



The Art of AMM

Anton Bukov, Co-founder 1inch

What is Capital Efficiency?

95%

Uniswap v2

84%*

Uniswap v3

84%*

Uniswap v4

83%

Curve

89%

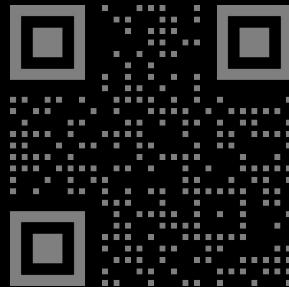
PancakeSwap

50+

Research papers

What is Capital Efficiency?

Share of stale capital in top pools for 90% days during 2025



95%

Uniswap v2

84%*

Uniswap v3

84%*

Uniswap v4

83%

Curve

89%

PancakeSwap

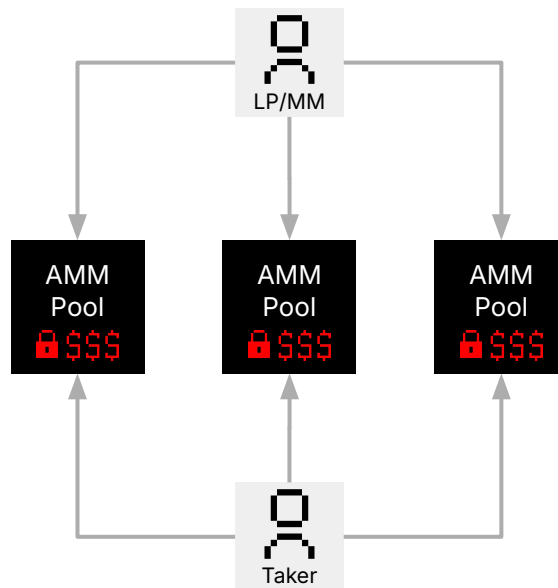
50+

Research papers

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Classic AMM

Pooled liquidity



- fragments liquidity &
- locks capital out of DeFi

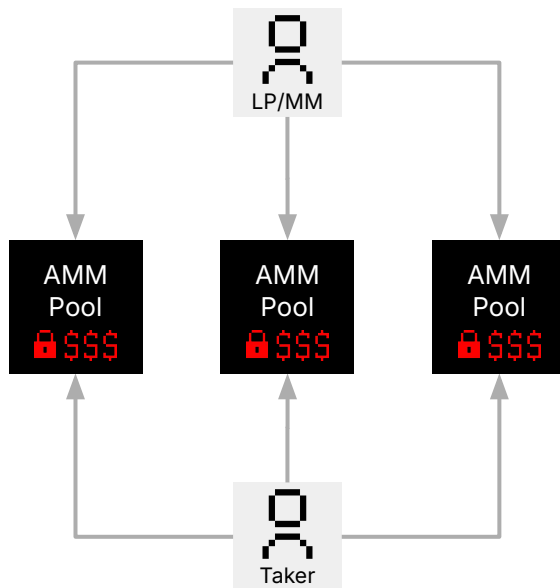
...since 2017

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Aqua
architecture
reinvents
DeFi liquidity
market

Classic AMM

Pooled liquidity

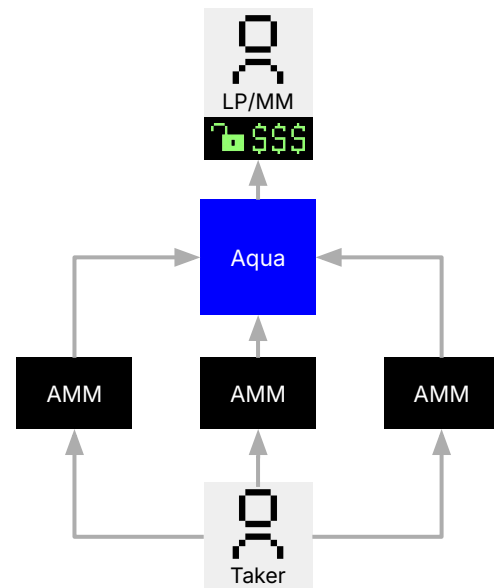


- fragments liquidity &
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...since 2017

Aqua AMM

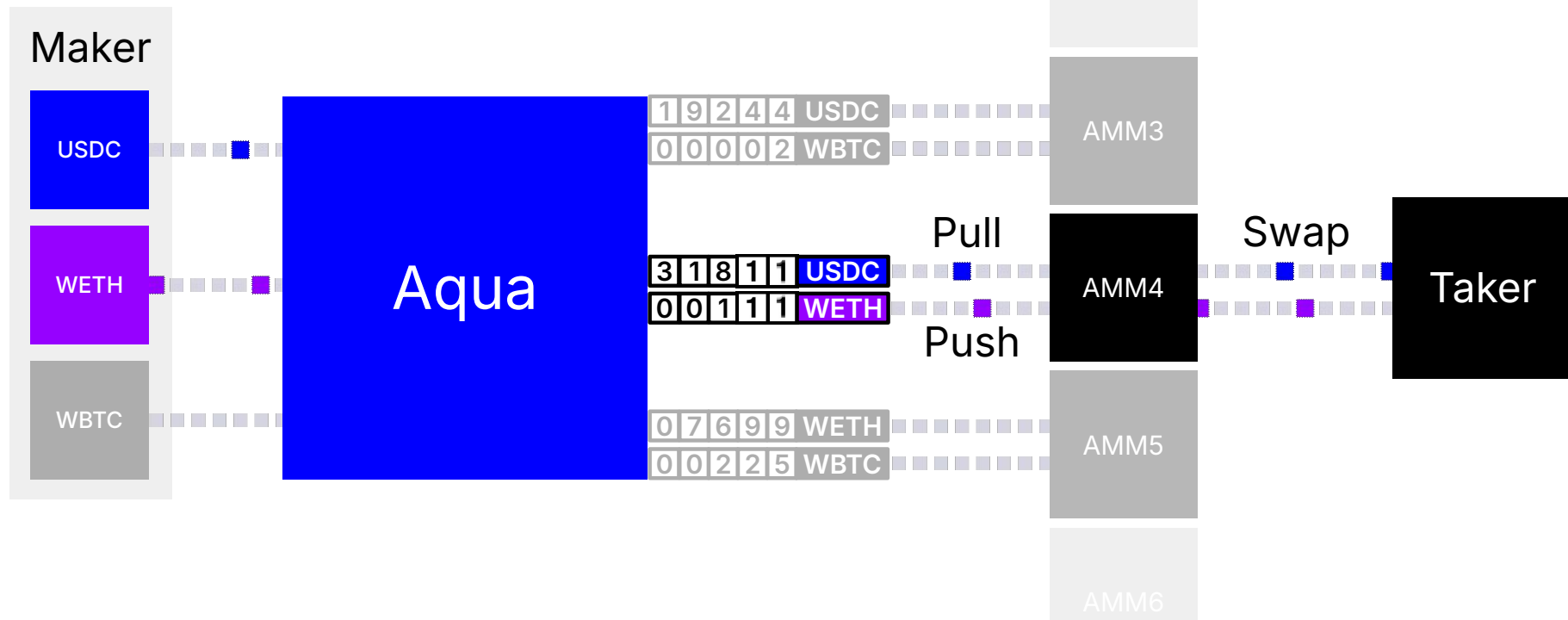
Shared & Unlocked Liquidity



- unlimits capital efficiency &
- elevates utility efficiency

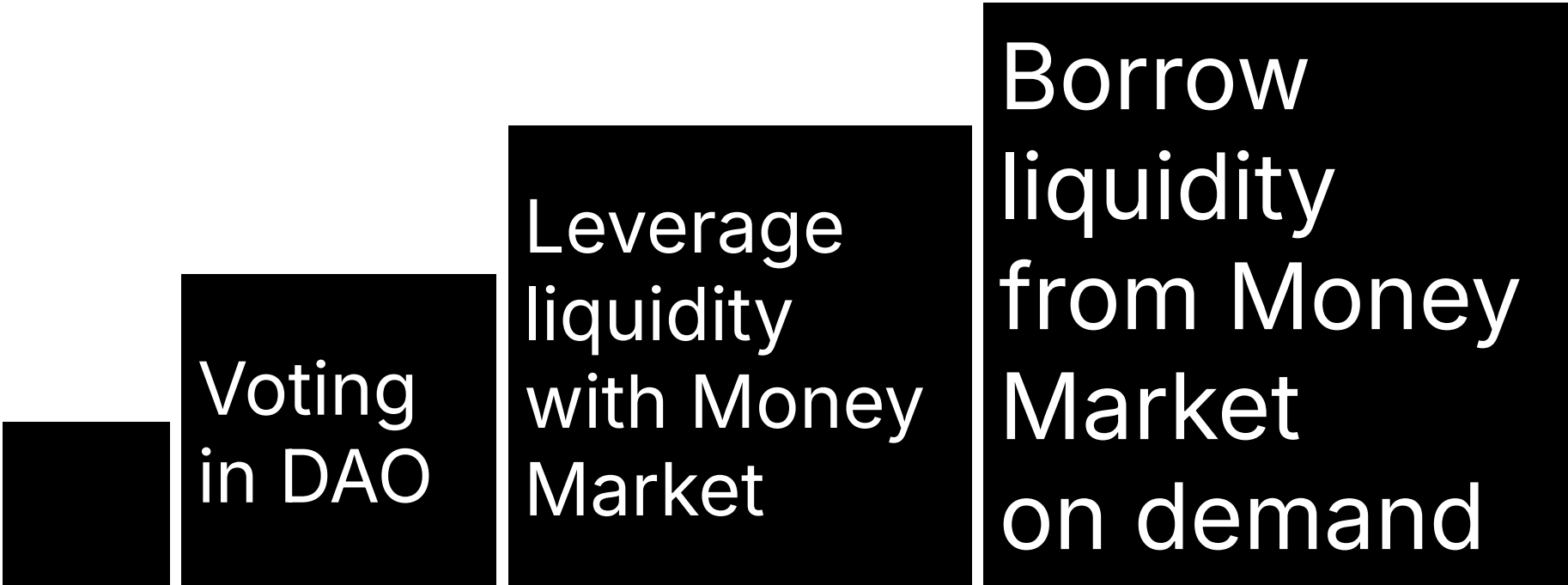
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Aqua **manages** virtual balances for each AMM



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Unlocked liquidity elevates
utility efficiency and **capital efficiency**



Voting
in DAO

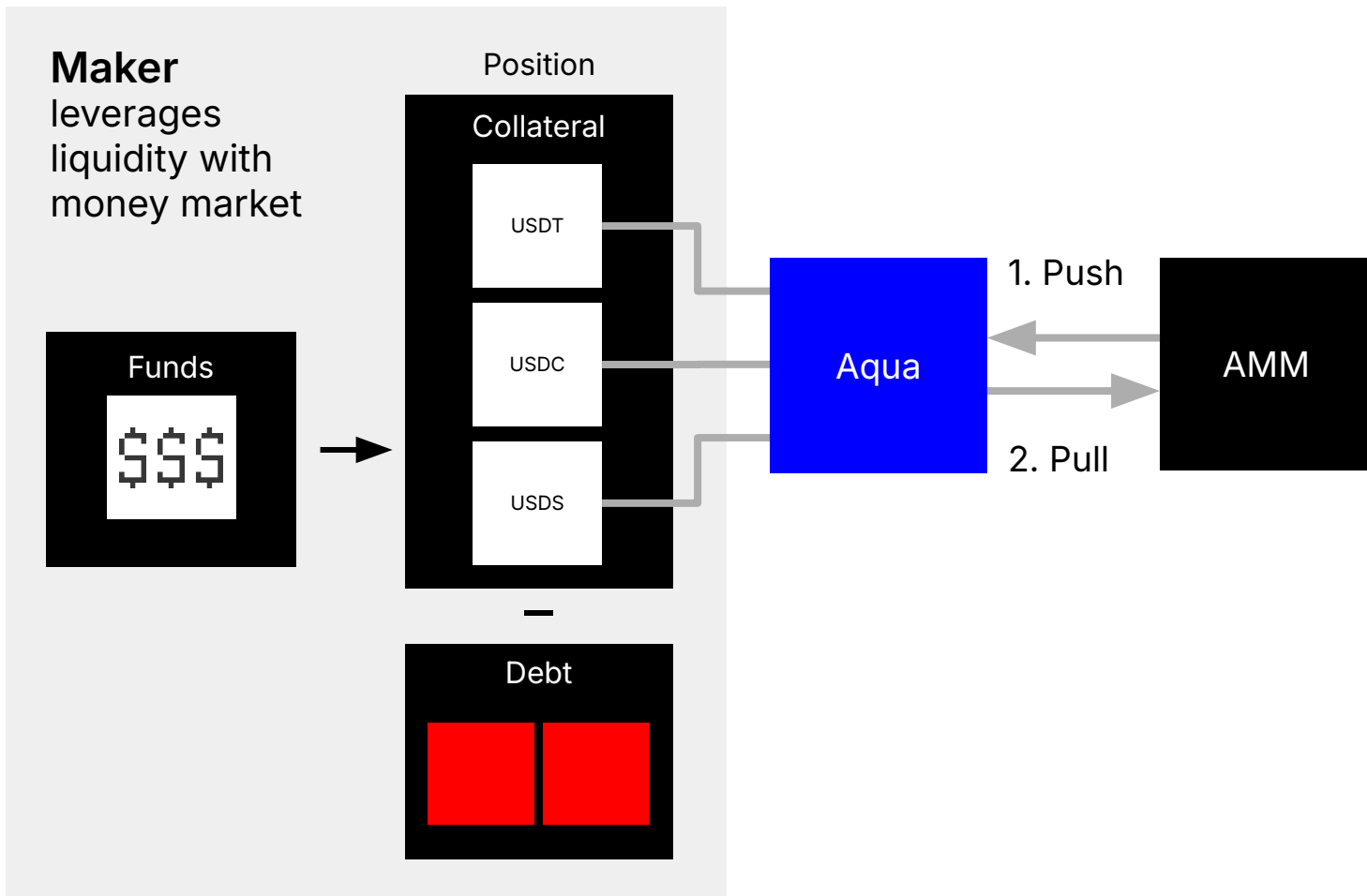
Leverage
liquidity
with Money
Market

Borrow
liquidity
from Money
Market
on demand

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Example

Leverage of liquidity



What is Capital Efficiency?

What is Capital Efficiency?

Capital efficiency is no more protocol metric, but measure of LP efforts and risk appetite.

1" Aqua

Shared & Unlocked Liquidity

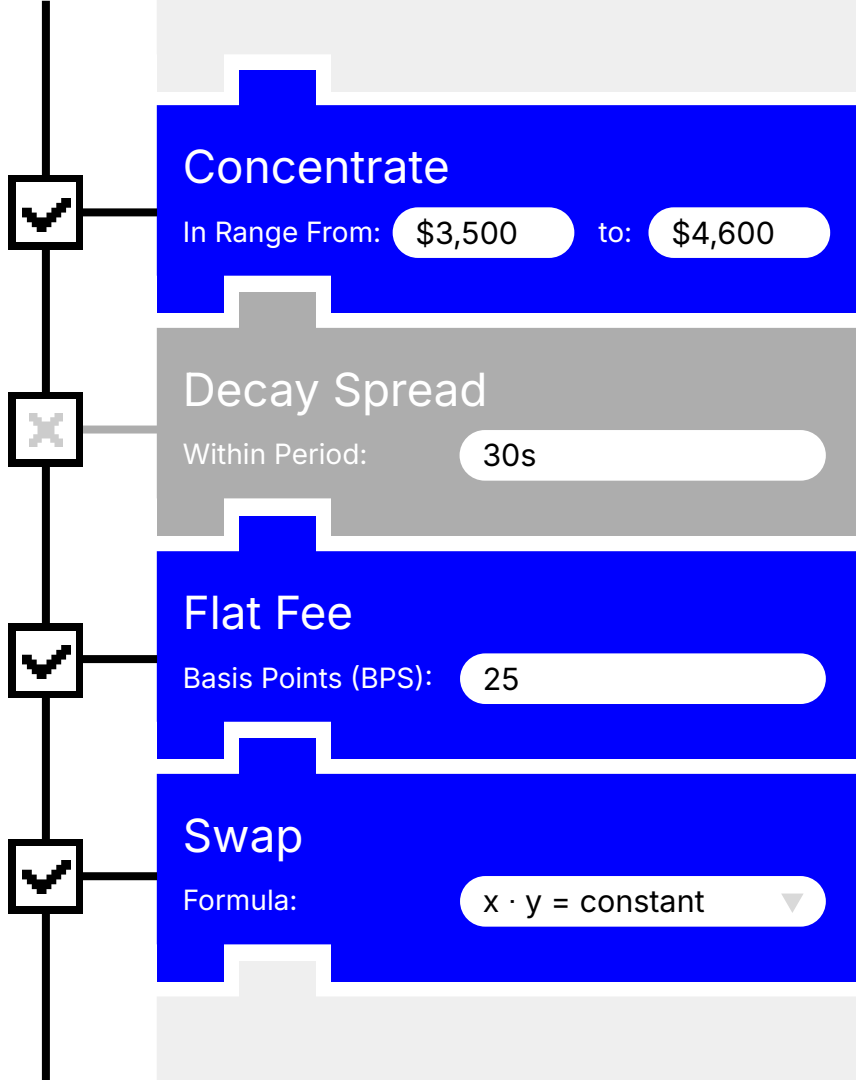
No flow is toxic anymore

SwapVM

Virtual Machine to program AMM

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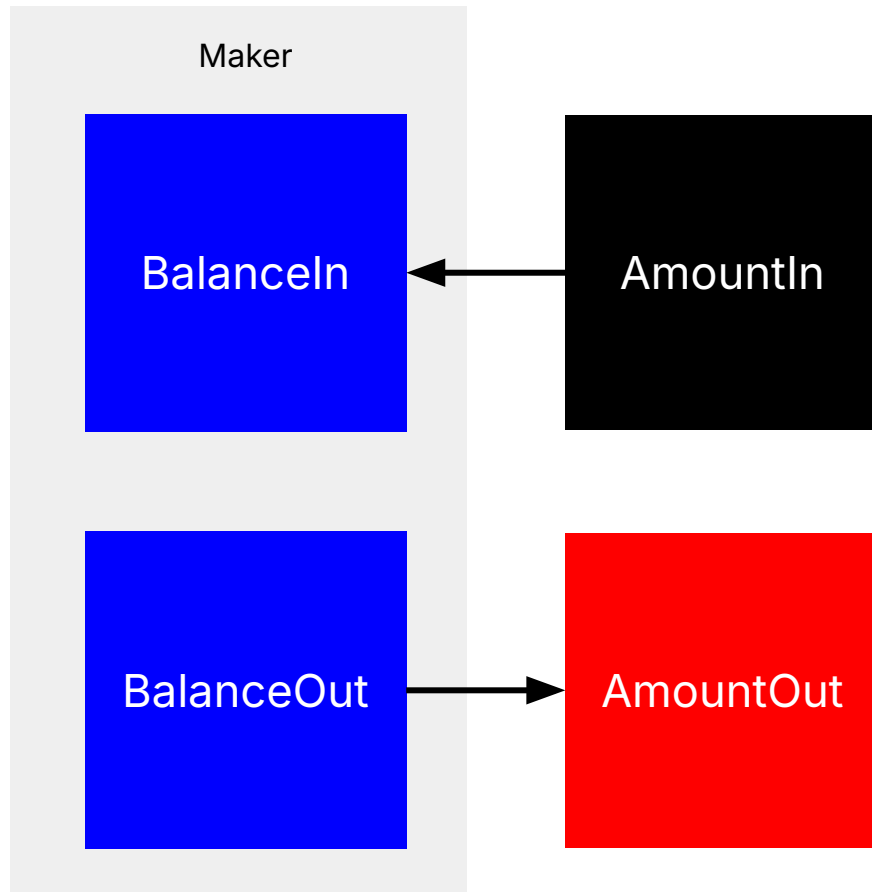
We
give you
Swap LEGO



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Data Model of the SwapVM

```
struct SwapRegisters {  
    uint balanceIn;  
    uint balanceOut;  
    uint amountIn;  
    uint amountOut;  
}
```



3 instruction examples

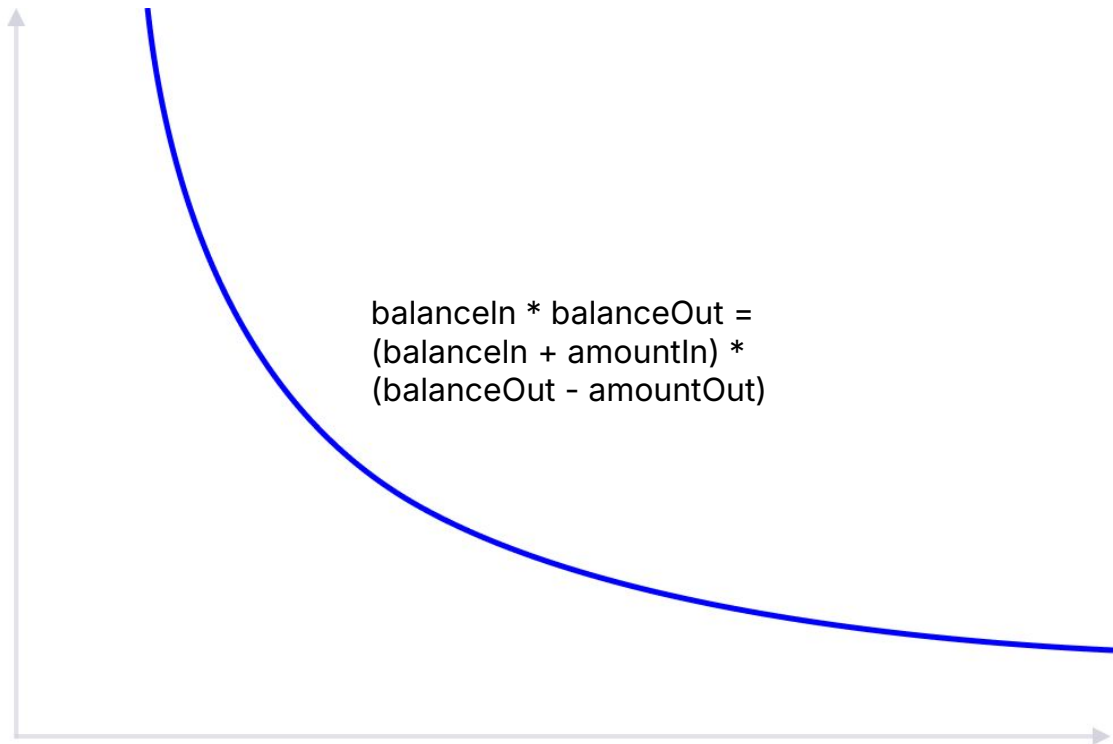
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Constant product AMM

```
amountOut = (  
    (amountIn * balanceOut) /  
    (balanceIn + amountIn)  
);
```

```
amountIn = Math.ceilDiv(  
    amountOut * balanceIn,  
    (balanceOut - amountOut)  
);
```

Balance B

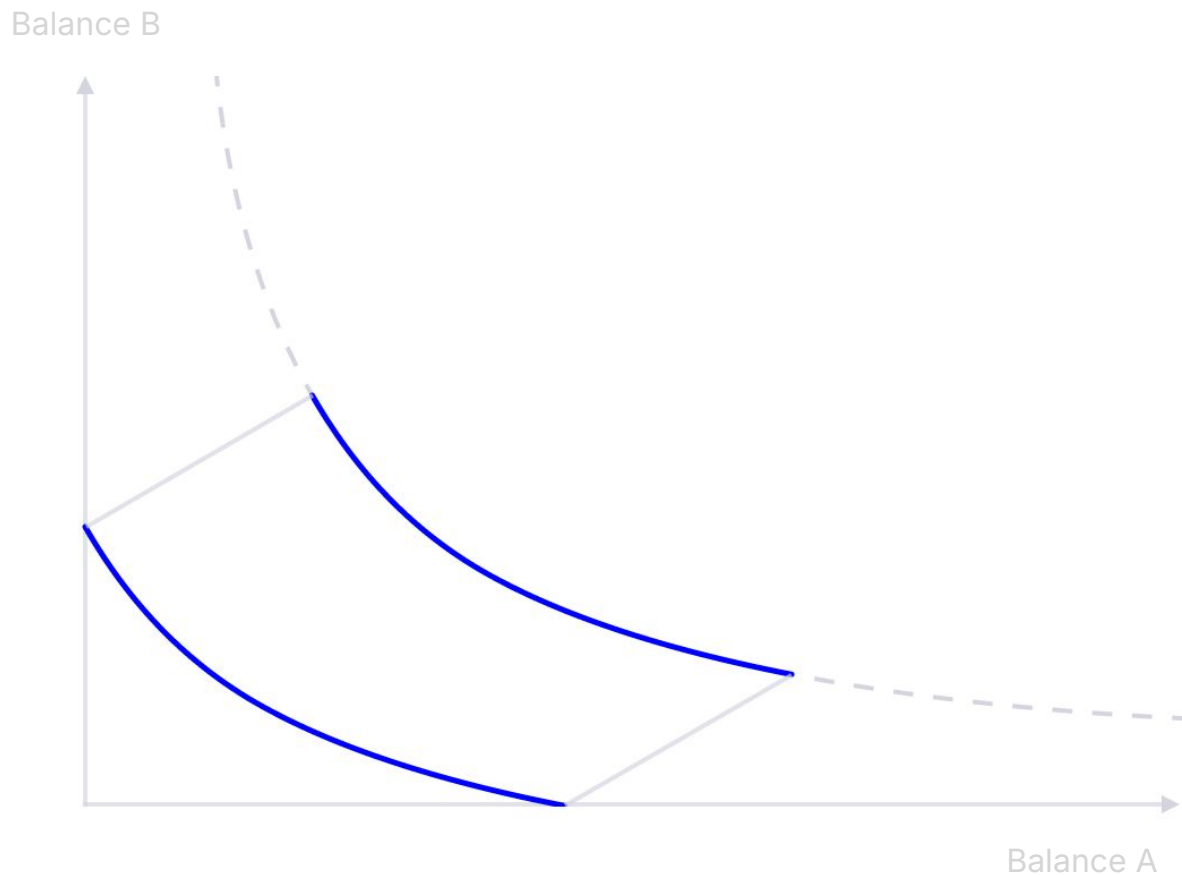


Balance A

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Concentrated liquidity

```
balanceIn += deltaIn;  
balanceOut += deltaOut;
```

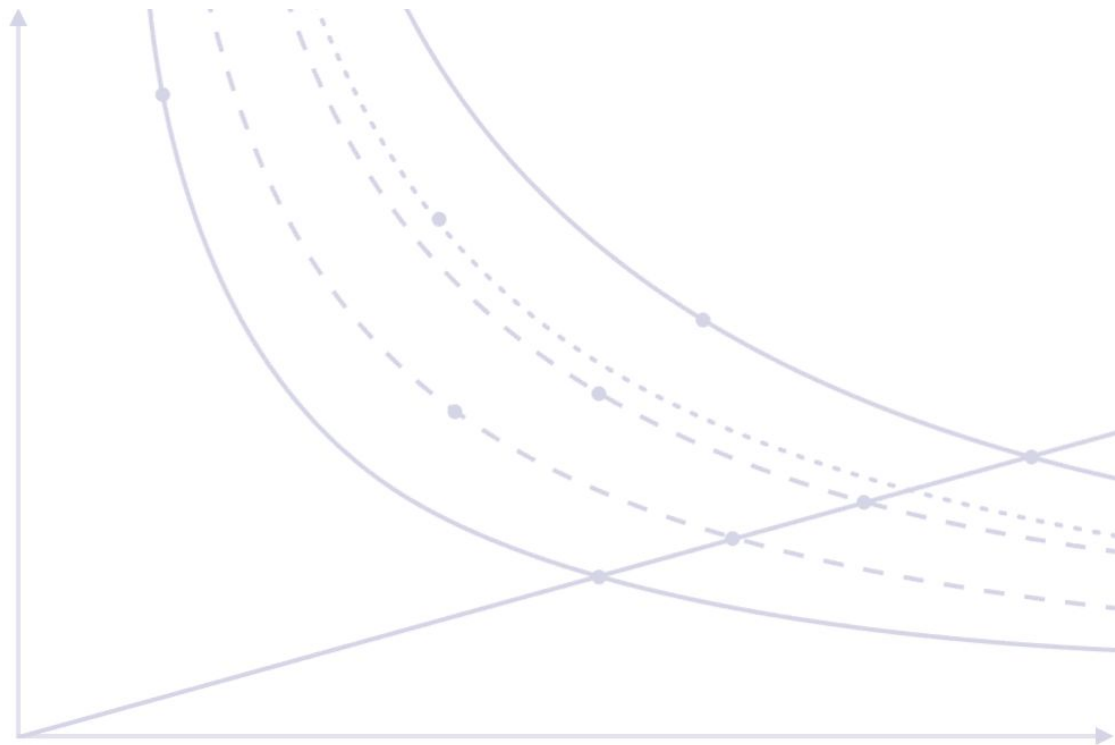


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Spread decay (Mooniswap)

```
balanceIn += decayIn(time);  
balanceOut -= decayOut(time);
```

Balance B



Real balances



Virtual balances

Balance A

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Current AMM development **requires**

- Swap Logic
- Deposit
- Withdrawal
- Balances Accounting
- Swap settlement

Code Level
Composability

SwapVM architecture **empowers**

- Swap Logic
- ~~Deposit~~
- ~~Withdrawal~~
- ~~Balances Accounting~~
- ~~Swap settlement~~

Instruction Level
Composability

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Anton Bukov

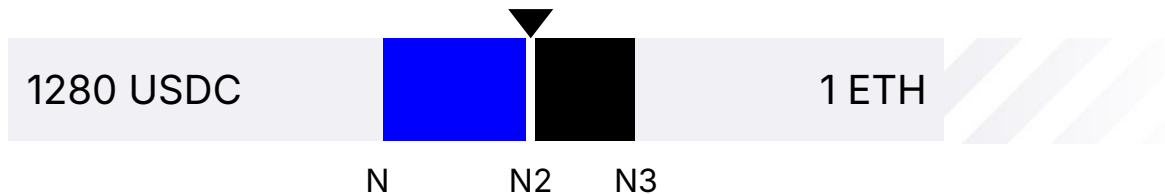
Co-founder 1inch



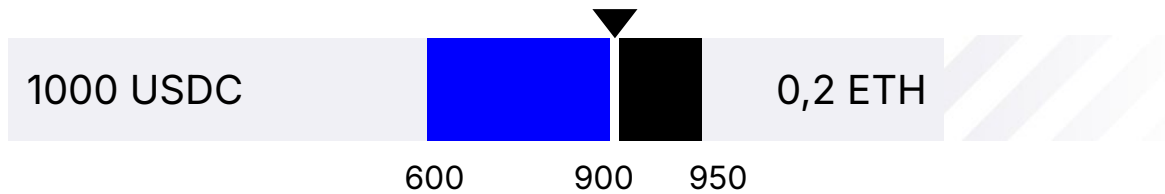
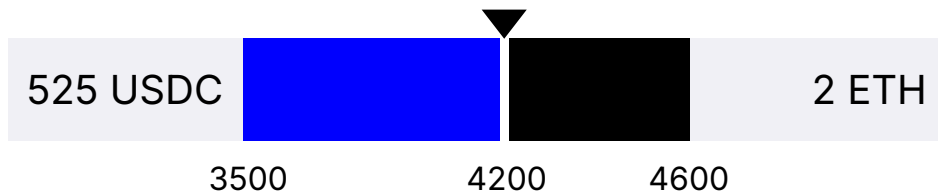
Reinventing DEX

Anton Bukov, Co-founder 1inch

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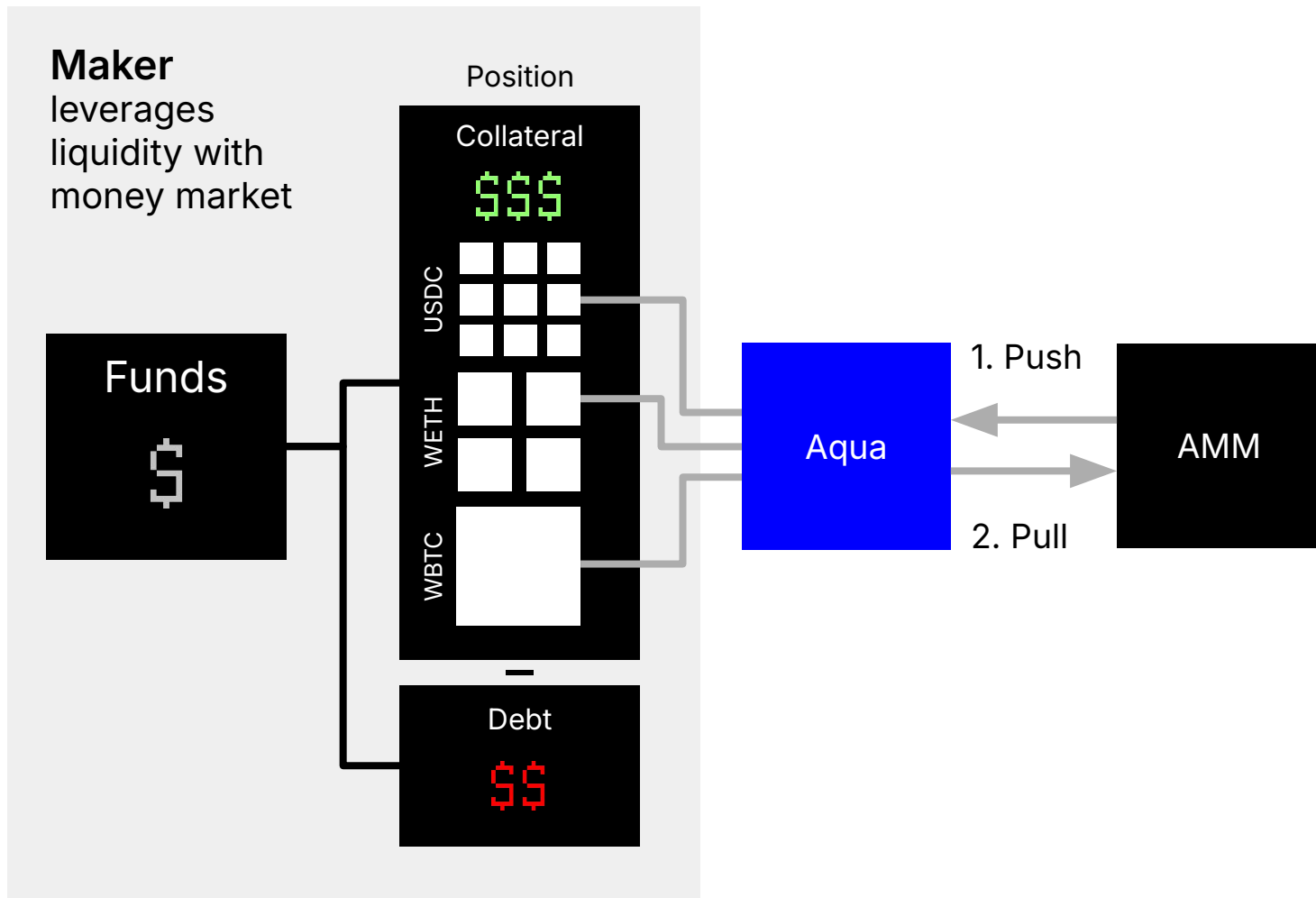
Shared liquidity
positions



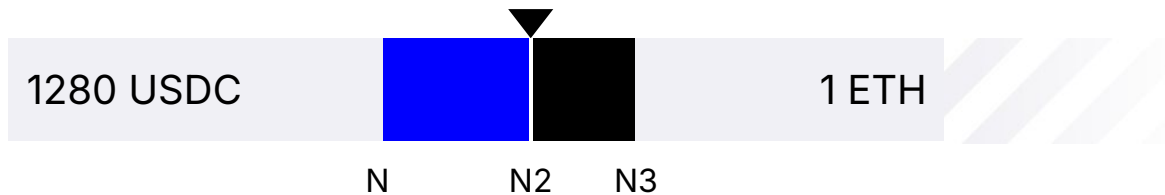
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Maker
leverages
liquidity with
money market

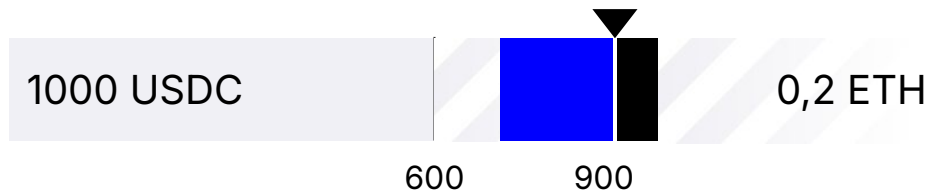
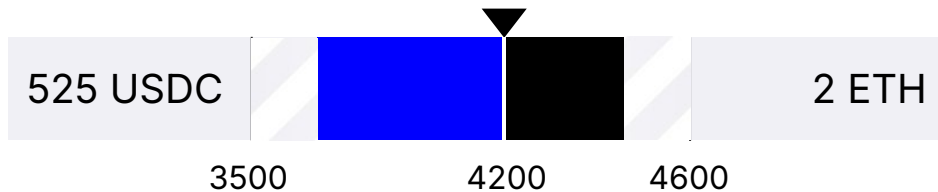
Example
**Leverage
of liquidity**



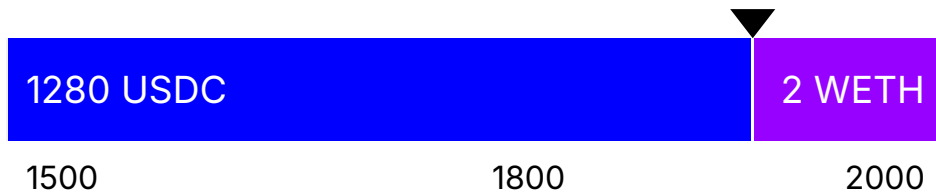
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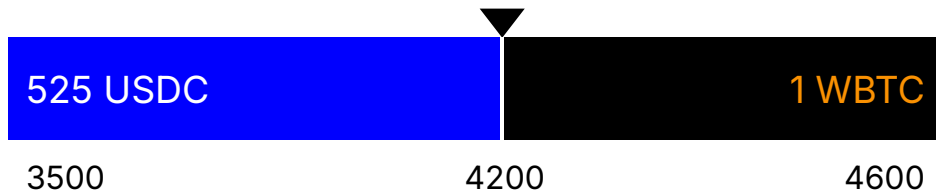
Shared liquidity
positions



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Shared liquidity
positions



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Balance

Liquidity

1000 USDC

2500 USDC

3,5x

Shared liquidity
portfolio

Balance

Liquidity

2 WBTC

4x

Balance

Liquidity

1 WETH

5x