# Demo Abstract: An Interoperable Avatar Framework Across Multiple Games and Blockchains*

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*Abstract*—**Blockchain game is the most important category of decentralized applications. However, to leverage the feature of blockchain in state-of-the-art game mechanism design is still a challenge for developers and designers. In this work, we propose an interoperable blockchain gaming framework across multiple games and chains, to facilitate next-generation blockchain games. Two demo games are implemented to validate our framework.**

*Index Terms*—**blockchain, game, software, framework**

## I. Introduction

In addition to a decentralized ledger [1], more and more researchers realize the potential of blockchain [2] can be extended to other application domains, thanks to the smart contract [3] concept introduced by Ethereum platform [4]. In fact, the decentralized application [5] (dApp) become the hope of true value for blockchain nowadays. However, there is still a lack of dApps, despite the notorious initial coin offering (ICO) projects. Digital games, in our opinion, will become the rescue of the blockchain. It perfectly fits the nature of the virtual currency ecosystem to fulfill the ultimate dream of many game players: the items they owned in the virtual world are non-fungible, exchangeable, and inheritable. The major benefits blockchain has brought to the game industry can be summarized as transparency of game rules, the liquidity of game assets, efficient way of new player acquisition, and highly motivated user-generated content.

However, the state-of-the-art blockchain games still in their preliminary stages from the perspective of entertainment. To leverage the feature of blockchain in game mechanism design is still a challenge for developers and designers. First, the interoperability among different games is yet to be implemented. For example, the CryptoCuddles[1] leverages the cats produced from CryptoKitiies to battle. Similar concept can be found in PirateConquest[2] who reuse the players' assets in CryptoKitties and CryptoCountries. However, existing attempts only reuse the existing tokens available in a single direction, which means that the data modification in new games can not make effects on the token they inherit. This implies that, the relationship between the new and the existing games are principal and subordinate, rather than an equal interoperability. Second, current blockchain games are empowered by a specific chain.

Even some games support multiple blockchain platforms, the assets in different chains are still isolated from each other.

In this demonstration, we present Manis, an interoperable blockchain gaming framework across multiple games and chains, to facilitate next-generation blockchain games. Two demo games are implemented to validate our framework.
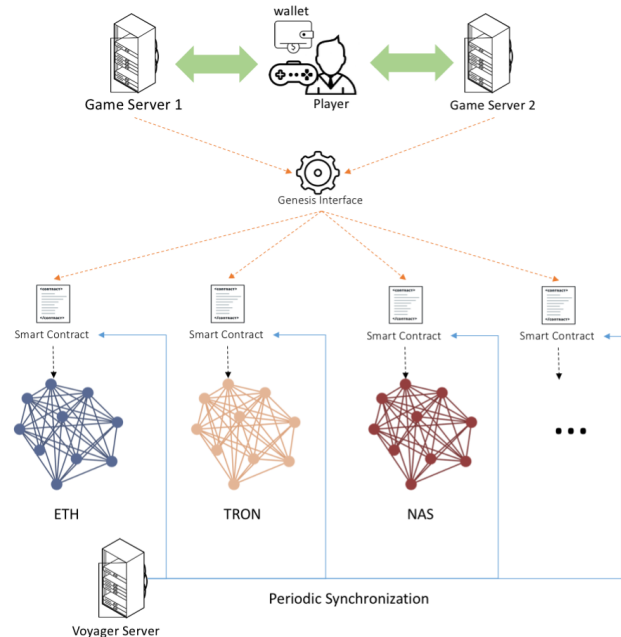
## II. System Design



Fig. 1. Manis Framework

Fig. 1 illustrates the proposed Manis framework, which is consisted of two major components: *Genesis* package and *Voyager* server. *Genesis* is an open source avatar consensus package, including a uniformed interface for shared avatar set and corresponding smart contracts in distinct blockchains. In our design, the avatar data will be stored as variables in smart contracts, rather than immutable tokens defined with ERC721. This approach enables the growth of the avatar during the game progress. The data of the avatar follows the GNU General Public License, which allows the creators to retain their copyright. We have implemented multiple versions of

[1]https://cryptocuddles.com/
[2]https://www.pirateconquest.com/

smart contracts, including Tron, Neo, Qtum, Nas, ETH, Loom and Mana. On the other hand, the Genesis interface provides a simple application programming interface (API) for avatar invocations. By leveraging the Genesis package, different games can share the same avatars. From the perspective of cross-chain data synchronization, we implement the *Voyager* server, which periodically compares the Genesis data sets among distinct blockchains and overwrites the aggregated data back to all chains. With this approach, we are able to facilitate cross-chain gaming experience in an asynchronous way.

## III. Demo Games

In order to validate the idea proposed in Project Genesis, we developed two blockchain games "Last Trip" and "Adam's Adventure".

### A. Last Trip



Fig. 2. Screenshot of Last Trip

As illustrated in the Figure 2, Last Trip is like a story book, players will perform different actions to trigger different events. The actions they choose may apply negative or positive influences on their avatars' attributes, such as spirit, magic, etc. The players need to improve their avatars' attributes to win the battles. After the game is over, the player can upload his avatar to the blockchain. Therefore, players may interact with the past players through the journey. With this approach, the players of the tame will influence the future adventures and contribute their content to make Last Trip's stories continuously increasing.

### B. Adam's Adventure

Adam's Adventure (AA) is a multi-player Dungeons and Dragons (D&D) novel-adventure game powered by multiple blockchains. In this game, the players will experience three modes: Battle of Adventure, Battle of Dark Lord, and Battle of Blood Moon. In the Battle of Adventure mode, massive players will create avatars to adventure in the Dungeon, conquer demons to empower their avatars on their own. All growth in these avatars will eventually be accumulated into Adam, a shared character stored in the blockchain. In our current implementations, different blockchain will create different Adams. In the battle of Dark Lord, the player will use the shared Adam and one random character summoned from Last

Trip to combat the Dark Lord, the evil king created by the system. Each 30 times Dark Lord is defeated in every chain, the battle of Blood Moon can be triggered. The player will use the Adam in their corresponding chain to conquer the Adams in other chains. In this approach, the player can enjoy the cross-chain battle among different Adams in a different chain.
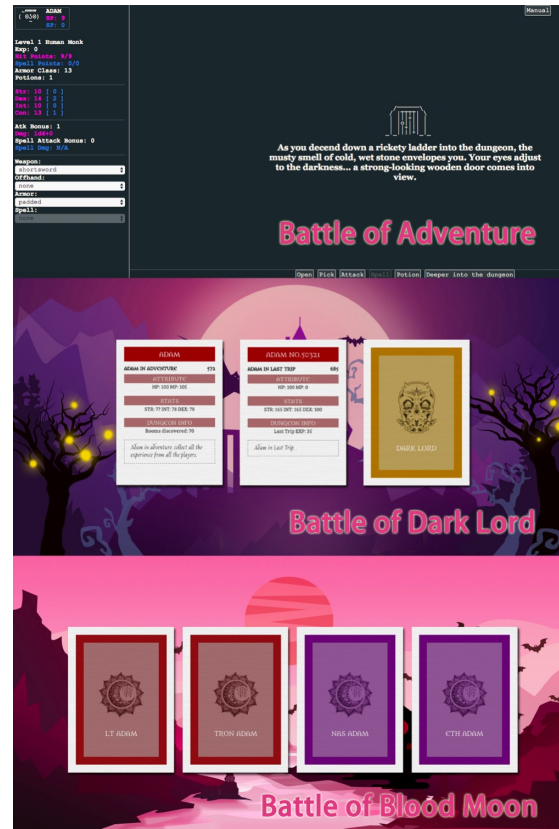


Fig. 3. Screenshot of Adam's Adventure

### C. Interactions across games and chains

After opperatoring these two games for a period of time, the players in Last Trip will encounter the heroes produced by AA, while the players in Adam's Adventure will summon heroes from Last Trip and conduct cross-chain battles. Restricted by the latency and gas fee cost from different blockchain platforms, we adopt an asynchronous approach to facilitate interactions across games and chains.

## References

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