Complex Abstractions

Computer Science - Week 4  
Jul 25, 2022 - Version 0.0.1

Please make sure that all members of the group place their UD **email** AND **name** below.

Choose roles following the [instructions here](https://blockpy.cis.udel.edu/assignments/reading/bakery_appendix_pogil).

You should work in groups of 3. If you cannot find 3 group members, then work in groups of 2.

| **Role** | **Name** | **Email** |
| --- | --- | --- |
| **Manager** | Zach Phillips | phillizr@udel.edu |
| **Speaker** | Nathanael Pierre-Louis | nathanpl@udel.edu |
| **Recorder** | Zach Phillips | phillizr@udel.edu |

# 1) Review Dataclasses

Given the following code…

| from dataclasses import dataclass  @dataclass  class Movie:  # The name of a movie  title: str  # An average rating, scale of 1-5, by the group  # excluding those who haven't seen it.  average\_rating: float  # Whether or not everyone in the group has seen  # the movie.  seen\_by\_all: bool |
| --- |

1. Make two instances of the dataclass. Your group will need to choose two movies, determine whether everyone has seen the movie, and have each group member give a rating 1-5 (and calculate their average). Note that not everyone needs to have watched the movie (that affects the values you will pass to the constructor!). Do not assign the instances to a variable; just call the constructor and pass in the appropriate arguments as discussed by your group.

| Movie(“Top Gun: Maverick”, 5.0, False) |
| --- |
| Movie(“Fast and Furious”, 3.8, True) |

# 2) Making Up Data

The Recorder should open up this URL: <https://picsum.photos/300/200>

|  |
| --- |

2. You are going to represent the image above as Python data. Fill in the table below by making up possible properties of the object(s) in the picture via their name, type, and a potential value. You must create at least two of each of the following types: Integer, Float, String, Boolean, and Lists. Be creative and think outside of the box. There are many possible right answers!

| **Name** | **Type** | **Value** |
| --- | --- | --- |
| how\_many\_records\_playing | Integer | 1 |
| How\_many records\_played | Integer | 20 |
| Current\_play\_time\_percent | Float | 55.0 |
| current\_volume\_percent | Float | 50.1 |
| record\_title | String | ”Neat Neat Neat” |
| record\_artist | String | ”The Damned” |
| is\_playing | Boolean | True |
| has\_record | Boolean | True |
| records\_owned | List | [“The Damned”, “The Cure”] |
| records\_wanted | List | [“Rolling Stones”, “Abba”] |

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# 3) Choose Types

For each of the following scenarios, describe at least three different types that could abstract the information. For each type, provide a justification for how that type might be useful in abstracting the given thing. **At least one of the types MUST be a dataclass in each question!** Remember, Dataclass is not a type itself; if you want to represent something with a dataclass, you must provide the dataclass definition instead of just writing “Dataclass”! You must also provide an *instance* of the dataclass as the Example.

3. What three types might you use to represent where a person lives??

| 1st | Type: | string |
| --- | --- | --- |
| Example: | “18 Amstel Ave” |
| Justification: | A string is useful if you want to quickly just show the user a text representation of where they live, and don’t need any details about the address. |
| 2nd | Type: | bool |
| Example: | True |
| Justification: | A bool could be useful to quickly show if a person lives at an address. |
| 3rd | Type: | Coordinates |
| Example: | Coordinates(39.6837, 75.7497) |
| Justification: | Can be used to give latitude and longitude coordinates. |

4. What three types might you use to represent the current time?

| 1st | Type: | int |
| --- | --- | --- |
|  | Example: | 34000 |
|  | Justification: | An integer could represent the number of seconds passed since some arbitrary base time (e.g., midnight). From there, we can easily calculate other things like how many hours into the day we are. |
| 2nd | Type: | float |
|  | Example: | 54.2 |
|  | Justification: | A float could be used to give the percentage of time passed through the day/week/year. |
| 3rd | Type: | Date |
|  | Example: | Date(20,”September”,2022) |
|  | Justification: | This dataclass will give the current date, which could represent the time. |

# 4) Define Dataclasses

A Learning Management System (like Canvas) is responsible for a lot of different things in a course, like showing assignments, tracking grades, and student enrollment. Computer Scientists had to decide how to represent those real-world entities inside of a computer, as Abstractions. Those abstractions often must be dataclasses in order to capture enough information to be useful.

For each of the following things, decide at least four fields you might include to represent the thing in the Learning Management System. You will need to provide the field’s name, its type, and a quick description of what it represents and why that is useful.

5. Describe 4 fields for an AssignmentSubmission dataclass:

| **Name** | **Type** | **Description/Justification** |
| --- | --- | --- |
| file\_name | str | Name of the file |
| is\_submitted | bool | Checks to see if the assignment is submitted |
| who\_submitted | str | Gets the name of the student that submitted. |
| num\_of\_files | int | Some assignments might require more than one file submission. |

6. Describe 4 fields for a StudentGrade dataclass:

| **Name** | **Type** | **Description/Justification** |
| --- | --- | --- |
| student\_name | str | Gets the name of the student submitting. |
| assignment\_grade | float | Gives the grade of the assignment. |
| is\_late | bool | Allows the grade to automatically be reduced if the assignment is late. |
| average\_grade | float | Gives the average of all assignments. |

7. Describe 4 fields for a Course dataclass:

| **Name** | **Type** | **Description/Justification** |
| --- | --- | --- |
| course\_name | str | Gives the name of the course. |
| room\_number | int | Gives the room number. |
| course\_building | str | Gives the name of the building the course is in. |
| description | str | Gives a description of the course. |

# 3) Reflect and Review

Discuss among yourselves: what did you learn from this activity? What was surprising or interesting? If you didn’t learn anything, what do you think we were trying to teach you? How could this activity be improved?

| I learned about all the different variables that could be created from just a picture of an object. I think the assignment was trying to have us explore all the different ways that things can be abstracted from a single object. |
| --- |
| What I learned from this activity was the amount of variables that could be created if we were just more creative and put more thought into it. This broadened and made me think that I could be way more specific within my coding. |
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# Final Submission

When your team is happy with your answers for all the questions, download this file as a Word Document (docx) and upload the file to the appropriate assignment on Canvas.

Only one member of your team needs to submit.