



Road to Web 3.0

—— third part ——

Let's Build an eKYC application
using blockchain



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HEARTS ACADEMY

Help our Hearts to improve their skills.





First part

Core Concepts of Blockchain



Second part

Ethereum Development



Third part

Build eKYC Application using blockchain

In the previous two sessions,

- Cryptocurrency & Crypto wallets
- Core Concepts of Blockchain
- Ethereum Development

What will you learn ?

- Introduction to KYC
- Self-Sovereign Identity
- Build an eKYC application using blockchain

Let's begin with

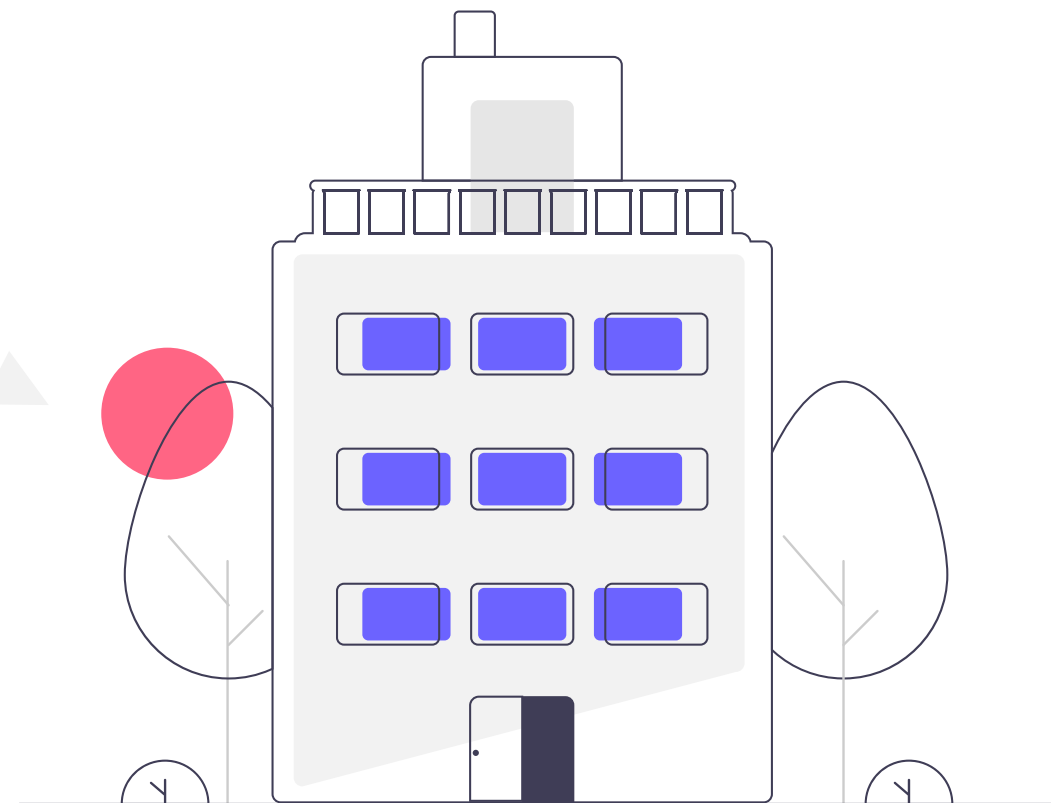
The Story of Sam.



SAM

Here is Sam.

Sam went to the bank to open a bank account.
He received a bunch of documents to fill.



BANK



One of them was **KYC Form.**

BANK OF CEYLON
BOC
Bankers to the Nation

Please tick the */* appropriate cage

Know Your Customer (KYC) Check List
(Requirement in terms of Financial Transaction Reporting Act No. 6 of 2006)

Bank Use Only

Name with initials : Date :
Account No. : Officer's signature with sig. No. :
Currency Code : Manager's signature with sig. No. :
Branch No. :

PURPOSE FOR OPENING THE ACCOUNT & THE USAGE

<input type="checkbox"/> Business Transactions	<input type="checkbox"/> Utility bill payment	<input type="checkbox"/> Investment purposes
<input type="checkbox"/> Employment/ Professional Income	<input type="checkbox"/> Savings	<input type="checkbox"/> Social & Charity work
<input type="checkbox"/> Family inward remittances	<input type="checkbox"/> Loan repayments	<input type="checkbox"/> Others (Specify)
<input type="checkbox"/> Upkeep of family/person	<input type="checkbox"/> Rare transactions	

SOURCE OF FUNDS: Expected source and nature of credits in to the account

<input type="checkbox"/> Sales and business turnover	<input type="checkbox"/> Contract proceeds	<input type="checkbox"/> Sales of Property/assets
<input type="checkbox"/> Family remittances	<input type="checkbox"/> Donations/Charities (local/foreign)	<input type="checkbox"/> Gift
<input type="checkbox"/> Commission income	<input type="checkbox"/> Salary/Profit Income	<input type="checkbox"/> Membership Contribution
<input type="checkbox"/> Export proceeds	<input type="checkbox"/> Investment Proceed	<input type="checkbox"/> Others (Specify)

ANTICIPATED VOLUMES: Expected/Usual average volumes of deposits into the account in rupees per month

<input type="checkbox"/> Less than 100,000 (App. US\$ 1,000)	<input type="checkbox"/> 3000,000 to 5000,000 (App. US\$ 30,000 to 50,000)
<input type="checkbox"/> 100,000 to 500,000 (App. US\$ 1,000 to 5,000)	<input type="checkbox"/> 5000,000 to 7000,000 (App. US\$ 50,000 to 70,000)
<input type="checkbox"/> 500,000 to 1000,000 (App. US\$ 5,000 to 10,000)	<input type="checkbox"/> 7000,000 to 10,000,000 (App. US\$ 70,000 to 100,000)
<input type="checkbox"/> 1000,000 to 2000,000 (App. US\$ 10,000 to 20,000)	<input type="checkbox"/> Over 10,000,000 (App. US\$ 100,000)
<input type="checkbox"/> 2000,000 to 3000,000 (App. US\$ 20,000 to 30,000)	

SOURCE OF WEALTH Wealth generated from :

<input type="checkbox"/> Business ownership/income	<input type="checkbox"/> Inheritance
<input type="checkbox"/> Investments	<input type="checkbox"/> Others (Specify)
<input type="checkbox"/> Profession/employment	

Risk Category

☐ Low ☐ Medium ☐ High

Is the client or any member of his immediate family is a Political Exposed Person (PEP)?

☐ Yes ☐ No

If "Yes" – Please specify

.....

.....

.....

Any other information

.....

.....

.....

Next day he wanted to open another bank account in a different bank.

(Maybe he was somehow disappointed with the first one.)

Again, He received another bunch of documents to fill.

One of them is this!

A KYC Form.

Customer Profile Form (KYC)- For Personal Customers					
(Requirement in terms of the Financial Transaction Reporting Act No.6 of 2006/ any other Foreign or Local Law)					
For Bank Use Only		KYC Reviewed Dates			
ACCOUNT NO	:	Date	Intl	Date	Intl
CIF NO	:				
BRANCH NO	:				
MANAGER'S INTL	:				
Section A – Basic information of the Individual including of those holding power of attorney.					
✓ Tick the appropriate boxes					
1. Customer Name :					
2. Nature of Business :			3. Occupation/Employment/ Position Held :		
4. Name & Address of Employer :					
5. Status of the Residential Address :					
Ownership of premises		<input type="checkbox"/> Owner (A)	<input type="checkbox"/> Lease/Rent (C)	<input type="checkbox"/> Friends/Relatives (E)	
		<input type="checkbox"/> Parent's (B)	<input type="checkbox"/> Official (D)	<input type="checkbox"/> Board/Lodging (F)	
Permanent Address :			Foreign Address (if any) :		
6. Citizenship :					
<input type="checkbox"/> Sri Lankan (A)		<input type="checkbox"/> Resident in Sri Lanka <input type="checkbox"/> Non Resident Country of Residence	For (B) (C) and (D)		
<input type="checkbox"/> Sri Lankan with dual citizenship (B)			Country of Birth	Nationality	
<input type="checkbox"/> Foreign National with dual citizenship (C)			Type of Visa	<input type="checkbox"/> Permanent Residence <input type="checkbox"/> Green Card	
<input type="checkbox"/> Foreign national (D)			Expiry Date	<input type="checkbox"/> Temporary Residence <input type="checkbox"/>(Specify)	
7. In case of Foreign Passport Holders, give the purpose of opening the account in the foreign jurisdiction :					
8. Purpose of Opening the Account :					
<input type="checkbox"/> Business transactions		<input type="checkbox"/> Remittances	<input type="checkbox"/> Social & Charity work		
<input type="checkbox"/> Employment/Professional income		<input type="checkbox"/> Bill payment/ Loan repayment	<input type="checkbox"/>		
<input type="checkbox"/> Savings		<input type="checkbox"/> Share transactions / Investment purposes			
9. Source of Funds : [Expected source and nature of credits into the account]					
<input type="checkbox"/> Salary/Profit/Professional Income		<input type="checkbox"/> Export Proceeds	<input type="checkbox"/> Sale of Property/Assets		
<input type="checkbox"/> Sales and Business Turnover		<input type="checkbox"/> Donations/Charities (Local/Foreign)	<input type="checkbox"/> Gifts		
<input type="checkbox"/> Rent Income		<input type="checkbox"/> Investment Proceeds	<input type="checkbox"/>		
10. Anticipated Volumes : [Expected/Usual average volumes of deposits into the account in Rs per month]					
<input type="checkbox"/> Less than Rs.200,000 (or equivalent FC value)		<input type="checkbox"/> Rs.1,000,000 to Rs.3,000,000 (or equivalent FC value)			
<input type="checkbox"/> Rs.200,000 to Rs.1,000,000 (or equivalent FC value)		<input type="checkbox"/> Over Rs.3,000,000 (or equivalent FC value)			
11. Expected Mode of Transactions/ Delivery Channels :					
<input type="checkbox"/> Cash		<input type="checkbox"/> Cheque	<input type="checkbox"/> Fund Transfers	<input type="checkbox"/> All mode of forms	
12. Other Connected Businesses /Professional Activities (if applicable) :					
Section B –Mandatory checks (For Bank Use Only)					
1. Name, Date of birth and Nationality verification : To be supported by one of the following accepted documents.					
<input type="checkbox"/> National Identity Card		<input type="checkbox"/> Valid Driving License			
<input type="checkbox"/> Valid Passport		<input type="checkbox"/> Postal Identity Card/Birth Certificate (only for Minors)			
2. Address verification: Residential address to be supported by one of the following accepted documents (N.B.- Mobile Phone Bills/ Statements of other Banks are not accepted)					
<input type="checkbox"/> National Identity Card		<input type="checkbox"/> Voting Card issued within one month	<input type="checkbox"/> Letter from a public Authority		
<input type="checkbox"/> Tenancy/Lease Agreement (with billing proof of owner)		<input type="checkbox"/> Current Utility Bill (Electricity / Water/ Fixed Phone/ Pay TV)	<input type="checkbox"/> Income Tax Receipt/ Assessment Notice		
<input type="checkbox"/> Valid Driving License		<input type="checkbox"/> Employment Contract	<input type="checkbox"/> A letter from Gramaniladhari (counter signed by Divisional Sec.)		
3. Geographical Area :					
Customer is residing within a reasonable distance to the Branch?				<input type="checkbox"/> Yes	<input type="checkbox"/> No

And,

Next day Sam wanted to get a leasing.
He went to a financing company.

Again, he received a bunch of documents.

One of them was
Yeah,

A KYC Form !



As required under the Financial Institutions (Customer Due Diligence) Rules, No. 01 of 2016 issued by the Financial Intelligence Unit of Central Bank of Sri Lanka in terms of Section 02 of the Financial Transactions Reporting Act, No 06 of 2006.

Please tick (✓) appropriate boxes.

Customer Due Diligence (CDD) Form – Individuals

For Office Use Only

Client Code		Branch	
Managers' Initial		Date	

Personal Details	
Full name : Mr/Mrs/Miss/Dr/Rev (Please underline the title)	
National Identity Card No (NIC)	
(Indicate valid Passport Number in the case of Foreign Nationals)	
Date of Birth	D D M M Y Y Y Y
Nationality	<input type="checkbox"/> Sri Lankan <input type="checkbox"/> Resident <input type="checkbox"/> Non Resident - Country of Residence <input type="checkbox"/> Sri Lankan with Dual Citizenship - Country <input type="checkbox"/> Foreign National with dual citizenship / resident in or employed in Sri Lanka Country VISA Expiry Date.....

Contact Information	
Permanent Address	
Mailing Address	
Foreign address (If applicable)	
Contact No.	Res: Mobile: Office: Fax:
E-mail	

Employment Information			
Employment Status	<input type="checkbox"/> Self employed	<input type="checkbox"/> Part-time employed	<input type="checkbox"/> Retired
	<input type="checkbox"/> Full-time employed	<input type="checkbox"/> Not currently employed	<input type="checkbox"/> Others (Specify)
Occupation/ Position held			
Name of the Employer			
Address of the Employer			
Nature of Business	<input type="checkbox"/> Manufacturing	<input type="checkbox"/> Import/ Export	
	<input type="checkbox"/> Finance/Insurance	<input type="checkbox"/> Wholesale	
	<input type="checkbox"/> Construction	<input type="checkbox"/> Communications	
	<input type="checkbox"/> Retail	<input type="checkbox"/> Business Services	
	<input type="checkbox"/> Transport	<input type="checkbox"/> Real Estate	
	<input type="checkbox"/> Restaurants	<input type="checkbox"/> Public Services	
	<input type="checkbox"/> Hotel/ Boarding house	<input type="checkbox"/> Gem and Jewelry	
	<input type="checkbox"/>		

Now,
Sam is thinking,

**“ Why do I need to
fill the same stuff
over and over.
Is there any better
solution? ”**



KYC : Know your customer

Identification and verification of customer.

How to reuse / share KYC data ?

Paper-Based Identity

Most credentials are physical



Digital Identity

Siloed Identity

- Poor user Experience.

Federated Identity

- Centralized.
- Third Party is the middleman of thrust.



Self-Sovereign Identity (SSI)

- User owns and controls their identity.
- Decentralized.
- Tamper proof – immutable.
- No need of trusted third party.

Three pillars of SSI

- Verifiable credentials protocol.
- Decentralized Identifiers protocol.
- Distributed Ledger Technology. (Blockchain)

Three roles of SSI “trust triangle”

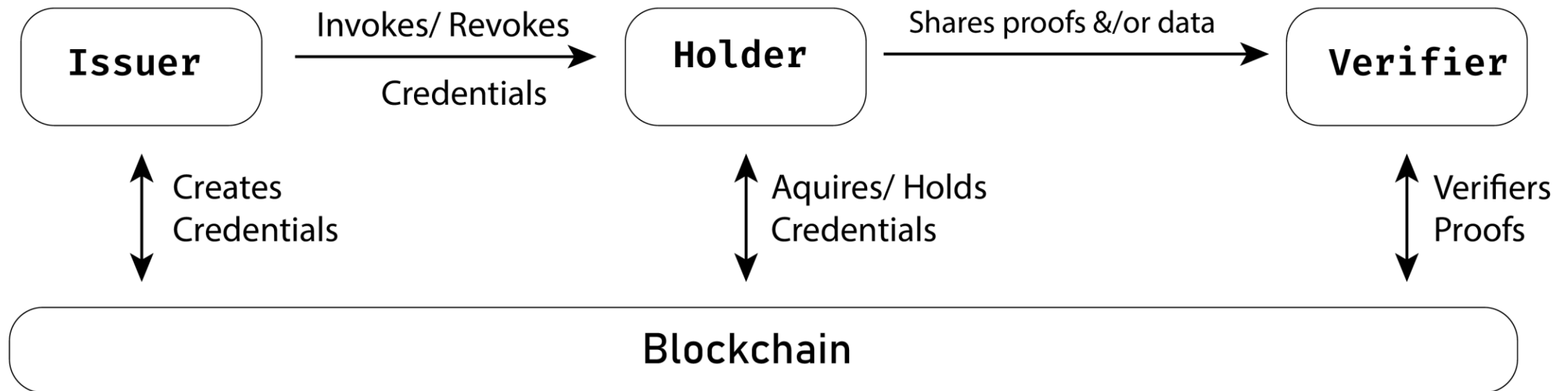
- Issuer
- Holder
- Verifier

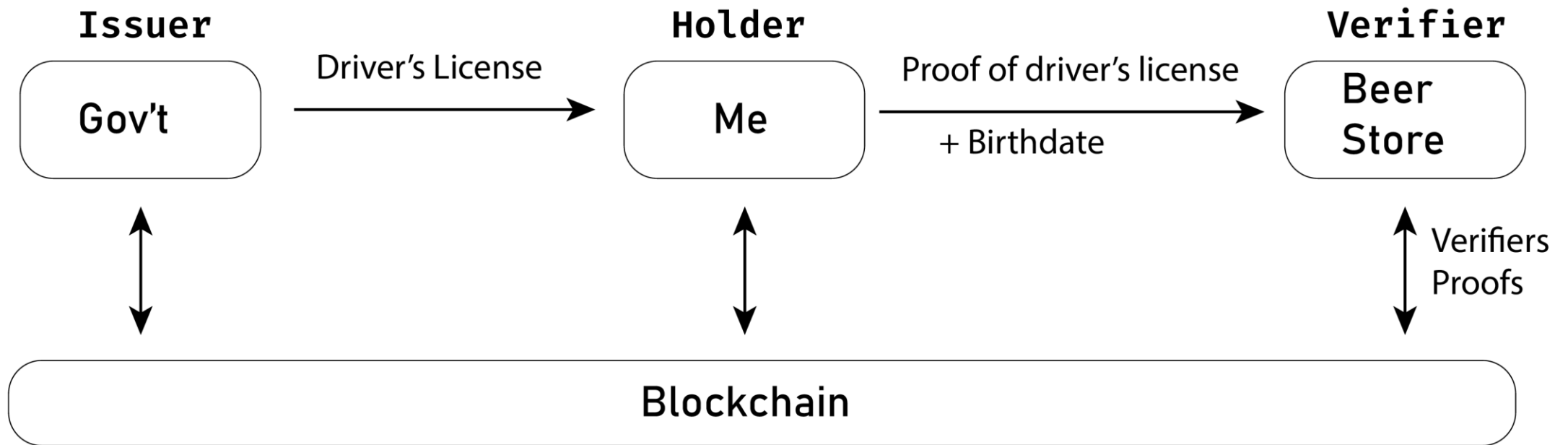
Credentials & Verifiable Credentials

Credential is a proof of identity or a qualification.

E.g. : Driver's License, Passport, Diploma certificate

Verifiable credential is tamper-proof credentials that can be verified cryptographically.





Self-Sovereign Identity has been used in,

W3C : The World Wide Web Consortium

Decentralized Identifiers (DIDs) v1.0 becomes a W3C Recommendation

W3C press release – 19 July 2022

[Decentralized Identifiers \(DIDs\) v1.0 becomes a W3C Recommendation](#)

Microsoft Decentralized Identity Solution

[Decentralized Identity Solution | Microsoft Security](#)

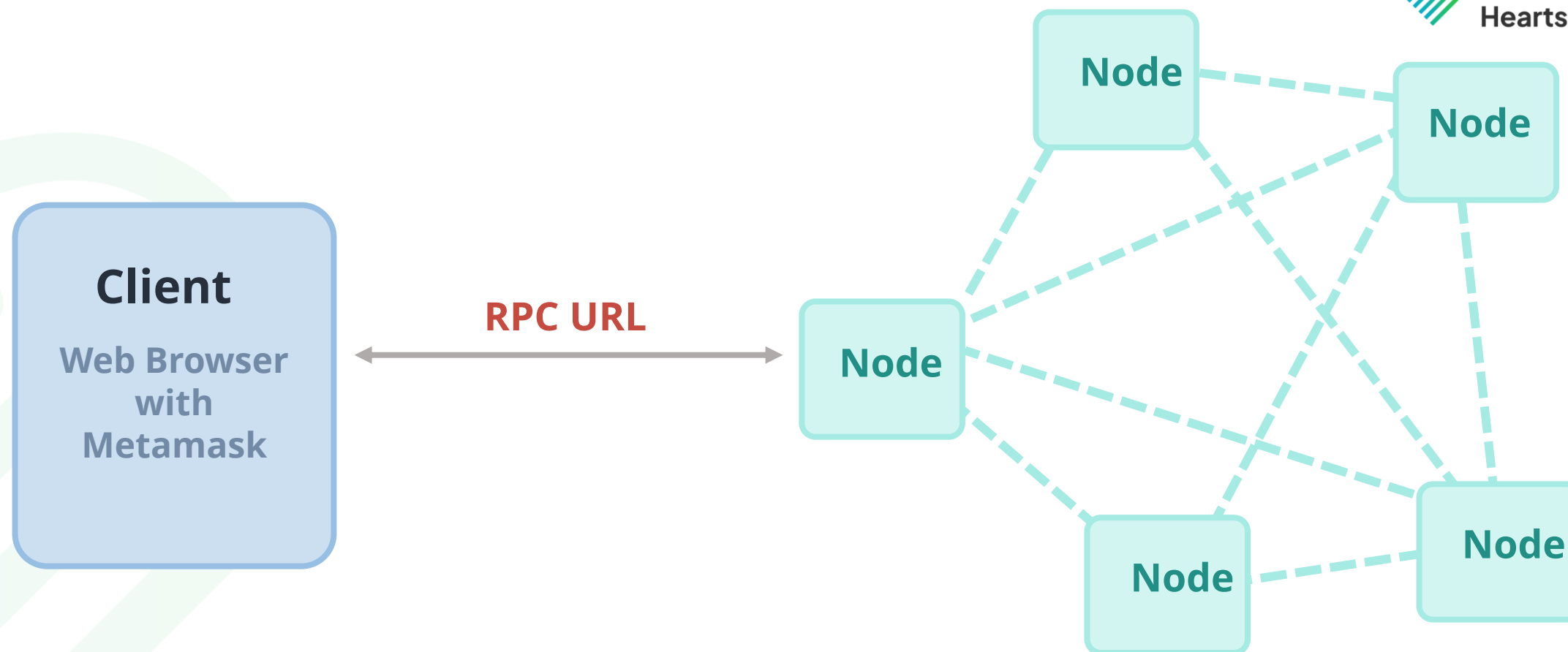
European Self-Sovereign Identity Framework – European Commission (European Union)

[Home - EBSI - \(europa.eu\)](#)

Silicon valley Innovation Program - US Department of Homeland Security

[Blockchain Portfolio | Homeland Security \(dhs.gov\)](#)

Let's build our dApp.

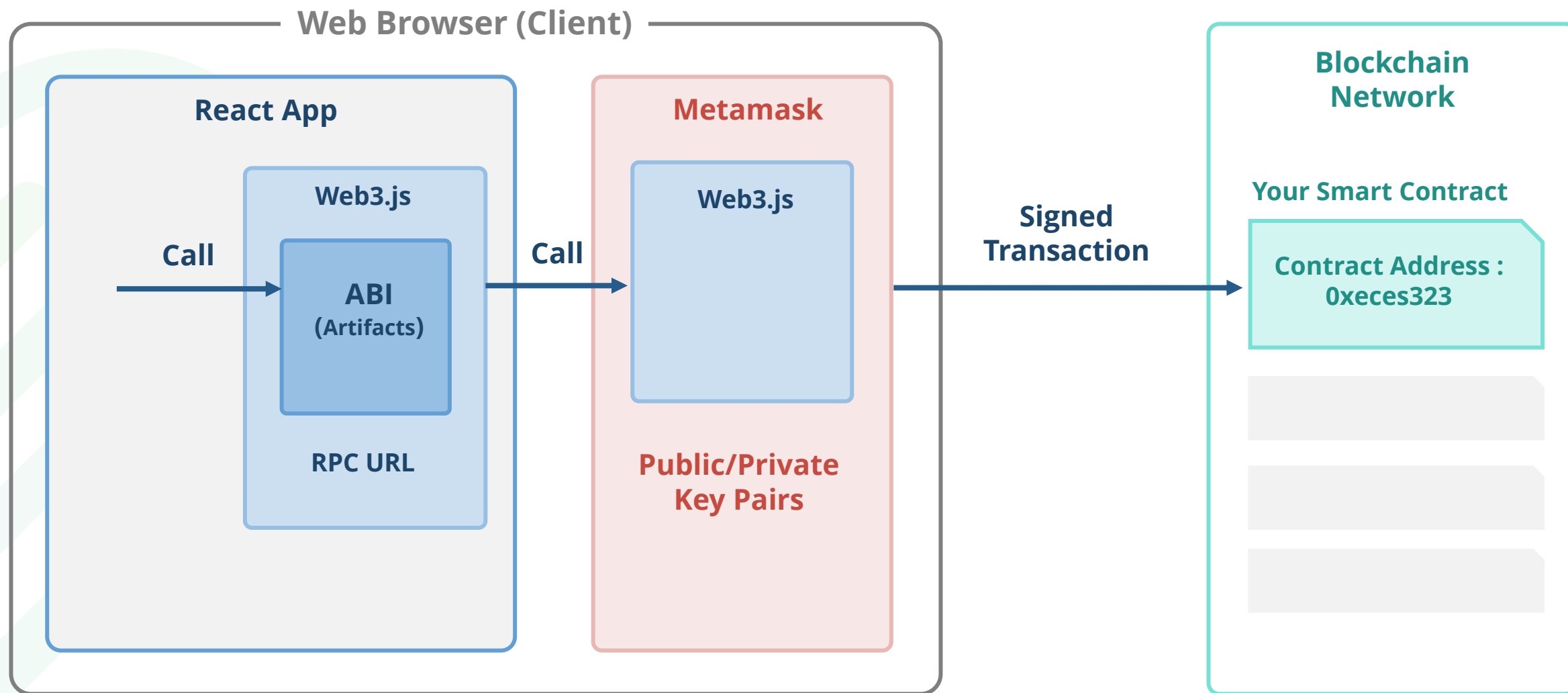


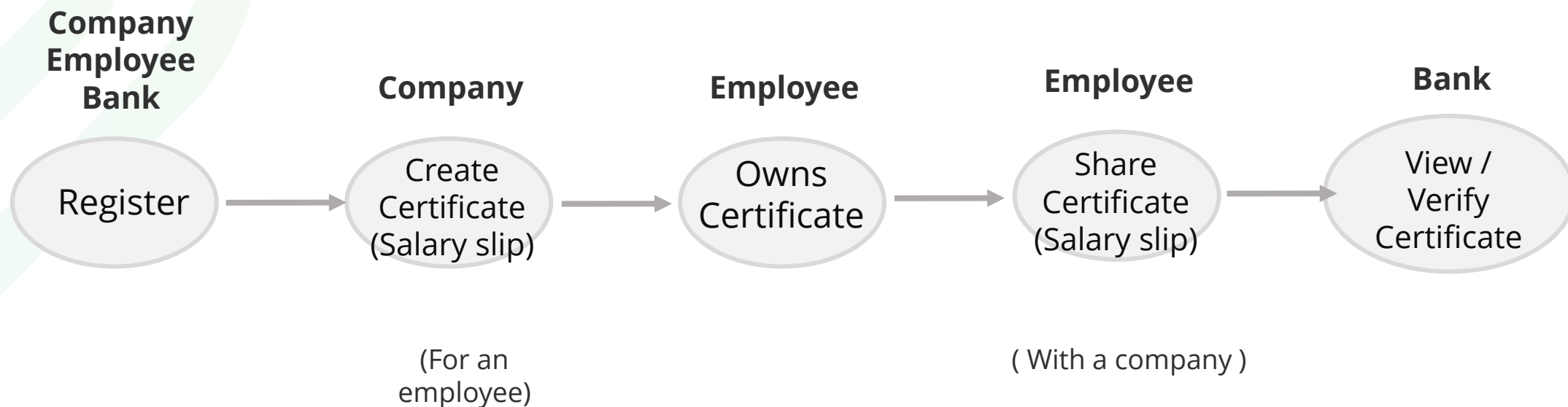
Local Node Provider – Ganache

<http://127.0.0.1:8545>

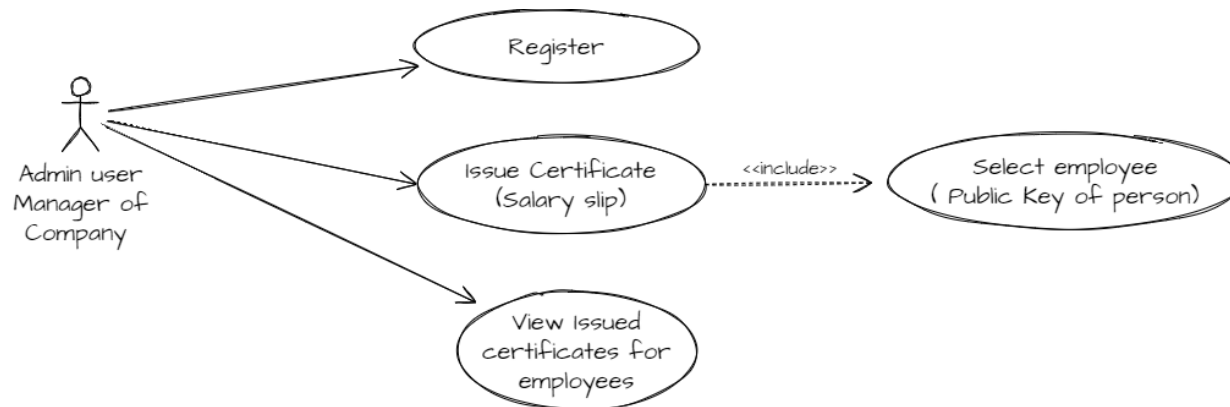
Ethereum Node Provider / Testnet Node Provider – Alchemy

<https://eth-mainnet.g.alchemy.com/v2/6zPxpRISR-Q1WjuSRNdMtIrBNPqHvuyY>

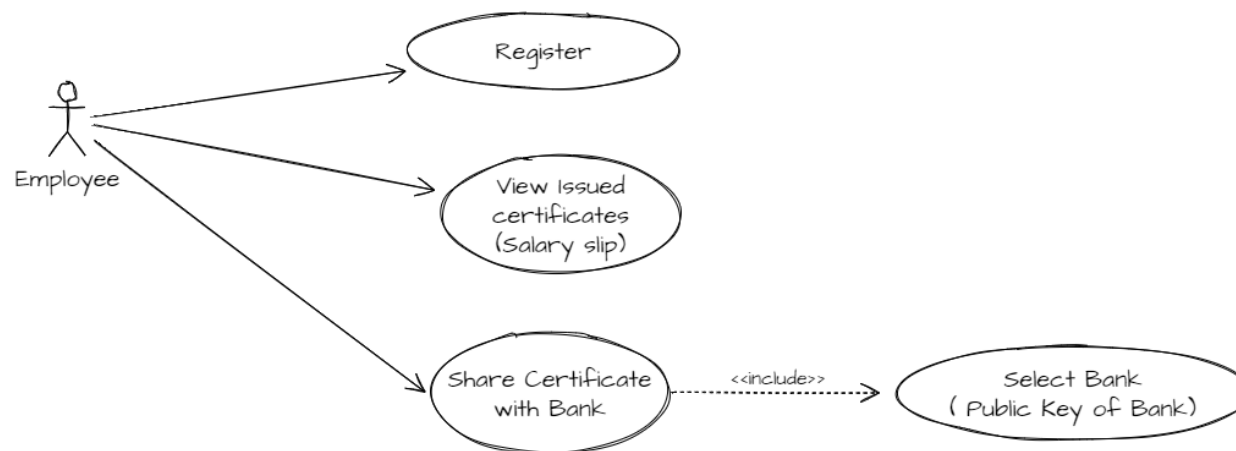




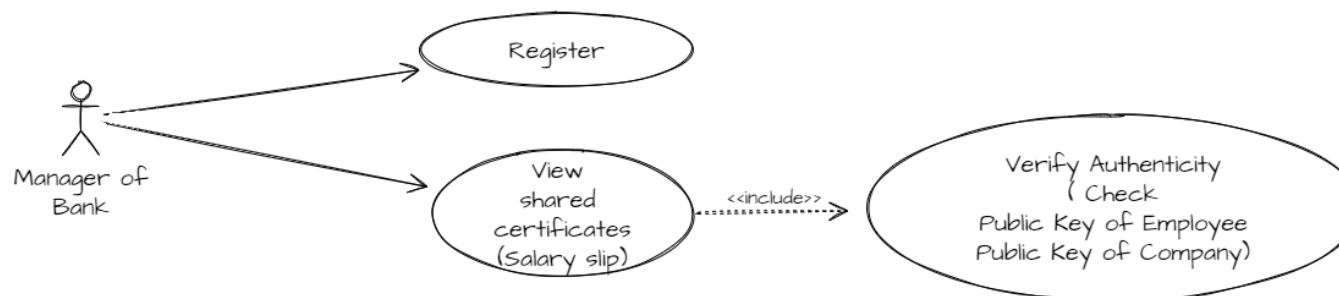
Public Address:
0xabcd1234



Public Address:
0xefcg5678



Public Address:
0xpqrs9012



Data Structures

UserType (enum)
Issuer
Holder
Verifier

User (struct)
Id (uint32)
Name (string)
Type (UserType)

Users (mapping)	
User Address (address)	User (User)

Credential (struct)
Id (uint32)
Holder (address)
Definition (string)
CreatedAt (uint32: timestamp)

Credentials (mapping)	
Credential Id (uint32)	Credential (Credential)



Credentials List (Array)

Credential []

Shared Credentials List (Array)

Credential []

Credentials Record (mapping)

Holder Address (address)

Credential Id array (uint32 [])

Shared Credentials Record (nested mapping)

Holder Address (address)

Verifier Address (address)

Credentials Id Array (uint32 [])

Functions

add User()

- Creates a user. (Owner, Issuer, Verifier)

get User()

- Returns a User from Users.

create Credential()

- Creates a credential.
- Check if an Issuer and a holder is given.

get Credentials By Id()

- Returns a credential by Id.

get All Credentials()

- Returns an array of credentials.

get All Credentials By Holder()

- Returns an array of credentials by holder.

Share Credentials()

- Push a credential in to shared credentials array.

Get All Shared Credentials()

- Return an array of shared credentials.

Next steps

Third Generation blockchains.

Cardano, Polygon, Avalanche, Solana, Cosmos

Blockchain Oracles

Chainlink

Enterprise blockchains

Hyperledger

Corda



Potential Blockchain Use Cases



Financial Institutions

- International payments
- Capital markets
- Trade finance
- Regulatory compliance & audit
- Anti-money laundering & know your customer
- Insurance
- Peer-to-peer transactions



Corporates

- Supply chain management
- Healthcare
- Real estate
- Media
- Energy



Governments

- Record management
- Identity management
- Voting
- Taxes
- Government & non-profit transparency
- Legislation, compliance & regulatory oversight



Cross-industry

- Financial management & accounting
- Shareholders' voting
- Record management
- Cybersecurity
- Big data
- Data storage
- Internet of Things



**Learn long,
Build & Prosper**

“Live long and prosper.” Captain Spock

Thank You.

