

Polkadot Decentralization Analytics

Project Delivery Report

2022 Q4+

Kusama
Treasury Proposal

Polkawatch Decentralization Analytics Parachain Support and Continued Operation.
Valletech

About This Document

This report contains information about the execution of actions and milestones agreed in the referenced Treasury proposal, the deliverables, community engagement and potential next steps.

Executed Actions and Milestones

Parachain Support for Polkawatch

We have delivered parachain support for Polkawatch and announced it to our community via Twitter and Blog post. Furthermore, the release includes the launch of Statemine decentralization analytics, so that we could ensure that our implementation is as production ready as possible.

Statemine was chosen as first parachain for its community relevance (see blog post for details) and because it uses a different consensus mechanism, see architectural impact below.

Parachain support feature had severe impact on Polkawatch architecture, for three different reasons:

- Substrate is modular and parachains use different consensus systems. Polkawatch has been modularized to support multiple consensus system. Statemine uses Aura and Polkawatch has added support for Aura in the process.
- Parachains delegate functionality to Relay Chain. In the case of Statemine, Account Identity is delegated to the RelayChain, which means that Polkawatch must query both Relay and Parachain during the indexing process.
- Polkawatch, as originally designed, uses the Reward event as base of analytics. However, some parachains, such as Statemine, do not implement Nominated Proff of Stake, but instead Aura enrolls a set of authorities. We opted to include a second method to track decentralization, based on block authorship for parachains that do not implement Staking, such as Statemine.

This implementation is also affected by the Heartbeat issue described later in this document, however Polkawatch can infer network topology of the operators thanks to the indexing of the Relay chain.

Data Quality Observability

We implemented this feature and announced it via our Twitter and blog post. We use Node-Red as part of the implementation of observability. We used a Polkadot plug-in for Node-Red developed by our community (details in the blog post) and added support for other substrate query types, such as RPC.

All in all we are very satisfied with our observability system and has already been proven very effective in detecting network issues during our operation (see below).

Continued Operation and Project Management

The system has been operated according to the agreed model without issues.

The operation has been extended to Statemine, including in-house archive node, indexing, observability, etc. The operation has also been extended to another data center following community feedback (see below).

However, our operation involvement was underestimated due to issues discovered affecting not only Polkawatch but the community as a whole:

- Kusama nodes stop sync, p2p instability. It took us significant time to figure out what was happening. We tried to be helpful and cooperated with the Substrate development team with testing, traces, etc until the issue was found and resolved.
- on chain Heartbeats without external_addresses. This issue affects Polkawatch traceability (see future plans). And it is still being investigated.

Community Feedback Implementation

During the discussion of our proposal we received feedback that part of our Operation was based on Hetzner, the same provider that deplatformed multiple Solana nodes.

We decided to add infrastructure from Scaleway too. In particular to our IPFS infrastructure which serves Polkawacth DAPP and Data packs and is therefore responsible for user experience. With this addition our Operation is now distributed across 3 sites.

Project Next Steps

Changes in Project Management

Project Management required much more involvement than anticipated, and now that we interact with both Polkadot and Kusama seems like a waste or resources for us and the rest of the community to interact too frequently.
After discussing with the Treasury Team, going forward we will try to interact with the treasury less often, perhaps every 6 months or more instead of 3 months, alternating between Kusama and Polkadot.

Next Project Features

- We discovered on-chain Substrate Heartbeats without addressing information. An issue that Parity Networking team is investigating. However, we also discussed that the addressing information in this event is now considered Obsolete and may be removed. Furthermore, Collators may not be required to issue ImOnline Hearbeat events, as it is the case of Statemine.

We have been advised to move the implementation responsible for detecting Network topology to lower level layers in the protocol, i.e. by querying the Distributed Hash Table (DHT) of the libp2p stack. The modularization work done in this delivery will certainly help in delivering pluggable network topology mechanisms for Polkawatch.

- We will onboard additional parachains.
- We have detected Geolocation mistakes by our provider, which are properly addressed by premium databases with reasonable cost. We have started to look into upgrading the GeoIP database.
- Polkawatch requires a continuous effort related to traceability and accuracy of the dataset, and the delivered observability features will help along the process.