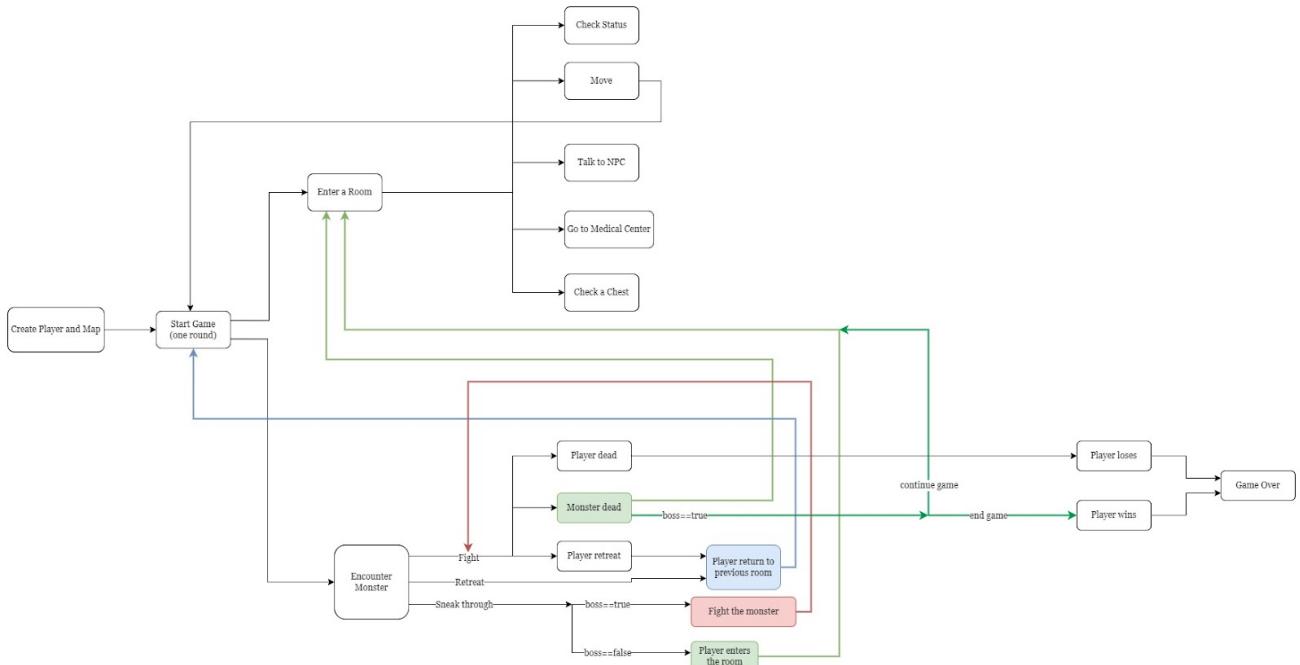


Dungeon Report

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I. Implementation Detailed

A. 遊戲流程



圖為整體遊戲流程。

- 遊戲進行可分為多個小回合，玩家會遇到的情形決定於他進入的房間內有甚麼物件
 - 房間約略可分為兩大類，分別是有Monster和沒有Monster的房間。若玩家進入的是有Monster的房間，則需要先與Monster進行互動，才能進入房間，與房間內的物件互動，如Chest, NPC, Medical Center等。此外，在與怪物互動前也不能移動到下一個房間
 - 一旦玩家選擇移動到下一個房間，則新的小回合開始
- 接下來我將分別解釋我的程式各部分如何運作。

B. Room

建置Dungeon中的房間。

- variable
 - int index : 紀錄該房間的種類

index	0	1	2	3
room content	empty	Monster	Monster and Chest	Chest
index	4	5	6	7
room content	NPC	boss	exit	Medical Center

- function
 - bool popObject(Object*)

把room內用過且要移除的物件從房間內移除，並重新設定Room的index
 - bool checkDeadEnd(char)

檢查該房間特定方向是否為死路，如果是死路則return true，反之則return false

C. Skill

建置GameCharater的技能。

- variable
 - int cd (**optional enhancement**)

該技能的冷卻時間，若不為零，則該技能無法使用
- function
 - void coolDown()

每打鬥過一回合，該技能cd-1

D. Object

- function
 - triggerEvent(Object*) = 0

為pure virtual function，繼承自Object的class各自設置不同的觸發情節

E. Item

各種道具及物品，繼承自Object。

- variable
 - int value

該物品的金錢價值
 - bool weapon

用來辨別是一般道具還是武器
- function
 - void showItem()

print出物品的性質，如加成血量、攻擊、防禦等
 - bool triggerEvent(Object*)

當玩家獲得Item時會觸發的行動（可能經由寶箱或NPC獲得）
首先列出該物品性質，詢問玩家是否要將該物品放入背包，若回答是，則
物品被加入背包，物品的性質加成到玩家身上；若回答否，則玩家狀態不
改變
- Items in the game

Item name \ property	HP+	ATT+	DEF+	value
Jar of Fortitude	4	0	10	\$15
Exiled Horn	3	5	2	\$16
Decimation Stone	-3	10	0	\$18
Spite Gauntlet	0	8	0	\$10

Securing Lamp	0	5	10	\$18
Finality Ring	4	5	3	\$15
Circlet of Apathy	0	5	8	\$12
Skull of Riddles	0	8	1	\$11
Virtue Mask	3	5	2	\$10
Mirage Pillar	0	8	6	\$14
Rod of Souls	3	0	6	\$12

F. Weapon

玩家使用的武器，每個玩家只能配置一個，繼承自Item。

不能販售或贈送武器給NPC，但可以向NPC購買武器，初始武器價值為0。

- variable

- string fitClass

該武器適用的玩家職業，不符合的職業無法裝備該武器

- function

- void showWeapon()

print出該武器的性質，如攻擊加成、防禦加成和適用職業

- bool triggerEvent(Object*)

當玩家獲得Weapon時會觸發的行動（可能經由寶箱或NPC獲得）。

首先印出玩家當前武器和獲得的武器性質，若該武器不符合玩家職業，則印出"You cannot equip the new weapon because you don't know how to use it."；若符合，則讓玩家選擇要不要更換武器

- Weapons in the game

- intial weapons

weapon name \ property	ATT+	DEF+	fitClass	value
Normal Sword	8	3	Soldier	0
Normal Dagger	10	2	Assassin	0
Normal Magic Wand	10	1	Sorcerer	0
Normal Bow	9	2	Archer	0
Normal Staff	7	2	Priest	0

- other weapons

weapon name \ property	ATT+	DEF+	fitClass	value
Big Sword	15	12	Soldier	\$20
Poisoned Dagger	18	7	Assassin	\$20

Holy Wand	19	8	Sorcerer	\$20
Silver Bow	15	12	Archer	\$20
Aurora Staff	12	19	Priest	\$20

G. Chest

寶箱，打破後可以獲得金錢和一個道具或武器，繼承自Object。

如果裡面的金錢大於等於\$15，則會顯示為"big chest"，反之則顯示為"small chest"。

- variable

- Item* found

因為Chest內含的物品有可能是Item或Weapon，故使用Item的pointer以實作virtual function的功用

- function

- void takeDamage(int)

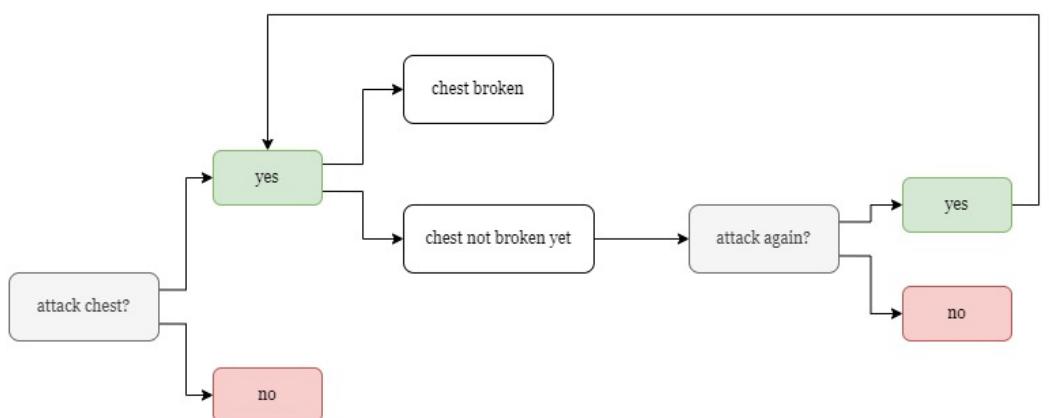
根據玩家的攻擊減少寶箱的health

- bool checkBroken()

檢查寶箱是否已被玩家破壞，若已被破壞則return true，反之則return false

- bool triggerEvent(Object*)

首先執行以下流程：



若寶箱有成功被破壞，玩家可獲得裡面的金錢和物品。

取得物品時會發揮virtual function的功用，取決於found指向Item或

Weapon，found->triggerEvent(Object*)會執行不同的動作。

最後，若寶箱被成功破壞return true，反之則return false。

H. GameCharacter

各類遊戲角色的基本設定，繼承自Object。

- function

- GameCharacter(char)

內含Player初始基本設定的constructor

- GameCharacter(int)

內含NPC初始基本設定的constructor

- GameCharacter(int, bool)

內含Monster初始基本設定的constructor

- **bool checkIsDead()**
檢查該遊戲角色是否死亡，若死亡則return true，反之則return false
- **void takeDamage(int)**
將該遊戲角色的血量減去受到的傷害，若受到的傷害小於零，則血量不變
- **void getHealed(int)**
將該遊戲角色的血量加上受到治療的量，但最大不超過maxHealth
- **bool checkSkillCD(int) (optional enhancement)**
檢查該角色是否可以使用該技能，若可以則return true，反之則return false
- **void useSkill(int)**
讓遊戲角色的血量、攻擊、防禦數值升高到使用技能的狀態
- **void afterSkill(int)**
讓遊戲角色的血量、攻擊、防禦數值恢復到使用技能前
- **void skillCoolDown(int) (optional enhancement)**
使該技能的cd-1
- **void resetSkillCD(int) (optional enhancement)**
在每一輪戰鬥結束後，將角色技能的cd值設定為0
- **bool triggerEvent(Object*)**
無功用，在本程式中不會被呼叫

I. Player

玩家角色設定，繼承自GameCharacter。

- **variable**
 - **string playername**
玩家給自己取的名字
 - **bool matches**
代表玩家是否持有特殊道具Matches
 - **Weapon weapon**
玩家持有的武器
- **function**
 - **void addItem(Item)**
在玩家的背包 (vector<Item> inventory) 中加入新的Item
 - **void increaseStates(int, int, int)**
增加或減少玩家的血量、攻擊、防禦
 - **void changeRoom(Room*)**
代表玩家移動，將currentRoom設為previousRoom
 - **void changeMoney(int)**
增加或減少玩家的金錢
 - **bool triggerEvent(Object*)**
印出Player的status
- **Player classes**

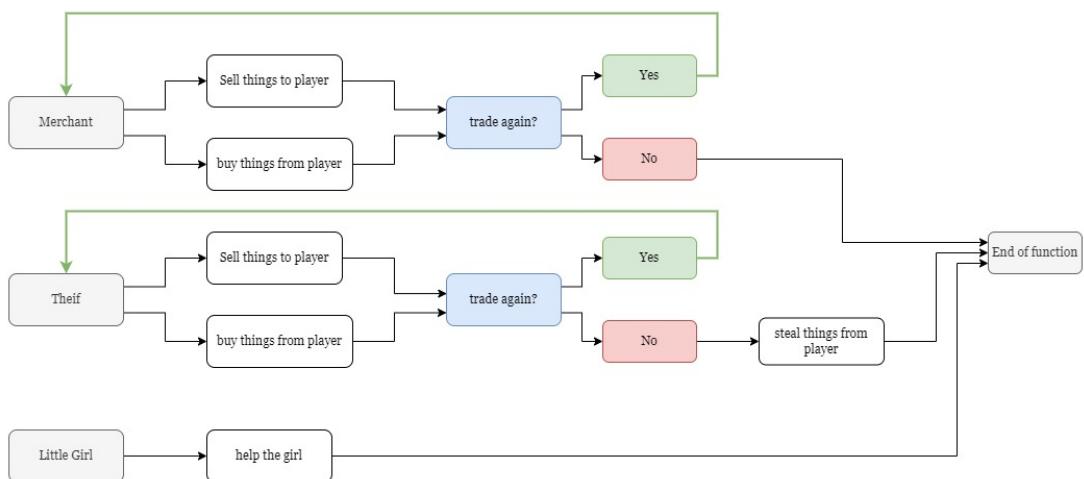
class \ property	HP	ATT	DEF	Skill 1 (HP+\ATT+\DEF+)	Skill 2 (HP+\ATT+\DEF+)
Soldier	100	28	8	Running Attack (0\10\10)	Mighty Swing (0\15\7)

Assassin	80	35	4	Sneak Attack (0\23\1-3)	Quiet Death (0\27\1-5)
Sorcerer	80	38	3	Frost Bolt (0\20\0)	Chain Lightning (1\21\0)
Archer	90	31	6	Quick Shot (0\14\6)	Blazing Arrow (0\17\5)
Priest	100	25	3	Magic Barrier (10\2\13)	Holy Aura (25\0\5)

J. NPC

NPC角色設定，繼承自GameCharacter。

- variable
 - int pricedown (**optional enhancement**)
不同的NPC收購商品有不同的收購價
- function
 - void listCommodity()
印出NPC擁有的商品名稱和特性
 - void stealThings(Player*) (**optional enhancement**)
盜賊NPC會偽裝成商人與玩家交易，並在交談結束後隨機偷走玩家背包裡的一樣物品
 - void sellThings(Player*)
NPC賣東西給玩家，玩家可以選擇要購買的物品，若錢不夠會購買失敗
 - void buyThings(Player*)
NPC收購玩家的物品，根據NPC的身分會有不同的收購價
 - void helpTheGirl(Player*) (**optional enhancement**)
遇到小女孩NPC時，可以選擇要不要贈送小女孩一個道具，若選擇贈送，則可以獲得特殊道具Matches
 - bool triggerEvent(Player*)
根據玩家遇到的NPC，提供玩家不同的操作選項



如果玩家遇到盜賊，且東西被盜賊偷竊了，則該盜賊會逃跑，從地圖中消失，此時return true；其他情況return false。

- NPC types

NPC type	Operations
Merchant 商人	賣東西給玩家 \ 收購玩家的物品
Thief 盜賊	賣東西給玩家 \ 收購玩家的物品 \ 偷玩家的物品
Little Girl 小女孩	接受玩家的贈送 \ 贈送特殊道具Matches

K. Monster

怪物角色設定，繼承自GameCharacter。

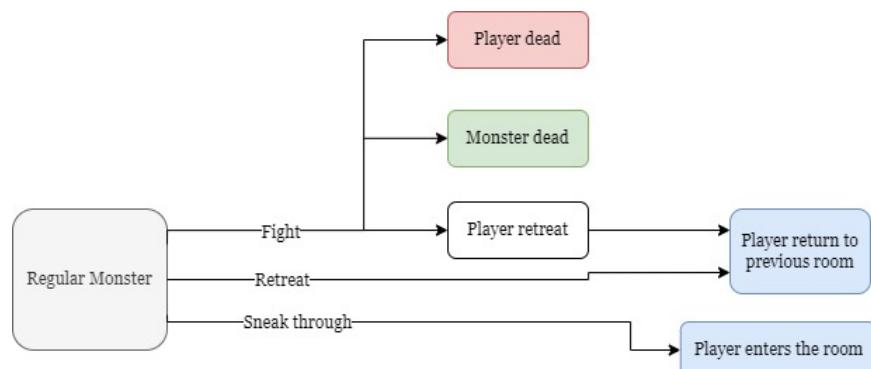
分為普通Monster和Boss，Boss所在的房間即為Dungeon的出口。

- variable

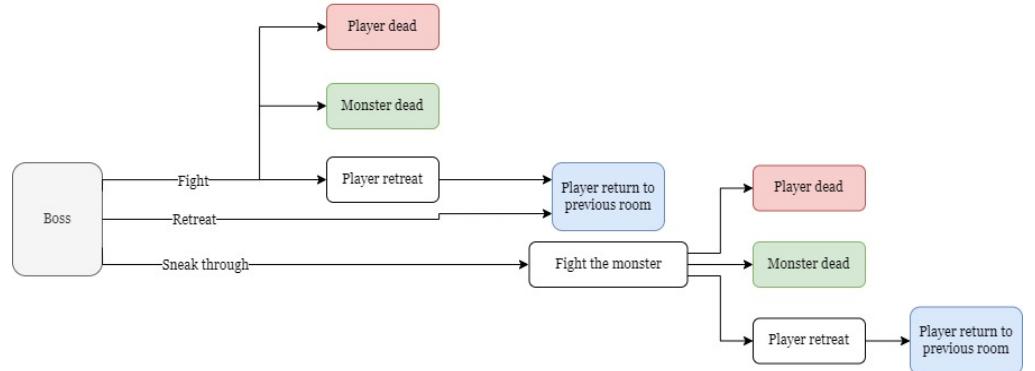
- int value
打敗該怪物後可以獲得的金錢

- function

- int playerChooseSkill(Player*)
列出玩家可選擇的技能，讓玩家選擇此輪攻擊使用的技能
- void playerAttackMonster(Player*)
玩家攻擊怪物，並輸出怪物受到幾點傷害
- void monsterFightBack(Player*)
怪物攻擊玩家，並輸出玩家受到幾點傷害
- void fightMonster(int, Player*)
與普通怪物打鬥一輪
- void fightBoss(bool, int, Player*)
與Boss打鬥一輪，若Boss血量低於特定值則會觸發Boss的技能
- bool bossInRage()
Boss血量是否低於特定值
- bool triggerEvent(Object*)
根據玩家遇到的不同怪物，進行不同流程



若為普通怪物，可以不引起怪物注意，成功sneak through(optional enhancement)，進入房間。



若遇到的是Boss，則無法成功sneak through，被發現後則會進入打鬥的程序，直到玩家死亡、怪物死亡或玩家撤退。

如果怪物死亡則return true，其他情況則return false。

- Monster types
 - regular Monster

Monster name \ property	HP	ATT	DEF	value
Slime	30	8	0	5
Rat	40	14	1	8
Skeleton	45	15	2	12
Cobra	45	17	3	16

- Boss

Boss name \ property	HP	ATT	DEF	Skill (HP+\ATT+\DEF+)	value
Hydra	500	30	10	Poison Trap (0\20\0)	100
Dracula	500	32	13	Bat Swarm (0\15\10)	120

L. Medical Center

醫療中心，玩家可以在此獲得血量回復 (optional enhancement)

- function
 - bool triggerEvent(Object*)
- 進入醫療中心後，玩家可以選擇要花多少錢獲得回血服務，若錢不夠則無法獲得服務。

M. Dungeon

建置Dungeon結構，設定各項遊戲初始值。

- variable

- bool run

用於確認玩家在擊敗Boss後，想不想要遊戲繼續進行，繼續進行則true，否則false

- function

- void createPlayer()

讓玩家輸入玩家名字和選擇職業

- void createMap()

創建地圖，填入各房間內容 (Monster \ Chest \ NPC \ Medical Center)

- void handleMovement()

讓玩家選擇移動方向，如果是死路就請玩家再選一次

- void handleEvent(Object*)

傳入要和玩家互動的Object的pointer，此處應用了virtual function的特性

· 根據Object的種類 (Monster \ Chest \ NPC \ Medical Center)，會有不同triggerEvent函式的結果。再根據triggerEvent傳回的bool值，決定要不要使用popObject，把該物品從房間移除

- void startGame()

創建地圖和玩家，設定玩家初始位置

- void chooseAction(vector<Object*>)

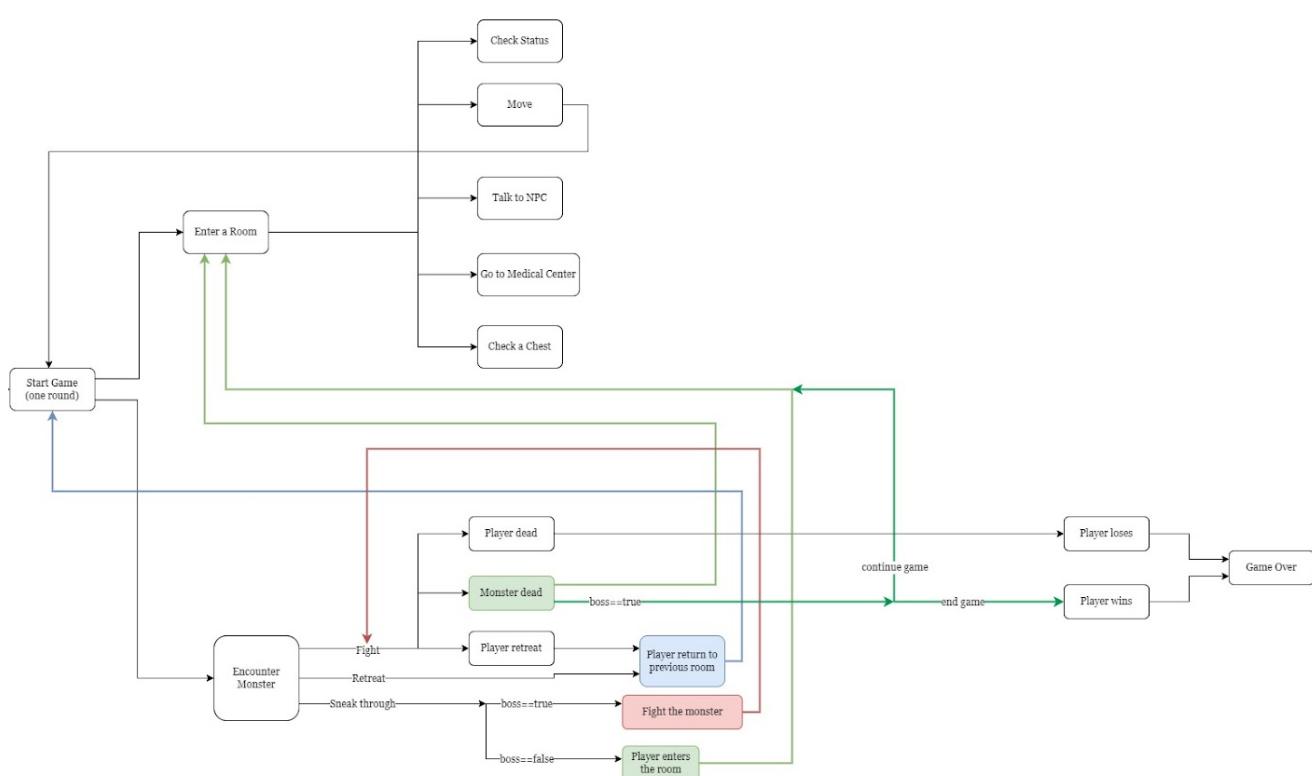
根據房間index，輸出玩家可以進行的動作，讓玩家選擇

- bool checkGameLogic()

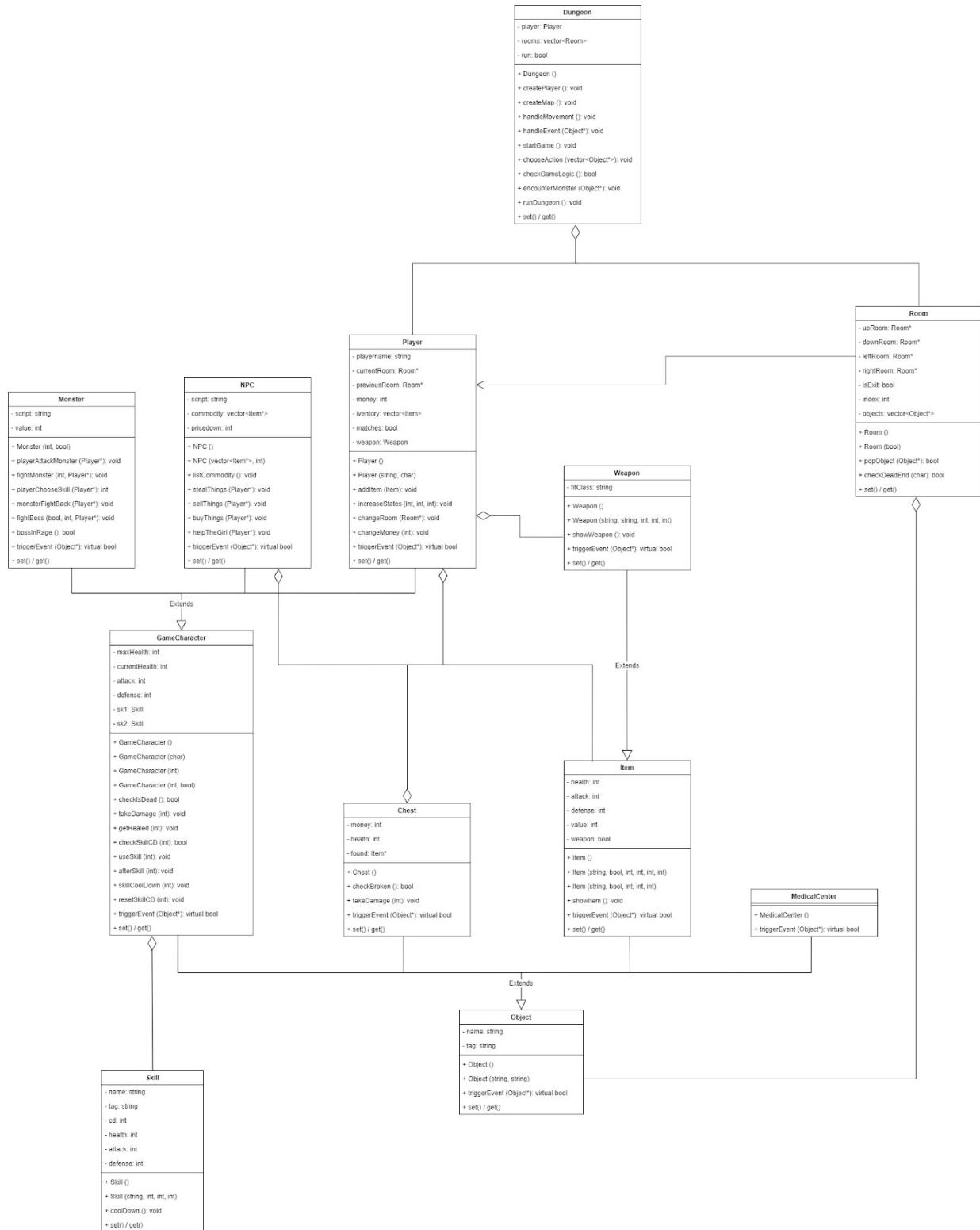
若玩家死亡，或是玩家打敗Boss且選擇離開，則return false，遊戲終止

- void runDungeon()

整個遊戲一輪的流程，即



II. UML Design



架構大致如下：

- **Object**

- **GameCharacter** (擁有Skill)

- **Player** (擁有Item和Weapon，和Room有關係)
 - **NPC** (擁有Item)
 - **Monster**

- Chest (擁有Item)
- Item
 - Weapon
- MedicalCenter
- Room (擁有Object)
- Skill
- Dungeon (擁有Player和Room)

III. Results

- 遊戲開始

- 設定玩家

```
Please insert your name:Bonnie
Please choose your character class.
a. Soldier: HP:100 / Attack:20 / Defense:5 / Skills:Running Attack, Mighty Swing
b. Assassin: HP:80 / Attack:25 / Defense:2 / Skills:Sneak Attack, Quiet Death
c. Sorcerer: HP:80 / Attack:28 / Defense:2 / Skills:Frost Bolt, Chain Lightning
d. Archer: HP:90 / Attack:22 / Defense:4 / Skills:Quick Shot, Blazing Arrow
e. Priest: HP:100 / Attack:18 / Defense:1 / Skills:Magic Barrier, Holy Aura
a

Status of <Bonnie>
>Class: Soldier
>Health: 100/100
>Attack: 28
>Defense: 8
>Money: $0
>Weapon: Normal Sword: ATT+8 / DEF+3 / Suitable class: Soldier
>Items in your bag:
There's nothing in your bag.
```

- 移動

```
Welcome to the dungeon.

What do you want to do?
a. Move.
b. Check status.
a

Which way do you want to go?
a. Go up.
b. Go down.
c. Go right.
d. Go left.
a

You met a dead end. Choose again.

Which way do you want to go?
a. Go up.
b. Go down.
c. Go right.
d. Go left.
b
```

- 與怪物互動

- 打鬥

```
You encountered the Rat. You want to:
a. Fight.
b. Retreat.
c. Try to sneak through.
a

Fight!
Rat: *squeaks*

Choose which attack you want to use:
a. Normal attack.
b. Running Attack.
c. Mighty Swing.
c

You harm the Rat by 42 points.

Your current health: 100
Rat's current health: -2
Congratulations! You defeated the monster. You got $8.
```

- 撤退

You encountered the Slime. You want to:
a. Fight.
b. Retreat.
c. Try to sneak through.
b

What do you want to do?
a. Move.
b. Check status.

- Sneak Through

- 普通怪物

You encountered the Slime. You want to:
a. Fight.
b. Retreat.
c. Try to sneak through.
c

You passed without alerting the Slime.

What do you want to do?
a. Move.
b. Check status.
c. Check the chest.

- Boss怪物

You encountered the Hydra. You want to:
a. Fight.
b. Retreat.
c. Try to sneak through.
c

You tried your best to sneak through. However, the Hydra still noticed you.

Fight!
Hydra: Roarrrr!!

- 與NPC互動

- Merchant and Thief

- sell things to Player

Mysterious person : I am a merchant. I have some good things to show you. Come with me.

* You checked your bag. You have \$57 and 1 item(s) now. *
a. Yes! I'd love to sell some stuff.
b. Of course. I want to buy some stuff.
c. No thanks. Maybe next time.
b

Mysterious person: Here are some things available:
1. Exiled Horn(Item) : HP+3 / ATT+5 / DEF+2 / listed price: \$16
2. Decimation Stone(Item) : HP+3 / ATT+10 / DEF+0 / listed price: \$18
3. Spite Gauntlet(Item) : HP+0 / ATT+8 / DEF+0 / listed price: \$10
4. Aurora Staff(Weapon) : HP+0 / ATT+12 / DEF+19 / listed price: \$20
5. Poisoned Dagger(Weapon) : HP+0 / ATT+18 / DEF+7 / listed price: \$20

Mysterious person: Anything interested?
a. Yes.
b. No thanks.
a

Mysterious person: Great! Choose a commodity (please indicate by number): 1

You obtained the Exiled Horn.
Exiled Horn(Item) : HP+3 / ATT+5 / DEF+2

Do you want to put it in your backpack?
a. Yes.
b. No.
a

You put the Exiled Horn in your backpack.

■ buy things from Player

Mysterious person : I am a merchant. Do you want to trade with me?

* You checked your bag. You have \$80 and 3 item(s) now. *

- a. Yes! I'd love to sell some stuff.
- b. Of course. I want to buy some stuff.
- c. No thanks. Maybe next time.

a

Items in your bag:

- 1. Exiled Horn(Item) : HP+3 / ATT+5 / DEF+2 : listed price: \$13
- 2. Spite Gauntlet(Item) : HP+0 / ATT+8 / DEF+0 : listed price: \$7
- 3. Securing Lamp(Item) : HP+0 / ATT+5 / DEF+10 : listed price: \$15

Mysterious person: Do you want to sell anything?

- a. Yes.
- b. No thanks.

a

Choose an item in your bag for sell (please indicate by number): 2

Mysterious person: Thank you. Anything else for sale?

- a. Yes.
- b. No thanks.

b

Mysterious person: Alright. Hope to see you soon.

What do you want to do?

- a. Move.
- b. Check status.
- c. Talk to NPC.

b

Status of <Bonnie>

>Class: Soldier
>Health: 103/103
>Attack: 45
>Defense: 29
>Money: \$87
>Weapon: Big Sword: ATT+15 / DEF+12 / Suitable class: Soldier
>Items in your bag:
Exiled Horn(Item) : HP+3 / ATT+5 / DEF+2
Securing Lamp(Item) : HP+0 / ATT+5 / DEF+10

■ steal things from Player

Mysterious person: Thank you for your purchase. Want anything else?

- a. Yes.
- b. No thanks.

b

Mysterious person: That's fine. Come back when you need anything.

The mysterious person vanished and you suddenly found out something was missing in your bag.

○ Little Girl

What do you want to do?

- a. Move.
- b. Check status.
- c. Talk to NPC.

c

Little girl : Hello. I am scared and hungry. Can you help me?

* You checked your bag. You have \$45 and 1 item(s) now. *

- a. Yes. I will help you.
- b. No. I'm sorry.

a

Items in your bag:

- 1. Jar of Fortitude(Item) : HP+4 / ATT+0 / DEF+10

Which one do you want to give to the little girl? (Please indicate by number. Insert 0 if you changed your mind.): 1

Little girl: Thank you so much for your Jar of Fortitude! This box of matches is for you. Have a great day!

What do you want to do?

- a. Move.
- b. Check status.
- c. Talk to NPC.

b

```
Status of <Bonnie>
>Class: Soldier
>Health: 100/100
>Attack: 35
>Defense: 17
>Money: $45
>Weapon: Big Sword: ATT+15 / DEF+12 / Suitable class: Soldier
>Items in your bag:
Matches(Item) : HP+0 / ATT+0 / DEF+0
```

- 與寶箱互動

```
What do you want to do?
a. Move.
b. Check status.
c. Check the chest.
c

You found a Big Chest. Do you want to break it?
a. Yes. Attack the chest.
b. No.
a

The chest is not broken yet. Attack again?
a. Yes. Attack the chest again.
b. No.
a

Congratulations! You broke the chest. You found $20 in the chest.

There is something under the pile of coins.
You obtained the weapon Big Sword: ATT+15 / DEF+12 / Suitable class: Soldier.
Your current weapon is Normal Sword: ATT+8 / DEF+3 / Suitable class: Soldier.
```

- 與醫療中心互動

```
Welcome to the Medical Center.

What kind of healing service do you want?
WARNING: Your current HP cannot exceed your max HP.
Your current HP: 64 / 110
a. HP+10 price: $12.
b. HP+15 price: $16.
c. HP+20 price: $20.
d. I don't want any service.
c

Service done. Your current health is: 84 / 110

Any other service?
a. Yes.
b. No.
```

- 與Weapon互動

- 獲得與職業相符的武器

```
You obtained the weapon Big Sword: ATT+15 / DEF+12 / Suitable class: Soldier.
Your current weapon is Normal Sword: ATT+8 / DEF+3 / Suitable class: Soldier

Do you want to discard your current weapon and equip the new one?
a. Yes.
b. No.
a

* You equipped Big Sword as your weapon. *
```

- 獲得與職業不相符的武器

```
You obtained the weapon Big Sword: ATT+15 / DEF+12 / Suitable class: Soldier.
Your current weapon is Normal Dagger: ATT+10 / DEF+2 / Suitable class: Assassin

You cannot equip the new weapon because you don't know how to use it.
```

- 與Item互動

- 獲得Item

```
You obtained the Jar of Fortitude.  
Jar of Fortitude(Item) : HP+4 / ATT+0 / DEF+10  
  
Do you want to put it in your backpack?  
a. Yes.  
b. No.  
a  
  
You put the Jar of Fortitude in your backpack.  
  
What do you want to do?  
a. Move.  
b. Check status.  
b  
  
Status of <Bonnie>  
>Class: Soldier  
>Health: 104/104  
>Attack: 35  
>Defense: 27  
>Money: $45  
>Weapon: Big Sword: ATT+15 / DEF+12 / Suitable class: Soldier  
>Items in your bag:  
Jar of Fortitude(Item) : HP+4 / ATT+0 / DEF+10
```

- 丟棄Item

```
You obtained the Jar of Fortitude.  
Jar of Fortitude(Item) : HP+4 / ATT+0 / DEF+10  
  
Do you want to put it in your backpack?  
a. Yes.  
b. No.  
b  
  
You discarded a Jar of Fortitude.
```

- 遊戲結束

- 玩家勝利

```
Congratulations! You defeated the boss. You got $100.  
  
What do you want to do?  
a. Move.  
b. Check status.  
c. Exit the dungeon.  
c  
  
Congratulations! You escaped the dungeon successfully.
```

- 玩家死亡

```
You harm the Hydra by 18 points.  
You got harmed by the Hydra by 22 points.  
  
Your current health: -10  
Hydra's current health: 410  
  
You are dead.
```

IV. Discussion

- 如何使擴充程式的容易度上升

在撰寫程式的過程中，因為不時要加入新的函式以執行新的功能，所以我認為繼承順序比較前面的class (如GameCharacter和Item) 的function功能不能寫得太固定或內容過多，最好是基本的功能就好。如果有很多種不同操作，可以把每個操作拆分開來，寫成不同函式，這樣在後面繼承的class使用函式會有比較大的彈性，不會被限制在同一個流程或順序。

- " error: expected class-name before '{' token " 的error訊息

最開始debug時出現了這樣的錯誤訊息，上網搜尋後了解到各個class的標頭檔不能無限制地隨便引用，要是沒有一個有邏輯的先後順序，class的建構可能會被忽略或跳過，造成建構失敗。

- 活用virtual function

原先在上課練習並不覺得virtual function是這麼方便的東西，但實作Dungeon時，Object的pointer可以指向各種不同的derived class，並執行不同的triggerEvent，真的非常有效率，讓我更加了解virtual function的功能所在。

V. Conclusion

在開始撰寫這個程式之前，我原本覺得非常困難，完全不知道從何下手，所幸有助教給了模板，讓我有一個開始的頭緒。但由於架構不是自己構思的，所以剛開始寫的時候並不完全了解架構的邏輯，只能從比較具像化的NPC和Player等等開始寫，但其實邏輯應該是要從較上層的開始，這造成我在後續必須做頗多修改，我也因此明白，邏輯架構在物件導向設計中非常重要。這次Dungeon的設計中，我明白了物件導向程式設計的一大優點在於它的可擴展性，撰寫者可以非常輕易的擴增程式的功能，使它更豐富，並且各子類別可以有各自的特殊變數和函式，整個程式非常有邏輯跟秩序，分類明確，我相信這個思維對於未來開發更大型且龐大的程式時會非常有幫助。