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Computer Games Development
Project Report
Year IV

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Acknowledgements

Project Abstract

The project I will be working on is a blockchain mining game, and I will try to implement the blockchain technology as an extra game mechanic instead of it being the full focus of the game.

So, the solution for this will be using a Game Engine to create a fun and enjoyable game and then integrate Blockchain into the game and have the player log into his account and pass in the Ethereum wallet address so that he can earn tokens while playing the game.

The reason I chose this solution is that it will speed up the process of the game development, the I can create and API for the blockchain integration basically requests and transactions. Once that is done correctly all the player will have to do is sign in and pass his wallet address and then just enjoy the game and earn tokens while playing the game.

Project Introduction and/or Research Question

Blockchain technology have been growing in popularity recently and made its way into the gaming industry. Most of these games make use of the blockchain for profit and/or marketing with the main aspect of these games being that you earn money from playing them.

This project will try to investigate the process of making a blockchain game, the technical challenges that come with it and the use of blockchain to better the experience for the player playing a game with this technology, by trying to make a fun and enjoyable game instead of just giving them only one reason to play which is basically to earn money.

In this game the player plays as a miner and explorer diving into dangerous caves and mines to try a gather any riches he can while evading or killing enemies. The game spawns you in an area with the cave entrance and shops, when the player goes into the caves, he will come across multiple custom levels and randomly generated levels with enemies and harvestable token blocks. The harvestable token blocks will grant the player tokens which are used for

spending in the shops, these tokens get converted into actual tokens on the blockchain by minting the amount harvested to the players wallet.

This project will take the blockchain aspect of other popular games and will add more gameplay than some of the other blockchain games. The transactions for blockchain only happen when the player decides to leave the caves (at the end) and when buying upgrades and items in the shops in the HUB area of the game. It will also try to be more for the casual players and not only players that want to make money.

In this document I will also talk about my inspiration for this project, the main technical achievements. I will also talk about where I think the project went well and where it went wrong as well as my opinion of where blockchain games can be taken in the future.

Literature Review

Blockchain Games

The Blockchain is a distributed database that is shared between the nodes or 'Blocks' which takes care of storing records of transactions and tracking assets in its network. Each block has data not only about itself as it also has data of the blockchain which allows for validation of each block in connection to the entire chain. The nodes or 'Blocks' are in most cases across multiple computers without any authority for the validation of transactions but using cryptographic algorithms to validate them.

On top of many cryptocurrencies are tokens which are like a currency with the worth of them coming from its parent cryptocurrency. There are two types of tokens (FT) Fungible Tokens and (NFT) Non-Fungible Tokens.

The Fungible Tokens are the same as any other cryptocurrency as each one is worth the same amount so that means they can be exchanged for the same number of tokens of the same type.

The Non-Fungible Tokens are each unique and have which means they have different worth, and the worth depends on other sources. These tokens are most often used for the ownership of digital works of art, with the price of it being depended on and set by the highest bidder like real works of art.

The Blockchain games aren't new as they have been around for several years, but their popularity started growing recently. Majority of the game use this in a way where the player is working for crypto rather than being awarded with it. This makes most of these games not put any focus on fun. Hence people don't play these games for fun and enjoyment but just for

the reason of earning some crypto or NFT's, which the earning of is the main mechanic in the game.

Trending in the gaming industry

Majority of the blockchain game use the business model of 'Play to earn' in which games the players play games that are based on earning or winning and losing cryptocurrencies by skill or luck.

Although nearly all these games are free to play, they all require the player to put in some kind of a fee or stake into the game in exchange for items or stuff in the game so that they can begin playing the game. After this the players have potential to earn more or lose their investment. As the tokens in the game have actual real live value players can buy and sell any tokens at any given time they want as long as there are players willing to buy or trade these tokens.

The most successful types and trends of games in the gaming industry are Real world modelled games that already include winning or losing money such as different types of gambling, Farming games where the player buys seeds and grows them, and they have a chance to fail and wither away or give little back once fully grown.

Potential for these games

Although the opinions of using blockchain technology in the gaming industry are not the best and I agree with some of them, I feel like this technology has great potential but only if it is used in a right way.

As all companies in the world make decisions based on profits in mind at least majority of the time, I think that as long as crypto games will be created with only profits in mind by their developers these types of games will become a loop of poor experience by the players and behaviour that manipulates people to put money into the game by different influencers so that they can cash out.

The fact that entry cost into these games could be used as a whole new mechanic with layers of risks to every interaction the player takes. For example, the players could lose a part or all of their currently equipped stuff and anything else they are carrying on them on death this would prompt the player to critically think about each decision and step they take as they could be at a huge loss with the smallest mistake or mess up.

This could be countered by the fact that the rewards could be way greater than the risks which would cause players to make more critical decisions and it would be way more satisfying for all different types of players depending on the game.

For some players it would be gathering, harvesting and crafting gear and items to fight difficult enemies but they have more to lose but the reward would be great enough for them to try and kill the enemies but it would also be easier for them, and for others it could be learning the game mechanics and perfecting them in order to defeat the difficult enemies with less stuff and pure skill which in their case would grant way better rewards compared to others but also less of a risk of having a great loss but it would make it way more difficult.

In this project I tried to bring the aspect I mentioned in the paragraph above me as in the project if the player dies in a level, they lose all the stuff on them in the cave (tokens they have harvested since entering). Using this method, I tried to have players think more critically about their decisions and as a result have them earn tokens by playing the game.

Project Milestones

I never set any hard deadlines / milestones for this project, but I did have general goals for progress and the order for it.

Within the first month I created a game with a tile based world and platformer styled movement, and a basic enemy as well as a destructible block that could be harvested.

Next, I created an upgrade tree that used the harvested tokens to upgrade specific stats of the player and its gear, as well as adding more enemy types with different stats.

Randomized level generator took longer than I expected but I still had enough time after this to add extra features before the deadline of the project.

I was planning on integrating the blockchain and creating blockchain features earlier than I have but I still wasn't sure what way I'll be integrating and adding blockchain to the game, so the Blockchain integration was one of the last features I added in April, and it was also the feature that took me the longest to add taking over a week.

Major Technical Achievements

I put a decent amount of effort into random world generation and a bit of effort into the upgrade tree.

The world generation uses Open Simplex Noise which is like Perlin noise but has a lower computational complexity and requires fewer multiplications making it faster and more efficient. This creates different somewhat natural looking terrain which can also be easily modified and tuned in the editor to get a more desired result and its easy to see what kind of terrain is created as it receives feedback and generates the world based on it in real time.

The upgrade tree was a bit difficult to start it of and structure it so that the upgrades would require specific previous upgrades and that they would connect to the next upgrade once one was bought. Once that was set up all the upgrades can be easily added into any screen and modified in the scene to set up its description, its price, its type, and the upgrades it requires to be bought and what upgrades it allows to buy.

The last major technical achievement I had was the implementation of a blockchain API which was somewhat complex and the lack of documentation and majority of documentation available being out of date wasn't helpful and it took a decent amount of trial and error as well as finding other documentation and schema references online.

Project Review

The game could still use a bit more of different unique features as well as refinements and polish, the game itself is quite fun and enjoyable but the first 5 levels being custom they are quite repetitive and can be done with ease and quite quickly.

The game takes inspiration from a couple of similar type games. The game could still use a few features to improve gameplay and difficulty and some more aspects of the blockchain to have a bigger variety of tokens in the game such as different Fungible Token types that each has a different value and or use and some Non-Fungible Tokens for very specific and limited upgrades.

There is still a couple of outstanding / missing features that I was planning on adding to the game, but I ran out of time. The two biggest features that would add the most to the game was a grappling hook and a swarm enemy.

The swarm enemy would have been a flying creature that just roams randomly around the level and once it would spot a player it would signal or alert all other enemies of this type in the range of its signal. The enemies would then use A* pathfinding to go to the players location and swarm him, once all these enemies would lose sight of the player they would go to its last location and wander from there.

The grappling hook would have let the player grapple to walls and ceiling and get pulled to the location in a straight line. I was also planning on trying to develop the hook more down the line to use rope simplified physics.

If I were to do this project again or advise someone doing a similar project in the future, I would put a focus on setting up sprints and deadlines for features and try and stick to them as close as possible. I would also start the blockchain integration early on to get it out of the way as soon as possible and that it could be tested more throughout the development of the game.

Using Godot probably made the blockchain integration harder than it should have been, as there is no existing support for it. But it made a bunch of other in game feature simpler than they would have been in other game engines such as Unity or Unreal.

Conclusions

The development of a blockchain game adds a whole new bunch of difficulties other than the technical features, such as:

- The economy of the game will have to be planned out in a lot of detail, as the smallest mistake could let players abuse it which could cause great financial loses to all invested into the game, such as the owner or owner company of the game, developers, and player, basically anyone that plays the game and isn't aware of this mistake or exploit.
- This game requires an Ethereum wallet which means it introduces the difficulties of understanding how cryptocurrencies work and setting up a wallet, which will deter a lot of players from even trying the game. This will also create a barrier for those that can create a wallet and understand how cryptocurrencies work as they will have to put a stake in the game to earn money.

Future Work

If any student next year was going to undertake a project in this area an interesting thing for them to examine would be the aspects of different blockchain integrations into games and apps. Then they could compare the aspects of it such as ease of use, how hard is it to add, what kind of benefits and drawbacks they have in between them and how easy is it for the user to interact with it on order to earn tokens in the project.

Another thing would be trying to create a browser game that uses blockchain and something like meta mask so that all the players would have to log in to the wallet and enjoy the game without having to many validations and requests to accept sent to him.

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