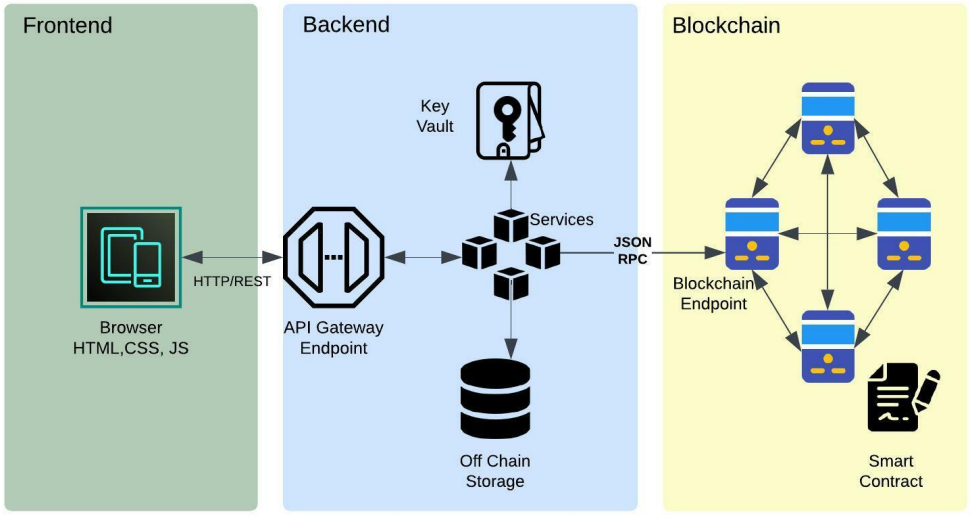
8. Architectural Overview

(Ivonne Ojeda)

Our services will be delivered through a Web application with a hybrid architecture (semi-decentralized) between client-server and a blockchain. The conceptual and logical structure will be the following:



The aim of our service is to provide users with secure, immutable, and decentralized storage of their testament/will which would be achieved using the blockchain as the main source of truth for the application. However, technical limitations of a blockchain (gas, the workload in the network, etc) make the client-blockchain (Dapp - decentralized application) communication tends to be asynchronous which means the user will encounter; in a high probability, a UI being less responsive, and the flow of a process uncompleted in some cases [3}. On the other hand, the high cost of computation in a blockchain will increase the expenses of the company and that will affect the final prices of our services.

To overcome those challenges and provide a "smoother perceived user experience" [3] the application will have a basic client-server architecture where the backend processes the different requests and manage the communication with the blockchain.

8.1 Conceptual Components [3]

1. Client: A client is any computer/device that requests any of our services (the creation of a login account, creation of a draft testament, confirmation of final testament, confirmation of death, deleting of a testament, querying a testament) through our UI.

2. API Gateway: The API Gateway will provide a single entry point for all API calls that come into the application[8].

3. Backend Application Logic: It contains the logic to fulfilled the business objectives; a set of small services according to the different requests the user can be sent, besides the communication with the blockchain.

4. Off Chain Storage: Any data storage outside the blockchain. In our case, a database will contain the login data, testament draft, and metadata, etc.

5. Key Vault: A key value will storage the private key to access the blockchain services.

6. Blockchain Endpoint: A blockchain endpoint is a device or node running a piece of software that implements the blockchain protocol. [3]

7. Smart Contract: "A smart contract is simply a program that runs on the blockchain. It's a collection of code (its functions) and data (its state) that resides at a specific address on the blockchain" [4]. The smart contract will store the testament once the confirmation of authenticity is verified, and additionally will release the testament when the user's death is confirmed.

8.2 The Blockchain

This apart contains the overview of the Ethereum blockchain as a first option of the provider of the blockchain for our application, however, the final decision has not been taking it at the moment of this monthly report.

What is Ethereum? "Ethereum is a blockchain with a computer embedded in it. It is the foundation for building apps and organizations in a decentralized, permissionless, censorship-resistant way."[10]. This blockchain is permissionless (public), which means any device/computer that joins the network does not require authorization; also sends and receives transactions; operates a node; views, copy and contributes to the code; and participate in the consensus process.

The main advantage that Ethereum offers to our company is that Ethereum is programmable, and provides a framework to build and deploy decentralized applications on its network [11]. The application's logic is contained in the Smart Contracts.

Deploying a smart contract in Ethereum requires: 1) A wallet and ETH. Adding the contract to the blockchain requires high computations that consume resources then the nodes receive a payment (a reward) for the work before performing the operations. The currency used is the ETH. 2) the bytecode of the smart contract generates after compilation. 3) A deployment script/plugin.

8.2.1 Storage of the testaments/will - Initial idea

The information that our company will store on the blockchain is highly sensitive and must remain private. Since the blockchain Ethereum is public/permissionless, the proposed idea is to store in the blockchain the verified testament encrypted with a private key. The user and his attorney will have the private key that allows decrypted the document. The idea is based on the blockchain developed by Almaviva, an Italian company leader in the IT sector [1].

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