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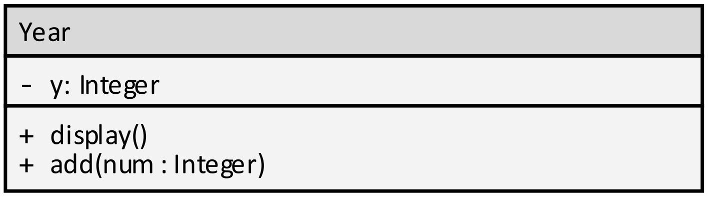
CSE 230 Problem Set 07

Problem 23.1: Year Class

Consider the following class diagram:


Year

- y: Integer

+ display()
+ add(num : Integer)

Consider the following method definitions:

Pseudocode

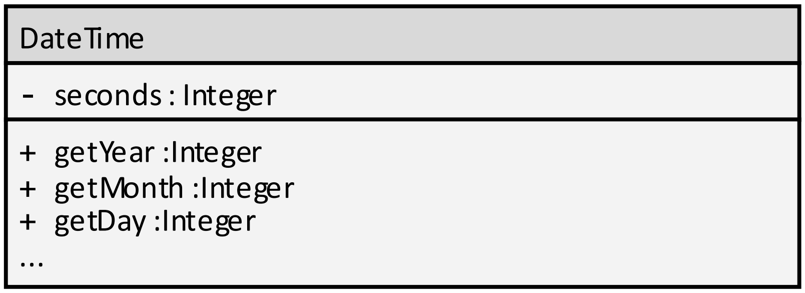
```
Year:: add(num)
   y += num

Year :: display()
   IF year > 0
      PUT year AD
   ELSE
      PUT -year BC
```

Classify the level of abstraction of the following class which stores a year as an int. Justify your answer. Hint: What happens when you subtract 2030 from today’s year?

I consider this to be **Opaque**. It is incredibly straightforward, but it would help to have negative years explained.

Problem 23.2: Date-Time Class

Consider the following class diagram:



The Unix operating system represents time using the POSIX format. Here, time starts on the 1st of January 1970. Time is stored as a 32-bit integer, representing the number of seconds since that date. Classify the level of abstraction of the following class implementing POSIX date/time:

Pseudocode

```
DateTime::getYear
   RETURN seconds / 31,577,600
```

Classify the level of abstraction of the following class and justify your answer. Hint: What happens on the 19th of January 2038?

I classify this level of abstraction as **porous**, because once the user sees that the year resets to 1902, it will be obvious and exploitable how the class works. I would be compelled to tell the user that it only goes up to that year.

Problem 23.3: File Name Class

Consider the following class diagram:

```
FileName
- name: String
- extension: String
- type: FileType

…
+ isGreater(rhs: FileName) : Boolean
…
```

Consider the following method definitions: Note that the `isGreater()` method is used to sort files by their name so they are presented to the user in alphabetical order.

Pseudocode

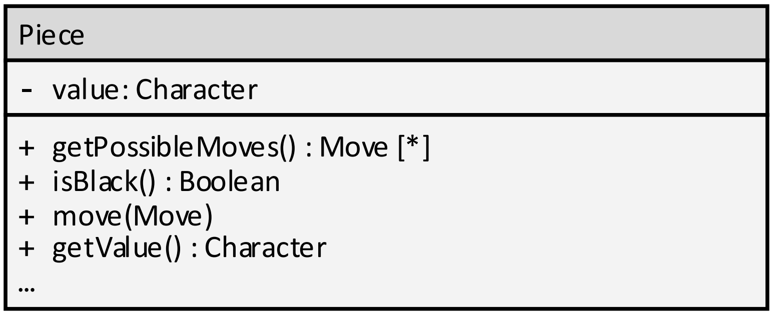
```
FileName :: isGreater(rhs)
   RETURN name > rhs.name
```

Classify the level of abstraction of the following class and justify your answer. Hint: What happens when I try to list “`a.txt`” and “`B.txt`” in the same directory?

I regard this as **Opaque**, as it can still function fine without added knowledge. It just has the quirk of grouping capitalized filenames separately.

Problem 23.4: Chess Piece Class

Consider the following class diagram:



```
Piece
- value: Character
+ getPossibleMoves() : Move [*]
+ isBlack() : Boolean
+ move(Move)
+ getValue() : Character
…
```

Classify the level of abstraction of a class designed to store a chess piece on a chess board. The member variable is a single character where ‘r’ corresponds to a white rook and ‘R’ corresponds to a black one. Note that the `getValue()` method returns the character corresponding to each chess piece.

I mark this as **Complete** because the user can easily find out which piece goes to which color. No help is needed, and no bugs are found.

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Problem 23.5: Angle Class

Classify the level of abstraction of a class that stores an angle. This allows the client to work equally with radians (where 2π is a complete loop around a circle) and degrees (where 360° is a complete loop).

I mark this as **complete**. The user will know when they're using radians or degrees, and the ability to use both means this has short development time, high comprehension, and stability.