

# DecoSwap

Oakley, Trevor Lee

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## 1 Introduction

**This is an on-going doc, and is not complete.**

Slippage is a serious problem in decentralized exchanges. It especially affects whales trading 100K USD trades. A number of measures were introduced to reduce slippage and provide better prices. These were for example:

- Concentrated Liquidity (CLAMM)
- DEX Aggregators
- Meta Aggregators

Current Meta DEX Aggregators [1] assess routing via a simple rules based criteria and a trade is usually routed in its entirety to a DEX.

We propose an AI agent which decides based on learned behaviour by linking liquidity movements to slippage. ie the LP actions are taken to be economic signals of market sentiment. If LP distribution and movement (e.g. liquidity velocity) can be classified then these classifications can be linked to market strength.

## 2 Uniswap v3 Data Model

This document defines every field in the snapshot structure, including type, format, units, constraints, and semantic meaning.

### 1. Database Identification Layer

Field	Definition	Format / Constraints
_id	Unique database identifier for the snapshot record.	MongoDB ObjectId (12-byte BSON).

snapshotType	Descriptor of data collection method. Example: "near_price_rpc".	String.
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## 2. Pool Identification Layer

Field	Definition	Format / Constraints
poolAddress	Unique Uniswap v3 pool smart contract address.	20-byte Ethereum address (42-char hex incl. 0x).
chain	Blockchain network identifier (e.g., base, arbitrum).	String.
dex	Exchange protocol name.	String (e.g., uniswap-v3).
subgraphId	External indexing identifier (e.g., The Graph).	String.

## 3. Timestamp Layer

Field	Definition	Format
fetchedAt	Snapshot observation time.	ISO-8601 DateTime.
fetchedAtUnixMs	Unix time in milliseconds.	64-bit integer.
fetchedAtUnix	Unix time in seconds.	32/64-bit integer.

## 4. Price Context

Field	Definition	Format
priceContext source	Data source type (e.g., rpc).	String.
priceContext windowTicks	Number of ticks collected around currentTick.	Integer.

## 5. Pool Immutables (Fixed at Deployment)

Field	Definition	Format / Constraints
immutables.token0	Base token ERC-20 address. Example: WETH on Base.	20-byte Ethereum address.
immutables.token1	Quote token ERC-20 address. Example: USDC on Base.	20-byte Ethereum address.
immutables.fee	Fee tier expressed in hundredths of a basis point. Example: 500 = 0.05%.	uint24.
immutables.tickSpacing	Minimum spacing between valid ticks.	int24. Constraint: tickIdx mod tickSpacing = 0.

## Token Decimal Conventions

ERC-20 tokens define decimals:

- WETH: 18 decimals
- USDC: 6 decimals
- USDT: 6 decimals

All on-chain balances are stored as unsigned integers in base units:

$$\text{humanReadable} = \frac{\text{rawAmount}}{10^{\text{decimals}}}$$

## 6. Slot0 Dynamic State

Field	Definition	Format / Type
slot0.tick	Current active tick index representing pool price.	int24.
slot0.sqrtPriceX96	Square root price in Q64.96 fixed-point format.	uint160.
slot0.liquidity	Active liquidity at current tick.	uint128.
slot0.priceUSDC	Derived external USD valuation of pool price.	Float (off-chain derived).

## Price Definition

Price is defined by tick:

$$P = 1.0001^{\text{tick}}$$

sqrtPriceX96 encodes:

$$\sqrt{P} \times 2^{96}$$

Liquidity is a scalar used in the invariant:

$$x \cdot y = L^2$$

Liquidity is not denominated in token units.

## 7. Tick Boundary Array

ticks is an ordered array of boundary records:

Field	Definition	Format
tickIdx	Discrete tick boundary index.	int24.
liquidityGross	Total liquidity referencing this boundary.	uint128.
liquidityNet	Net liquidity change when crossing upward.	int128.

Active liquidity at any tick equals cumulative sum of liquidityNet.

## 8. Liquidity Bands (Derived Intervals)

liquidityBands is an ordered array representing piecewise constant liquidity.

Field	Definition	Format
tickLower	Lower tick boundary (inclusive).	int24.
tickUpper	Upper tick boundary (exclusive).	int24.
activeLiquidity	Liquidity within interval.	uint128.
liquidityUSD	Off-chain USD valuation of activeLiquidity.	Float.

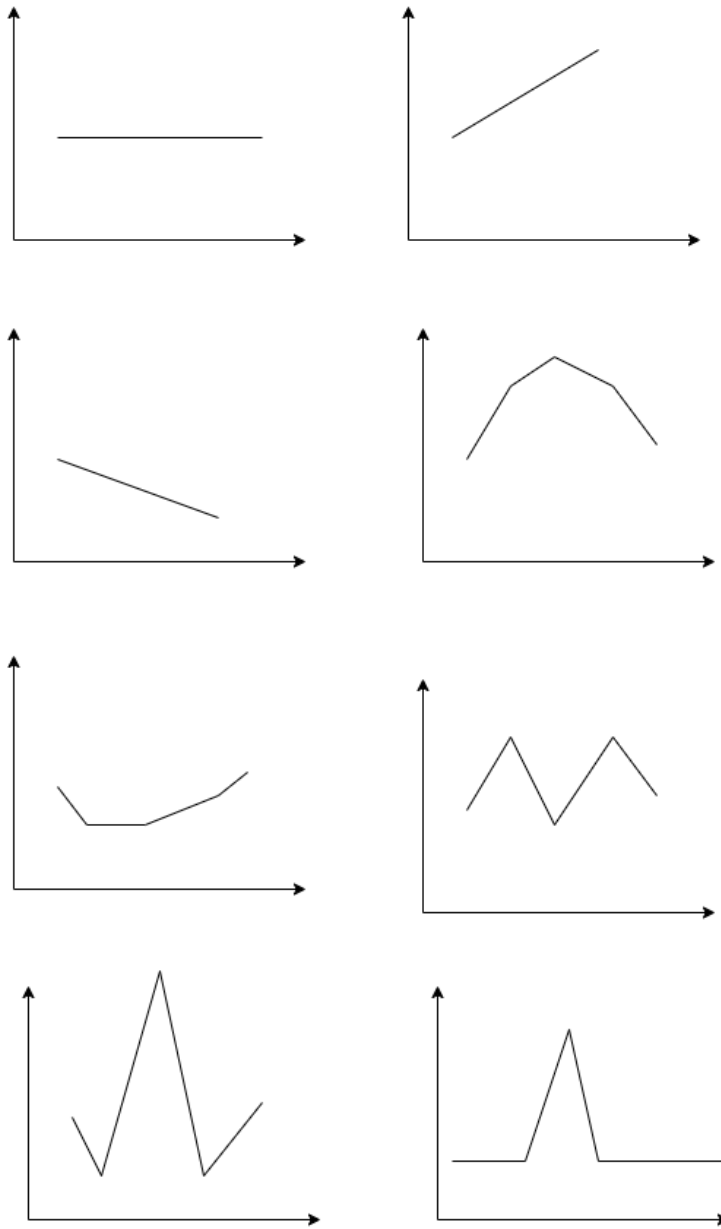
Bands correspond 1:1 with adjacent tick boundaries.

## 9. Structural Relationships

- currentTick lies within exactly one liquidityBand interval.
- liquidityBands are contiguous and ordered.
- activeLiquidity in slot0 equals activeLiquidity of band containing currentTick.
- USD fields are derived and not intrinsic to AMM core state.

### 3 LP Profiles

Basic Variations in an LP



(a) LP Profiles

### 4 Appendix

Example is below.

Listing 1: Uniswap v3 Snapshot Example

```
1  
2 {
```

```

3  _id: ObjectId('699d49e257bd35ac8799491a'),
4  snapshotType: 'near_price_rpc',
5  poolAddress: '0xd0b53d9277642d899df5c87a3966a349a798f224',
6  chain: 'base',
7  dex: 'uniswap-v3',
8  subgraphId: '43Hwfi3dJSoGpyas9VwNoDAv55yjpgGrPpNSmbQZArzMG',
9  fetchedAt: ISODate('2026-02-24T06:49:06.423Z'),
10 fetchedAtUnixMs: 1771915746423,
11 fetchedAtUnix: 1771915746,
12 priceContext: { source: 'rpc', windowTicks: 100 },
13 immutables: {
14   token0: '0x4200000000000000000000000000000000000000000000000000000000000006',
15   token1: '0x833589fCD6eDb6E08f4c7C32D4f71b54bdA02913',
16   fee: 500,
17   tickSpacing: 10
18 },
19 slot0: {
20   tick: -201222,
21   sqrtPriceX96: '3385617275728546016391147',
22   liquidity: '839973669285812182',
23   priceUSDC: 1826.0663632537858
24 },
25 ticks: [
26   {
27     liquidityGross: '12936558024903656',
28     liquidityNet: '12935060481595286',
29     tickIdx: '-201320'
30   },
31   {
32     liquidityGross: '22867756579428',
33     liquidityNet: '5639250164458',
34     tickIdx: '-201310'
35   },
36   {
37     liquidityGross: '80847994232844221',
38     liquidityNet: '73252511421207285',
39     tickIdx: '-201300'
40   },
41   {
42     liquidityGross: '7213525350019148',
43     liquidityNet: '-7210951849942036',
44     tickIdx: '-201290'
45   },
46   {
47     liquidityGross: '11788636577265039',
48     liquidityNet: '-931947540229507',
49     tickIdx: '-201280'

```

```
50     },
51     {
52         liquidityGross: '396901510973603',
53         liquidityNet: '223747879762069',
54         tickIdx: '-201270'
55     },
56     {
57         liquidityGross: '509250675652722',
58         liquidityNet: '509250675652722',
59         tickIdx: '-201260'
60     },
61     {
62         liquidityGross: '4241217706245185',
63         liquidityNet: '4238483984798089',
64         tickIdx: '-201250'
65     },
66     {
67         liquidityGross: '538157072568543190',
68         liquidityNet: '538157072568543190',
69         tickIdx: '-201240'
70     },
71     {
72         liquidityGross: '486790419777349878',
73         liquidityNet: '-449992384842818278',
74         tickIdx: '-201230'
75     },
76     {
77         liquidityGross: '24514601228726683',
78         liquidityNet: '24514601228726683',
79         tickIdx: '-201220'
80     },
81     {
82         liquidityGross: '7439601905293624',
83         liquidityNet: '7439601905293624',
84         tickIdx: '-201210'
85     },
86     {
87         liquidityGross: '77219613436395019',
88         liquidityNet: '-75396167939610451',
89         tickIdx: '-201200'
90     },
91     {
92         liquidityGross: '1070313293064118',
93         liquidityNet: '1070313293064118',
94         tickIdx: '-201190'
95     },
96     {
```

```

97     liquidityGross: '24886199862818',
98     liquidityNet: '24886199862818',
99     tickIdx: '-201180'
100  },
101  {
102     liquidityGross: '1463300102798820',
103     liquidityNet: '1463300102798820',
104     tickIdx: '-201170'
105  },
106  {
107     liquidityGross: '13854710091757755',
108     liquidityNet: '5242999334972855',
109     tickIdx: '-201160'
110  },
111  {
112     liquidityGross: '628003047445986',
113     liquidityNet: '-337866026120252',
114     tickIdx: '-201150'
115  },
116  {
117     liquidityGross: '2820685419876449',
118     liquidityNet: '-1101715283382835',
119     tickIdx: '-201140'
120  },
121  {
122     liquidityGross: '531965601521495',
123     liquidityNet: '531965601521495',
124     tickIdx: '-201130'
125  }
126 ],
127 liquidityBands: [
128     {
129         tickLower: -201320,
130         tickUpper: -201310,
131         activeLiquidity: '668787187257078904',
132         liquidityUSD: '14356.02'
133     },
134     {
135         tickLower: -201310,
136         tickUpper: -201300,
137         activeLiquidity: '681722247738674190',
138         liquidityUSD: '14626.36'
139     },
140     {
141         tickLower: -201300,
142         tickUpper: -201290,
143         activeLiquidity: '681727886988838648',

```

```
144     liquidityUSD: '14619.17'
145   },
146   {
147     tickLower: -201290,
148     tickUpper: -201280,
149     activeLiquidity: '754980398410045933',
150     liquidityUSD: '16181.93'
151   },
152   {
153     tickLower: -201280,
154     tickUpper: -201270,
155     activeLiquidity: '747769446560103897',
156     liquidityUSD: '16019.36'
157   },
158   {
159     tickLower: -201270,
160     tickUpper: -201260,
161     activeLiquidity: '746837499019874390',
162     liquidityUSD: '15991.40'
163   },
164   {
165     tickLower: -201260,
166     tickUpper: -201250,
167     activeLiquidity: '747061246899636459',
168     liquidityUSD: '15988.19'
169   },
170   {
171     tickLower: -201250,
172     tickUpper: -201240,
173     activeLiquidity: '747570497575289181',
174     liquidityUSD: '15991.09'
175   },
176   {
177     tickLower: -201240,
178     tickUpper: -201230,
179     activeLiquidity: '751808981560087270',
180     liquidityUSD: '16073.72'
181   },
182   {
183     tickLower: -201230,
184     tickUpper: -201220,
185     activeLiquidity: '1289966054128630460',
186     liquidityUSD: '27554.91'
187   },
188   {
189     tickLower: -201220,
190     tickUpper: -201210,
```

```
191     activeLiquidity: '839973669285812182',
192     liquidityUSD: '17951.64'
193 },
194 {
195     tickLower: -201210,
196     tickUpper: -201200,
197     activeLiquidity: '864488270514538865',
198     liquidityUSD: '18484.80'
199 },
200 {
201     tickLower: -201200,
202     tickUpper: -201190,
203     activeLiquidity: '871927872419832489',
204     liquidityUSD: '18653.20'
205 },
206 {
207     tickLower: -201190,
208     tickUpper: -201180,
209     activeLiquidity: '796531704480222038',
210     liquidityUSD: '17048.77'
211 },
212 {
213     tickLower: -201180,
214     tickUpper: -201170,
215     activeLiquidity: '797602017773286156',
216     liquidityUSD: '17080.21'
217 },
218 {
219     tickLower: -201170,
220     tickUpper: -201160,
221     activeLiquidity: '797626903973148974',
222     liquidityUSD: '17089.29'
223 },
224 {
225     tickLower: -201160,
226     tickUpper: -201150,
227     activeLiquidity: '799090204075947794',
228     liquidityUSD: '17129.20'
229 },
230 {
231     tickLower: -201150,
232     tickUpper: -201140,
233     activeLiquidity: '804333203410920649',
234     liquidityUSD: '17250.21'
235 },
236 {
237     tickLower: -201140,
```

```
238     tickUpper: -201130,  
239     activeLiquidity: '803995337384800397',  
240     liquidityUSD: '17251.59'  
241   }  
242 ]  
243 }  
244 ]
```

## References

[1] DeFiLlama. Dex aggregator volume by protocol, 2025. Accessed: 2026-02-24.

Table 9: Common Liquidity Profile Shapes in CLAMMs

Label (short name)	Shape description	Typical characteristics	Common in pools	Interpretation / LP behavior
Flat / Uniform	horizontal line	constant L across wide range	legacy full-range LPs, very low-vol assets	passive, v2-style, risk-averse, wide safety net
Linear slope (rising/falling)	straight diagonal line	liquidity gradually increases or decreases with distance from current price	trending markets, directional bets	asymmetric directional view (long one side)
Single peak (Gaussian-like)	symmetric bell / mountain	strong concentration around current price, decays roughly exponentially or Gaussian	most volatile pairs (ETH/USDC 0.05–0.3%)	market-making around fair value, volatility targeting
Tight single peak	very sharp / narrow spike	extreme concentration ( $\pm 0.1$ –1%)	stablecoin pairs (USDC/USDT 0.01%)	high-efficiency stable farming, very low IL risk
Plateau + drop	flat high in middle → sharp fall-off	high uniform L in range, zero outside	intentional "bar" ranges	bracketed range strategy, expected trading corridor
Inverted-V / triangular	rises to peak then falls (tent shape)	linear build-up and decay	moderate concentration	cheap approximation of Gaussian
Multi-modal (bimodal)	two distinct peaks	e.g. one at current price + another at expected support/resistance	ranging markets, hedging layers	layered strategies (tight + wider safety), arbitrage layers
W / M / zigzag	multiple local minima/maxima (W/M shapes)	3+ peaks or sawtooth	competing strategies, bot wars	fragmented LP competition, rebalancing noise
Single sharp peak + flat tails	high central spike + wide low shoulders	most L in narrow band, small uniform backup	hybrid passive/active	core tight + wide fallback insurance
Asymmetric skew	peak offset left/right, longer tail one side	e.g. more L below current price	directional conviction	one-sided range bet (bullish → more L above)
Very wide + low amplitude	almost flat but very broad, low height	liquidity spread thinly over large range	low-activity pairs, speculative	low-confidence wide provision