

Lending and Borrowing: Detailed Design

Version: 1.0

Catalyst Project ID: 1200142

✓ Milestone Acceptance Criteria Checklist

Deliverable Component	Acceptance Criteria	Evidence Type
Indexer Architecture	Clear technical design of the indexer	Section 1 + Diagram
Database Schema	Logical schema for storing lending data	Section 2 + ERD
Smart Contract Interaction	Step-by-step interaction with Liqwid	Section 3
Working Indexer	Indexes at least one protocol (Liqwid integrated)	Section 4 + Screenshots/Video
UI – Lending Aggregator Flow	Token → Results → Transaction Build	Section 5.1 + Screenshots
UI – User Portfolio / Positions Page	Page showing user's active positions	Section 5.2 + Screenshots
UI – Loan Overview Page	Detailed loan terms and positions	Section 5.3 + Screenshots

One note on the acceptance criteria is that instead of Figma we are further along and have a working app so we have included screenshots from the app and a walkthrough video. If anything else is required on this we can add that too.

1. Indexer Architecture

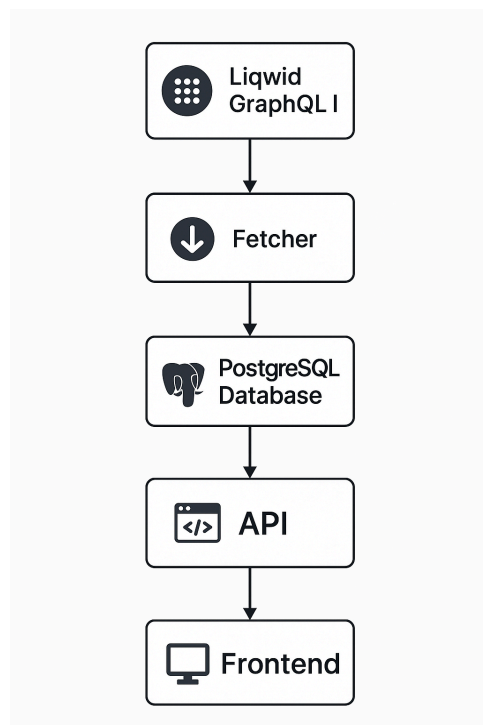
Our indexer system is built around a modular service-based design specifically tailored for integrating Cardano DeFi protocols like Liqwid. The key components include:

- **Liqwid GraphQL API** as the upstream data source
- **Fetcher Service** to poll and retrieve relevant data at defined intervals (every 20s)
- **PostgreSQL Database** to store processed market data, lending stats, and user positions
- **API Layer** (`/api/liqwid/...`) exposing RESTful endpoints to the frontend
- **Frontend UI** (built with Next.js) consuming the API endpoints for live user interaction

Tech Stack:

- Node.js / TypeScript backend (Next.js + `app/api/` structure)
- PostgreSQL database
- Mesh SDK and CIP-30 wallet interface for Cardano wallet and TX signing (not part of indexer)

Architecture for Liqwid Data:



2. Database Schema

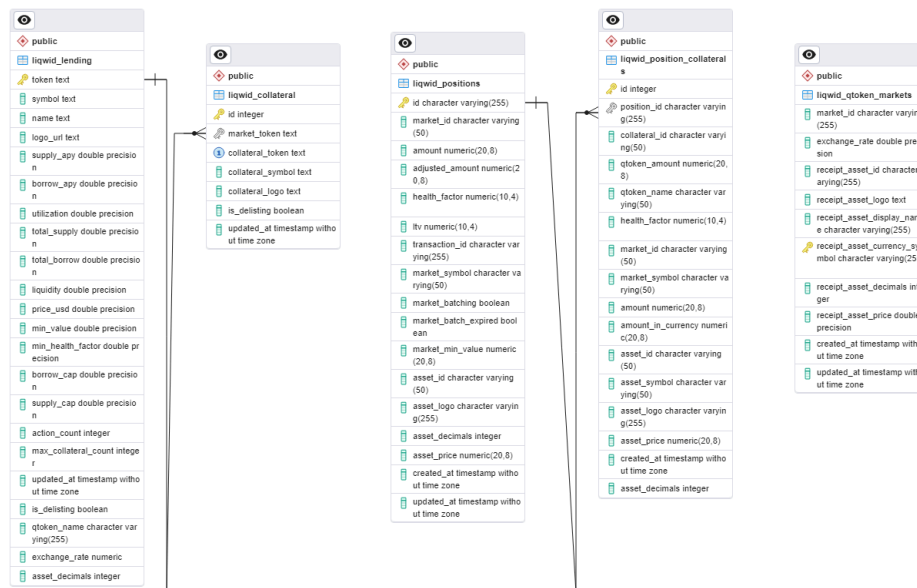
The backend uses a PostgreSQL database with normalized tables mapped directly to protocol data. Below are the core tables powering the Liqwid Finance integration:

Key Tables in Liqwid Schema

Table Name	Purpose
liqwid_lending	Core market data: APYs, liquidity, price, thresholds
liqwid_collateral	List of valid collateral assets with symbols, metadata
liqwid_positions	User positions: supplied/borrowed, health factors
liqwid_position_collateral	Per-position collateral breakdown
liqwid_qtoken_markets	Metadata about qTokens: exchange rates, decimals

Each table contains precise fields such as:

- supply_apy, borrow_apy, utilization in liqwid_lending
- collateral_token_text, is_delisting in liqwid_collateral
- adjusted_amount_numeric, health_factor, transaction_id in liqwid_positions



Each protocol would have its own tables similar to Liqwid with each slightly different depending on the type of protocol. If other protocols that use similar pooled lending to Liqwid are created

on Cardano in the future they would be very similar to the above and there would be some tables that combine both. Below are the tables used for Lenfi P2P.

public	public
lenfi_loans	lenfi_tokens
id character varying(255)	id character varying(255)
borrower_address character varying(255)	symbol character varying(50)
loan_asset_id character varying(255)	name character varying(255)
loan_amount numeric(20,6)	price_usd numeric(20,6)
collateral_asset_id character varying(255)	decimals integer
collateral_amount numeric(20,6)	logo_url text
term_length integer	supported_as_collateral boolean
interest_rate numeric(10,6)	supported_as_loan boolean
health_factor numeric(10,2)	collateral_factor numeric(10,2)
status character varying(50)	created_at timestamp without time zone
expiry_date timestamp without time zone	updated_at timestamp without time zone
tx_hash character varying(255)	interest_value numeric(20,6)
created_at timestamp without time zone	is_borrower_request boolean
updated_at timestamp without time zone	loan_asset_symbol character varying(50)
interest_value numeric(20,6)	collateral_asset_symbol character varying(50)
is_borrower_request boolean	loan_asset_decimals integer
loan_asset_symbol character varying(50)	collateral_asset_decimals integer
collateral_asset_symbol character varying(50)	
loan_asset_decimals integer	
collateral_asset_decimals integer	

3. Smart Contract / API Interaction

Liquid (Integrated Protocol)

With Liquid we are using their GraphQL to pull the required data and stats on the protocol with regard to available liquidity and opportunities. We also use it to help build the transactions that are submitted to the Liquid smart contracts.

User Flow:

1. User selects token → clicks "Supply" or "Borrow"
2. UI sends params to </api/liquid/buildTx>
3. Backend calls Liquid's transaction builder → receives CBOR
4. CBOR is signed in browser via MeshJS + CIP-30 wallet
5. Signed transaction submitted to Cardano network

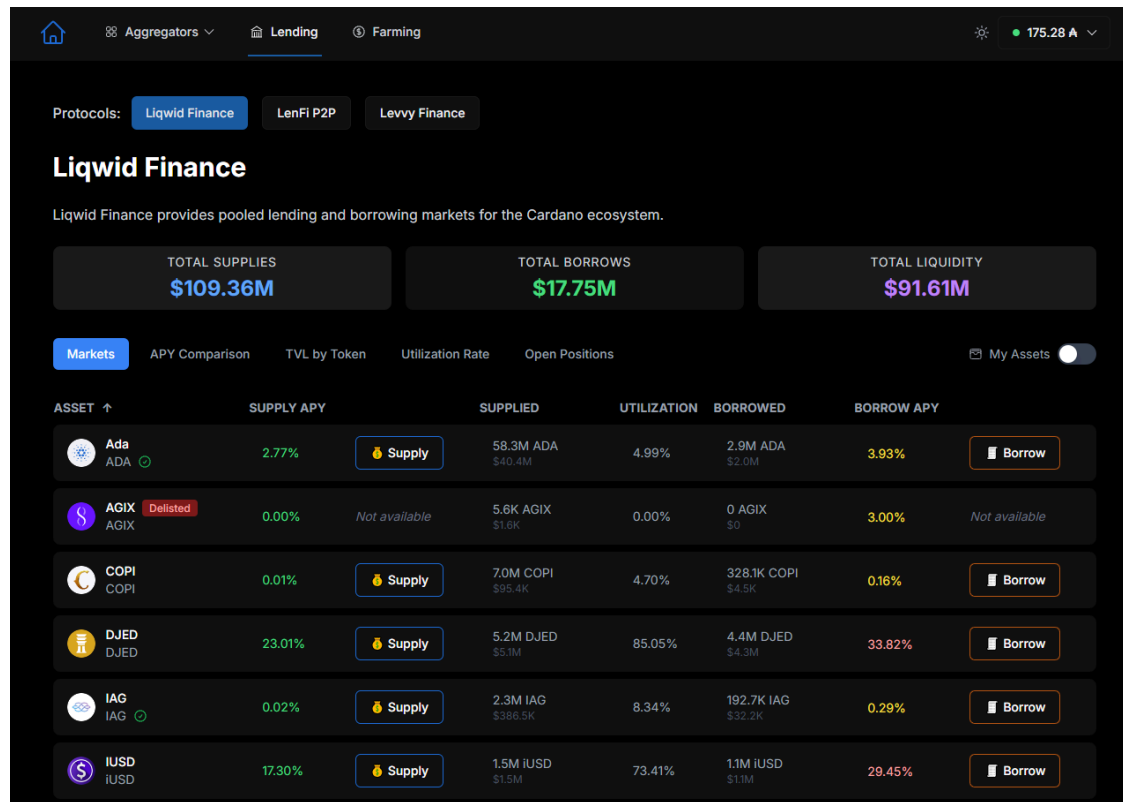
4. Working Indexer Implementation

- ✓ **Liquid:** Fully live and syncing every 20s
- ✓ **Lenfi V1:** Read-only mode live
- ✓ **Backend:** Express-like API structure inside Next.js
- ✓ **Frontend:** Queries internal API, renders using SWR/fetch

Logs of indexing from Liquid Finance graphql and storing in our database for fast access and comparisons

```
Problems Output Debug Console Terminal Ports
[1] "symbol": "ADA",
[1] "decimals": 6,
[1] "logo": "https://public.liquid.finance/v5/assets/ADA.svg",
[1] "price": 0.6903881484149469
[1] }
[1] }
[1] [2025-06-03T14:32:48.202Z] Fetched 20 markets from Liquid
[1] [2025-06-03T14:32:48.350Z] Starting to store 20 markets in database...
[1] [2025-06-03T14:32:48.214Z] Raw Lenfi API token response received with 58 tokens
[1] [2025-06-03T14:32:48.214Z] Successfully transformed and fetched 58 tokens from Lenfi
[1] [2025-06-03T14:32:48.770Z] Starting to store 58 Lenfi tokens in database...
[1] [2025-06-03T14:32:48.770Z] Cleared existing Lenfi loans from database
[1] [2025-06-03T14:32:48.770Z] Cleared existing Lenfi tokens from database
[1] [2025-06-03T14:32:48.350Z] Stored 20 collateral options for ADA
[1] [2025-06-03T14:32:48.350Z] Stored 1 collateral options for AGIX
[1] [2025-06-03T14:32:48.350Z] Stored 6 collateral options for wanBTC
[1] [2025-06-03T14:32:48.350Z] Stored 10 collateral options for COPI
[1] [2025-06-03T14:32:48.350Z] Stored 6 collateral options for wanDAI
[1] [2025-06-03T14:32:48.770Z] Successfully stored 58 Lenfi tokens in database
[1] [2025-06-03T14:32:50.684Z] Fetching Lenfi loans...
[1] [2025-06-03T14:32:48.350Z] Stored 19 collateral options for DJED
[1] [2025-06-03T14:32:50.684Z] Raw Lenfi API response received with 9 loans
[1] [2025-06-03T14:32:50.684Z] Successfully transformed and fetched 9 loans from Lenfi
[1] [2025-06-03T14:32:50.862Z] Starting to store 9 Lenfi loans in database...
[1] [2025-06-03T14:32:50.862Z] Cleared existing Lenfi loans from database
[1] [2025-06-03T14:32:48.350Z] Stored 10 collateral options for rsERG
[1] [2025-06-03T14:32:50.862Z] Successfully stored 9 Lenfi loans in database
[1] [2025-06-03T14:32:48.350Z] Stored 6 collateral options for wanETH
[1] [2025-06-03T14:32:48.350Z] Stored 6 collateral options for wanEURC
[1] [2025-06-03T14:32:48.350Z] Stored 10 collateral options for IAG
[1] [2025-06-03T14:32:48.350Z] Stored 18 collateral options for IUSD
[1] [2025-06-03T14:32:48.350Z] Stored 19 collateral options for LQ
[1] [2025-06-03T14:32:48.350Z] Stored 10 collateral options for MIN
[1] [2025-06-03T14:32:48.350Z] Stored 6 collateral options for wanPVUSD
[1] [2025-06-03T14:32:48.350Z] Stored 10 collateral options for SHEN
[1] [2025-06-03T14:32:48.350Z] Stored 10 collateral options for SNEK
[1] [2025-06-03T14:32:48.350Z] Stored 17 collateral options for USOA
[1] [2025-06-03T14:32:48.350Z] Stored 4 collateral options for wanUSDC
[1] [2025-06-03T14:32:48.350Z] Stored 18 collateral options for USDM
[1] [2025-06-03T14:32:48.350Z] Stored 6 collateral options for wanUSDT
[1] [2025-06-03T14:32:48.350Z] Successfully stored 20 markets in database
[1]
[1] Market Summary:
[1] ADA:
[1] Supply APY: 0.02769473894741568%
[1] Borrow APY: 0.03928129301248284%
[1] Utilization: 0.049865343254571384%
[1] Min Value: 81
[1] Min Health Factor: 1.0012360939431397
[1] Reserve Ratio: 0.05
```

Live data from liqwid on the app frontend

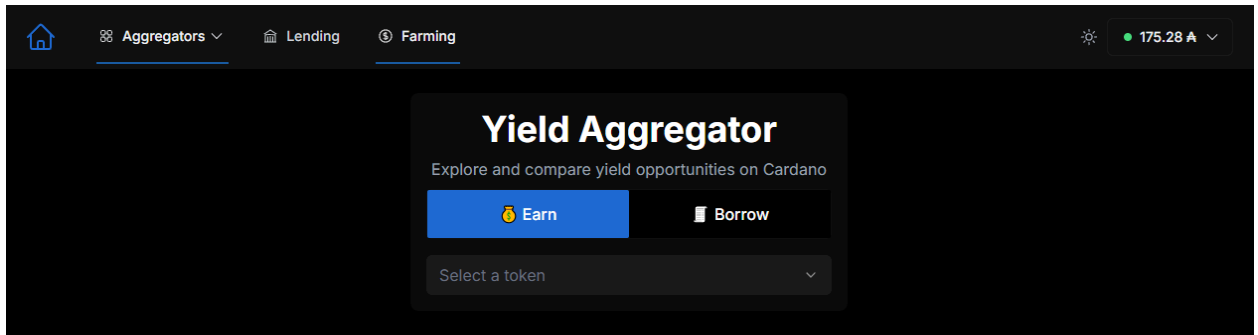


Video walkthrough of the working App - <https://youtu.be/E62tq5kPUa>

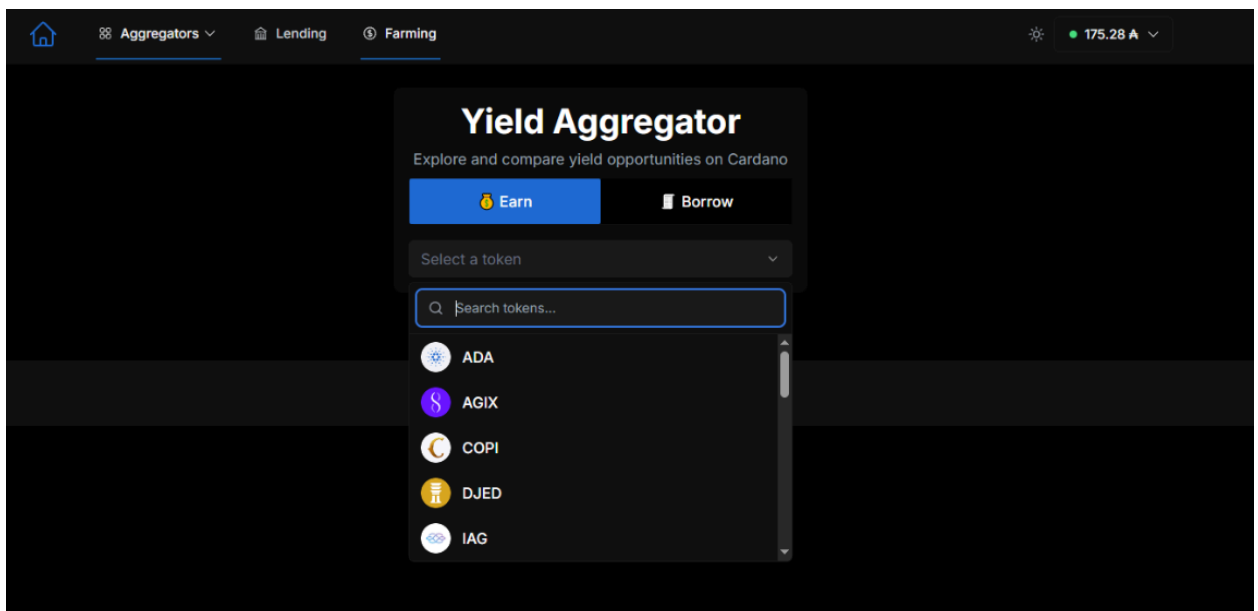
5. UI Designs

5.1 Lending Aggregator Flow

- Toggle between "Earn" and "Borrow"



- Select token from dropdown



- Aggregated data from Liqwid and Lenfi showing supply opportunities for ADA

The screenshot shows the 'Yield Aggregator' interface with the 'Supply' tab selected. The top navigation bar includes 'Aggregators', 'Lending', and 'Farming' tabs. The main header displays 'Yield Aggregator' and 'Explore and compare yield opportunities on Cardano'. Below this, there are buttons for 'Earn' and 'Borrow', and a dropdown menu set to 'ADA'. The 'liqwid' section shows a table with columns: ASSET, SUPPLY APY, and AVAILABLE LIQUIDITY. The table has one row for ADA with an APY of 2.77% and 38.3M ADA available. A 'Supply' button is present. The 'LENFI' section shows a table with columns: TYPE, LOAN VALUE, COLLATERAL, INTEREST (FIXED), TERM, and HEALTH FACTOR. It states 'No opportunities available'.

ASSET	SUPPLY APY	AVAILABLE LIQUIDITY
ADA	2.77%	38.3M ADA

TYPE	LOAN VALUE	COLLATERAL	INTEREST (FIXED)	TERM	HEALTH FACTOR
No opportunities available					

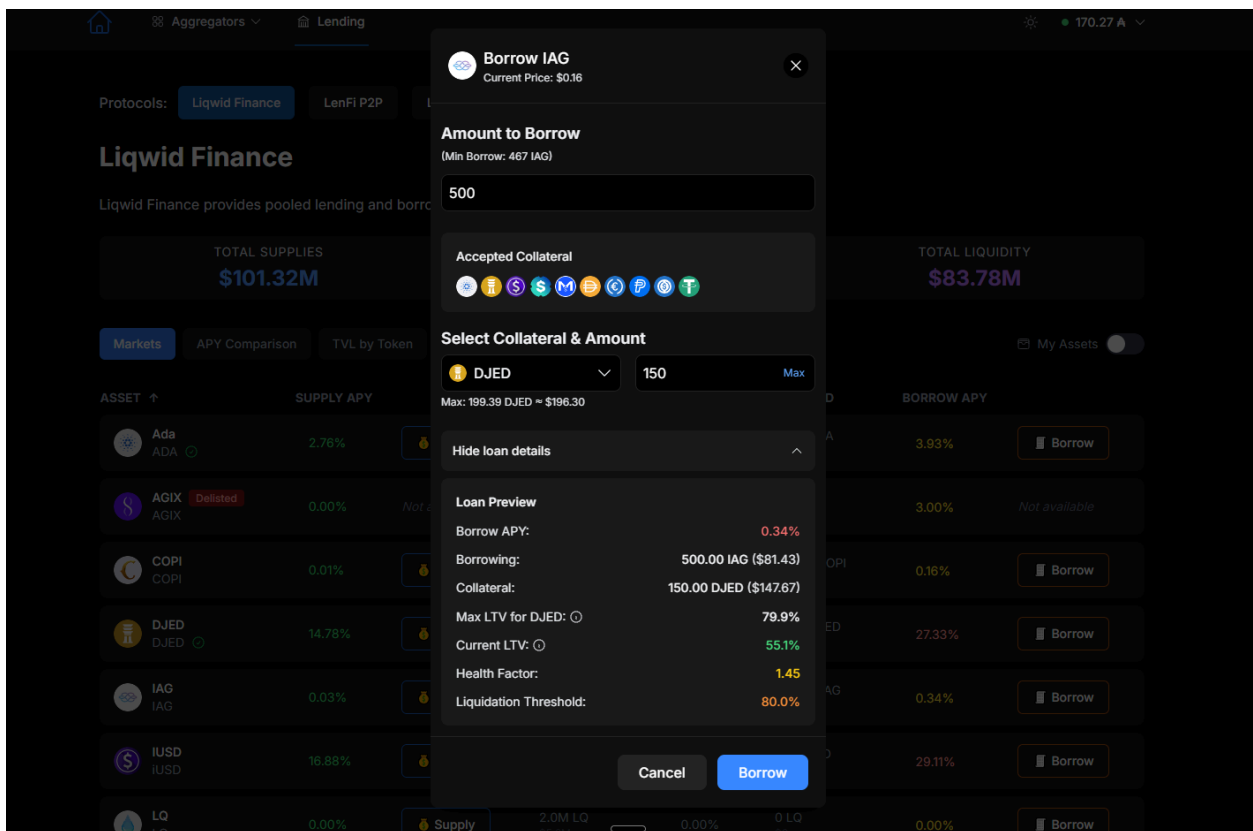
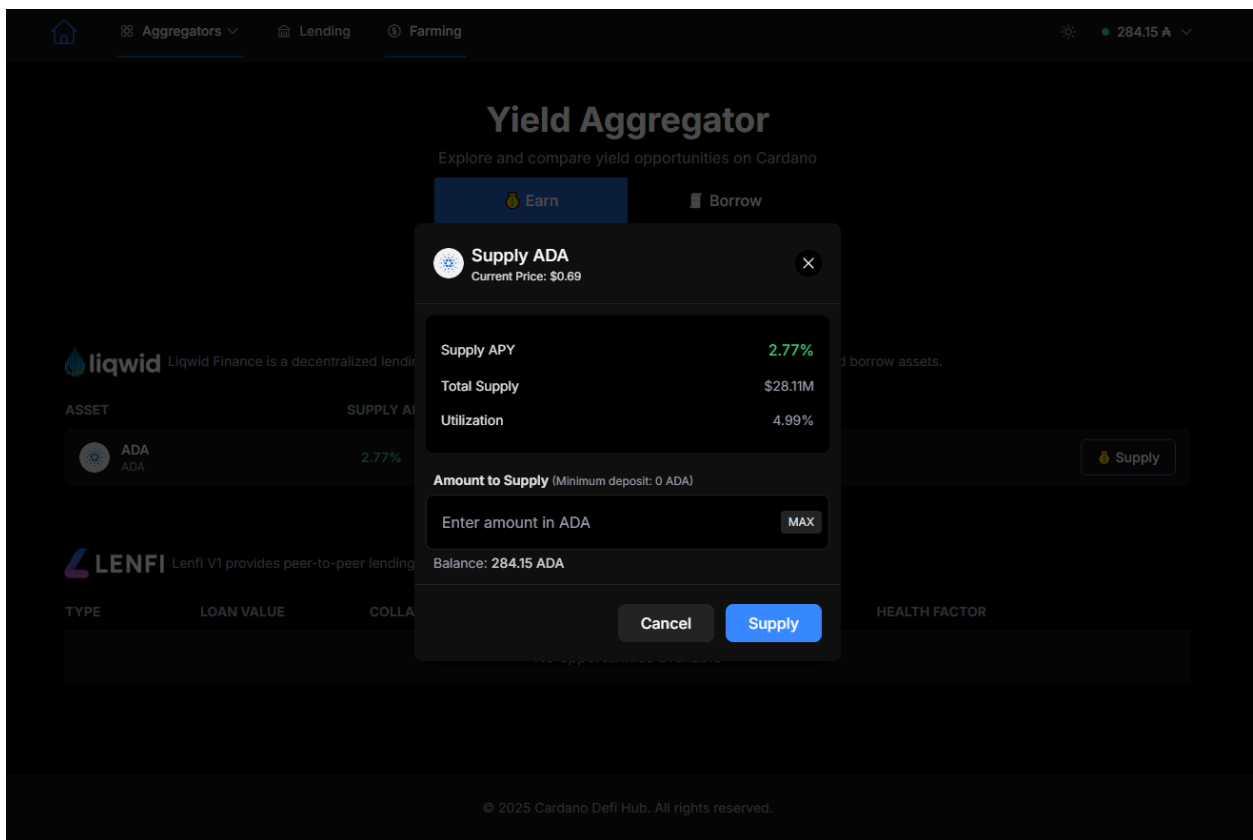
- Aggregated data from Liqwid and Lenfi showing borrow opportunities for ADA

The screenshot shows the 'Yield Aggregator' interface with the 'Borrow' tab selected. The top navigation bar is the same. The main header displays 'Yield Aggregator' and 'Explore and compare yield opportunities on Cardano'. Below this, there are buttons for 'Earn' and 'Borrow', and a dropdown menu set to 'ADA'. The 'liqwid' section shows a table with columns: ASSET, BORROW APY, COLLATERAL OPTIONS, and AVAILABLE LIQUIDITY. The table has one row for ADA with an APY of 3.93%, 13 collateral options, and 38.3M ADA available. A 'Borrow' button is present. The 'LENFI' section shows a table with columns: TYPE, LOAN VALUE, COLLATERAL, INTEREST (FIXED), TERM, and HEALTH FACTOR. It shows one offer with a loan value of 250 ADA, collateral of 536.25 ADA, interest of 10.00%, term of 30 days, and health factor of 1.50. An 'Open' button is present.

ASSET	BORROW APY	COLLATERAL OPTIONS	AVAILABLE LIQUIDITY
ADA	3.93%	+13 more	38.3M ADA

TYPE	LOAN VALUE	COLLATERAL	INTEREST (FIXED)	TERM	HEALTH FACTOR
Offered	250 ADA	536.25 ADA	10.00%	30 days	1.50

From there the user can decide to supply or borrow an asset and below are the modals that they get when they click the supply or borrow button in the screenshots above. They get the same modals if they use the supply or borrow buttons on the liqwid protocol page or the wallet page too.



5.2 User Portfolio / Positions Page

- Shows user's supplied assets and active loans.
 - This page checks the users wallet and displays the assets in their wallet as well as open positions in liqwid finance. You can see in the screenshot below this wallet has supplied both ADA and DJED to Liqwid Finance to earn yield and has used some of that ADA as collateral to borrow SNEK.
 - The user can also repay any of their open loans from here or supply more / withdraw in the positions they have supplied assets

The screenshot displays the Liqwid Finance User Portfolio / Positions Page. The interface is divided into two main sections: 'Liqwid Finance Positions' and 'Wallet Assets'.

Liqwid Finance Positions

Supplied Assets (2)

- DJED** (APY: 23.00%)
 - SUPPLIED: 199.39 DJED
 - AVAILABLE: 199.39 DJED
 - Buttons: Supply, Withdraw
- ADA** (APY: 2.76%)
 - SUPPLIED: 331.06 ADA
 - LOCKED: 290.00 ADA
 - AVAILABLE: 41.06 ADA
 - Buttons: Supply, Withdraw

Active Loans (1)

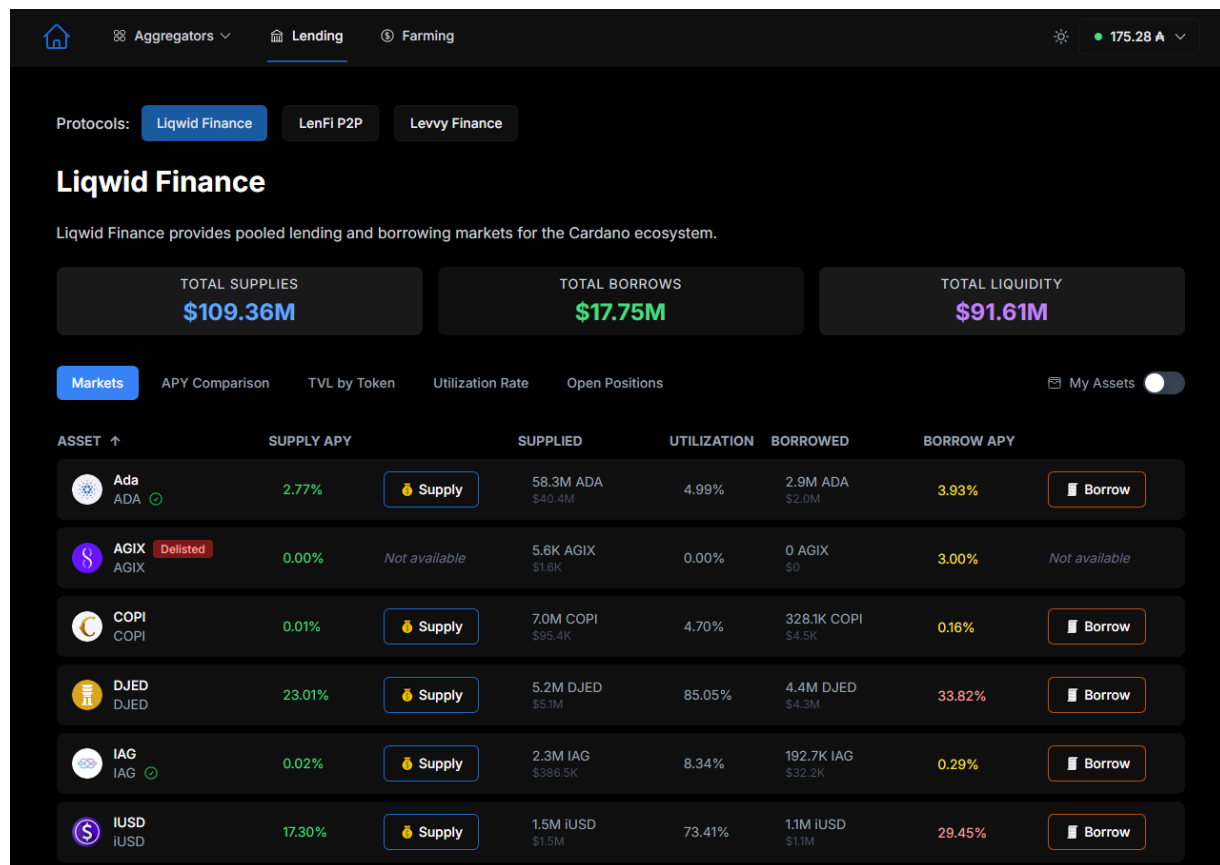
- 35,028 SNEK** (\$99.22)
 - COLLATERAL: 289 ADA
 - HEALTH: 1.63
 - BORROW APY: 0.36%
 - Total: \$199.52
 - Button: Repay Loan

Wallet Assets

Asset	Balance
Cardano (ADA)	170.272485
DJED (DJED)	250
HOSKY (HOSKY)	400,000,000
IAG (IAG)	148
qADA (qADA)	1,946
qDJED (qDJED)	7,524
SNEK (SNEK)	35,098
STUFF (STUFF)	659
USDA (USDA)	31
USDM (USDM)	50

5.3 Active Loan Overview Page

Each protocol also has their own page as you can see with the main Liqwid page below



There are multiple tabs on this page with one to allow the user to see all open positions on Liqwid finance.

Protocols:

Liquid Finance

LenFi P2P

Levy Finance

Liquid Finance

Liquid Finance provides pooled lending and borrowing markets for the Cardano ecosystem.

TOTAL SUPPLIES

\$109.42M

TOTAL BORROWS

\$17.78M

TOTAL LIQUIDITY

\$91.64M

Markets

APY Comparison

TVL by Token

Utilization Rate

Open Positions

Q

Search Asset or Collateral

Showing 50 of 773 Open Positions

Asset	HEALTH FACTOR	DEBT	Collateral	TX LINK
ADA	1.0234	2.5k \$1.9k	3.2k ADA \$2.4k	
ADA	1.0301	412.53 \$307.54	524.61 ADA \$391.09	
USDM	1.0334	17.8k \$17.8k	22.5k DJED \$22.3k 1.0k ADA \$745.49 Total: \$23.0k	
wanUSDC	1.0678	751.60 \$751.60	1.0k DJED \$1.0k	
ADA	1.0732	753.72 \$561.89	91.7k SNEK \$276.35 40.0k MIN \$895.45 Total: \$1.2k	

They can also filter by asset or collateral type by clicking on the headers to show the search dropdown

Protocols:

Liquid Finance

LenFi P2P

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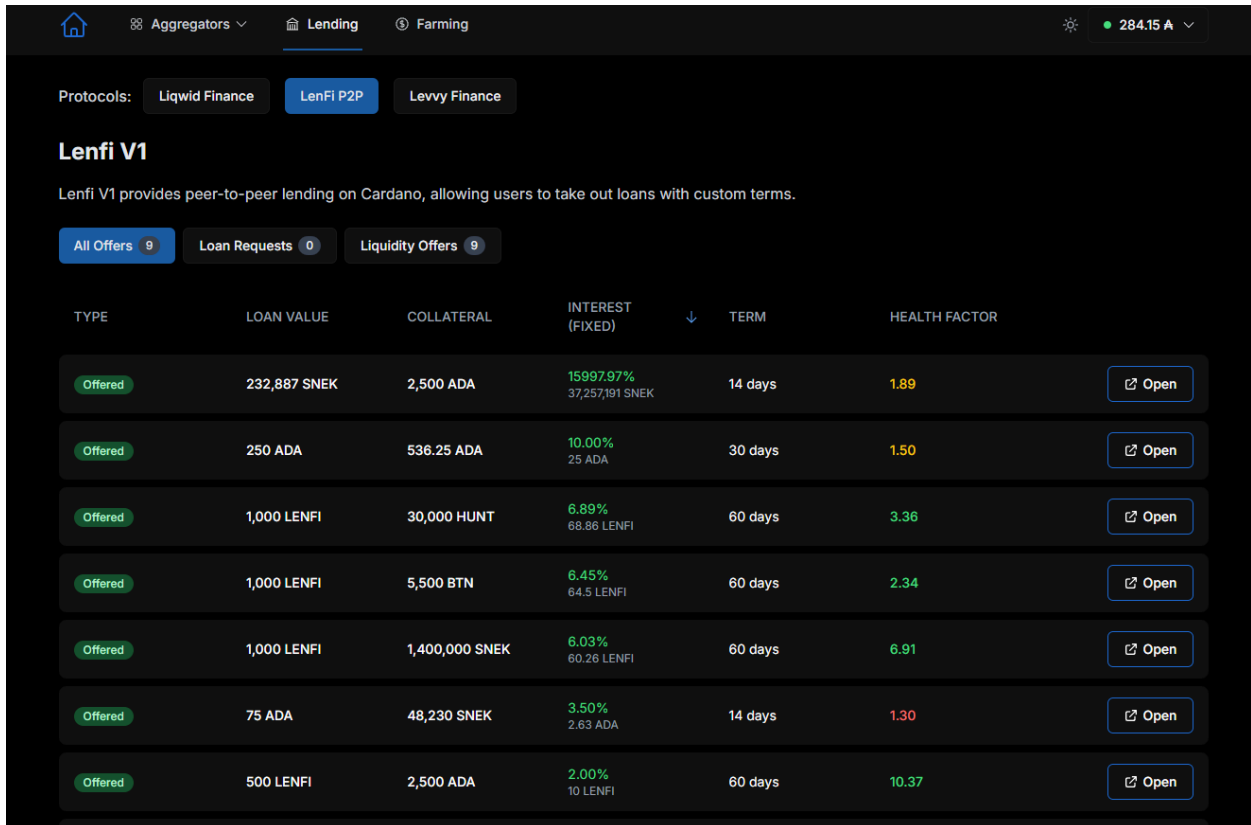
Search Asset or Collateral

Showing 50 of 85 Open Positions

USDM	HEALTH FACTOR	DEBT	Collateral	TX LINK
USDM	1.0334	17.8k \$17.8k	22.5k DJED \$22.3k 1.0k ADA \$745.49 Total: \$23.0k	
USDM	1.1099	13.8k \$13.8k	25.0k ADA \$18.6k 2.3k IAG \$410.54 Total: \$19.0k	
USDM	1.1852	1.4k \$1.4k	22.4k IAG \$4.0k	
USDM	1.2234	11.1k \$11.1k	1,100.9k MIN \$24.6k	
USDM	1.2274	11.6k \$11.6k	1,160.4k MIN \$26.0k	

6. Supplement: Lenfi V1 Integration

- Peer-to-peer loan listings from Lenfi V1 are live
- Displayed in the UI with full details: value, collateral, interest, term, health
- Sets foundation for V2 integration using SDK if Lenfi relaunches V2. We are also looking at other protocols for future integrations too.



The screenshot shows a web application interface for Lenfi V1. At the top, there's a navigation bar with 'Aggregators', 'Lending', and 'Farming' tabs. Below this, there are buttons for 'Protocols: Liqwid Finance', 'LenFi P2P' (selected), and 'Levy Finance'. The main heading is 'Lenfi V1', followed by a description: 'Lenfi V1 provides peer-to-peer lending on Cardano, allowing users to take out loans with custom terms.' Below the description are three tabs: 'All Offers' (9), 'Loan Requests' (0), and 'Liquidity Offers' (9). The main content is a table of loan offers with columns: TYPE, LOAN VALUE, COLLATERAL, INTEREST (FIXED), TERM, and HEALTH FACTOR. Each row represents a loan offer with specific details and an 'Open' button.

TYPE	LOAN VALUE	COLLATERAL	INTEREST (FIXED)	TERM	HEALTH FACTOR
Offered	232,887 SNEK	2,500 ADA	15997.97% 37,257,191 SNEK	14 days	1.89
Offered	250 ADA	536.25 ADA	10.00% 25 ADA	30 days	1.50
Offered	1,000 LENFI	30,000 HUNT	6.89% 68.86 LENFI	60 days	3.36
Offered	1,000 LENFI	5,500 BTN	6.45% 64.5 LENFI	60 days	2.34
Offered	1,000 LENFI	1,400,000 SNEK	6.03% 60.26 LENFI	60 days	6.91
Offered	75 ADA	48,230 SNEK	3.50% 2.63 ADA	14 days	1.30
Offered	500 LENFI	2,500 ADA	2.00% 10 LENFI	60 days	10.37

7. Conclusion

We feel that milestone 2 deliverables have been fully implemented:

- The indexer is live and functional
- Smart contract / API flow is wired and tested
- Completed UI pages submitted in place of figma as the app is working rather than just a plan and the pages are populated with live protocol data

If anything else is needed we are happy to expand on any section or add anything else that is needed in.