



chainscore

Cross-Chain
DeFi Risk Protocol

“If DeFi is serious about going mainstream and further nurturing relationships with institutional players, a reliable means for evaluating risk in a timely, accurate manner while permitting the same level of due diligence is integral.”

DeFi Needs Reliable Credit Scoring System, but We Must Be Cautious

- Li Jun, Founder Ontology



Abstract

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Abstract

This protocol helps to increase trust and reputation in financial transactions for DeFi. These decentralized credit scores will allow protocols to verify user's eligibility, also supporting cross-chain data and verifiable credentials.

The use of Oracles and Indexing protocols provides a multi-chain credit scoring protocol based on transactions by a user. Scores are submitted to Harmony Blockchain's decentralized ledger providing immutability and privacy, with minimal transaction fees and high throughput. These scores can be used by other DeFi projects on the Harmony network to evaluate risk while doing any kind of financial transaction.

Introduction

A credit score is a numerical expression based on a level analysis of a person's credit files, to represent the creditworthiness of an individual. A credit score is primarily based on a credit report, information typically sourced from credit bureaus.

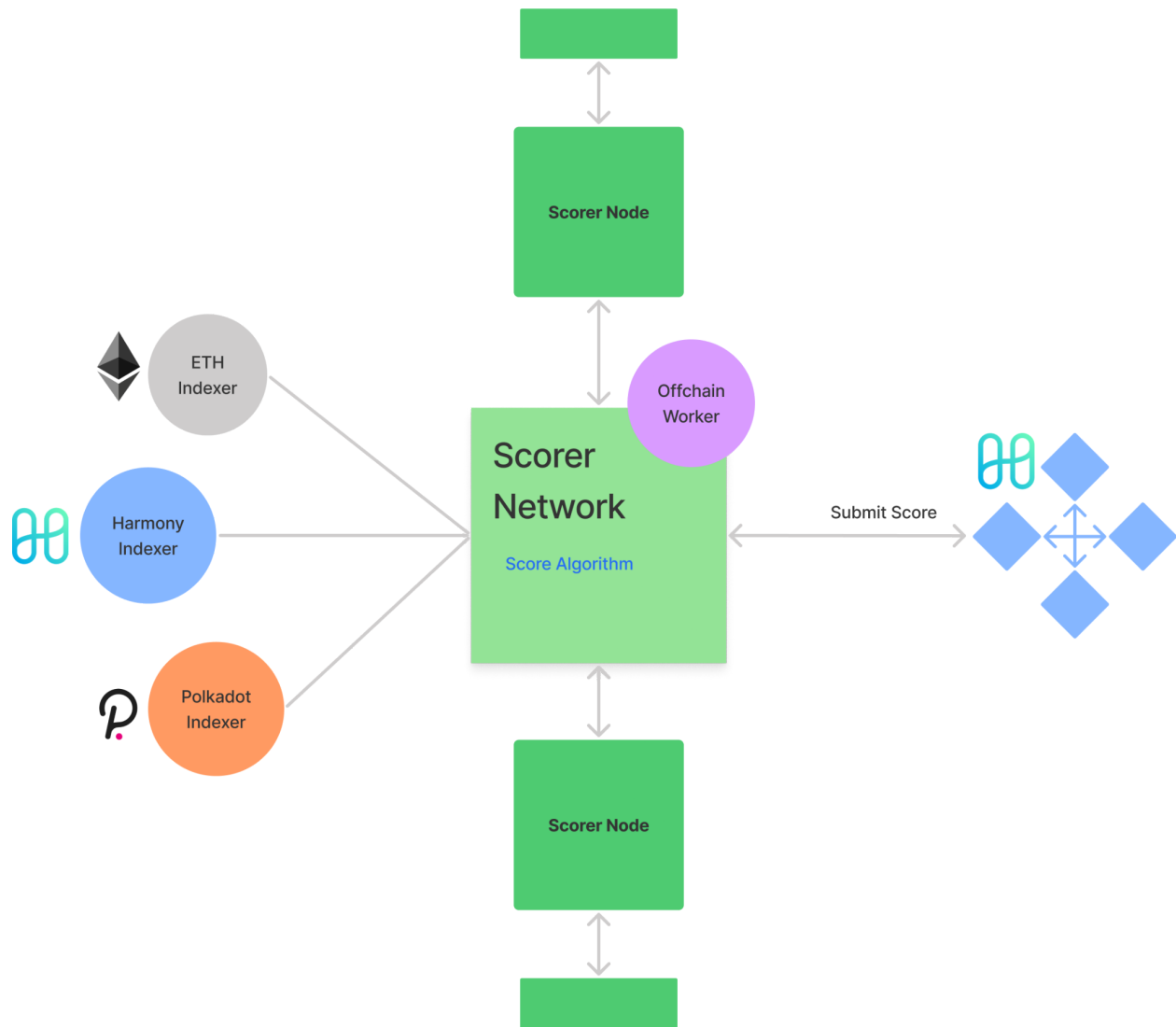
Lenders use credit scores to evaluate the potential risk posed by lending money to consumers and to mitigate losses due to bad debt. Lenders use credit scores to determine who qualifies for a loan, at what interest rate, and what credit limits. Lenders also use credit scores to determine which customers are likely to bring in the most revenue.

One use case could be for DeFi lending protocols to offer better rates for users with a better record of repaying loans on time or low debt to minimise risk.



Architecture

In our approach, we use a network of indexers and nodes from various blockchain networks to listen to DeFi transactions and calculate the credit score for accounts.





Network

The ChainScore Network consists of 3 components —

1. Indexers

Block indexers listening to transactions on DeFi contracts from multiple networks and classifying transactions into Lending, Borrowing, Payoff, etc. Indexers would also listen to transactions related to assets like NFTs or listed ERC20 tokens.

2. Scoring Nodes / Off-chain worker

A network of nodes for calculating scores from the data received by indexers and updating the score on the blockchain.

These off-chain nodes would create a score feed for the blockchain to access scoring data.

Scoring nodes need to stake a certain amount of tokens to participate in submitting a score to the contract. Staking contract allows users to stake SCORE tokens to receive sSCORE (staked-SCORE) tokens.

3. Blockchain

Decentralized blockchain network for storing users' scores, attributes, assets' data, relationships, etc on a tamper-proof ledger.

The calculated score can be stored on any decentralized ledger, but having minimal fees and greater throughput is crucial for submitting transactions from different indexers. Harmony blockchain's multi-sharded architecture and performance fits in perfectly with low gas fees for submitting scores to the blockchain.

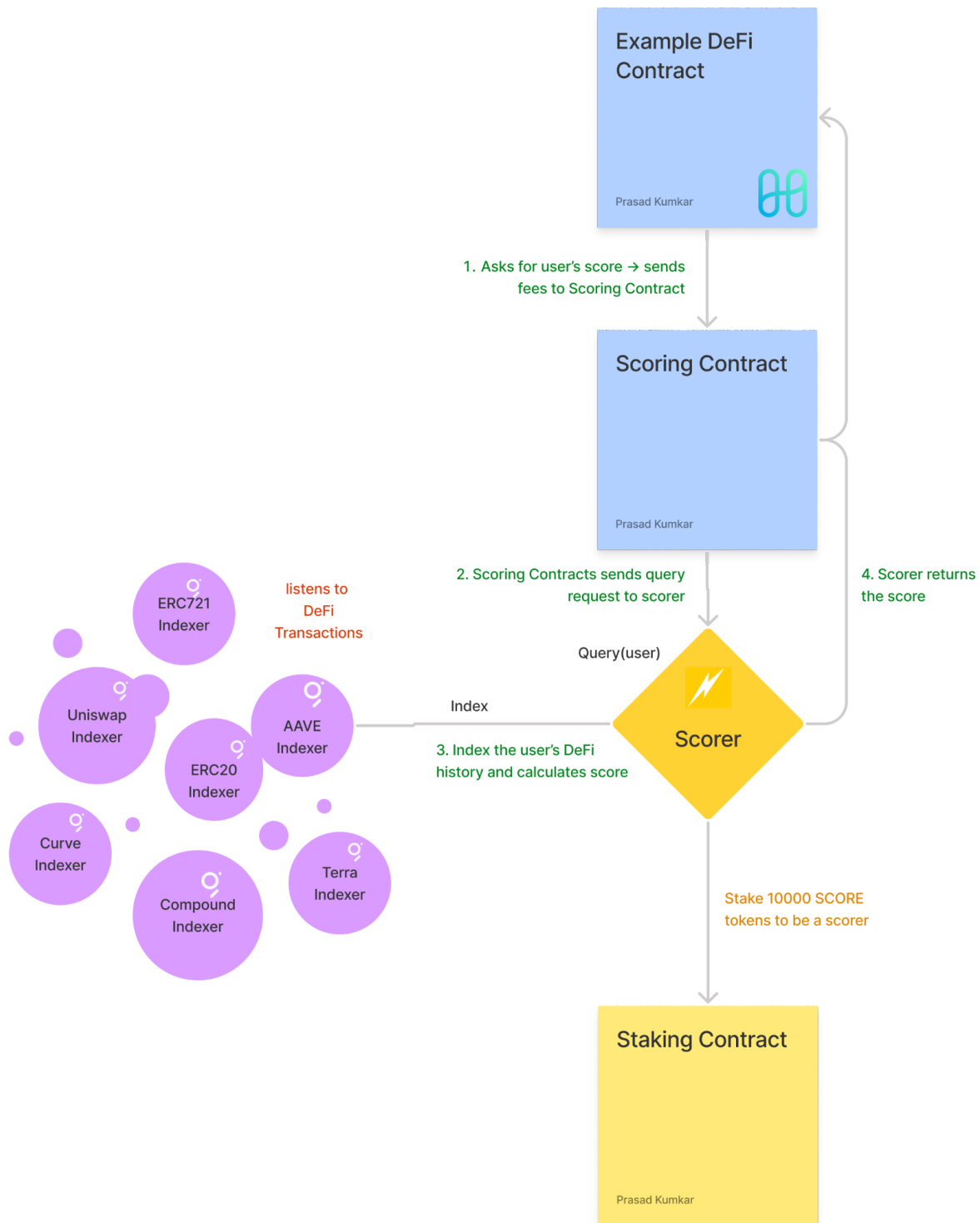
On the deployment of the network, all DeFi apps on Harmony's ecosystem can access credit scores for users with cross-contract calls.

Multichain

Indexers can aggregate from multiple chains for an address. The score calculated from this data could be submitted to any blockchain. This would allow dapps on one chain to use financial data from other chains of the same address.



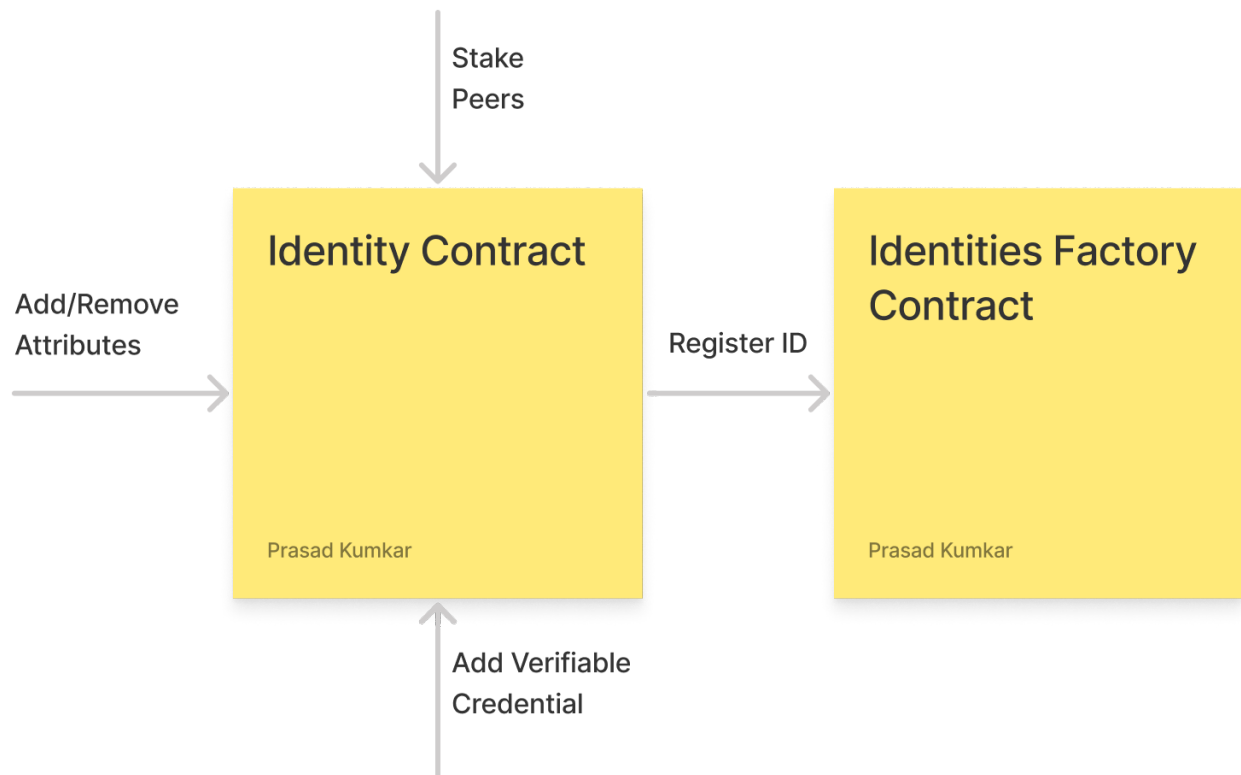
How can DeFi apps use Chainscore?





Identity 2.0

By coupling decentralized credit scoring with a decentralized digital identity system, no one party will hold full control over an individual's financial data.



By connecting user identities with personal accounts, users can bind their digital assets and contact addresses making it easy for the correct due diligence to take place.

Staking peers

Enabling users to vouch for ("stake") other people they personally know, and whom they expect to be financially responsible. Bilateral staking prevents users from abandoning identity with a low credit score.

Verifiable Credentials

Verifiable credentials can be generated by users, assigning some claims and proofs to it. Credentials are Non-Fungible Tokens (NFTs) generated in the Identity Contract. These



credentials are written on the blockchain and can be used to verify the owner (Issuer). This can be then verified by some service provider by looking at the credential owner on the ledger.

Attributes

Attributes could be assigned to identities from anyone by specifying attribute names and values. These attributes could then be verified with the signer's identity and attribute name.



Credit Scoring

Credit Score is calculated after taking into consideration factors such as payment history, credit utilization, credit age, and credit type. Let's take a look at all of these factors in detail with the level of impact they have on your credit history and score.

Payment History - High Impact

Payment history is one of the most important factors that affect your score. If you have been consistent in paying your bills/loan EMIs, it suggests that you are a responsible borrower and are at a lower risk of default. Responsible credit behavior will also make you eligible for preferential rates on loans and quicker approval on your applications. Making late payments, missing payments, etc. Will lower your score by several points.

Credit Utilisation Ratio - High Impact

Credit usage is the second biggest factor that affects your credit score. A credit utilization ratio refers to the total amount of credit you have used in proportion to the cumulative total credit limit available to you. The credit utilization ratio is calculated by dividing your overall outstanding balance by your total credit limit. According to experts, consumers should ideally use only 30-40% of the credit limit to maintain a high score.

Age of the Credit - Medium Impact

To better assess your creditworthiness, your history with credit is also considered when computing your score. If you have handled your credit in a responsible manner in the past and continue to service payments on time on your active credit lines, it will positively affect your credit score. A long credit history helps lenders take a sound decision on whether to offer you credit or not. Therefore, it is advised to keep credit cards with a long history open compared to cards you have recently acquired.

Total Accounts - Low Impact

It is important to maintain a good balance of secured as well as unsecured credit. A credit card is an example of unsecured credit while a secured creditor can be a car loan or home loan. A mix of credit helps to boost your score. Although it has a lower impact compared to other factors, you should not ignore it. Your total accounts reflect the experience you have with handling both types of credit. You should avoid borrowing only one type of credit in large quantities as it could hamper your score.



Comparing Existing Credit Scoring Algorithms

VantageScore

Recent credit amount: 30% of the score
Payment history: 28%
Credit utilization: 23%
Account balances size: 9%
Depth of the consumer's credit: 9%
Amount of available credit: 1%

FICO

Payment history: 35% of the score
Outstanding debts: 30%
Length of your credit history: 15%
Types of credit you've used: 10%
Amount of new credit:

Reliability Score

In our case, considering the available data, the credit reliability score can be calculated by the following factors —

- The total amount paid vs. total amount owed
- Longest repayment history on file
- Average payment total per month
- Number of past loans
- The total amount paid across all reported information



Indexers

1. Data from DeFi Protocols



0xf50b – 351e0c

Yearn Vaults V2 Subgraph

v0.0.2

Query

Signal

▼

INDEXED NETWORK

Mainnet

QUERY URL

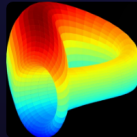
/subgraphs/id/0xf50b – 1e0c-0

SUBGRAPH ID

0xf50b – 1e0c-0

INDEXING

PROGRESS 100%



0x2382 – b65253

Curve

v0.2.0

Query

Signal

▼

INDEXED NETWORK

Mainnet

QUERY URL


/subgraphs/id/0x2382 – 5253-0

SUBGRAPH ID

0x2382 – 5253-0

INDEXING

PROGRESS 100%



0x0d69 – 78e1d3

AAVE V2

v0.0.2

Query

Signal

▼

INDEXED NETWORK

Mainnet

QUERY URL

/subgraphs/id/0x0d69 – e1d3-0

SUBGRAPH ID

0x0d69 – e1d3-0

LOADING

The following query would give us all positions held by users at Yearn Vaults:



```
{
  accounts (where: {id: "0x6a1277348cf377c544bf5d0b9d
    deposits{
      timestamp,
      tokenAmount
    }
    withdrawals{
      timestamp,
      tokenAmount
    }
    vaultPositions{
      vault{
        id
      }
      token{
        id
        symbol
      }
      balanceShares
      balanceTokens
      balancePosition
    }
  }
}
```

```
{
  "data": {
    "accounts": [
      {
        "deposits": [
          {
            "timestamp": "1632985220000",
            "tokenAmount": "1000000"
          },
          {
            "timestamp": "1632985335000",
            "tokenAmount": "1000000"
          }
        ],
        "vaultPositions": [
          {
            "balancePosition": "1999998",
            "balanceProfit": "0",
            "balanceShares": "1857186",
            "balanceTokens": "2000000",
            "token": {

```

2. Indexing Assets owned by the user


We use data from platforms like OpenSea and Uniswap to get an estimate of assets owned by users. Furthermore, we could also look at many more assets like

- Digital property in Decentraland
- High volume ERC20 tokens held by the user
- Art, etc.

These assets could be used to create an estimated valuation to be included in the score.

USDC subgraph indexes token holders





0x06b3 - 4eff64

USDC Protocol

v0.0.2

INDEXED NETWORK
Mainnet

QUERY URL
/subgraphs/id/0x06b3 - ff64-0

SUBGRAPH ID
0x06b3 - ff64-0


Query

Signal

INDEXING

PROGRESS 100%

ArtBlocks subgraph indexes Art Blocks tokens, projects, and OpenSea sales:



0x3c3c - 15a5b0

Art Blocks

v0.0.1

INDEXED NETWORK
Mainnet

QUERY URL
/subgraphs/id/0x3c3c - a5b0-0

SUBGRAPH ID
0x3c3c - a5b0-0

Query

Signal

INDEXING

PROGRESS 100%

Overview

Indexers

Curators

Playground

Example Query

```
{
  accounts(where: {id: "0x661218f97ee63af34baa42d8de0...
    projectsOwned{
      project{
        name
        artistName
        pricePerTokenInWei
      }
    }
  }
}
```

```
{
  "data": {
    "accounts": [
      {
        "projectsOwned": [
          {
            "project": {
              "artistName": "Rich Lord",
              "name": "Geometry Runners",
              "pricePerTokenInWei":
                "5000000000000000000"
            }
          },
          {
            "project": {
              "artistName": "Piter Pasma",
              "name": "Skulptuur",
              "pricePerTokenInWei":
                "4000000000000000000"
            }
          }
        ]
      }
    ]
  }
}
```

< Query

> Hide schema

Search...

Account

id: ID!

tokens: [Token!]

Projects the account owns tokens from

projectsOwned: [AccountProject!]

Projects the account is listed as artist for

projectsCreated: [Project!]

Contracts the account is whitelisted on

whitelistedOn: [Whitelisting!]



Scorer Network

The Scorer network consists of nodes that listen to score requests from Score Protocol Contract. The node is required to stake a certain amount of tokens to be a part of the network and be able to submit scores.

Scorer node logs -

```
prasad@prasad-ubuntu:~/Desktop/harmony/scorer$ node app.js
Connected to Score Protocol 0x35
Staking SCORE tokens...
Transaction successful with hash: 0xd3317afb8eb4038c4ef5dc639af0c422898cf7748fe
Transaction successful with hash: 0x5ff90c37f535ad20daf6eb787619c8dc93db2daba05
Node is staked
New Scoring Request
User: 0x7C98A435ddC9Cc6333F0dF41C89A8F1d495dF63A, Contract: 0xd445954A74583AeCA
Submitting Score...
Transaction successful with hash: 0xbc5627052a81b36494485c942dae6655ef185e27395
█
```

Example transaction requesting score -

```
prasad@prasad-ubuntu:~/Desktop/harmony/scorer/example$ node .
Contract doesn't hold sufficient SCORE Tokens
Sending SCORE tokens ...
Transaction successful with hash: 0x09526ddf16b370aa0ef834610cfdd6c5c3b0396e5032ddf7a9e
Calling sendMeTokens... Current Example-Token balance: 0
Transaction successful with hash: 0xfb356e0a4fccf9388c9f073b03a9170b72e70c4410cf7948eb3
Balance on receiving tokens after Score verification: 1000
█
```

Instructions to use

<https://github.com/Chainscore/contracts/blob/main/README.md>