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Assignment 3:
Polymorphism

DISCOVERING REQUIREMENTS:

This assignment required to utilize our knowledge of class inheritance and polymorphism in order to create a simple class hierarchy for a fantasy combat game. We were required to create an abstract base "Creature" class to be used to as a pointer to instantiate any of the subclass objects. Since each subclass requires data members to keep track of their type, attack, defense, armor, and strength points we only needed to create one constructor in the base class and use that to instantiate each of the derived class objects. We were asked to create a subclass for the following types of creatures; Medusa, Gollum, Reptile People, Blue Men, and Harry Potter.
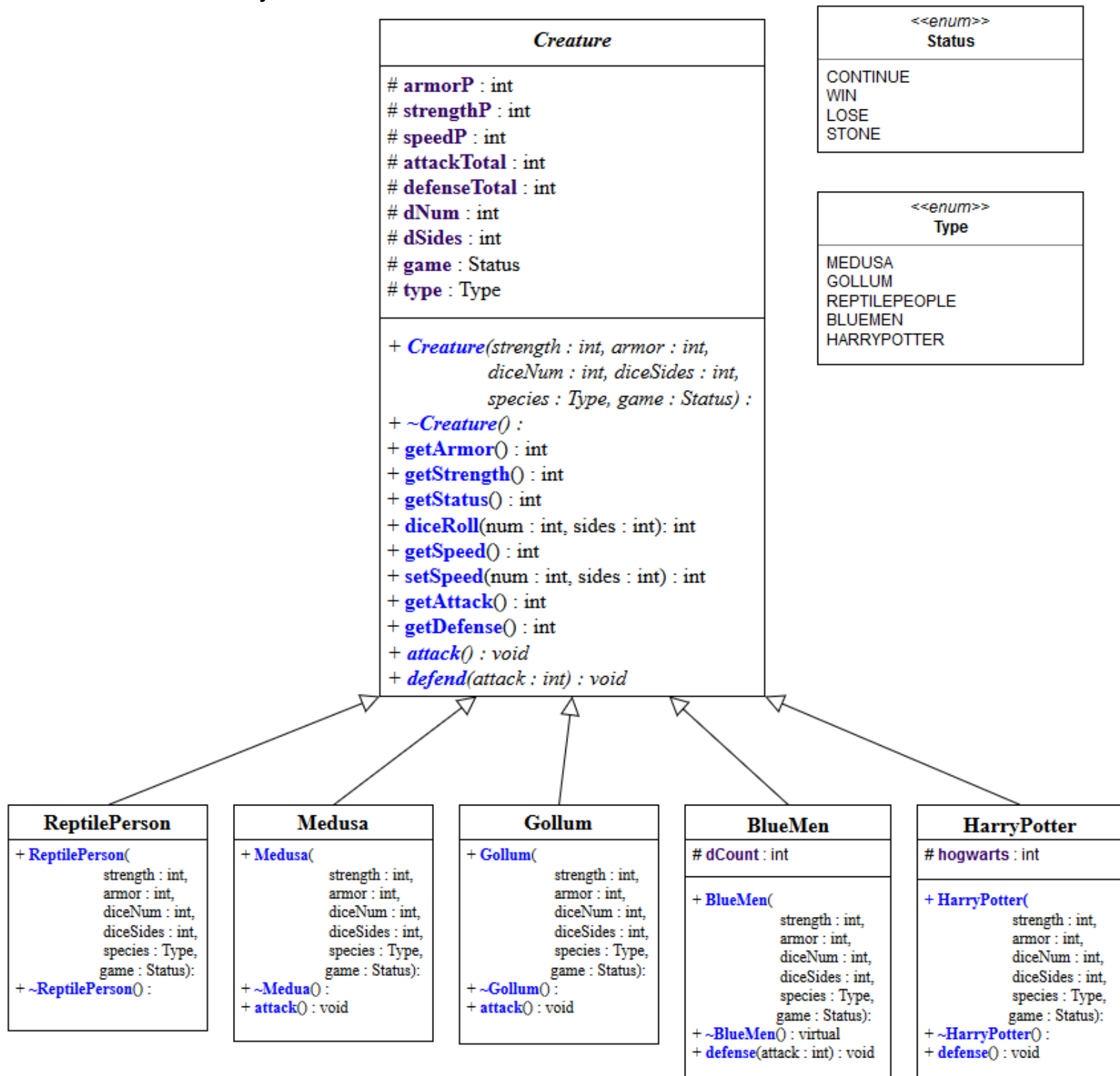
Every class, except for the Reptile People class, also has their own overridden attack or defense functions that allow them to use their special abilities. Medusa has an overridden attack function that makes her turn her enemy into stone if she rolls a 12 and Gollum has an overridden defense function that gives him a 5% chance each turn to activate his ring and triple the amount of dice he rolls for that attack. The Blue Men have their own overridden defense function that causes them to lose one of their initially 3 defensive dice for every 4 strength points they lose. Lastly, Harry Potter has an overridden defense function that will allow him to use the magic of Hogwarts to revive only once after his strength points have been depleted.

DESIGN:

When I initially thought of my design I was able to draw influence from a lot of the projects I have done in both this class and in CS 161. For instance, I knew right from the start the diceRoll() function from lab B would be very useful in implementing this game. I was also able to incorporate enum values to keep track of creature type and game state, which I covered in our tic tac toe game in CS 161 and the Doodlebug assignment from this class. Since I am very well acquainted with turn-based fighting games I decided to model my main program after that, by alternating calls to attack and defense function and checking to see if the character getting attacked survived after each attack.

After determining which classes needed the attack or defense function overridden I was then able to determine what data members would be needed to run the fighting simulator. I ultimately opted to include data members for all of the base stats (attack, defense, type, armor, and strength) along with members that help keep track of attack/defense totals, number of dice to roll, number of sides per die, counters for the overridden defense function in HarryPotter & the BlueMen, as well as the previously mentioned character type and game state enumerated members. After lots of planning I was finally able to draft up my final class hierarchy chart, which is illustrated on the following page.

Class Hierarchy:

Creature

```
# armorP : int
# strengthP : int
# speedP : int
# attackTotal : int
# defenseTotal : int
# dNum : int
# dSides : int
# game : Status
# type : Type
```

```
+ Creature(strength : int, armor : int,
           diceNum : int, diceSides : int,
           species : Type, game : Status) :
+ ~Creature() :
+ getArmor() : int
+ getStrength() : int
+ getStatus() : int
+ diceRoll(num : int, sides : int): int
+ getSpeed() : int
+ setSpeed(num : int, sides : int) : int
+ getAttack() : int
+ getDefense() : int
+ attack() : void
+ defend(attack : int) : void
```

<<enum>> Status

```
CONTINUE
WIN
LOSE
STONE
```

<<enum>> Type

```
MEDUSA
GOLLUM
REPTILEPEOPLE
BLUEMEN
HARRYPOTTER
```

ReptilePerson

```
+ ReptilePerson(
         strength : int,
         armor : int,
         diceNum : int,
         diceSides : int,
         species : Type,
         game : Status):
+ ~ReptilePerson() :
```

Medusa

```
+ Medusa(
         strength : int,
         armor : int,
         diceNum : int,
         diceSides : int,
         species : Type,
         game : Status):
+ ~Medua() :
+ attack() : void
```

Gollum

```
+ Gollum(
         strength : int,
         armor : int,
         diceNum : int,
         diceSides : int,
         species : Type,
         game : Status):
+ ~Gollum() :
+ attack() : void
```

BlueMen

```
# dCount : int
```

```
+ BlueMen(
         strength : int,
         armor : int,
         diceNum : int,
         diceSides : int,
         species : Type,
         game : Status):
+ ~BlueMen() : virtual
+ defense(attack : int) : void
```

HarryPotter

```
# hogwarts : int
```

```
+ HarryPotter(
         strength : int,
         armor : int,
         diceNum : int,
         diceSides : int,
         species : Type,
         game : Status):
+ ~HarryPotter() :
+ defense() : void
```

TESTING:

After much deliberation I decided to model the main, "tester" function similar to a turn-based role-playing game. This meant that I would use a die roll to set the "speed" for each creature in the arena. I would then look at the speed value for each creature and re-

roll until each creature had a unique speed value. The creature with the fastest speed value would then attack first. Each round of combat is fairly simple, the faster creature attacks first, the slower creature defends, the program checks the status of each creature, if they are both alive the program then lets the next creature attack first. If a creature dies after being attacked, the fighting loop ends and the results of that match are displayed. Due to the logic used in the fighting loop it was not feasible to have a draw, so the game states available are CONTINUE, WIN, LOSE, and STONE, with STONE being the special state that occurs after looking into the eyes of Medusa.

In order to keep track of how each subclass was behaving during runtime I had the results of each round displayed after each turn. Each result listed the values each player rolled for attack and defense, as well as the damage received by each player after their shield was applied, and their total strength points remaining at the end of each round. By looking at each creatures attack total, defense total, damage taken, and remaining strength points I believe I will be able to adequately test my program and find any errors with the members or objects within the class hierarchy.

As per the assignment guidelines, the first classes I implemented for testing were the base Creature class and the ReptilePeople class (which has no overridden attack/defense functions). After testing to ensure that the ReptilePeople subclass was working correctly I then implemented the overridden functions for the other four subclasses and made sure to conduct a fight between every different subclass, as well as test every creature against themselves, which would increase the likelihood of an attack or defense bonus occurring.

TEST PLAN:

Creature Type	Reptile Person	Medusa	Gollum	BlueMen	HarryPotter
Reptile Person	Reptile Person vs Reptile Person	Reptile Person vs Medusa	Reptile Person vs Gollum	Reptile Person vs BlueMen	Reptile Person vs HarryPotter
Medusa		Medusa vs Medusa	Medusa vs Gollum	Medusa vs BlueMen	Medusa vs HarryPotter
Gollum			Gollum vs Gollum	Gollum vs BlueMen	Gollum vs HarryPotter
BlueMen				BlueMen vs BlueMen	BlueMen vs HarryPotter
HarryPotter					HarryPotter vs HarryPotter

TEST RESULTS:

For this section I will display the final results of each battle, and any rounds in which driver functions were called to demonstrate their behavior. For my first test I simulated a battle between two Reptile People, for this test I will show the entire program's output, just as an example. For consequential tests I will just display the second to last round, final round, final results, and any rounds where an overridden attack or defense function was used has the bonus activator messages highlighted.

1) **ReptilePerson vs. Reptile Person**
   Welcome to the Fantasy Arena!

   Please choose from the following characters:
   1 - Reptile People
   2 - Medusa
   3 - Gollum
   4 - Blue Men
   5 - Harry Potter
   Player 1: 1
   Player 2: 1

   Rolling to see who goes first...
   Player 1's Reptile Person rolled a(n) 2
   Player 2's Reptile Person rolled a(n) 7

   Player 2's Reptile Person attacks first.

   Press ENTER to start the battle!

   _____ROUND 1 RESULTS_____

   Player 2: Attack = 10
   Player 1: Defense = 4
   Player 1: Damage Taken = 0

   Player 1: Attack = 17
   Player 2: Defense = 5
   Player 2: Damage Taken = 5

   Player 1's Reptile Person
   Strength Points = 18

   Player 2's Reptile Person
   Strength Points = 13
   _____

   Press ENTER to continue the fight!

_____ROUND 2 RESULTS_____

Player 2: Attack = 12
Player 1: Defense = 6
Player 1: Damage Taken = 0

Player 1: Attack = 10
Player 2: Defense = 6
Player 2: Damage Taken = 0

Player 1's Reptile Person
Strength Points = 18

Player 2's Reptile Person
Strength Points = 13
_____

Press ENTER to continue the fight!

_____ROUND 3 RESULTS_____

Player 2: Attack = 7
Player 1: Defense = 1
Player 1: Damage Taken = 0

Player 1: Attack = 7
Player 2: Defense = 2
Player 2: Damage Taken = 0

Player 1's Reptile Person
Strength Points = 18

Player 2's Reptile Person
Strength Points = 13
_____

Press ENTER to continue the fight!

_____ROUND 4 RESULTS_____

Player 2: Attack = 15
Player 1: Defense = 3
Player 1: Damage Taken = 5

Player 1: Attack = 15

Player 2: Defense = 5
Player 2: Damage Taken = 3

Player 1's Reptile Person
Strength Points = 13

Player 2's Reptile Person
Strength Points = 10
_____

Press ENTER to continue the fight!

_____ROUND 5 RESULTS_____

Player 2: Attack = 7
Player 1: Defense = 6
Player 1: Damage Taken = 0

Player 1: Attack = 17
Player 2: Defense = 4
Player 2: Damage Taken = 6

Player 1's Reptile Person
Strength Points = 13

Player 2's Reptile Person
Strength Points = 4
_____

Press ENTER to continue the fight!

_____FINAL_ROUND_____

Player 2: Attack = 11
Player 1: Defense = 4
Player 1: Damage Taken = 0

Player 1: Attack = 14
Player 2: Defense = 2
Player 2: Damage Taken = 5

Player 1's Reptile Person
Strength Points = 13

Player 2's Reptile Person

Strength Points = 0
_____

Press ENTER to view final results!

_____FINAL_RESULTS_____

Player 1's Reptile Person has defeated
Player 2's Reptile Person in 6 turns!

Player 1: Reptile Person
Strength Points = 13
Status = Victor!

Player 2: Reptile Person
Strength Points = 0
Status = Defeated
_____

2) **ReptilePerson vs Medusa**
        _____ROUND 1 RESULTS_____

Player 1: Attack = 12
Player 2: Defense = 2
Player 2: Damage Taken = 7

Player 2: Attack = 4
Player 1: Defense = 2
Player 1: Damage Taken = 0

Player 1's Reptile Person
Strength Points = 18

Player 2's Medusa
Strength Points = 1
_____

Press ENTER to continue the fight!

_____FINAL_ROUND_____

Player 1: Attack = 9
Player 2: Defense = 4
Player 2: Damage Taken = 2

Player 2: Attack = 4
Player 1: Defense = 2
Player 1: Damage Taken = 0

Player 1's Reptile Person
Strength Points = 18

Player 2's Medusa
Strength Points = 0
_____

Press ENTER to view final results!

_____FINAL_RESULTS_____

Player 1's Reptile Person has defeated
Player 2's Medusa in 2 turns!

Player 1: Reptile Person
Strength Points = 18
Status = Victor!

Player 2: Medusa
Strength Points = 0
Status = Defeated
_____

3) **ReptilePerson vs Gollum**
_____ROUND 1 RESULTS_____

Player 2: Attack = 5
Player 1: Defense = 1
Player 1: Damage Taken = 0

Player 1: Attack = 14
Player 2: Defense = 6
Player 2: Damage Taken = 5

Player 1's Reptile Person
Strength Points = 18

Player 2's Gollum
Strength Points = 3
_____

Press ENTER to continue the fight!

_____FINAL_ROUND_____

Player 2: Attack = 2
Player 1: Defense = 4
Player 1: Damage Taken = 0

Player 1: Attack = 12
Player 2: Defense = 1
Player 2: Damage Taken = 8

Player 1's Reptile Person
Strength Points = 18

Player 2's Gollum
Strength Points = 0
_____

Press ENTER to view final results!

_____FINAL_RESULTS_____

Player 1's Reptile Person has defeated
Player 2's Gollum in 2 turns!

Player 1: Reptile Person
Strength Points = 18
Status = Victor!

Player 2: Gollum
Strength Points = 0
Status = Defeated
_____

4) ReptilePerson vs BlueMen
        _____ROUND 1 RESULTS_____

Player 2: Attack = 10
Player 1: Defense = 3
Player 1: Damage Taken = 0

Player 1: Attack = 13
Player 2: Defense = 7
Player 2: Damage Taken = 3

Player 1's Reptile Person
Strength Points = 18

Player 2's Blue Men
Strength Points = 9
_____

Press ENTER to continue the fight!

_____ROUND 2 RESULTS_____

Player 2: Attack = 13
Player 1: Defense = 6
Player 1: Damage Taken = 0

Player 1: Attack = 13
Player 2: Defense = 6
Player 2: Damage Taken = 4

Player 1's Reptile Person
Strength Points = 18

Player 2's Blue Men
Strength Points = 5
_____

Press ENTER to continue the fight!

You've weakened the Blue Men's defense...

Press ENTER to continue the fight!

_____ROUND 3 RESULTS_____

Player 2: Attack = 15
Player 1: Defense = 5
Player 1: Damage Taken = 3

Player 1: Attack = 14
Player 2: Defense = 7
Player 2: Damage Taken = 4

Player 1's Reptile Person
Strength Points = 15

Player 2's Blue Men

Strength Points = 1
_____

Press ENTER to continue the fight!

<mark>You've further weakened the Blue Men's defense...</mark>

Press ENTER to continue the fight!

_____FINAL_ROUND_____

Player 2: Attack = 9
Player 1: Defense = 4
Player 1: Damage Taken = 0

Player 1: Attack = 12
Player 2: Defense = 1
Player 2: Damage Taken = 8

Player 1's Reptile Person
Strength Points = 15

Player 2's Blue Men
Strength Points = 0
_____

Press ENTER to view final results!

_____FINAL_RESULTS_____

Player 1's Reptile Person has defeated
Player 2's Blue Men in 4 turns!

Player 1: Reptile Person
Strength Points = 15
Status = Victor!

Player 2: Blue Men
Strength Points = 0
Status = Defeated
_____

5) ReptilePerson vs HarryPotter

_____ROUND 3 RESULTS_____

Player 2: Attack = 5
Player 1: Defense = 5
Player 1: Damage Taken = 0

Player 1: Attack = 12
Player 2: Defense = 7
Player 2: Damage Taken = 5

Player 1's Reptile Person
Strength Points = 18

Player 2's Harry Potter
Strength Points = 2

_____

Press ENTER to continue the fight!

By Hagrid's beard that was close!

Hogwarts can only revive you once,
so you're on your own now...

Press ENTER to continue the battle!

_____ROUND 4 RESULTS_____

Player 2: Attack = 7
Player 1: Defense = 6
Player 1: Damage Taken = 0

Player 1: Attack = 9
Player 2: Defense = 7
Player 2: Damage Taken = 2

Player 1's Reptile Person
Strength Points = 18

Player 2's Harry Potter
Strength Points = 10

_____

Press ENTER to continue the fight!

_____ROUND 5 RESULTS_____

Player 2: Attack = 7
Player 1: Defense = 5
Player 1: Damage Taken = 0

Player 1: Attack = 12
Player 2: Defense = 7
Player 2: Damage Taken = 5

Player 1's Reptile Person
Strength Points = 18

Player 2's Harry Potter
Strength Points = 5
_____

Press ENTER to continue the fight!

_____ROUND 6 RESULTS_____

Player 2: Attack = 8
Player 1: Defense = 2
Player 1: Damage Taken = 0

Player 1: Attack = 9
Player 2: Defense = 8
Player 2: Damage Taken = 1

Player 1's Reptile Person
Strength Points = 18

Player 2's Harry Potter
Strength Points = 4
_____

Press ENTER to continue the fight!

_____FINAL_ROUND_____

Player 2: Attack = 9
Player 1: Defense = 5
Player 1: Damage Taken = 0

Player 1: Attack = 12
Player 2: Defense = 7
Player 2: Damage Taken = 5

Player 1's Reptile Person
Strength Points = 18

Player 2's Harry Potter
Strength Points = 0
_____

Press ENTER to view final results!

_____FINAL_RESULTS_____

Player 1's Reptile Person has defeated
Player 2's Harry Potter in 7 turns!

Player 1: Reptile Person
Strength Points = 18
Status = Victor!

Player 2: Harry Potter
Strength Points = 0
Status = Defeated
_____

6) **Medusa vs. Medusa**

_____ROUND 2 RESULTS_____

Player 1: Attack = 9
Player 2: Defense = 6
Player 2: Damage Taken = 0

Player 2: Attack = 7
Player 1: Defense = 1
Player 1: Damage Taken = 3

Player 1's Medusa
Strength Points = 2

Player 2's Medusa
Strength Points = 8

_____

Press ENTER to continue the fight!

<mark>The opposing player has gazed into the eyes of Medusa...</mark>

Press ENTER to continue the battle!

_____FINAL_ROUND_____

Player 1: Attack = 1000
Player 2: Defense = 6
Player 2: Damage Taken = 0

Player 2: Attack = 7
Player 1: Defense = 1
Player 1: Damage Taken = 3

Player 1's Medusa
Strength Points = 2

Player 2's Medusa
Strength Points = 8
_____

Press ENTER to view final results!

_____FINAL_RESULTS_____

Player 1's Medusa has defeated
Player 2's Medusa in 3 turns!

Player 1: Medusa
Strength Points = 2
Status = Victor!

Player 2: Medusa
Strength Points = 8
Status = Statue...

_____

7) Medusa vs. Gollum

_____ROUND 2 RESULTS_____

Player 1: Attack = 4
Player 2: Defense = 6
Player 2: Damage Taken = 0

Player 2: Attack = 2
Player 1: Defense = 2
Player 1: Damage Taken = 0

Player 1's Medusa
Strength Points = 8

Player 2's Gollum
Strength Points = 2
_____

Press ENTER to continue the fight!

_____FINAL_ROUND_____

Player 1: Attack = 8
Player 2: Defense = 2
Player 2: Damage Taken = 3

Player 2: Attack = 2
Player 1: Defense = 2
Player 1: Damage Taken = 0

Player 1's Medusa
Strength Points = 8

Player 2's Gollum
Strength Points = 0
_____

Press ENTER to view final results!

_____FINAL_RESULTS_____

Player 1's Medusa has defeated
Player 2's Gollum in 3 turns!

Player 1: Medusa
Strength Points = 8
Status = Victor!

Player 2: Gollum
Strength Points = 0
Status = Defeated
_____

8) **Medusa vs. BlueMen**

_____ROUND 1 RESULTS_____

Player 1: Attack = 2
Player 2: Defense = 10
Player 2: Damage Taken = 0

Player 2: Attack = 14
Player 1: Defense = 4
Player 1: Damage Taken = 7

Player 1's Medusa
Strength Points = 1

Player 2's Blue Men
Strength Points = 12
_____

Press ENTER to continue the fight!

_____FINAL_ROUND_____

Player 1: Attack = 8
Player 2: Defense = 5
Player 2: Damage Taken = 0

Player 2: Attack = 15
Player 1: Defense = 4
Player 1: Damage Taken = 8

Player 1's Medusa
Strength Points = 0

Player 2's Blue Men
Strength Points = 12

_____

Press ENTER to view final results!

_____FINAL_RESULTS_____

Player 2's Blue Men has defeated
Player 1's Medusa in 2 turns!

Player 1: Medusa
Strength Points = 0
Status = Defeated

Player 2: Blue Men
Strength Points = 12
Status = Victor!

_____

9) Medusa vs. HarryPotter

_____ROUND 2 RESULTS_____

Player 1: Attack = 11
Player 2: Defense = 6
Player 2: Damage Taken = 5

Player 2: Attack = 9
Player 1: Defense = 3
Player 1: Damage Taken = 3

Player 1's Medusa
Strength Points = 5

Player 2's Harry Potter
Strength Points = 3

_____

Press ENTER to continue the fight!

By Hagrid's beard that was close!

Hogwarts can only revive you once,
so you're on your own now...

Press ENTER to continue the battle!

_____ROUND 3 RESULTS_____

Player 1: Attack = 7
Player 2: Defense = 2
Player 2: Damage Taken = 5

Player 2: Attack = 9
Player 1: Defense = 3
Player 1: Damage Taken = 3

Player 1's Medusa
Strength Points = 2

Player 2's Harry Potter
Strength Points = 10
_____

Press ENTER to continue the fight!

_____ROUND 4 RESULTS_____

Player 1: Attack = 10
Player 2: Defense = 4
Player 2: Damage Taken = 6

Player 2: Attack = 3
Player 1: Defense = 6
Player 1: Damage Taken = 0

Player 1's Medusa
Strength Points = 2

Player 2's Harry Potter
Strength Points = 4
_____

Press ENTER to continue the fight!

_____FINAL_ROUND_____

Player 1: Attack = 5
Player 2: Defense = 8
Player 2: Damage Taken = 0

Player 2: Attack = 9
Player 1: Defense = 2

Player 1: Damage Taken = 4

Player 1's Medusa
Strength Points = 0

Player 2's Harry Potter
Strength Points = 4
_____

Press ENTER to view final results!

_____FINAL_RESULTS_____

Player 2's Harry Potter has defeated
Player 1's Medusa in 5 turns!

Player 1: Medusa
Strength Points = 0
Status = Defeated

Player 2: Harry Potter
Strength Points = 4
Status = Victor!
_____

10) Gollum vs. Gollum
_____ROUND 18 RESULTS_____

Player 1: Attack = 2
Player 2: Defense = 5
Player 2: Damage Taken = 0

Player 2: Attack = 1
Player 1: Defense = 4
Player 1: Damage Taken = 0

Player 1's Gollum
Strength Points = 6

Player 2's Gollum
Strength Points = 3
_____

Press ENTER to continue the fight!

Press ENTER to continue the battle!

_____FINAL_ROUND_____

Player 1: Attack = 11
Player 2: Defense = 5
Player 2: Damage Taken = 3

Player 2: Attack = 1
Player 1: Defense = 4
Player 1: Damage Taken = 0

Player 1's Gollum
Strength Points = 6

Player 2's Gollum
Strength Points = 0
_____

Press ENTER to view final results!

_____FINAL_RESULTS_____

Player 1's Gollum has defeated
Player 2's Gollum in 19 turns!

Player 1: Gollum
Strength Points = 6
Status = Victor!

Player 2: Gollum
Strength Points = 0
Status = Defeated
_____

11) Gollum vs. BlueMen

_____FINAL_ROUND_____

Player 2: Attack = 20
Player 1: Defense = 2
Player 1: Damage Taken = 15

Player 1: Attack = 2
Player 2: Defense = 9
Player 2: Damage Taken = 0

Player 1's Gollum
Strength Points = 0

Player 2's Blue Men
Strength Points = 12
_____

Press ENTER to view final results!

_____FINAL_RESULTS_____

Player 2's Blue Men has defeated
Player 1's Gollum in 1 turns!

Player 1: Gollum
Strength Points = 0
Status = Defeated

Player 2: Blue Men
Strength Points = 12
Status = Victor!
_____

12) Gollum vs. HarryPotter

_____ROUND 6 RESULTS_____

Player 2: Attack = 7
Player 1: Defense = 3
Player 1: Damage Taken = 1

Player 1: Attack = 6

Player 2: Defense = 8
Player 2: Damage Taken = 0

Player 1's Gollum
Strength Points = 3

Player 2's Harry Potter
Strength Points = 10
_____

Press ENTER to continue the fight!

_____FINAL_ROUND_____

Player 2: Attack = 11
Player 1: Defense = 2
Player 1: Damage Taken = 6

Player 1: Attack = 6
Player 2: Defense = 8
Player 2: Damage Taken = 0

Player 1's Gollum
Strength Points = 0

Player 2's Harry Potter
Strength Points = 10
_____

Press ENTER to view final results!

_____FINAL_RESULTS_____

Player 2's Harry Potter has defeated
Player 1's Gollum in 7 turns!

Player 1: Gollum
Strength Points = 0
Status = Defeated

Player 2: Harry Potter
Strength Points = 10
Status = Victor!
_____

13) BlueMen vs. BlueMen

_____ROUND 5 RESULTS_____

Player 1: Attack = 3
Player 2: Defense = 10
Player 2: Damage Taken = 0

Player 2: Attack = 15
Player 1: Defense = 11
Player 1: Damage Taken = 1

Player 1's Blue Men
Strength Points = 10

Player 2's Blue Men
Strength Points = 11
_____

Press ENTER to continue the fight!

<mark>You've weakened the Blue Men's defense...</mark>

Press ENTER to continue the fight!

<mark>You've further weakened the Blue Men's defense...</mark>

Press ENTER to continue the fight!

_____FINAL_ROUND_____

Player 1: Attack = 17
Player 2: Defense = 3
Player 2: Damage Taken = 11

Player 2: Attack = 15
Player 1: Defense = 11
Player 1: Damage Taken = 1

Player 1's Blue Men
Strength Points = 10

Player 2's Blue Men
Strength Points = 0

_____

Press ENTER to view final results!

_____FINAL_RESULTS_____

Player 1's Blue Men has defeated
Player 2's Blue Men in 6 turns!

Player 1: Blue Men
Strength Points = 10
Status = Victor!

Player 2: Blue Men
Strength Points = 0
Status = Defeated
_____

14) BlueMen vs. HarryPotter

_____ROUND 1 RESULTS_____

Player 1: Attack = 7
Player 2: Defense = 10
Player 2: Damage Taken = 0

Player 2: Attack = 11
Player 1: Defense = 9
Player 1: Damage Taken = 0

Player 1's Blue Men
Strength Points = 12

Player 2's Harry Potter
Strength Points = 10
_____

Press ENTER to continue the fight!

<mark>By Hagrid's beard that was close!</mark>

<mark>Hogwarts can only revive you once,
so you're on your own now...</mark>

Press ENTER to continue the battle!

_____ROUND 2 RESULTS_____

Player 1: Attack = 16
Player 2: Defense = 5
Player 2: Damage Taken = 11

Player 2: Attack = 6
Player 1: Defense = 14
Player 1: Damage Taken = 0

Player 1's Blue Men
Strength Points = 12

Player 2's Harry Potter
Strength Points = 10
_____

Press ENTER to continue the fight!

_____ROUND 3 RESULTS_____

Player 1: Attack = 16
Player 2: Defense = 10
Player 2: Damage Taken = 6

Player 2: Attack = 9
Player 1: Defense = 7
Player 1: Damage Taken = 0

Player 1's Blue Men
Strength Points = 12

Player 2's Harry Potter
Strength Points = 4
_____

Press ENTER to continue the fight!

_____ROUND 4 RESULTS_____

Player 1: Attack = 9
Player 2: Defense = 7
Player 2: Damage Taken = 2

Player 2: Attack = 5

Player 1: Defense = 7
Player 1: Damage Taken = 0

Player 1's Blue Men
Strength Points = 12

Player 2's Harry Potter
Strength Points = 2
_____

Press ENTER to continue the fight!

_____FINAL_ROUND_____

Player 1: Attack = 16
Player 2: Defense = 11
Player 2: Damage Taken = 5

Player 2: Attack = 5
Player 1: Defense = 7
Player 1: Damage Taken = 0

Player 1's Blue Men
Strength Points = 12

Player 2's Harry Potter
Strength Points = 0
_____

Press ENTER to view final results!

_____FINAL_RESULTS_____

Player 1's Blue Men has defeated
Player 2's Harry Potter in 5 turns!

Player 1: Blue Men
Strength Points = 12
Status = Victor!

Player 2: Harry Potter
Strength Points = 0
Status = Defeated
_____

15) HarryPotter vs. HarryPotter

_____ROUND 5 RESULTS_____

Player 2: Attack = 10
Player 1: Defense = 9
Player 1: Damage Taken = 1

Player 1: Attack = 10
Player 2: Defense = 3
Player 2: Damage Taken = 7

Player 1's Harry Potter
Strength Points = 3

Player 2's Harry Potter
Strength Points = 3
_____

Press ENTER to continue the fight!

By Hagrid's beard that was close!

Hogwarts can only revive you once,
so you're on your own now...

Press ENTER to continue the battle!

_____ROUND 6 RESULTS_____

Player 2: Attack = 11
Player 1: Defense = 4
Player 1: Damage Taken = 7

Player 1: Attack = 11
Player 2: Defense = 9
Player 2: Damage Taken = 2

Player 1's Harry Potter
Strength Points = 10

Player 2's Harry Potter
Strength Points = 1
_____

Press ENTER to continue the fight!

_____ROUND 7 RESULTS_____

Player 2: Attack = 6
Player 1: Defense = 2
Player 1: Damage Taken = 4

Player 1: Attack = 6
Player 2: Defense = 9
Player 2: Damage Taken = 0

Player 1's Harry Potter
Strength Points = 6

Player 2's Harry Potter
Strength Points = 1
_____

Press ENTER to continue the fight!

_____FINAL_ROUND_____

Player 2: Attack = 4
Player 1: Defense = 8
Player 1: Damage Taken = 0

Player 1: Attack = 7
Player 2: Defense = 6
Player 2: Damage Taken = 1

Player 1's Harry Potter
Strength Points = 6

Player 2's Harry Potter
Strength Points = 0
_____

Press ENTER to view final results!

_____FINAL_RESULTS_____

Player 1's Harry Potter has defeated
Player 2's Harry Potter in 8 turns!

Player 1: Harry Potter
Strength Points = 6

Status = Victor!

Player 2: Harry Potter
Strength Points = 0
Status = Defeated
_____

TEST OUTCOMES / REFLECTIONS:

By running each test battle I was able to examine the output for each attack and defense roll and quickly determine if the player was rolling the wrong amount of dice after an attack or defense special had been called. Although, for the most part once the program was up and running things mostly worked as expected, but I was able to isolate a few very serious issues while conducting my tests. The most obvious unexpected outcome was when I was in my 9th round of testing and the program had a segmentation fault and the run failed. After running a valgrind check in the flip server I was able to realize that I was not deleting the objects I was initializing in main at the end of each battle, by adding a delete function for each player I was able to stop the memory leak and continue testing.

I also encountered issues with Medusa's attack function, as well as the Blue Men's defense function. Although it was not a serious issue, in order to recognize Medusa's stone gaze I registered a roll of 12 to equal an attack output of 1000, since that is far larger than any of the potential dice rolls in the game. After doing this and implementing my test plan, I really didn't like seeing characters lose with -997 strength points. In order to resolve this issue I added a conditional statement in the base class defense function the will activate Medusa's stone gaze if the attack value passed to the defense function was equal to the function call, therefore not deleting any strength points from the opposing player but simply turning them to stone instead and recognizing that as a losing game state.

When dealing with the Blue Men's defense function I implemented a dCount member variable that in order to keep track of the number of times each condition was met. Before doing this, after a Blue Men's strength points dropped below 8, it would output the bonus activator message to the screen before every turn. This was annoying, and painful to look at, so by using dCount I was able to manipulate the integer variable to ensure that each bonus activator message would only print to the screen once, when a die was initially lost.

There was also some behavior that I found very interesting, but after hand tracing each step began to make logical sense. If you look at test number 13, which is a battle between two BlueMen, you will see that Player 1's strength points are 10 in both round 5 and the final round(6), despite the results stating that he had taken 1 point of damage in the final round. After tracing back through my main fight loop I was able to determine that this was the case because Player 1's BlueMen attacked first in the final round, and because player 2 was defeated before his attack the match was already over. So instead of outputting that current turn's attack and defense data, the program just output the previous turns data because no new calls to the attack or defense function were made. I thought about fixing this, but it ultimately does not affect how the functions work or how the game operates.