

Decentralized Exchanges (DEX) I

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Source: “Decentralized Exchanges (DEX)” by A. Gervais, UCB DeFi course

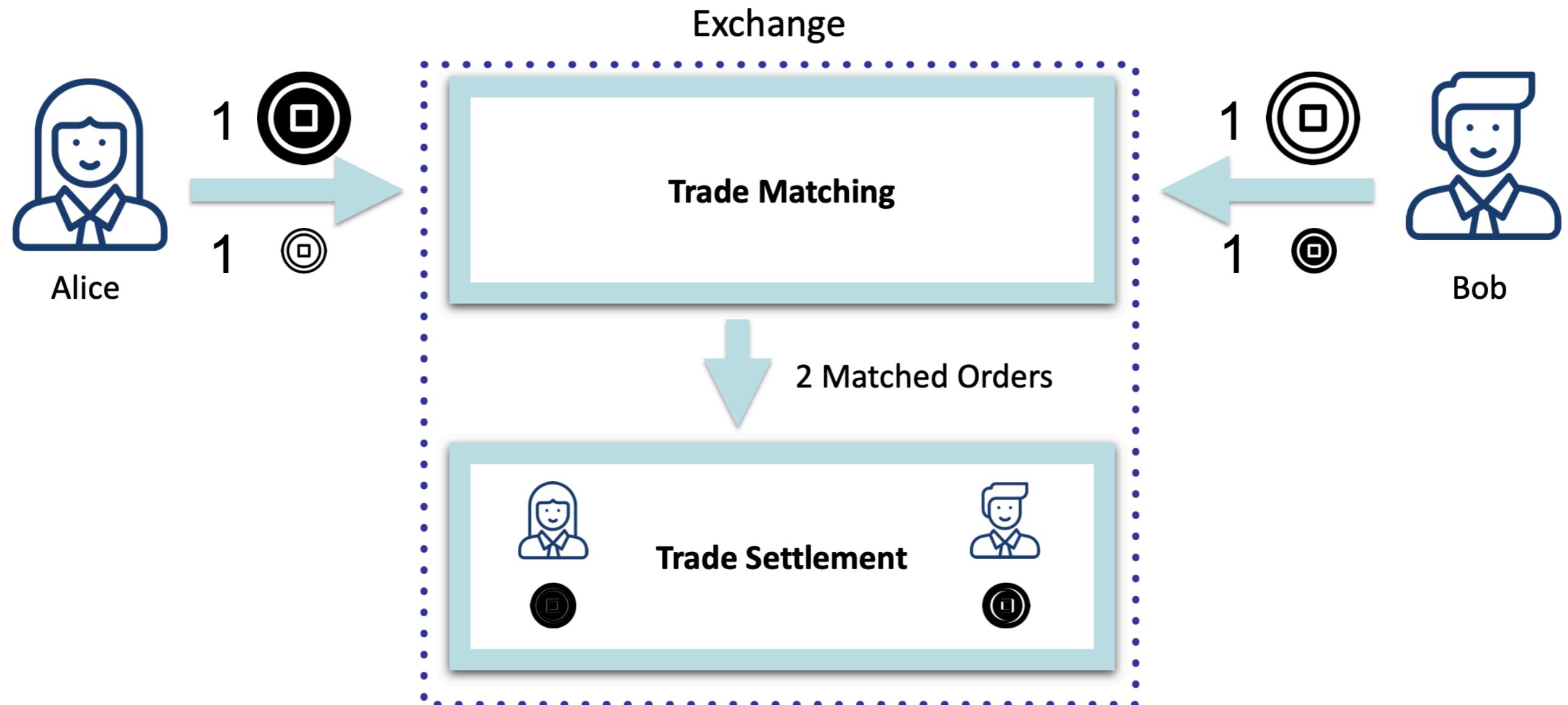
Centralized Exchanges (CEX)

Financial Exchanges

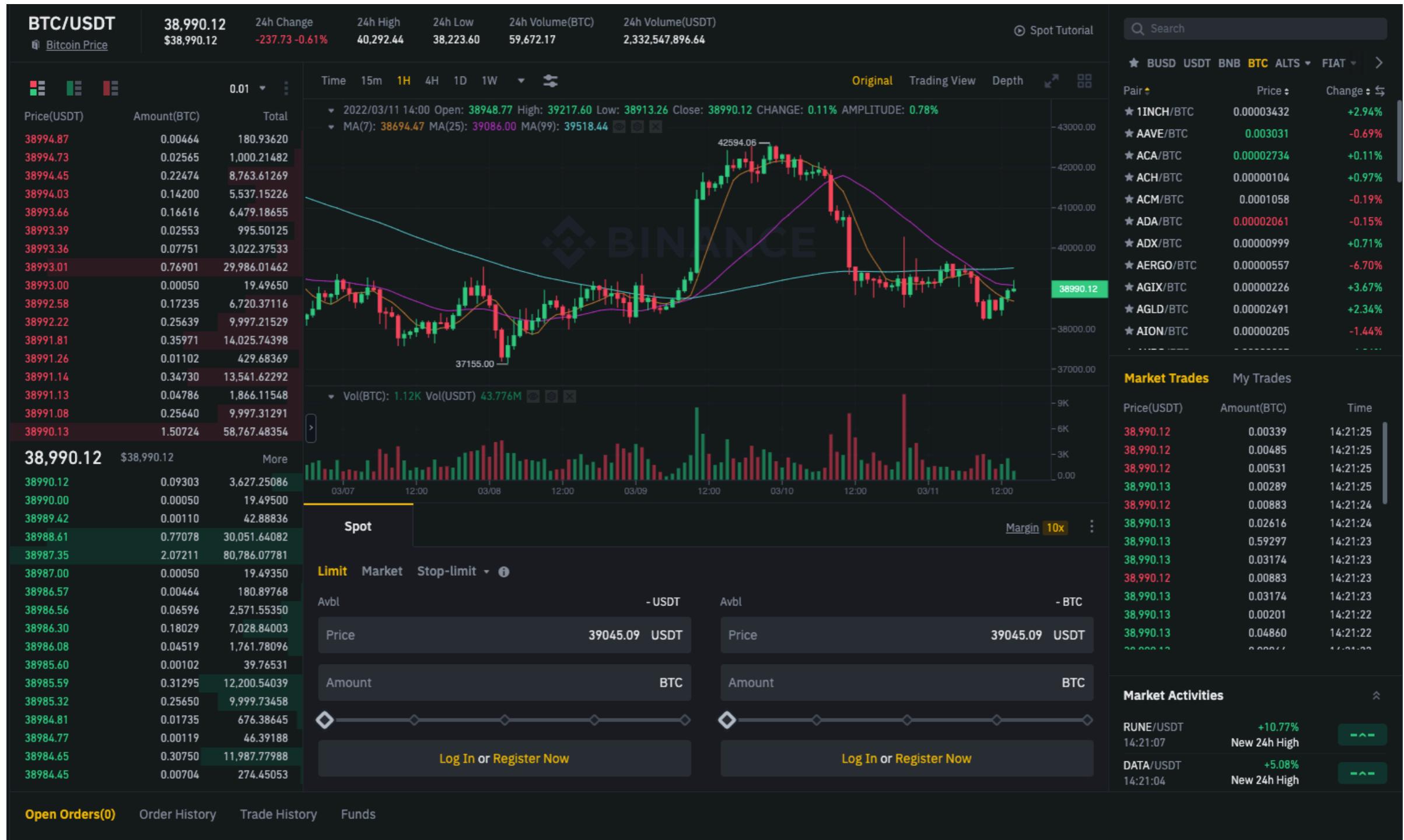


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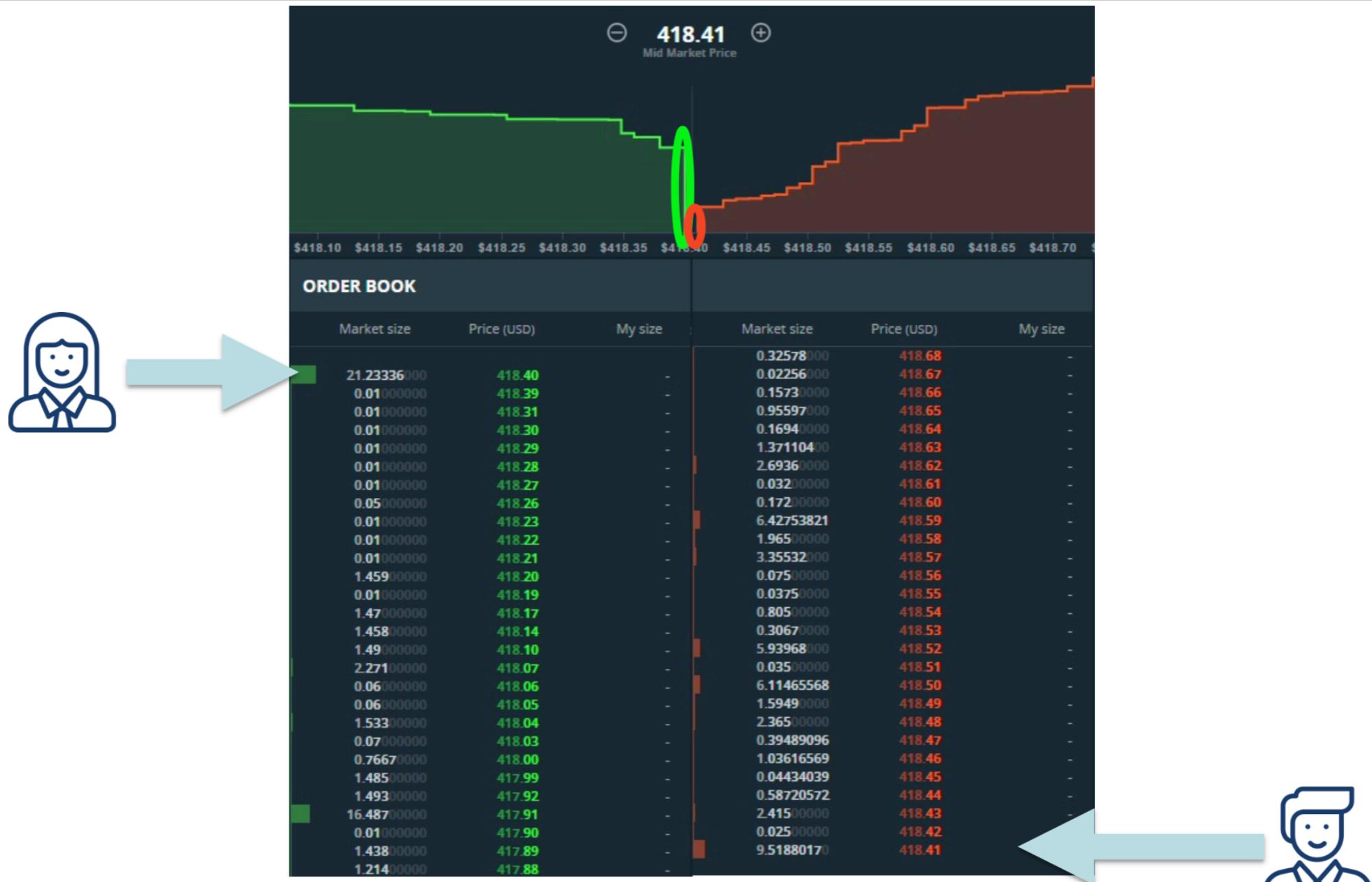
Financial Exchanges 101



Binance: Crypto Assets CEX



Order Book

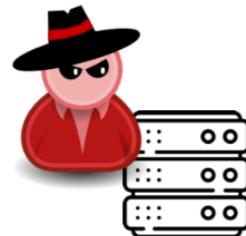


CEX (Server) Order Book

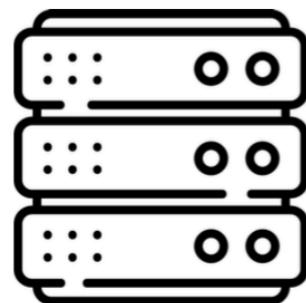
- Rely on market makers to always make the market
- Market maker = a firm or individual who actively quotes two-sided markets in a particular security, providing bids and offers
- Market makers provide liquidity and depth to markets and profit from the difference in the bid-ask spread

Two Order Book Models

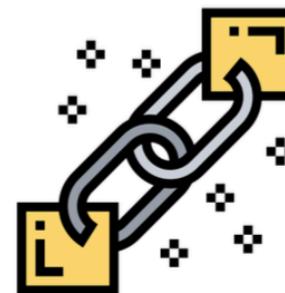
- + Fast matching
- + No fees for canceled orders
- No censorship resistance
- Exchange front running



Server



On-Chain



- + Censorship resistance
- + Robust
- Slow matching
- Blockchain fees for orders
- Miner/trader front running



EtherDelta

EtherDelta | PPT | PPT

Chat Help Tokens Contract English Account

Balance

Deposit Withdraw Transfer

Please select an account using the account dropdown in the upper right.

Order Book

PPT	ETH	Price
40.000	0.024880000	0.995
3.150	0.024422244	0.077
25.000	0.024000000	0.600
2.583	0.023450000	0.061
30.000	0.023330000	0.700
7.134	0.022400000	0.160
15.000	0.022000000	0.330
20.000	0.021000000	0.420
587.500	0.019777777	11.619
5.000	0.019770000	0.099
189.000	0.019000000	3.591
400.000	0.018990000	7.596
252.898	0.018900000	4.780
200.000	0.017999000	3.600
10.000	0.017888880	0.179
1.500	0.017400000	0.026
50.006	0.017399999	0.870
50.006	0.017399999	0.870

Price Chart

PPT/ETH ▲ 0.015508 +4.58%

1H 2H 6H 24H

Your Transactions

Trades Orders Funds

Trades & Volume

Time	PPT	PPT/ETH
6:00:32 PM 9/18	10.000	0.015507512
5:59:32 PM 9/18	290.000	0.015359271
5:17:43 PM 9/18	25.000	0.015432548
2:30:01 PM 9/18	13.644	0.015498731
12:10:40 PM 9/18	20.000	0.017399999
10:33:54 AM 9/18	8.765	0.015128456
8:24:26 AM 9/18	10.000	0.015000000
8:22:41 AM 9/18	10.000	0.015030000
8:17:02 AM 9/18	10.000	0.015166125
8:16:40 AM 9/18	38.731	0.015175101
8:16:40 AM 9/18	15.890	0.015175860
8:07:06 AM 9/18	11.269	0.015175101
6:58:17 AM 9/18	200.000	0.015565806
5:47:25 AM 9/18	99.500	0.015175100
3:05:30 AM 9/18	0.993	0.016127865
11:12:57 PM 9/17	62.000	0.016025931
10:50:41 PM 9/17	463.228	0.016041887
9:33:59 PM 9/17	67.000	0.016252595

Updates

Important Twitter

Notices

The only official URL for EtherDelta is <https://etherdelta.com>. Bookmark it once and use the bookmark.

Do not send your tokens directly to the smart contract, or they will be lost and unrecoverable. Use the Deposit form (upper left) to send the proper deposit transaction.

The only official representatives in the chat

An example of an order book (almost) DEX on Ethereum

LOB DEX: Lessons Learned

- Advantages:
 - No KYC/AML
 - No fees paid to the exchange
 - No impermanent loss (explained later in AMM)

- Disadvantages:
 - Fees for deposit, withdraw, trade creation/cancel
 - Slow execution
 - Not fully decentralized (mediating server)

Why do we need DEX?



Alice is rich
(aka a “whale”)

Alice wants to provide her
money to traders to earn fees

..but has to trust someone
to manage her money

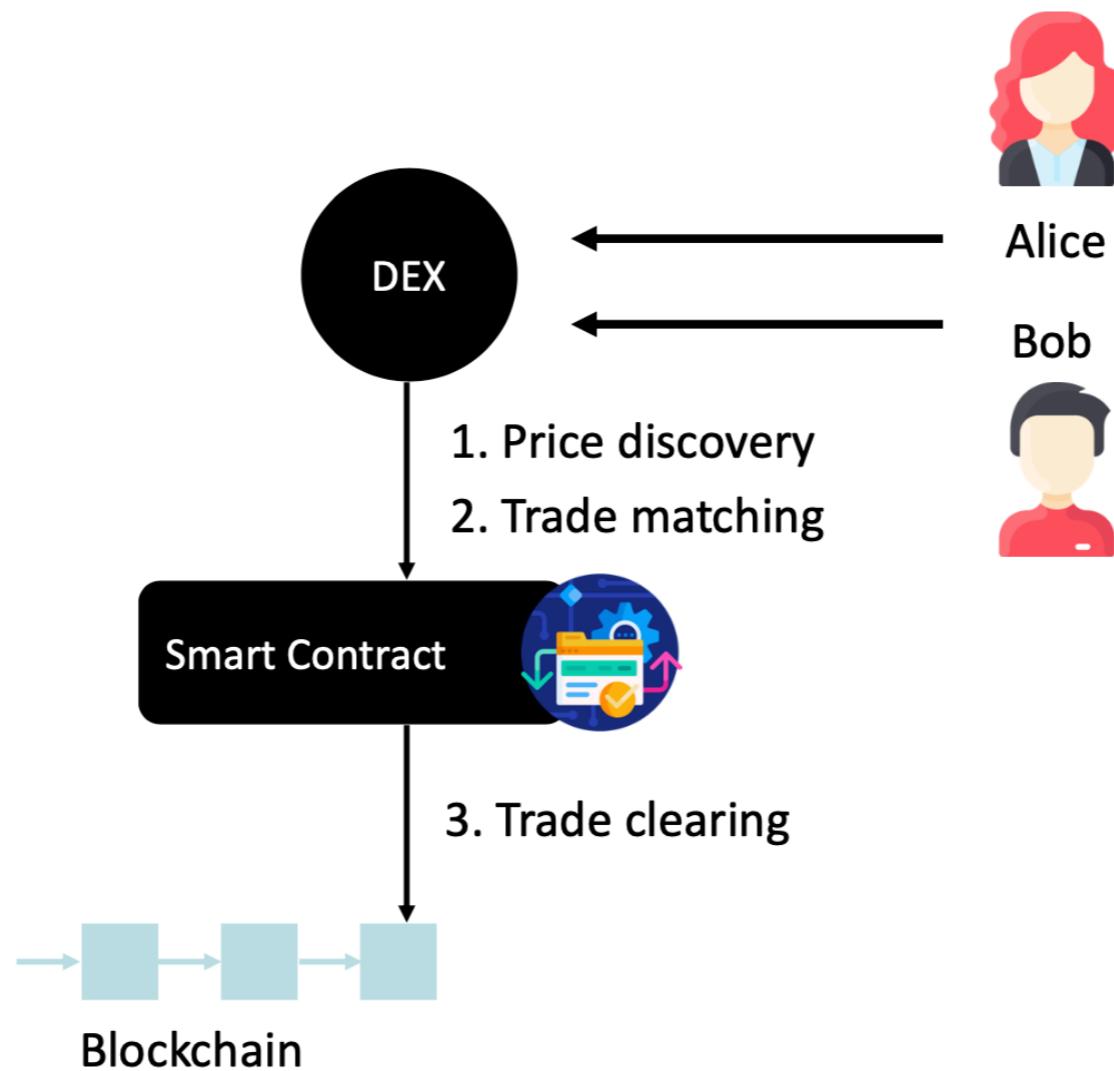


Bob is nifty
trader

Bob wants to buy
the latest coins

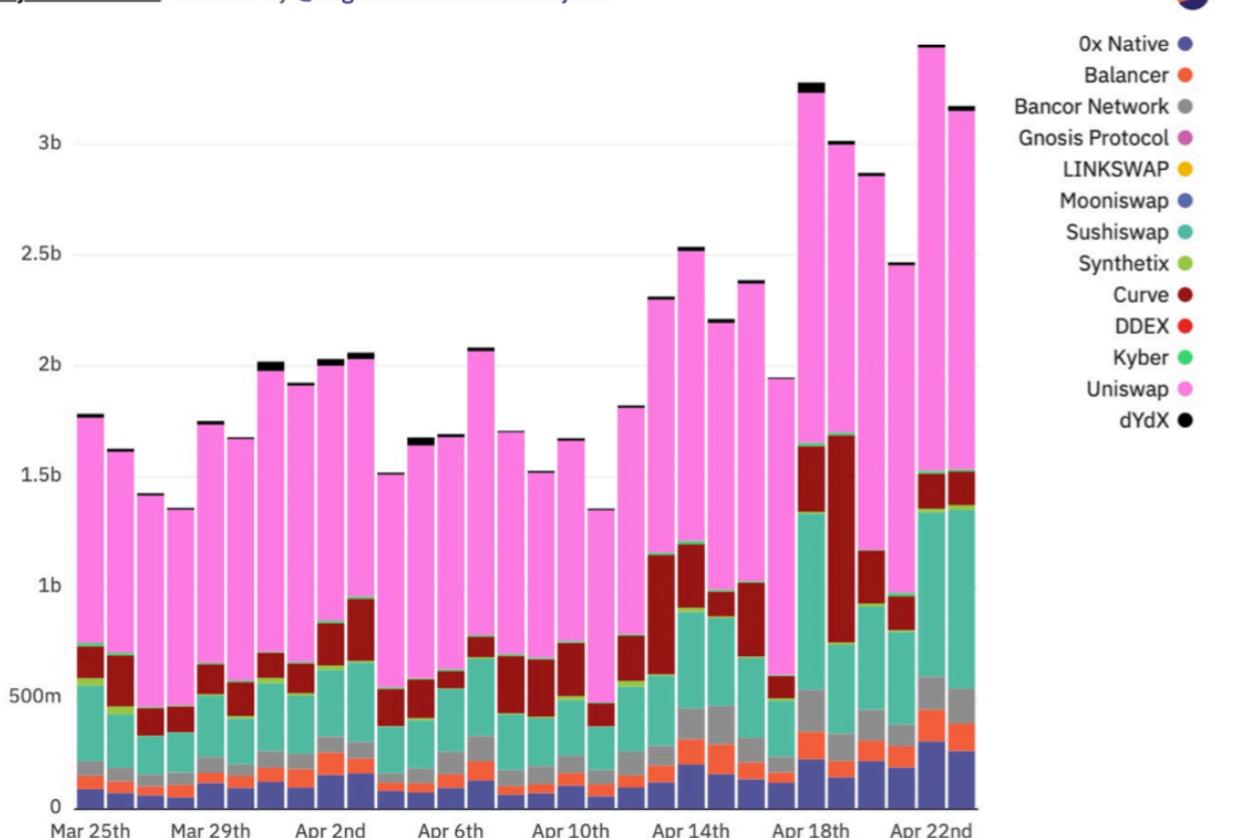
..but struggles to find
a trusted source to buy

DEX System Architecture

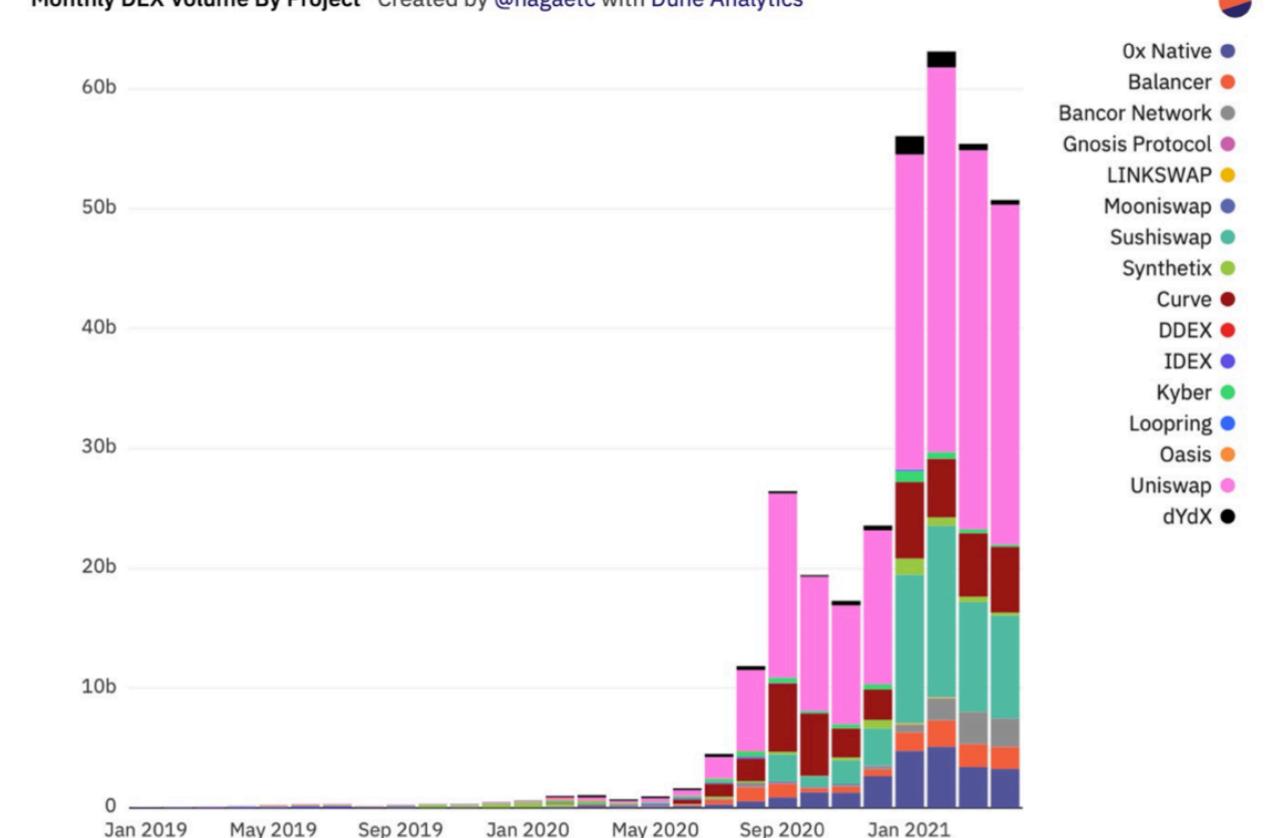


DEX trading volume

Daily DEX volume Created by @hagaetc with Dune Analytics



Monthly DEX Volume By Project Created by @hagaetc with Dune Analytics



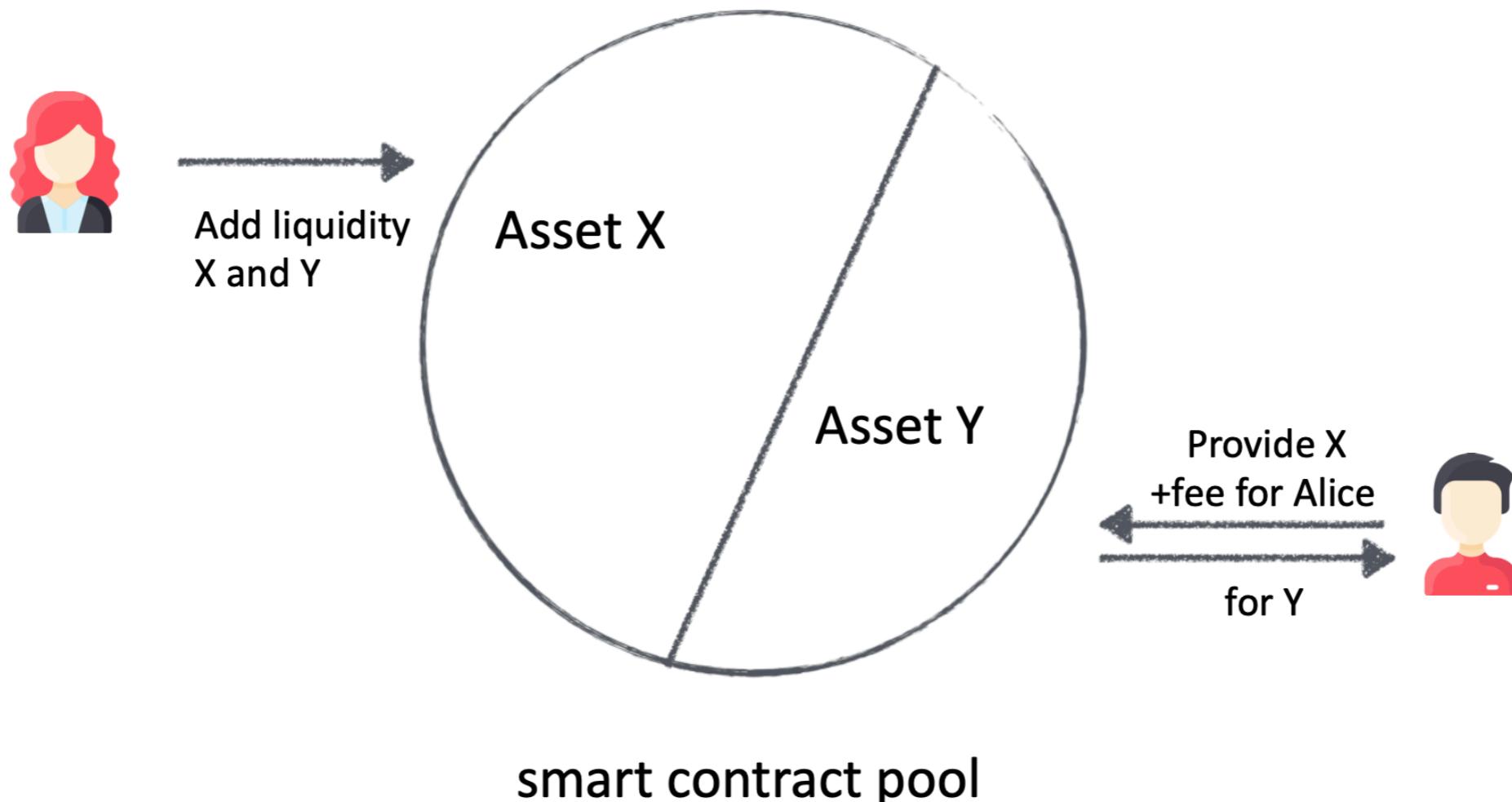
Daily Volume:

- DEXes: 3.5B
- Binance: 49B
- Nasdaq: 234B

Source:
<https://defiprime.com/dex-volume>
<http://www.nasdaqtrader.com/Trader.aspx?id=DailyMarketSummary>
<https://coinmarketcap.com/rankings/exchanges/>

Liquidity Pool

Idea: Let a smart contract do the market making.



AMM – Automated Market Maker

Idea: Let a smart contract do the market making.

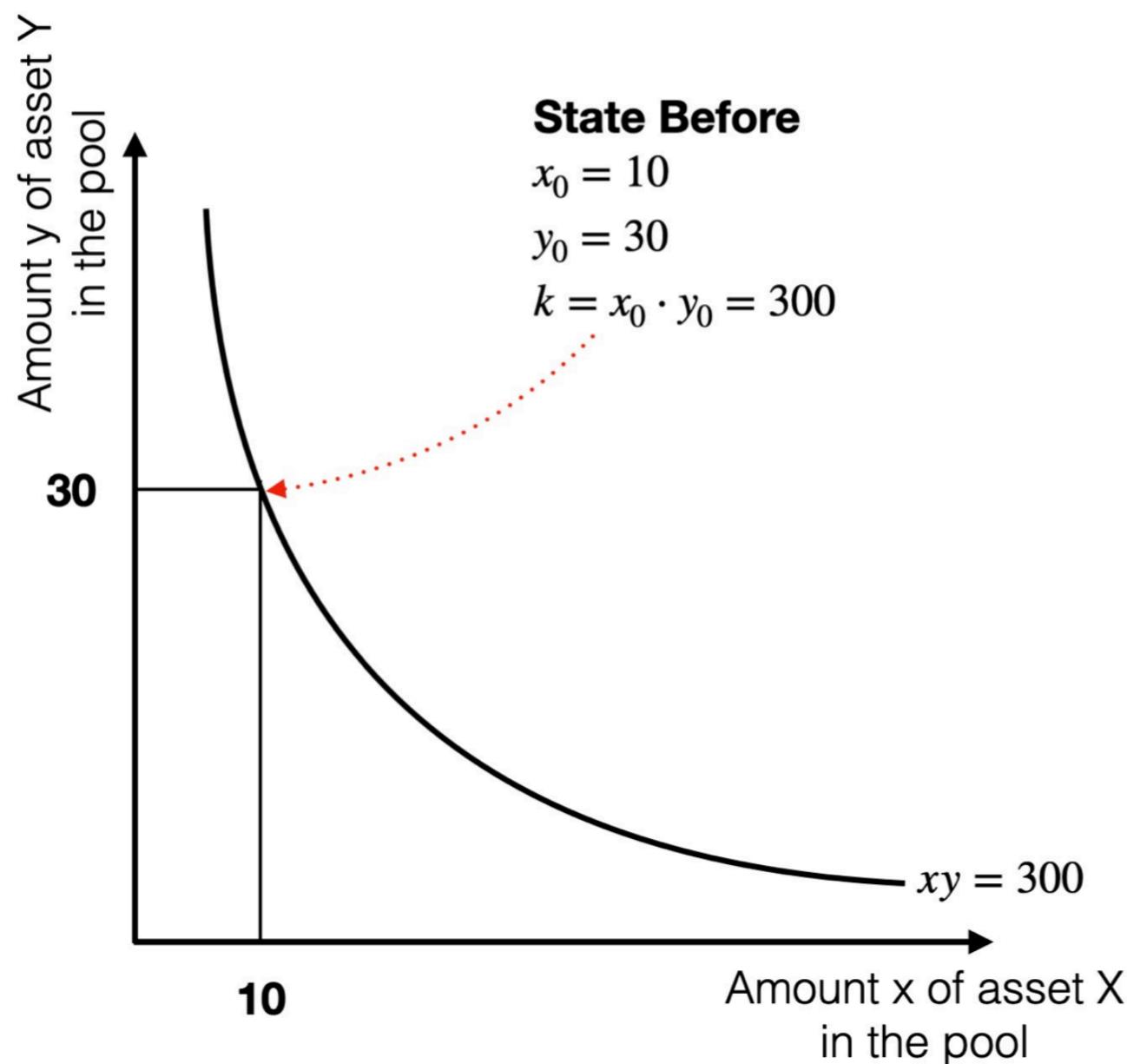
$$x \times y = k$$

Asset X quantity Asset Y quantity constant

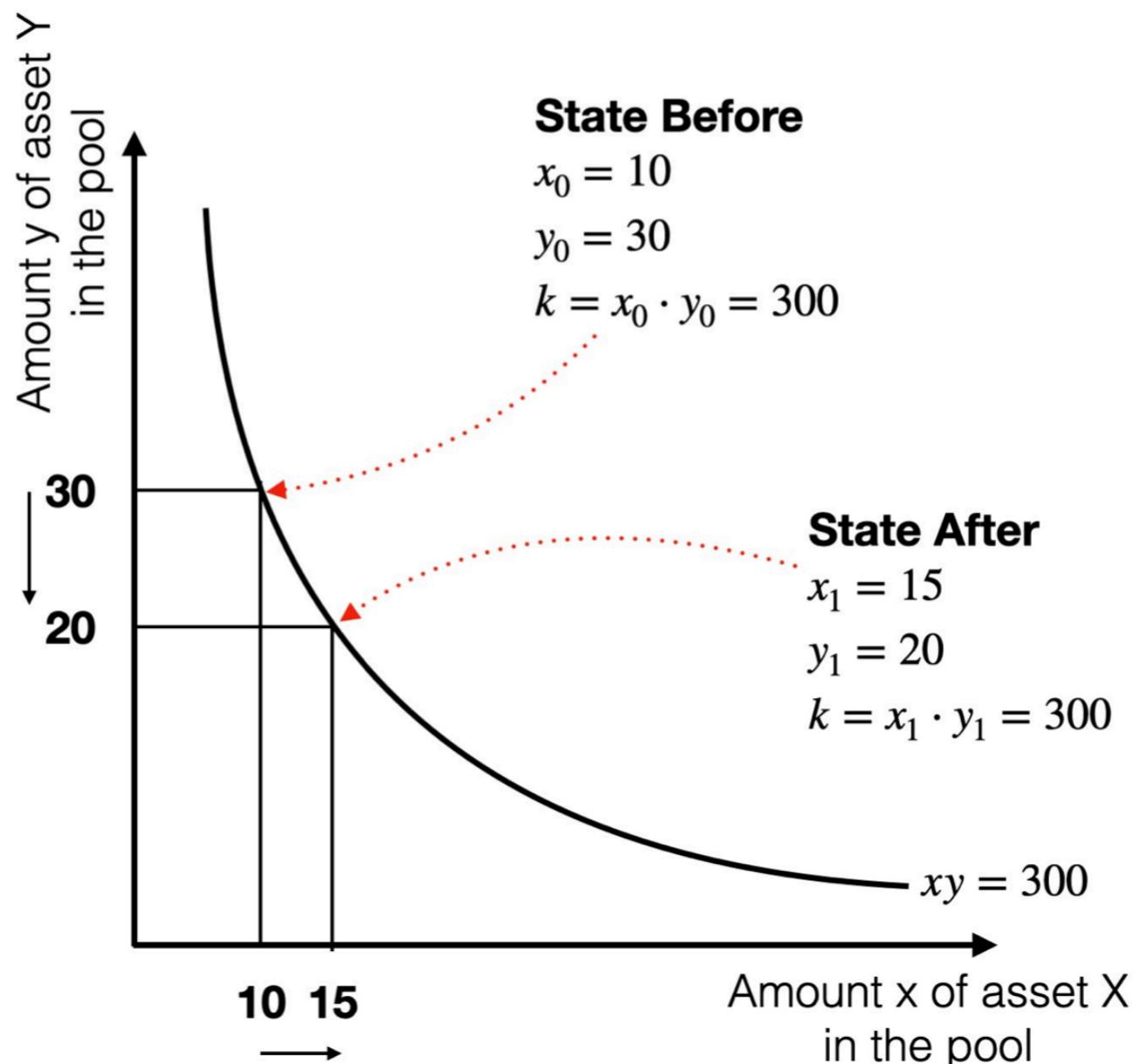
Properties:

- Instant liquidity, irrespective of the trade size
- Purchase of asset X **increases price** of X and **decreases the price** of Y
- Ratio of asset X and Y sets the price
- Known as Constant Product (CP) AMM

AMM Example

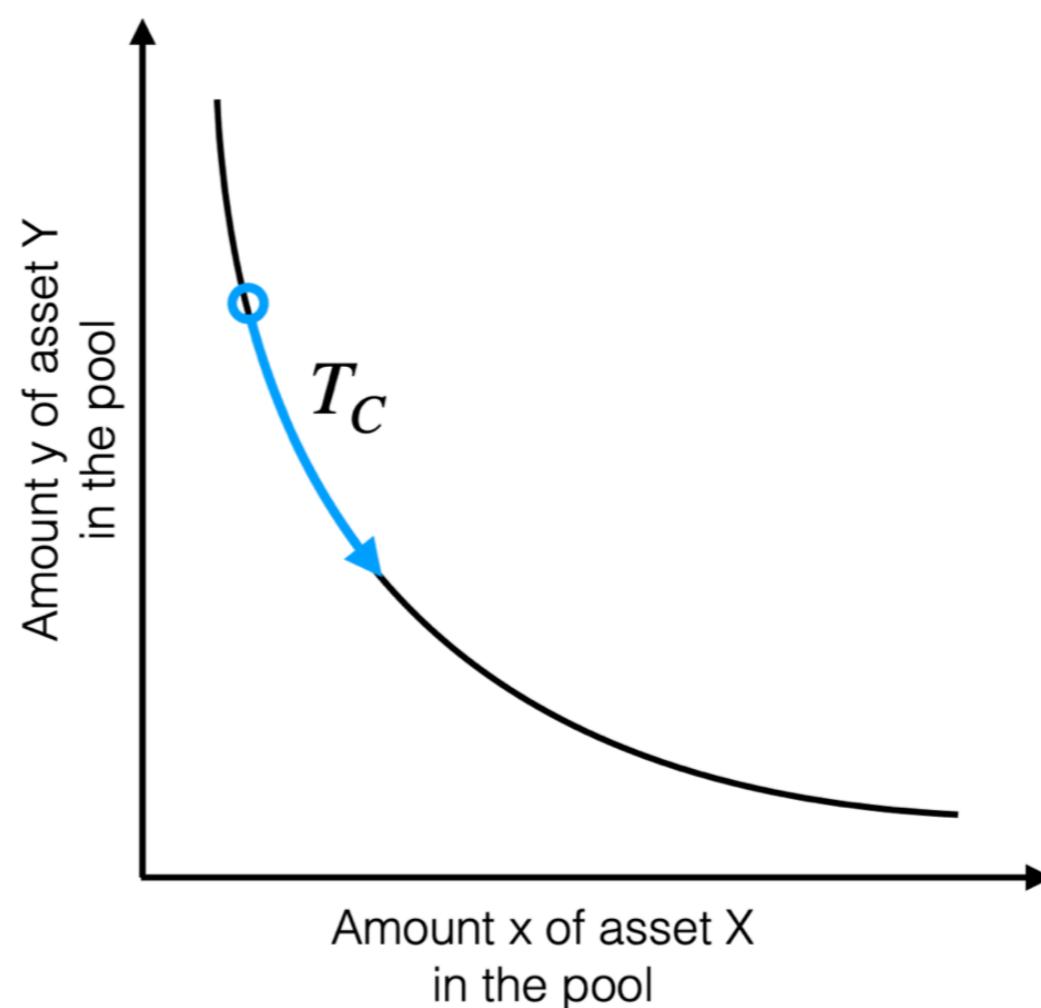


AMM Example

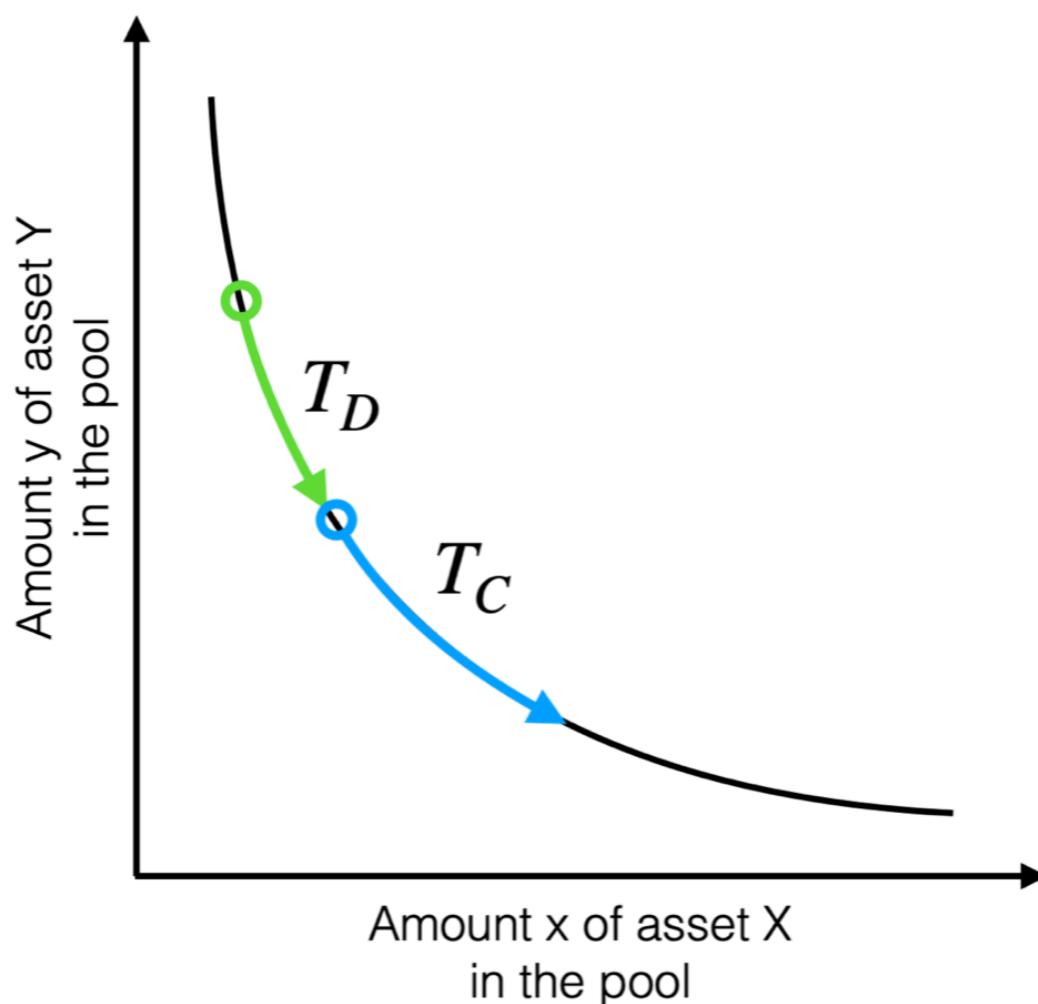


Expected Slippage

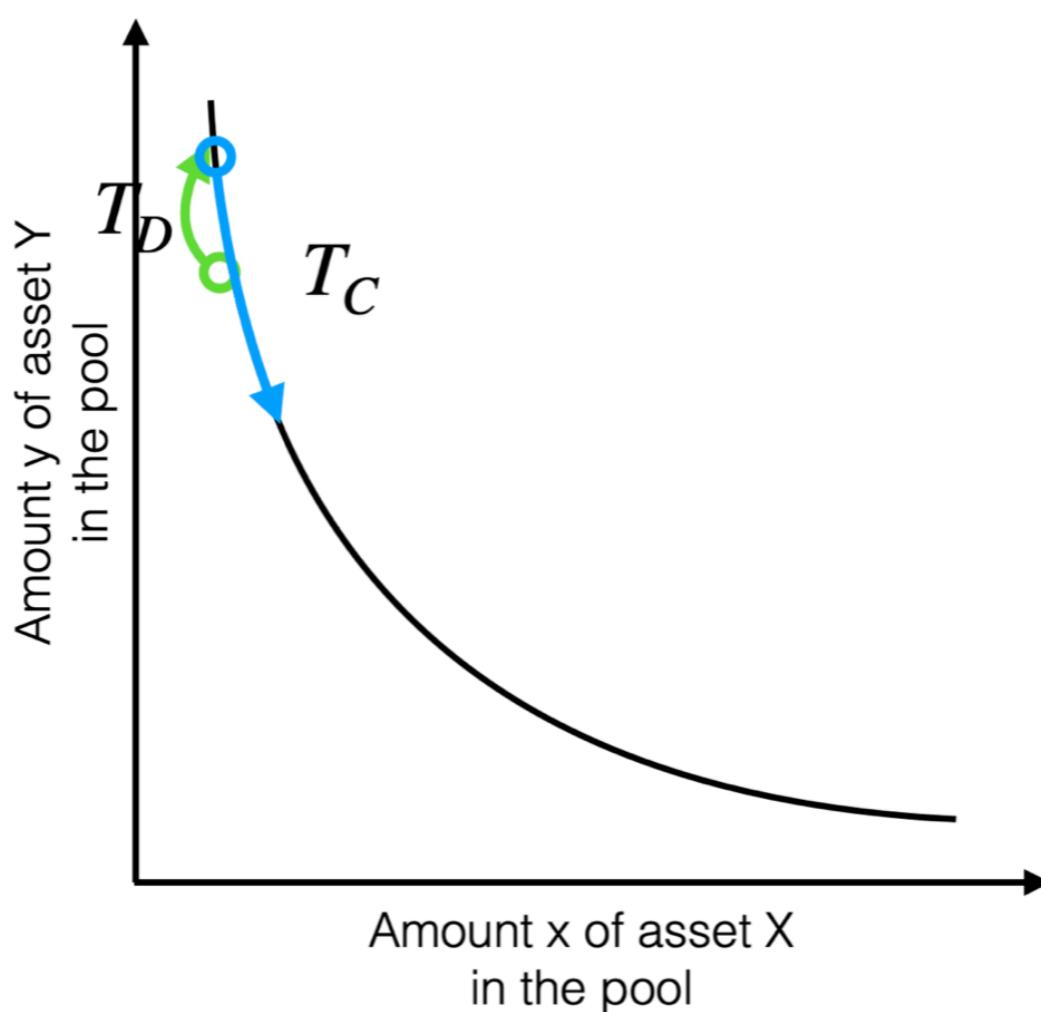
The expected increase or decrease in price based on the trading volume and available liquidity.



Unexpected Slippage → Worse Execution Price



Unexpected Slippage → Better Execution Price

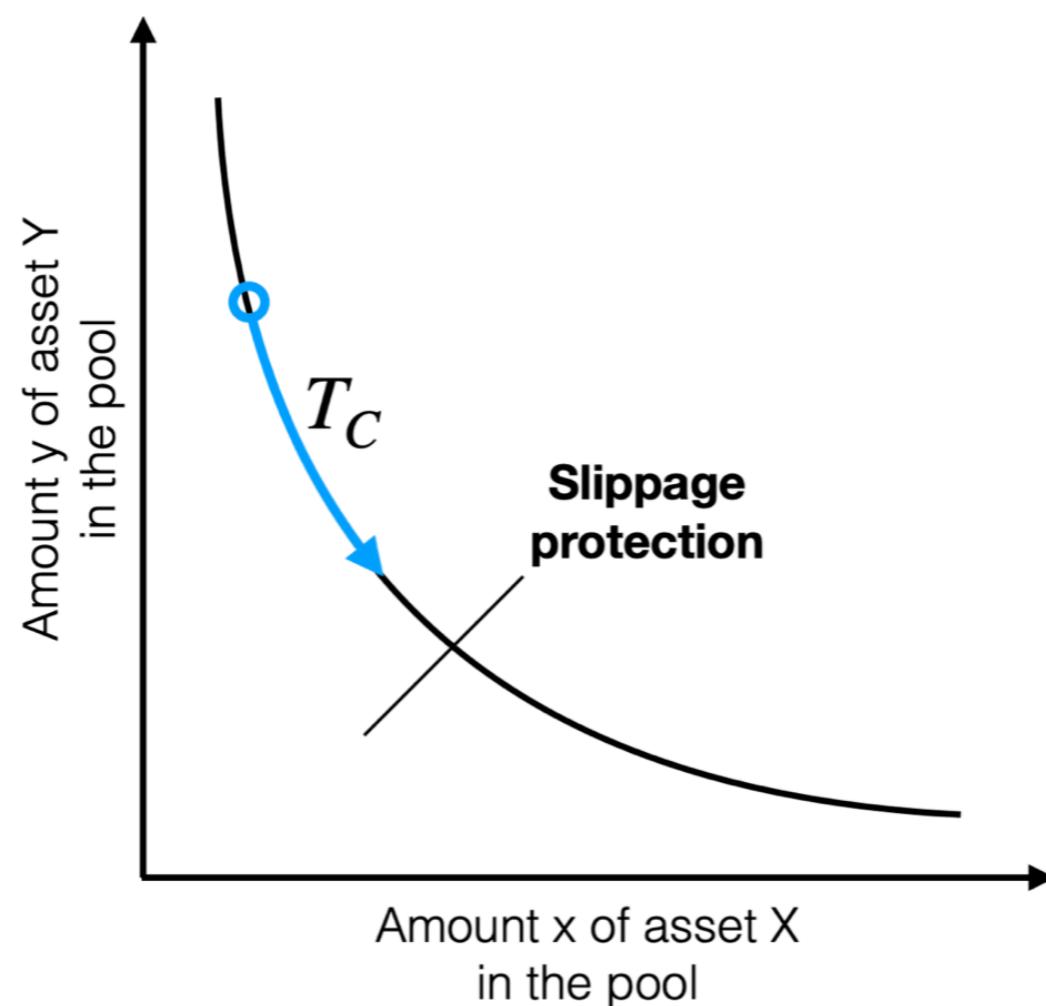


AMM for 100 ETH / 20000 DAI Pool

<i>ETH Purchased</i>	<i>Cost per ETH in DAI</i>	<i>Total Cost in DAI</i>	<i>Premium</i>	<i>New DAI Liquidity</i>	<i>New ETH liquidity</i>	<i>Product (k)</i>
1	202.02	202.02	1.01%	20,202.02	99	2,000,000
5	210.52	1,052.63	5.26%	21,052.63	95	2,000,000
10	222.22	2,222.22	11.11%	22,222.22	90	2,000,000
50	400	20,000	200%	40,000	50	2,000,000
75	800	60,000	400%	80,000	25	2,000,000
99	20,000	1,980,000	10,000 %	2,000,000	1	2,000,000
100	Infinity	Infinity	Infinity	Infinity	0	2,000,000

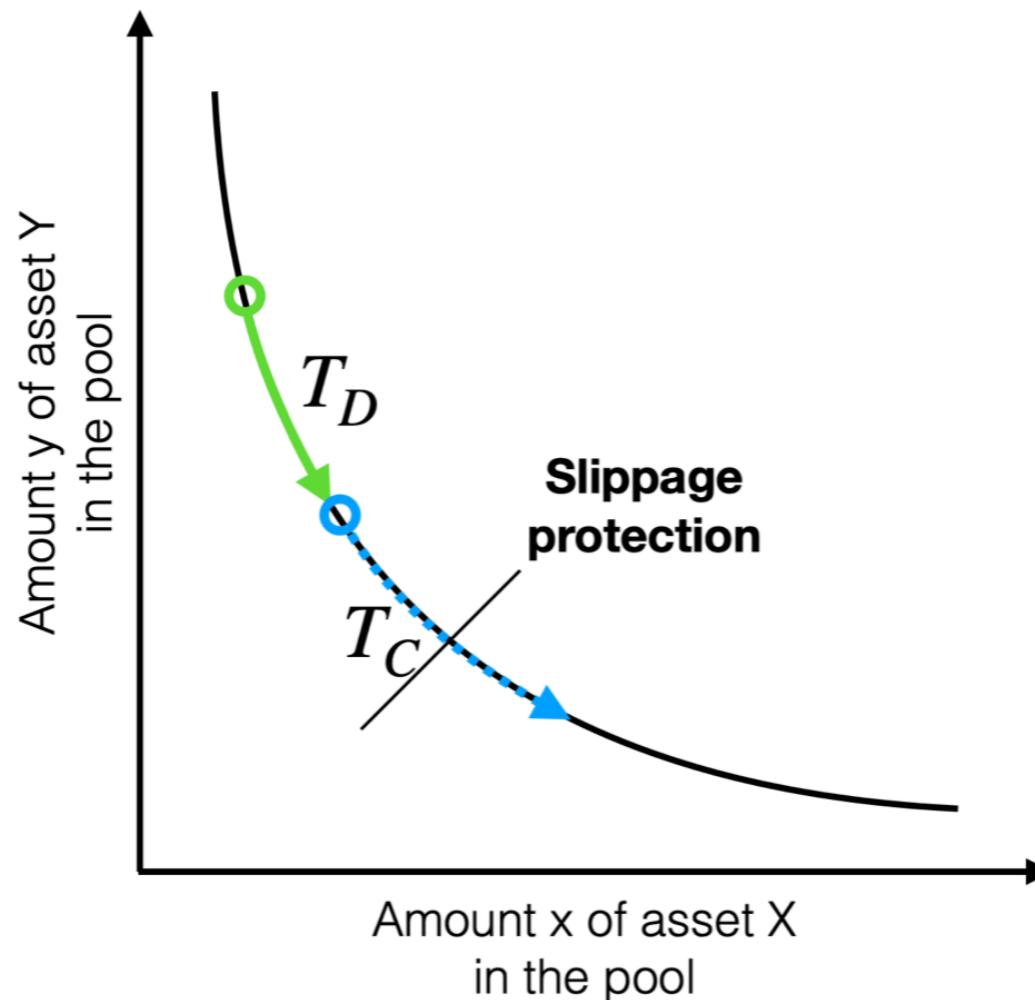
Slippage Protection

Configures a slippage protection threshold to prevent unacceptable slippage



Slippage Protection

A transaction **fails** when crossing the slippage limit.



Pros and Cons of an AMM

- (+) No Order Book maintenance
 - But arbitrage required
- (+) Simple implementation for CP AMM
 - Low gas costs
- (-) Danger of impermanent loss/coin de-peg
 - Total loss of funds possible
- (-) High slippage for low liquidity markets
 - Please do observe your slippage tolerance
- (-) Users vulnerable to sandwich attacks
 - See security lecture

To be continued