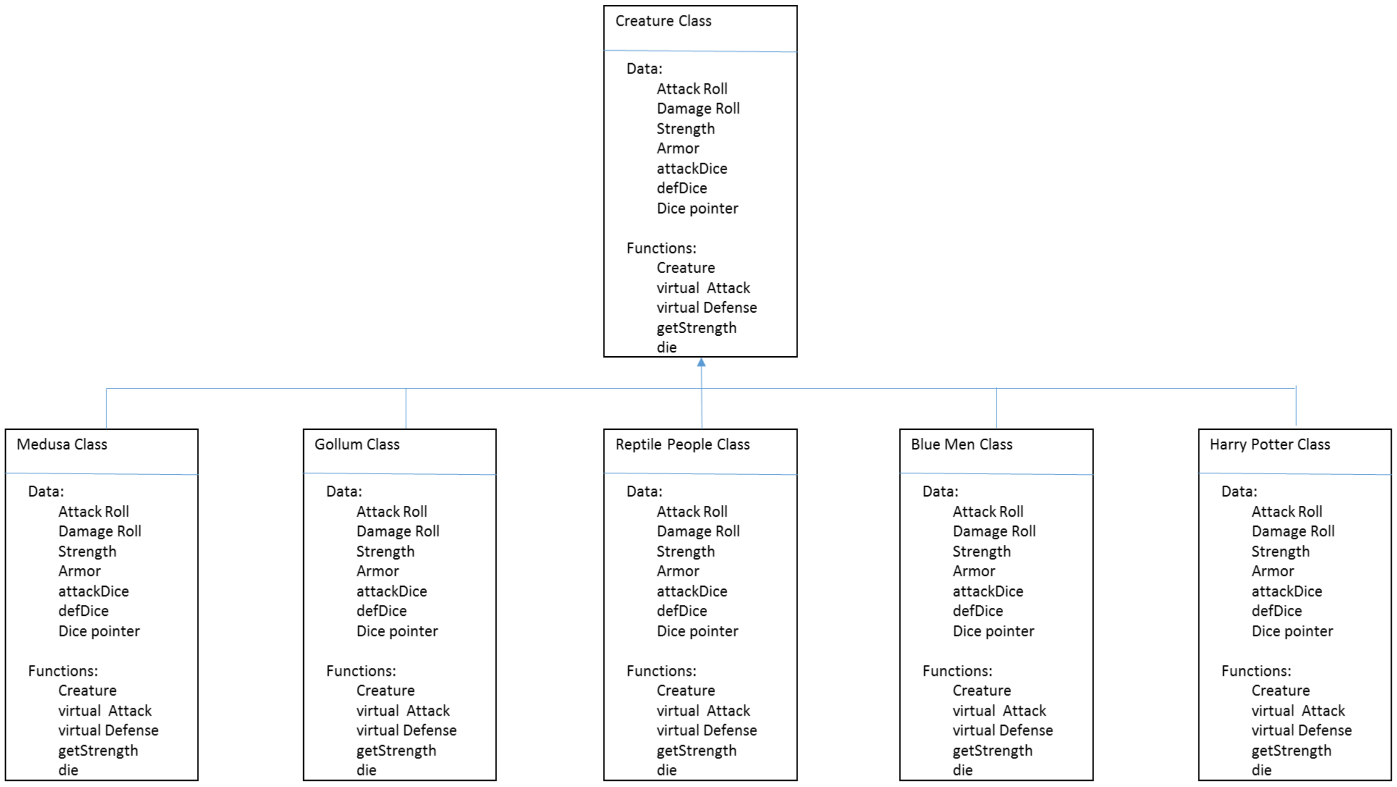
Name: Molly Arwood
Date: 7-20-16
Class: CS_162_400_Su2016
Assignment 3

Objective: You will create a simple class hierarchy as the basis for a fantasy combat game. The "universe" contains Goblins, barbarians, Reptile People, Blue Men and possibly others. Each will have characteristics for attack, defense, armor, and strength points.

Breaking Down the Code:

Data Needed	Actions Needed
Creatures class (abstract)	Attack move
Medusa subclass	Defense move
Gollum subclass	Armor move
Reptile People subclass	Strengthen move
Blue Men subclass	Roll Dice (with random num generator)
Harry Potter subclass	Creature constructor
Strength Points	
Dice class	
Armor value(?)	
2 Pointers to creature for combat	

Class Hierarchy:



Name: Molly Arwood
Date: 7-20-16
Class: CS_162_400_Su2016
Assignment 3

Design/Implementation Part 1:

Creating the Creature Class and Generic Reptile People class (no special powers).

Pseudocode:

Creature.hpp file:

```
Class Creature {
    Protected:
        double  attackRoll
        double damageRoll
        double strength
        Int armor
        Int attackDice;
        Int defDice;
        Dice *d1;
    Public:
        Creature()
        double Virtual attack()
        double Virtual defense(double)
        double getStrength() const
        virtual Bool die()
}
```

Creature.cpp file:

```
Creature Constructor()
    SET strength to 10
    CREATE new Dice object
    SET dice side count to 6


double getStrength() const
    RETURN strength


Bool die() const
    CREATE bool dead
    SET dead = false
    IF (strength <= 0)
        SET dead = true
```

```
                RETURN dead
```

ReptilePeople.hpp file:

```
    Class ReptilePeople {
        Public:
            ReptilePeople()
            double Virtual attack()
            double Virtual defense(double)
    }
```

ReptilePeople.cpp file:

```
    ReptilePeople()
        SET strength = 18
        SET armor = 7
        SET attackDice = 3
        SET defDice = 1
        SET dice side count = 6

    double Virtual attack()
        CALL dice setRollCount function
            SEND attackDice value
        SET attackRoll = 0
        CALL roll function
            STORE returned values
        RETURN attackRoll

    double virtual defense(double attackRoll)
        IF (attackRoll = 550)
            SET strength = -1
            DISPLAY "game over"
        ELSE
            CALL dice's setRollCount function
        SEND defDice value
        SET damageRoll= attackRoll
        CREATE double roll
            SET roll = 0
        CALL roll function
            STORE returned values in roll
        SUBTRACT damageRoll - roll
            STORE in damageRoll;
        SUBTRACT damageRoll – Armor
        IF (result is positive)
            SET strength = strength – damageRoll
    RETURN strength
```

Part 1 Test Plan:

(Note: cout values placed throughout functions for testing have been removed in final files)

Test Case	Input Value	Driver Function	Expected Outcome	Actual Outcome
Successful Creation of ReptilePeople objects	ReptilePeople *rp1; Rp1 = new ReptilePeople;	Creature & ReptilePeople Constructor and getStrength()	“rp1 strength: 10” “rp1 armor: 7”	“rp1 strength is 10” “rp1 armor: 7”
Attack function correctly rolls dice & sums values[i]	Double attackRoll = rp2->attack	Attack()	“roll: *rndm nbr*”	“roll: 0”
Defense function correctly rolls nbr of dice	lifeStrength = rp1->defense(attackRoll)	Defense()	“rp1 strength: *damageRoll – armor value*”	“rp1 strength: *damageRoll – armor value*”

Fixes to Poor Test Outcome:

i. Altered Dice class’s rollDie() function in the following ways:
   a. Removed mean, median, mode analysis equations and all associated variables
   b. Altered return type from double pointer to double
   c. Solved Problem

Design/Implementation Part 2:

Pseudocode:

Name: Molly Arwood
Date: 7-20-16
Class: CS_162_400_Su2016
Assignment 3

Medusa.hpp file:

```
Class Medusa {
    Public:
        Medusa()
        double Virtual attack()
        double Virtual defense(double)
}
```

Medusa.cpp file:

```
Medusa()
    SET strength = 8
    SET armor = 3
    SET attackDice = 2
    SET defDice = 1
    SET dice side count = 6

double Virtual attack()
    CALL dice’s setRollCount function
        SEND attackDice value
    SET attackRoll = 0
    CALL roll function
        STORE returned values
    IF (attackRoll == 12)
        SET attackRoll = 550
    RETURN attackRoll

double virtual defense(double attackRoll)
    IF (attackRoll = 550)
        SET strength = -1
        DISPLAY “game over”
    ELSE
        CALL dice’s setRollCount function
            SEND defDice value
        SET damageRoll= attackRoll
        CREATE double roll
        SET roll = 0
        CALL roll function
```

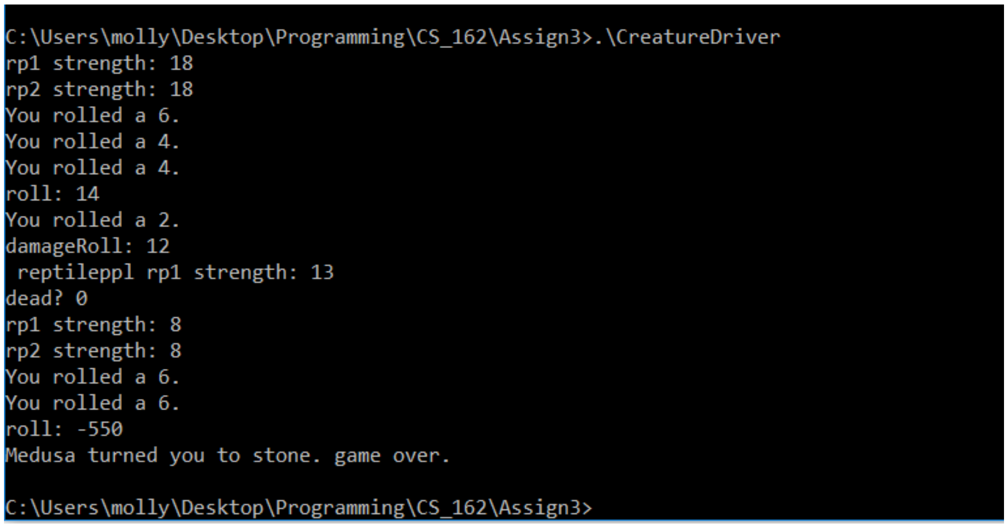
Name: Molly Arwood
Date: 7-20-16
Class: CS_162_400_Su2016
Assignment 3

```
                    STORE returned values in roll
                SUBTRACT damageRoll - roll
                STORE in damageRoll;
                SUBTRACT damageRoll – Armor
                IF (result is positive)
                    SET strength = strength – damageRoll
            RETURN strength
```

Part 2 Test Plan:

(Note: cout values placed throughout functions for testing have been removed in final files)

Test Case	Input Value	Driver Function	Expected Outcome	Actual Outcome
Successful Creation of Medusa objects	Rp1 = new Medusa;	Medusa Constructor and getStrength()	"rp1 strength: 8"	"rp1 strength: 8"
Attack function correctly rolls dice & sums values[i]	attackRoll = rp2->attack()	Attack()	"roll: *rndm nbr*"	"roll: *rndm nbr"
Defense function correctly rolls nbr of dice	lifeStrength = rp1->defense(attackRoll)	Defense()	"rp1 strength: *damageRoll – armor value*"	"rp1 strength: *damageRoll – armor value*"
Defense function correctly id's roll of 12.	attackRoll = rp2->attack()	Defense()	"roll: -550" "Medusa turned you to stone. Game over."	"roll: -550" "Medusa turned you to stone. Game over."



```
C:\Users\molly\Desktop\Programming\CS_162\Assign3>.\CreatureDriver
rp1 strength: 18
rp2 strength: 18
You rolled a 6.
You rolled a 4.
You rolled a 4.
roll: 14
You rolled a 2.
damageRoll: 12
 reptileppl rp1 strength: 13
dead? 0
rp1 strength: 8
rp2 strength: 8
You rolled a 6.
You rolled a 6.
roll: -550
Medusa turned you to stone. game over.

C:\Users\molly\Desktop\Programming\CS_162\Assign3>
```

Design/Implementation Part 3:

Name: Molly Arwood
Date: 7-20-16
Class: CS_162_400_Su2016
Assignment 3

Pseudocode:

```
Gollum.hpp file:
    Class Gollum : public Creature {
        Public:
            Gollum()
            double Virtual attack()
            double Virtual defense(double)
    }

Gollum.cpp file:
    Gollum()
        SET strength = 8
        SET armor = 3
        SET attackDice = 1
        SET defDice = 1
        SET dice side count = 6

    Double attack()
        SET attackRoll = 0
        CREATE ring variable
            SET ring = 13
        CREATE ringRoll variable
        GENERATE random number between 1 – 20
            SET ringRoll to value
        IF (ringRoll == ring)
            SET attackDice = 3
        CALL dice’s setRollCount function
            SEND attacDice
        CALL roll function
            STORE returned values
        RETURN attackRoll

    Double defense(double attackRoll)
        IF (attackRoll = 550)
            SET strength = -1
            DISPLAY “game over”
```

Name: Molly Arwood
Date: 7-20-16
Class: CS_162_400_Su2016
Assignment 3

```
ELSE
    CALL dice's setRollCount function
        SEND defDice value
    SET damageRoll= attackRoll
    CREATE double roll
    SET roll = 0
    CALL roll function
        STORE returned values in roll
    SUBTRACT damageRoll - roll
        STORE in damageRoll;
    SUBTRACT damageRoll – Armor
    IF (result is positive)
        SET strength = strength – damageRoll
RETURN strength
```

Part 3 Test Plan:

(Note: cout values placed throughout functions for testing have been removed in final files)

Test Case	Input Value	Driver Function	Expected Outcome	Actual Outcome
Successful Creation of Gollum objects	Rp1 = new Gollum;	Gollum Constructor and getStrength()	"rp1 strength: 8"	"rp1 strength: 8"
Attack function correctly rolls dice & sums values	attackRoll = rp2->attack()	Attack()	"roll: *rndm nbr*"	"roll: *rndm nbr"
Defense function correctly rolls nbr of dice	lifeStrength = rp1->defense(attackRoll)	Defense()	"rp1 strength: *damageRoll – armor value*"	"rp1 strength: *damageRoll – armor value*"
Attack function correctly uses 3 dice if number 13 is randomly generated	ringRoll = 13	Attack()	3 rolls appear in output screen for Gollum attack	3 rolls appear in output screen for Gollum attack

Design/Implementation Part 4:

Pseudocode:

BlueMen.hpp file:

```
Class BlueMen : public Creature {
    Private:
        Dice *d2
```

Name: Molly Arwood
Date: 7-20-16
Class: CS_162_400_Su2016
Assignment 3

```
        Public:
            BlueMen()
            double Virtual attack()
            double Virtual defense(double)
    }
```

BlueMen.cpp file:

```
    BlueMen()
        SET strength = 12
        SET armor = 3
        SET attackDice = 2
        SET defDice = 3
        SET d1 dice side count = 6
        DECLARE new d2 Dice
        SET d2 dice side count = 10

    Double attack()
        CALL d2 dice's setRollCount function
            SEND attackDice
        SET attackRoll = 0
        CALL d2 roll function
            STORE returned values
        RETURN attackRoll

    Double defense(double attackRoll)
        IF (attackRoll = 550)
            SET strength = -1
            DISPLAY "game over"
        ELSE
            CALL d1 dice's setRollCount function
                SEND defDice value
            SET damageRoll= attackRoll
            CREATE double roll
                SET roll = 0
            CALL d2 roll function
                STORE returned values in roll
            SUBTRACT damageRoll - roll
```

Name: Molly Arwood
Date: 7-20-16
Class: CS_162_400_Su2016
Assignment 3

```
            STORE in damageRoll;
        SUBTRACT damageRoll – Armor
        IF (result is positive)
            SET strength = strength – damageRoll
            IF (strength has lost < 4 points)
                No change
            ELSE IF (strength has lost 4-7 ponts)
                SET defDice = 2
            ELSE
                SET defDice = 1
    RETURN strength
```

Part 4 Test Plan:

(Note: cout values placed throughout functions for testing have been removed in final files)

c	Input Value	Driver Function	Expected Outcome	Actual Outcome
Successful Creation of BlueMen objects	Rp1 = new BlueMen;	BlueMen Constructor and getStrength()	“rp1 strength: 12”	“rp1 strength: 12”
Attack function correctly rolls dice & sums values	attackRoll = rp2->attack()	Attack()	“roll: *rndm nbr*”	“roll: *rndm nbr”
Defense function correctly rolls nbr of dice	lifeStrength = rp1->defense(attackRoll)	Defense()	“rp1 strength: *damageRoll – armor value*”	“rp1 strength: *damageRoll – armor value*”
Defense function correctly removes die in strength increments of 4	Strength = 8	Defense()	2 rolls appear in output screen for BlueMen Defense	2 rolls appear in output screen for BlueMen Defense

Design/Implementation Part 5:

Pseudocode:

HarryPotter.hpp file:

```
Class HarryPotter : public Creature {
    Private:
        Int catLife
    Public:
        HarryPotter()
        double Virtual attack()
```

Name: Molly Arwood
Date: 7-20-16
Class: CS_162_400_Su2016
Assignment 3

```
                    double Virtual defense(double)
                    virtual bool die();
            }
        HarryPotter.cpp file:
            HarryPotter()
                SET strength = 10
                SET armor = 0
                SET attackDice = 2
                SET defDice = 2
                SET d1 dice side count = 6
                SET catLife = 0;

            Double attack()
                CALL dice's setRollCount function
                    SEND attackDice
                SET attackRoll = 0
                CALL roll function
                    STORE returned values
                RETURN attackRoll

            Double defense(double attackRoll)
                IF (attackRoll = 550)
                    SET strength = -1
                    DISPLAY "game over"
                ELSE
                    CALL d1 dice's setRollCount function
                        SEND defDice value
                    SET damageRoll= attackRoll
                    CREATE double roll
                        SET roll = 0
                    CALL d2 roll function
                        STORE returned values in roll
                    SUBTRACT damageRoll - roll
                        STORE in damageRoll;
                    SUBTRACT damageRoll – Armor
                    IF (result is positive)
                        SET strength = strength – damageRoll
```

Name: Molly Arwood
Date: 7-20-16
Class: CS_162_400_Su2016
Assignment 3

```
        RETURN strength
    Bool die() const
        CREATE bool dead
        SET dead = false
        IF (strength <= 0)
            SET dead = true
        IF (dead = true)
            IF (catLife = 0)
                SET dead = false
                CALL resetStrength function
                SET catLife = 1
        RETURN dead
```

Part 5 Test Plan:

(Note: cout values placed throughout functions for testing have been removed in final files)

c	Input Value	Driver Function	Expected Outcome	Actual Outcome
Successful Creation of HarryPotter objects	Rp1 = new HarryPotter;	HarryPotter Constructor and getStrength()	"rp1 strength: 10"	"rp1 strength: 10"
Attack function correctly rolls dice & sums values	attackRoll = rp2->attack()	Attack()	"roll: *rndm nbr*"	"roll: *rndm nbr"
Defense function correctly rolls nbr of dice	lifeStrength = rp1->defense(attackRoll)	Defense()	"rp1 strength: *damageRoll – armor value*"	"rp1 strength: *damageRoll – armor value*"
Die function correctly resets if catLife == 0[i]	catLife == 0	Die()	HarryPotter's strength = 10 next turn	HarryPotter's strength = 10 next turn

Reflections:

After hard-coding data into a driver file to confirm that each function was appropriately working, the code above was modified slightly in order to be more compatible with a looping environment. The Creature class was extended to include a name member variable with setName and getName functions in order to allow the user to see the name of the Creature during battles. A strengthDefault member and resetStrength function were also included in the Creature class in order to reset character strengths automatically between each battle. One type of each character was placed into an array of pointers. The main method loops through the array in a way to ensure that each character battles each other once.

Name: Molly Arwood
Date: 7-20-16
Class: CS_162_400_Su2016
Assignment 3

Because it is not a common feature for all Creatures to have a second chance at life (like Harry Potter), the decision was made to keep the function "resetCatLife" within the HarryPotter class only, and not declare it as a virtual function in the Creature class. Therefore, a dynamic_cast is needed in the main file between battles in order to gain access to this function through a Creature pointer variable. Access is needed in order to reset the trigger variable that allows HarryPotter objects to regenerate once before the next battle.