Name: Taoyue Xia (James) Date: 2021/08/16 Section: ST10701

**Total in points** (100 in total):\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Professor’s Comments:**

1. **(a).** A Hyperledger Fabric channel is a private subnet of communication between two or more specific network members, for the purpose of conducting private and confidential transactions. A channel is defined by members, anchor peers per member, the shared ledger, chaincode applications and the ordering service nodes. Each transaction on the network is executed on a channel, where each party must be authenticated and authorized to transact on that channel. Each peer that joins a channel, has its own identity given by a membership services provider (MSP), which authenticates each peer to its channel peers and services.

**(b).** Endorsing and committing peers.

**(c).**

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| --- | --- | --- | --- |
| Statement | Correct? | | Reason (only if no) |
| Yes | No |
| IOTA uses a blockchain as maindata structure |  | No | IOTA doesn’t use traditional blockchain, but develop a new platform named Tangle. |
| Smart contracts in Hyperledger are called chaincode |  | No | In Hyperledger, Smart Contracts refer to the transaction logic of an business project, while a chaincode is a technical container of a group of related smart contracts for installation and initiation. |
| Hyperledger Fabric: All nodes in one channel must have installed all chaincodes for this channel |  | No | Chaincode should only be installed on endorsing peer nodes of the owning members of the chaincode to protect the confidentiality of the chaincode logic from other members on the network. |
| Hyperledger Fabric: Each channel maintains its own ledger | Yes |  |  |
| Hyperledger Fabric: Each committing peer is always endorsing peer |  | No | An endorsing peer is always a committing peer |
| IOTA uses a mixture between an account and an UTXO scheme | Yes |  |  |
| A fully confirmed transaction (referenced by all tips) in IOTA can lose its status when a single valid transaction is attached to the tangle | Yes |  |  |
| The number of transactions in a transaction bundle is independent of the security level for the derived private key | Yes |  |  |

1. **(a).** Private blockchain systems have the benefits such as:

* High execution speed
* More scalable, can process more transactions

The disadvatages are:

* The centralization due to private network
* Trust problems. The credibility of a private blockchain network relies on the credibility of the authorized nodes.

**(b).** Fabric uses an Execution-Order-Validate architecture instead of the traditional Order-Execution architecture to ensure that there is no non-deterministic methods.

**(c).** 0.25.

**(d).** Consensus is reached when the endorsement of a transaction is accepted, the ordering was successful and the execution was valid and committed.

**(e).**

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| --- | --- | --- | --- |
| Statement | True | False | Reason(if false) |
| Hyperledger Fabric uses a validate-order-execute architecture |  | False | It uses an execute-order-validate architecture |
| Each peer only shares the ledger with nodes that are in the same channel | True |  |  |
| Participants are incentivized with cryptocurrency for participating in Hyperledger Fabric |  | False | Cryptocurrency are not needed in Hyperledger Fabric |
| Hyperledger Fabric has be deprecated |  | False | Hyperledger Composer has been deprecated, not Fabric |
| The ordering service packages transactions into blocks | True |  |  |
| Everyone can join a Hyperledger Fabric network and participate with a peer node without invitation |  | False | They need to be invited and permitted, since it’s a private blockchain |
| Peers can have two different roles in Hyperledger Fabric: endorsing peer or validating peer |  | False | The two roles are endorsing peer and committing peer |
| The MSP is responsible for access control to the network | True |  |  |
| Native chaincode can be written in Go, NodeJS and Java | True |  |  |
| A ledger in Hyperledger Fabric consists of a world state and a blockchain | True |  |  |

1. **(a).** Corda is considered not a blockchain because transactions are confirmed immediately, and don’t depend on others.

**(b).** Services are listed below:

* **Identity operator service**, providing admission to the network after reviewing the submitted credentials
* **Network map service**, enabling the participants to find and communicate with one another over the network.
* **Notary service**, providing network consensus and guaranteeing the timestamping, uniqueness, history validity and finality of each transaction without the need for costly block mining.

A transaction is considered valid if all of its input and output states are acceptable according to the contract.

**(c).** Internally, the node has access to a rich set of services that are used during flow execution to coordinate ledger updates. The key services are listed below:

* Information on other nodes on the network and the services they offer
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**(d).** CorDapps are distributed applications that run on the Corda platform. The goal of a CorDapp is to allow nodes to reach agreement on updates to the ledger. CorDapps components are listed below:

* Flows: Define a routine for the node to run, usually to update the ledger
* States: Define the facts over which agreement is reached
* Contracts, defining what constitutes a valid ledger update
* Services, providing long-lived utilities within the node.
* Serialization whitelists, restricting what types your node will receive off the wire.