INDIAN INSTITUTE OF TECHNOLOGY, PATNA

Innovation design lab project report

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1 PROBLEM STATEMENT

Develop a platform leveraging blockchain technology which provides trusted, secure, transparent and scalable insurance services over the metaverse for products like virtual lands, NFTs, gadgets, avatars.

1.1 MOTIVATION

The emergence of metaverse is set to pave the way for industries to utilize various aspects to develop various products, services, and solutions. This new reality opens doors to possibilities that have never been heard before.Metaverse is estimated to be a $800 Bn market by 2024. This will transform how various industries work and function, and insurance will not be alien to this. Unlike traditional insurance management in the real world, there is a need to build a quick product launch with dynamic pricing for these nonadmitted products.

1.2 OBJECTIVES

1. Create a solution using Hyperledger fabric for managing policy workflow.
2. Build a working website that can be used to access the product by users and insurance companies.

2 Proposed solution

2.1 Overview

Participants The participants in the network are insurance company, insurance buyers, and orderer. The role of an insurance company is to post their insurance policies in the network. Users are the insurance buyers who can buy any listed insurance. Orderer is a organization required by blockchains to order the sequence of transactions between multiple parties.

Smart contracts Smart contracts or chaincode is a piece of code in hyperledger fabric that executes certain instructions on a blockchain based on a predefined and transparent manner. These are the main building blocks to make the blockchain functional for general use. We have used different smart contracts for various aspects and functionalities of the network.

2.2 Solution Architecture

2.2.1 Blockchain

The blockchain describe the core of the solution, and controls the most important aspects of the solution.

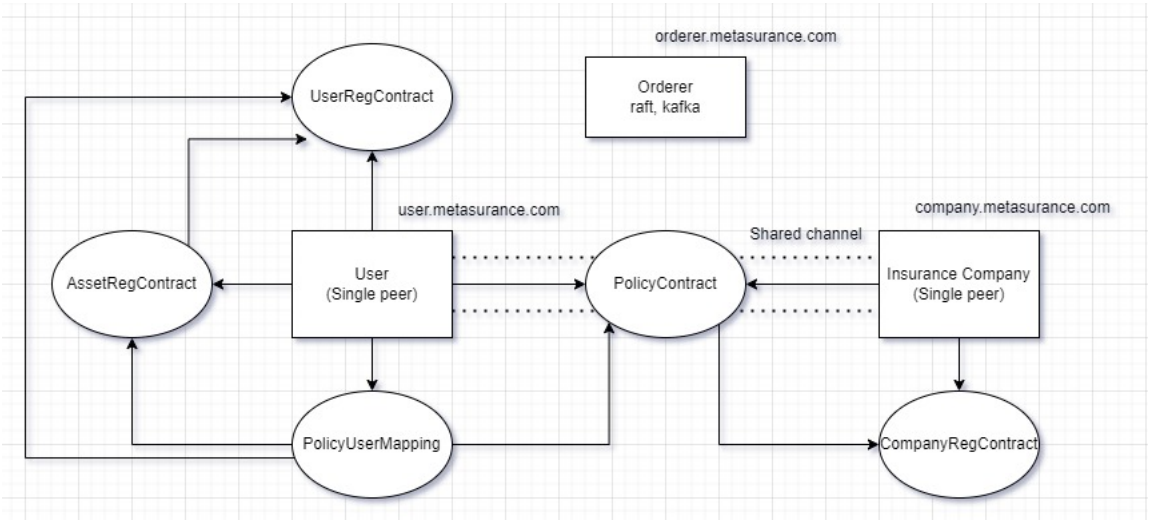

Figure 2.1: Blockchain architecture of Metasurance

2.2.2 Smart Contracts

The smart contracts contains the business logic of the problem, and are crucial for the overall functionality of the project.

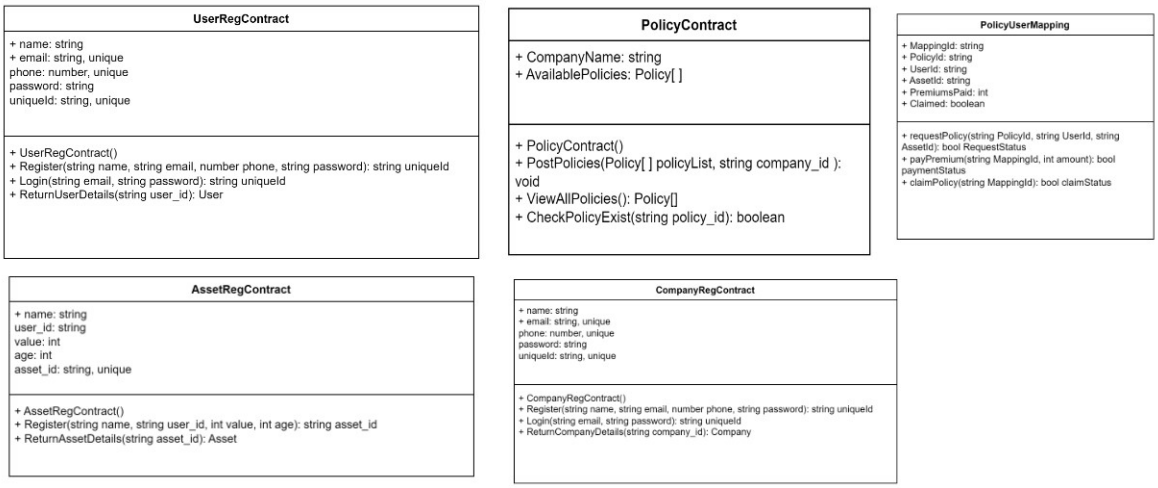

Figure 2.2: Class UML diagrams for smart contracts

2.3 Fabric APIs

Hyperledger Fabric operates using different docker containers for each of it's componets, each of them communicating with each other via a RPC protocol. We aim to design fabric APIs for our product to make the process of communicating with blockchain easier for application developers. For that we create a express server that uses a shim object to call different hyperledger objects for registering admins, users and carrying out transactions for business specific logic.

2.4 Frontend

We are creating a nextjs based frontend which uses javascript to render high quality web pages and Single Page Applications(SPA). This will be used by both users and insurance companies to login, view and post different insurance policies, buy policies and pay premium. This along with the APIs helps us to abstract the complexity of the underlying fabric network for the end users and companies.

3 Challenges ahead

- Securing user authentication by devising techniques to store credentials on blockchain.
- Adding decentralized identitiy(DIDs) in hyperledger fabric using different protocols like W3C, Hyperledger Aeres, etc.
- Make the network proof to different kinds of cyberattack like DDoS, MITM, Phishing, etc.

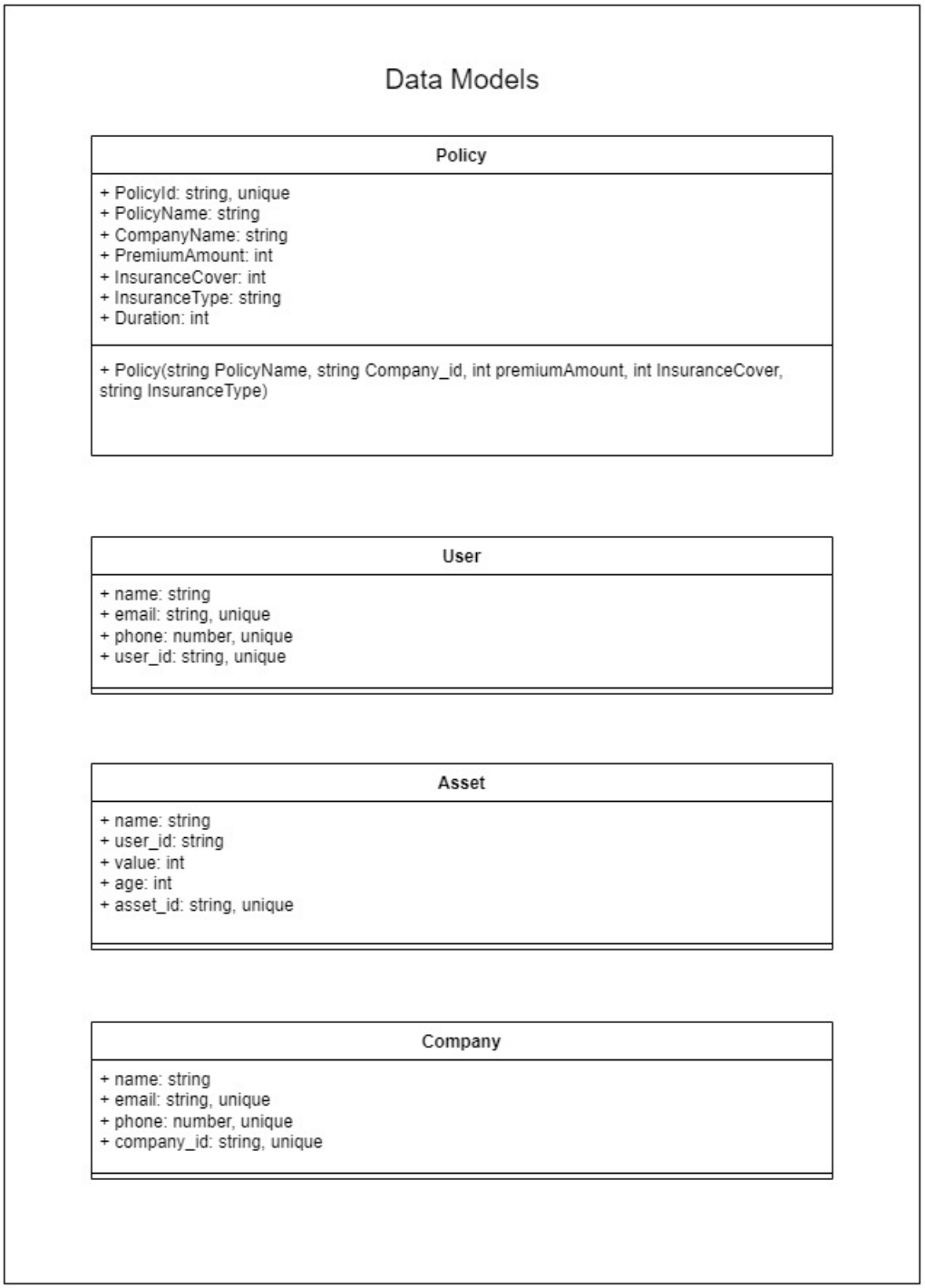

Figure 2.3: Smart contracts data models