Proofs Technical Design

General Information

As a User I want to be able to create Agreement, collect the signatures from the Signers. As a result I want Agreement to become Active.

Specification

Glossary

- *Creator* – creator of Agreement (i.e. the initiator of the Agreement signing process)
- *Signer* – user who is indicated in Agreement as a signer
- *Agreement File* – the original file of Agreement provided by *Creator*
- *Agreement File CID* – IPFS CID of the *Agreement File*
- *Agreement File Proof Data* – object with *Agreement CID* and other data for *Creator* to sign. For details see the structure of the file below
- *Agreement File Proof* – signed by *Creator*, *Agreement File Proof Data*. For details see the structure of the file below
- *Agreement File Proof* CID – IPFS CID of the signed *Agreement File Proof*
- *Agreement Sign Proof Data* – object with *Agreement CID* and other data for *Signer* to sign. For details see the structure of the file below
- *Agreement Sign Proof* – signed by any *Signer*, *Agreement Sign Proof Data* object. For details see the structure of the file below
- *Agreement Sign Proof CID* – IPFS CID of the signed *Agreement Sign Proof*
- *Agreement Proof* – object that contains *Agreement File Proof CID* along with *Agreement Sign Proof CIDs* of all *Signers*. For details see the structure of the file below
- *Agreement Proof CID* – IPFS CID of the *Agreement Proof*

Note

For more details about the structure of *Agreement File Proof, Agreement File Proof Data, Agreement Sign Proof, Agreement Sign Proof Data, and Agreement Proof* – see a Medium article "EIP712 is here: What to expect and how to use it"

Agreement File Proof Data

```
{
  "types": {
    "EIP712Domain": [
        { "name": "name", "type": "string" },
        { "name": "version", "type": "string" },
        { "name": "chainId", "type": "uint64" },
        { "name": "verifyingContract", "type": "address" }
    ],
    "Agreement": [
      { "name": "name", "type": "string" },
      { "name": "from", "type": "address" },
      { "name": "agreementFileCID", "type": "string" },
      { "name": "signers", "type": "Signers" },
      { "name": "app", "type": "string" },
      { "name": "timestamp", "type": "uint64" },
      { "name": "metadata", "type": "string" }
    ],
    "Signers": [
      { "name": "address", "type": "string" },
      { "name": "metadata", "type": "string" }
    ]
  },
  "domain": {
    "name": "daosign",
    "version": "0.1.0"
  },
  "primaryType": "Agreement",
  "message": {
    "name": "Proof-of-Authority",
    "from": "<Creator's address>",
    "agreementFileCID": "<Agreement File CID>",
    "signers": [
      { "address": "<Signer 1 address>", "metadata": "{}" },
      { "address": "<Signer 2 address>", "metadata": "{}" },
      { "address": "<Signer 3 address>", "metadata": "{}" }
    ],
    "app": "daosign",
    "timestamp": <timestamp in seconds>,
    "metadata": "{}"
  }
}
```

Agreement File Proof

```
{
  "address": "<User's address>",
  "sig": "<User's signature of Agreement File Proof Data>",
  "data": <Agreement File Proof Data object>
}
```

Agreement Sign Proof Data

```
{
  "types": {
    "EIP712Domain": [
        { "name": "name", "type": "string" },
        { "name": "version", "type": "string" },
        { "name": "chainId", "type": "uint64" },
        { "name": "verifyingContract", "type": "address" }
    ],
    "Agreement": [
      { "name": "name", "type": "string" },
      { "name": "signer", "type": "address" },
      { "name": "agreementFileProofCID", "type": "string" },
      { "name": "app", "type": "string" },
      { "name": "timestamp", "type": "uint64" },
      { "name": "metadata", "type": "string" }
    ]
  },
  "domain": {
    "name": "daosign",
    "version": "0.1.0"
  },
  "primaryType": "Agreement",
  "message": {
    "name": "Proof-of-Signature",
    "signer": "<signer's address>",
    "agreementFileProofCID": "<Agreement File Proof CID>",
    "app": "daosign",
    "timestamp": <timestamp in seconds>,
    "metadata": "{}"
  }
}
```

Agreement Sign Proof

```
{
  "address": "<signer's address>",
  "sig": "<signer's signature>",
  "data": <Agreement Sign Proof Data object>
}
```

Agreement Proof

```
{
  "agreementFileProofCID": "<Agreement File Proof CID>",
  "agreementSignProofs": [
      { "proofCID": "<Agreement Sign Proof CID>" },
      { "proofCID": "<Agreement Sign Proof CID>" },
      { "proofCID": "<Agreement Sign Proof CID>" }
  ],
  "timestamp": <timestamp in seconds; this this the last signature's
timestamp>
}
```

Description

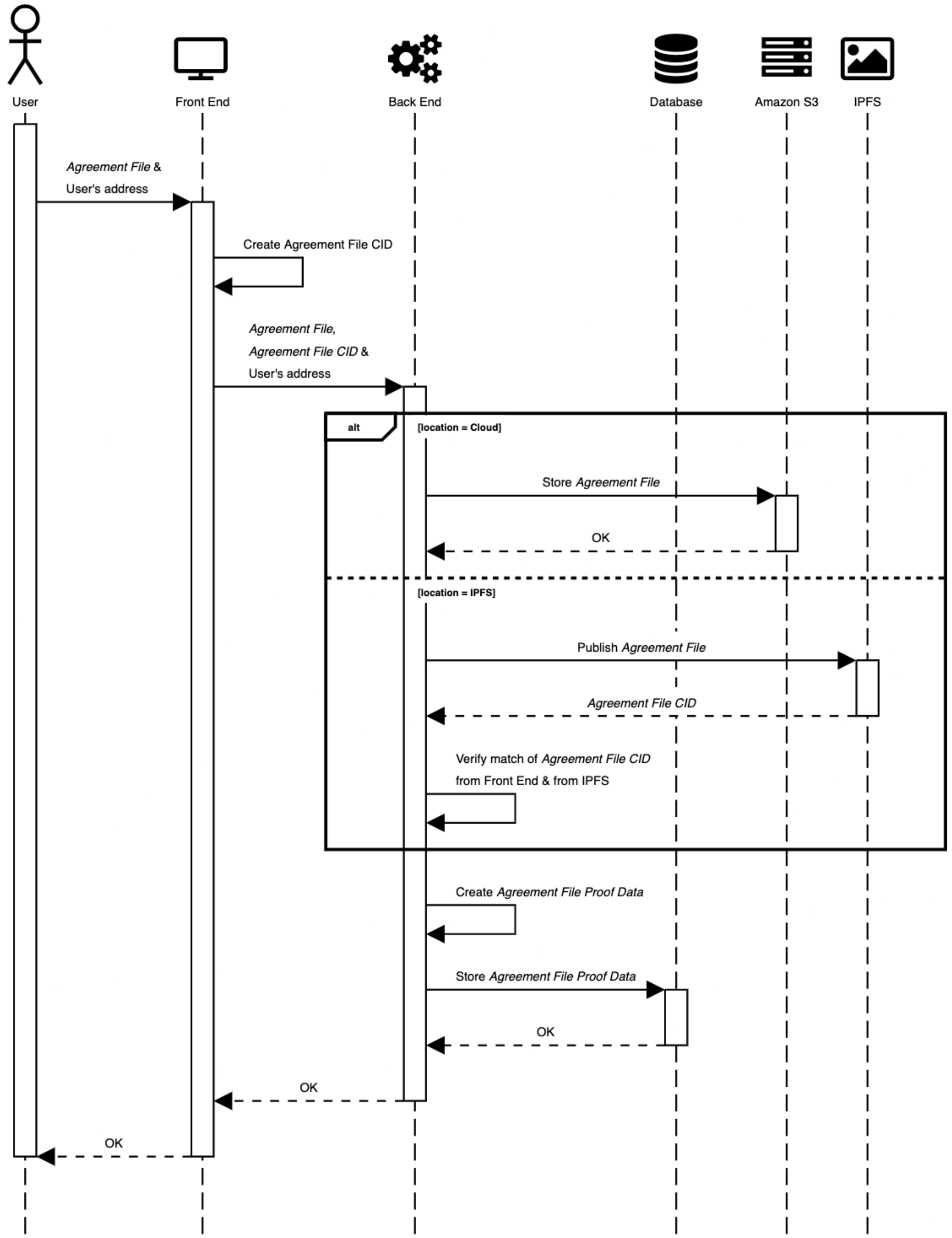
The Agreement signing process involves a couple of steps.

- Step 1 – Publishing Agreement
- Step 2 – Signing the document (a.k.a Proof-of-Authority)
- Step 3 – Signing Agreement by Signer(s) (a.k.a Proof-of-Signature)
- Step 4 – Create Agreement Proof (a.k.a Proof-of-Agreement)

Step 1 – Publishing Agreement

To create an Agreement, the user must first create an Agreement Draft. From the Agreement draft file *Agreement File CID* is created that is stored in the Database and IPFS. Also, the *Agreement File* (Agreement draft file) is stored in Amazon S3, if user want us to store the file.

Publishing Agreement



Step 2 – Signing the document (a.k.a Proof-of-Authority)

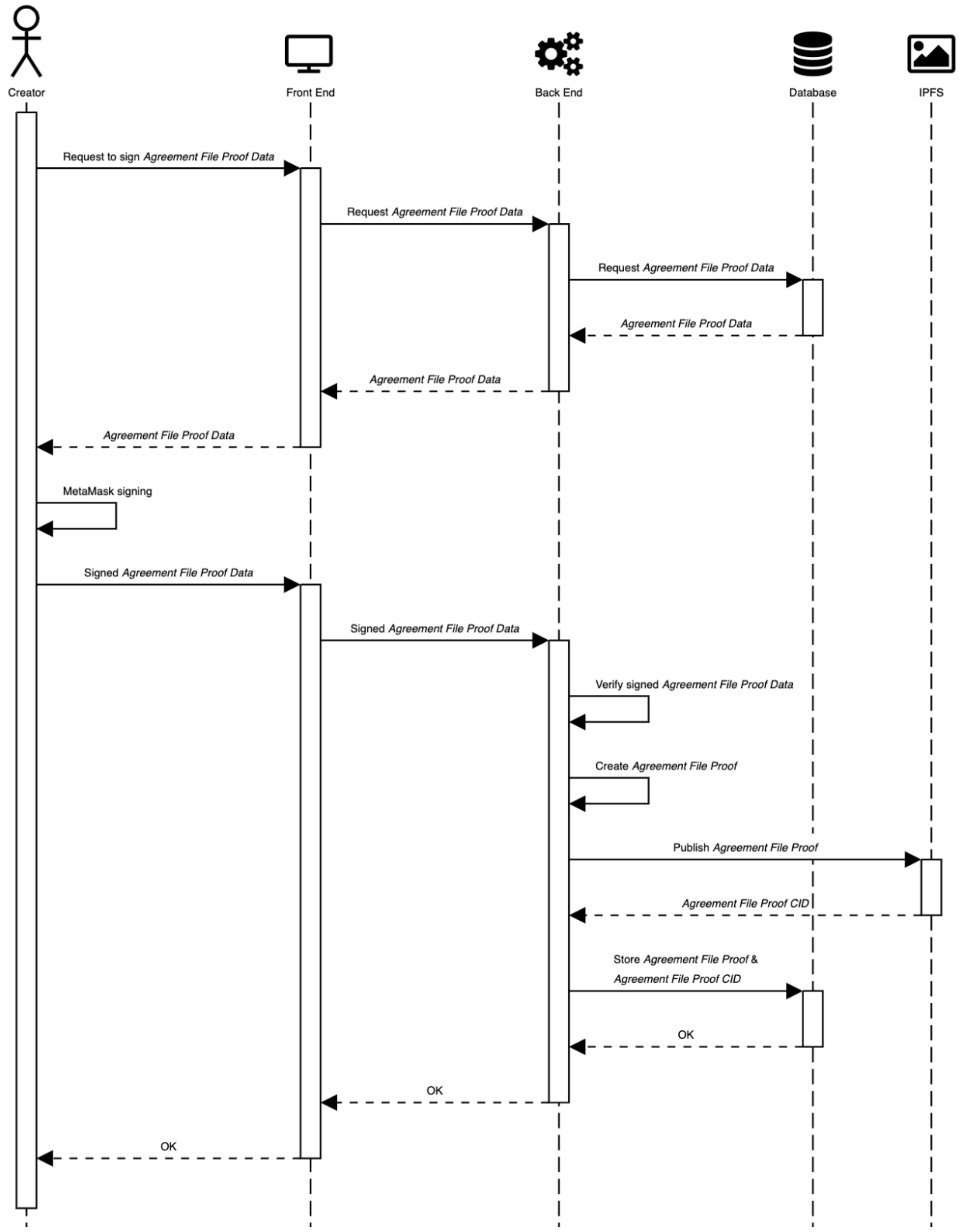
On this step, *Creator* of *Agreement File* has to proof that he’s the one who created *Agreement File*.

Creator is presented with the *Agreement File Proof Data* to be signed. After *Creator* is satisfied with the document content, the user clicks the "Sign Agreement" button to sign the *Agreement File Proof Data*. Signed *Agreement File Proof Data* is stored in the Database and IPFS.

During *Agreement File Proof Data* signature verification step Back End should verify the following:

- timestamp in *Agreement File Proof Data* isn’t older than 1 hour
- the object that the user has signed is the object that the user was asked to sign and it is unchanged
- the signature is valid i.e the user’s address is the one who created the signature, and the signature is the signature of the *Agreement Sign File Data*

Signing Agreement by Agreement Creator / Proof-of-Authority


Creator
Front End
Back End
Database
IPFS
Request to sign *Agreement File Proof Data*
Request *Agreement File Proof Data*
Request *Agreement File Proof Data*
Agreement File Proof Data
Agreement File Proof Data
Agreement File Proof Data
MetaMask signing
Signed *Agreement File Proof Data*
Signed *Agreement File Proof Data*
Verify signed *Agreement File Proof Data*
Create *Agreement File Proof*
Publish *Agreement File Proof*
Agreement File Proof CID
Store *Agreement File Proof* &
Agreement File Proof CID
OK
OK
OK

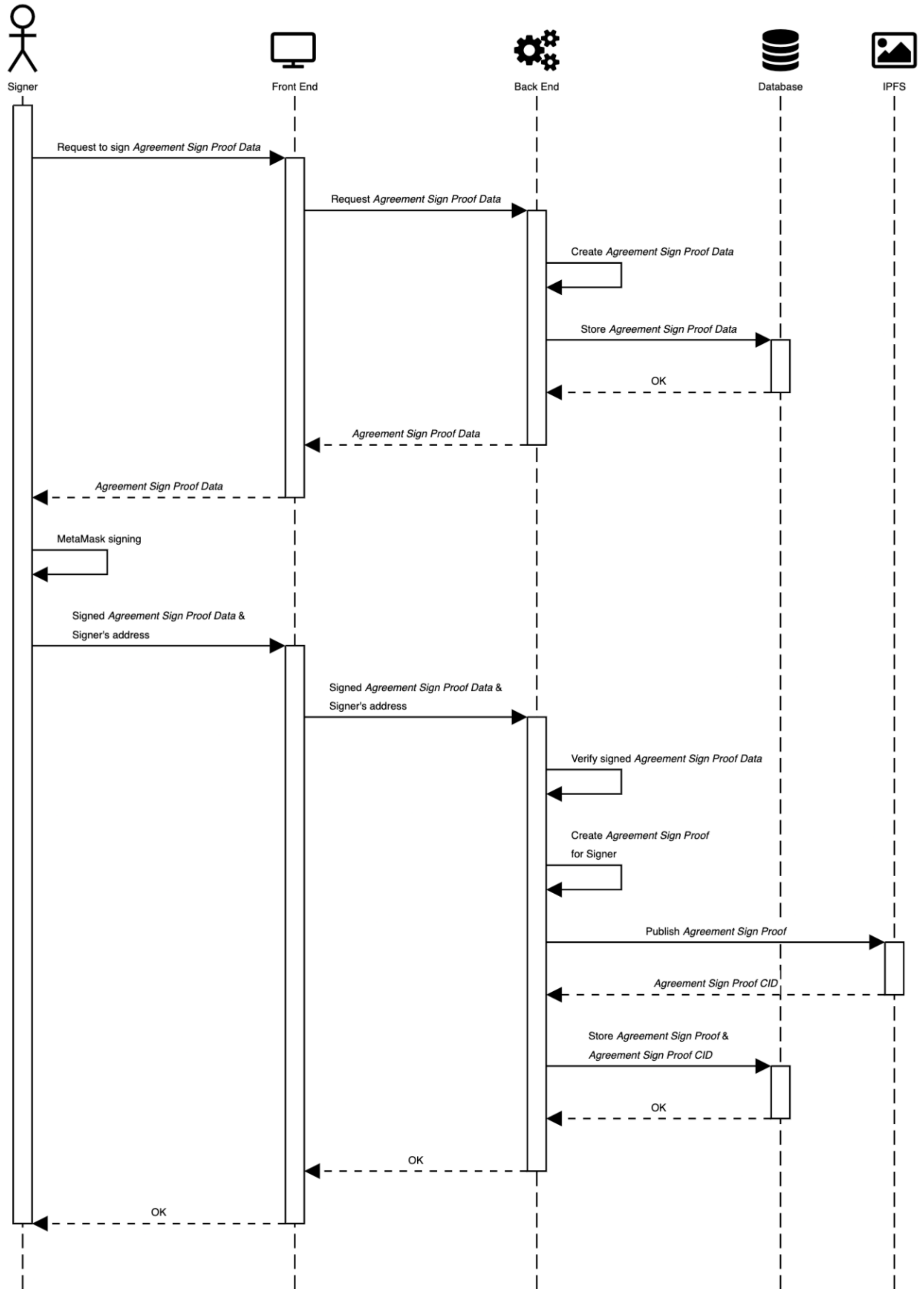
Step 3 – Signing Agreement by Signer(s) (a.k.a Proof-of-Signature)

Now, when *Agreement File Proof Data* is signed by *Creator*, the *Signers* of *Agreement* can start adding their signatures to approve the document. To do so, they will receive *Agreement Sign Proof Data* to sign. Their signature proofs (*Agreement Sign Proofs*) will be stored to Database and IPFS.

During *Agreement Sign Proof Data* signature verification step Back End should verify the following:

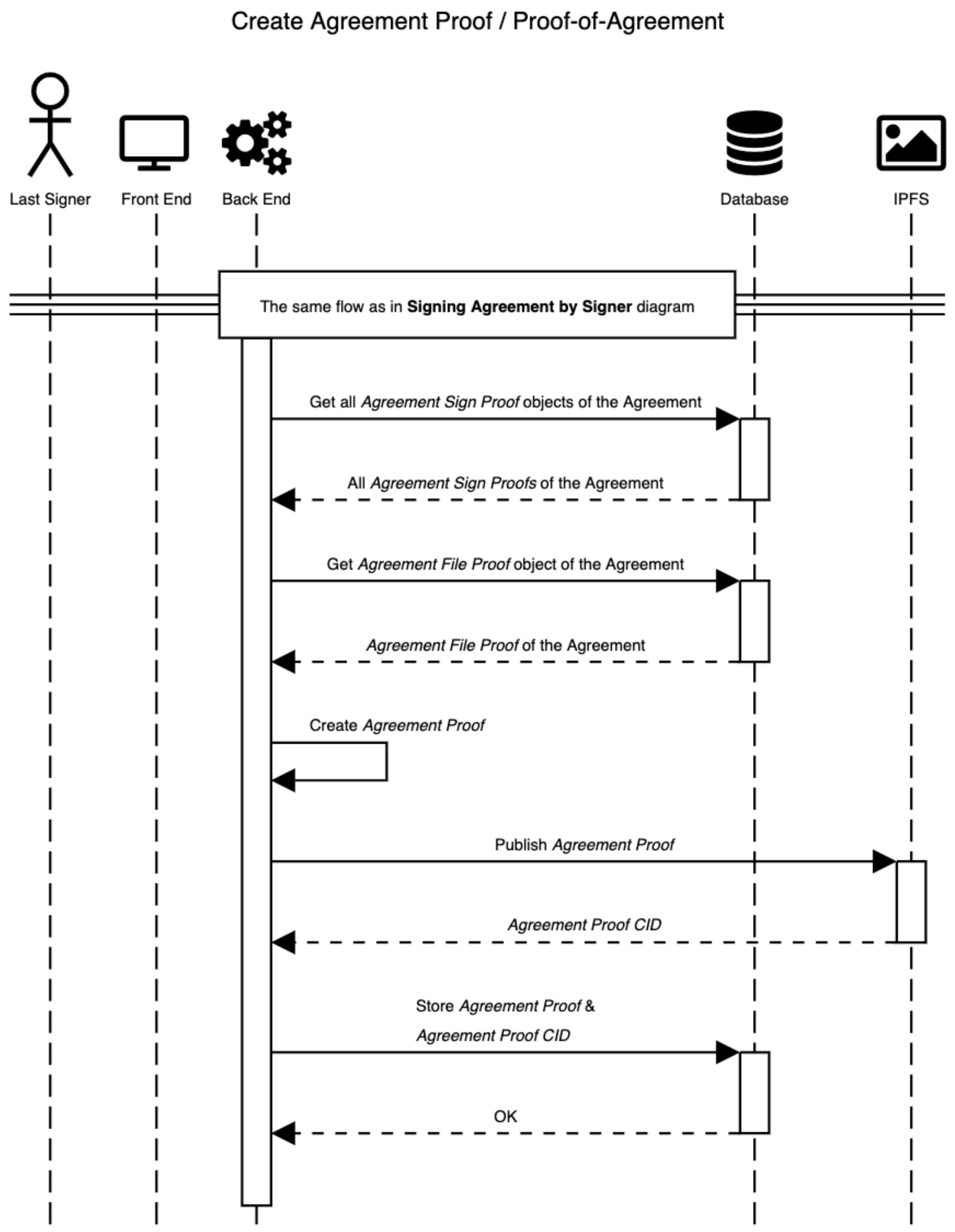
- timestamp in *Agreement Sign Proof Data* isn't older than 1 hour
- the object that the user has signed is the object that the user was asked to sign and it is unchanged
- the signature is valid i.e the user's address is the one who created the signature, and the signature is the signature of the *Agreement Sign Proof Data*

Signing Agreement by Signer / Proof-of-Signature


Signer
Front End
Back End
Database
IPFS
Request to sign *Agreement Sign Proof Data*
Request *Agreement Sign Proof Data*
Create *Agreement Sign Proof Data*
Store *Agreement Sign Proof Data*
OK
Agreement Sign Proof Data
Agreement Sign Proof Data
MetaMask signing
Signed *Agreement Sign Proof Data* & Signer's address
Signed *Agreement Sign Proof Data* & Signer's address
Verify signed *Agreement Sign Proof Data*
Create *Agreement Sign Proof* for Signer
Publish *Agreement Sign Proof*
Agreement Sign Proof CID
Store *Agreement Sign Proof* & *Agreement Sign Proof CID*
OK
OK
OK

Step 4 – Create Agreement Proof (a.k.a Proof-of-Agreement)

On this final step, *Agreement File Proof* signed by *Creator* is combined with *Agreement Sign Proofs* from all *Signers*. Based on these proofs the final proof, *Agreement Proof*, is created. It is also stored to IPFS and the Database. After this, the Agreement is considered to be fully signed and becomes active.


Create Agreement Proof / Proof-of-Agreement
Last Signer
Front End
Back End
Database
IPFS
The same flow as in Signing Agreement by Signer diagram
Get all Agreement Sign Proof objects of the Agreement
All Agreement Sign Proofs of the Agreement
Get Agreement File Proof object of the Agreement
Agreement File Proof of the Agreement
Create Agreement Proof
Publish Agreement Proof
Agreement Proof CID
Store Agreement Proof & Agreement Proof CID
OK