Dungeon Crawler CO3 Computer Science Programming Project

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Contents

1 Analysis of the problem

2 Problem Identification

2.1 What will be developed

I will be hoping to develop a Medieval dungeon crawler game in C#, which is using the Visual Studio 2017 IDE. The game will allow the user to move their character around a randomly generated dungeon. This dungeon will look like a maze, with dead ends and loops, where the player will encounter monsters, trap rooms and treasure rooms. This is where the player will grow in power, by upgrading their statistics; like strength, carry weight, stamina etc. As the player moves through the dungeon the enemies will get stronger as the player levels up, until they encounter the Boss Room. This is where the character has to beat the Boss in a final battle to win the game. If the player dies within the

dungeon then they lose, and they then must create a new starting character and begin all over again, growing stronger along the way to try to defeat the final Boss again.

The Setting for the game will be in a dark dungeon, with set back grounds which indicate where the dungeon will lead for the character, be it if there is a left turn, right turn, both, if it continues etc. I could have doors drawn into the background which could indicate the different rooms. Parts of the dungeon which haven't been visited yet will be hidden from the player, so they don't know what is inside the room. This means that they can move into a trap room at any time. Once the player is in a room though, they can "run" to the last tile they were at. This means that they have the option to not fight the monster, and instead take a different route.

There will be a small menu in the very middle bottom which will give the player all the options which are open to them, be it to move in a certain direction, and then to the side of their options, but still in the same box there will be the description of the current room. The menu will change when the player encounters an . The menu will show more options, these options are;monster change which weapon they want to fight with. weapon, it changes the icon displayed next to the character menu (Which will be talked about later) showing how much base damage and the multipliers the current weapon has.The menu will give a description of what is contained in the current tile, and if a monster is in the tile, a description of the monster. This menu will allow the player to change their equipped weapon.

There will also be text which appears. This text describes the damage dealt or taken. This text will be located just right of the very middle of the screen and will keep the player up to date on what is happening in the battle, allowing them to make better decisions when playing through the game. and will be there to tell the user what is happening in the current fight so they can make the correct decisions. It is also there to make sure the user does not miss any important information which may lead to them losing the game.

There will be a small screen just to the left of the bottom menu, which will show the current statistics on the character. This will show the health of the player, their carry weight and then their currently equipped weapon. This will also show the currently equipped armour as well, showing what the player has a resistance too, and then the amount of damage it will deal to each type of monster.

To the right of the bottom menu, there will be the inventory, this will include, for example provision, gold and other treasures, as well as items like a sword and armour, it will also have items like torches. Extending this there will be a finite number of spaces in the inventory, this limits the space which the player has, meaning that they have to prioritise what they want to carry.

There will be a minimap in the top right which will give a localised view of the area surrounding the player, showing only where they have been, and if they click this it will show a full map, meaning they can plan their route out, or explore areas.

If the player presses a certain button (Escape for example) it will open a

main menu, pausing the game in the background and allowing the player to save, overwrite saves or quitting. Having this save feature will allow people to pick it up, and to then come back to it as the game, on the harder difficulties and on a bigger map will last for quite some time, meaning this would be a crucial feature.

3 Computational Methods

3.1 Thinking Abstractly and Visually

I need to begin to think Abstractly and Visually, this is because it would be impossible to accurately simulate everything which would happen in the dungeon, and would also be impossible to code, this is because of my own limitations and ideas. This means that some ideas will be lost for a more simple reconstruction which achieves the same effect. This could be for example when battling monsters, the monsters will have a single simple attack, and then multipliers which will be added to the attack. This means that it simplifies the idea that if the monster was real then it would instead have an array of different attack styles which will all do different "damages". Another example is that different attack styles would do different amounts of damage against different armour. This could be simplified with armour levels, as light armour like leather or chainmail would absorb less damage and would therefore have a lower armor level. This is a abstract of real life as if you take light armor it allows the person to have more maneuverability, but at the same it would take less damage against certain weapons.

There are certain aspects of real life which I was not sure if I was going to include or not, this were aspects of life like eating and drinking. I was also thinking about including the idea that when you are damaged you deal less damage, as this would be similar to real life. After talking to my Stakeholders I have came to the final conclusion that eating and drinking would take too much effort to keep track of, and would take away from the core idea of the game. They would also think that the idea about decreasing the amount of damage that you do was a good idea at first, and then later Jimbo came back and said that it wouldn't actually be a good idea, so I don't think I will be including any of these aspects as it would be too close to real life and would take away from the main idea of the game, it would also feel unfair for the user to die in battles because of a strong hit by the enemy.

3.2 Thikning Ahead

When coding the dungeon crawler I need to look at the inputs which are needed for the game. I think that I would need the mouse for the user to select what options they want and what action they would want the character to do. This would be the first input. I would also need the keyboard as this would allow the user to input the name and other information about their character. After this

I would mainly use the mouse, and the keyboard would become unnecessary.

When coding my game I will need to code in error handling, this is when the player enters the wrong data type for example, and without the error handling the whole code will break, as there wouldn't be the expected data type, and would therefore go wrong when I try to work out values. Null values may also break my code, and I need to catch any errors when they appear.

3.3 Thinking Procedurally and Decomposistionally

My problem can be broken down into sections. I can separate the windows into a main menu, this would allow the player to select what they would want to do, this could be to open the options, to exit or to load up a old save or to make a new one. Each of these options will lead on to the next window. Each window will contain its own menus, only building what it needs and when it needs it. Having the forms like this means that the code will be much faster as it will be more optimised as it will only need to load up the menus which it needs. When the game loads the game make a new maze, this maze will be built from Tiles, and these tiles will contain either a monster or a room. There will be a tile class which means I can have a maze of any size as I can just make more tile objects. When I populate the maze with rooms, some of the tiles will be assigned a room, if it is not assigned a room, the tile will have the room value of null and will not contain a room. The same method will be applied to the monsters, as this will allow a even spread of monsters to be applied to the maze of any size.

As the player moves through the maze he will pick up items from the ground, this will be stored in their inventory. This will be a parent class, and then there will be a class for Gold, armor and then other misc items which for example could be potions. Having inheritance means that I only need to code certain aspects of each item once, as they all share the some of the same properties, such as being a item which can be stored in the players inventory.

3.4 Thinking Logically

When thinking logically, it concerns the idea of thinking with iterations and selection. There will be multiple loops in my code. On a larger scale the game doesn't have too much iteration, the game will have replayability though, and the user will have to make decisions, but the computer doesn't have to make many decisions itself, instead it just reacts to what the user chooses to do in simple ways.

When looking at the code there is a lot of For loops, this is classed under iteration. We can see that it is used when moving through the 2D arrays of tiles. When deciding what to do the computer uses If statements, this is called selection, and there will be multiple of if statements throughout my code, for example when the user has found a treasure room, the computer needs to send back the correct items contained in the room.

3.5 Thinking Concurrently

In my game there isn't code which is called at the same time. Within my game everything is executed in steps, which is dependent on what the user chooses to do.

Even when creating the maze there isn't any code which is executed at the same time as when the grid is created everything which is placed on to of it (The Monsters and the rooms) are all placed individually, I have executed my code this way to make sure that there isn't a monster placed over a monster etc. I could have 2 threads placing monsters throughout the maze if it is large enough, but at the current time there doesn't need to be another thread, so I will code this in at a later date if I have the time.

4 Stake Holders

5 Researching the Proposed Solution

Information about my Stakeholders My Stakeholders are Jimbo Giling, and Peter Cunningham. I think these two people will be suitable for my game as they both bring different angles to my project, and will input different views, ideas and solutions which appear. I know these people personally, and can easily contact them, this will allow me to get a fast response to my questions even in time outside college. Having this fast response means that I can tailor my game to fit them as they are in the target audience quickly and efficiently.

I asked Jimbo to be my stakeholder because he will bring ideas for the enemies which the player will be encountering throughout the game. He has played many fantasy games which will give him a wide range of knowledge in enemies and encounters which I can code into my game. This will keep the game interesting even when the player is on a larger map.

Peter is more interested with the design of the character. He can bring armor, weapon and other item ideas. This could be the items which they are picking up, or the apparel which they wear as well as the apparel on the monsters. Peter can also help me with the HUD (Heads up Display) which could also be called the user interface, the HUD is a crucial part of the game, as this is what they will be interacting with, so a HUD which is simple to use and aesthetically pleasing would be crucial.

I think Jimbo and Peter alike have felt a dissatisfaction in the current release of RPG games and how alike the game-play is in all of them. This is why they are both looking forward to my randomly generated levels and interesting encounters. Peter has also found a lack of a challenge in current games, and therefore means that he loses interest in the games which he plays, so having a level system would suit him massively.

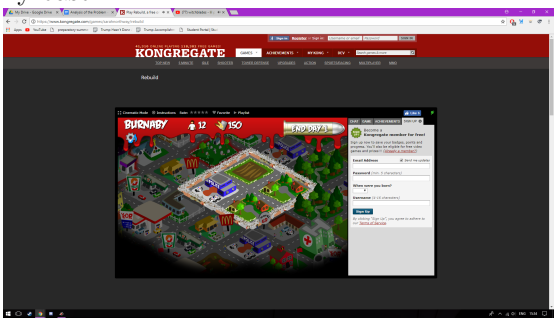
Jimbo took GCSE art, this will allow me to ask him about my art work, and will take ideas which he produces, making sure that the HUD and the monster design is to a certain quality. Peter plays a lot of single player games, this forces

me to keep the game to a high quality so it keeps him interested.

5.1 Similar Solutions

5.1.1 Random Generation

I looked at a game called "Rebuild". In this game you are placed in a post apocalyptic world surrounded by zombies. The goal is to grow your base and survive until you reach a win condition. Every time you load into a new City the terrain around you will change, for example in this game I have a Mall next to my base:



In this game there are constants, you are given 12 people and 150 food to start with (This is in the top bar in each image). This is a good idea as this means when you start a new game you always know that you will have a strong start, and then from them you

5.1.2 Ramping Difficulty

Furthermore in Rebuild, the zombie attacks on you city ramp over time, meaning it is always getting harder and more challenging. I would like to include this in my own project so the game doesn't get too easy in the late game, and also meaning the final boss will be around the same difficulty no matter when you face it in the game. I can either do this as time goes on, which is how this game works, or instead the average XP of the players characters. This will be standard for all difficulties, so when you select easy, the game will be easy thought out, or when you select hard, it is still hard until the very end.

5.1.3 Appearance and Audio

I much prefer having my game first person, this will increase the connection the player has to the characters, as well as increasing immersion. Even though the graphics are not realistic, I would like the audio to be convincing. So I will be looking for copyright free audio samples which I could use on my game. I wouldn't be able to achieve graphics like this so I would like to do basic pixel art, as this is more accessible for me. This will allow me to use skills which I have learned in GCSE art, and also to ask Jimbo, my stakeholder with advice for this as he also took GCSE art.

I have found a game called the Legend of Grimrock. This is what it looks like:

As you can see, it has items in the bottom right, and characters in the top left. This is somewhat what I would like my game to looks like referencing the HUD, but the background is exactly what I would like it to look like, although the graphics would be in a pixel art style, and will be 2D. I would like enemies to appear in front of the player when the player enters that monsters square. I don't know whether I will indicate what is in the next tile at this point in time. Furthermore I would like the enemies to have an indicator for the Health and other statistics, to give the character information about what they are facing. This is contained in to top left with each Character, but I will only have one character which the player will play as. This means I think I will have a seperate menu section for the health and statistics which will be in the bottom left.

After talking to my stakeholders I should not indicate what is in the next rooms, but instead indicate where they can next go. This will keep the idea that everything is random until discovered and entered.

The inventory on the right will be exactly like that, but with an increased number of slots which is dictated by the characters carry weight, and inside the slots the item which they are carrying.

5.1.4 Combat

The game above is Pokemon, I will be taking the combat system from this

game. As you can see there is the Players pokemon in the foreground and then the enemy's Pokemon in the background, and to the side of each pokemon there are statistics which are displayed to the player. This tells the name of the two pokemon battling, the level of the two pokemon and the health of the pokemon. Furthermore there is a menu at the bottom of the screen which displays text to the player and then options which they can select.

When you enter a battle with an enemy you decide what to do on your first turn. This could be to "Fight" and then you can select the attack which you will use. You could use something from you bag, this could be to increase the HP of the pokemon on the field. If your current pokemon is low, "KO" (This means it can't be used) or too weak you can swap it out for another Pokemon. Finally, if you are going to lose this battle you can run, allowing you to safely move on. Pokemons combat is turn based.

I would like to implement all of these features into my game. For the "Fight" button, you could select the style of attack to use, for example you could "Lunge" this, for example could be a high damage, but low accuracy attack, compared to a "Stab" where it could be very accurate, but low damage. I could further this with multipliers, for example a "Slash" attack is weaker on armoured opponents, yet stronger on less armoured enemies. This can further develop the depth of the game, as as you move on and spot the boss,you can prepare your character to deal with that Boss type, which is dictated from the multipliers. For example there could be an Undead Boss, which means you should try to find weapons and armour which is more adapt to dealing with undead characters, which could be a fire based attack, or the slash attack we talked about earlier.

The player should have an option to use their turn by selecting an item their inventory. This could be switching weapons, or using some provisions to heal up their character if they are low on HP. Finally, you should be able to run away from the enemy, this means that you move to the room you were last in. This will be used to take a different path way if there is a strong monster in the way.

5.2 Stakeholder Questionaire

This is the Questionnaire which I will be sending to my stakeholders. The answers to the questionnaire will be stated below.

1. Would you like random monsters to be generated through out the grid?
   (a) Yes
      i. If so, what statistics should be randomised?
      ii. Should I make every enemy be around the same difficulty?
      iii. Should I have multipliers? For example, this monster has a specific weakness to fire.
      iv. Other Ideas
   (b) No
      i. How many monsters should I set?

2. Should I limit my inventory?
    (a) Yes
        i. The carry weight integer should be the numebr of items a single character should hold
        ii. Some items should not be carried, for example arrows.
    (b) No
3. Should I add a scoring system?
    (a) Yes
    (b) No
4. Should I add a constant music, maybe ambiance?
    (a) Yes
    (b) No
5. Should I add audio cues, for example when you reach a treasure room, there is a small jingle which playes?
    (a) Yes
    (b) No
6. Should all the dungeons be the same, or should I change to a different background, for example it could be inside a pyramid?
    (a) Yes
    (b) No
7. Should the user be able to see all of the map?
    (a) Yes
    (b) No
        i. How much should I limit it by? Or should I only allow the player to view the tiles which trhey have been on?
8. Should I have a constant minimap in the main form, or should I have a map form which they can always keep open?
    (a) You should have it in the Mini Map style
    (b) It should be contained in a seperate form
9. Please enter further ideas on the game.

I have kept this questionnaire short, and specific. I believe this will be better as I already have a good view of what I would like the game to look like. Although on some areas, im not too sure what to do and this is why I have asked my stakeholders. This will allow me to clarify what to do and how to attack these problems, as well as giving me new ideas to develop and move into the game. I can also ask my stakeholders throughout my project, as they are easy to contact them to get a quick answer.

Peters response:

1. Yes, I think you should have range where the monsters health, attack damage etc should be.

   This response was originally in line with my own opinions, as this will keep the mystery when moving into another tile, and facing a random boss.

2. *Yes, I think the inventory should be a visual grid, here there is a limited amount of squares.*

   Peter gave the example of the game Runescape, the inventory looked like this: