# Technical Challenge - Liquidity Migration Analysis

This challenge tests your ability to analyze on-chain liquidity data, interact with smart contracts, and synthesize findings for client communication. You'll evaluate a real liquidity migration from UniswapV2 on Ethereum Mainnet to an Arrakis-managed UniswapV4 position.

A client migrated most of their IXS/ETH liquidity from UniswapV2 to an Arrakis-managed UniswapV4 vault. Some funds remain in the original UniV2 pool. They want to understand whether the migration improved execution quality for traders and how their LP position has performed. Obtain data directly using RPC calls to the blockchain.

Please create a GitHub repository for your fully documented code, data exports, visualizations, and a written summary.

**1. Execution Quality Comparison**

Compare the IXS/ETH UniV2 pool 0xC09bf2B1Bc8725903C509e8CAeef9190857215A8 (pre-migration) with the UniV4 pool https://app.uniswap.org/explore/pools/ethereum/0xd54a5e98dc3d0a90a058d4e46b2db9e7d92dbf505 98833035e1f27eac4f23a4f (post-migration):

- Calculate historical slippage (definition below) for $1,000, $5,000, $10,000, and $50,000 trades in both directions (IXS → ETH and ETH → IXS) on UniV2 before the migration
- Calculate historical slippage for the same trade sizes and directions on UniV4 from migration to present
- Visualize execution quality over time showing pre-migration (UniV2) and post-migration (UniV4) periods
- Visualize the current liquidity distribution of the UniV4 pool across tick ranges
- Compare this to the theoretical full-range distribution and explain how it affects execution quality

*Slippage (excluding fees) = |spot price − avg execution price| / spot price × 100 − fee × 100*

**Hint:** The UniV4 Quoter contract will help you.

**2. Vault Performance Analysis**

The UniV4 pool liquidity is primarily managed by an Arrakis vault with contract address 0x90bde935ce7feb6636afd5a1a0340af45eeae600. See https://docs.arrakis.finance for technical documentation.

- Visualize vault token amounts over time (IXS and ETH) and vault composition over time (value of IXS vs value of ETH)
- Visualize vault performance vs holding initial amounts over time since inception
- Calculate theoretical full-range LP performance over the same period
- Analyze the performance differential and explain the tradeoffs

**3. Client Synthesis**

Based on your analysis:

- Was this migration beneficial? Under which metrics?

- What tradeoffs should the client understand?
- Using your data, write a quantitative argument for why the client should consider migrating their remaining UniV2 funds to the Arrakis vault
- Draft a short client-facing summary explaining the outcomes