Share-park Decentralized Parking Management

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Motivation

- Difficulty in finding a parking space

- Finding a cheap parking space

- Leads to problem and causes delays

But why blockchain?

Why Blockchain?

- Parking Management Industry has grown at Rate of 12.3% worldwide.

- In developing countries rate expected to increase sharply.

- Current Evaluation :

  - 7.43 Billion USD,

  - By 2023 : 16 billion USD

- Many Big players are reaping benefits.

"Distribute benefits among the real actors : Owner and User!!"

What Have we Created ?

- Login Based Decentralized Application
- For Parking Spots Rent-Out and Booking
- Based on Ethereum
- Hosted on a Private Network
- Simple User Interface
- Interacts with Blockchain using web.js

What is Required to Use?

- Golang Ethereum Client
- Connect to one of the nodes of network
- Network Must have one of the Instance of Contract
- Contract Address

Components

- **Smart contract :** defines behavior of system

- **Blockchain** : stores database of parking lots

- **Data Structure** : { Price Information, status, location }
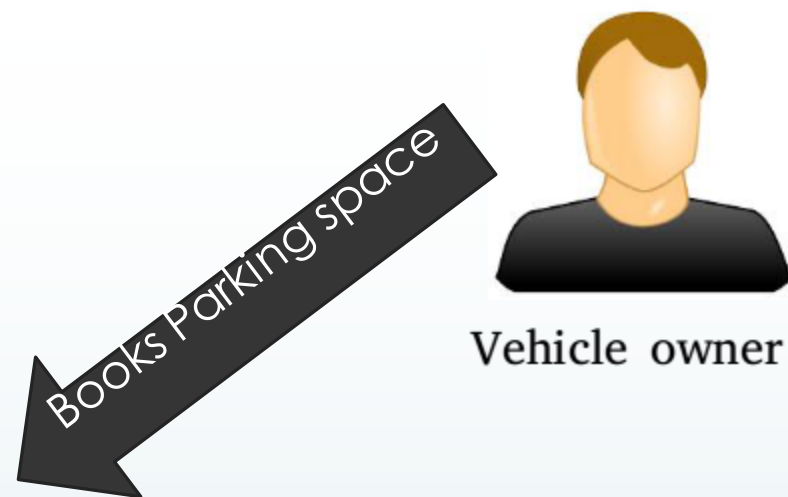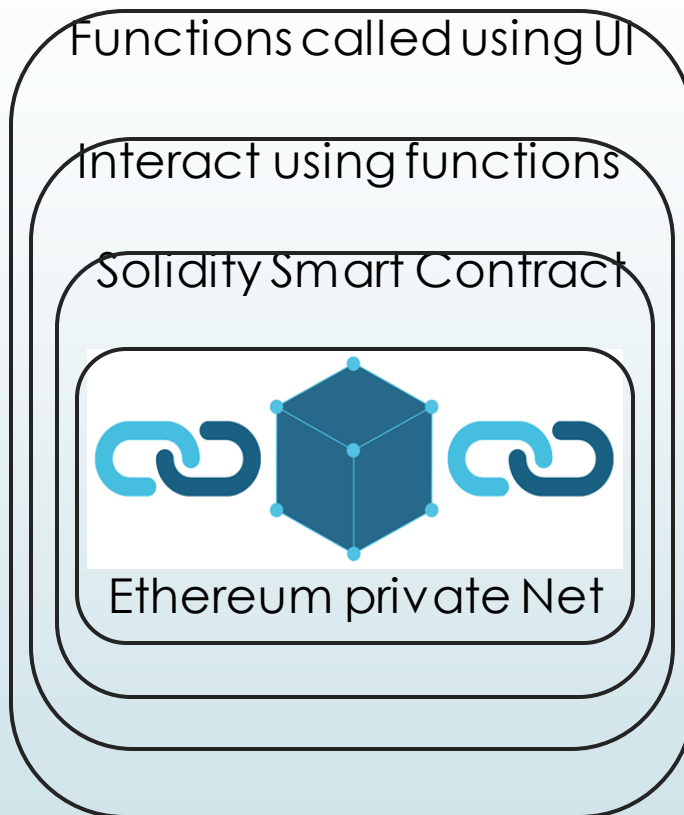
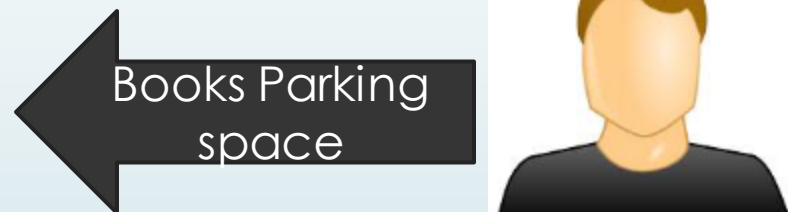- **User Interface** : helps interact with DApp.
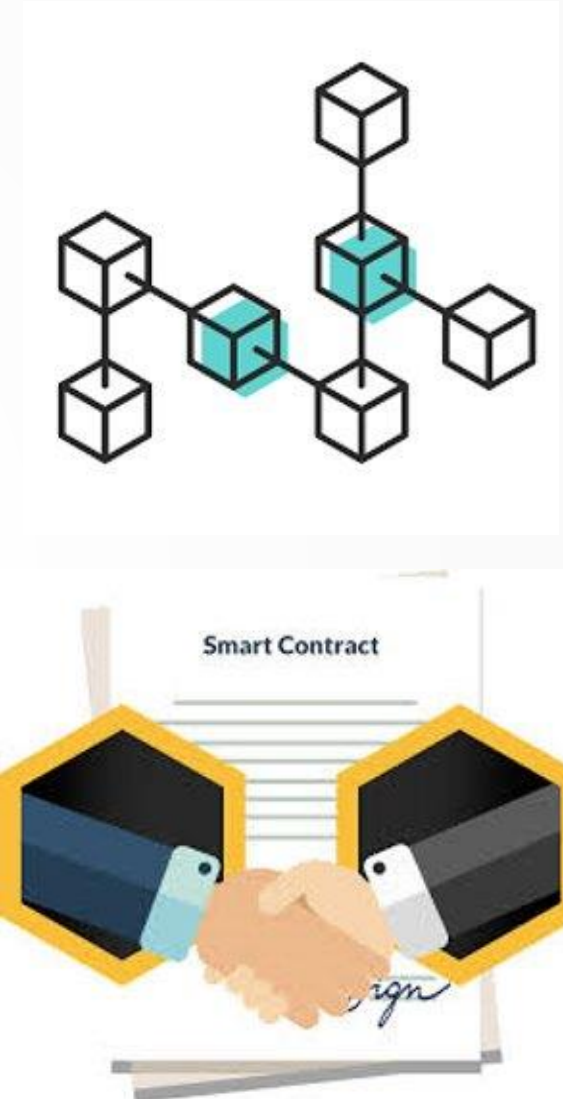
Smart Contract

Architecture
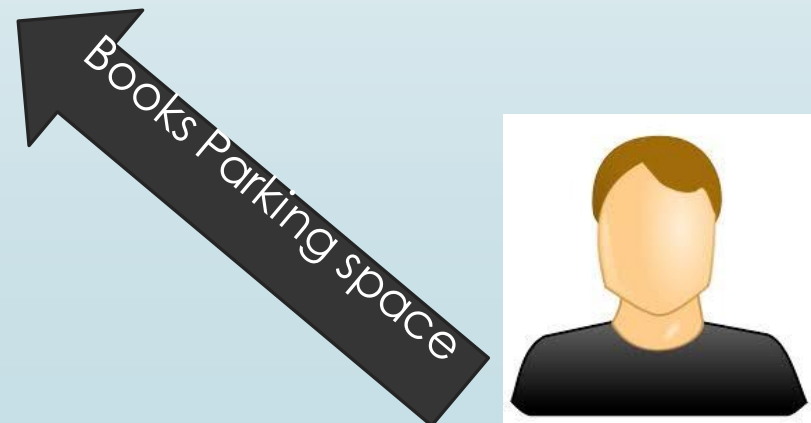
User Functions

Vehicle Owner

- Easily find a parking lot

- Hassle free booking

- Secure payment

Land Owner

- Publish their lands

- Regulate land status

- Instant secure remittance

System Features

- Each Actor a node in **blockchain**

- Record **location** available and booking

- Search nearby parking

- Interaction with **Mapbox API**

- Interaction with users wallet using **web3**

Decentralized Ledger

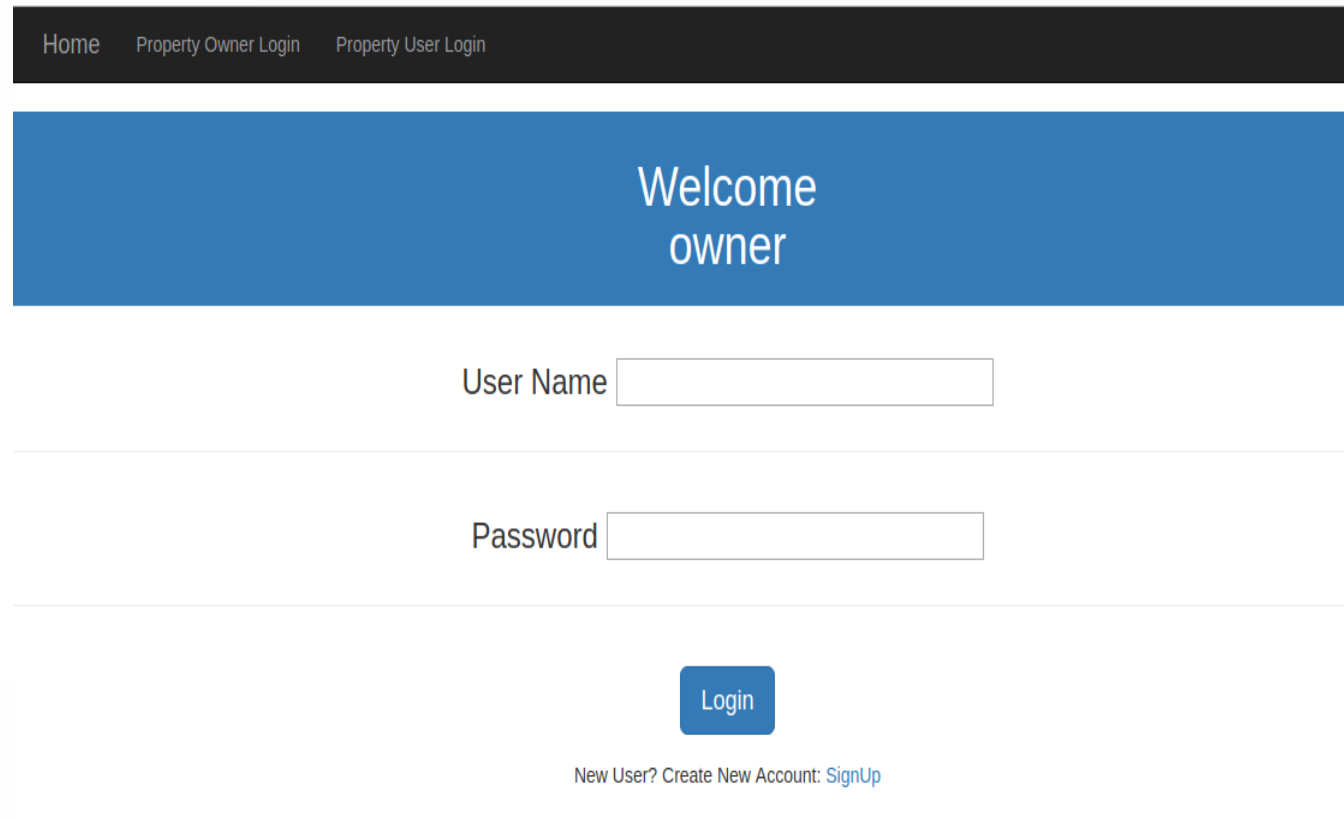# Non-Functional Features

• Cost-Efficient : due to competitive and open market

• Secured : Payments using one of the cryptocurrency

• High Accessibility : to anyone & everyone wishing to park

• High Response Time : real-time platform

• Transparency : because its based on Blockchain
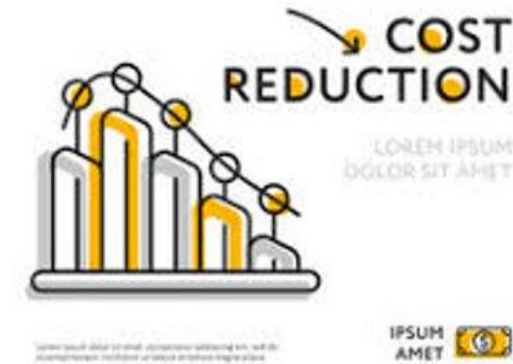
Interface Design

- Limiting Access by Registration

- Signup for new users

- Password protected login Based System

Interface Design

- Owner Home

Home   Property Owner Login   Property User Login

Property 1

Pohang City
@2 ETH/hr

(36.0292, 129.3648)

Property 2

Seoul City
@3 ETH/hr

(37.5326, 127.024612)

Property 3

Rent a new Property

Location Address [   ]   Cost per Hour [   ]
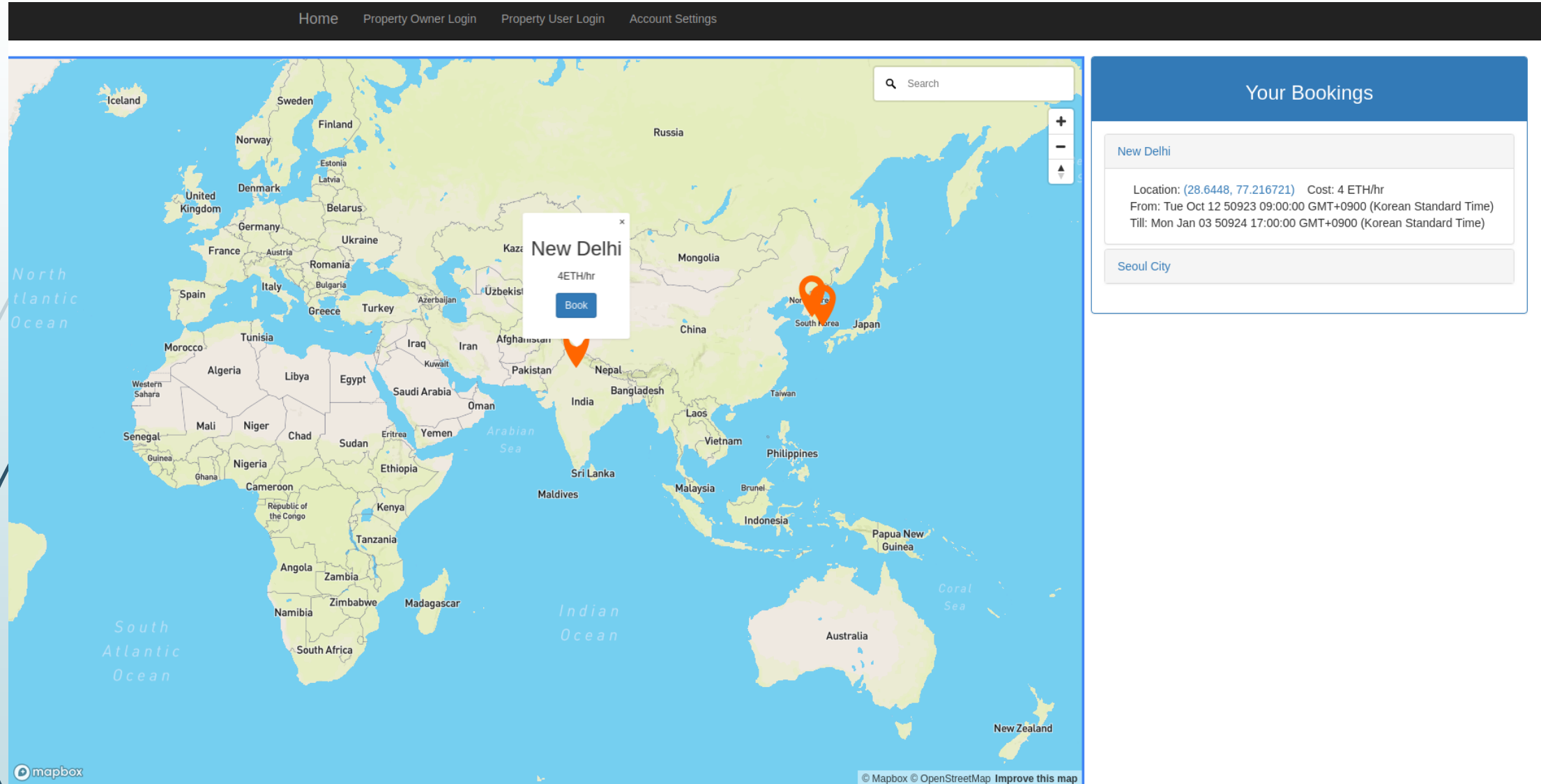
Latitude [   ]   Longitude [   ]

[Rent]

Interface Design

- User's Window

Interface Design

- Integrated Map for convenience of user along with Search Bar

Button Click to Contract Function Invocation

- Contract function are invoked by Clicking Buttons

- Html Buttons invoke JavaScript functions

- JavaScript Function Invokes web3.contract functions

```javascript
function send_transaction(){
    web3.eth.personal.unlockWallet(investor,pwd,30)
    contract.fund()
    window.location.href = "Investor.html";
}
```
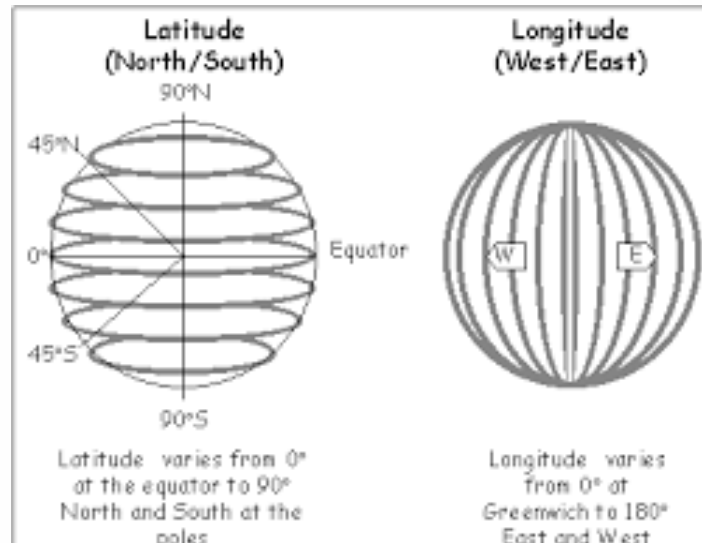
```html
<div class="row">
    <h3 align="center">
        <button type="button" onclick="send_transaction();">Fund</button>
    </h3>
</div>
```

Data Structure and Variables

Geographic co-ordinate system to denote **location**

Struct **ParkingSpot**

Struct **Booking**

Latitude (North/South) — Latitude varies from 0° at the equator to 90° North and South at the poles

Longitude (West/East) — Longitude varies from 0° at Greenwich to 180° East and West

Functions

1

SignUp : New User Registration

2

reserveSpot – reserves the parking spot selected

3

abandonSpot – abandons the parking lot and pays the calculated rent

4

addRentOutSpot – enables owner to rent out their land as a parking spot

Working with Solidity

- Avoid using Arrays in struct

- Use push() to insert values in an uninitialized array

- Backend comprises of integration of JavaScript and solidity

- Avoid using complicated structs and data structures

- Always look up for ways to find ways which consume least gas

What Do we Plan to do in Future

- Proper Integration of Payment system with our Dapp

- Changes in the Data Structure of Smart Contract

- Robust Testing of all functionality

- Security Isuues

- Possibly explore option of Using other Blockchains like Hyperledger

- Reason Being : No Transaction Fee and No Language Constraint

Reference

- http://www.academia.edu/4576117/Parking_Management_Market_worth_7.43_Billion_by_2018

- http://www.cdl.edu/uploads/Qd/S6/QdS615B1DcnwRZInSuTDnQ/writing-requirements.pdf

Thanks For Watching.