



App Development on Stellar

An Overview of Key Concepts



Outline

- Components of the Stellar Network
- Concepts
 - Accounts
 - Federation
 - Fees
 - Assets
 - Transactions
 - Operations
- Softwares
- SDKs



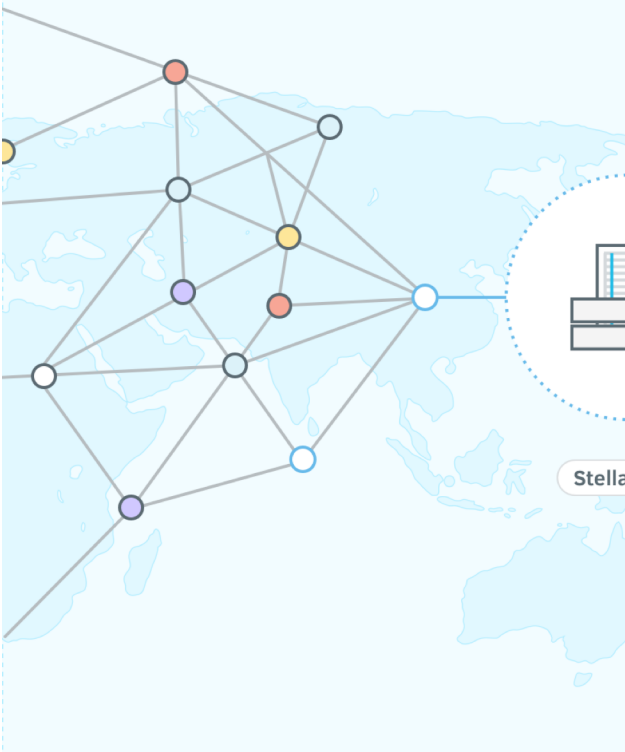
Let's Begin



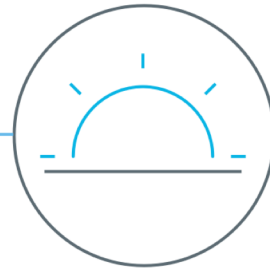
Components of the Stellar Network

- Stellar Core
 - Validates transactions on the Network through the Stellar Consensus Protocol
 - Communicates with other Stellar Cores
 - It is the network backbone
- Horizon
 - RESTful HTTP API server
 - Communicates with Stellar core
 - Applications typically interact with Horizon
 - Can be accessed via web browser, command line (cURL) and SDKs

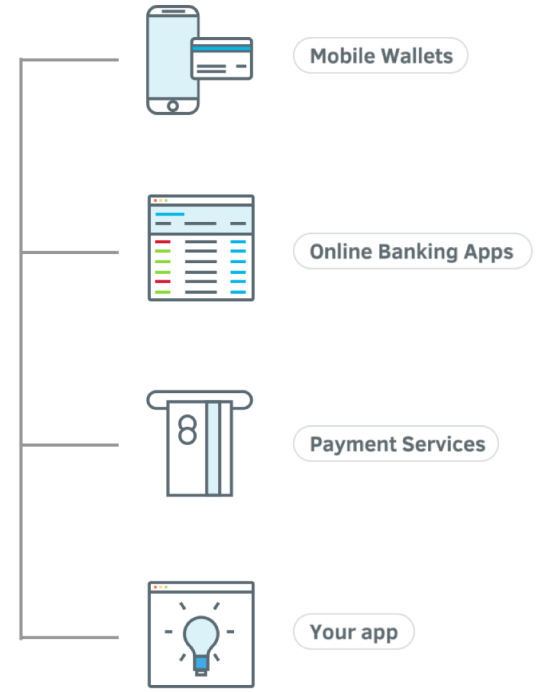
Stellar network



Stellar Core



Horizon



Stellar Concepts

Accounts



- The central data structure in Stellar

Public Key:

GBTTAYJ5D5E6RXI55Q4J2WDDRY4P5
I42Y3ELIU6MNSH3HXCPDBFXG3PZ

Private Key:

SBEZ3WUM7756ZIDTYX7FCVJRZY23
VURDNF3UDF643EGZ4AOQB5FBF6N

- Identified by a public key saved on the ledger
- All actions are performed on an account

Account Fields

- **Account ID**
- **Balance**
- **Sequence number**
- **Number of subentries**
- **Inflation destination**
- **Flags**
- **Home domain**
- **Thresholds**
- **Signers**
- **Liabilities**

Federation



- The Stellar federation protocol maps Stellar addresses(public keys) to more information about a given user
- Maps `name*yourdomain` -> `GCCVPYFOHY7ZB7557JKENAX62LUAPLMGIWNZJAFV2MITK6T32V37KE`
- Implemented on the Anchor

Fees



- Stellar requires a small fee for transactions and minimum account balance
 - The base fee (currently 100 stroops or 0.00001 XLM) is used in transaction fees.
 - The base reserve (currently 0.5 XLM) is used in minimum account balances.
- Transaction Fee: # of operation X base fee
- Minimum account balance: $(2 + \# \text{ of entries}) \times \text{base reserve}$
- Entries include:
 - Trustlines
 - Offers
 - Signers
 - Data entries
- Fee Pool
 - The fee pool is the lot of lumens collected from transaction fees.
 - Stellar does not retain these lumens. They are distributed in the weekly process of inflation voting.

Assets



- Stellar network can be used to track, hold and transfer any Asset.
- Assets are typically digital representation of physical value.
- Assets on the network are represented by
 - Asset Code
 - Asset Issuer (Public Key)

Transactions



Any command that changes the state of the ledger is a Transaction

Attributes

- Source account
- Fee
- Sequence number
- List of operations
- List of signatures
- Memo
- Time bounds



Transaction Life Cycle

1. Creation:
2. Signing:
3. Submitting:
4. Propagating:
5. Including in a transaction set:
6. Application:



Operations

Specific commands to be applied to an account

Typically executed on behalf of the source account of the transaction, unless there is an override defined for the operation.

Each operation falls under a specific threshold category: **low, medium, or high**. Thresholds define the level of privilege an operation needs in order to succeed.

List of Operations



1. Create Account
2. Payment
3. Path Payment
4. Manage Offer
5. Create Passive Offer
6. Set Options
7. Change Trust
8. Allow Trust
9. Account Merge
10. Inflation
11. Manage Data
12. Bump Sequence

Operations: Create Account



Threshold: **Medium**

creates and funds a new account with the specified starting balance.

Starting Balance is always in XLM

Operations: Payment



Threshold: **Medium**

Sends an amount in a specific asset to a destination account.

Asset can be XLM or a custom asset

Operations: Path Payment



Threshold: **Medium**

Sends an amount in a specific asset to a destination account through a path of offers. This allows the asset sent (e.g., 450 XLM) to be different from the asset received (e.g, 6 BTC).

Asset can be XLM or a custom asset

Operations: Manage Offer



Threshold: **Medium**

Creates, updates, or deletes an offer.

If you want to create a new offer set Offer ID to 0.

If you want to update an existing offer set Offer ID to existing offer ID.

If you want to delete an existing offer set Offer ID to existing offer ID and set Amount to 0.

Asset can be XLM or a custom asset

Operations: Create Passive Offer



Threshold: **Medium**

A passive offer is an offer that does not act on and take a reverse offer of equal price. Instead, they only take offers of lesser price. For example, if an offer exists to buy 5 BTC for 30 XLM, and you make a passive offer to buy 30 XLM for 5 BTC, your passive offer does not take the first offer.

Asset can be XLM or a custom asset

Operations: Set Options



Threshold: **Medium or High**

This operation sets the options for an account.

When updating signers or other thresholds, the threshold of this operation is high.

Operations: Change Trust



Threshold: **Medium**

Creates, updates, or deletes a trustline.

This is the primary operation for asset creation

Operations: Allow Trust



Threshold: **Low**

Updates the authorized flag of an existing trustline. This can only be called by the issuer of a trustline's asset.

Operations: Account Merge



Threshold: **High**

Transfers the native balance (the amount of XLM an account holds) to another account and removes the source account from the ledger.



Operations: Inflation

Threshold: Low

This operation runs inflation

Operations: Manage Data



Threshold: **Medium**

Allows you to set, modify or delete a Data Entry (name/value pair) that is attached to a particular account.

Data Entries can be used for application specific things. They are not used by the core Stellar protocol

Operations: Bump Sequence



Threshold: **Low**

Only available in protocol version 10 and above

Bump sequence allows to bump forward the sequence number of the source account of the operation, allowing to invalidate any transactions with a smaller sequence number.

Softwares



- **Stellar Core:** Standalone application for a single core instance
- **Horizon Server:** Standalone application for a single horizon instance
- **Docker Stellar/quickstart:** Docker image containing both core and horizon
- **Stellar Ubuntu Packages**
- **Stellar Laboratory:** Frontend interface for the Stellar API. Provides an interactive way to learn the API

The Stellar Development Foundation also provides a publicly available Horizon Server that you can query when building your application

Public Network: <https://horizon.stellar.org>

Test Network: <https://horizon-testnet.stellar.org>

SDKs



- To interact with Horizon use one of the following libraries:
- Libraries maintained by [Stellar.org](https://stellar.org):
 - [JavaScript](#)
 - [Java](#)
 - [Go](#)
- Community-maintained libraries:
 - [Ruby](#)
 - [Python](#)
 - [C# .NET Core 2.0](#)
 - [C#](#)
 - [C++](#)
 - [Scala](#)



Questions and Discussions