D.La.R.S.
Decentralized Land Registry System

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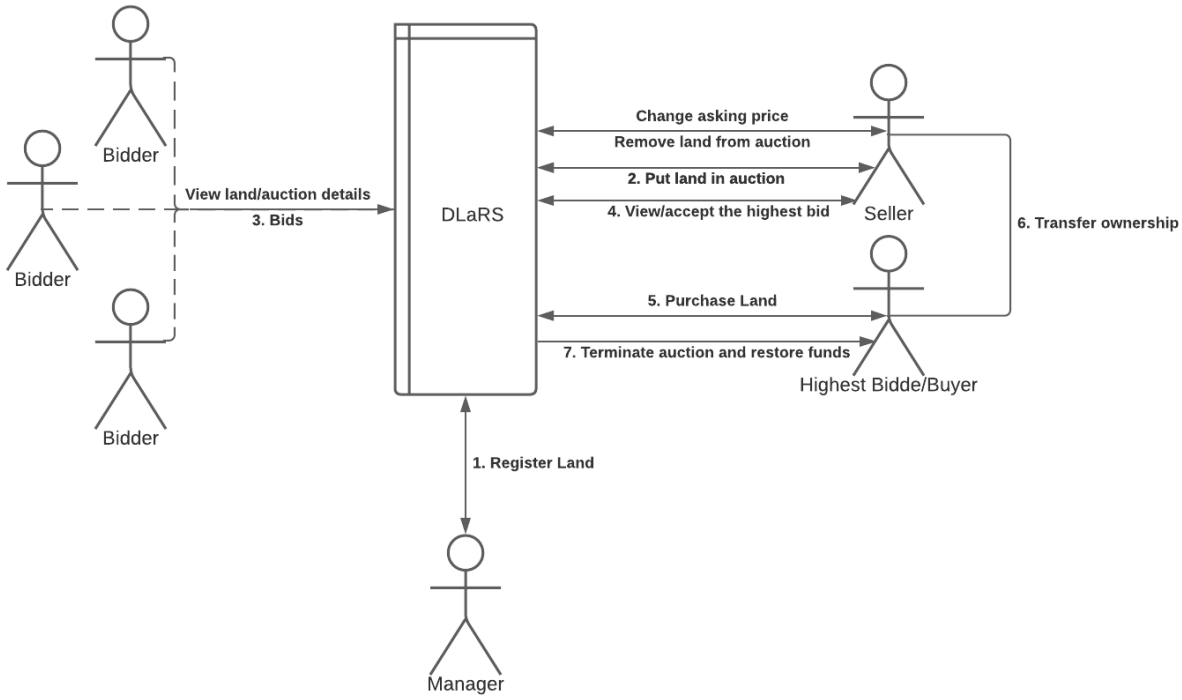
Final Progress Report
System Architecture

Overview

The model we proposed consists of four entities: Seller, Bidder, Buyer and Manager.

1. Owner/Seller - This is the person who owns the land. The seller will register their land to be sold on the platform. The DApp will ask for all the relevant information to uniquely identify the piece of land. They can also view the highest bid made by potential buyers and accept the highest bidder.
2. Bidder - Bidders are the potential buyers. These are the people who are interested in buying land and might have placed a bid for it.
3. Buyer - Buyer is one of the bidders selected by the owner to buy their land. They are the highest bidder. The land will be transferred to the buyer's address.
4. Manager - The manager is responsible for registering the land of a specified owner and adding it to the ledger.

System Design



In this model, we have one smart contract with entities: owners, bidders, auctions and a manager.

Functionalities that will be used by the manager are as follows:

1. registerLand(): This function would be used to add the land to the DLaRS system. The manager would be required to add the address, city, country and Pincode of the land along with the owner's address. The status of the land is also set as registered. If a land is already registered, then it cannot be registered again by the manager.

Functionalities that will be used by the seller are as follow:

1. putUpForAuction(): To put up land for auction, the seller specifies the asking price from which the auction will start. The land's status is changed to underBidding indicating that it is currently under some auction. A new entry is created in the list of auctions.
2. deleteFromAuction(): This function removes the land from the auction process. The condition is there should not be any bid for the land yet.
3. updateAuctionDetails(): This function allows the seller to update the asking price and minimum bid raise amount for the auction if there has not been a bid on the land yet. This will be useful if the seller realises they have asked too high a price for the land.
4. acceptHighestBid(): This function would prompt the contract to stop bidding for the auction and accept the current highest bid (if any) and complete the sale. This takes care of transferring the ownership from the seller to the buyer. Changes the status of the land to 'registered' as the new buyer can again choose to put it up for auction. Calls the transferOwnership() function.
5. transferOwnership(): This function will change the land's owner from seller to buyer. This is a private function only called through acceptHighestBid() function.

Functionalities that will be used by the bidders are as follow:

1. placeBid(): This function would be used to place bids by the bidders in a given auction. It checks if the bid amount is greater than the amount by the previous highest bidder, if it is then, update the highest bidder with the current bidder and update the highest bid with the current amount; it also returns the money of the previous highest bidder to their address. Moreover, it also ensures the current bidder is not the owner.
2. terminateAuction(): This function will give the highest bidder the power to transfer the ownership of the land to themselves if their bid has not been accepted for a long time like 30 days. Changes the status of the land to 'registered' with highest bidder as new owner.

Functionalities available to everyone are as follows:

1. viewLandDetails(): This function lists the details of land given land id.
2. computeIdLand(): Given the details of the land, this function uses a deterministic hash function that gives a unique id corresponding to the land.
3. viewAuctionDetails(): This function returns the auction specific details given a land ID.

Control Flow

1. The manager first registers land with the specified owner on the DLaRS system.
2. Create a unique id for the land and add its details to the system; the status of the land is set to ‘registered’.
3. A seller can now choose to put the land under auction and change its status to ‘underBidding’.
4. Bidders can view various land details and bid for the one they are interested in accordingly. The bids made cannot be reversed like a traditional auction system but can be made void by bidding a higher amount. Previous bidders will be returned their money as soon as someone has made a higher bid than them.
5. The seller can view the highest bid placed on their land and choose to accept the highest bid or may ignore the bids till 30 days after which the current highest bidder will get the power to transfer the land in their name. The status of the land will be set to ‘registered’.
6. If the seller approves a bid, the auction is completed, the ownership is transferred instantly.

Work Distribution -

Everyone contributed equally.