Transparent Bidding Blockchain (TBB)

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Introduction / Motivation

The **Transparent Bidding Platform (TBB)** is a proof of concept model, designed to reduce transaction costs and opportunities for double-ending fraud. Currently, **transaction costs** amount to 11-22% of the purchase price, and it is a time-consuming, predominantly paper-based process.

Double-ending fraud occurs when a broker represents both the seller and the buyer, and withholds the highest bid from the seller to push through a lower bid from a buyer whom they represent, to earn the additional commision.

Blockchain technology is suitable for the real estate market, because it can add transparency, handle the complex transaction process, is designed to prevent fraudulent behaviour and supports strict ownership protection.
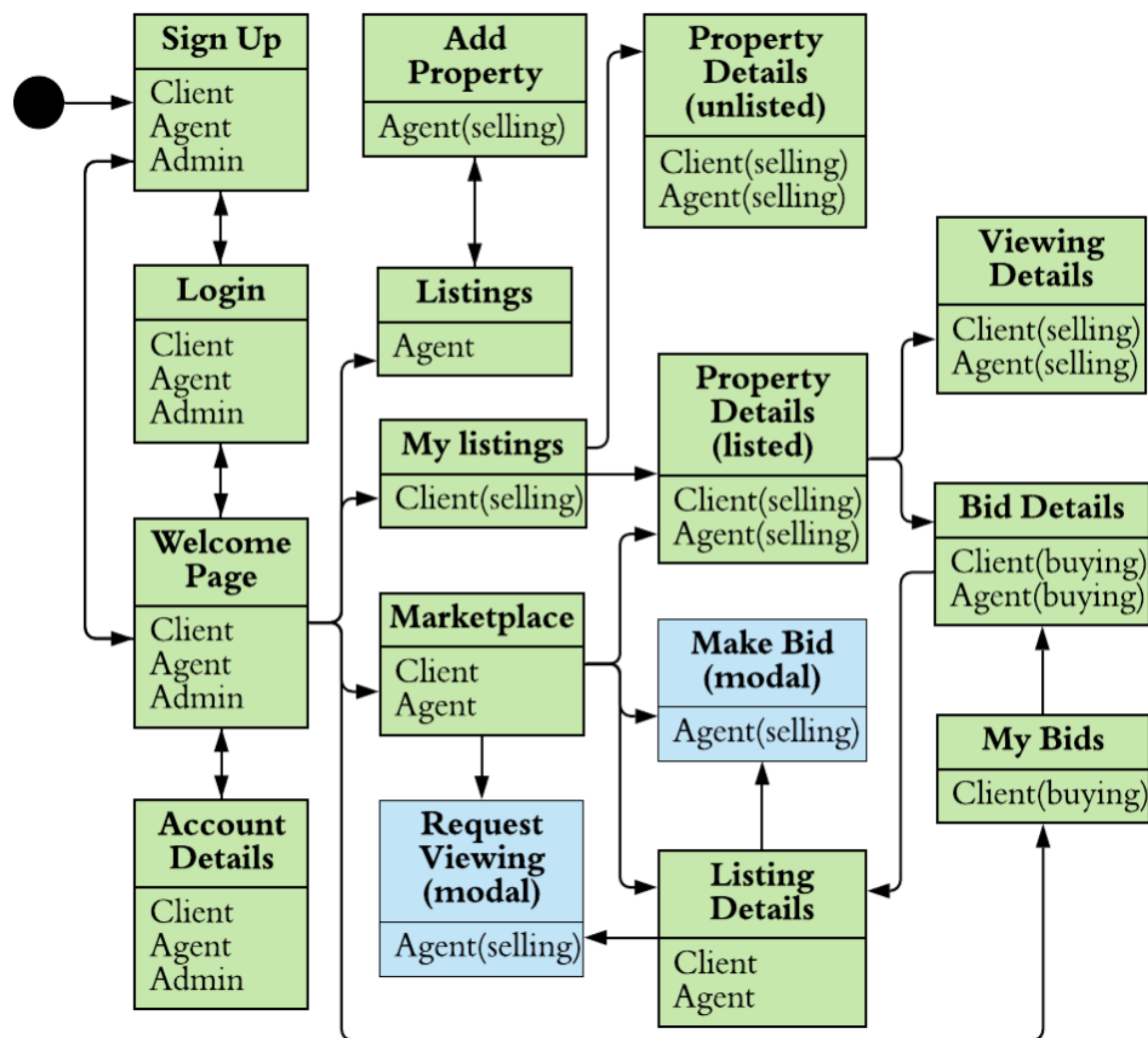
Blockchain ⟷ **Web App**

Background

The goal of the TBB system is to make real estate transactions transparent and streamlined by using blockchain technology. The model demonstrates:
- the system architecture
- how the web app calls and puts information on to the blockchain
- how the system prevents fraud
- how user **personal identifiable information (PII)** is protected
- the specifications for each web interface in the system

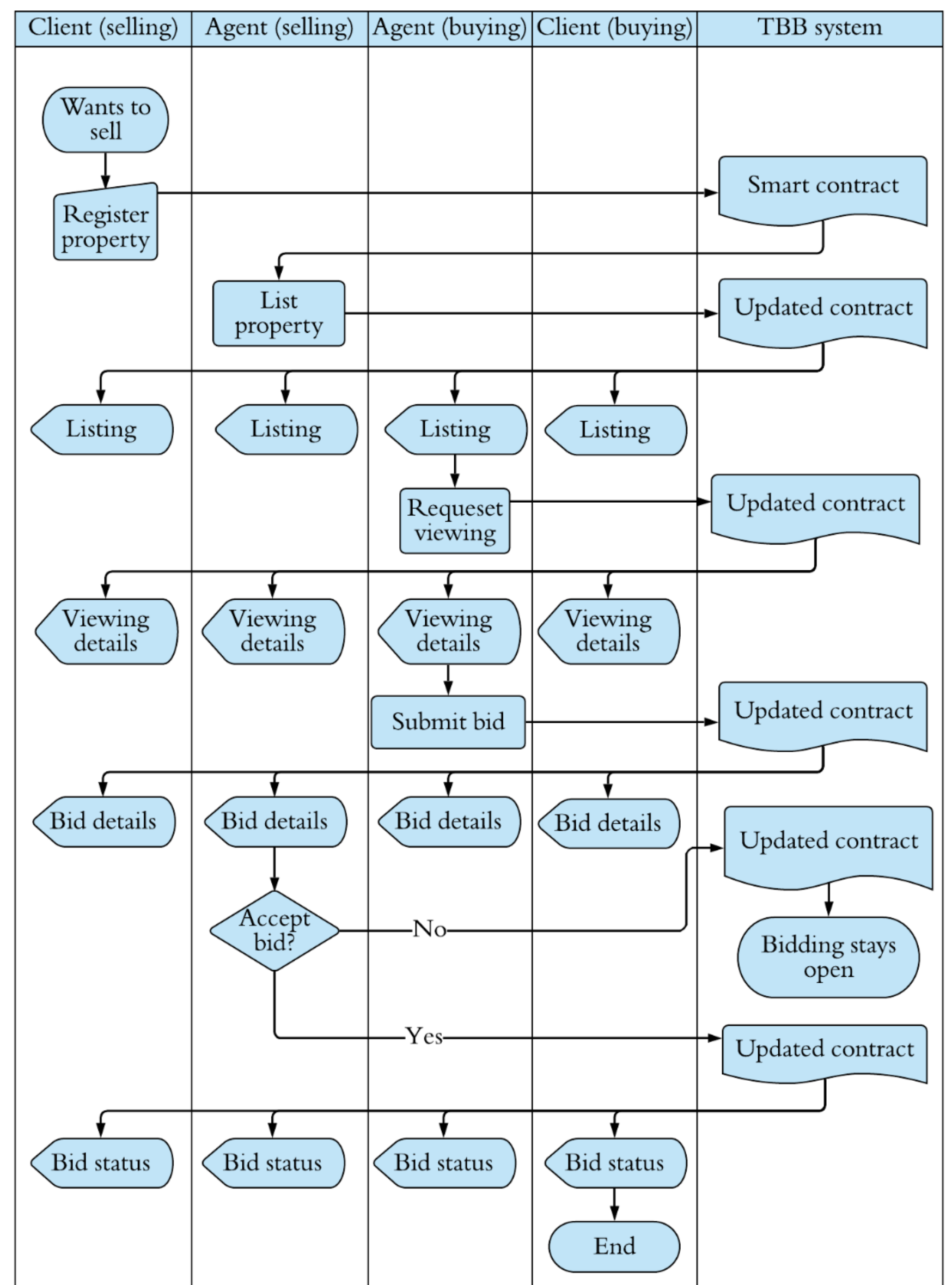TBB Interfaces

High Level TBB Flowchart

Results

The **TBB** tracks property bids made by buyers' agents and allows the sellers to see the bids placed on their property. The process begins with the registering of a property on the blockchain and finishes with the seller selecting a bid. The **TBB** is designed to be integrated with the Pre-Construction Registry and the Smart Property Ledger, but can operate as a stand-alone system if launched separately. We used Hyperledger Fabric and Sails to build the blockchain platform with a web application as the user interface.

The proof of concept model shows:
- Strong information security and transparency in the **TBB** to be **fraud deterrent**
- **Reduced transaction costs** enabled by digital signatures
- Protected **personal identifiable information (PII)**

Discussions

Verifiable credentials: the decentralized architecture and 'trustless' system hosts immutable records about the properties, the **relationships** of users to those properties, and to other users. These relationships are represented by verifiable credentials.
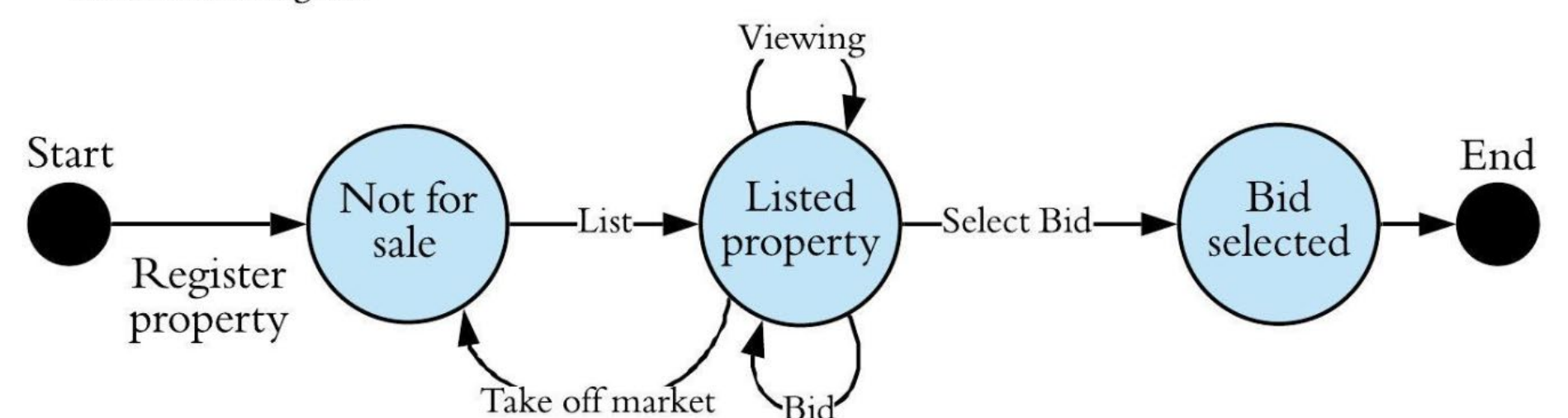
State information: The automated system tracks the progress of the transaction using shared **state** information on the blockchain. Actions to change the state can be created using digital signatures executed from a mobile device.

Protected PII: The user's digital identity is a hash of full name, email, city, address, and time of ID creation using SHA-3. These hashes are non-reversible.

Cryptographic wallet: The wallet will be a central part of this system, the starting point for all relationships, and hold the user's real estate portfolio.

Key Management: The safest way to store the user's private keys is using a hardware security module. Key recovery will use a social key recovery method.

TBB State Diagram

Implications

The **TBB** facilitates a secure, transparent bidding process, inhibiting fraudulent practices in real estate transactions. All parties can sign off quickly, easily and securely reducing paperwork, time and transportation.

This benefits all parties at risk in the current real estate market. The overall costs of real estate transactions will decrease, and more property taxes will be generated as a result the highest bid being accepted.

For future research, as blockchain technology continues to be applied, improved **key management** techniques need to be developed for decentralized cryptographic systems.