GOSSAMER.

Treasury Proposal: Ongoing Development of Gossamer

Proposal Date: 24th April 2024

Requested DOT: 368,016 DOT

Beneficiary address: 149mJjdQjEBMHHbWDjbLJ7X4e95ps6L35DZVaBzn1raR1EVQ

Short description: Gossamer is an implementation of the Polkadot Host, developed using Go. As an alternative client implementation, it serves decentralization and robustness of the network by being a full node and a validator node. Ultimately, Gosammer is a framework for building within the Polkadot ecosystem, uniquely positioned to accelerate Golang development and offer additional advantages and capabilities.

Project Category/Type: Software development

Previous treasury proposals: Treasury Gossamer grant in 2022 (accepted)

1. Context of the proposal

So far Gossamer has been funded through the Web3 Foundation, the Polkadot Treasury and ChainSafe itself. Funding through the treasury has run out in October 2023 and since then Gossamer has been funded through ChainSafe itself, as its own investment and commitment to the ecosystem.

This proposal seeks Polkadot treasury to consider supporting the Gossamer team by requesting an additional 12 months of funding along with 5 months of retroactive funding to at least partly cover the development costs since October 2023. Having devoted years to this project, the team possesses deep knowledge and has gained significant traction. This continued support would leverage their extensive experience to sustain and enhance the project's development, building on successful foundations.

The next 12 months will be crucial for Gossamer as it reaches significant user-facing milestones like full node and validator node capabilities while also discovering its potential and value within the Go development ecosystem.

1.1. Gossamer's Current State and Accomplishments

One of Gossamer's goals is to expand the ecosystem's capabilities and secure the Dotsama ecosystem while also attracting a wave of new developers and users, fostering a more vibrant and diverse community. Gossamer has established a strong presence within the community with more than 1,938 merged pull requests and contributions from over 50 developers. The current codebase continues to mature, with a monthly average of 35 pull requests.

Gossamer's accomplishments since the last grant include:

- Drastically improved reliability and performance by fixing recurring panics and switching from BadgerDB to PebbleDB.
- Syncing improvements with Westend, approaching the network's latest block height.
    - Faster synchronization and enhanced error handling.
    - Improved logging and transparency.
    - Optimized state trie loading from the latest block.
- Improved solution for memory management.
    - Switching to Wazero from Go-Wasmer, fixing Wazero bugs and maintaining our own Wazero fork to handle exported memory.
- Improving and optimizing our testing suite.
    - Speeding up our top six packages that were slowest to run 10x faster.
- Fixing our GRANDPA implementation to support multiple concurrent voting rounds and prune outdated rounds for enhanced finality.
- Updated our trie implementation to support the new v1 layout and associated hybrid state to ensure consistency when generating merkle proofs.
- Implemented snapshot functionality to streamline the syncing process by creating checkpoints.

- Adapted our CLI for integration with ZombieNet for testing Gossamer nodes, addressing issues with command line parameters and chain spec.
- Making progress towards the parachain consensus support by implementing the Polkadot host subsystems. Considerable advancements were made towards the Backing and Availability subsystems.
- Tested tip-sync mode on the Paseo network, and identified and solved synchronization problems.
- Enhancing support for necessary host API calls.
- Improved child trie support, and support for nested transactions.
- Retaining a total of four Technical Fellowship members.

We are on the verge of fully syncing with Westend, with ~90% of the chain successfully being processed. Additionally, we have initiated the implementation of Polkadot subsystems essential for efficient block authoring. We are continuing to look ahead to future upgrades to ensure we can direct resources towards new features such as BEEFY and SASSAFRAS. Gossamer technical roadmaps can be found in the section below.

1.2. About ChainSafe

At ChainSafe, we are dedicated to pioneering the development of decentralized and community-oriented technologies that empower users globally. Our mission is to advance web3 potential through open-source innovation, making it more accessible, secure, and sustainable.

Outside Gossamer, some of ChainSafe's development contributions to the Polkadot ecosystem are:

- Multix
    - An interface to easily manage complex multisigs.
- Phala SubBridge
    - Bridging data and assets from/to Dotsama and Ethereum.
- Sygma Substrate Pallets

    - Enables native connectivity for assets and messages leveraging Sygma protocol, between EVM and Substrate based chains.
- Cypress Plugin - Polkadot Wallet
    - A plugin that enables integration tests with wallets using the popular testing framework Cypress.
- Metamask Snap
    - Plugin for interacting with Polkadot dapps and other Substrate-based chains.
- Chainlink Pallet
    - Integration of Chainlink feed in Substrate-based chains.

Outside development contributions and as part of our multifaceted approach, we are enhancing the Polkadot ecosystem through targeted infrastructure improvements:

- Snapshot Hosting Services
    - Snapshots are free and allow efficient network synchronization of both Polkadot and Kusama.
- Validator Nodes
    - Entering the 1K Validator Program on Kusama, with plans to proceed to Polkadot thereafter.
    - Will eventually become a testing ground for Gossamer to demonstrate its capabilities

Additionally, we continue to be active in our non-technical contributions such as participating and presenting at Polkadot events like Decoded (2022, 2023), Sub0 (2024), ParisDot and similar. We are also organizers of Polkadot both physical and online meetups (Croatia meetup, CSCON).

2. Problem statement

Client diversity plays a pivotal role in bolstering the resilience and security of decentralized networks. Additionally, fostering an environment where multiple teams are building client

implementations reduces the likelihood of single-point failures, vulnerabilities and systemic risks that can arise from software bugs or exploits. This diversity not only ensures a higher degree of security but also encourages ongoing innovation and development within the ecosystem.

Each client implementation is a solution that is oriented toward diverse design goals. Gossamer makes blockchain development more accessible via a Go framework that can be used to build blockchains, including parachains. Additionally, all types of Go builders within the Polkadot community can benefit as Gossamer helps other projects to build comprehensive Go libraries for the Polkadot ecosystem. With Gossamer getting closer to the production state, the plan is to engage closer with the community and users to understand their needs and desires. The goal is to enhance the ecosystem by providing a tailored value proposition, which goes beyond the basic and foundational role of a network node.

2.1. Gossamer Goals

Gossamer stands as the core of ChainSafe's contributions to the Polkadot ecosystem and increasing its accessibility, decentralization and security. Gossamer objectives are:

Enhancing Relay-Chain Accessibility

By acting as a full relay-chain client, Gossamer opens up alternatives to running substrate-based Polkadot nodes, providing a significant infrastructure for service providers and parachains interfacing with Polkadot.

Strengthening Ecosystem Decentralization

As an independent implementation of the Polkadot protocol with their own team of core developers, Gossamer acts as a cornerstone of the ecosystem not only fostering a technical but also a logical decentralization.

Fostering the Polkadot Go Developer Community

Through the porting of substantial portions of the Polkadot SDK codebase to Go, Gossamer and other ecosystem projects open the door for a broader developer audience, tapping into the vast and vibrant Go developer community.

Increasing Participation in the Polkadot Governance

We're committed to actively shaping the future of the Polkadot ecosystem by engaging in initiatives like the Technical Fellowship, RFC updates and hosting community events. Our goal is to collaboratively shape Polkadot's future alongside the broader community, drawing from our unique insights gained from extensive involvement in various ecosystems.

Elevating Brand Awareness and Adoption

Our efforts include actively developing and expanding the Gossamer brand. Initiatives like writing articles, governance participation, community events, social media, and the launch of a dedicated Gossamer website will play a pivotal role in increasing awareness and adoption.

Financial Sustainability and Adoption

Our commitment to Gossamer's long-term success includes a strategic focus on financial sustainability and finding additional value propositions. Drawing from multiple years of delivering sustainable business cases we plan to discover and validate product opportunities and use cases for Gossamer.

2.2. Increasing Developer Accessibility

The steep technical learning curve is one of the biggest impediments to growth in the Polkadot ecosystem. Additionally, the current dominance of Rust in the Polkadot ecosystem might limit participation from developers familiar with other programming languages. A product discovery that combines primary and secondary research is planned to address these issues and enhance Gossamer’s positioning and value add.

3. Proposal Objectives

The goal of the proposal is to fund the ongoing effort of Gossamer technical development and product discovery for Gossamer and the Go community.

3.1. Gossamer Implementation

Gossamer is close to a large milestone of being able to sync with the Westend chain completely and this brings us closer to the more exact roadmap planning.

By the end of Q3 2024, Gossamer will be able to act as a Full Node. The following roadmap includes the steps to achieving full node capability:

- Improve state storage and the storage trie along with the database layer
    - Lazy loading in the storage trie
    - State DB performance optimization
        - Implementing non-canonical overlays
        - Online pruning
- Sync modes
    - Warp sync
- Finalize RPC API implementation
    - Run PolkadotJS specification compatibility test
    - Documentation for all JSON-RPC API endpoints
    - Performance testing for all methods
- Finalize GRANDPA implementation
    - Network/Communication layer
    - Voter Protocol implementation (VoterWork)
    - Block Import protocol
        - Grandpa message types
        - Justification gossip
    - Integration and interop testing of consensus participation
- General code maintenance
    - General performance testing
    - Public documentation for Gossamer full node usage
- QA and Infrastructure
    - Automating test environment

    - Longevity and regression sync tests
    - Testing with Zombienet tooling
- Telemetry
    - Support the specification of the metrics

Our roadmap will continue with the following plan in Q1 2025 to become a **Validator Node**:

- Continue with parachain integration
    - Collator protocol subsystems
    - Backing subsystems
    - Availability subsystems
    - Approval subsystem
    - Dispute subsystems
    - Utility subsystems
    - GRANDPA updated
- Comply with spec updates, including SASSAFRAS and BEEFY support
- QA and infrastructure
    - Expand existing Zombienet test cases for validation
    - Setup infrastructure for running Gossamer validators on testnets

Currently, we are focused on Gossamer being able to offer both full node and validator services to serve the basic needs of network security and decentralization but always considering planning for additional R&D efforts like SASSAFRAS, light client communication layer and even future changes like JAM.

3.2. Product Discovery

As Gossamer is approaching readiness for the first node use case it is important to begin expanding Gossamer's vision beyond implementing the technical specification to participate in

the Polkadot network. As a starting point, we have identified the following objectives that we believe have a substantial impact on Polkadots overall success and growth:

1. **Growing Polkadot Developer Base**

   The Polkadot Growth Strategy Report indicates that usage 'difficulty and learning challenges' are a significant impediment to Polkadot growth and adoption. We believe Gossamer can play a pivotal role in increasing the developer ecosystem accessibility of Polkadot Protocol and Application development by enabling the Golang community to access and contribute to Polkadot Protocol and application development easily. Gossamer can become the go-to way to onboard Go developers leading to a substantial increase in the active developer base.

2. **Surfacing New Opportunities**

   We believe Gossamer's unique properties in modularity and compatibility with the Golang toolchain open up unique opportunities to provide additional value to Polkadot. Within this objective, we plan to explore the following potential opportunities:

   - Providing core parts of Polkadot implementations (Gossamer, Polkadot SDK, etc.) as Go libraries to meet the emerging needs of developers, ensuring Polkadot is accessible to as many developers as possible.
   - Support for use cases such as *large-scale validator operations* via observability tools or *data analytics* via dedicated language bindings and support for data mining, among other potential use cases.

Based on those two objectives listed above the plan is to:

1. Conduct primary and secondary research in order to surface and prioritize opportunities.
2. Find solution candidates to address the most promising opportunities.
3. Validate solution potential by evaluating the usability, feasibility, value and viability.

4. Budget

The Gossamer core team currently consists of:

- 1x Full-Time Product Manager
- 8x Full-Time Protocol Engineer
    - Including Senior Engineering Manager and Tech Lead
    - 1 open position for a Senior Protocol Engineer

Except for the core team staffing, projected costs include infrastructure, subscriptions, marketing efforts, support staff (e.g. DevOps, Agile coach) and QA and ancillary staff costs (e.g. taxes, insurance).

This leads to an overall cost breakdown of the total requested funds:

Period	**Team Size (FTE)**	**Amount (USD)**
Jan 2024 - April 2024 (retroactive 4 months)	9	**$668,700**
May 2024 - April 2025 (12 months)	10	**$2,229,000**
TOTAL		**$2,897,700**

As mentioned, Gossamer funding ran out in October 2023 and since then has been self-funded for over 6 months. Partial retroactive funding would ensure some additional runway in the event funding is an issue in the future.

Proposal Execution: 12 months (May 2024 — April 2025)

Progress and Updates:

- Public articles every month (see blog)
- GitHub code progress (see insights)
- Presentations at Polkadot events

- Documentation updates (see docs)
- New releases every 1-4 weeks once the production state is reached (see releases)
- New (Gossamer) nodes on Telemetry

4.1. Payment conditions

Total amount of DOT requested: 368,016 DOT *(approximately $2,897,700 USD)*

DOT price: 7.873830 *(EMA30 based on Subscan calc at block #20483745)*

Beneficiary account: 149mJjdQjEBMHHbWDjbLJ7X4e95ps6L35DZVaBzn1raR1EVQ

Contact:

- Lerna Jabourian, Gossamer Product Manager, lerna@chainsafe.io, @lernaj:matrix.org
- Belma Gutlic, VP of Engineering, belma@chainsafe.io, @morrigan.iv:matrix.org