

Cometh Beyond

a DeFi powered videogame with yield generating NFT



Cometh Whitepaper v2.0.0 - October 2021 [for v1 please refer to github, the description below is a living document meant to be updated with new visuals and more in depth descriptions in the future]

Abstract:

Cometh is a groundbreaking strategy and exploration game where players earn valuable tokens, craft items. Cometh leverages the Decentralized Finance ecosystem to create a persistent and sustainable outer space. All the core features of the Ethereum blockchain play a role in Cometh which also leverages scaling solutions to handle millions of users.



Comet 2020 F3 (NEOWISE) on Jul 14 2020

Introduction

Cometh is a blockchain based massively multiplayer online role-playing strategy and exploration game. It leverages the blockchain to create a persistent and programmatically expanding world that the players can explore, hold and conquer. The players engage in several activities, including mining, piracy, manufacturing, trading, exploration, politics and combat. Cometh uses decentralised finance services to foster the sustainability of its internal economy and to expose the players to blockchain third parties.

As a player you control spaceships orbiting around giant stars, you can travel to other stars or explore the area nearby by interacting with other players and crafting items. While Cometh exposes a story designed to unravel itself over the course of 12 months, a player can either actively participate in the development of the story by teaming up with other players to push the boundaries of the known universe or passively by taking part in Cometh economy and politics.

Player owned Assets: Spaceships and Items

Spaceships in Comeths are vessels capable of mining asteroids and venturing uncharted space territories. From the blockchain perspective, spaceships are Non-Fungible Tokens based on the NFT standards ERC721, ERC1155 and EIP-2535. In basic solar systems, the spaceships have a circle trajectory around the sun. The surroundings of a spaceship is represented by a canvas of tiles. A spaceship can be

pulled in space towards another spaceship in order to get closer to an asteroid or to land in another tile.

Spaceships can be upgraded with other NFTs such as better **drilling tools, engines or crew members** that have effects on the spaceship abilities in the game.

NFT minted by third parties can also have an esthetic or gaming effects once equipped in a spaceship.

The spaceships :

- Are provably rare, very stylish and sometimes also one of a kind
- Have a random color scheme impacting the game play
- Can be rented to other players
- Let you passively or actively mine asteroids
- Let you cooperate with other players to explore remote places of the galaxy
- Let you challenge other players to steal their cargo

Spaceship's Characteristics

Mining Specs

Every type of spaceship has a set of base values in Radar, Drill and Machinery. The sum of those base values depends on the level of rarity of a type of spaceship (0 for Common, 2 for Uncommon, 4 for Rare and 6 for Mythic). Ingame characteristics are derived from the base values:

- Mining Range is influenced by the Radar,
- Mining Power is influenced by the Drill,
- Mining Cooldown is influenced by the Machinery
- Rover Power is influenced by both the Drill and Machinery
- ...

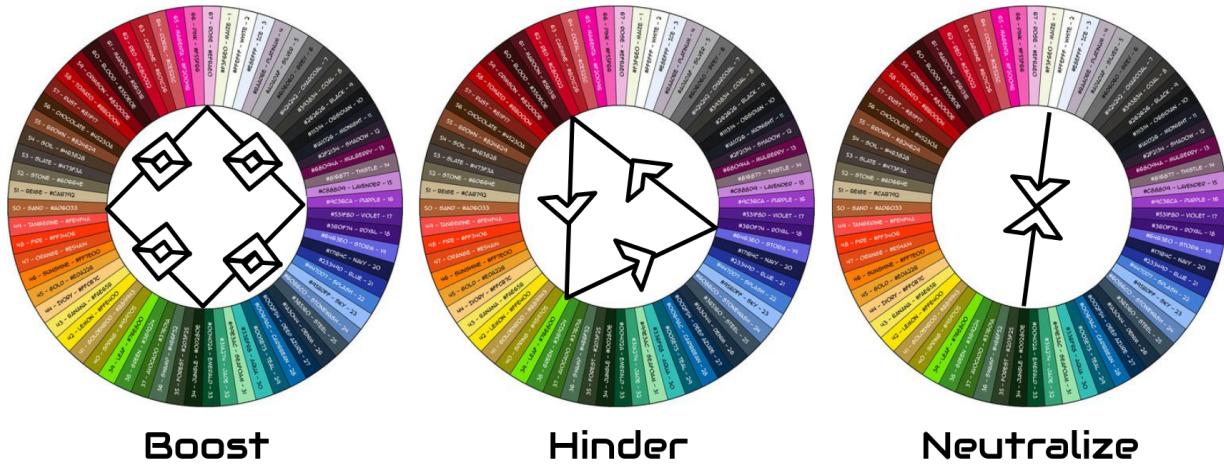
For example, a Monocle is an uncommon spaceship manufactured by the Gotchi faction. Like all the Monocles, it has for base values in [Radar, Drill, Machinery] the set [4, 1, -3] and the subsequent ingame characteristics bellow:



There have been 200 Monocles ever created and each has a unique color scheme. As an uncommon spaceship, the Monocle can equip up to 4 perks in its inventory.

Color Scheme

Each spaceship has a primary and secondary color that are unique to its type and manufacture number. For the Monocle above, the primary color is Red (RGB 195,64,52 or HEX #c34034) and the secondary color is Purple (RGB 159, 71, 181 or HEX #9f47b5). The color scheme of a spaceship has contextual influence with equipped perks, consumed items, hostile spaceship encounters and themed quests.



Inventory

Each spaceship has an inventory with equipment slots depending on the rarity of the vessel. Any NFT can be equipped in a spaceship inventory slot, equipped NFTs are displayed to any players browsing the spaceship. The equipped NFT can change the spaceship characteristics, give special effects, or access to special features of Cometh like dedicated quests. At the very least, equipping a NFT brings social signaling through public display and consequent esthetic change.



Items: perks and consumables

Using the resources they collect during space exploration, the players can craft items for the inventory of their spaceships (perks) and items for easing their journey in outer space (consumables). Crafted items have random attributes that have contextual consequences in game. For example, a crafted gravity beacon (consumable) has a reach and a number of uses that vary from one craft to another, a crafted titanium drill has a color, effect on mining power and durability that vary from one craft to another.

Outer Space Exploration

A blockchain generated galactic environment

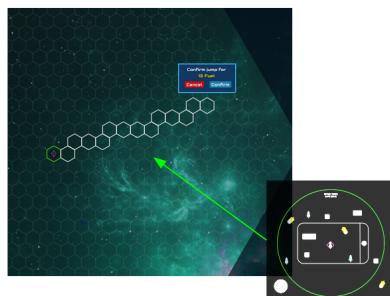
The universe of Cometh is procedurally generated from the blockchain's entropy. It contains valuable resources the players can dig out of asteroids or out of other player's

hulls. It also contains buildings offering various services which are progressively deployed as solar systems grow in activity.

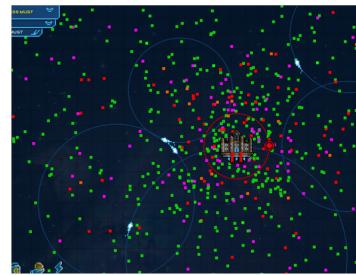
The universe offers three levels of exploration:

- the galaxy's map displays the solar systems that have already been opened (level 3)
- a solar system (level 2) is made of tiles showing the density of players, buildings available, guilds' influences, important comets passing by and unreachéd portals towards new systems
- a tile (level 1) displays the closest surroundings of a player, notably minable asteroïds, player controlled spaceships, buildings, interactive items and space anomalies

The artworks and game design are presenting a pleasant environment the players can intuitively interact with and that is loading at lightspeed on both mobiles and lightweight desktops.



Level 1: mobile friendly tile, moving cost a few DUST



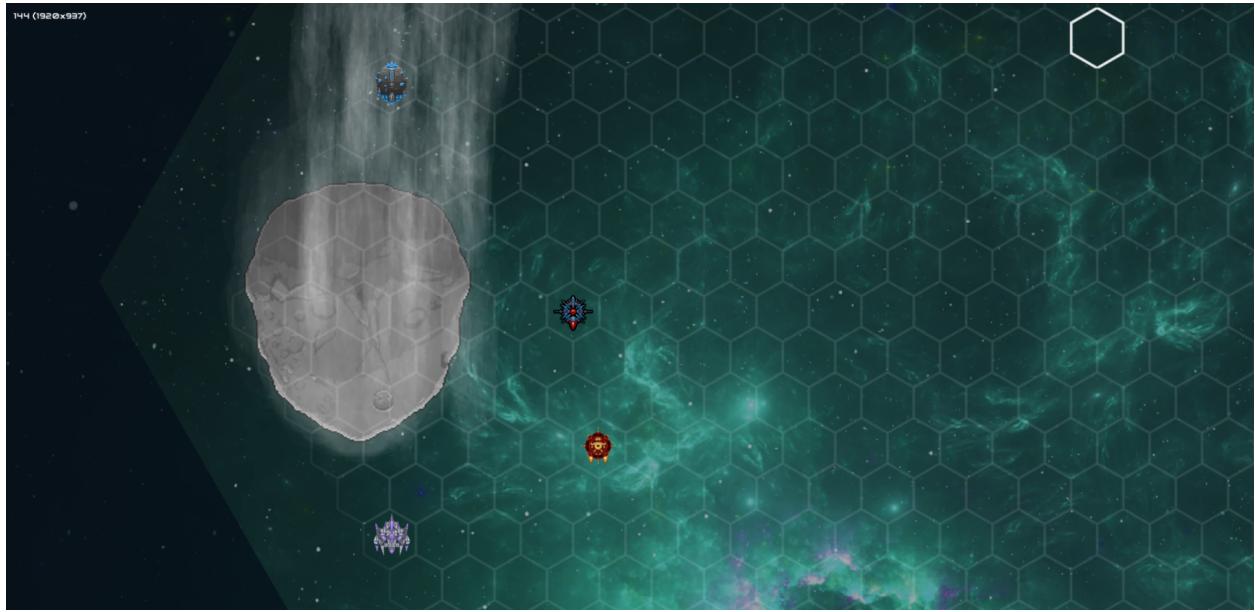
Level 2: moving cost some DUST



Level 3: crossing portals cost a lot of DUST

Blockchain space travel

In order to move within their close surroundings, Players move from one tile to another by consuming Cometh interstellar fuel: The DUST. They can also travel longer distances by relying on other players and beacons to drag them, this service is known as pulling.

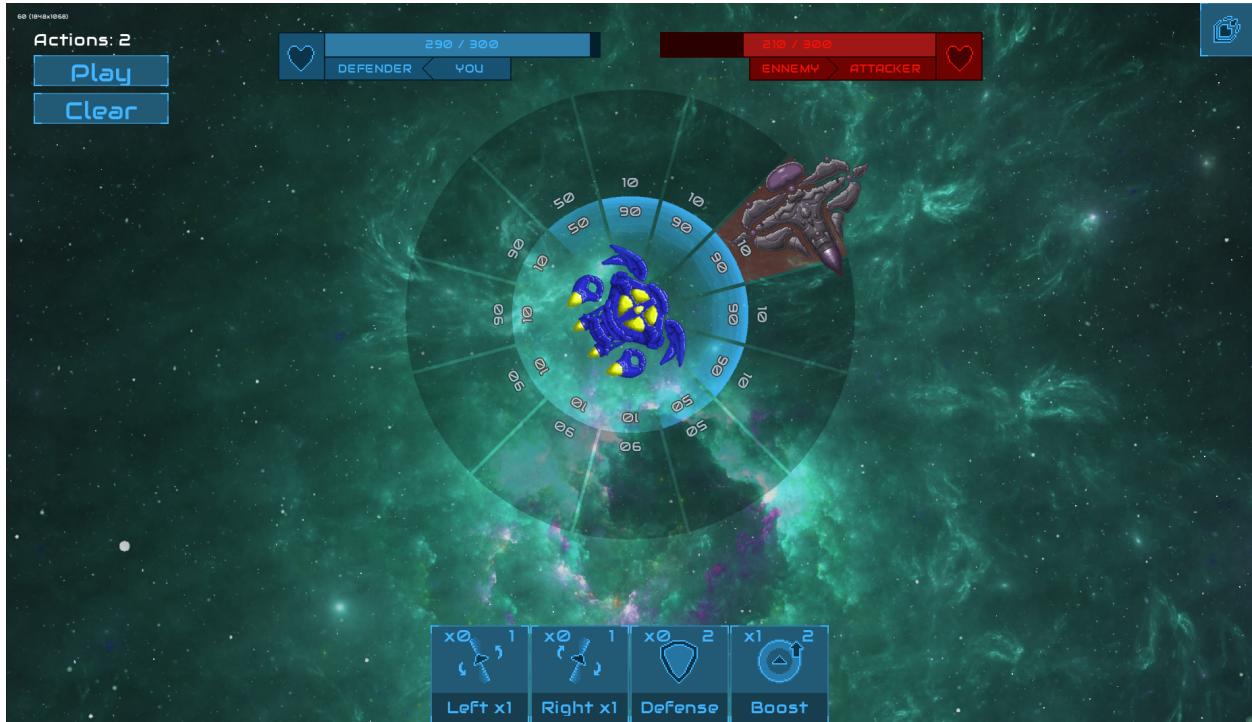


Pulling is the core mechanism of the game. Each spaceship can be selected by other players for a pulling service against a DUST fee paid to the spaceship's owner. Spaceships' owners are free to set and change their pulling fee they charge at will. Nevertheless changing a pulling fee may be subjected to administrative constraints such as a minimum delay for the update.

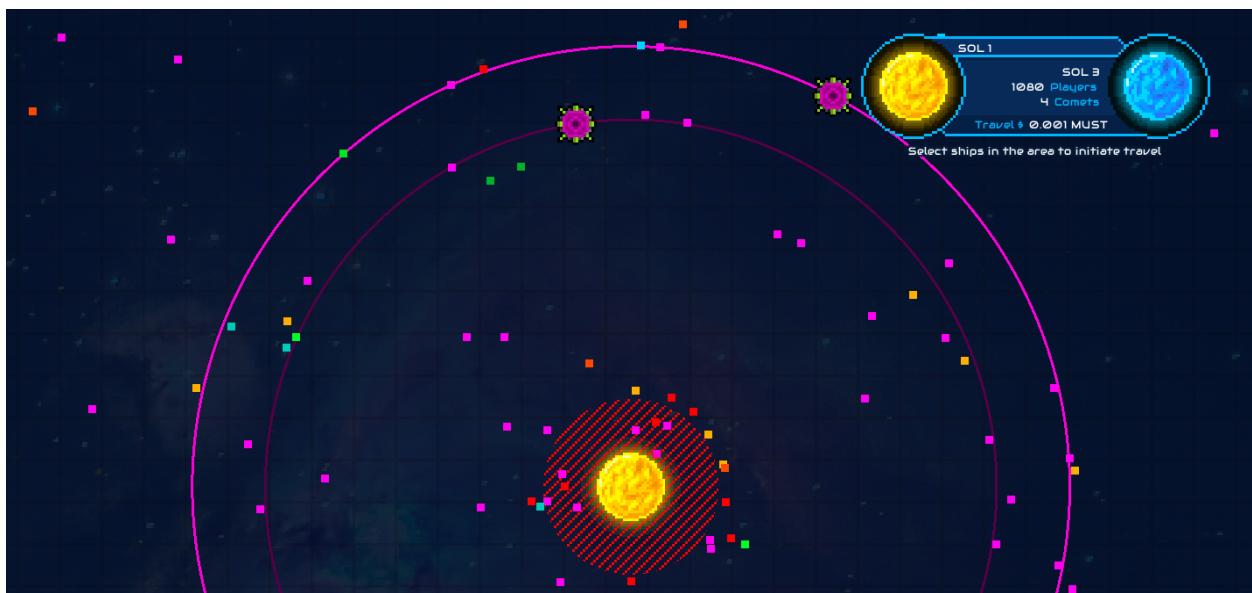


After the pulling, the spaceship that paid for the service ends up closer to the pulling point.

It's worth noting that finding the optimal pulling path to mine useful asteroids will be one of the challenges of the game. Both individual prices for pulling and smart asteroid trajectories are dynamic while letting spaceships approach puts the player at risk of space piracy. It's also expected that players will adapt their price for pulling service accordingly to extract a rent when they are certain positions.



Inactive spaceships on unstabilized orbits slowly derive towards the closest star until their orbit stabilizes.



Traveling from one Solar system to another can be done via established space portals.

Mining valuable resources

The asteroïds of Cometh are smart contracts carrying all sorts of ERC20 tokens (including liquidity pool shares of a decentralized exchange) and Non-Fungible Tokens (NFT). Asteroids are generated automatically and are sometimes triggered once a threshold is reached. Cometh exposes its players to a hub of decentralized finance services whose fees are used to create special loot for the players.



Exploring the universe requires dedicated tools and perks to overcome space hazards. Hoarding, trading and crafting are common activities of the players. The native resources are tokens representing the chemical elements with various levels of purity. Although they can seem to be abundantly available in the game areas, all resources are limited in supply.

Group →	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
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1	1 H															2 He			
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3	11 Na	12 Mg															8 O	9 F	10 Ne
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5	37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe	
6	55 Cs	56 Ba		72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn	
7	87 Fr	88 Ra		104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn	113 Uut	114 Fl	115 Uup	116 Lv	117 Uus	118 Uuo	
Lanthanides	57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu				
Actinides	89 Ac	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr				

● Resources available in known systems of Cometh

The first solar systems of Cometh will expose Iron (Fe), Cobalt (Co), Germanium (Ge), Argent (Ag) and Titanium (Ti). As new systems are discovered, the diversity of resources grows and so does the available recipes for crafting consumable items and perks.

Solar system growth

A solar system grows and expands its available services with the cumulated mining activity. When a solar system has just been opened it contains:

- a portal closely orbiting around the system's star and leading to a previously opened system
- a neutral supply depot building
- one or more remote portals leading to a new and unopened solar system

Mining activities in the system leads to a procedural deployment of new buildings. The first five stages of system development release in a random order a cantina, a garage, a factory, a new portal to an existing system and a new depot. The following stages trigger the random deployment of one of the 5 building types. Except for the initial depot, all buildings can be taken over and contested by guilds or individual players.

While the buildings generate ingame resources and forms of revenue for their controllers they also require upkeep commitments and defense against other parties.

This mechanism is designed to encourage sustainable expansion of the global influence of a guild or a player. For examples:

- a fastly growing system will naturally tend to be hard to gain considerable control on for a single party
- the party in charge of a system with low mining activity may be tempted to hinder its growth so as to keep tight control over the area.

Buildings

The buildings in Cometh can be controlled by the players and their guilds. Buildings have recurring upkeep the controller has to pay to maintain their control. Buildings can be equipped with addons enhancing the experience of players using them. Buildings offer different kinds of services and their respective controllers retain a share of the amount spent by the players. There are 4 initial types of buildings:

- The garage for players to customize their spaceships and to repair their gear. Players whose spaceships have been drifting after multiple piracy encounters will recover their vessels at the garage.
- The depot for players to drop their cargo and to secure their mining rewards to their wallets
- The cantina for the players to change their crew members and to restore their status
- The factory for the players to craft new items, perks and spaceships with the resources they harvested

Guilds

The Guilds in Cometh are communities of players gathering around common goals. Every guild acts as Decentralized Autonomous Organizations whose wallets can hold any blockchain assets and manage the guild's activities.

As guild members are active in a solar system their guild influence over the tiles of this system grows. Influence over the tiles decreases when guild members and neutral players lose battles in the sector. A portion of the mining activity of the tiles where the guild is the most influential goes to the guild's wallet.

Guilds can put in common their spaceships, consumables, perks, recipes but also claim control over buildings and emit guild emblems for their members. Control over

a building can be challenged by opposing guilds in takeover attempts. The conditions to open a guild are based on spaceships and MUST 🚀 token pledged.

Lore & Quests

The lore of Cometh extends the stories deployed in the description of Cometh's NFT. Lore specific NFT will be dropped by each asteroïds and the full story will run over a twelve months cycle. During this cycle, quests are programmatically generated and bring the players to new challenges involving the game mechanics. Finishing a quest triggers the reception of an achievement NFT perk that can open access to other quests. Quests available to a player are based on the equipped NFT of the spaceships and blockchain history of these spaceships.

Cometh Beyond Galactic Economy

Crafting goods

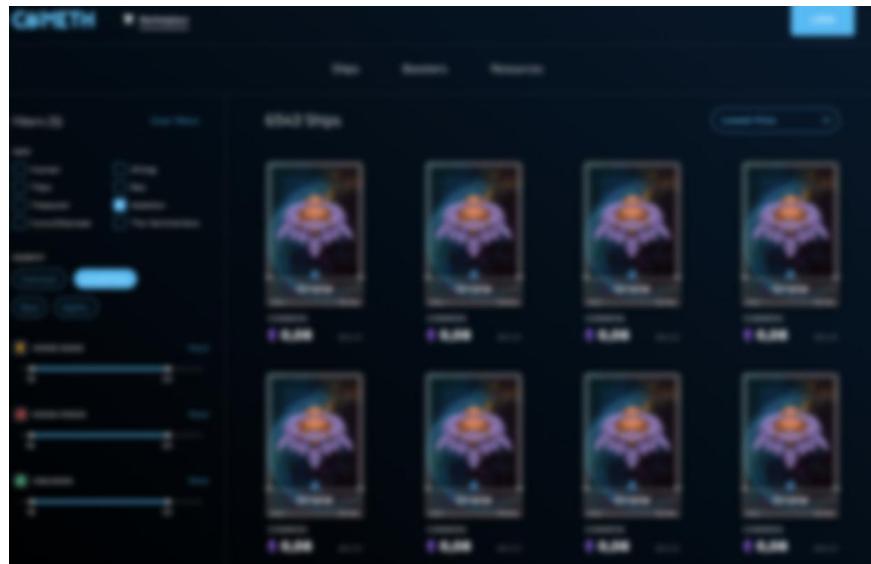
The crafting system is compatible with any ERC20 and players can freely search for undiscovered recipes. Crafting recipes for items are discovered or acquired by the players. Players can craft items directly on the premises of their spaceship but also in dedicated factory buildings. Knowledge and Control of recipes are strategic for the players and their guilds (see below). Crafted items and compatible NFTs (including Spaceships) can be converted back into fungible commodities through the Cometh Grinder.



The crafting system relies on ComethSwap in its recipes to bring sustainability in the galactic economy. For example, in case of an excess of Iron being harvested, the price of iron would drop relative to other resources while the crafting recipes involving iron would require more iron thus automatically pressure the price recovery of iron.

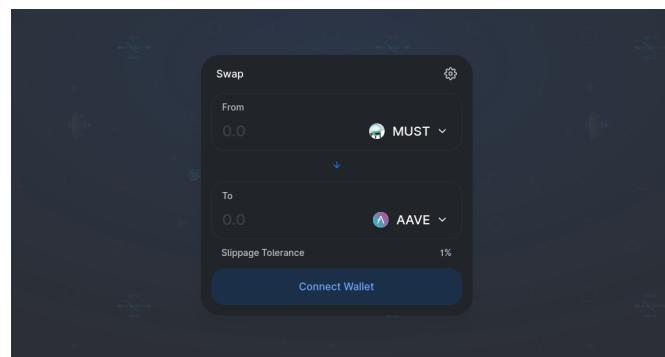
ComethMarket: The Galactic Marketplace to trade spaceships, perks, items and resources

Compatible NFT can be listed and traded in the peer to peer galactic market ComethMart



ComethSwap: The Galactic Auto-Market-Maker for tradable resources

Ressources and compatible ERC20 can be listed and traded in the peer to peer automated market maker: ComethSwap.



Cometh Rental system

Spaceships and compatible NFT can be lent to other players on Cometh Rental:

The left screenshot displays the 'Open rental offers' section of the Cometh Rental website. It features a grid of six items, each representing a bundle of spaceships for rent. Each item includes a thumbnail image, the name of the bundle, the percentage of mining reward, the number of ships in the bundle, the rental duration (e.g., 0.5 MUST for 21 days), and the rent price. The right screenshot shows the 'New Rental Offer' form. It asks for rental conditions for 0 ships, including Duration (0 days), Revenue sharing (0%), and Entry cost (0 MUST). It also lists four specific spaceship options for rental: Drone ALONG COMMON, Kanpeito LUNARELLA COMMON, Arbitrator KLEROTERION UNCOMMON, and Arbitrator KLEROTERION UNCOMMON. Each listing includes a thumbnail, name, stats (e.g., 15km, 1.1, 330s), and a checkbox to 'Add to my rental offer'.

This system allows players to put their game assets at work, granting the owner a share of the revenue generated from the tenant. The rental system of Cometh was initially limited to spaceships and a rental contract had three main parameters: duration, revenue sharing percentage and entry cost. Extending this already efficient system to other NFT such as Cometh compatible perks, Cometh Beyond introduces new options like private or whitelisted offers, recurring rents and thresholds.

From MUST to DUST, accumulation mechanics and ingame impact

What is the MUST?

The MUST is the ERC20 token that fuels Cometh's economics:

- When at rest the MUST lets the players earn new game assets;
- Many in game assets and services like pulling on a spaceship have a price expressed MUST;
- When acquiring an spaceship from the Cometh protocol, the owner receives a portion of the spaceships price in MUST to kickstart the player's activity in the game;

The MUST has a limited supply of 1,000,000 units, it is a precious commodity in Cometh and astronomical stuff can be done with it. Consequently the Cometh protocol

leverages a smart-contract called the TUBE  to stores the MUST  of the players while also putting it at work.

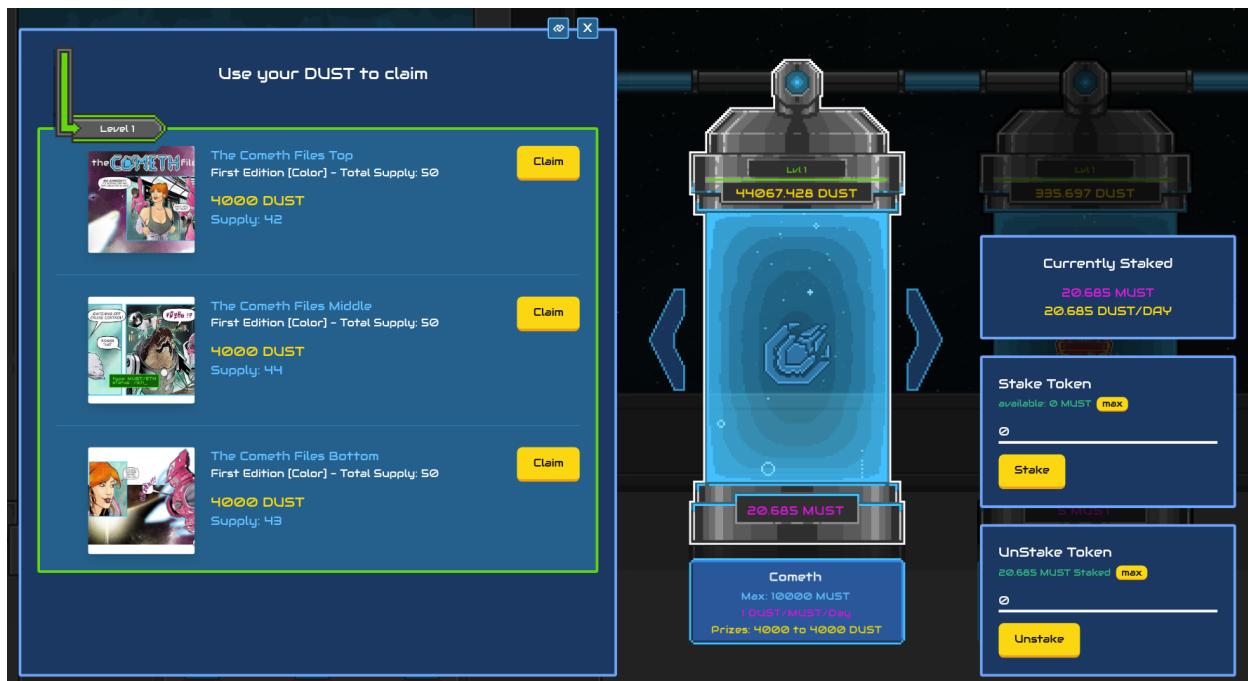
In game actions for a spaceship are free up to a certain amount of actions per day based on the spaceship and its inventory. In order to move beyond the daily limit, the players can consume DUST generated from MUST  at stake for small tasks or consume MUST  itself for heavy duties.

What is the TUBE ?

The MUST is fairly distributed to the players and Cometh's contributor through the TUBE . This smart-contract facilitates several in-game mechanisms:

- **NFT Farming:** MUST stored in the TUBE  let the players unlock NFT based perks, upgrades, spaceships the players can freely use or transfer;

MUST tokens locked overtime in the TUBE create DUST counters the players can redeem new NFT against.



- **In game enabler:** Consuming DUST generated from MUST stored in the TUBE  let the players do extra actions;

- **Scaling:** the TUBE  acts as a layer 2 gateway to allow gasless transfers of MUST and access to compatible blockchain service.



The very first simulated image of a black hole, calculated using a 1960s punch card IBM 7040 computer and plotted by hand by French astrophysicist Jean-Pierre Luminet in 1978.

MUST token economics

Cometh creates a persistent outer space with a sustainable generation of new smart asteroids by leveraging the Decentralized Finance (DeFi) ecosystem. On the one hand, Cometh introduces two tools for Defi enablement of the Players, the Melange and the Refinery, on the other hand, Cometh distributes the MUST  tokens to Players contributing to the game sustainability. Players holding MUST will be able to participate in the governance for the balancing of the game and future development prioritization.

The Melange

In today's DeFi landscape, interacting with applications is very costly in transaction fees thus discouraging individuals to put their tokens at work. Cometh gives the opportunity to the players to cheaply access DeFi protocols and to contribute to the

sustainability of the game by doing so. **The Melange** smart contract is designed for that purpose.

Cometh integrates external DeFi protocols exposed to the players from the scalable infrastructure hosting the game. **The Melange** optimizes the transaction costs for the players while collecting a small service fee redistributed as in-game loot.

The Melange is a layer 2 gateway to DeFi applications that will be integrated along the way and thus allowing gasless interaction for the player.

The Refinery

Players can get rid of tokens they don't want to hold anymore by allowing **The Refinery** smart contract to spend the tokens for players. **The Refinery** refines tokens it has been allowed to spend into MUST  tokens on Cometh's layer 2 infrastructure. Anyone can activate the refining process and get compensated in MUST  for bearing the transaction fees associated with it.

The Refinery is a cheap and efficient gateway to the game but also to access layer 2 decentralized exchange for efficient wallet management: ComethSwap.

ComethSwap

Uniswap is the standard way for millions of people to freely exchange tokens and to provide liquidity on token pairs. Liquidity providers perceive fees on the swaps for which volume, albeit significant today, remains hindered by the transaction cost of the blockchain. The monthly transaction cost consumed on applications like Uniswap is in the ten million range in USD.

Cometh includes ComethSwap, a fork of Uniswap deployed on Ethereum sidechains (including Polygon) and on an optimistic rollup layer 2 in order to offer an opportunity to the players to swap tokens without having to pay for the usually deterring transaction costs. While players will be able to swap without hassle, the liquidity providers are set to perceive more fees in a decentralized exchange where swaps happen more often.

Cometh Beyond Layer 2: Optimistic Rollups

Optimistic Rollups are arguably the most promising scalability solution for blockchains today. Optimistic Rollups allow for generalised smartcontract interaction in the Ethereum Virtual Machine and interact very elegantly with Ethereum based chain.

Cometh Beyond runs on top of Cometh's own Optimistic Rollup Layer 2 using the technology developed by Offchainlabs¹ and currently supporting Arbitrum on Ethereum Mainnet. This infrastructure is open to everyone and easy to integrate: "Arbitrum Rollup chain is a super scaled Layer 2 (L2) chain. Like all Rollups, the Arbitrum Rollup chain is built on top of and secured by the Ethereum blockchain, and all transaction data is logged on Ethereum. From a user and developer perspective, interacting with Arbitrum feels exactly like interacting with Ethereum. Arbitrum supports the same RPC interface as Ethereum, supports all EVM languages, and natively supports all Ethereum tooling without any special adapters. The only way in which an Arbitrum Rollup chain does not resemble Ethereum is the cost: transactions on Arbitrum cost a small fraction of what they would if run natively on Ethereum."¹

This layer 2 addition to Cometh's infrastructure aims at delivering the best game experience to Cometh players by removing as much as possible the fees one has to pay when casting a blockchain transaction. Cometh will be the first blockchain game delivering a real free to play gaming experience to its players. The native token of this infrastructure will be a token generated from staking MUST 🎮 token. Although this infrastructure is initially dedicated to run Cometh's gaming applications, it will likely open up to third parties in the future.

Governance: The Galactic Council

Finding the optimal value for parameters in an economic model is hard and even harder when the system is evolving. As a community of players emerges it is important to let the community decide on what the parameters of Cometh games should be.

The Galactic Council is the governance body for Cometh games balancing and improvement. It is composed of the multisig signers elected by the MUST 🎮 holders. Cometh multisig will notably be in charge of allocating the Dev Funds and overseeing the transition between versions of Cometh's smart contracts.

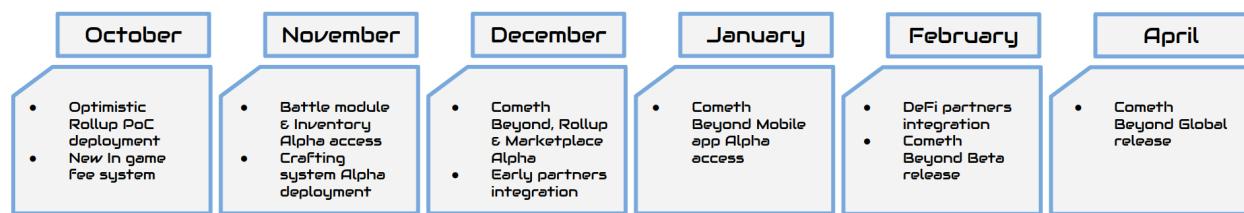
¹ https://developer.offchainlabs.com/docs/rollup_basics

Holders of MUST 🚀 can propose changes in the parameters of the protocol, request new features or be elected at the Galactic Council if they have a minimum amount of 1000 MUST 🚀. Any holders of MUST 🚀 can vote on proposals and election of the Galactic Council.

A non-exhaustive list of economic parameters and finances of Cometh is displayed in the annexes.

Space Technology Roadmap

Short Term Roadmap:



MUST distribution

MUST is to be distributed fairly among players and in a way that will support future developments as well as a vibrant ecosystem.

Initial circulating MUST 🚀 supply (Oct. 2021): 76,900 🚀 Granted to liquidity providers, initial contributors and as cashback on NFT purchasers across 6,000 unique holders on Ethereum and Polygon.

Optimistic rollup bonding: 18,000 🚀.

Liquidity Provider and DeFi incentivization reserve: 409,000 🚀 used to promote volume of transactions on Cometh DeFi services.

Melange & Refinery incentivization reserve: 297,600 🚀 used to promote volume of transactions on Cometh cross layer services.

Future Development reserve: 198,500 🚀 used to finance future developments and games relying on Cometh NFTs.

Total MUST 🚀 supply: 1,000,000 🚀