**Name**

Ephora

**About**

ephema is a research group focused on unravelling truth in the Ethereum ecosystem.

Our research expands across a couple of different areas related to scaling, data availability and incentive design.

Specific examples are EIP-4844 (proto-danksharding) and blobspace, based preconfirmations and execution tickets, proposer-builder separation and the MEV supply chain.

We are positioning us as unique knowledge leader for the advancement of the Ethereum ecosystem, scalability and rollup/L2 landscape.

**Description**

In Q1/2024 EIP-4844 (Proto-Danksharding) is planned to go live on Ethereum. This will have substantial impact on the whole ecosystem, particularly L2/rollup scaling and DEXes on the according networks. With this proposal we will bring some light into the jungle of expected effects, outline our research paths and technical implementations. This will bring more clarity and enhance future outcomes for Arbitrum and Uniswap. Particularly regarding scaling, TX per second and usability of the Uniswap deployments (v3 and v4 with hooks, UniswapX) for smoother trading and AMM functioning on advanced L2 infrastructure.

Even though EIP-4844 will be a leap forward for the ecosystem we see several issues that need to be solved for a successful adaption of Proto-Danksharding. With an initial block size of ~125 kilobytes most consumers will not fill up a complete blob while with only three to six blobs per block the space will be limited. Hence, it will make sense to combine the data of several market participants (L2s / rollups) into one blob and align this efficiently. Further, with an exponential pricing function blob price volatility is a major concern that needs to be tackled early on.

Our solution space for this expands across technical implementation factors, economical incentive aspects and governmental alignment. Firstly, to identify and continuously monitor the requirements, we plan to implement a Uniswap and Arbitrum TX and mempool data dashboard. To tackle the issue of efficient blob space allocation we will explore prototypes of a blob merging solution. For the issue of blob price volatility we see economic market making mechanisms such as a derivatives market as suitable. The third pathway will be in collaboration with L2s to explore the possibilities of governance-based approaches to deal with the effects of EIP-4844.

For better readability we have outlined the more extensive application details on the following Notion page: https://ephema.notion.site/UAGP-Application-049e3ef3ed8c4da68316181ce00cd563

**How will you use these funds? Please make a detailed plan for expenditures.**

To conduct the project costs occur. Our project costs are largely driven by personnel costs. The team is in place and motivated to start, however living expenses have to be covered. In more detail the costs consist of:

For personnel expenses we have budgeted a total of $172,800 including ancillary wage costs. This consists of a total team size of 5.5 FTE (full time equivalent) for a project period of four months. This includes in detail: 1.0 FTE Project Lead ($7,500/m), 1.0 FTE Research Lead ($7,500/m), 2.0 FTE Senior Software/Blockchain Engineers ($6,000/m per FTE) and 1.5 FTE Research Specialists ($6,000/m).

Further, the project requires technical infrastructure costs of $6,400 for the four months period. This includes $3,200 for servers and hosting, $2,400 for technical tooling and an estimate of $800 for domains.

Additionally, for some team members office space is necessary to allow for efficient work and collaboration. To keep these expenses at a minimum, when feasible team members will work from home. However, we estimate to have a need of four office seats at an estimated full cost of $300 per month. This totals to $4,800. Additionally, we estimate that miscellaneous costs of $500 per month will occur.

In total this adds up to a total cost of $186,000 for the project.

**Which RFP is this proyect covering?**

Open Contribution

**Is this project open-source? (If yes, share the repository link).**

Not yet, but planning to open source the technical parts once finalized.

**Who are the members of the team?**

Christian Haug - Project & Research Lead

Pascal Stichler - Project & Research Lead

Marc Nitzsche - Senior Fullstack Engineer

Gabriel Fior - Senior Blockchain Engineer

Nicolas De Luz - Blockchain Engineer

Jason Chaskin - Researcher

Advisors:

Akaki Mamageishvili - Chief Researcher at Offchain Labs (Arbitrum)

Conor McMenamin - Senior Researcher at Nethermind (Ethereum, PBS, based rollups)

Kydo - Protocol Designer at Eigenlayer (DA layer, scaling, AVS)

**What are the Project Milestones? (Be very specific and write a roadmap highlighting critical deliverables of the project; mention how you will ensure to supervise and track them).**

We will split the main milestones for the project into the following four main deliverables.

1. Uniswap & Arbitrum TX and mempool Data Dashboard:

We plan to implement a real-time data transparency dashboard and make it publicly available. The dashboard will include the information about transactions on Uniswap and Arbitrum, their inclusion into blocks (prospectively blobs). This will give first predictions of future blobspace utilization over time. Further other L2s / rollups can be added for more comparative data.

1. Blob Merging Protocol Prototype:

We will develop a prototype for a blob merging solution. The solution will include the functionality outlined above with a specific focus on solving the NP-hard space allocation problem and implementing a pareto-efficient pricing mechanism. It will allow different consumers of blobspace to combine their requests and have them stored in the blobspace. This prototype will be open sourced and publicly available.

1. Gas Prices Discovery Mechanism Prototype:

Based on the previously conducted research we will implement a prototype demonstrating that it is feasible to implement an economic gas prices discovery mechanism, most likely a futures / derivatives market for block / blobspace. The v1 will include the functionality documented above. We will build the prototype in a way that it is scalable towards a fully fledged solution in the future.

1. Blog post / Whitepaper on general findings and blobspace market predictions:

We will publish the blog post / white paper on our combined research findings on how the blobspace can be best utilized. This will include especially how the blobspace can be most efficiently allocated and how the secondary pricing can be done and implemented. We will include the findings of our implementations of the prototypes including a thorough analysis of its strengths and weaknesses emphasizing on learnings for the future. We aim to as well answer the working hypotheses outlined above.

**How do you plan to reach these milestones? (Explain the project feasibility).**

To reach the milestones we plan to parallelize the research and implementation phase to already benefit from first findings in the implementation that reflect back to the research. As common in exploratory research we will work with an hypothesis driven approach to quickly gain quantifiable results.

We have already done extensive knowledge gathering, information aggregation and laid out the technical basis for prototypes. Following our philosophy of transparency we have shared the most relevant resources online under ephema.io. Furthermore we built-up the relationships with the most knowledgeable researchers and developers in the space. We have further defined the necessary research hypothesis that we aim to verify or falsify. This will be a continued process as we work in an adaptive approach given the fast-paced nature of the field and the high level of uncertainty.

The defined research hypothesis will be the foundation for the data dashboard of milestone 1. Defining the key elements of the data dashboard will be the responsibility of the research lead, as it will be the foundation for the future research and implementations.

The prototype for the blob merging is currently in development. We have one research scientist giving input on the theoretical side and a software engineer as well as a protocol engineer are working on the implementation.

The gas price futures marketplace is the main responsibility of the second protocol engineer together with a part-time research advisor. To ensure a timely delivery the team will receive support from the other protocol engineer after the finalization of the first version of the blob merging protocol as well as from the research lead.

The blog post / whitepaper on general findings, blobspace market predictions and price discovery will be a joint effort by the research team under the guidance of the research lead. It will include the findings from the different research areas as well as the implementations of the two prototypes and their ongoing development.

For software development, we will start with a minimum viable product (MVP), building a prototype and then continuously expanding on it. Our objective is learning as much as possible

in as little time as possible about the problem and its implementation (lean method). The team has years of experience working with this process and it has proven to be most productive. For task management, the team will work with the agile methodology using Notion and GitHub as the main tools to avoid further system costs.

To ensure a strong focus on the project goals we have set-up internally a bi-weekly review meeting in which progress towards the addressed project goals is aligned and potential hurdles and bottlenecks are addressed in advance. Further, the bi-weekly meeting includes a team retrospective discussing the highlights and lowlights of the last two weeks. This ensures that we continuously optimize the working processes within the team. Overall, this approach has been proven successful for the team in the past to successfully complete larger and complex development projects.

(This use example is taken from this proyect in gitcoin, https://explorer.gitcoin.co/?utm_source=grants.gitcoin.co&utm_medium=internal_link&utm_campaign=gg19&utm_content=independent-rounds#/round/42161/0x6142eedc06d80f3b362ce43b4ac52fad679dc850/0x6142eedc06d80f3b362ce43b4ac52fad679dc850-21)