Cyberpop Whitepaper

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Abstract. This paper provides the main idea and core design of the game. We build the Cyberpop metaverse game based on Web 3.0, App Chain, Highly Customized Pipeline and Multi-platform Techniques. We use these techniques and our economic system to let the users join and create our Cyberpop world.

1. About Cyberpop new world

Cyberpop New World (CPW) is a 3D MMO-ARPG with a AAA quality presentation, providing a feast for your eyes and senses. At the starting point of the journey, players will enter a near-future society filled with highly developed digital and biological technologies. As the foundation of this world, we have integrated popular features and visual aesthetics of Cyberpop.

Unlike Cyberpunk, this world leaves players feeling adventurous, positive and hopeful. Therefore, we call it Cyberpop instead of Cyberpunk. Players will have a virtual identity in CPW. They can explore, combat, socialize and even create the world. It's not just a Cyberpop world, but also a real world. The reason why this world is real lies in its Metagame elements: the whole game is trying to break the fourth wall. For example, all NPCs in CPW allow players to live out their fantasies. Therefore, players can act out all kinds of fantasies and become whoever they want to be in the world of CPW. Players can explore many different cyberspaces which are all connected in CPW, from the desolate Wasteland to the MagicPunk with the visual aesthetics of "Dune”. We have prepared infinite possibilities for players who want to experience a different life in another reality.

2. Game Play

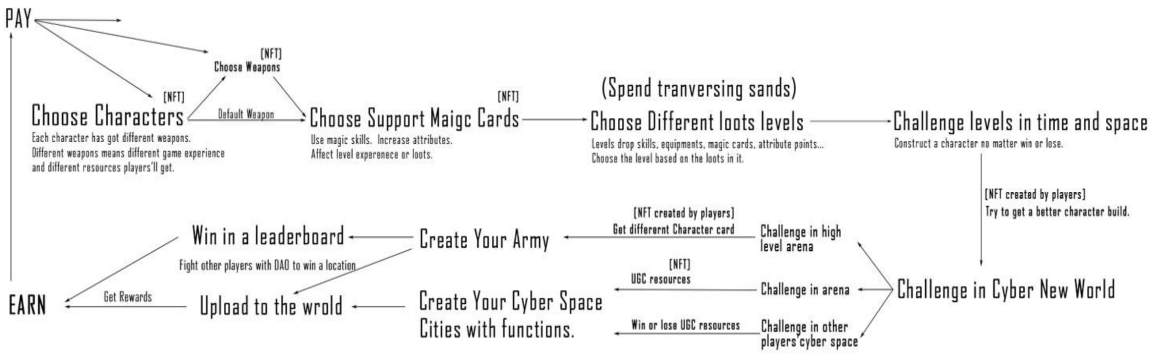
PAY
[NFT]
Choose Weapons
[NFT]
Choose Characters
Each character has got different weapons.
Different weapons means different game experience
and different resources players'll get.
Default Weapon
[NFT]
Choose Support Maigc Cards
Use magic skills. Increase attributes.
Affect level experenece or loots.
(Spend tranversing sands)
Choose Different loots levels
Levels drop skills, equipments, magic cards, attribute points...
Choose the level based on the loots in it.
Challenge levels in time and space
Construct a character no matter win or lose.
[NFT created by players]
Try to get a better character build.
Challenge in Cyber New World
Challenge in high level arena
Challenge in arena
Challenge in other players'cyber space
[NFT created by players]
Get differernt Character card
[NFT]
UGC resources
Win or lose UGC resources
Create Your Army
Create Your Cyber Space
Cities with functions.
Win in a leaderboard
Fight other players with DAO to win a location
Upload to the wrold
Get Rewards
EARN

Figure 2.1

As shown in the Figure 2.1, we have a game loop to let players set a goal in different stages. In the initial stage, players can buy a character NFT and a weapon NFT . Later on in the game, players will get new NFTs. These NFTs are important for combats including PVP and creating players' own cyberspace in the virtual world. Let's explain more concepts below.

- **Training**

You must choose a character, equip it with a weapon, and load it with a variable number of support cards (we highly recommend a full load) to start a round of training.

In a round of training, you can travel through different time zones and spaces. Different levels mean different challenges and rewards, etc. players will experience different level content in each round of training.

The training gameplay looks like an ARPG version of Pretty Derby. Players can shape their characters based on the unique experience in the cyperspace. If players do think they build a very good character, they can mint the character into a NFT to sell in the market. We call it Character Parallel Simulation. These NFTs are important for the gameplay in the following stages as shown in Figure 2.1.

- **Arenas**

Character Parallel Simulation can participate in arenas to challenge levels. We give UGC resources in limited numbers in arenas. The UGC resources are NFTs which can also be traded by players.

Players can also receive a character card based on the rewards they get after finishing the rounds of an arena in a higher level. And this character card will be useful to create an army to fight in the virtual world created by players and developers.

- **Cyber cities**

The UGC resources can be used to build the virtual world. A city built by players is also a NFT . They can upload their cities to our virtual world. Different locations have different hashrates in the virtual world, which means different productivities. players can also fight other cities with their armies and DAO support.

3. NFT

- ### Characters

Characters can be obtained by opening blind boxes (or so-called treasure boxes), and repeatedly obtained characters will be automatically converted into corresponding character fragments.

By consuming character fragments, players can increase their character's card rating, earn assignable attribute points and unlock unique passive skills.

- ### Weapons

Weapons can also be obtained by opening blind boxes. players can increase the weapon star rating and its base value by consuming weapon fragments. Weapon Cards are rare. The rarer the weapon cards are, the higher is their defense ability.

- ### Support card

Support cards are obtained by drawing blind boxes or challenging a game level. Repeatedly obtained support cards will be automatically converted into corresponding support card fragments.

Players can increase the cards' star ratings, basic stats and skill effects by consuming support card fragments. The rarer the support card is , the bigger is the effect of its skills.

- ### Build Simulation

In the training period, players will build a unique Character Parallel Simulation by challenging different levels to obtain the following contents.

• Character attribute points

Players can improve characters' abilities and build up their experience and attributes.

• Equipment

Random affix values to build up characters' attributes.

Weapons are also equipments, which can be upgraded in the game.

• Support cards

Unlock or upgrade the initially loaded support card.

• Rings

Powerful passive effects, combine them for stronger synergies.

- **Skill**

  Unleash brilliant and powerful skills with simple input.
- **Inscription**

  Unlock hidden abilities of skills.

4. The Token

CYT tokens are the main tokens in our game. The total amount of tokens is 120,000,000.

4.1 Economic

3% for Seed Round.

Co-founder Team owns 3% of the total token supply very early on. Once it is listed, 10% of Seed Round will be released at first. The next 90% is released linearly in 24 months.

3% for Advisor.

Advisors own 3% of the total token supply. Once it is listed, 10% of this will be released at first. The remaining 90% will be released within 24 months, at the rate of 3.75% per month.

7% Round A.

We will release 7% of the total token supply in Round A. Once it is listed, 10% of this will be released at first. The remaining 90% will be released in 10 months, at the rate of 9% per month.

8% Round B.

We will release 8% of the total token supply in Round B. Once it is listed, 15% of this will be released at first.The remaining 85% will be released in 10 months, at the rate of 8.5% per month.

3% Round C.

We will release 3% of the total token supply in Round C. Once it is listed, 25% of this will be released at first. The remaining 75% will be released in 5 months and 15% will be released each month.

3% Public Sale (IDO).

Linear release in 2 months.

12% Community build.

We will have four rounds of community building. In the first two rounds, we mainly do some airdrops. in the second two rounds, the game union will be introduced for further cooperation.

30% In Game

30% of our total token supply is in circulation in the game. Most of NFT props and artwork income are used to support token prices, others are used for rewards and activities.

12% Team

The Development Team owns 12% of our total token supply. The tokens will unlock after 10 months, after which tokens will follow a monthly linear release schedule within 2 years.

17% Cyber fund

The Cyberpop fund will be used for development and maintenance of Metaverse systems, including long-term project management, partner support, academic funding, public work and community development.

2% Rewards

The tokens will be used to pay interests to players who mint their NFTs in the game.

4.2 Governance

We are using CYT tokens to manage our game. Participants holding CYT tokens can vote and decide the direction of our game development. When development node arrives, participants can vote to decide which features come first using Quadratic Funding.

4.3 UGC content value build

We make this loop to build the values in the game. The main idea is to quantify the participants’ contribution with rewards. The basic workflow is shown below:

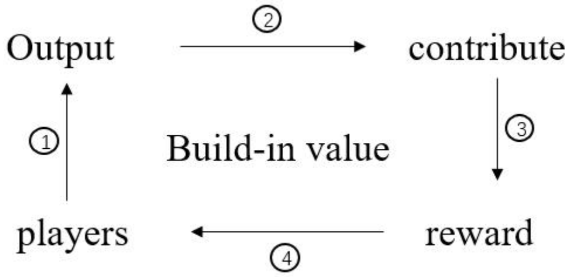

Figure 4.1

① **Guide users to generate content**

Cyberpop will provide the UGC Editor. Players can create their own NFTs like buildings and transports using the editor. Players can then cooperate to build a city together.

② **Calculate the value of players' contents output**

Players create contents. Their contribution will be valued and calculated in the game. It will trigger the Dynamic Recommendation Algorithm and the statistics will be shared in the Community.

③ **Calculated the Reward based on contribution**

The mechanism will calculate two parts of players' contents. The first part is based on the cost of the content, and the basic parameter is given by the system. The second part is decided by our participants. Wilson's Voting Algorithm will calculate the value according to all participants' feedback.

④ **Return reward and make build-in value**

The participants will earn a long-term reward if their contents exist in the cyberpop world. The yield curve satisfies diminishing marginal benefits.

5. Promoting Mechanics

5.1 Promoting through partners/agents

We welcome partners from all over the world. Regional Influencers will become our important partners by joining our community. For our partners, we will offer the following privileges:

- Independent second-level domain name.
- Exclusive NFT, no numerical attributes can be played in the game.
- Data analysis and tracking.

Users who are pulled by our partners can obtain continuous benefits for their continuous participation in the game.

In the process of finding partners, we strictly abide by relevant laws and regulations.

5.2 Promoting through players/evangelists

Every player is a member of Cyberpop. Their actions will be recorded and evaluated. The key contribution is to bring new users into our game. The players who successfully bring new users into our game can obtain the preacher title and earn NFT rewards.

5.2.1 Technology and Algorithm

Smart-contract architecture: There are four layers in this system. Our smart contract is released on chain which supports EVM. The game will implement its own high performance decentralization system using in game chain, as shown in Figure 5.1.

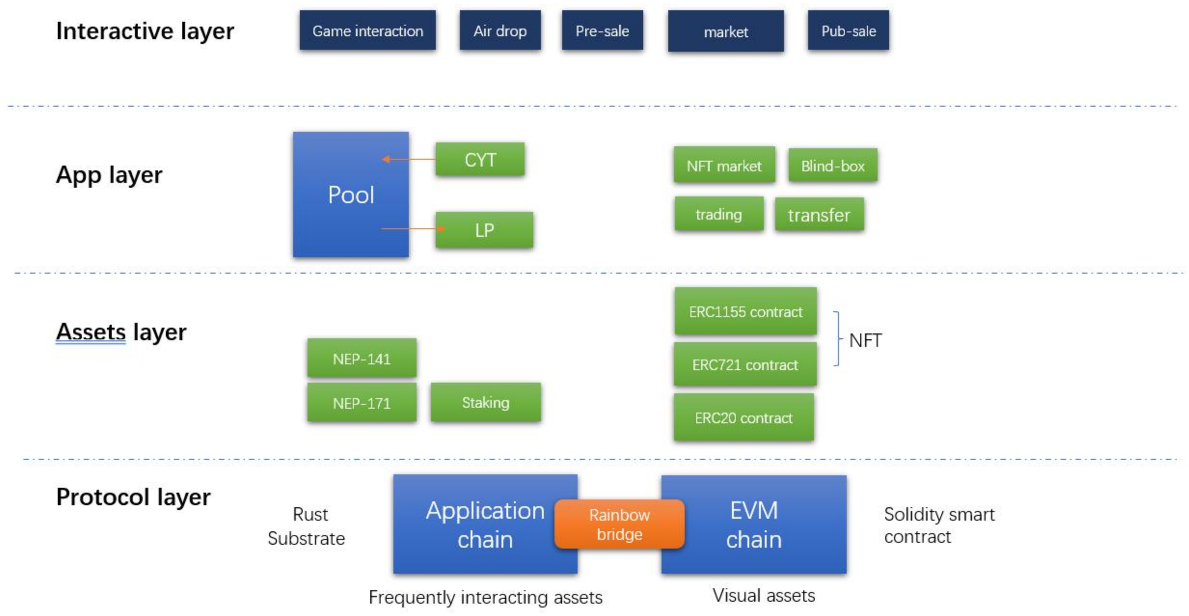

Figure 5.1 Smart-contract architecture

Figure 5.2 below shows our project structure under the computer network architecture, which ensures the smooth operation of the project. The decentralized data blockchain network supports the effective operation of the game.

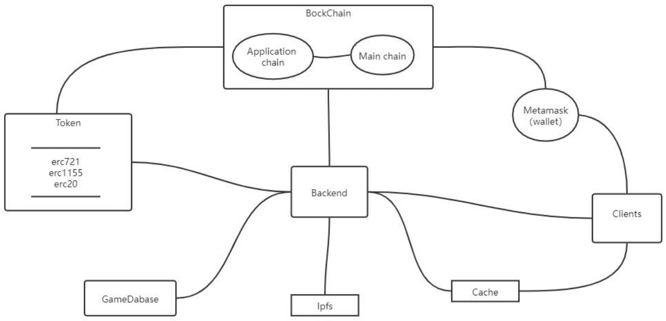

Figure 5.2

• layers create their assets on the backend. These assets will be shown on the blockchain.

• Meta-mask is a web3 provider which acts not only as an intermediary between the user and the blockchain but also show the assets that users own on the blockchain.

• The smart contracts running on the blockchain.

• This cache is connected to the backend and the client, which is used to speed up users' queries for on-chain data.

• We use the structure of GAS fee on the application chain to better adapt to the interaction scenarios in the AAA game.

• IPFS17 (The Interplanetary File System) is a peer-to-peer distributed file system that aims to connect all computing devices using the same file system.

Quadratic funding algorithm: Quadratic funding turns voting into a funding project using an endogenous process. Anyone can contribute to a project and vote while contributing.

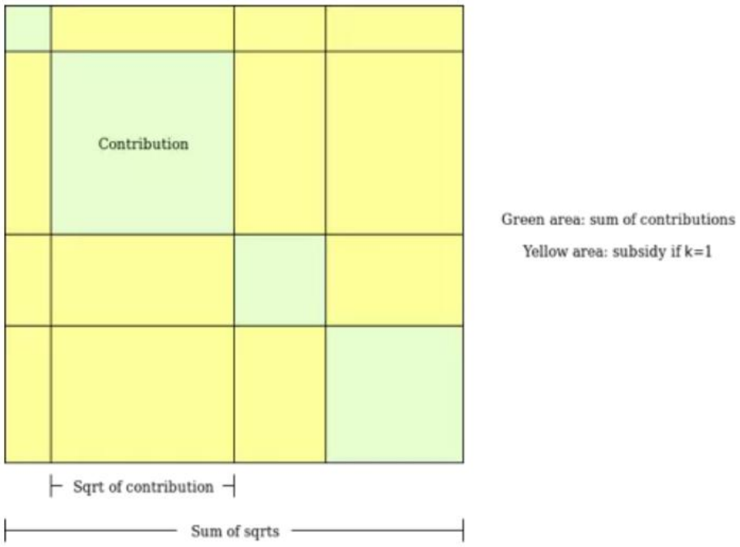

Figure 5.3

Every green block in Figure 5.3 represents a contribution. The big Square C represents total supply amount, and the yellow part S represents a pool supported by external token holders, C= $(\sum_{i=1}^{n}\sqrt{ci})^2$the supply amount is

$$S = C - (\sum_{i=1}^{n}\sqrt{ci})^2, S = C - \sum_{i=1}^{n} ci \qquad (1.1)$$

1) At any time, if there is more than one contributor, $C > \sum_{i=1}^{n} ci$.
2) If S value does not match the Capital pool, proportionately based on the area of yellow.
3) Multiple small donations can lead to large yellow areas, so the project can win more reward.

Wilson's voting algorithm: Users' voting weight plays an important role in this algorithm. There is an identity system designed for players in our game.

$$n = u + v$$

$$p = u / n$$

$$S = (p + \frac{z^2}{2n} - \frac{z^2}{2n}\sqrt{4n(1-p)p + z^2})/(1 + \frac{z^2}{n}) \qquad (1.2)$$

1) When the total number of votes is low, the score of the answer that is approved will increase rapidly. The higher the total number of votes are, the less impact the approval votes have on the score. At the same time, answers with more votes and higher scores start to get affected negatively, and their scores will drop rapidly. The lower the score, the slower the decline.
2) The value range of score is (0,1) and has nothing to do with the total number of votes. (In the old algorithm, score = weighted approval - weighted disapproval, the score difference between different questions is big, and it is impossible to compare horizontally).
3) The smaller n is, the stronger the correction effect of Wilson's algorithm there is.

UGC Editor based on Wave Function Collapse Algorithm: This has been developed based on Paul Merrell's work for generating tile-based images based on simple configuration or sample images. The WFC algorithm is set up on the concept of constraint programming, it is a method to Solve the Constraint.

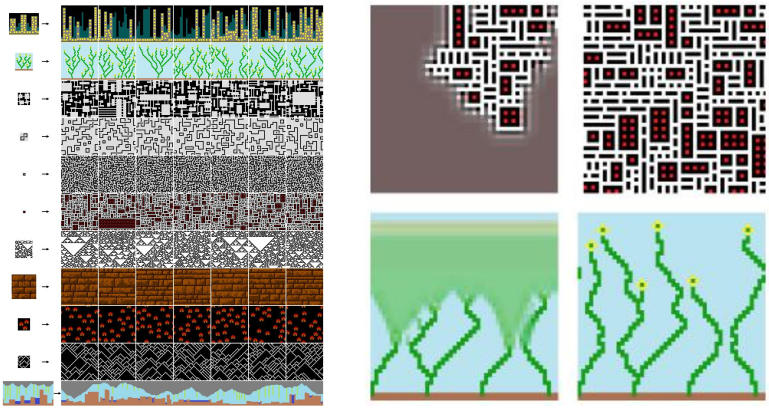

Figure 5.4

The Wavefunction Collapse generator in action: The diagram on the left of Figure 5.4 shows unresolved information as the average color value of their possible outputs.

The algorithm generates contents which are rational in local areas and random on a large scale.

The WFC algorithm can work on 3D space well, here are some examples, as shown in Figure 5.5, 5.6 and 5.7 below.

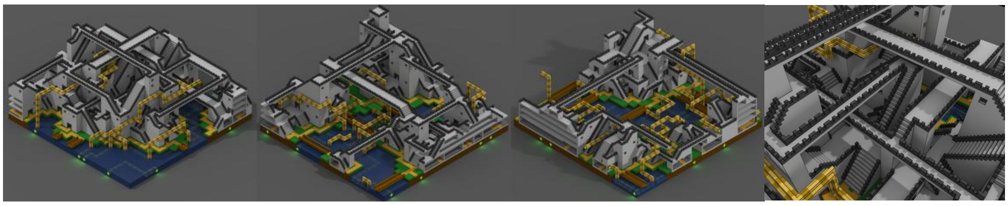

Figure 5.5 3D Examples generated by WFC

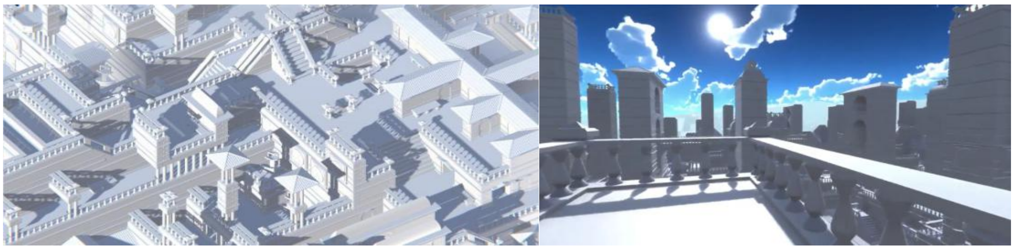

Figure 5.6 Marian Kleinberg created a city generator based on the tiled model

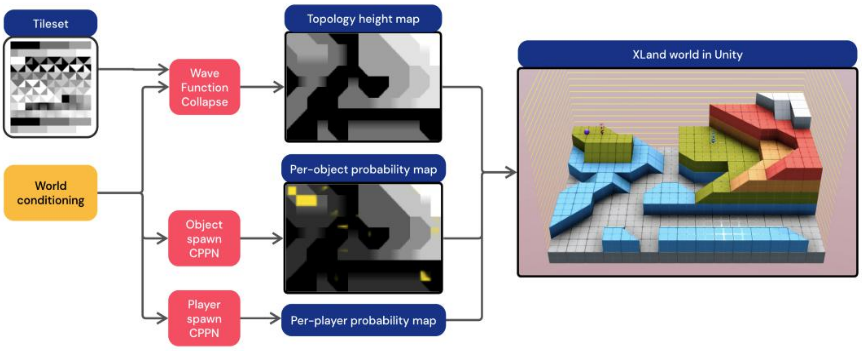

Figure 5.7

DeepMind open-ended learning team used WFC to generate arenas for reinforcement learning agents. The steps of procedural world generation are as follows. The process is conditioned on a seed and optionally an existing world to be similar to. Wave Function Collapse(Gumin,2016,)acting on a tile set of primitive building blocks, creates a height map of the topology. Additionally, for each object and playable CPPN , WFC also creates a probability map for the entity's initial spawn location. These elements are combined in the Unity game engine to produce the playable world.

Multi-Pass WFC: When using WFC algorithm in different scales by several passes, the generated map has more details.

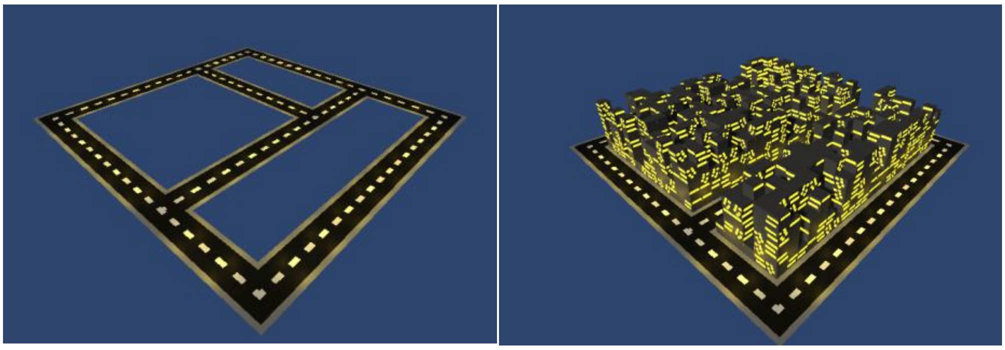

Figure 5.8

Boris the Brave made an example of a Multi-Pass WFC. Figure 5.8 shows the map generated with street on a large scale on the left and buildings in blocks with more details on the right.

Use WFC to aid users' map editing: In our game's map editor, we are using WFC to aid users' map editing. Tile prefabs of different scales are stored, and the rational adjacent relationship information is stored as constraints. Thus WFC can generate reasonable contents in the area. Users can also specify some blocks then the map editor fills the gaps automatically.

Based on multi-pass WFC, users can edit their scenes from city road network to streets, to the buildings on block.

Tiled Directional Static Soft Shadow Techniques: High Quality Directional shadow is very important for visual effects. However rendering real-time shadows for a large scale scene such as a big city would cause big pressure on GPU performance (and CPU in most cases), especially on mobile platforms. Since most of the objects(buildings) in the scene (city) do not move at all, the shadow map for those objects can be generated only once (or once in few minutes for 24 hours lighting) at runtime.

The directional light can be split into tiles, each tile covers part of the scene. For both quality and performance purposes, each tile can render a different resolution of shadow map. For the parts that players can walk around, the tile would render a shadow map with higher resolution, compared with the parts that players can only see in a far distance, as shown in Figure 5.9.

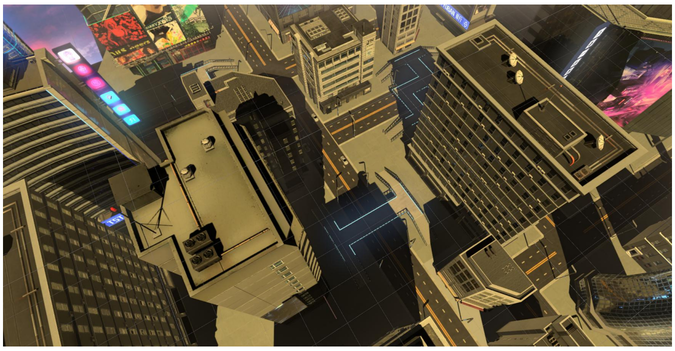

Figure 5.9

GPU-Driven Rendering Techniques: A large scale scene like a city with substantial amount of details would have a lot of objects to render and require generating a large number of draw-calls on CPU at each frame. It would take a lot of CPU time and reduce the entire performance. Since the UCG map is composed as blocks, geometries can be baked into each block off-line. At runtime, instead of collecting rendering objects for the camera and generating command buffers on CPU, the geometry data is sent to the GPU and generates indirect-draw buffer in the compute shader directly, largely reducing CPU cost.

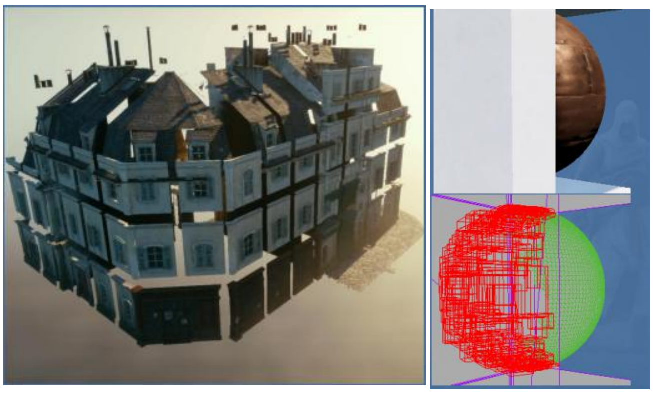

Figure 5.10 GPU driven rendering

Global Ambient from Sky Light: The global ambient from sky light could provide a much more realistic lighting for a big city. As the UCG map is composed block by block, we can bake the occlusion information for sky light in each block off-line and visit that information during rendering to generate global ambient from sky light. As shown in Figure 5.11.

Figure 5.11