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Class: CS162

Assignment 3 Design and Test Plan

Design:

For this assignment I made the design based on the class hierarchy. Champion will be the base class that contains 4 functions: attack, defense, armor, and strengthPoints. The base class will have 4 child classes: Reptile, BlueMen, HarryPotter, Medusa, and Gollum. The child classes will inherit the member variables from the base class, and each will have its own constructor to initialize the member variables. They will declare more member variables depend on their need.

Attack and strengthPoints will be declared in the Base class as pure virtual functions, and defined differently in each of the child class. Defense and armor will be defined in the base class and overloaded in the child classes.

Following are the pseudocodes for each of the class:

Base Class: Champion

Member variable:

```
Defense     //the armor point
HP          //health point
numOfDef    //number of defense die
numOfAtk    //number of attack die
```

Functions:

```
Attack()        // Pure virtual?
Defense(int atk)// virtual  //takes an attach amount as its parameter
        Use rand() to mimic a 6 side die and loop numOfDef times and add up numbers rolled
        Hit = atk – number rolled
        Return hit

Armor(int hit)          // virtual //takes the hit amount as its parameter
        damage = hit – armor
        return damage

StrengthPoints(int dmg)//pure virtual?
```

Class Reptile

```
Defense = 7
HP = 18
numOfDef = 1
numOfAtk = 3
```

int attack()

To roll 3d6:

Use rand() to mimic a 6 sided dice and loop *numOfAtk* times, add up the numbers rolled

Return the number rolled

int strengthPoints(int dmg) //takes the damage amount generated by armor

HP = HP – dmg

Return HP

(If HP <= 0, Champion dies: delete object in main)

Class BlueMen

Defense = 3

HP = 12

numOfDef = 3 *Mob

numOfAtk = 2

Int attack()

Use rand() to mimic a 10 side die and loop *numOfAtk* times and add up the numbers rolled

Return number rolled

Int strengthPoint(int dmg) //takes damage generated by armor

HP = HP – dmg

If(HP == 8 or HP == 4)

numOfDef – 1 //they lose 1 die for every 4 points of damage

Return HP

(if HP <= 0, champion dies: remove object in main)

Class HarryPotter

Defense = 0

HP = 10 *Hogwarts

numOfDef = 2

numOfAtk = 2

bool max = false //see if Harry maxed out 20 HP for the fight

Int attack()

Use rand() to mimic a 6 side die and loop *numOfAtk* times and add up the numbers rolled

Return number rolled

Int strengthPoint(int dmg) //takes damage generated by armor

HP = HP – dmg

*Hogwarts

If HP is 0 or below

If max == false , harry doesn't die immediately

HP = 10 //reset life

Max = true; //now he has reached 20 HP

Else

HP = 0 //Harry is dead

Return HP

(if HP <= 0, champion dies: remove object in main)

Class Medusa

Defense = 3

HP = 8

numOfDef = 1

numOfAtk = 2 *Glare

int attack()

Use rand() to mimic a 6 side die and loop *numOfAtk* times and add up the numbers rolled

Medusa has the Glare ability:

If number Rolled = 12

Return a very large attack number (1000?)

Return number rolled

int strengthPoint(int dmg) //takes damage generated by armor

HP = HP – dmg

(if HP <= 0, champion dies: remove object in main)

Class Gollum

Armor = 3

HP = 8

numOfDef = 1

numOfAtk = 1 *Ring

Int attack()

Gollum has the Ring ability:

Use rand() to determine the 5% chance (mimic a 20 side die?)

If chance

Use rand to mimic a 6 side die and roll 3 times, add up the number

else

Use rand() to mimic a 6 side die and loop *numOfAtk* times and add up the number rolled
Return number rolled

Int strengthPoint(int dmg) //takes damage generated by armor
HP = HP – dmg

(if HP <= 0, champion dies: remove object in main)

Test Plan:

Medusa attacks with 10 attack points						
	Attack	Defense	Armor	HP	New HP	✓
Gollum	10	6	3	8	-11	✓
Reptile	10	6	3	18	-1	✓
Blue Men	10	18	7	12	-23	✓
Harry Potter	10	12	3	10	-15	✓
Medusa	10	6	0	8	-8	✓

Gollum attacks with 6 attack points						
	Attack	Defense	Armor	HP	New HP	✓
Gollum	6	6	3	8	-7	✓
Reptile	6	6	3	18	3	✓
Blue Men	6	18	7	12	-19	✓
Harry Potter	6	12	3	10	-11	✓
Medusa	6	6	0	8	-4	✓

Reptile attacks with 18 attack points						
	Attack	Defense	Armor	HP	New HP	✓
Gollum	18	6	3	8	-19	✓
Reptile	18	6	3	18	-9	✓
Blue Men	18	18	7	12	-31	✓
Harry Potter	18	12	3	10	-23	✓
Medusa	18	6	0	8	-16	✓

Blue Men attacks with 20 attack points						
	Attack	Defense	Armor	HP	New HP	✓
Gollum	20	6	3	8	-21	✓
Reptile	20	6	3	18	-11	✓
Blue Men	20	18	7	12	-33	✓
Harry Potter	20	12	3	10	-25	✓

Medusa	20	6	0	8	-18	✓

Harry Potter attacks with 12 attack points						
	Attack	Defense	Armor	HP	New HP	✓
Gollum	12	6	3	8	-13	✓
Reptile	12	6	3	18	-3	✓
Blue Men	12	18	7	12	-25	✓
Harry Potter	12	12	3	10	-17	✓
Medusa	12	6	0	8	-10	✓

Test Special Abilities		
Medusa rolls 12	attack points becomes 1000	✓
Gollum received the 5% chance	attack points becomes 18	✓
1st time Harry's HP reduced to 0	HP becomes 10	✓
2nd time Harry's HP reduce to 0	HP stays 0	✓
BlueMen's HP reduced to 8	Defense dice = 2	✓
BlueMen's HP reduced to 4	Defense dice = 1	✓

Reflection:

At first, I planned on defining the attack function in the base class and have all the child classes inherit from it. However, as I started coding, I find it necessary to make the attack function virtual and overload it in the child classes. One issue that I have encountered wile implementing the function, is that if I call several functions at once without the semicolon,

ie. cout << champ1.attack() << champ1.defense() <<champ1.strengthPoints() << endl;

strengthPoints() will always execute right after the attack function, no matter how many function I placed in between. It does not interfere with my program execution, but I just find it very curious and need to read more to find out why.