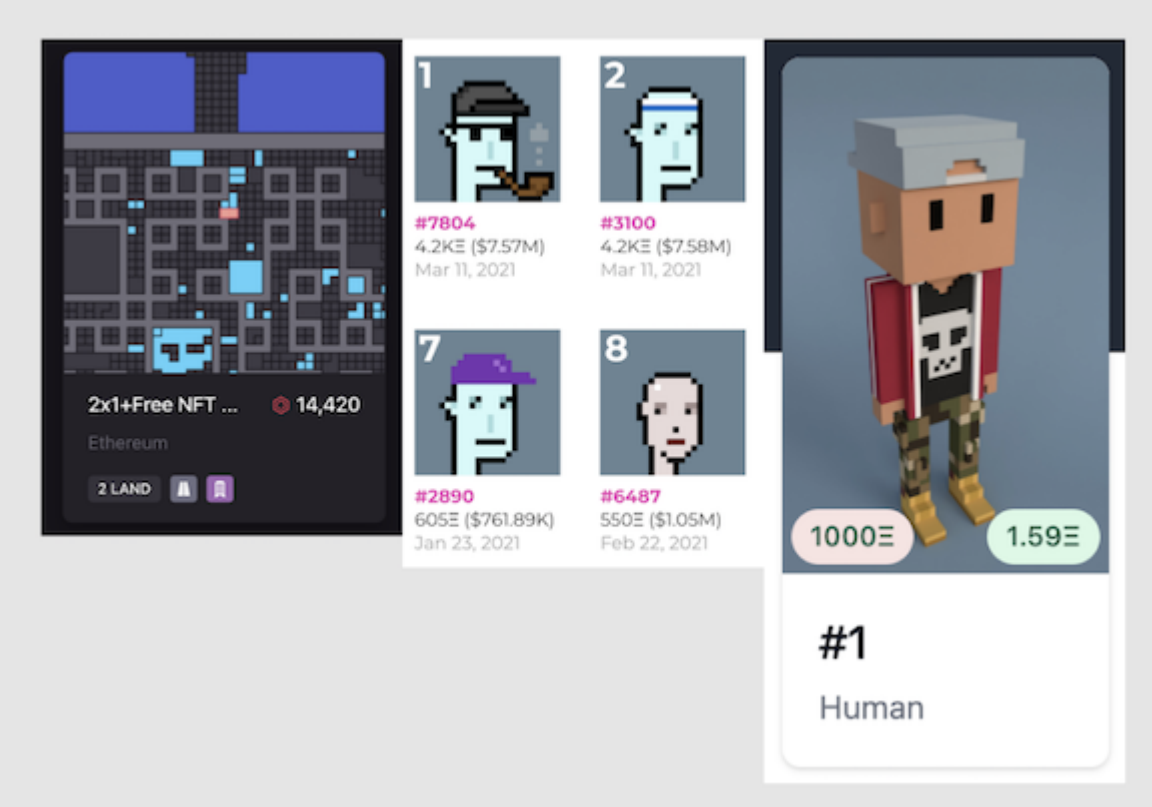
Pricing Protocol ($PP)

The Idea

The world of NFTs is currently introducing a new form of art, ownership, and value to the world all at once. The derivation of value from a specific NFT is skewed and changes depending on the person evaluating it. As we see the Web3 ecosystem continue to thrive and become more reliant on NFTs representing different forms of ownership (i.e. Land in Decentraland, Mirror participation, Crypto Punk/Meebit ownership, etc…) there will be an increasing demand for a method of assigning value to these items. Taking this idea of “assigning value” in Web3 a step further, this value is derived from the question of “How much is the community willing to pay?” and, therefore, this assigning of value can only be done by the community as a whole. In comes PricingProtocol, a protocol that allows the community to *suggest/assign* a value to any past, present, and future NFTs.

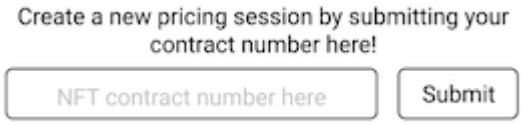


Left to right: Decentraland Estate, Crypto Punks, Meebit.

How does it work?

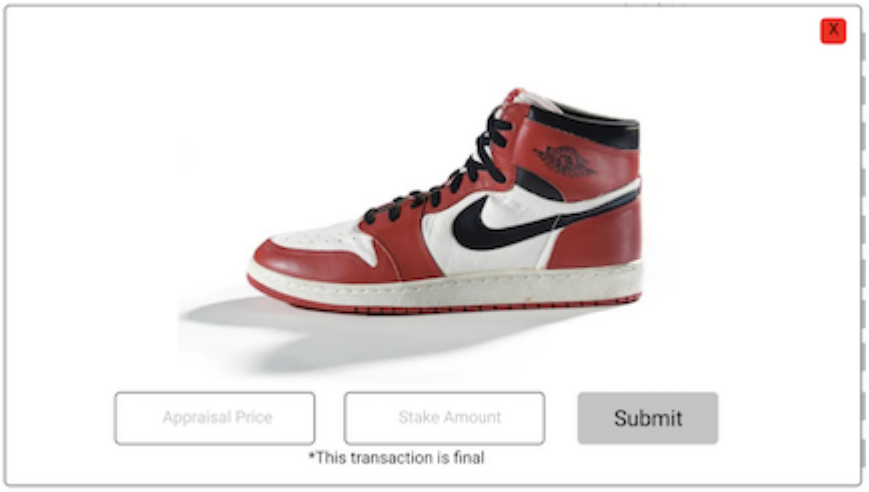
The contract that'll be referenced throughout this section can be found here. For users reading this on paper, the code can be found on github at: alangindi/pricingcoin/contracts/PricingProtocol.sol.

Step 1: Create a Pricing Session



To create a pricing session from the pricing protocol front end, a user will be able to simply submit the address of an NFT in the above form and pay the gas fee for creating the session. Once this address is submitted, the contract creates a new PricingSession instance which starts a timer that expires exactly 24 hours later, which marks the end of the pricing session.

Step 2: Active Pricing Session



During an active pricing session any user can submit a vote by entering an appraisal price (pricing the NFT) and an amount they'd like to stake. Voters participation:

- Price a randomly selected NFT that is shown on the Pricing Protocol website.
- Look up a specific NFT address of interest through the look up form on the Pricing Protocol website.
- Directly interact with the contract itself.

When a vote is submitted, the stake and vote are locked in until the end of the pricing session. Additionally, the protocol prohibits the same address from voting in a single pricing session more than once. Each vote is weighted using the formula $\sqrt{user\ stake/pricing\ session\ lowest\ stake}$. This method allows each appraisal to stay "pure" while still being counted proportionally based on the user's stake in relation to others. Furthermore, a quasi-quadratic voting method is used to limit "overpowered" voters from heavily influencing the outcome of the pricing sessions.

Step 3: Post-Session Computations

Once the pricing session is over the finalAppraisal of the NFT is set. To compute the final value we simply take the totalAppraisalValue and divide it by totalVotes. This can be done because all

of the weighting is taken care of and accounted for in the weightVote function. After the finalAppraisalValue is computed, we calculate each user's *base*. A user's base determines the base value that the user's and community multipliers will be applied to. For example, as documented above the calculateBase function, if a user is within 1% of the finalAppraisalValue their base is set to 5. Once user bases are set any participant who wasn't within 5% of the finalAppraisalValue loses a portion of their stake equal to margin of error - 5%. For example, if they were 6% off, they would lose 1% of their stake. Post-loss harvesting, coins are issued to "in the money" users based on four factors:

1. Size of pricing session (constant for all participants in that session)
2. Size of total staking pool (constant for all participants in that session)
3. User stake (quadratic multiplier)
4. Accuracy (base)

The equation used to distribute PricingProtocol ($PP) coins per user is →

$$\$PP\ issued\ =\ base\ *\ \sqrt{user\ stake}\ *\sqrt{size\ of\ pricing\ session}\ *\ \sqrt{total\ ETH\ in\ staking\ pool}$$

Step 4: Refund Stake and Profit Distribution

Once the post-session computations are complete, modified stakes are refunded to participants based on their accuracy. This will leave the contract with the lossPool profits that were harvested from users that mispriced the item. The profits are distributed to each $PP holder based on the equation $balanceOf(receiver)\ *\ contractBalance\ /\ totalSupply$. In other words, the amount of tokens the holder owns multiplied by the amount of ETH (measured in wei) held in the contract divided by the total supply of tokens (which is profit per token).

Step 5: Post pricing session

At the conclusion of a pricing session, NFT appraisals are easily accessible through:

- The Pricing Protocol user interface using the NFT address
- A direct call to the contract using the NFT address

Protocol Considerations

If you implement the weight when instantiating the vote it distorts the user's appraisal value because conventionally weighting a vote would be done by $\_appraisal\ *\ weight$. The weighting formula needs to be generalized for all pricing sessions regardless of the staking range in that specific session. Therefore, the weighting equation is $\sqrt{user\ stake/lowest\ stake}$. This system generalizes well because each user has at least one vote (since the smallest stake is equivalent to one vote) no votes get distorted anymore. Furthermore, the square root is used to stop overpowered voters from creating a lopsided pricing session (i.e. quasi quadratic staking). Using quadratic staking causes a dilemma because we disincentivize participants from staking large amounts due to the quadratically increasing marginal cost of a vote. This is why PricingProtocol uses the equation

$base\ *\ \sqrt{user\ stake}\ *\sqrt{size\ of\ pricing\ session}\ *\ \sqrt{total\ ETH\ in\ staking\ pool}$ to issue $PP tokens. The user's stake works as a multiplier to the amount of coins issued. Additionally, the protocol weaves session participant interests with overall coin holder interests by using the total ETH staking pool and session participant sizes as a coin issuance multiplier. Larger staking

pools translate to greater lossPools and a higher rate of profit distribution for all token holders. Lastly, the more users staking and taking part in these pricing sessions the more accurate or “telling” these appraisals are and the greater the benefit to the users and overall community.