Writing Smart Contracts
04 Tokens

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Supported by the Algorand Foundation

Tokens

Token = entry in the blockchain that represents a claim.

Fungible Token

- All are the **same**
- Cryptocurrency, stock token
- Implementation: Algorand Standard Asset (ASA)

Non Fungible Token = NFT

- All are **different**
- Art, "Moment", ticket, real estate
- Implementation: Next chapter

ASA as Fungible Token

Properties

- AssetName (long), UnitName (short)
- Total supply
- Decimals
- Asset index (obtained from blockchain at creation)

Transactions

- All transactions are denominated in "small" units
  - **Ex:** ASA with 3 decimals $\rightarrow$ 1 Coin $= 10^3 = 1000$ "small" units
  - Transfer 12 coins $\rightarrow$ `amt = int(12*1E3)`

Opt-in

- Can only receive token after opt-in
  - Send 0 tokens to yourself
  - Idea: reject spam transactions
  - Opt-in for each token separately

ASA as Fungible Token

Special addresses

- Manager*: can re-assign the special roles
- Reserve*: information only (store for not yet minted tokens)
- Freeze: can (un)freeze assets in a given address
- Clawback*: can undo a given transaction

**Discussion*

- If Clawback or Reserve a nonzero, transactions may not be final
  - If Manager is nonzero, these rules may be changed

Opt-out

- "Leaving" a token is possible via a special *closeout* transaction

Destroy

- Manager can destroy an ASA, if the creator possesses all tokens

Fees and minimum balance

Standard transaction fee of 0.001 ALGO

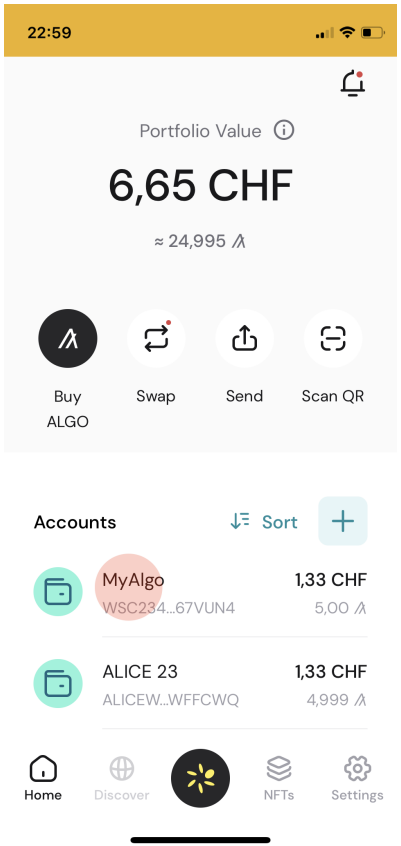
- Creation of ASA
- Opt-in (each user $\times$ each asset)
- Asset transfer

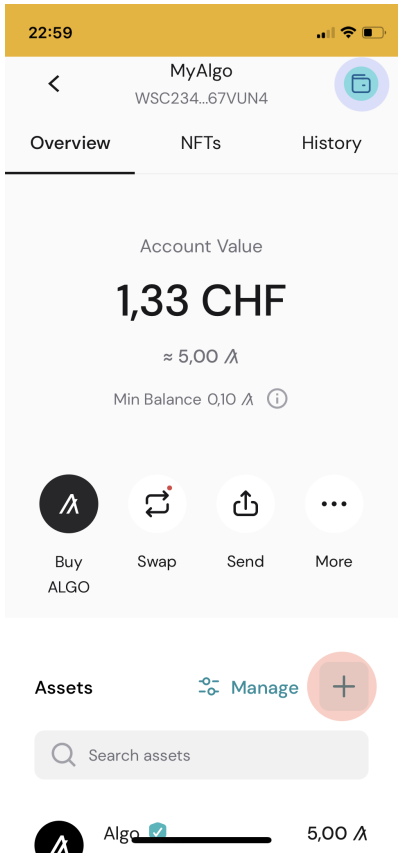
Minimum balance of 0.1 ALGO

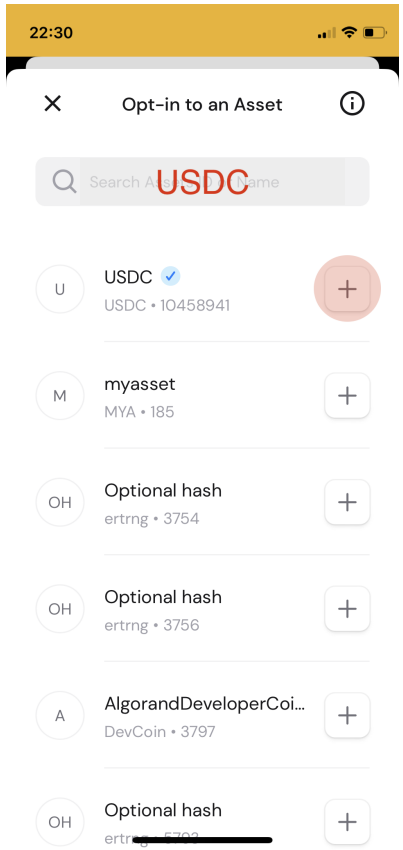
- Each account that holds ALGOs
- Additionally for each ASA created
- Additionally for each ASA opted-in
- Minimum balance can spent after Closeout/Asset destroy/Opt-out

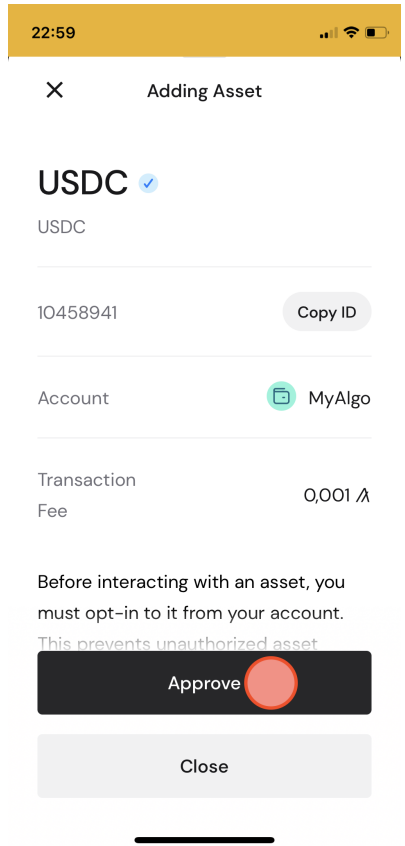
`https://developer.algorand.org/docs/get-details/parameter_tables/`

Opt-In with Pera Algo Wallet









(1) Opt in

(2) Copy your address

(3) Get TestNet USDC or EURC from `https://faucet.circle.com`