Demystifying Crypto Derivatives

From Basics to Building Blockchain-Based Options

About myself

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- Mathematician & Haskell Enthusiast
- Director of Education at IOG
- CTO at Genius Yield

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Traditional Derivatives

“In finance, a derivative is a contract that derives its value from the performance of an underlying entity.”

Wikipedia

Types of Derivatives

- **Future**
- Swaps
- Options
- ...

Contracts to buy or sell an asset on a future date at a price specified today.

Types of Derivatives

- Future
- **Swaps**
- Options
- ...

Contracts to exchange cash (flows) on or before a specified future date based on the underlying value of currencies exchange rates, bonds/interest rates, commodities exchange, stocks or other assets.

Types of Derivatives

- Future
- Swaps
- **Options**
- …

Contracts that give the owner the right, but not the obligation, to buy [...] or sell [...] an asset. The price at which the sale takes place is known as the **strike price**, and is specified at the time the parties enter into the option. The option contract also specifies a **maturity date**. [...] If the owner of the contract exercises this right, the counterparty has the obligation to carry out the transaction.

Call & Put Options

- A **Call Option** gives the owner the right to **buy** an asset at the **strike price** at some point in the future.

- A **Put Option** gives the owner the right to **sell** an asset at the **strike price** at some point in the future.

A sheep farmer might buy a **Put Option** for wool to receive a guaranteed minimum price come shearing time.

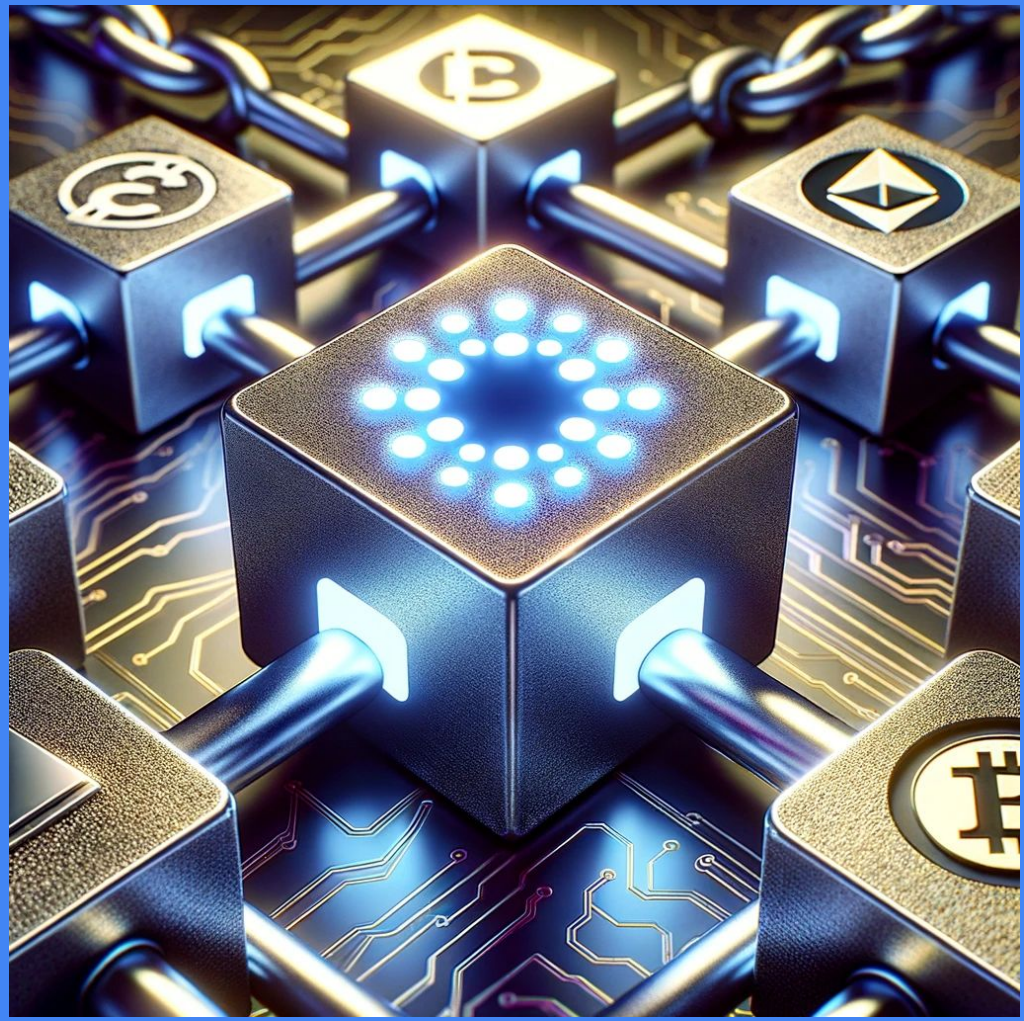
A logistics company could buy a **Call Option** for petrol to hedge against a drastic price increase.

American & European Options

- The owner of an **American Option** can require the sale to take place at any time up to the **maturity date**.

- The owner of a **European Option** has the right to require the sale to take place on (but not before) the **maturity date**.

Options on the Blockchain



Opportunities

Get rid of historical ballast:

- **Number of issued options**
- Call versus Put
- American versus European

Traditionally, options are issued with fixed quantities (like 100).

There is no need for that on the blockchain.

Opportunities

Get rid of historical ballast:

- Number of issued options
- **Call versus Put**
- American versus European

A Call option is just a Put option with the two assets reversed.

No need to make that distinction!

Opportunities

Get rid of historical ballast:

- Number of issued options
- Call versus Put
- **American versus European**

American and European options can both be generalized to having an arbitrary **maturity interval**.

Challenge

For traditional options, a **Clearing House** guarantees that options can be executed.

There are no clearing houses in the decentralized setting of a blockchain.

Solution

Replace the clearing house with a smart contract into which the issuer deposits enough funds to guarantee option execution.

Case Study

GENIUS YIELD

Idea

Represent options as **Cardano Native Tokens**.

Trading of options can then be done on any DEX (or CEX for that matter).

Smart Contracts

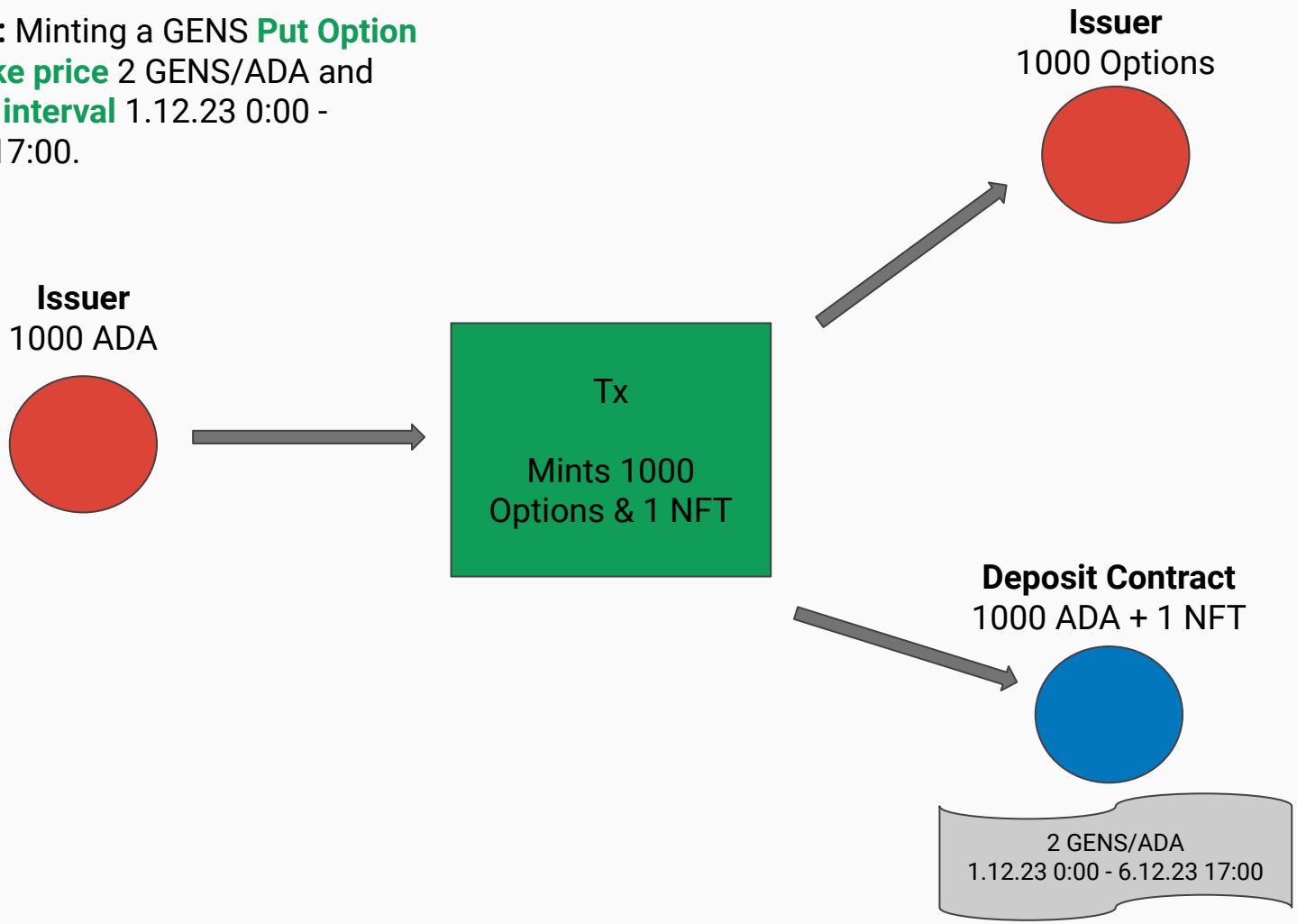
Minting Policy

- Ensures that when options are minted, the correct deposit is put down.

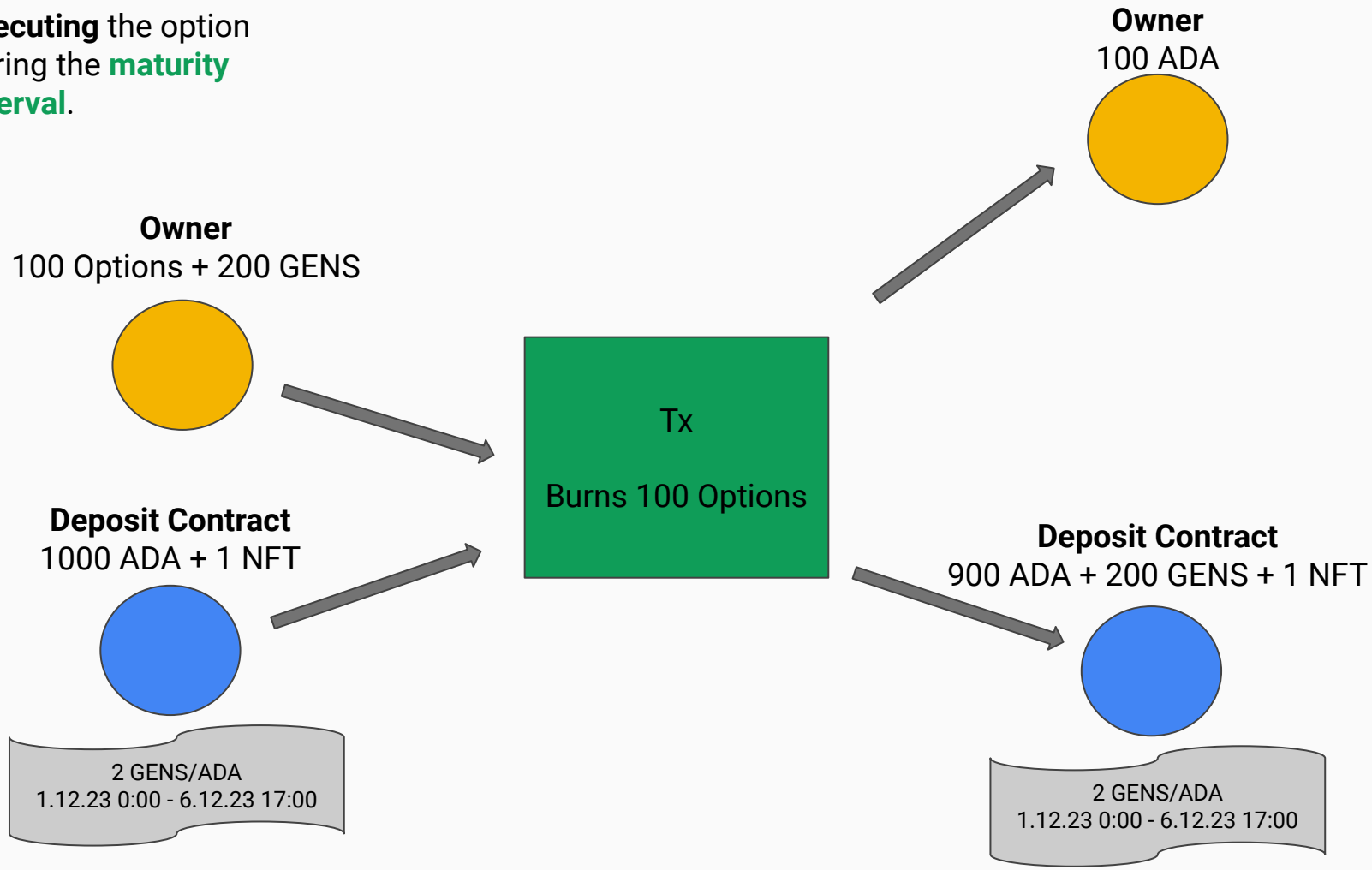
Deposit Contract

- “Identity” tracked by an NFT.
- Ensures that options are burnt and the correct price is paid when options are executed.

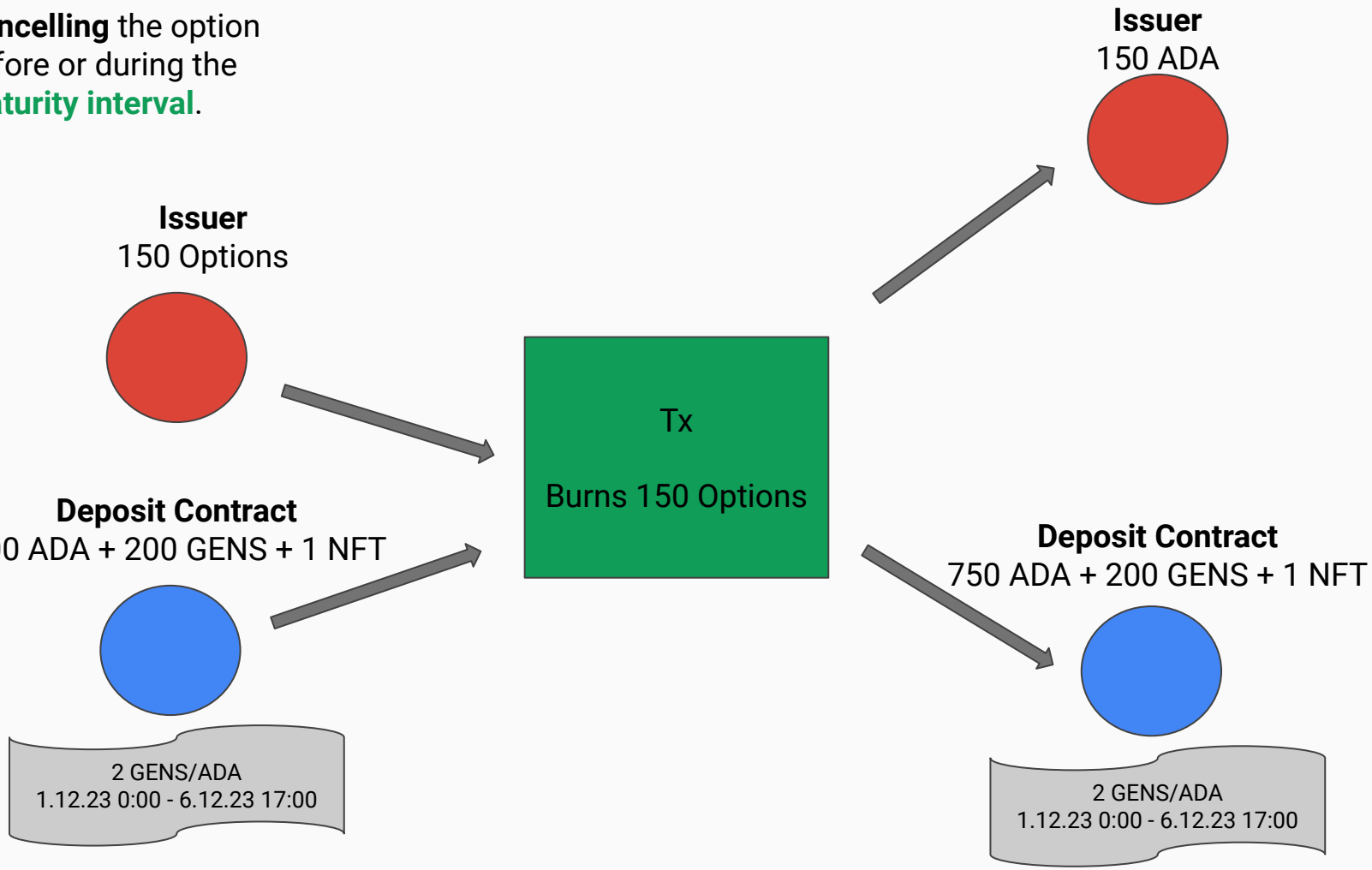
Example: Minting a GENS **Put Option** with **strike price** 2 GENS/ADA and **maturity interval** 1.12.23 0:00 - 6.12.23 17:00.



Executing the option during the **maturity interval**.

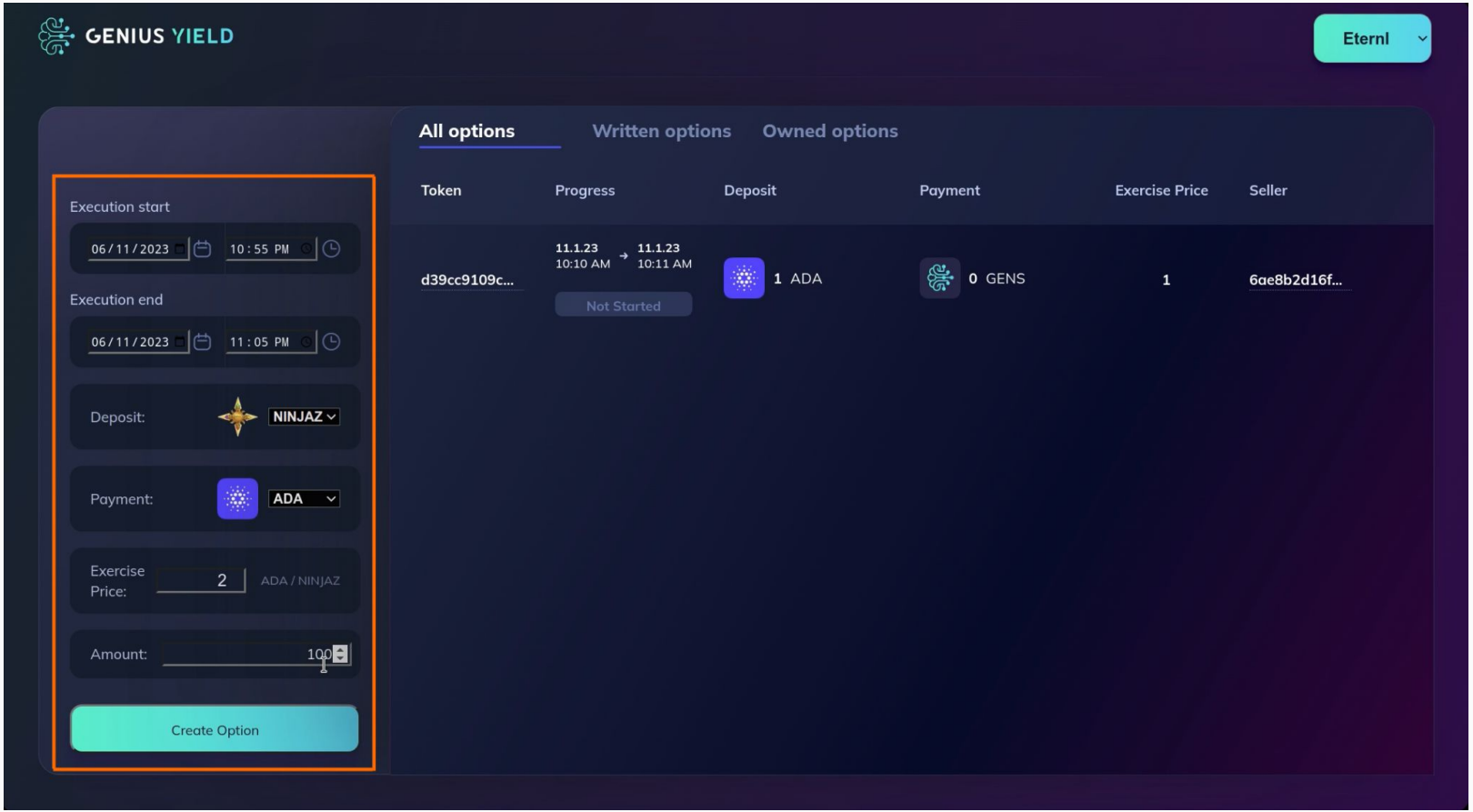


Cancelling the option before or during the **maturity interval**.

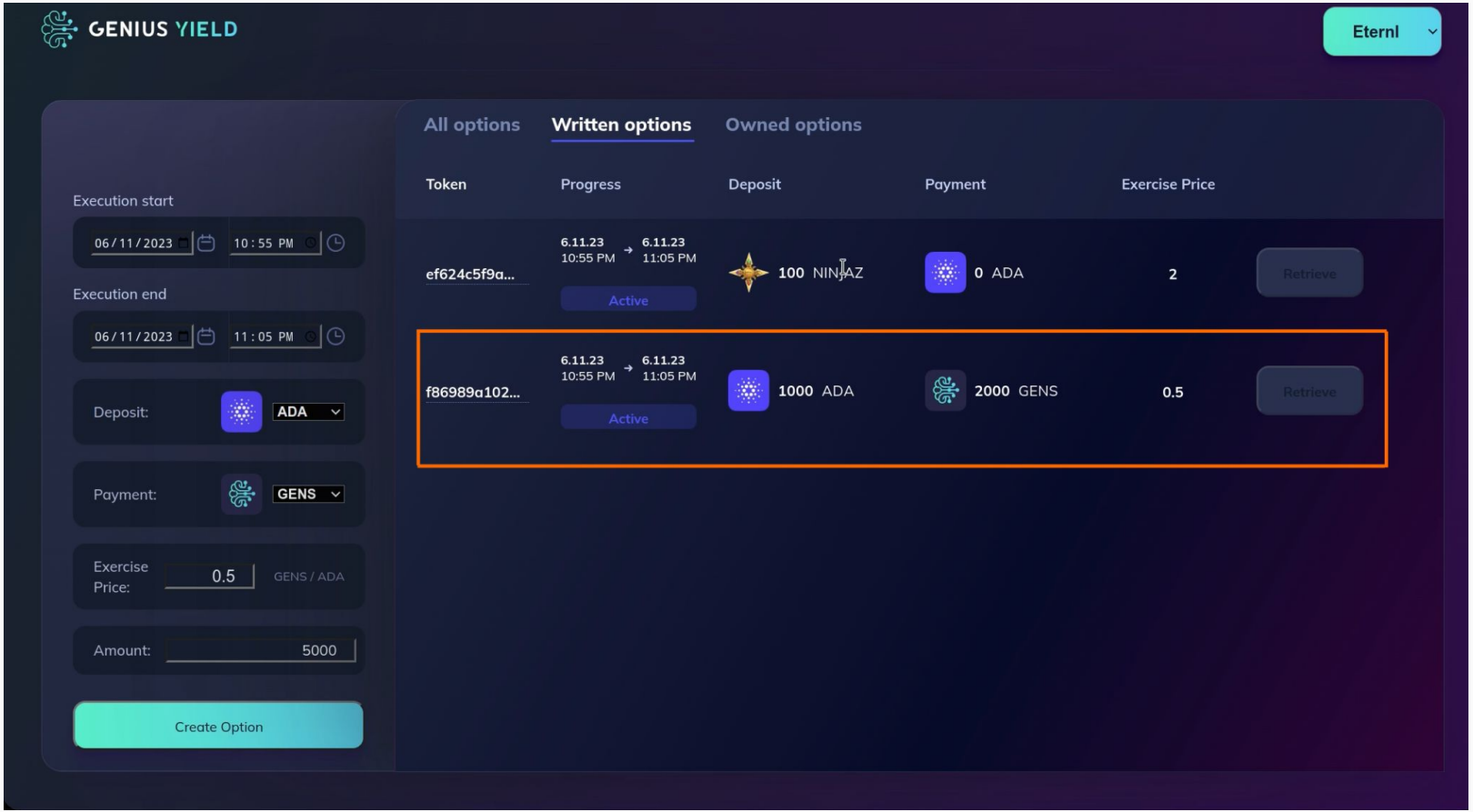


Retrieving the deposit after the **maturity interval**.

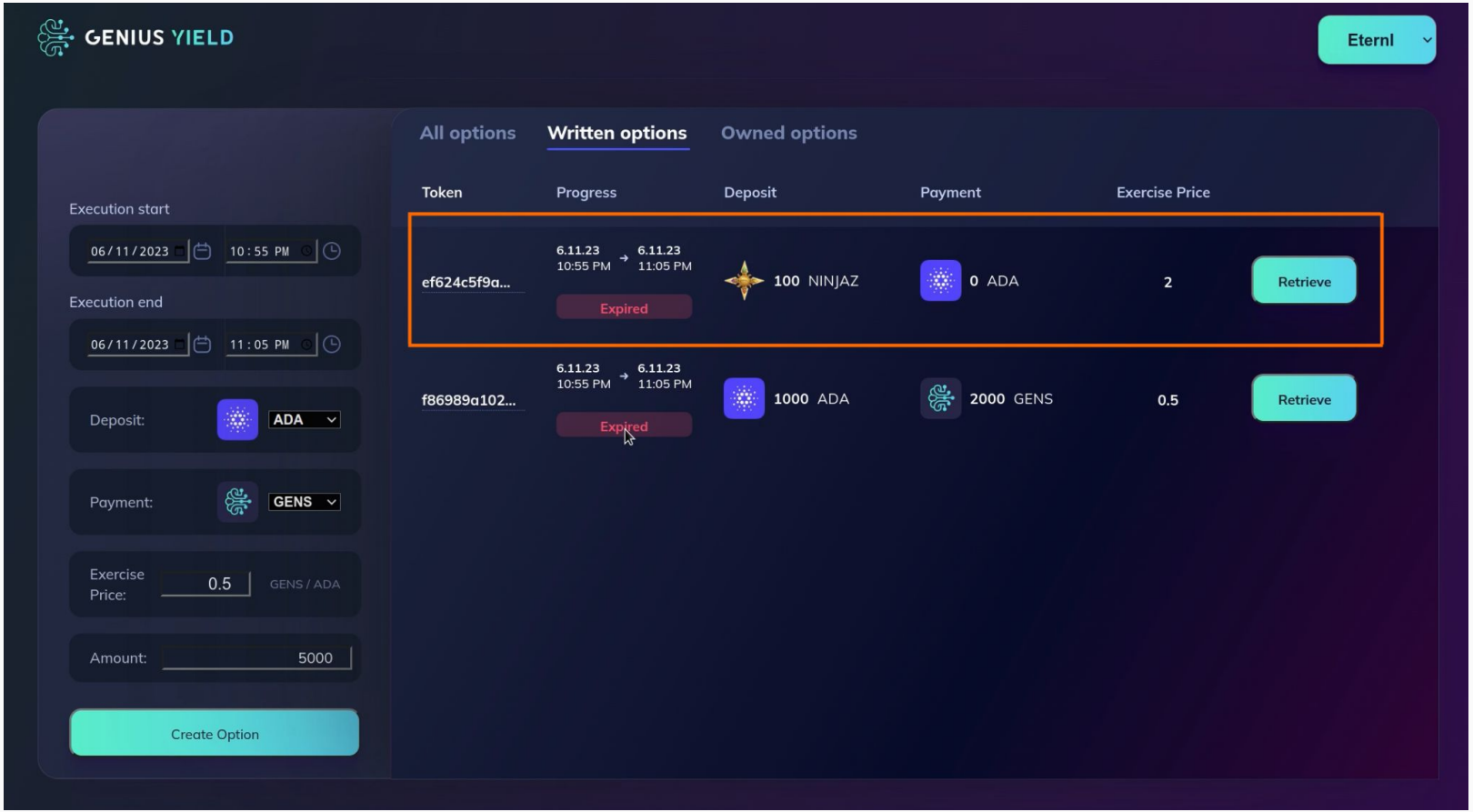
Prototype: Option Creation



Prototype: Active Option



Prototype: Expired Option



Thank you!

Input Output
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