Digital Document Archive with Authenticity Guarantee

DiSA

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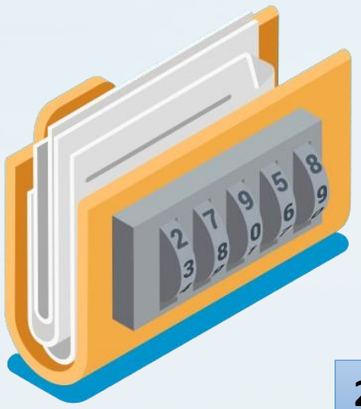

Context & Our Product

Predominance of Digitalization

Growing use of digitalization for document handling require services to handle said interactions.

Store Space Limitations

Challenges arising from storage space limitations in public institutions and upload restriction sizes as documents get bigger and more common.

Our Product aims to (goals):

- Simplify the document's submission
- Guarantee the document's authenticity
- Remove size restrictions
- Ensure integrity over the time

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Requirements Gathering

Brainstorming

- **Advisors:** gave us ideas and key points of view to work with (mainly with signatures).
- **Team:** made researches and discussed about our system.
- **Results:** clearer vision of the system's architecture and interactions

Analysis of Similar Systems

Document archive platforms
Digital signature platforms

Consultation with Archivematica's experient

- **Rafael Direito**
(teacher and prior experience with Archivematica)

- Showed us several possible configurations in each document's submission pipeline.

- **Results:** strict focus on a single document type (pdf).

State of The Art (SOA)

Document Archive platforms

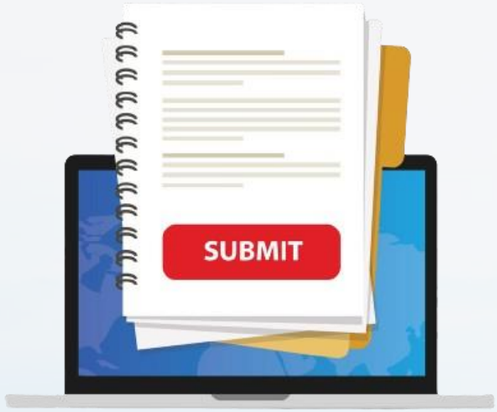
- **DSpace:** free open-source repository used by academic institutions to manage and store their documents (datasets, thesis, images, etc).
- **Preservica:** paid platform that accepts multiple formats (image, video, etc) used by institutions that need to store their documents throughout time.

Digital Signature platforms

- **Blockcerts:** open standard that relies on blockchain to emit and verify digital certificates (depends on the existence of an institution).
- **Proof of Existence:** platform that allows submission of a document's hash on the bitcoin blockchain (paid transactions). Also comes in a npm package.

Functional Requirements

- **Document Submission:** The system must allow users to submit individual documents or sets of documents (preferentially PDFs). These documents can have a bigger size than the normal (for example, 100MB).
- **Authenticity Guarantee:** The system must have a mechanism that guarantees the authenticity of the documents, using digital signatures (ensuring that they cannot be changed after submission, without changing its date, and that authenticity can be verified at any time).
- **Proof of Existence & Receipt Generation:** The system must have a mechanism that proofs the existence of a certain document at a given time, for example, a blockchain. In this case, it should generate a receipt to relate the downloadable document with the submitted document, by the link.
- **Way to Share:** The system should allow for the association of a unique DOI link to each document (or set of documents), which facilitates referencing and verification of the document's authenticity.
- **Persistence Archive:** The system should be integrated with an archive platform (Archivematica) for the persistent archiving of documents and treatment in the ingestion process (which ensure the preservation and accessibility of documents).
- **User Interface:** There should be developed an intuitive and user-friendly interface that inspires confidence.



Actors

Actor 1 - John Smith

John is a teacher that wants to apply to work in University of Aveiro.

John already has his application files ready.

So, he needs to send his application by submitting said files through the service.

Actor 2 - Emily Davis

Emily works in HR for University of Aveiro.

She receives applications frequently through links (which economizes mailbox space).

So, she needs to access the service to retrieve each applicants' documents.

Core Use Cases (1)

"Document Submission"

Actor: John Smith (document submitter).
Motivation: John wants to store his application documents in a secure and trustworthy way.
Preconditions: John is authenticated in the system and owns a digital document ready for submission.

1. **John selects the documents to be submitted.**
2. **The system requests the digital signature of the documents.**
3. **John digitally signs the documents.**
4. **The system processes the documents and uploads them.**
5. **The system generates a receipt linking original and processed documents (through hash) containing a DOI link.**
6. **The system stores the receipt in the blockchain and displays it to the user.**
7. **To John, is given the ability to share and/or save the DOI link obtained (and its receipt).**

Postconditions: The documents are stored securely and authenticated with a unique DOI link for access and validation.

Core Use Cases (2)

"Document Retrieval"

Actor: Emily (link receiver)
Motivation: Emily wants to get a document (a teacher's application).
Preconditions: Emily has a DOI link (given by the system).

1. **Emily accesses the system, using the DOI link.**
2. **The system verifies the link's authenticity (if it is valid/exists) and Emily's permission to access the document (*1).**
3. **The system recovers the documents associated with the link given.**
4. **The system gives a document list to Emily, Allowing for them to be visualized/downloaded.**

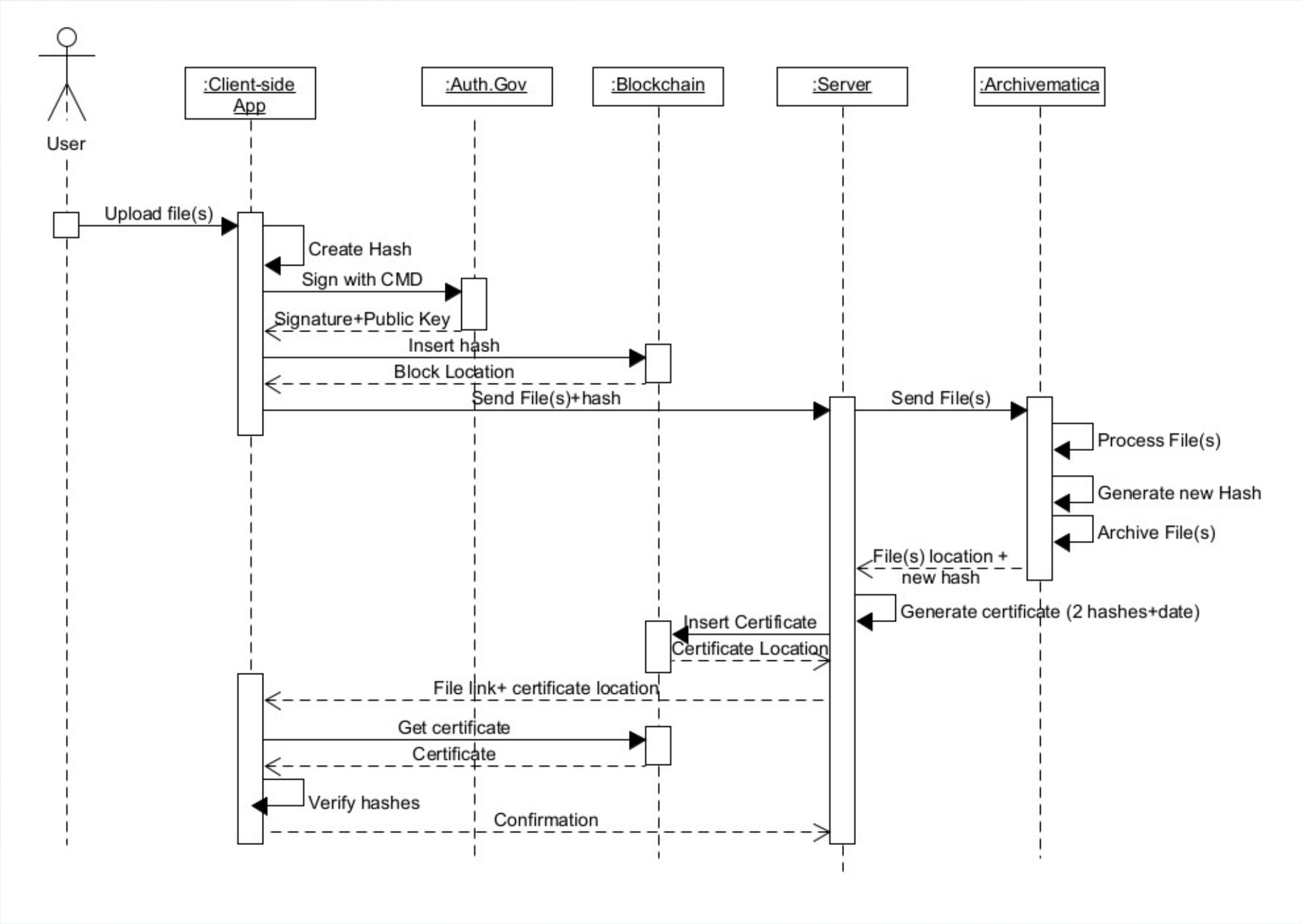
Postconditions: Emily has access to visualize/download the documents while being assured they are authentic and untampered with.

(***1-** notice that sometimes the document cannot be accessed until a certain date)

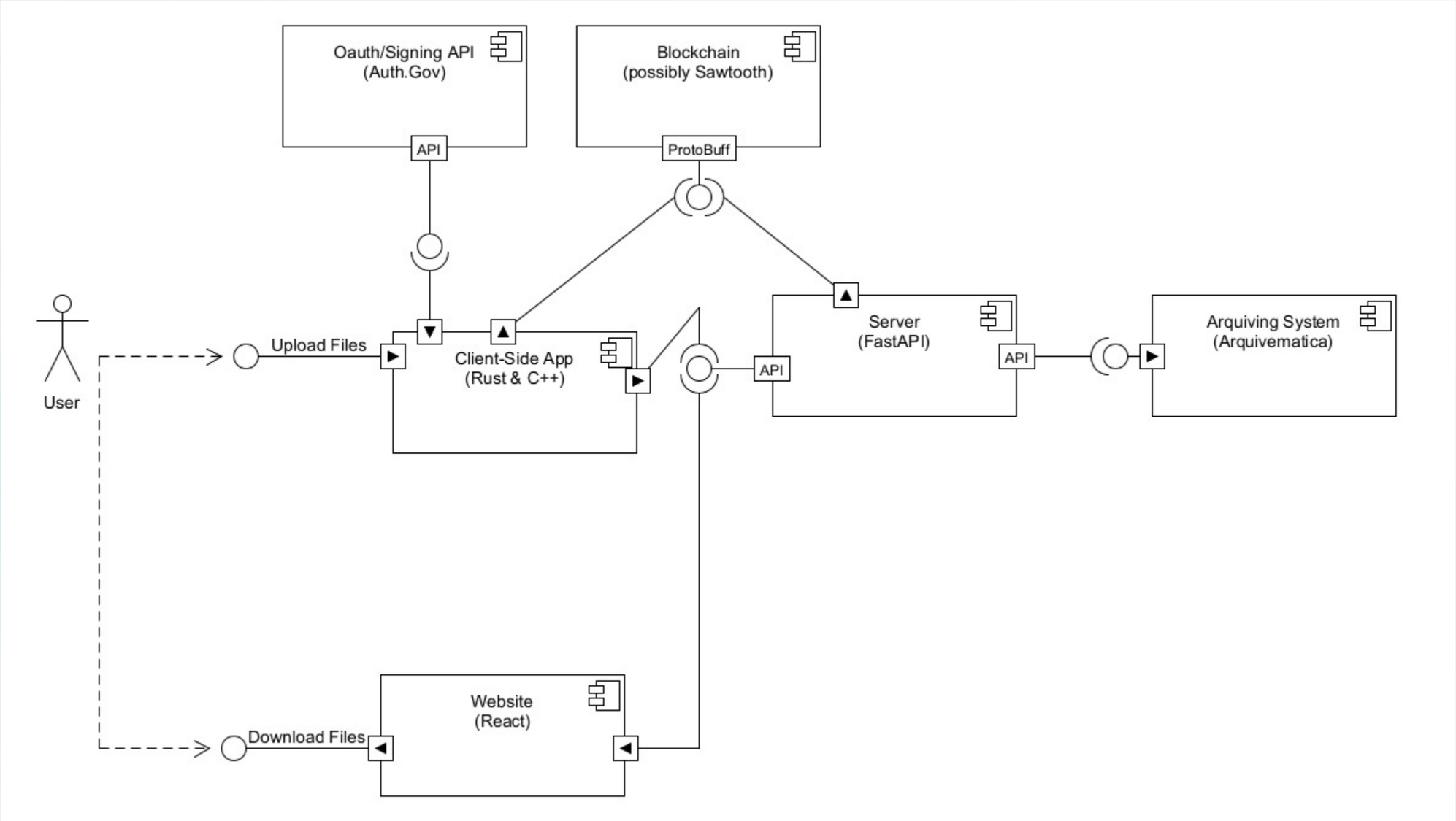
Non-Functional Requirements

- **Performance:** The system must be able to support a large volume of documents and big documents, without degrading performance, ensuring fast response times for submission operations, authenticity verification and document access.
- **Security:** There should be implemented robust security measures to protect users' documents and information, including data encryption, strong authentication and intrusion detection mechanisms.
- **Reliability:** The system must be ensured to be reliable and available all the time, with redundancies and backups to prevent data loss.
- **Usability:** The user interface must be easy to use, allowing users to perform their tasks efficiently, with intuitive and clear feedback.
- **Compatibility:** The system must be compatible with different browsers, ensuring that users can access documents and perform operations from different environments.
- **Maintainability:** The project should have well written documentation to allow for further upgrades as needed in the future.

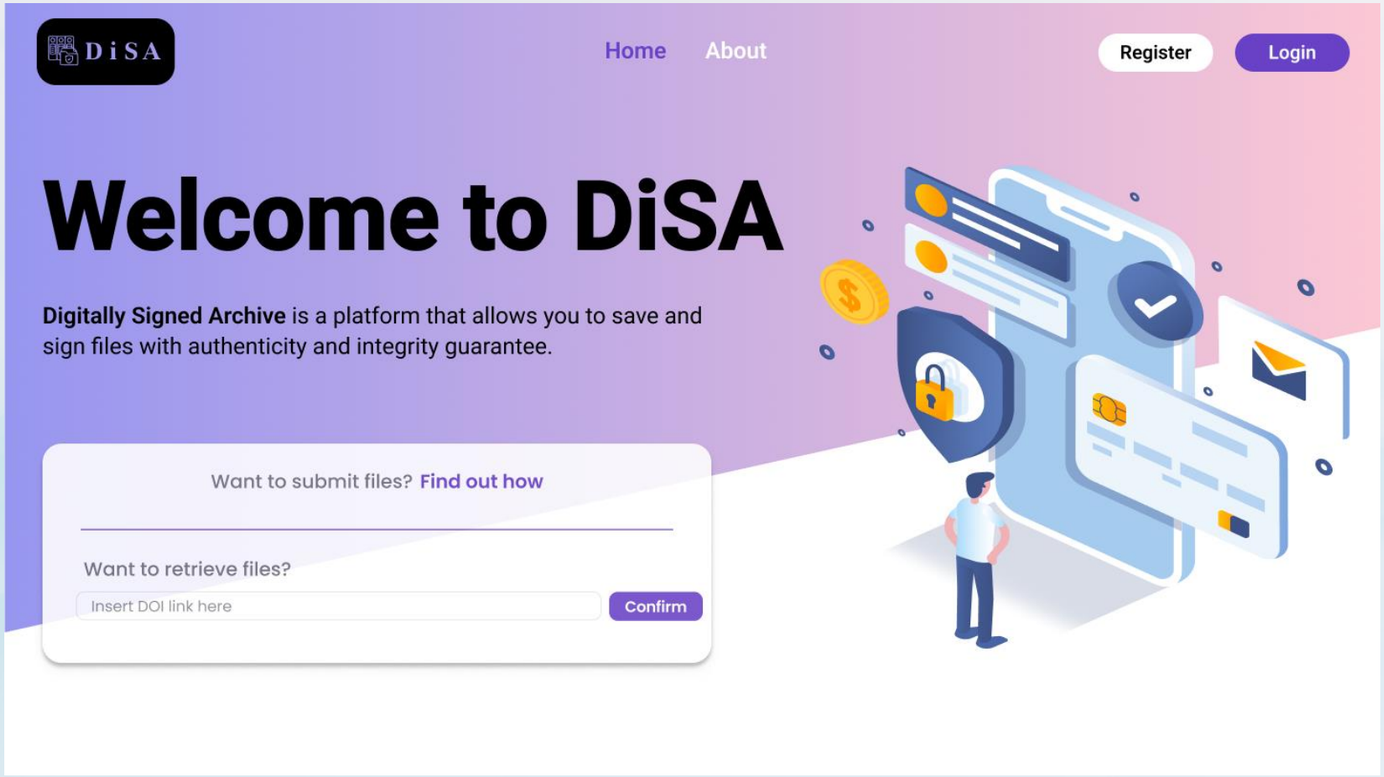
Architecture - Sequence Diagram



Architecture – Deployment Diagram



Prototype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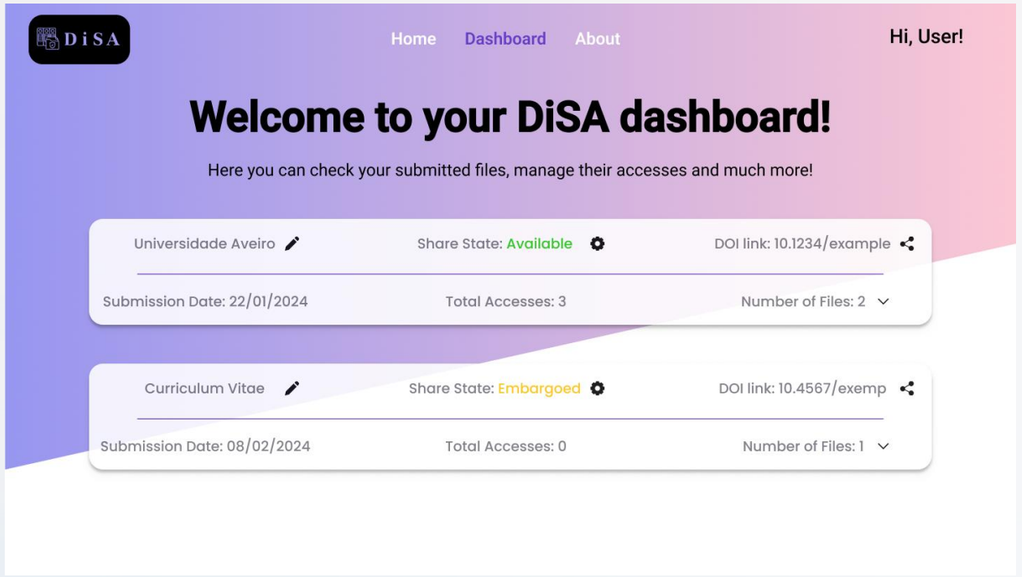
Want to retrieve files?
Insert DOI link here
Confirm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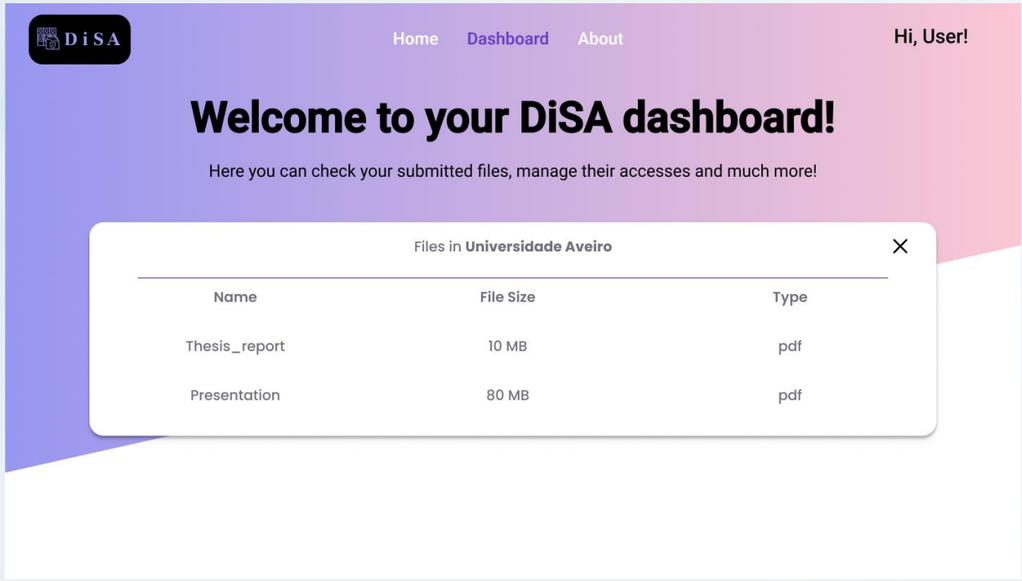
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Questions