

Decentralized Microservices Application for Real Estate Rental on Ethereum Blockchain

Decentralized Real Estate Rental dApp: A Microservices-Based Platform Integrating Web3, Spring Boot, Angular, and DevOps Practices.

This project proposes the development of a decentralized application (dApp) specialized in real estate rentals, enabling peer-to-peer property listings and leasing on the Ethereum blockchain for secure, transparent, and intermediary-free transactions. The application will utilize a microservices architecture with Spring Boot for the backend, Angular for the frontend, and Hardhat for smart contract development. To ensure scalability, reliability, and efficient deployment, the project incorporates DevOps practices including CI/CD pipelines with GitHub and Jenkins, infrastructure as code (IaC) with Terraform on AWS, containerization with Docker, orchestration with Kubernetes, and monitoring with Prometheus and Grafana.

The project will be executed by a team of 5 student engineers: Backend Engineer, Frontend Engineer, Cloud Engineer, DevOps Engineer, and Blockchain/Smart Contract Engineer. This collaborative effort aims to demonstrate the integration of modern web development, blockchain technology, and cloud-native practices in the real estate sector.

Role	Responsibilities
Backend Engineer	Develop Spring Boot microservices, implement REST APIs for real estate data, integrate with database and blockchain layers. Handle authentication, property validation, and rental logic.
Frontend Engineer	Build Angular components for property maps, lease forms, and Web3 interactions. Ensure responsive design and user experience for owners and tenants. Test frontend-blockchain integrations.
Cloud Engineer	Provision AWS resources using Terraform, manage cloud security (IAM, VPC), and optimize for cost and performance in handling real estate media storage. Integrate with Kubernetes.
DevOps Engineer	Set up CI/CD pipelines with GitHub and Jenkins, containerize applications with Docker, orchestrate with Kubernetes, and configure monitoring with Prometheus/Grafana for rental metrics.
Blockchain and Smart Contract Engineer	Write, test, and deploy Solidity smart contracts for rental escrow and agreements. Handle Web3 integrations, gas optimization for rental transactions, and testnet deployments.

Tools : IntelliJ IDEA Community Edition, Maven, Java 17 (OpenJDK), Visual Studio Code, Angular CLI, Node.js (v18.x), Leaflet.js, Hardhat, Solidity (v0.8.x), MetaMask, Slither, Git, GitHub, Jenkins, Docker, Docker Compose, Kubernetes (Minikube), Terraform, AWS CLI, Prometheus, Grafana, Web3j, ethers.js, JUnit, Karma