Course III:
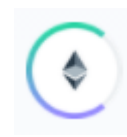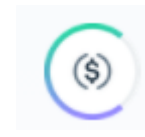
DeFi Deep Dive

1. Credit and Lending

(ii) Compound

(c) cTokens

Credit/Lending: Compound

cTokens

- The Compound protocol must escrow tokens as a depositor in order to maintain that liquidity for the platform itself and to keep track of each person's ownership stake in each market.

- A naive approach would be to keep track of the number inside a contract.

- A better approach would be to tokenize the user's share.

- Compound does this using a cToken, and this is one of the platform's important innovations.

Credit/Lending: Compound

cTokens are minted and burned

- Compound's cToken is an ERC-20 in its own right that represents an ownership stake in the underlying Compound market.

- For example, cDAI corresponds to the Compound DAI market and cETH corresponds to the Compound ETH market.

- Both tokens are minted and burned in proportion to the funds added and removed from the underlying market as a means to track the amount belonging to a specific investor.

Credit/Lending: Compound

cTokens can be traded

- Given interest payments continually accrue to suppliers, these tokens are always worth more than the underlying asset.

- cTokens can be traded on their own like a normal ERC-20 asset.

- Other protocols can seamlessly integrate with Compound simply by holding cTokens and allows users to deploy their cTokens directly into other opportunities, such as using a cToken as collateral for a MakerDAO Vault.

- Instead of using ETH only as collateral, an investor can use cETH and earn lending interest on the ETH collateral.
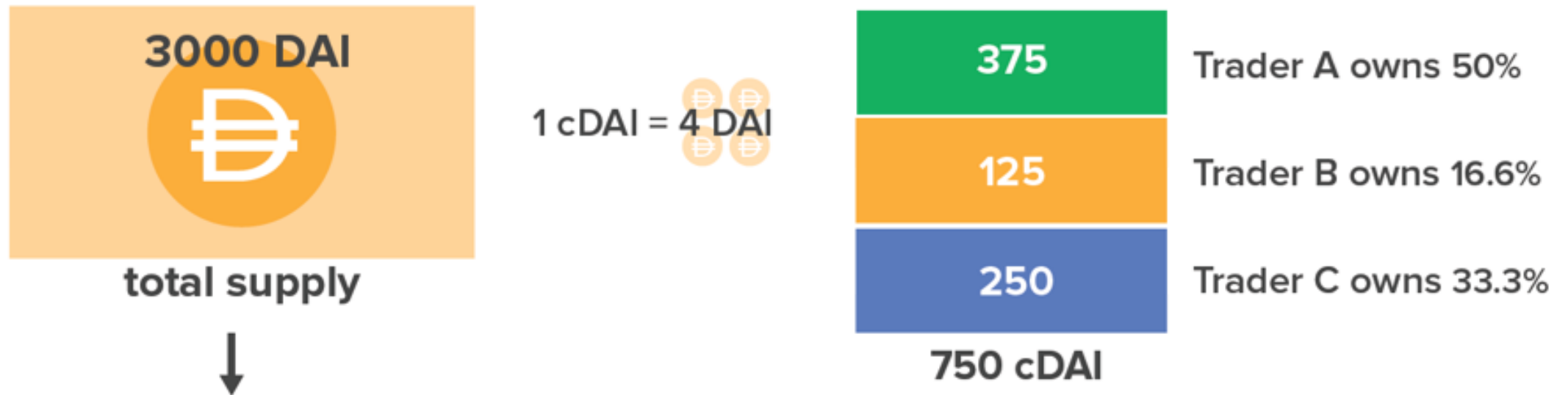
Credit/Lending: Compound

Example

- Assume there are 2,000 DAI in the Compound DAI market and a total 500 cDAI represents the ownership in the market; this ratio of cDAI to DAI is not determinative and could just as easily be 500,000 cDAI.

Credit/Lending: Compound

Example

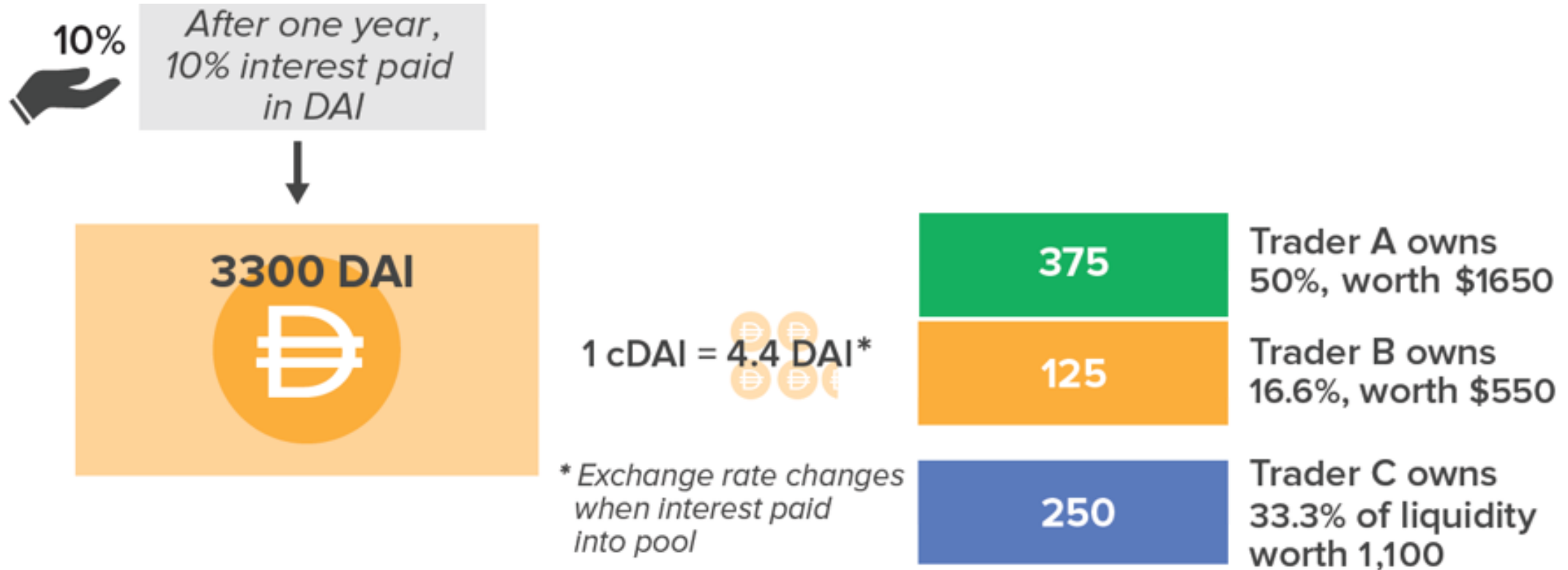- If a trader comes in and deposits 1,000 DAI, the supply increases by 50% (and Compound mints 50% or 250 cDAI)

3000 DAI

total supply

1 cDAI = 4 DAI

375	Trader A owns 50%
125	Trader B owns 16.6%
250	Trader C owns 33.3%

750 cDAI

Credit/Lending: Compound

Example

- Currently, 1 cDAI = 4 DAI, but after interest accrues the ratio will change. Let interest = 10%, at year end, 3,300 DAI. Trader redeems 250 cDAI for 1,100 DAI

10% — After one year, 10% interest paid in DAI

3300 DAI

1 cDAI = 4.4 DAI*

*Exchange rate changes when interest paid into pool

375	Trader A owns 50%, worth $1650
125	Trader B owns 16.6%, worth $550
250	Trader C owns 33.3% of liquidity worth 1,100

Credit/Lending: Compound

Example

- Note that the trader can deploy cDAI in the place of DAI so the DAI is not sitting idle but earning interest via the Compound pool.

- For example, the trader could deploy cDAI as the necessary collateral to open a perpetual futures position on dYdX or she could market make on Uniswap using a cDAI trading pair (discussed later).