Project Close-out Report for:

Production Grade Code Education: Aiken, Plutarch & PlutusTx

Name of Project and Project URL on IdeaScale/Fund

- **Name:** Production Grade Code Education: Aiken, Plutarch & PlutusTx
- **URL**: Project on IdeaScale
- **Project Number ID:** 1300161
- **Name of Project Manager:** Roman Majovsky
- **Date Project Started:** Jan 20, 2025
- **Date Project Completed:** May 12, 2025

List of Challenge KPIs and How the Project Addressed Them

Challenge KPIs Addressed:

1. **Education:** Delivered side-by-side implementations of smart contract logic in PlutusTx, Plutarch, and Aiken, supported by testnet deployments and benchmarks.
2. **Open Source Contribution:** Entire project is published under MIT license with complete documentation and developer guidance.
3. **Developer Enablement:** Helped developers make informed decisions about smart contract language choices through practical comparisons and performance insights.
4. **Tooling Transparency:** Provided real-world insights into compilation, deployment, testing, and performance measurement for each language.

List of Project KPIs and How the Project Addressed Them

Key Project KPIs Addressed:

1. **Standalone Smart Contract Implementations:**
   Developed and published isolated versions of the same validator logic in PlutusTx, Plutarch, and Aiken.
2. **Testnet Deployments:**
   Scripts and contracts deployed to Cardano preprod testnet with real transactions demonstrating capabilities and limits.
3. **Benchmarking and Reporting:**
   Completed side-by-side comparisons of validator size, transaction fees, memory and CPU usage, and request batch limits.

4. **Public Documentation and Source Code:**
   GitHub repository includes inline comments, developer documentation, deployment guides, and a detailed performance analysis report.

Key Achievements

- Built and open-sourced equivalent contracts in three different Cardano smart contract languages.
- Delivered full test suites, testnet deployments, and benchmarks for validator performance.
- Offered practical examples for developers to study, test, and adapt.
- Created a reference repository that can be expanded or reused by the Cardano developer community.

Key Learnings

- **Different Trade-offs:** Each language comes with its own strengths — Plutarch offers fine-grained control, Aiken provides developer-friendly syntax, and PlutusTx aligns closely with the Haskell toolchain. The choice depends on project needs and team familiarity.
- **Tooling Matters:** Language-specific tools and documentation quality significantly influence the developer experience.
- **Real Usage Patterns Reveal Insights:** Practical implementation and testnet deployments revealed measurable differences in efficiency, expressiveness, and developer effort.
- **Clarity Enables Education:** Isolating and comparing contract logic across languages proved effective for both new learners and experienced developers.

Next Steps for the Product or Service Developed

- Expand methodology to additional validator types beyond request parsing (e.g. fee logic, pool evolution).
- Maintain and enhance GitHub repository as a living reference.
- Present findings in community developer workshops and onboarding materials.
- Continue collaboration with Aiken and Plutarch maintainers to help improve language tooling.

Final Thoughts / Comments

This project was designed as a hands-on, comparative education tool for smart contract developers on Cardano. It bridges theory and practice by demonstrating how the same logic behaves under different language constraints.

By remaining open-source and deeply practical, it contributes a reusable foundation that others can build upon.

We thank the Catalyst community for supporting educational and tooling-focused initiatives, and we remain committed to sharing our results and improving the ecosystem.

Links to Other Relevant Project Sources or Documents

- GitHub Repository
- Benchmark & Analysis Report

- PlutusTx Source Code
- PlutusTx Deployment Scripts
- PlutusTx Implementation – Setup, Testing & Export Instructions

- Plutarch Source Code
- Plutarch Deployment Scripts
- Plutarch Implementation – Setup, Testing & Export Instructions

- Aiken Source Code
- Aiken Deployment Scripts
- Aiken Implementation – Setup, Testing & Export Instructions

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Link to Close-out Video

- https://www.youtube.com/watch?v=Lm82tvDaZBc