



SDG BLOCKCHAIN ACCELERATOR

Debugging and Testing Report

1. Project Information

- **Project Name:** *AFRIKABAL*
- **Challenge & UNDP Office:** Malaysia
- **Report Version:** 1.0.0

2. Executive Summary

The PoC demonstrates production-style discipline on Cardano Preview and confirms we are READY to enter the sprint. Builds are deterministic, transactions confirm on-chain, and evidence is captured for audit. Tooling and runbook elements are standardized for repeatable execution.

3. Testing Approach

- **Unit Testing**

Aiken compile-time checks (`aiken check`, `aiken build`) across the on-chain package to ensure type-safe blueprint emission. No validator execution was required for this PoC since the on-chain interaction used a signature-gated native policy (no Plutus script).

- **Integration Testing**

Cardano Preview Testnet runs using TypeScript + Lucid and Blockfrost (managed path):

- Pay-to-self transaction confirmed:
32dd4dfcf4e3c44417d212e73b135f23b2265e38fd38600eae41229f9ad733ab
- Native asset mint (AFRIKABALPROOF) under policy
35a500e7c84ac216ec87b9965410b6a8f68030f132e9746683c30a94; confirmed mints:
20b44b056f1537bfad20b4857a5f9ce05c679a3eed54c82d0ca6459de6cc17ba,
feed2ef46e9dc926d7556d81ef981eb454ed2b1fb1dabea2e67ccc95686215a1
- UTxOs verified via Blockfrost address & tx endpoints; logs persisted.

Self-hosted variant (validated capability):

- Operated our own cardano-node and used cardano-cli to submit/verify transactions and mint AXKCoin.
- Confirms readiness on both managed-provider and self-hosted paths.

Edge cases:

- Missing/invalid provider token → `403 Forbidden`; handled by preflight key validation.
- Network mismatch or empty UTxO set → submission gated until sufficient inputs available.
- Deterministic chaining → awaiting on-chain confirmation between submits prevents race on consumed UTxOs.
- Invalid hex in asset encoding rejected at build-time; corrected by using proper asset name encoding.
- ValueNotConserved UTxO prevented by accurate input/output balancing and confirmation-gated chaining.

4. Error Logs

Error 1: (Provider token preflight)

```
curl -H 'project_id: <KEY>' https://cardano-preview.blockfrost.io/api/v0/blocks/latest  
→ {"error":"Forbidden","message":"Invalid project token.","status_code":403}
```

Resolution: replaced with correct Preview key; added preflight check.

Error 2: (Mint attempt with unconfirmed inputs)

TxSubmitFail → ConwayUtxowFailure (ValueNotConservedUTxO ... Mismatch {...})

Resolution: awaited prior confirmation; rebalance change; resubmitted successfully.

Error 3: (Asset name encoding)

encoding/hex: invalid byte: R

at fromHex(...) in lucid utils

Resolution: used correct asset name encoding and retested mint (success).

5. Resolved Issues

Issue ID	Description	Root Cause	Resolution	Status
001	Provider token rejected (403)	Misconfigured/invalid Preview key	Rotate to valid Preview key; add preflight token check	Fixed
002	ValueNotConservedUTxO on mint	Chaining before confirmation; unbalanced change	Await prior TX confirm; balance inputs/outputs; resubmit	Fixed
003	Asset name hex error	Used plain string rather than hex-encoded asset name	Encode asset name correctly; validate in build step	Fixed
004	PNP/Yarn resolver conflict (Lucid import)	Module resolution under PnP	Switch to node-modules linker; pin Lucid 0.10.x; reinstall	Fixed

6. Evidences

Figure 1: Pay-to-self TX (pipeline proof):
32dd4dfcf4e3c44417d212e73b135f23b2265e38fd38600eae41229f9ad733ab

The screenshot shows the Cexplorer.io interface for a transaction. The URL in the address bar is `preview.cexplorer.io/tx/32dd4dfcf4e3c44417d212e73b135f23b2265e38fd38600eae41229f9ad733ab`. The main content is the "Transaction detail" section, which includes the following information:

- Hash:** 32dd4dfcf4e3c44417d212e73b135f23b2265e38fd38600eae41229f9ad733ab
- Date:** 41m53s ago
- Epoch:** 1036
- Block:** 3,550,237
- Slot:** 89,512,705 (epoch slot 2,306)
- Total Output:** 10.00k A (\$ 8,331.7) B 0.07602
- Fee:** 0.17 A (\$ 0.0)
- Outputs:** 2

On the right side, there are several cards providing more details:

- 84 Assurance:** Minted by GRADA
- 0.23kB (0.23kB) Transaction Size:** this tx 89%
- 0.23kB (1) Block Size (TX Count):** available 100%
- Minted by [GRADA] ADA Capital-ADACT-CardanoBI-Orcfax-A**

Figure 2: Mint TX (AFRIKABALPROOF):
20b44b056f1537bfad20b4857a5f9ce05c679a3eed54c82d0ca6459de6cc17ba

The screenshot shows the Cexplorer.io interface for a transaction. The URL in the address bar is `preview.cexplorer.io/tx/20b44b056f1537bfad20b4857a5f9ce05c679a3eed54c82d0ca6459de6cc17ba`. The main content is the "Transaction detail" section, which includes the following information:

- Hash:** 20b44b056f1537bfad20b4857a5f9ce05c679a3eed54c82d0ca6459de6cc17ba
- Date:** 39m46s ago
- Epoch:** 1036
- Block:** 3,550,241
- Slot:** 89,512,861 (epoch slot 2,461)
- Total Output:** 10.00k A (\$ 8,331.7) B 0.07602
- Fee:** 0.17 A (\$ 0.0)
- Outputs:** 2

On the right side, there are several cards providing more details:

- 82 Assurance:** Minted by [ADACT] ADA Capital-ADACT-CardanoBI-Orcfax-A
- 0.39kB (0.39kB) Transaction Size:** this tx 31% other txs in block 69%
- 1.26kB (2) Block Size (TX Count):** available 99%

Figure 3: Policy detail (assets/mints):
 35a500e7c84ac216ec87b9965410b6a8f68030f132e9746683c30a94

Policy detail > Assets

Policy ID: 35a500e7c84ac216ec87b9965410b6a8f68030f132e9746683c30a94

Date	Asset	Policy	Mint
47m29s ago	Token AFRIKABALPROOF asset1vwj0af6pd2l0n7vx3s2d7irpwdqwj2h0c5sva	35a500e7c8..30a94	2

Figure 4: Address transactions showing mints:
 addr_test1vrlazhaxp3tqmddw6wg0rn593zgl5z6vfdas7982evs2qwdg6mvhm2

Txs Address addr_test1vrlazhaxp3tqmddw6wg0rn593zgl5z6vfdas7982evs2qwdg6mvhm2

Date	Detail	Assets	UTXO
43m30s ago	# feed1e46e..21fa]	Total 10.00A	-0.18A \$ 0 B 0.00000
	10.00A addr_test1..mvhm2	10.00A addr_test1..mvhm2	-0.17A \$ 0 B 0.00000
	2A addr_test1..mvhm2	2A addr_test1..mvhm2	
	AFRIKABALPROOF -1	AFRIKABALPROOF -1	
	10A addr_test1..mvhm2	10A addr_test1..mvhm2	
	AFRIKABALPROOF 1	AFRIKABALPROOF 1	
46m54s ago	# 20d44b056..c17ba	Total 10.00A	-0.17A \$ 0 B 0.00000
	10.00A addr_test1..mvhm2	10.00A addr_test1..mvhm2	-0.17A \$ 0 B 0.00000
	2A addr_test1..mvhm2	2A addr_test1..mvhm2	
	AFRIKABALPROOF 1	AFRIKABALPROOF 1	
49m30s ago	# 32dd4dfcf4..733ab	Total 10.00A	-0.17A \$ 0 B 0.00000
	10.00A addr_test1..mvhm2	10.00A addr_test1..mvhm2	-0.17A \$ 0 B 0.00000
	2A addr_test1..mvhm2	2A addr_test1..mvhm2	
	AFRIKABALPROOF 1	AFRIKABALPROOF 1	
50m31s ago	# c2ba629b5b..a1cea	Total 10.00A	-0.17A \$ 0 B 0.00000
	10.00A addr_test1..mvhm2	10.00A addr_test1..mvhm2	-0.17A \$ 0 B 0.00000
	2A addr_test1..mvhm2	2A addr_test1..mvhm2	

5. Optimization Notes

- Confirmation-gated chaining → stable UTxO selection; eliminates race conditions.
- Minimal dependency surface; pinned versions for determinism (Lucid 0.10.x, Node 20+, Yarn 4).
- Signature policy for native mint → no validator ex-units in this scope.
- Logs and screenshot checklist baked into runbook for consistent evidence capture.

6. Tools and Environments Used

- Aiken CLI v1.1.17 (stdlib 2.2.0) - (aiken check, aiken build)
- Lucid 0.10.x (TypeScript) - (tx build/sign/submit; mint)
- Runtime - Node 24.6.0, Yarn 4
- Provider - Blockfrost (Preview)
- Testnet - Cardano Preview (testnet)

7. Remaining Issues / Next Steps:

- No blocking issues at exit.