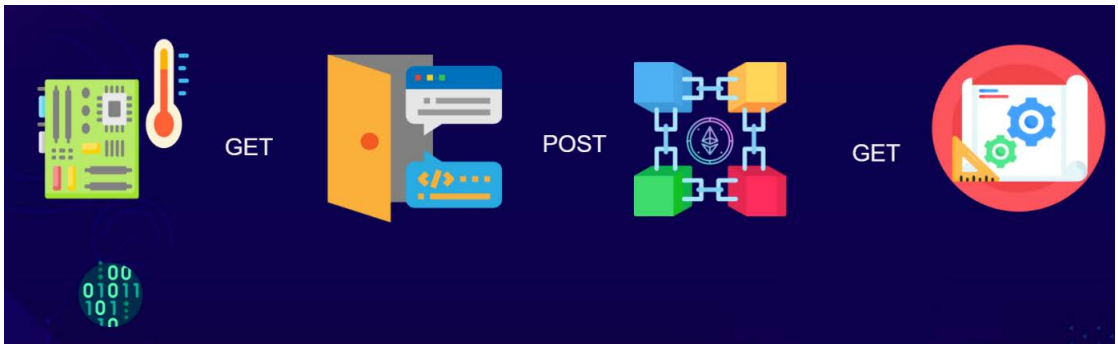
Arctic Challenge (2021) reflection by Elyas Khorasani (Team 2 - Djangos on Chain)

Three challenges were proposed at the beginning of the Arctic challenge. The challenge we chose to solve was High secure-no third-party IoT devices transactional record-keeping in the decentralized systems with weather use case.

We used Blockchain technology to design a transaction-keeping application for IoT devices that can keep the IoT transactional weather information like (IoT device id, City name, temperature, and timestamp, ...) secure and immutable without using centralized parties and cloud services like Google and Amazon.

The architecture of our proposed system is as follows:



I implemented a Blockchain Database using Ethereum platform which is fully decentralized, immutable and tamper-proof. I wrote a smart contract using Solidity language which deals with Post requests that comes from the broker and saves them on the Blockchain. Then it answers to the Get requests that comes from the Front-end by the user and sends back the Saved IoT data on the blockchain to the Front-end.

The smart contract was compiled by Truffle that is a somart contract developing tool and environment. The management of the private Blockchain was done by Ganache which creates a private blockchain with some pre-charged account to test.

The connection of the Blockchain with the broker and the front-end was made possible by using Web3 library of Nodejs. the broker was developed in Javascript. The front-end was developed in Html, Css and Javascript. The front-end and broker connection was through a Rest-full API and the connection between broker and front-end with the blockchain was been able through CRUD API.

As a front-end a web application was developed that was able to show the latest transactions on the Blockchain, the current temperature and the location of the IoT sensor, the calculated real feel using the heat Index, and the timestamp, plus a graph showing the temperature over time and a graph showing the humidity over time.

For the IoT part, we used a DHT11 sensor connected to an Arduino which was sending the sensor data each 10 seconds to the broker using a WiFi module.

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