| SHEETS | 12 pages | IoT Documentation |
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# Paraffin
# Open Source IoT Platform
# Proposal

Ver. 0.1.3



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## Definition

**IoT** or The Internet of Things is the network of physical devices, vehicles, home appliances and other items embedded with electronics, software, sensors, actuators, and connectivity which enables these objects to connect and exchange data.

**MQTT** (Message Queuing Telemetry Transport) is an ISO standard (ISO/IEC PRF 20922) publish-subscribe-based messaging protocol. It works on top of the TCP/IP protocol. It is designed for connections with remote locations where a "small code footprint" is required or the network bandwidth is limited.

**CoAP** Constrained Application Protocol (**CoAP**) is a specialized Internet Application Protocol for constrained devices, as defined in RFC 7252. It enables those constrained devices called "nodes" to communicate with the wider Internet using similar protocols. CoAP is designed for use between devices on the same constrained network (e.g., low-power, lossy networks), between devices and general nodes on the Internet, and between devices on different constrained networks both joined by an internet. CoAP is also being used via other mechanisms, such as SMS on mobile communication networks.

# Introduction

We are living in the age of connectivity, and that means more things than ever before are right at your fingertips — literally. With one press of the button, one swipe left or right, you can open up new worlds in seconds. The IoT is one of the hottest topics right now, and everyone is trying to figure out how to play in it. Every time someone launches a new product, the market changes and other players in the field need to adapt their offers to the new context.

**What is the problem?**

Today Startups needs get ready solutions to launch their products.

IoT needs back-end and front-end modules to handle the device connectivity and keep good user experience. The growth of IoT startups and their needs send a pulse to market for running new open source projects with more features like Social IoT and Machine Learning. Today, It is a requirement to share your devices with your friends to use once time or set your home temperature according weather or habit of use.

## Scope

The scope of the project is:

- Define and build a social solution to support communication between users and handle sharing devices between users.
- Define and build a security solution to support the communication between all these devices in multi-tenant.
- Define a REST API to expose the machines needs through REST, exposing multiple protocols (MQTT, CoAP) through the same API.
- Define a REST API for admin and users to interact with server and mange devices and settings.
- Prepare a starter kit with capability of building for different platforms so startup holders can be able to launch apps quickly.
- Design an admin and users Dashboard to manage devices and settings.
- Design a Docker/Kubernetes code to build microservice architecture for platform.
- Design a Command Line Interface CLI for users so they can be able to interact with platform. Users can host service on Cloud by payment.
- Design an Installer Script to install all codes automatically.

## Description

- Social IoT: a social solution helps to make social IoT network. It should handle social activity like share, Like, Comments on IoT asset.
- Authentication: IoT security needs authentication and authorization service to support the communication security between all of these devices in multi-tenant.

- REST API: multiple protocols (HTTP, MQTT, CoAP) through the same API make it easy for developers to add different features.
- Starter kit for different platform accelerate startups and it helps this platform to be more favor.
- Dashboard help admin and users to manage platform and settings by web.
- Design a Docker/Kubernetes code to build microservice architecture for platform.
- Installer Script and Command Line Interface CLI are tools which can help users to interact with platform without touching the platform complexity. It may encourage users to use built-in features like host service on Cloud by payment.

## What won't it do

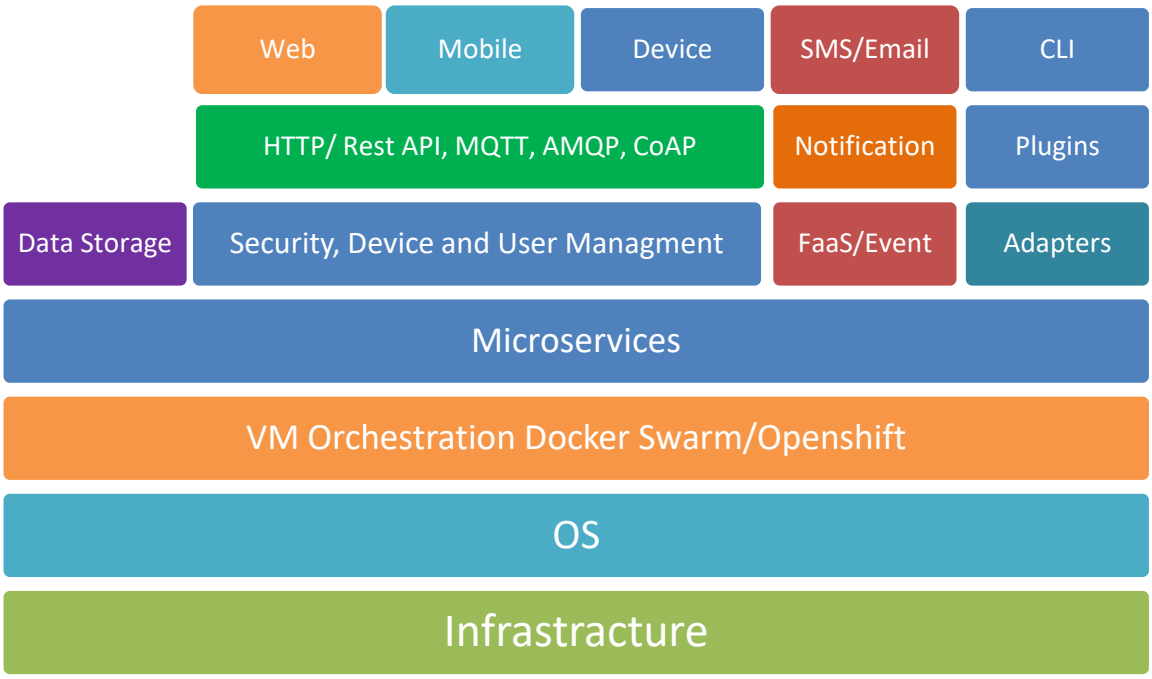
We are not going to reinvent the wheel. Also, It is clear that we are not RedHat or Microsoft Azure. This platform is based on opensource codes. the router and broker side code are chosen from proven open source codes with suitable license.

## What will it do

All services are related with front-end and management codes will designed. In fact, services like, API Server, Dashboard, Event Manager, Billing and Logging is designed by open source middle ware. Definitely, it must be avoided to rewrite codes which is available in git networks. It is a challenge to find a moderate path so programmer use proper middleware and has not fallen into trap to write codes which can be found open source.

## Architecture

The microservices architecture help to tackle the problem of complexity by decomposing application into a set of manageable services which are much faster to develop, and much easier to understand and maintain. It enables each service to be developed independently by a team that is focused on that service.




IoT Architecture

### Backend

This platform is based on docker machine. It's necessary to design a proper API for communication between services.

Here there are suggestions for choosing different elements;

- Broker: Mosca, Ponte, ActiveMQ Artemis
- Gateway, Router, Load balancer: Kong for API gateway / Nginx, Traefik, HAProxy / Hono Eclipse for IoT Messaging
- API Server: Parse Server / ExpressJS
- Security, Identity and Access Management IAM: Keycloak
- Function as a Service FaaS: OpenFaas
- Social Activity: Stream Framework
- Container Orchestration: Docker Swarm, Openshift and Kubernetes

## Frontend

There are many solutions and frameworks. It worth to effort to work with React or VueJs. Parse Server has good SDKs for HTTP and NodeJS clients. The first target client is Web and the others platforms will be added finally.

## Plugins

Users will able to add plugins as adapter to design custom services like Machine Learning. Designing a template for plugin is a big easiness for developers to customize this platform.

## API

API Server is based on Parse Server. Parse Server is an open source version of the Parse backend that can be deployed to any infrastructure that can run Node.js. You can find the source on the GitHub repo.

### Objects API

| URL | HTTP Verb | Functionality |
|---|---|---|
| /api/classes/<className> | POST | Creating Objects |
| /api/classes/<className>/<objectId> | GET | Retrieving Objects |
| /api/classes/<className>/<objectId> | PUT | Updating Objects |
| /api/classes/<className> | GET | Queries |
| /api/classes/<className>/<objectId> | DELETE | Deleting Objects |

- http://localhost:1337/api/Tanent

### Users API

| URL | HTTP Verb | Functionality |
|---|---|---|
| /api/users | POST | Signing Up<br>Linking Users |
| /api/login | GET | Logging In |
| /api/logout | POST | Logging Out |
| /api/users/<objectId> | GET | Retrieving Users |
| /api/users/me | GET | Validating Session Tokens<br>Retrieving Current User |
| /api/users/<objectId> | PUT | Updating Users<br>Linking Users<br>Verifying Emails |
| /api/users | GET | Querying Users |
| /api/users/<objectId> | DELETE | Deleting Users |
| /api/requestPasswordReset | POST | Requesting A Password Reset |

## Sessions API

| URL | HTTP Verb | Functionality |
|---|---|---|
| /api/sessions | POST | Creating Restricted Sessions |
| /api/sessions/<objectId> | GET | Retrieving Sessions |
| /api/sessions/me | GET | Retrieving Current Session |
| /api/sessions/<objectId> | PUT | Updating Sessions |
| /api/sessions | GET | Querying Sessions |
| /api/sessions/<objectId> | DELETE | Deleting Sessions |
| /api/sessions/me | PUT | Pairing with Installation |

## Roles API

| URL | HTTP Verb | Functionality |
|---|---|---|
| /api/roles | POST | Creating Roles |
| /api/roles/<objectId> | GET | Retrieving Roles |
| /api/roles/<objectId> | PUT | Updating Roles |
| /api/roles/<objectId> | DELETE | Deleting Roles |

## Files API

| URL | HTTP Verb | Functionality |
|---|---|---|
| /api/files/<fileName> | POST | Uploading Files |

## Analytics API

| URL | HTTP Verb | Functionality |
|---|---|---|
| /api/events/AppOpened | POST | Analytics |
| /api/events/<eventName> | POST | Custom Analytics |

## Push Notifications API

| URL | HTTP Verb | Functionality |
|---|---|---|
| /api/push | POST | Push Notifications |

## Installations API

| URL | HTTP Verb | Functionality |
|---|---|---|
| /api/installations | POST | Uploading Installation Data |
| /api/installations/<objectId> | GET | Retrieving Installations |
| /api/installations/<objectId> | PUT | Updating Installations |
| /api/installations | GET | Querying Installations |
| /api/installations/<objectId> | DELETE | Deleting Installations |

## Cloud Functions API

| URL | HTTP Verb | Functionality |
|---|---|---|
| /api/functions/<name> | POST | Calling Cloud Functions |
| /api/jobs/<name> | POST | Triggering Background Jobs |

## Schemas API

| URL | HTTP Verb | Functionality |
|---|---|---|
| /api/schemas/ | GET | Fetch All Schemas |
| /api/schemas/<className> | GET | Fetch Schema |
| /api/schemas/<className> | POST | Create Schema |
| /api/schemas/<className> | PUT | Modify Schema |
| /api/schemas/<className> | DELETE | Delete Schema |

## Function Hooks API

| URL | HTTP Verb | Functionality |
|---|---|---|
| /api/hooks/functions/<functionName> | GET | Fetch Cloud Functions |
| /api/hooks/functions/ | POST | Create Cloud Function |
| /api/hooks/functions/<functionName> | PUT | Edit Cloud Function |
| /api/hooks/functions/<functionName> | DELETE | Delete Cloud Function |

## Trigger Hooks API

| URL | HTTP Verb | Functionality |
|---|---|---|
| /api/hooks/triggers/<className>/<triggerName> | GET | Fetch Cloud Trigger |
| /api/hooks/triggers/ | POST | Create Cloud Trigger |
| /api/hooks/triggers/<className>/<triggerName> | PUT | Edit Cloud Trigger |
| /api/hooks/triggers/<className>/<triggerName> | DELETE | Delete Cloud Trigger |

## Timeline

We've offered a basic guide for the timeframe of delivery. It is estimated that it will take 6 months to complete codes and tests for the first stable version. Here's what to expect:

| Design | Development | Test | DevOps | Release |
|---|---|---|---|---|

| Item | 1st | 2nd | 3rd | 4th | 5th | 6th |
|---|---|---|---|---|---|---|
| Frontend, wireframe, UX, UI | | | | | | |
| API Server, Authentication/Authorization, | | | | | | |
| Broker, Router, Gateway | | | | | | |
| Docker and Orchestration | | | | | | |

*th in month

## Contribution

Open source projects with warm, welcoming communities keep people coming back for years. Many people form lifelong friendships through their participation in open source.

What does "open source" mean?

When a project is open source, that means anybody can view, use, modify, and distribute your project for any purpose. These permissions are enforced through an open source license.

Open source is powerful because it lowers the barriers to adoption, allowing ideas to spread quickly.

A common misconception about contributing to open source is that you need to contribute code. In fact, it's often the other parts of a project that are most neglected or overlooked. You'll do the project a huge favor by offering to pitch in with these types of contributions!

Even if you like to write code, other types of contributions are a great way to get involved with a project and meet other community members. Building those relationships will give you opportunities to work on other parts of the project.

**Do you like planning events?**

- Organize workshops or meetups about the project, like @fzamperin did for NodeSchool
- Organize the project's conference (if they have one)
- Help community members find the right conferences and submit proposals for speaking

**Do you like to write?**

- Write and improve the project's documentation
- Curate a folder of examples showing how the project is used
- Start a newsletter for the project, or curate highlights from the mailing list
- Write tutorials for the project, like PyPA's contributors did
- Write a translation for the project's documentation

- *Refer to https://opensource.guide/how-to-contribute/*

## Business Plan

There are several approaches to take money on opensource project. Writing about how the revenue will shared between contributors needs another proposal.

### Create a revenue stream

It’s possible to charge for commercial support, hosted options, or additional features. The idea of designing a CLI for platform made it easier for users to interact with hosted options. Users can control a demo server or hosted platform in our infrastructure.

### Apply for grant funding

Some software foundations and companies offer grants for open source work. Sometimes, grants can be paid out to individuals without setting up a legal entity for the project.

For more detailed options and case studies, @nayafia wrote a guide to getting paid for open source work.

In fact, there are some customers for this platform now, but we need a stable code and it is just possible with creation a team and contribution.

## Contact

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