

This document presents the architecture of **In Know Time**
(Blockchain Consulting)

Yeimi Pena

Contents

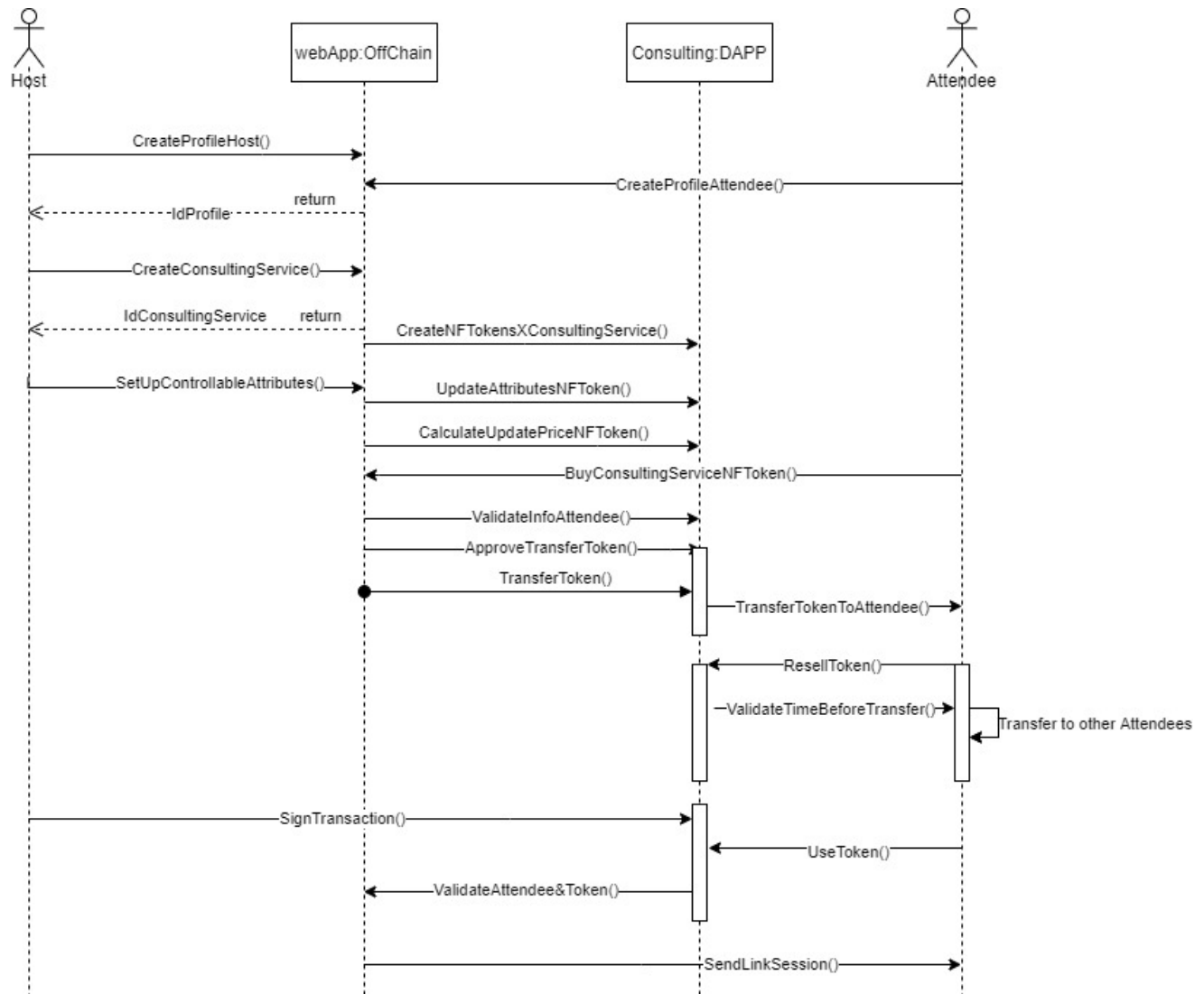
Goal	3
Sequence diagram.....	3
Explanation of the flow	3
Architecture of the solution.....	4
Technology required	5
Architecture of smart contract	5
Mockup of the solution.....	9

Goal

This document aims to describe the main architectural decisions for In Know Time solution. The architectural decisions respond to the requirements and support the design of the smart contract and the design of a mockup to determine how to represent the required functionalities.

Sequence diagram

The sequence diagram represents the flow of the functions executed by the actors (host and attendee) with the webApp and the DAPP.



Explanation of the flow

- 1- A host creates his profile using the web application and data is stored in a private database.
- 2- An attendee creates his profile using the web application and data is stored in a private database.

- 3- The host can create one or more consulting services, which will be offered in a particular time slot. Each service can have controllable attributes that might influence the price of the service.
- 4- Once a consulting service is created in the DAPP by a host, attendees can buy the NFTokens to attend the sessions of the consulting service. An attendee has to use its blockchain information (address and balance in ETH) to buy a token.
- 5- After sending the transaction to buy a token, the DAPP validates the attendee's information, the host has to approve the transfer of the token to the attendee, and the host transfers the token to the attendee. Finally, the host receives the payment in ethers that corresponds to the token's price.
- 6- A token can be resold by an attendee with the option of changing the price.
- 7- The last NFToken's owner can request the link to be connected to the session of the consulting service.
- 8- Before receiving the link, the web application will validate that the attendee is the owner of the token.
- 9- Then, the host will sign the transaction, and the web application will send the link to the attendee.
- 10- Finally, the token is destroyed by the DAPP.

Assumptions:

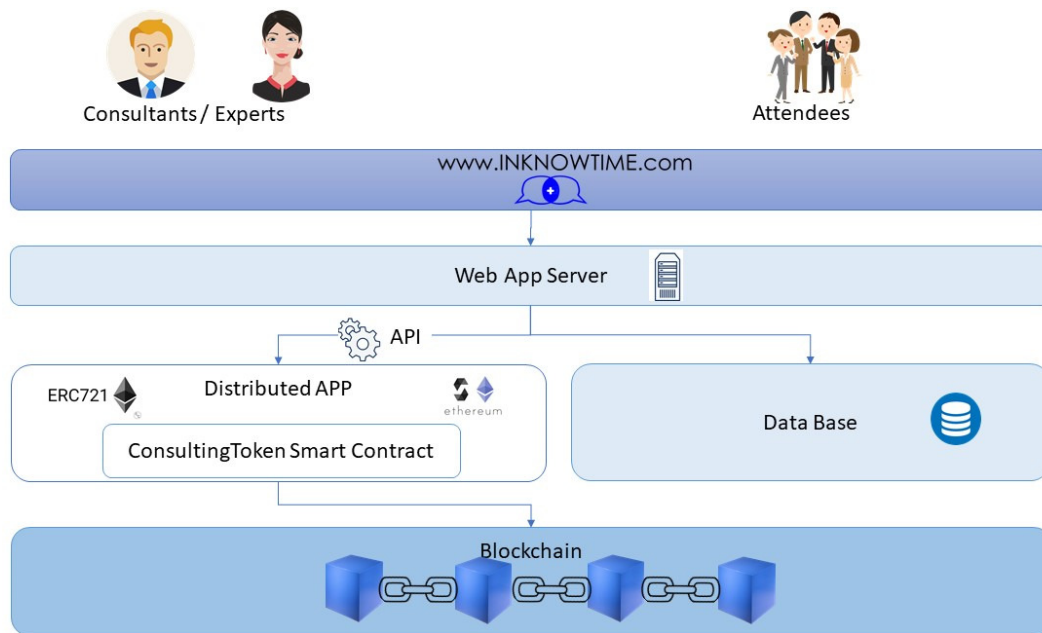
- We are trusting that data registered by hosts and attendees is real and accurate.
- The payment of the tokens will be in ETH (a conversion to CAD could happen at a future date).
- Hosts and attendees are both assumed to be in agreement for the solution's purpose.

Architecture of the solution

The architecture represents the required components for the "In Know Time" solution and their integration. Basically, the architecture contains the following components:

- 1- Two channels. Consultant/experts' channel and attendee channel. Both channels are connected to the web application.
- 2- Web application. The WebApp offers the web pages to use the different functions of the proposed solution. The WebApp has one page for each function (create profile of host, create profile for an attendee, create a consulting service, buy an NFToken, resell Token, request link for a session).
- 3- Database stores data of the host/attendee's profiles. The database's data can only be accessed by the database's administrator considering a set of security privileges to avoid access to the sensitive information of the clients (hosts and attendees).
- 4- Web application server. All the functions' algorithms are executed in the web app server. Depend on the function, web application server stores the information in a private database or transfers the information to the distributed application (DAPP). In the case of the blockchain transactions, the web server is connected to DAPP using an application programming interface (API).
- 5- Distributed APP. DAPP contains the smart contract used in the proposed solution. The smart contract was designed and developed in Remix. The smart contract implements the ERC721 standard that was imported the interface implemented by Openzeppelin. ERC721 was chosen because each consulting service is unique and it will be represented as a token in the solution.

6- MetaMask is employed to deploy the smart contracts in the local environment.



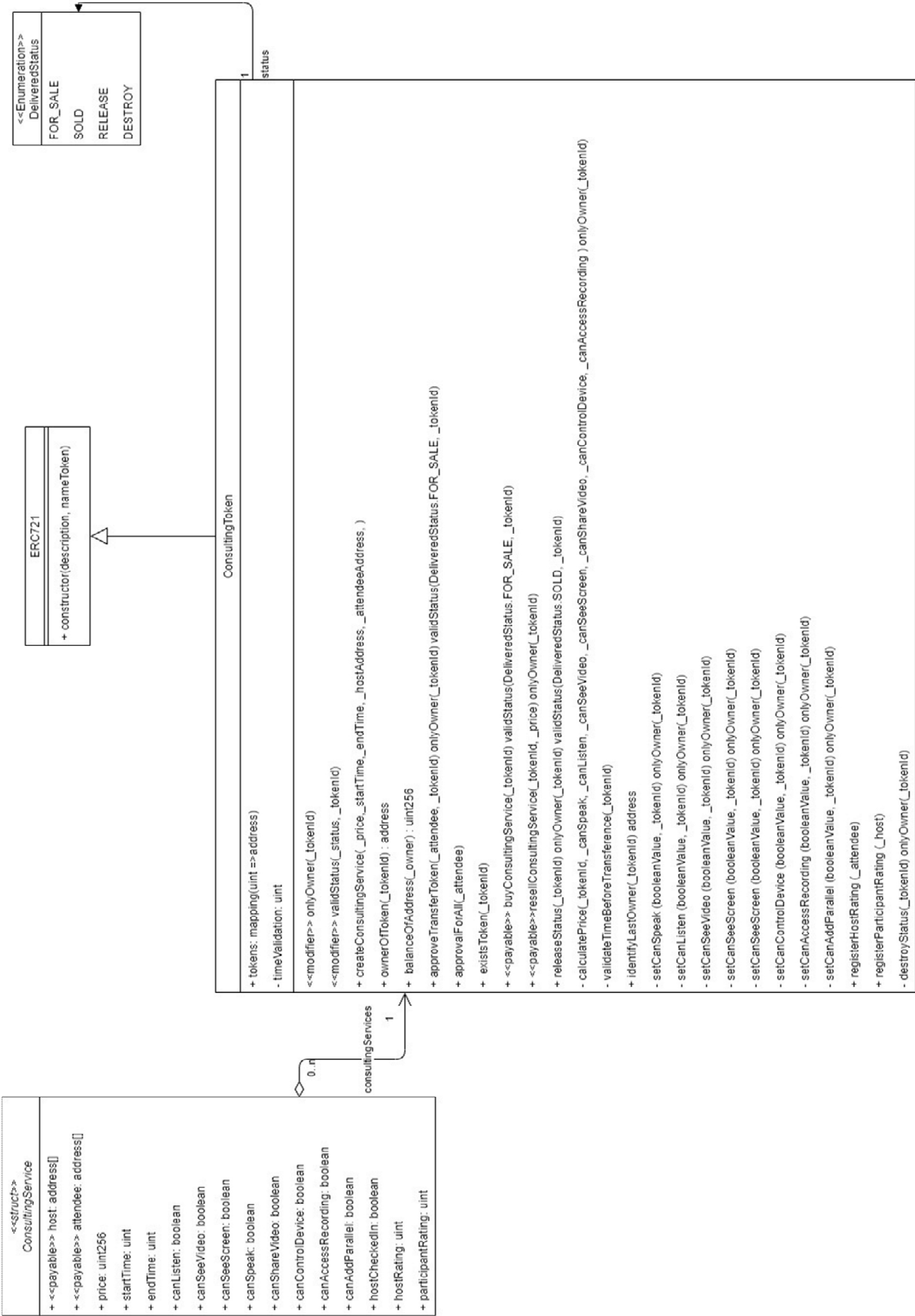
Technology required

- HTML, CSS, Java script (web application)
- Remix - Solidity
- Ethereum network
- Metamask
- Github

Architecture of smart contract

“In Know Time” has one smart contract that was designed considering the requirements. A high-level design of the smart contract is described in the following class diagram.

The contract implements the interface ERC721, contains a structure that includes the properties of a consulting services, and an enumeration to identify the delivery status of a consulting token (Release, for sale, sold or destroy). The solution can have 1 or more tokens for a consulting service. The following table lists the functions of the contract.



Name	Kind of function	Function mutability	Modifiers enforcing constraints	parameters	Purpose
createConsultingService	public	N.A.	N.A	(_price, _startTime, _endTime, _hostAddress, _attendeeAddress,)	Allow the creation of a token that represents a consulting service
ownerOfToken	public	N.A.	N.A	(_tokenId)	Consult the owner of a token
balanceOfAddress	public	N.A.	N.A	(_owner)	Consult the balance of an address
approveTransferToken	public		onlyOwner(_tokenId) validStatus(Delivered Status.FOR_SALE, _tokenId)	(_attendee, _tokenId)	Allow to approve an attendee to transfer a token from a host to an attendee
approvalForAll	public	N.A.		(_attendee)	Allow to approve the token to an address
existsToken	external	N.A.	N.A.	(_tokenId)	Validate if a token exists
buyConsultingService	public	Payable	validStatus(Delivered Status.FOR_SALE, _tokenId)	(_tokenId)	Allow to buy a consulting service (token) by an approved address (attendee)
resellConsultingService	public	Payable	onlyOwner(_tokenId)	(_tokenId, _price)	Allow to resell a consulting service (token) to a new attendee. Before to resell a token, the attendee can change the price of the token.
releaseStatus	public	N.A.	onlyOwner(_tokenId) validStatus(Delivered Status.SOLD, _tokenId)	(_tokenId)	Allow to change the states to release to the last owner of a token. After the change of the status, the owner can request for a link to connect to the service with the host.
calculatePrice	private	N.A.	onlyOwner(_tokenId)	(_tokenId, _canSpeak, _canListen, _canSeeVideo, _canSeeScreen, _canShareVideo, _canControlDevice, _canAccessRecording)	Allow to calculate the price of a token considering the permissions that an attendee can have. Only the owner can execute this function before to sell a token

validateTimeBeforeTransference	private	N.A.	N.A.	(_tokenId)	Allow to calculate the time when a token can be transfer. If the time is greater than the timeValidation, the token cannot be transfer or resell
identifyLastOwner	public	N.A.	N.A.	(_tokenId)	Allow to identify the last owner of a token
setCanSpeak	private	N.A.	onlyOwner(_tokenId)	(booleanValue, _tokenId)	Allow to set the value of the attribute
setCanListen	private	N.A.	onlyOwner(_tokenId)	(booleanValue, _tokenId)	Allow to set the value of the attribute
setCanSeeVideo	private	N.A.	onlyOwner(_tokenId)	(booleanValue, _tokenId)	Allow to set the value of the attribute
setCanSeeScreen	private	N.A.	onlyOwner(_tokenId)	(booleanValue, _tokenId)	Allow to set the value of the attribute
setCanSeeScreen	private	N.A.	onlyOwner(_tokenId)	(booleanValue, _tokenId)	Allow to set the value of the attribute
setCanControlDevice	private	N.A.	onlyOwner(_tokenId)	(booleanValue, _tokenId)	Allow to set the value of the attribute
setCanAccessRecording	private	N.A.	onlyOwner(_tokenId)	(booleanValue, _tokenId)	Allow to set the value of the attribute
setCanAddParallel	private	N.A.	onlyOwner(_tokenId)	(booleanValue, _tokenId)	Allow to set the value of the attribute
registerHostRating	public	N.A.	N.A.	(_attendee)	Allow to register the rating of a particular host by an attendee
registerParticipantRating	public	N.A.	N.A.	(_host)	Allow to register the rating of a particular attendee by a host
destroyStatus	private	N.A.	onlyOwner(_tokenId)	(_tokenId)	Change the status of a token to destroy

Mockup of the solution

Before to develop the web application, I decided to design the web pages using a mockup to validate the functionality. The following are examples of these web pages.

Last news, In Know Time offers its new service to trace your consulting services! [Read more here.](#)

Profile Consulting Service Attendee About

IN KNOW TIME
MONETIZE YOUR EXPERTISE

Create your profile

Name:

Biography:

Experience:

Portfolio:


LinkedIn:


Facebook:

[Upload your picture](#)

>>

Contact Us

 Download on the App Store

 GET IT ON Google Play

Profile Consulting Service Attendee About

IN KNOW TIME
MONETIZE YOUR EXPERTISE

Create your consulting service

Topic(s):

Time slot:

Guest:

Attendees:

Attributes:

<input checked="" type="checkbox"/> Listen	<input type="checkbox"/> See screen	<input checked="" type="checkbox"/> Share video	<input type="checkbox"/> Recording
<input checked="" type="checkbox"/> See video	<input checked="" type="checkbox"/> Speak	<input type="checkbox"/> Share screen	

Contact Us


Last news, In Know Time offers its new service to trace your consulting services! [Read more here.](#)

Profile

Consulting Service

Attendee

About

 **IN KNOW TIME**
MONETIZE YOUR EXPERTISE

Create attendee's profile

Name

James Gill

Biography

Email


Placeholder

Topics of interest

Management

Linked in

<https://www.linkedin.com/in/jamesgill/>



[Upload your picture](#)

Save

Cancel


Contact Us

Profile

Consulting Service

Attendee

About

 **IN KNOW TIME**
MONETIZE YOUR EXPERTISE

Attendee Name: Jhon Williams

Select a topic

Enterprise Architecture

Select a host

Yelimi Pena

Time slot

05/19/2021

12pm

3pm

Tokens

1

Attributes

☒ Listen

☒ See video

☒ Share video

☒ Speak

Price

CAD\$ 300

Buy

Cancel


Contact Us

Profile

Consulting Service

Attendee

About

IN KNOW TIME
MONETIZE YOUR EXPERTISE

Resell a NFToken for a consulting service

Current owner: Jhon Williams

Select the token

Token1

Select an attendee

Maria Groen

Attributes

☒ Listen

☒ See video

☒ Share video

☒ Speak

Price

CAD\$ 320

Sell

Cancel


Contact Us

Profile

Consulting Service

Attendee

About

IN KNOW TIME
MONETIZE YOUR EXPERTISE

Request link for a consulting service

Current owner: Maria Groen

Select the token

Token1

Your token has been validated and the link for the session has been sent to your email.

Request Link

Cancel

Contact Us