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 Class: BE COMP II Assignment No. :- 06

Q1) What is the difference between Hyperledger Fabric and Composer?

Ans Hyperledger Fabric

Hyperledger Composer

1. It is a framework.

It is a tool.

2. We ~~can~~^{cannot} create new platform similar to hyperledger fabric. We ~~can~~^{not} create a new platform as it is not a framework.

3. Fabric does not use composer for any customization. Using this we can only develop a hyperledger fabric platform.

4. It has a ledger, node structure, chaincode, transaction processor and many more picked out tools. Using this we can only develop our hands on the development tools.

5. It is independent.

It is dependent on fabric

Q2) What are the components of Hyperledger Composer?

Ans Hyperledger composer is composed of following high-level components:-

1. Execution Runtime:-

- Composer has been designed to support different pluggable runtimes and currently comes with Hyperledger Fabric, Web and Embedded.

2. JavaScript SDK:-

- The Hyperledger Composer Javascript SDK is a set of Node.js APIs that enables developers to create applications to manage and interact with deployed business networks.

3. Command Line Interface:-

- Composer CLI enables developers to deploy and manage business network definitions.

4. REST Server :-

- Composer automatically generates an Open API for a network.

5. LoopBack Connector :-

- Used by Composer REST Server.

6. Playground Web User Interface :-

- Web user interface to define and test business networks.

7. Yeoman code generators :-

- Composer uses this framework to generate skeleton project.

8. Vscode and Atom Editor Extensions:-

- Composer has community contributed extensions for IDEs.

Q3) What is business Network archive?

Ans 1. Composer allows us to package a few different files and generate an archive which can then be deployed onto a Fabric network.

2. To generate this archive, we need :

a] Network Model :-

- A definition of resources present in the network.

- Includes Assets, participants and transactions.

b] Business logic :-

- Logic for transactions functions.

c] Access Control limitations :-

- Various rules that define rights of participants in network.

d] Query File(optional) :-

- Set of queries that can be run on the network.

Q4) Discuss the main services offered by Hyperledger fabric?

Ans The main services offered by Hyperledger fabric are as follows:-

a) Identity Management :-

1. Fabric provides a membership identity service that manages user IDs and authenticates all participants on network.
2. Access control lists can be used to provide additional layers of permission through authorization of specific network operations.

b) Privacy and confidentiality :-

1. Hyperledger Fabric enables any competing business interests and any group that require private, confidential transactions, to coexist on same permissioned network.
2. Private channels are restricted messaging paths.

c) Efficient Processing :-

1. Hyperledger Fabric assigns network roles by node type.
2. Separation between transaction ordering and execution provides concurrency and parallelism.

d) Chaincode functionality :-

1. Chaincode applications encode logic.
2. This logic is invoked by specific type of transactions on the channel.

e) Modular design:-

1. Hyperledger Fabric implements a modular architecture to provide functional choice to network designers.
2. Specific algorithms for identity, ordering and encryption can be plugged-in.

Q6) Is it possible for creating, exporting, importing business network cards using hyperledger composer Playground? Justify your answer.

Ans Yes, it is possible to do so.

i) Creating :

1. Business network cards can be created in the wallet

screen, created the component files or created within a business network.

2. we can create a network card from the My Wallet screen.

II] Importing and Exporting business network cards:-

1. Importing and exporting business network cards is the simplest way to grant access to other users of the business network in Playground.
2. Valid business cards must be created for this process first.

A) Exporting Business Cards:-

1. To export a business network card create an identity by using a business network and add business network card to your wallet.
2. On the My wallet page, click the export icon on the business network card you wish to export.

B) Importing Business Network Cards:-

1. On the My wallet screen, click import business network card.
2. Drag and drop or browse to select a network card, we wish to import.

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- Q1) Enlist different ways to write, compile and deploy smart contract.

Ans 1) Connect to Ethereum network :-

- i) There are many ways to make requests to the Ethereum chain.

ii) For simplicity we can use a free account on Alchemy, a blockchain developer platform and API that allows us to communicate with the Ethereum chain without having to run our own nodes.

- iii) Create your app and API key :

iv) Now we can generate an API Key by creating an app.

- v) This allows us to make requests to the Goerli test network.

- vi) Create an Ethereum account :

vii) Ethereum account is required to send and receive transaction.

- viii) There are many ways to create an account, we will use Metamask a virtual wallet, it can downloaded for free.

- ix) Add ether from a Faucet :

x) In order to deploy our contract to network we need some fake Eth.

- xi) To get Eth we can go to the Goerli faucet and enter our Goerli account address and click "Send Me Eth".

- xii) Check Balance using Alchemy's composer tool.

- xiii) Initialize a project using npm init.

- xiv) Download Hardhat and create Hardhat project by running npx hardhat.

- xv) Write Contract :-

- xvi) Navigate to contracts folder and create a new file HelloWorld.sol
- xvii) Use the sample code from web3.university site .

- 9) Connect Metamask and Alchemy to our project:
 - i) We first need to install dotenv --save
 - ii) Edit .env to look like this:


```
API_URL = "Your-api-Key"
PRIVATE_KEY = "Our-metamask-private-key"
```
- 10) Install Ethers.js:
 - i) Run npm install @nomiclabs/hardhat-ethers
 - ii) This makes it easier to make requests by using standard JSON.
 - iii) Compile our contract:
 - i) Run on command line: npx hardhat compile
 - ii) Warnings may occur regarding SPDX license, it is fine.
 - 11) Write our deploy script
 - 12) Deploy our contract:
 - i) Run: npx hardhat run scripts/deploy.js --networks goerli
 - ii) We should see something like this:

Contract deployed to address: 0xCAF8...

That's it! We successfully created and deployed smart contracts.

Q2) What is ERC20 standard? Explain in detail.

- Ans 1. An ERC20 token is a standard used for creating and issuing smart contracts on the Ethereum blockchain.
2. Smart contracts can then be used to create smart property or tokenized assets that people can invest in.
 3. ERC stands for "Ethereum request for comment" and the ERC20 standard was implemented in 2015.
 4. Plenty of well-known digital currencies use the ERC-20 standard, including Maker (MKR), Basic Attention Token (BAT), Augur (REP) and OMG Network (OMG).
 5. ERC stands for "Ethereum request for comment" and "request for comment" is a similar concept to that devised by the Internet Engineering Task Force as a means of conveying

essential technical notes and requirements to a group of developers and users.

6. ERC20 standard has been a dominant pathway for the creation of new tokens in the cryptocurrency space for some time.

Q3) What is test net? How it works? List different test nets.

- Ans 1. An ethereum testnet is a collection of nodes that are used to test the Ethereum protocol.
2. Tests are run on the testnets to ensure that the protocol is working as expected.
3. Testnets are like mocks in that they are used to test the protocol in a controlled environment.
4. Just like we write tests in a unit test, we write smart contracts and test them in a testnet.
5. Different types of test nets are :-
- i) Rinkeby
 - ii) Kovan
 - iii) Ropsten
 - iv) Goerli