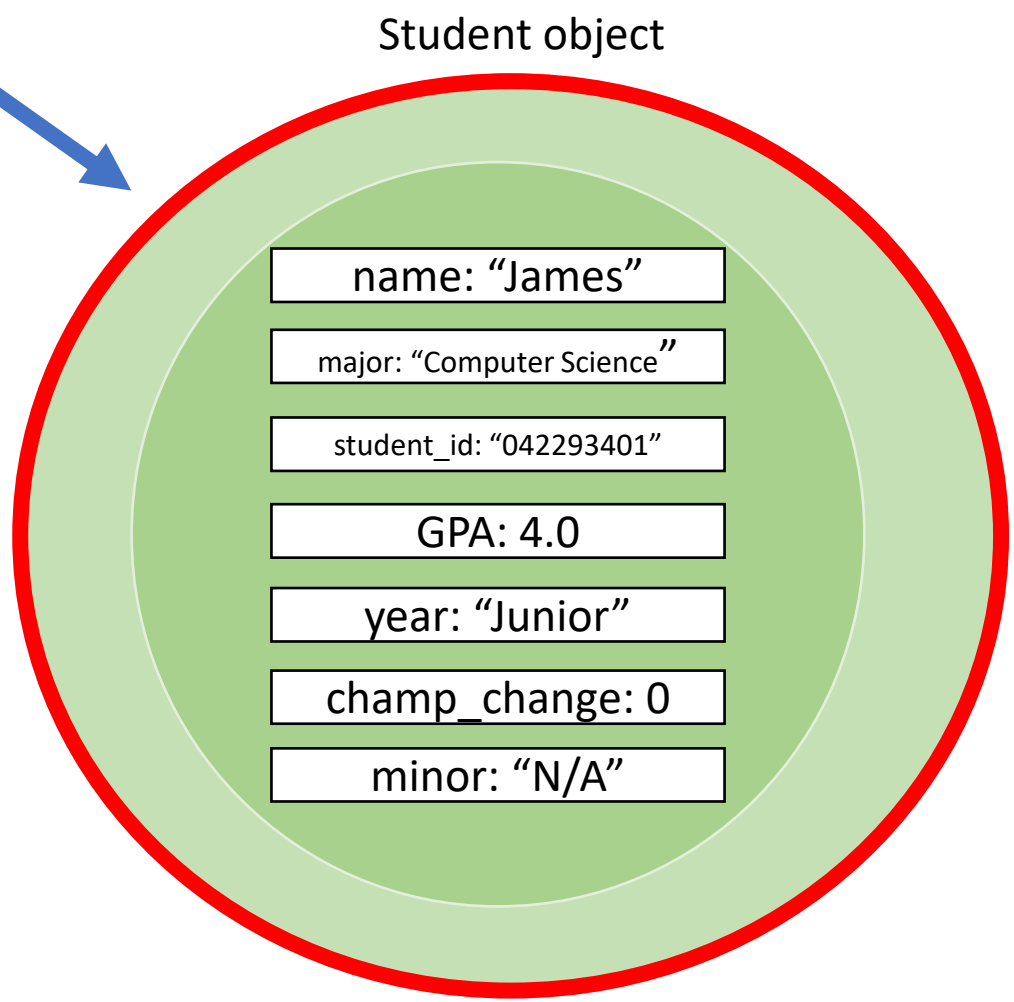


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print(student1)
```

```
<__main__.Student object at 0x03242D78>
```

Object’s Location in Memory

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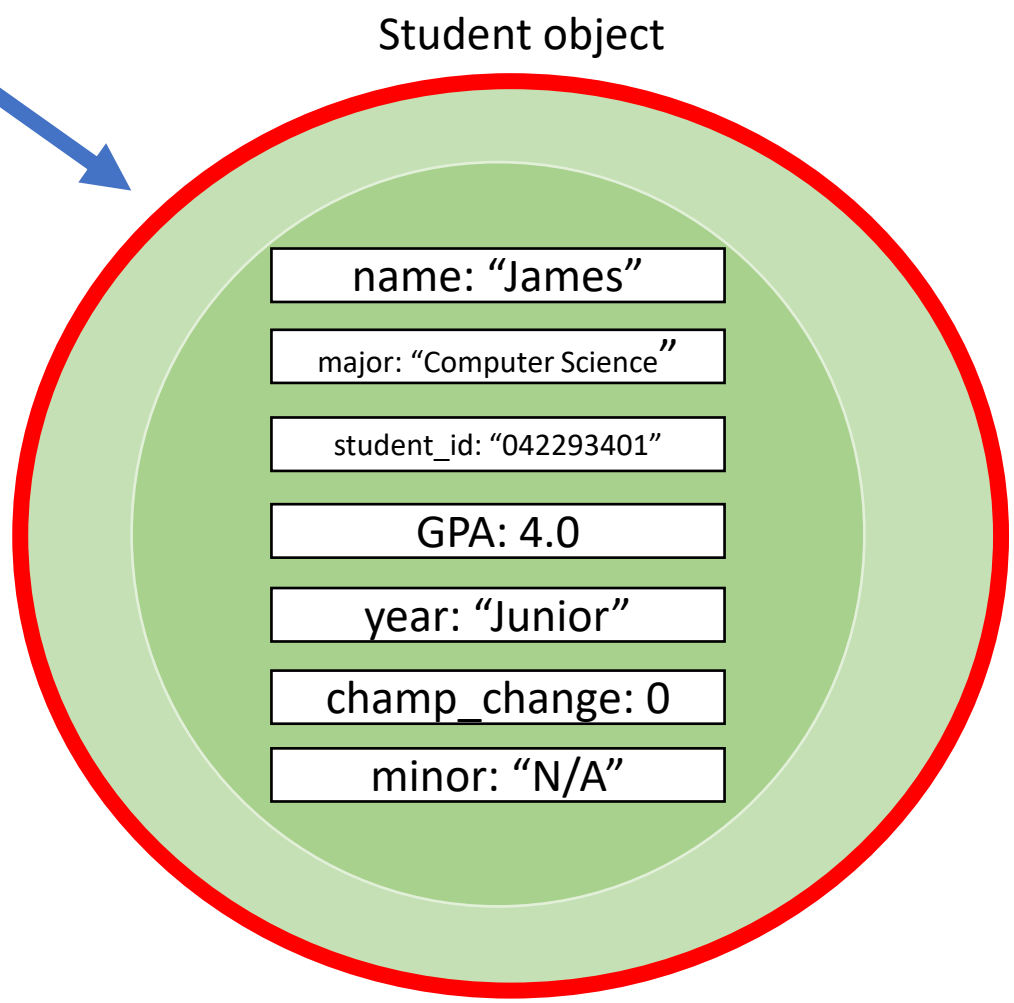

Solution:
Overwrite what gets printed out using the __str__ method

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We start off in our **constructor**

Our objects also have functionality (**methods**)

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print(student1.getName())
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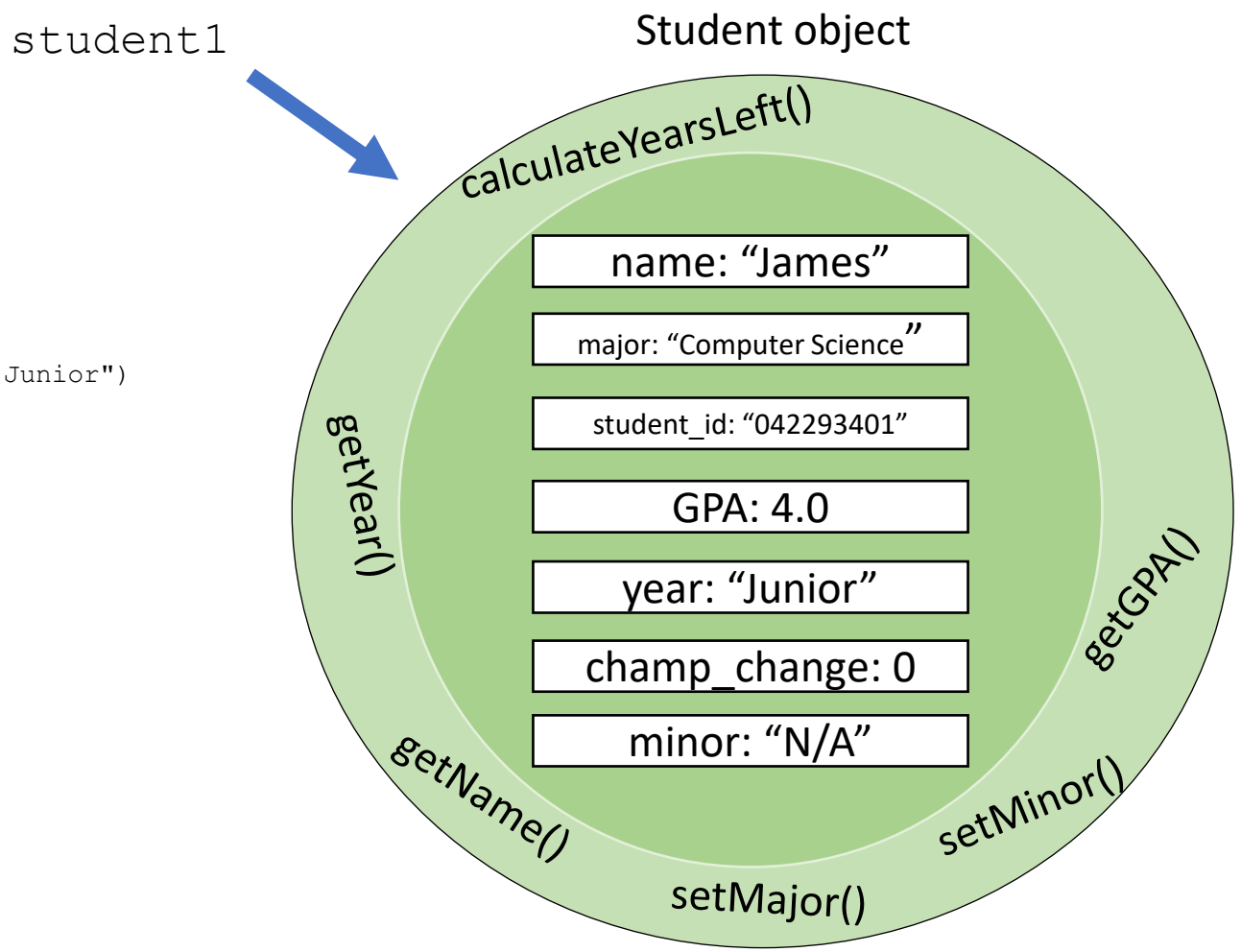

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Writer Methods (set)

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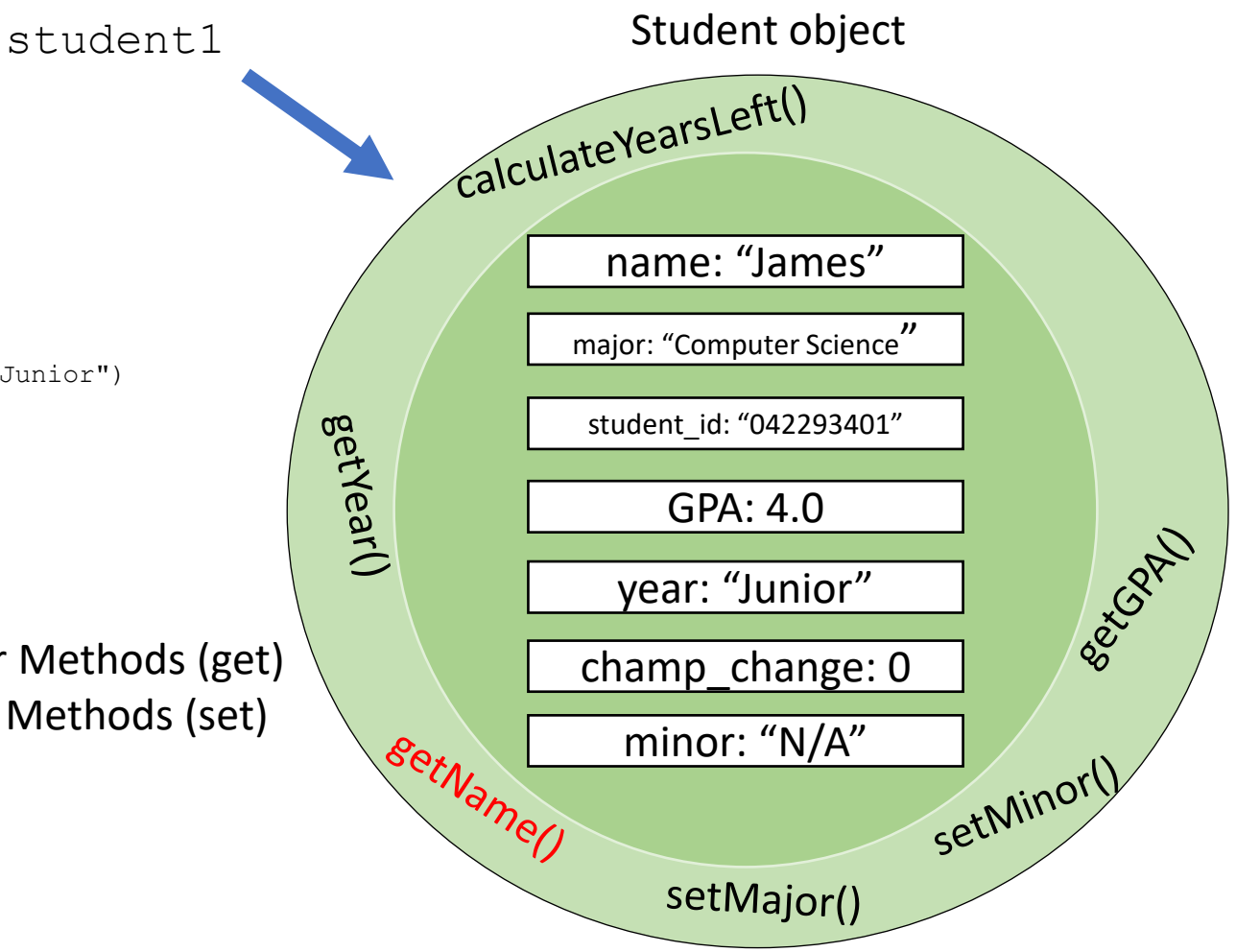

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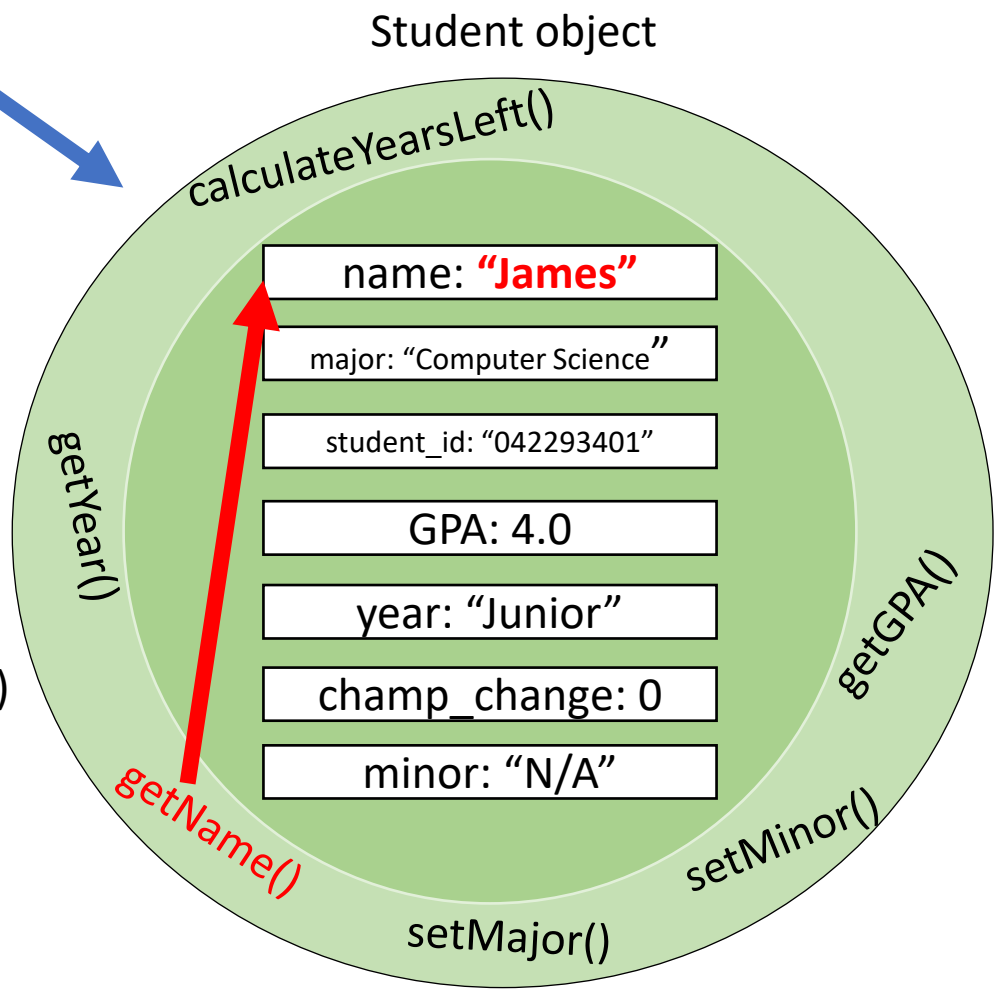

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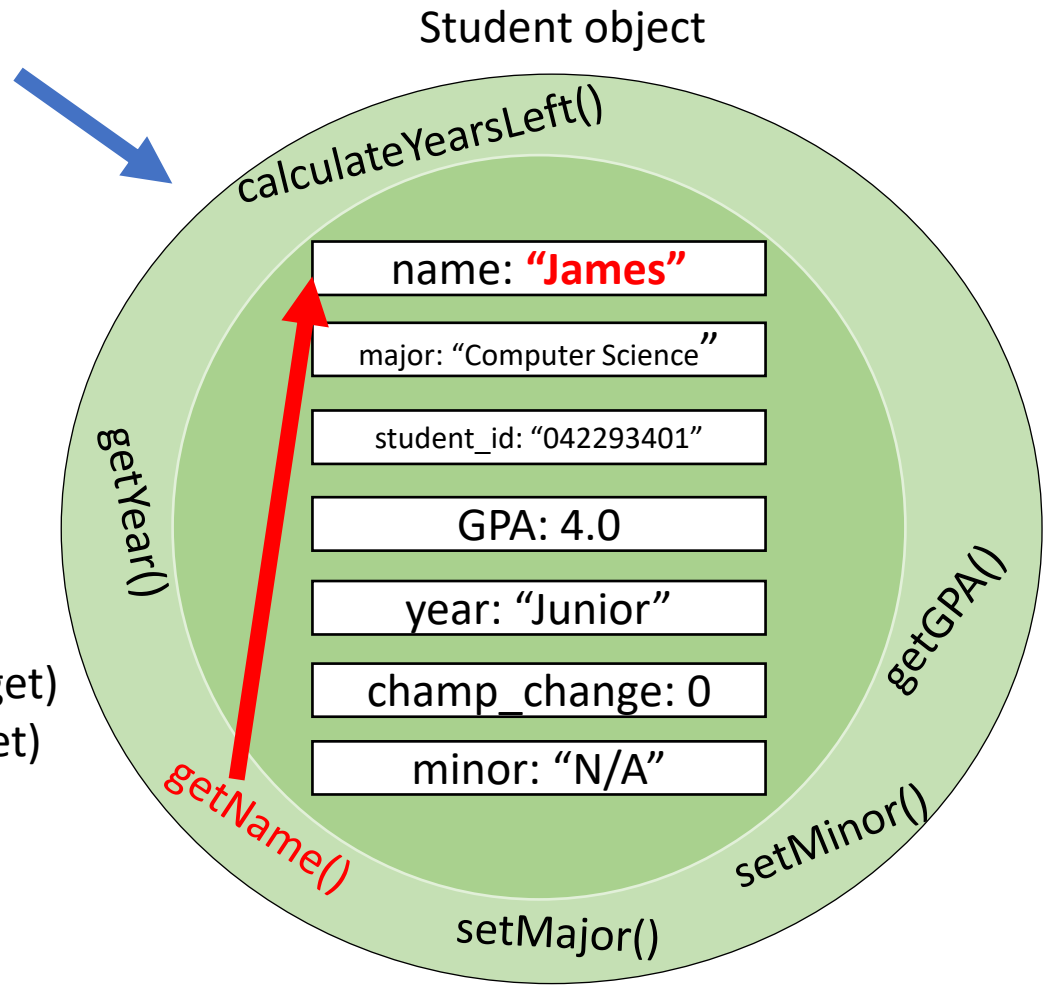
→ James



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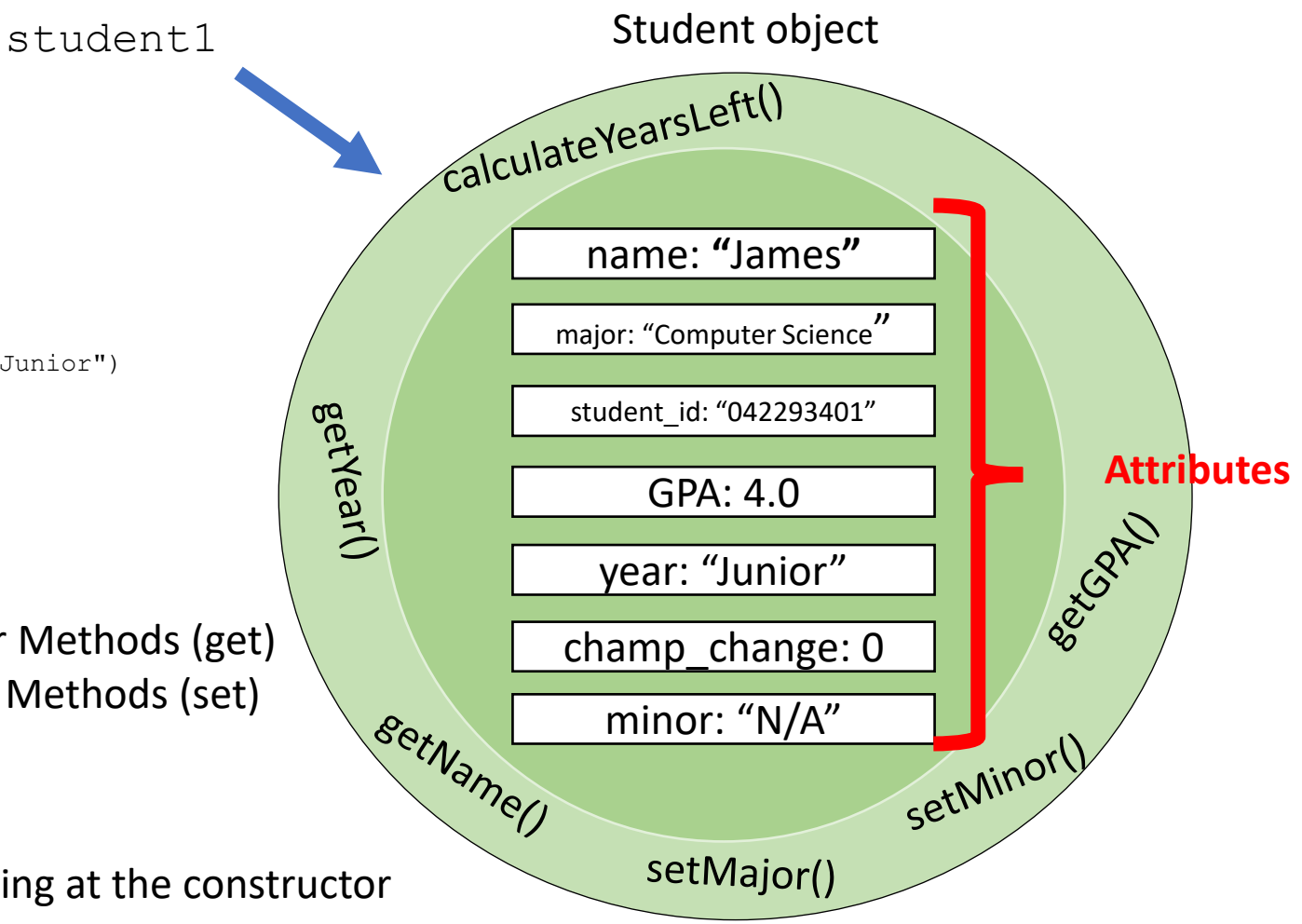

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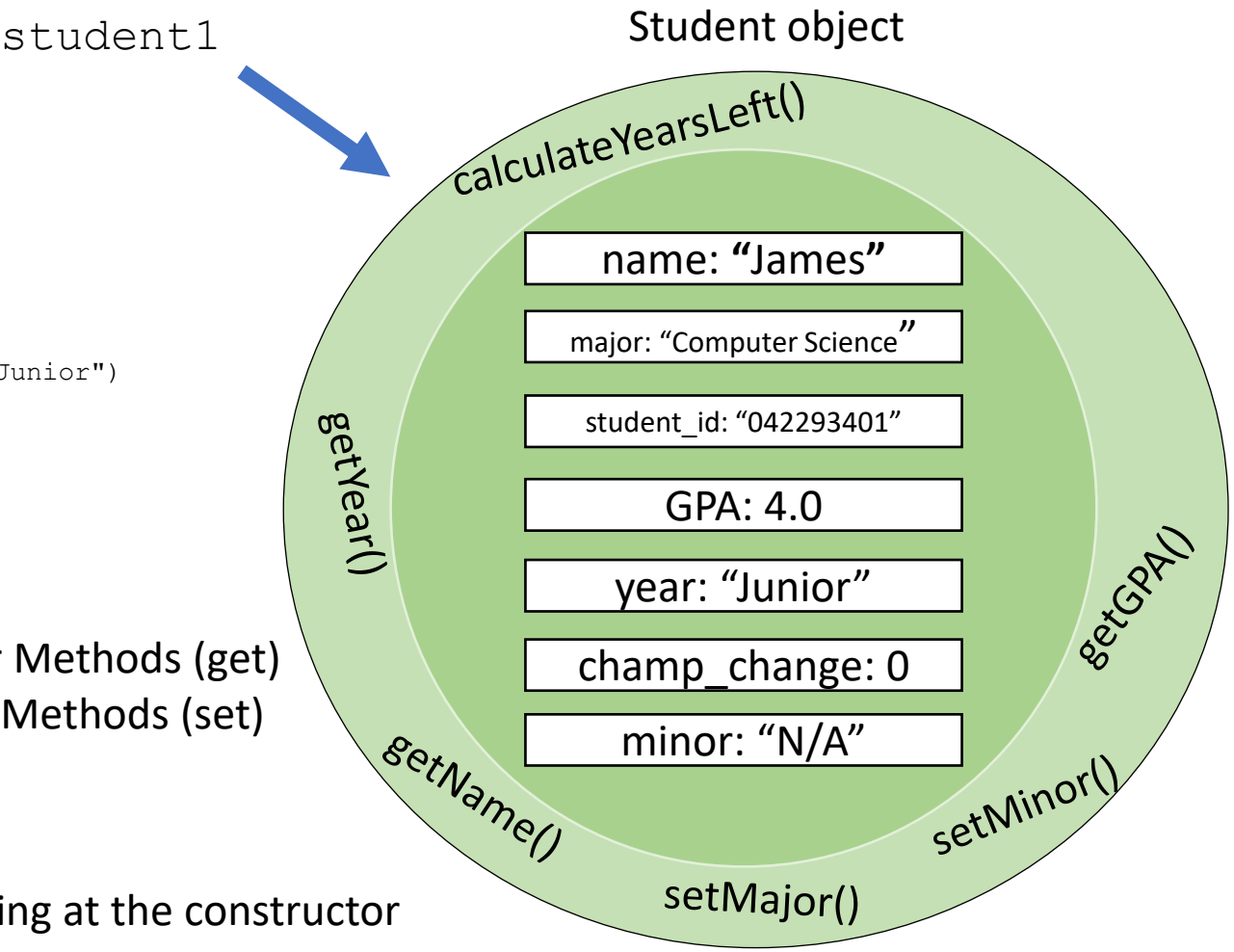

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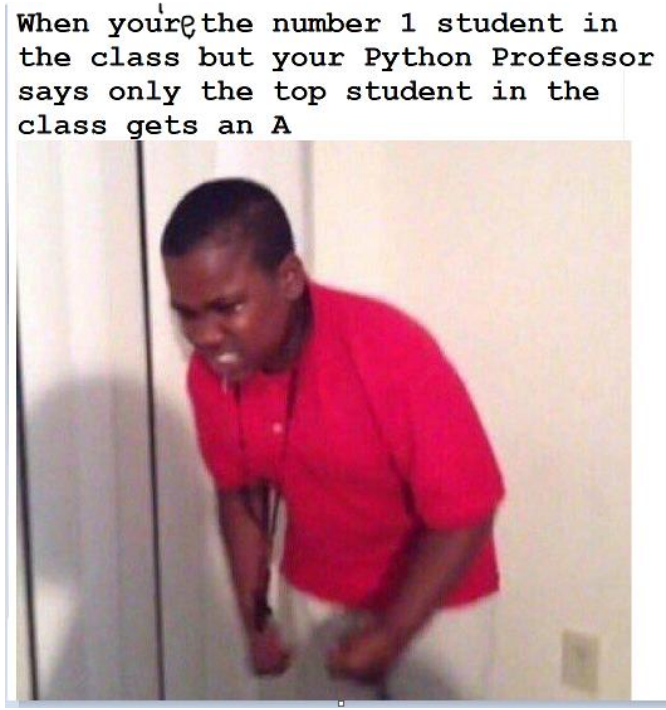

meme made by reese

Today:

More OOP

OOP Example

tbd

OOP Example

Lets create a Python class using billionaires.csv that is going to represent information about Billionaires

Each Billionaire has a

Name
Company Name
Age
Gender
Worth in Billions
Location (Continent)

Lets write some functions that can

- Search for billionaires that make more money than a certain threshold
- Print out proportion of male vs female billionaires
- Print out number of Billionaires based on Continent