CS 537 (01-41968)

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Move vs. Solidity

Stress-testing operations on blockchain storage collections

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Background

- Solidity and Move are both languages used to write smart contracts, which are useful for numerous applications where decentralized authority, security, and verifiability are vital.

- Solidity is the primary language used worldwide to write smart contract systems that function on the Ethereum blockchain.

- But Move is a newer language that has much greater storage capabilities than contracts written in Solidity and provides the means for true object ownership.

- Move achieves this by treating assets as “first-class, uncopyable objects with built-in security against double-spending and accidental deletion”

Project

- Program Hero bag using Dynamic Object Fields (DOF) in Sui Move
- Implement four functions on that module: Create, Access, Update, and Delete
- Create another similar module, but one that includes a vector of 200 items
- Implement an analogous pair of contracts in Solidity
  (using mappings of structs instead of objects)
- Gather gas fees from all those function calls
  (Execution, Storage, Rebate, and Toal)
- Compare costs to contrast storage capabilities of these two different languages

hero_with_obj_bag_in_dynamic_obj_field.move

Operation	Execution Fee (SUI)	Storage Fee (SUI)	Storage Rebate (SUI)	Total Fee (SUI)	Total Fee (USD)
Create	0.001	0.176016	0.000978	0.176037	0.29
Access	0.225	0.002515	0.00249	0.225025	0.37
Update	0.415	0.007296	0.007223	0.415072	0.69
Delete	0.001	0.000988	0.018305	-0.01631	-0.02715

hero_with_obj_bag_and_vector.move

Operation	Execution Fee (SUI)	Storage Fee (SUI)	Storage Rebate (SUI)	Total Fee (SUI)	Total Fee (USD)
Create	0.001	0.309928	0.000978	0.309949	0.52
Access	0.224	0.016134	0.015973	0.224161	0.37
Update	0.253	0.020687	0.020480	0.253206	0.42
Delete	0.001	0.000988	0.031563	-0.02957	-0.04921

HeroSmall.sol

Operation	Total Fee (ETH)	Total Fee (USD)
Create	0.0000948450010116	0.30
Access	0.0001226678675684	0.39
Update	0.0029955315279582	9.59
Delete	0.0000497985002987	0.16

HeroLarge.sol

Operation	Total Fee (ETH)	Total Fee (USD)
Create	0.000948750006325	3.03
Access	0.00012544478674484	0.40
Update	0.00320703152138021	10.26
Delete	0.0000492900003286	0.16

Conclusion & Comparisons

Small Hero / ‘non-vectorized’

Operation	Sui (USD)	Solidity (USD)
Create	0.29	0.30
Access	0.37	0.39
Update	0.69	9.59
Delete	1.64	0.16

> Solidity is around ~349% more expensive!

Large Hero / ‘vectorized’

Operation	Sui (USD)	Solidity (USD)
Create	0.52	3.03
Access	0.37	0.40
Update	0.42	10.26
Delete	-0.04921	0.16

[With a negative value for Delete, this means that the initial Create fee is effectively adjusted after deletion, such that the final cost to the user, for having executed all operations across this contract’s lifecycle, came out to ($0.52-$0.04921) = $0.47079]

Thank you