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%

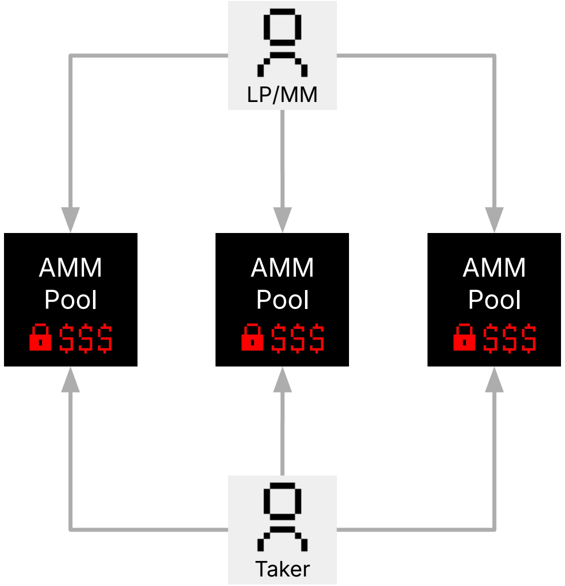
PancakeSwap

50+

Research papers

Classic AMM

Pooled liquidity



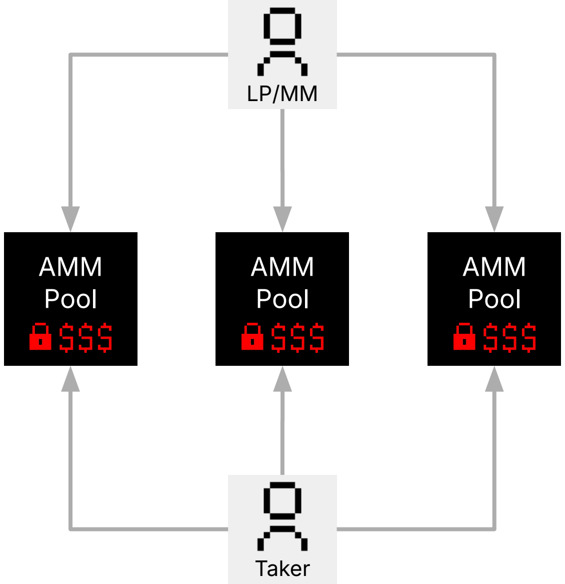
- fragments liquidity &
- locks capital out of DeFi

...since 2017

Aqua architecture reinvents DeFi liquidity market

Classic AMM

Pooled liquidity



- fragments liquidity &
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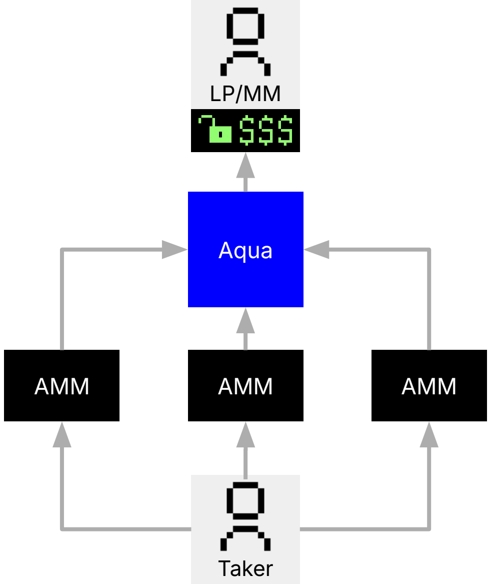
...since 2017

Aqua AMM

Shared & Unlocked Liquidity



- unlimits capital efficiency &
- elevates utility efficiency

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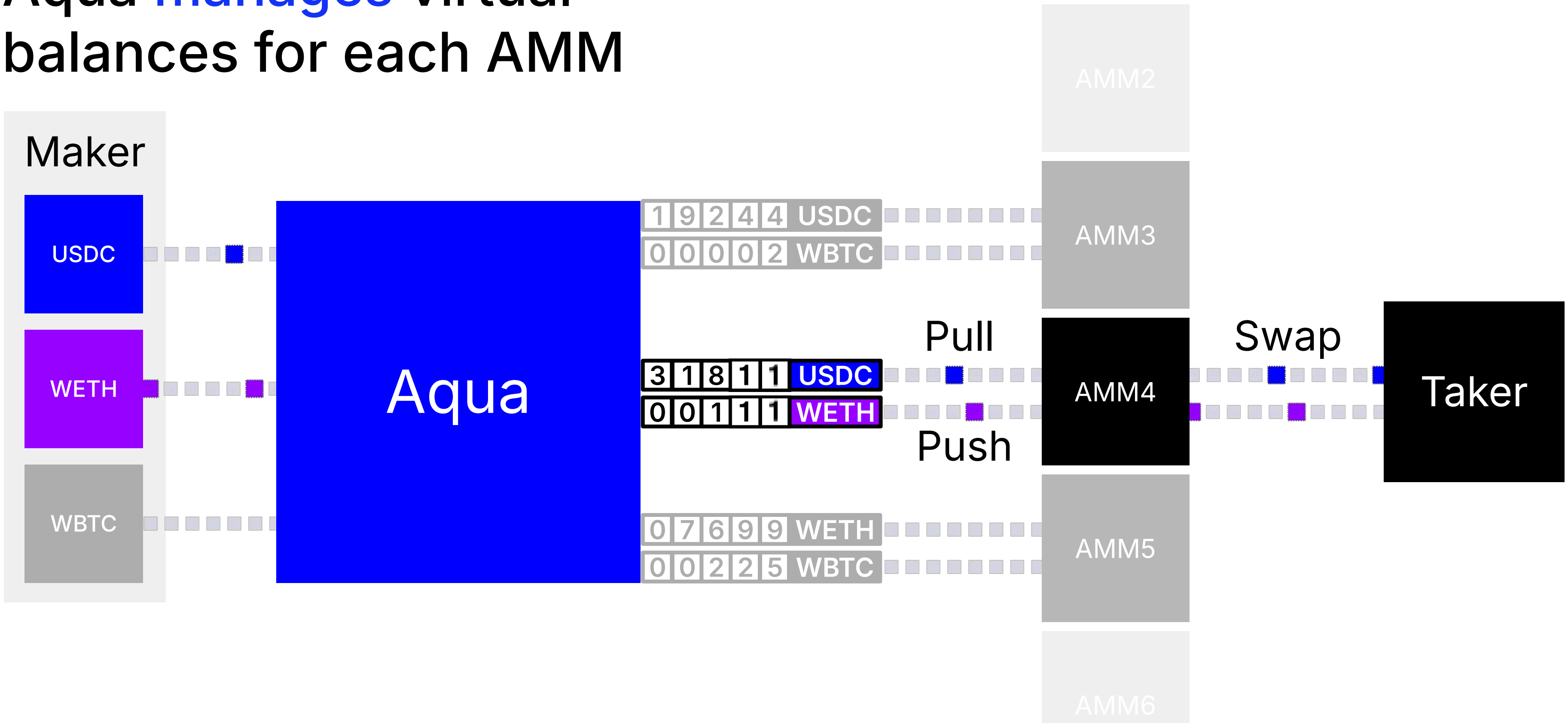
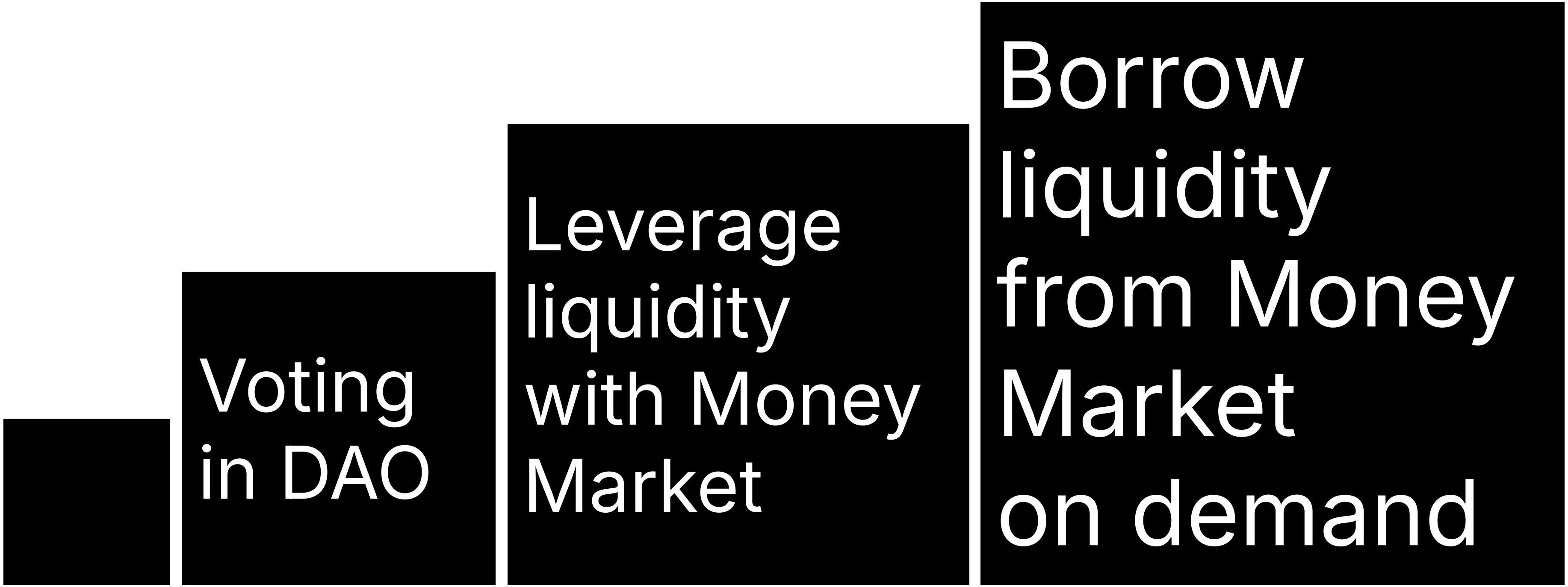
Aqua manages virtual balances for each AMM



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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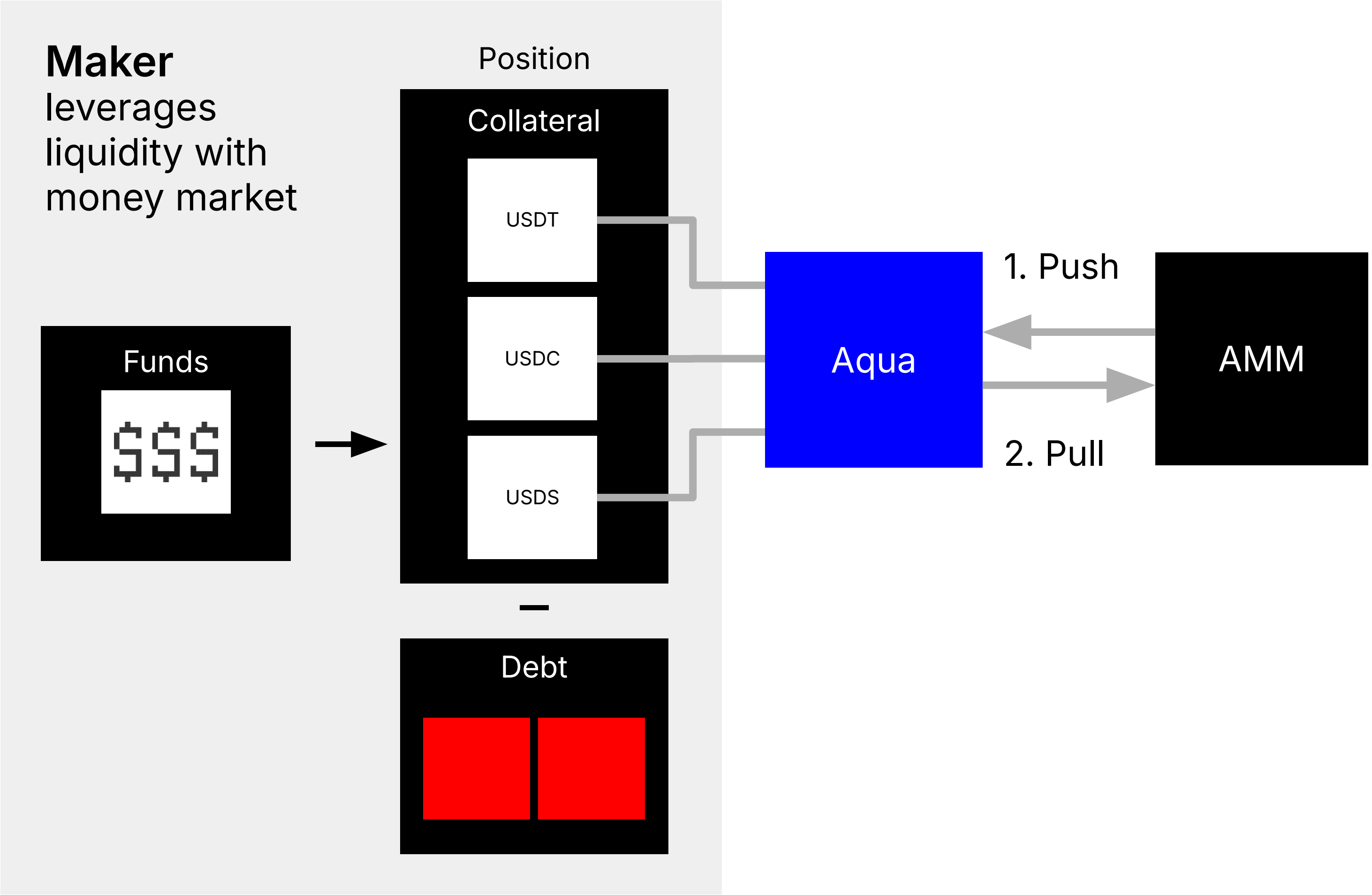
Example

Leverage of liquidity



Maker leverages liquidity with money market

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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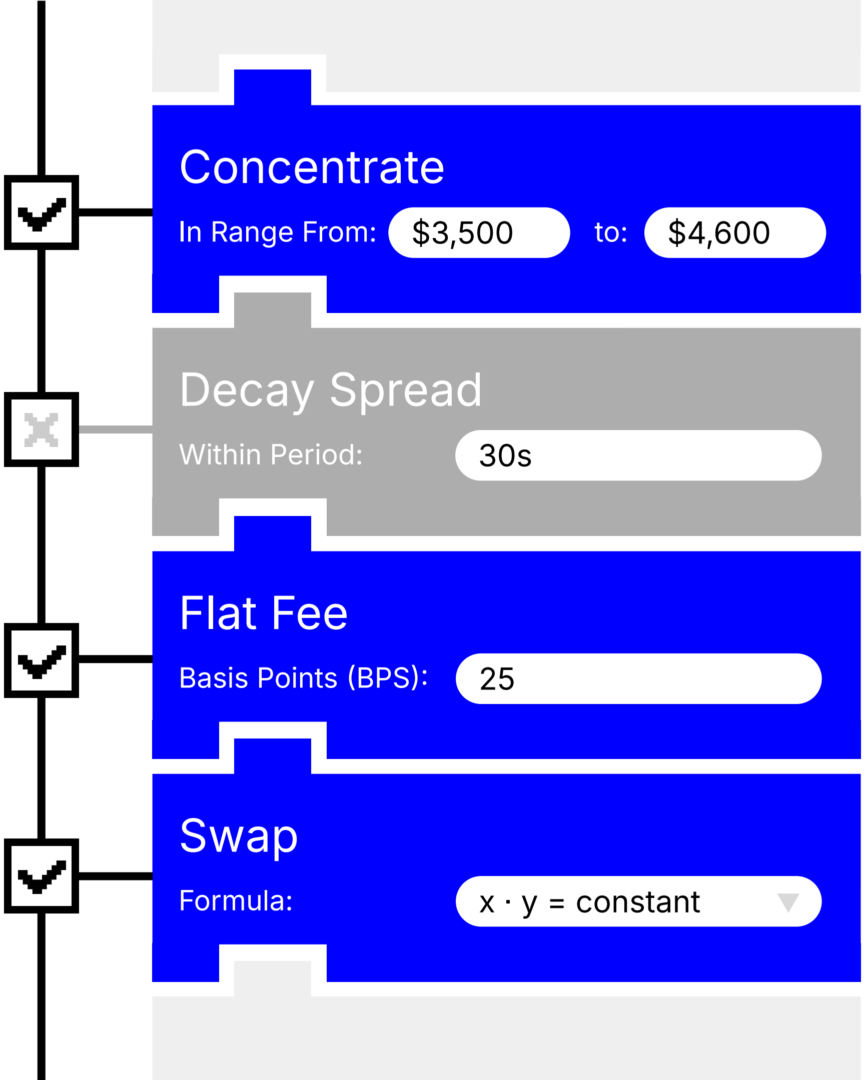
We
give you
Swap LEGO



☑ **Concentrate**

In Range From: $3,500 to: $4,600

☒ **Decay Spread**

Within Period: 30s

☑ **Flat Fee**

Basis Points (BPS): 25

☑ **Swap**

Formula: x · y = constant ▼

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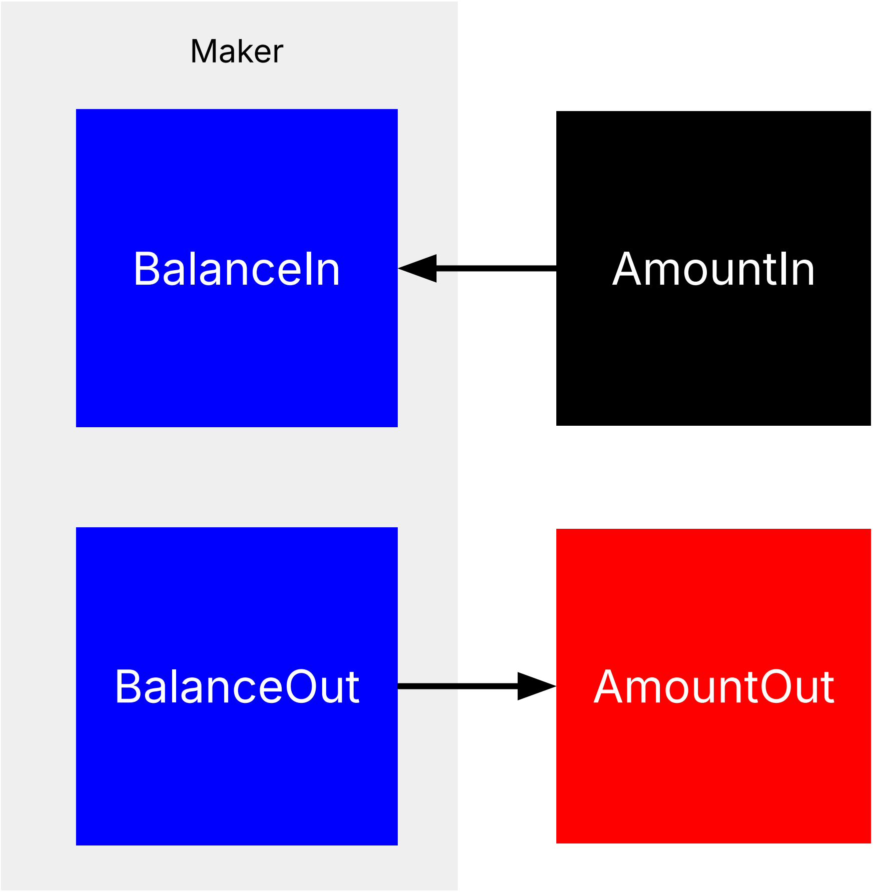
Data Model
# of the SwapVM

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



3 instruction examples

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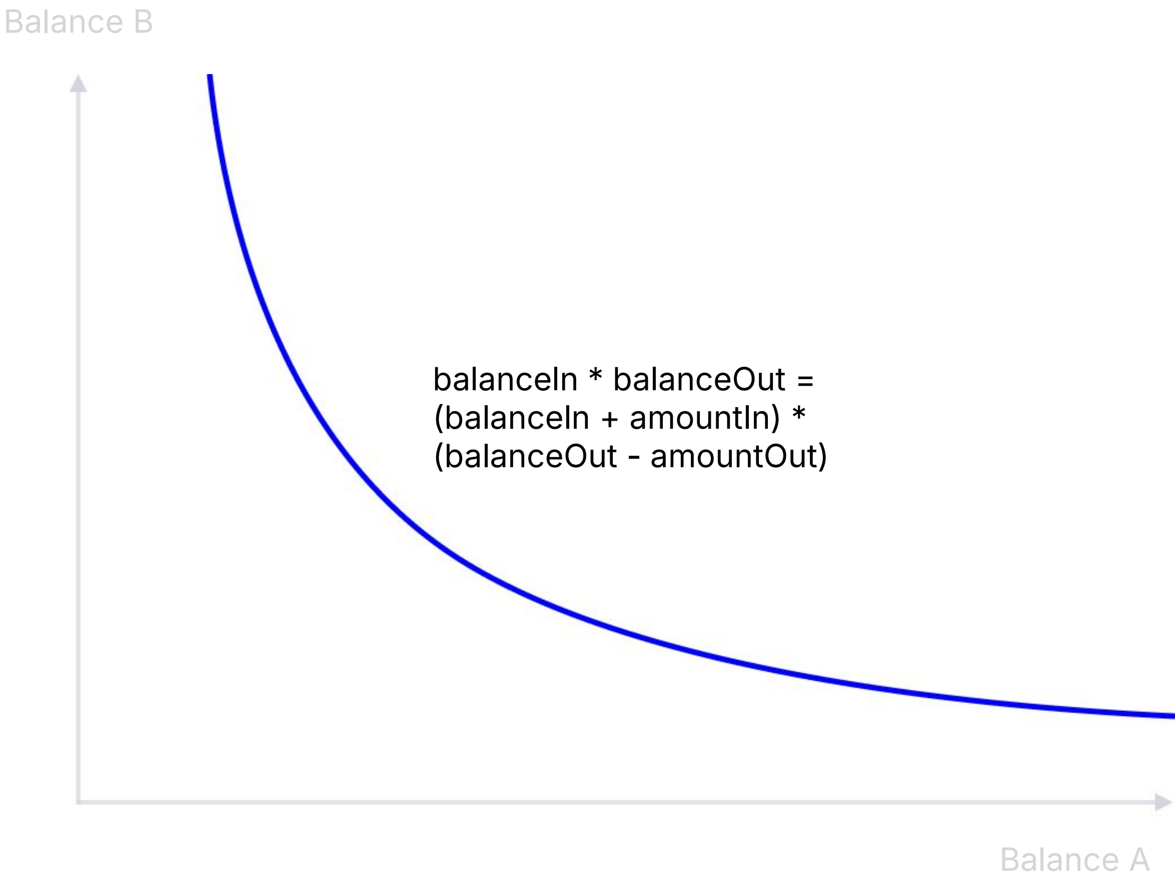
Constant product AMM

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

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



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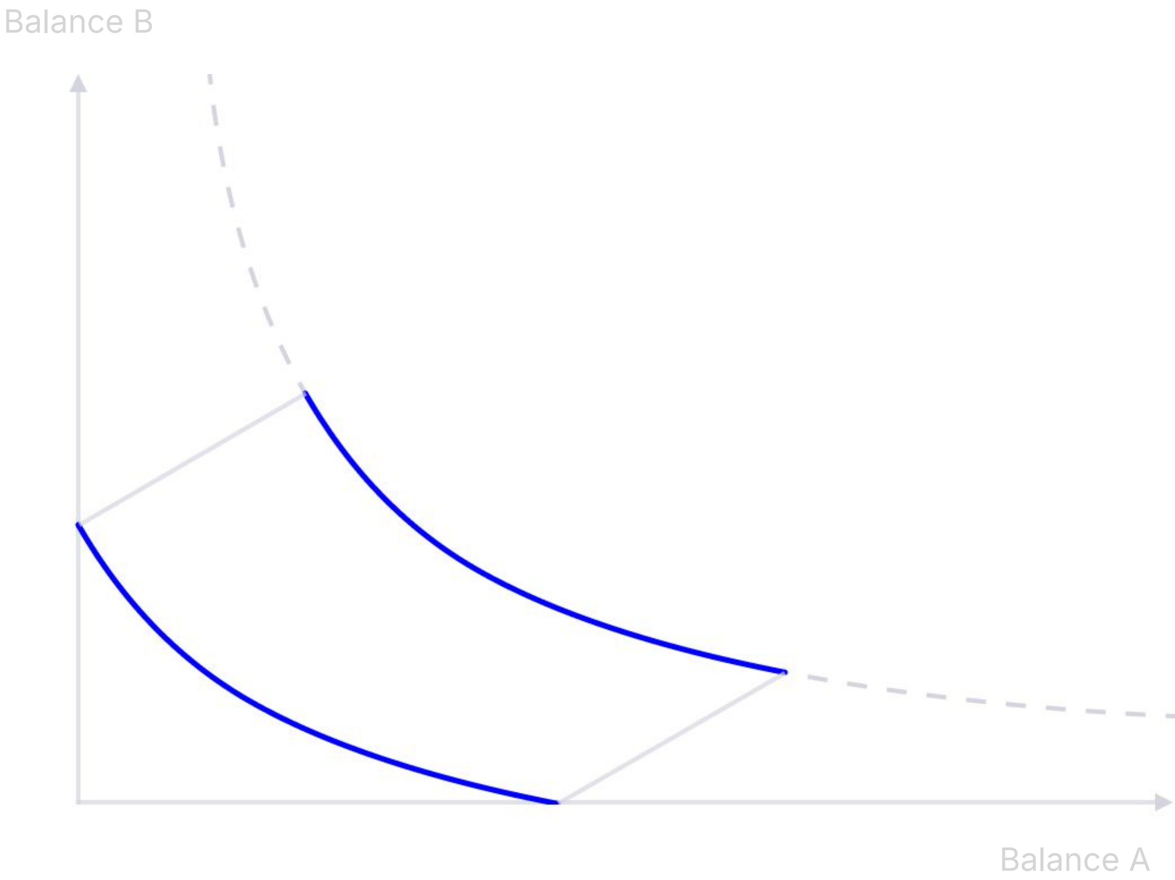
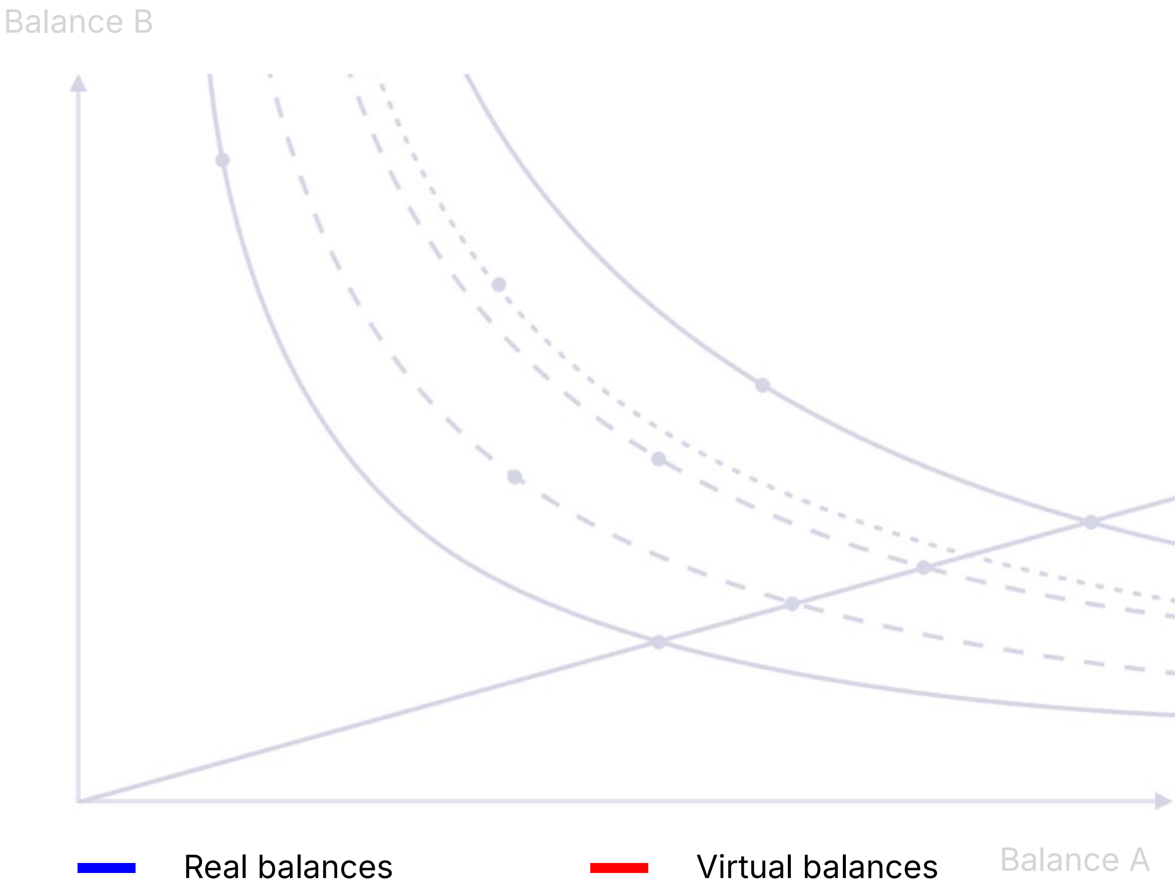
Concentrated liquidity

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



Spread decay (Mooniswap)

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



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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