Het Patel
CS 4301. 002
Professor Bhavani
03/09/2024

Ethereum Quiz

1) Assume we have a mathematical operation, called "exponent of 2", which calculates the exponent of 2 from 1 to 100, taking the exponent value as input. This can be handled in a smart contract in two different ways: **Option A is better choice**

   a. Pre-computer the results for 100 different exponents and store them in an array/hash-table. Retrieve from array when requested.

→ The reason is that Pre-computing the exponent of 2 results in significant gas savings for future calls on the Ethereum blockchain. This is because you avoid repeated, gas-intensive calculations within loops, making your smart contract more efficient overall.

Option B is not correct answer :- Calculate the value each time on the machine, by looping and multiplying 2 with itself as many times as the exponent.

→ Choice (b) is not ideal because repeated gas usage for calculations becomes expensive over time.

2) Select ALL that apply.
The Ethereum Virtual Machine: **Option a, b, & c are correct answers**

a. Is the environment in which all computations run → The EVM acts as a decentralized computer that executes smart contract code and transactions on the Ethereum blockchain
b. Transitions from state to state. → When a transaction is executed successfully, the EVM modifies the blockchain state according to the smart contract code or transaction instructions.
c. Is what every node on the network "runs on". → The very full node on the Ethereum network maintains a copy of the EVM and uses it to process transactions and smart contracts.

Not correct below:-

   d. Can concurrently have multiple valid states. → The Ethereum blockchain maintains a single, canonical state at any given time.

3) A key difference between the Bitcoin and Ethereum blockchains is **the existence of a smart contract platform.**
The reason is Ethereum offers a Turing-complete smart contract platform, enabling developers to build decentralized applications (dApps) that execute code on the blockchain.

Not correct below :-

b. Ethereum is objectively more decentralized. → The level of decentralization can vary depending on factors like node distribution and mining pool concentration.
c. Miners in the Ethereum network are rewarded whereas Bitcoin does not reward → Both Bitcoin and Ethereum reward miners for validating transactions and adding new blocks to the blockchain.

4) An Ethereum transaction has been initiated. Soon after, the transaction fails because the code execution appears to have insufficient gas. What follows?

c. Revert all changes of state → When a transaction runs out of gas, the EVM reverts all changes that were made to the blockchain state during the transaction's execution.

Not correct below :-

a. Freeze the state of the system at the point where gas ran out, wait for the transaction to be reinitiated and resume from the last saved state. → Ethereum does not freeze the state for incomplete transactions. This would create complexities and potential vulnerabilities.
b. Complete the transaction, placing the missing gas value as "loaned credit" for the sender, which the sender must pay off in order to initiate any future transaction. → Ethereum doesn't offer a credit system for gas. Transactions either have enough gas or fail entirely.