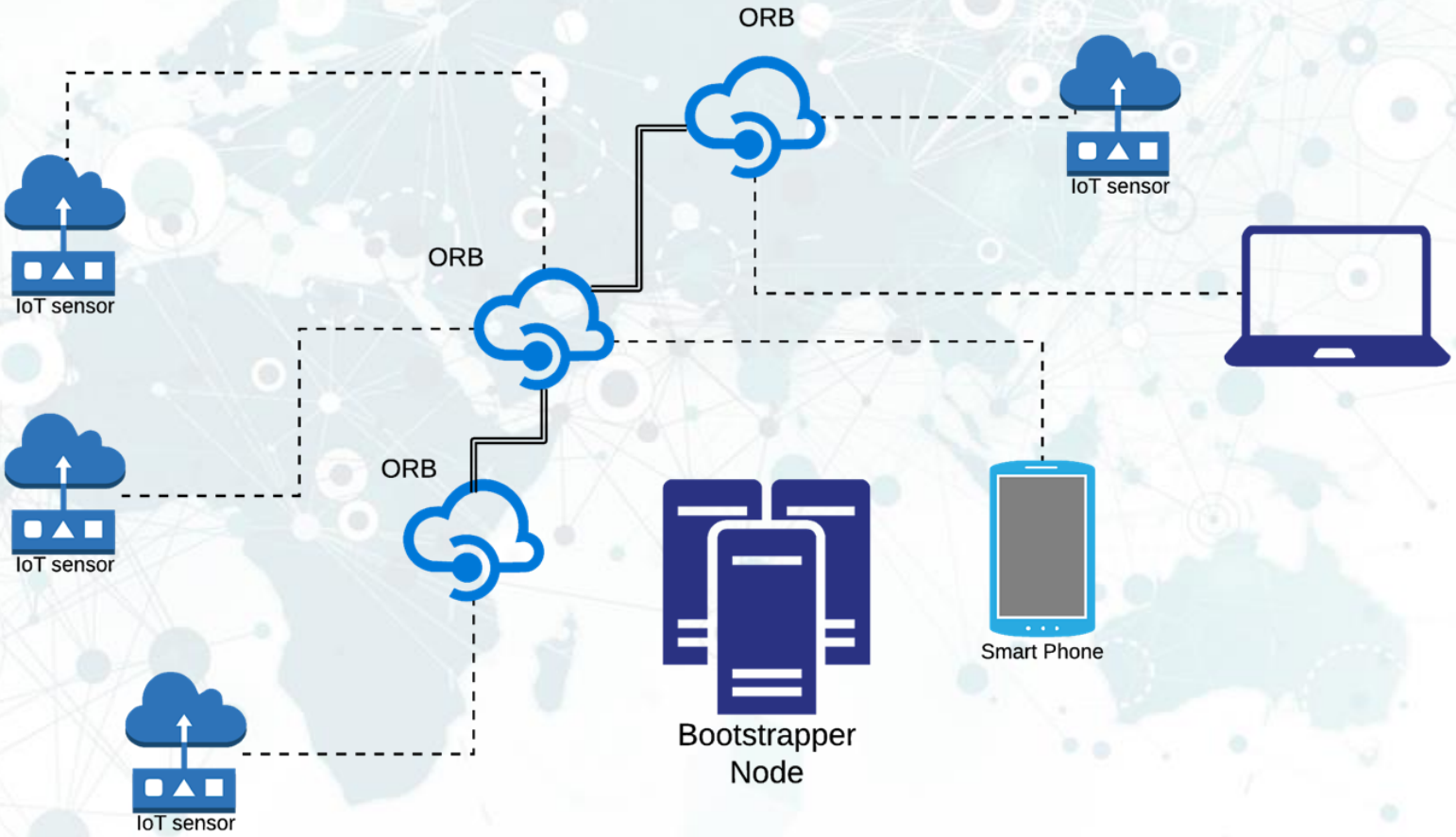

HELLO


ORB
IoT sensor
ORB
IoT sensor
ORB
IoT sensor
Bootstrapper
Node
Smart Phone

What did you **see**?

Lot of Buildings ?

People working **Overnight ?**

Do you ever **shutdown** your **computer** before going to **sleep** ?

What **if**?

You can spend the idle computing power to earn something

What if it's **cheaper and simpler** than **existing cloud service providers**

World's First Truely Decentralized Functions as a Service Provider

From Developers to Developers

What is ORb?

It's a decentralized network where each node is **capable of serving a function / function**

Function a piece of executable code with a **single responsibility** which takes inputs and returns a output.

ORb – Makes your life **Easy**

Means to achieves the truely **serverless dream**

No need to maintain **complex infrastructure**

What this means is that you can **simply upload functions into the Orb network** that will be executed upon calling.

Deploy

Seed

Consume

Simple **STEPS**

Install **Orb Client**

1

Use inline Code Editor

2

Package and **Deploy**

3

Then **What Happens**

Function runs on **users computer locally**

If another node wants to **host** it, the user can simple **seed** it

The **seeders** will get **Rewarded**

```
                                                    C:\Users\ntissera\Do…ts.controller.js:63
▶ Promise {[[PromiseStatus]]: "pending", [[PromiseValue]]: undefined}
var x= 21;var s=22; x+s                             C:\Users\ntissera\Do…ts.controller.js:64
0.0001 Coins                                        C:\Users\ntissera\Do…ts.controller.js:76
execution time 8.61397837 ms                        C:\Users\ntissera\Do…ts.controller.js:79
e857bf27-dbc4-eaaf-939b-d148ffea3b2e                C:\Users\ntissera\Do…ts.controller.js:61
                                                    C:\Users\ntissera\Do…ts.controller.js:63
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```

Overrall **Look**

Sam

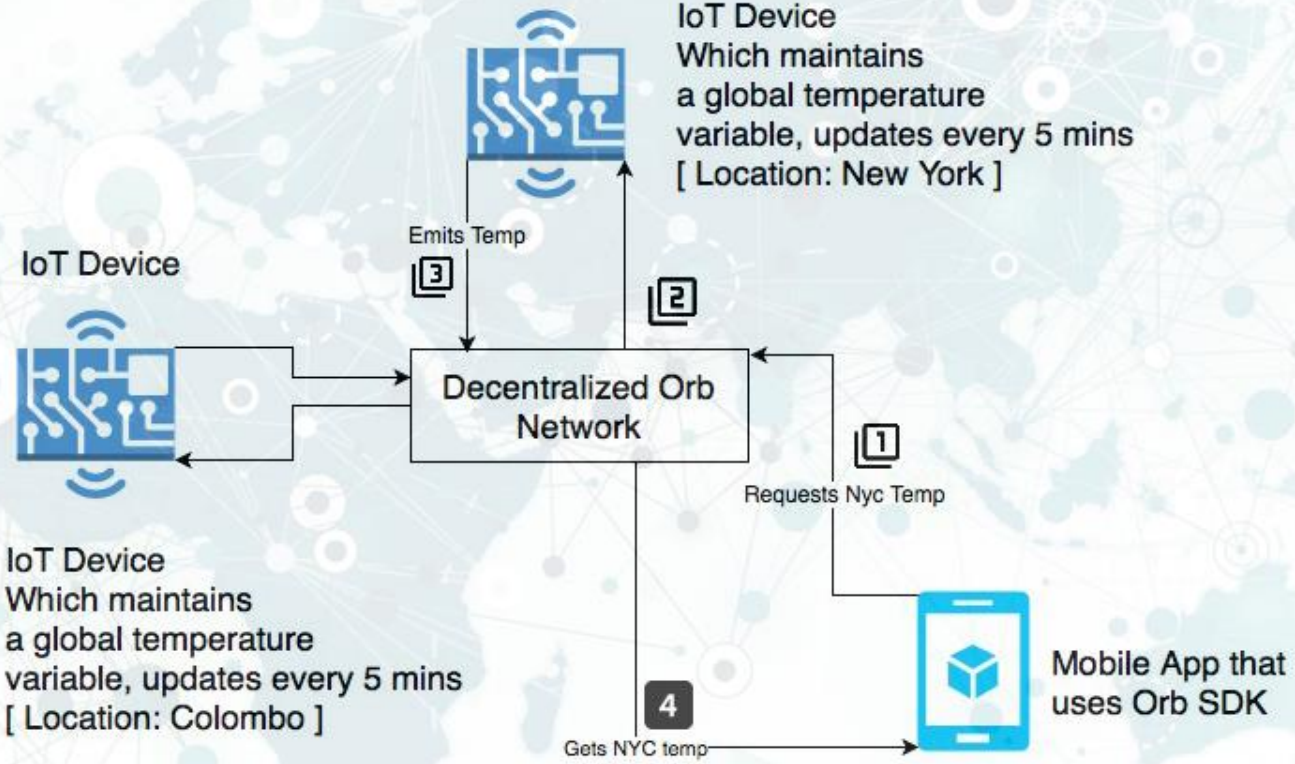
Deploy

ORb

Consume

Tanya

Why **Reimplement**
Just **Reuse**


IoT Device
Which maintains
a global temperature
variable, updates every 5 mins
[Location: New York]
Emits Temp
3
2
IoT Device
Decentralized Orb
Network
1
Requests Nyc Temp
IoT Device
Which maintains
a global temperature
variable, updates every 5 mins
[Location: Colombo]
4
Gets NYC temp
Mobile App that
uses Orb SDK

IoT Example

Target **Audience**

Devs & Non-Devs

Audience statistics

20 Million Devs

40% Tech Business Growth

WEF Stats 2017

Uniqueness

No one has ever done this

First in the market

Supports **Real time Services**

Provides hosting, publishing and sharing functions

Targeted on **Devs** and **non-Devs**

Revenue Model

Inbuilt Functions

Private Orb

Contribute &

Get Rewarded

Why Orb?

Objective of this research is to Create a truly **Decentralized Functions as a Service** provider

Eliminates **major** drawbacks in
Centralized networks
and
Existing Serverless Architecture

Drawbacks in Centralized Networks

Single Authority
Your data belongs to a **3rd party organization.**
Single Point Of Failure
Most of the systems are **not scalable** by default
Centralized systems tend to generate **more traffic**
The **security** of the data is a concern.

Similar Platforms

There are some **platforms, browsers, protocols** build on top of decentralized networks.

IPFS - Decentralized hyper media protocol
Beaker Browser - peer2peer browser
Steemit - Decentralized social media platform
Storj - Decentralized applications that allows to store data

Why Orb Over Other Systems?

EARN

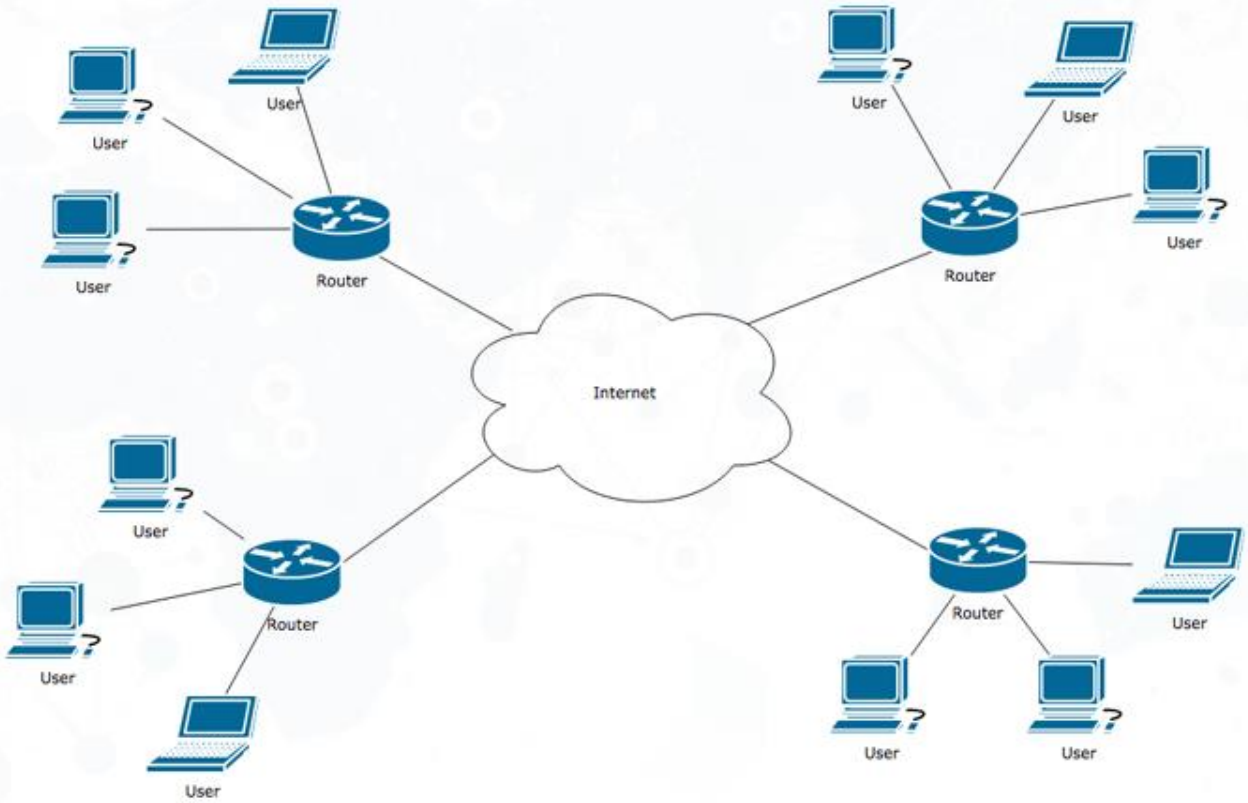
User can deploy a function
User can host a function

PAY
PAY AS U GO

User can consume deployed functions

How it works?

Internet


User
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User

Challenges

Private Network to **Public Network**. ✓

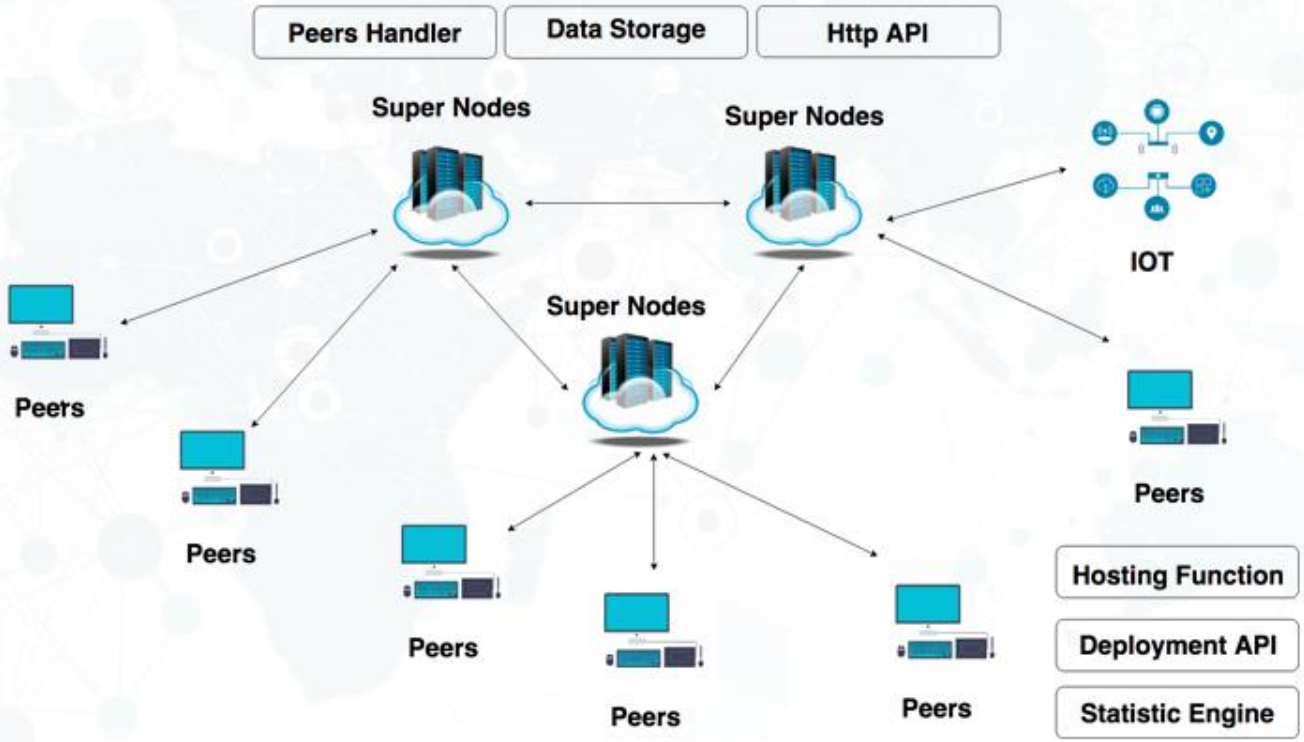
Public Network to **Private Network**. ✗

Key Components

Super Node

Node/Peer

Solution


Peers Handler
Data Storage
Http API
Super Nodes
Super Nodes
Super Nodes
IOT
Peers
Peers
Peers
Peers
Peers
Peers
Hosting Function
Deployment API
Statistic Engine

Super Node

1. Keeping a track of peers and super nodes.
2. Store Function relative information.
3. Rest API to outside world for data analytics.

Peer Nodes

1. Deploying a function to the network.
2. Keep a track of peers and super nodes.
3. Provide access to deployed function.

Demo

https://quiet-lake-45401.herokuapp.com/
https://achalakavinda.github.io/orb-web-client/

What is the **Rewarding System**?

Let’s have a look at it with an example

Initially all the users get 50 units after registering to Orb

Let’s have a look at it with an example

When deploying cost will be 10 units

-10

Let's have a look at it with an example

When requesting, requester's units will be reduce by one, and deployer's units will be increased by one

Who gets rewarded

Function seeder

When seeding -Per service call

Function owner

When function is requested

How can the above model can **Validate Requests**

The function owner can not simply
send requests to his own function and get rewarded.

Since

amount he pays per request >=amount he earn per request

Hence no point of sending requests to his own function
Likewise the requests will be validated through
the Rewarding system it self.

How to do the real Implementation

The above stated rewarding system can only be achieved with the use of a smart contract

What is a **Smart Contract?**
A smart contract is a computer protocol intended to digitally facilitate, verify, or enforce the negotiation or performance of a contract.
Smart contracts allow the performance of credible transactions without third parties.


THANK
YOU

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Kavinda
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Athukorala
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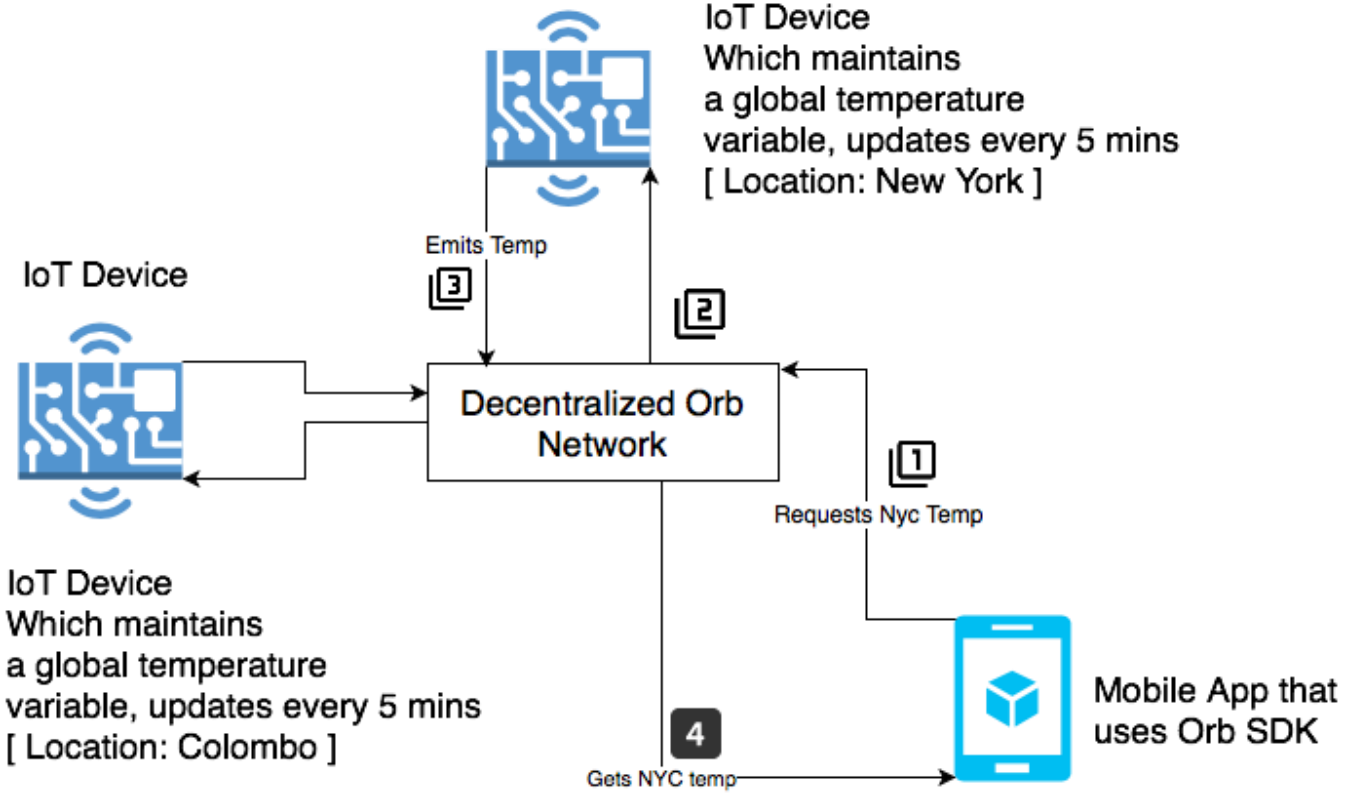
Example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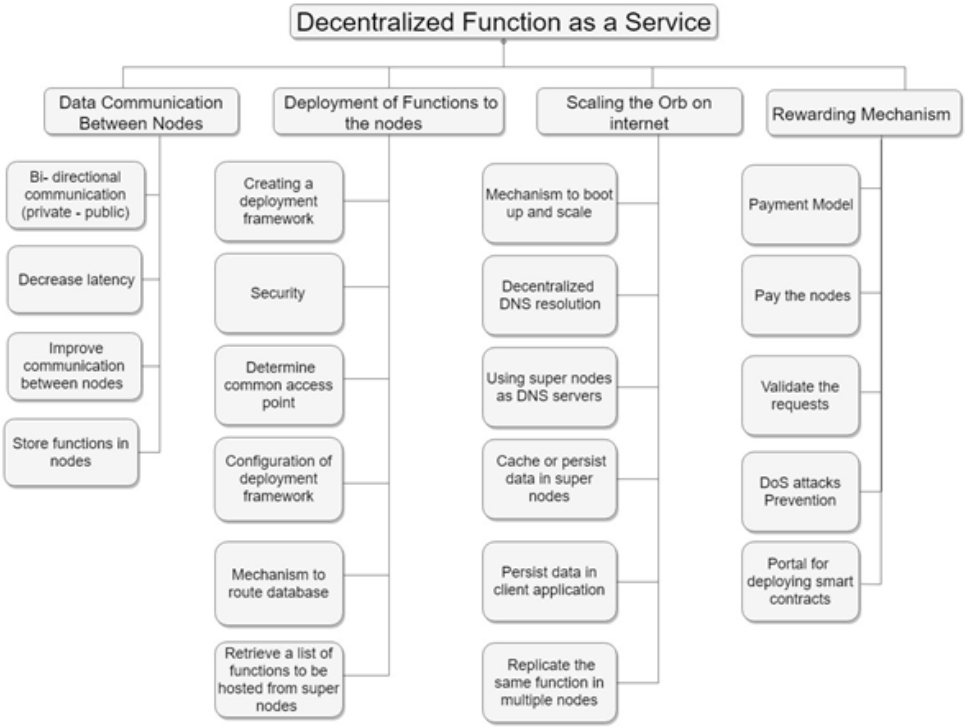
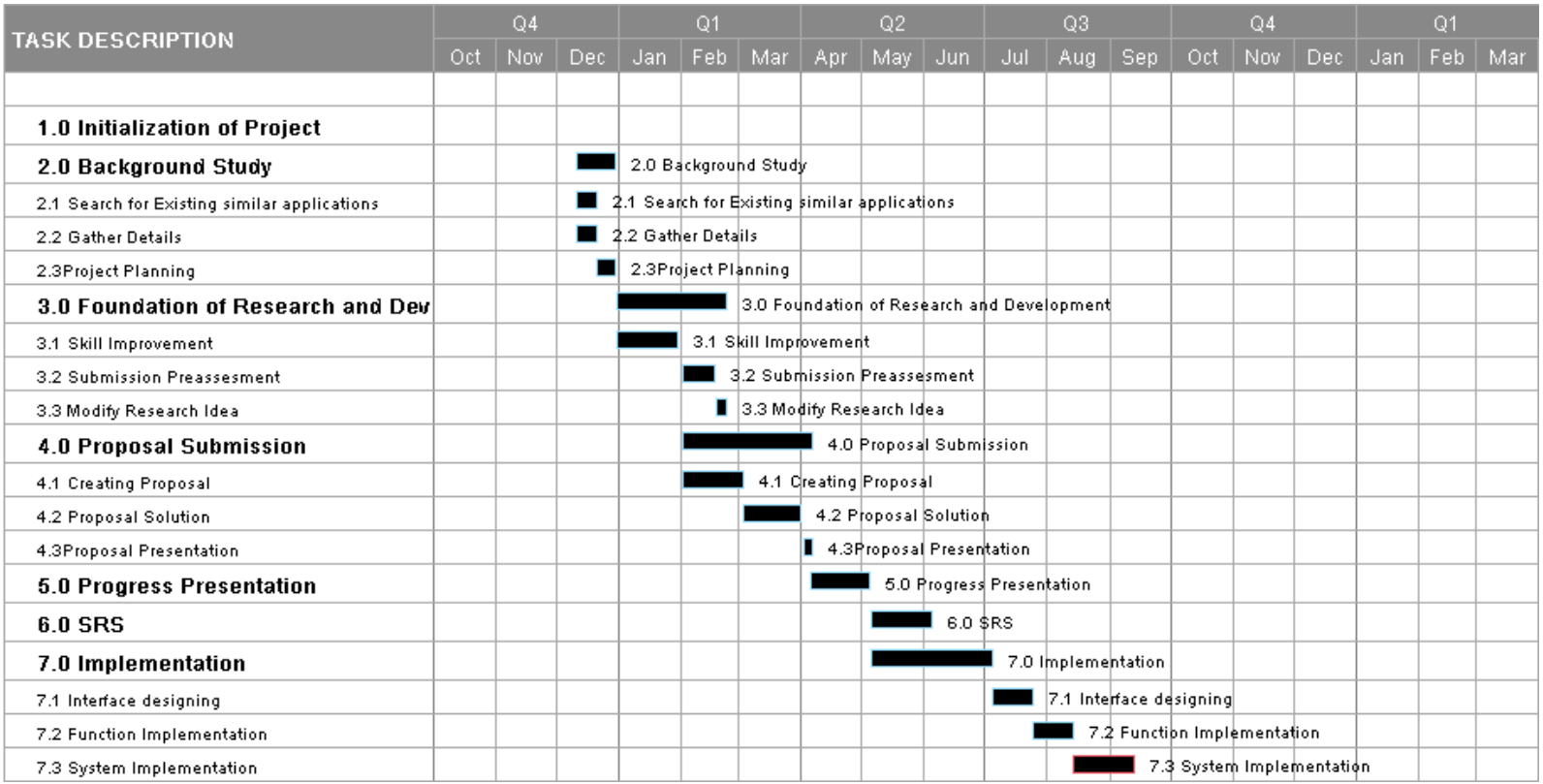
WBC


Decentralized Function as a Service
Data Communication Between Nodes
Deployment of Functions to the nodes
Scaling the Orb on internet
Rewarding Mechanism
Bi- directional communication (private - public)
Decrease latency
Improve communication between nodes
Store functions in nodes
Creating a deployment framework
Security
Determine common access point
Configuration of deployment framework
Mechanism to route database
Retrieve a list of functions to be hosted from super nodes
Mechanism to boot up and scale
Decentralized DNS resolution
Using super nodes as DNS servers
Cache or persist data in super nodes
Persist data in client application
Replicate the same function in multiple nodes
Payment Model
Pay the nodes
Validate the requests
DoS attacks Prevention
Portal for deploying smart contracts

Gantt Chart


TASK DESCRIPTION
Q4
Q1
Q2
Q3
Q4
Q1
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
1.0 Initialization of Project
2.0 Background Study
2.0 Background Study
2.1 Search for Existing similar applications
2.1 Search for Existing similar applications
2.2 Gather Details
2.2 Gather Details
2.3Project Planning
2.3Project Planning
3.0 Foundation of Research and Dev
3.0 Foundation of Research and Development
3.1 Skill Improvement
3.1 Skill Improvement
3.2 Submission Preassesment
3.2 Submission Preassesment
3.3 Modify Research Idea
3.3 Modify Research Idea
4.0 Proposal Submission
4.0 Proposal Submission
4.1 Creating Proposal
4.1 Creating Proposal
4.2 Proposal Solution
4.2 Proposal Solution
4.3Proposal Presentation
4.3Proposal Presentation
5.0 Progress Presentation
5.0 Progress Presentation
6.0 SRS
6.0 SRS
7.0 Implementation
7.0 Implementation
7.1 Interface designing
7.1 Interface designing
7.2 Function Implementation
7.2 Function Implementation
7.3 System Implementation
7.3 System Implementation

Member Contributions 1

- Finding an efficient mechanism to explore the possible ways of bi-directional communication between private and public networks.
- Main objectives
    - To decrease latency of data communication between the nodes.
    - To improve communication between nodes in the same network efficient.

- Determining secure ways to store functions in nodes
- Finding out a mechanism to revert / edit a function deployed in the network
- Finding out the possibility of creating a new protocol to transmit data between the private and public networks
- An API to query data from super nodes via http

Member Contributions 2

- Creating a deployment framework to deploy functions and their configuration in a way to suite the decentralized network.
- Client software
- Security
- Packaging
  - Using npm pkg we'll obfuscate the source code , and create an executable which can be directly execute inside js-interpreter
- Configuration
  - A user must create a universal identifier.
  - Then for every function, there should be a unique identifier which is based on the body of the function (hash the body)

Member Contributions 2

- Obfuscating functions
  - Supplied by obfuscator
  - The Most Effective Way to
    Protect JavaScript Code Protect & Defend JavaScript Code
    from Reverse Engineering & Tampering
- Finding out a mechanism to determine a common access point (an endpoint) to call functions deployed in to the network.
- We already resolved this
  1. Initially, we thought of generating unique endpoints for a particular function dynamically, but rather than using http calls, we can use socket io itself to achieve this functionality.

- Finding out a mechanism to route the request a scenario where a single node goes done
  1. This problem came with the above point, but when we are using socket io this issue is elimited

Member Contributions 3

- Finding out a proper mechanism to boot up and scale the decentralized network.
  - Decentralized architecture
  - Initially how the network stars = known peer
  - SN - SN
  - N - SN

- Decentralized DNS resolution
  - Initially we thought of having a set of servers as DNS servers but recently we understood that, doing so will reduce the efficiency of the network and make the network less fault tolerant.

Member Contributions 3

- Finding out the possibility of using super nodes as DNS servers itself
  - It’s proposed to have a routing table inside each supernode. This will be broadcasted to the new joinees
  - Why ?
    - Then the nodes themselves can handle function calls well,
    - Find other super nodes easily

- Finding an ideal mechanism to cache or persist data in super nodes
  - We are currently storing functions and routing data in memory.
  - In order to goto the production grade, we must persist data
    - Why ?
      - If a supernode restarts, there is no way of retrieving data if not persisted

Member Contributions 3

- Finding a mechanism to persist data in client application
    - There are technologies like couchbase which is a distributed database, we are in the process of finding a database which can synchronize with the known peers.

- Finding out a mechanism to replicate the same function in multiple nodes but the replicated function should act as a single function
    - When a user deploys a function, it will run locally and the information about the function is sent to the supernode.
    - When a new node connects, this information is sent to the node,
    - A node can decide whether to seed a function or not

Member Contributions 4

- **Payment Model based on requests served by a node, amount of data transferred** Via smart contracts
- Finding out the possibility of paying the nodes which hosts functions based on served requests
- Finding out a mechanism to validate the requests served by a mechanism between the origin of the request and the requests served
    - Use -> pay
    - Seed -> Get paid

Member Contributions 4

- Finding a method to determine the value of a smart contract
  - This will be decided by the user itself before subscribing to a smart contract for a function

- Deploying a smart contract to the network with a start price
  - Will be decided by the user before deploying a function