



Cardano/Chain indexers

What, Why, How

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What

Provide inspection data of the blockchain, including blocks, transactions, UTxOs, datums, and more.

Input UTxO is passed by reference - data are missing

Online inspectors:

<https://cexplorer.io/>

<https://cardanoscan.io/>



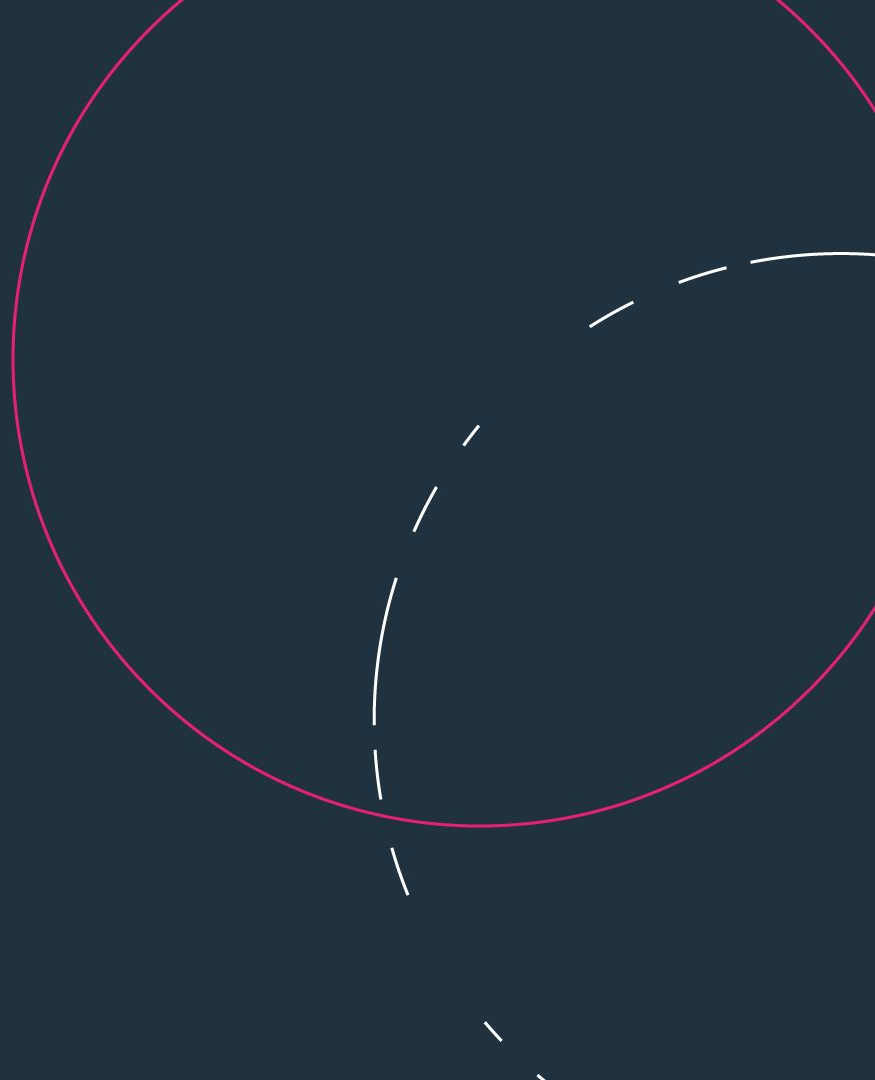
Why

- Get the balance of ADA: Retrieve all UTxOs and sum the amounts for the filtered address.
 - Get a list of NFTs in a collection.
 - Get a list of active contracts.
 - Get owners of tokens
 - Get datum by hash
 - Get address of script
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- Get a list of contracts for a specific user: Datum inspection is required.
 - Get detailed information about contract dependency: More UTxOs are needed.



How

- Ask directly cardano nodes
- External services - BlockFrost
- Full indexers - DBSync, Carp
- Thin indexers - Kupo
- Custom indexer - ???





Ask cardano node

- Difficult to request a foreign node; a local copy is required.
- Queries are very slow because nodes are not optimized for this use case.
- Analytics is challenging and requires re-storing data in a more suitable format.



External service like BlockFrost

- Very easy to use
- No backend required
- Third-party service with vendor lock.
- Does not support more complex queries.
- How can analytics be performed without locally re-storing data?



Full indexers like DBSync/Carp

- Easy to use.
- Lot of resources are required
- The entire blockchain is stored in the database, enabling support for complex queries.
- No need to re-fetch nodes when service changes occur.

Questions:

- Custom triggers and plugins?
- How can application data be mapped to this database?
- How can real-time data (e.g., transaction information) be retrieved?
- Is it possible to develop our application as a plugin?
- What happens when schema changes are required?



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Thin indexers like Kupo

- Easy to use
- Stored only UTXO matching filter
- Re-fetch from node is needed for service changes
- Custom triggers/plugins?
- Similar like Full Indexer



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Filtered block/transactions

- Cardano node is required
- You can write custom set of filter for block/transaction/utxo
- You can feed MQ, APIs, etc.
- Custom plugin with WASM
- Search in datums?



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Custom indexer

- Cardano node is required
- Can be integrated to our application
- Can be optimized for most typical use-case (memory, performance, etc.)
- No so difficult to write it
- It is possible to use the interface for passing transaction to mempool, etc.



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Notes

- Rollback are always possible
- Finding the ideal height to avoid rollback is unsafe!!!
- It is not good idea to "mutate" blockchain data because of rollback
- Pass rollbacks to database "foreign keys and cascade"
- Bulk is faster then single insert (lot of queries, index regeneration, lot of subqueries)
- Normalized form of database are not always faster because of id/uuid lookup
- Store meta information (slot, hash) for all blocks is good idea because of the range query of node when reindexing is needed.



Links

- [CardanoScan](#)
- [CExplorer](#)
- [CBOR](#)

- [Cardano node](#)
- [BlockFrost](#)
- [DBSync](#)
- [Carp](#)
- [Kupo](#)

- [Oura](#)
- [Pallas](#)
- [CDDL](#)

<https://github.com/miksax/CryptoAcademy2024>