

## Using Blockchain to Avoid Frauds with Fake Degrees and Other Fraudulent Educational Documents

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Validation of the existence or possession of formally signed documents is fundamental in any legal context. Typically, traditional certification of physical documents is based on central authorities, notary or not, that store and apply the records and mechanisms required for that purpose, and also that address security aspects and challenges. These challenges, however, become increasingly difficult as files age.

The materialization and dematerialization of relevant digital documents (RDDs) as well as the dynamism and speed of digital relations have represented a new front for entities issuing and/or certifying formal documents. Particularly when the possibility of generating paper documents from relevant digital documents and the generation of relevant digital documents from paper documents begins to emerge, demanding the guarantee that the terms established in the original were effectively preserved and received a seal of legitimacy, regardless of their form of representation.

From a practical point of view, the certification of relevant digital documents has three main dimensions:

- i) *Proof of Ownership/Authorship* (who is the holder/author of the document);
- ii) *Proof of Integrity* (the document is complete and exactly the same as when it was created); and
- iii) *Proof of Existence* (the document existed and was registered at a given moment in time).

In this sense, *Distributed Ledgers Technologies* (DLTs), usually based on blockchains, are presented as an alternative model for the certification of legal documents, especially by eliminating the need for a centralized authority to attest the authenticity of a document. An issuer can simply store the signature and timestamp associated with a relevant document in the blockchain and validate it at any time using the native mechanisms of the technology.

As it is considered fraud-proof and can be independently verified by third parties, this type of certification provided by DLTs is becoming more and more legally recognized. In addition, document registration using cryptographic timestamp and cryptographic hashes of digital documents in blockchain offers a new and irrefutable level of certification. In addition, the use of DLTs for this type of record can still ensure the privacy of the document and the authors involved, if applicable.

This presentation brings the preliminary results of Working Group GT-RAP (<http://gt-rap.lavid.ufpb.br>), an R&D project funded by the **Brazilian National Research and Educational Network** (RNP) and developed by the **Digital Video Applications Laboratory** (LAVID). The focus is to propose the combined use of blockchain technologies, digital certification and digital preservation for the creation of a scalable and agnostic platform specialized in the registration, authentication, and preservation of DDRs.

As proof of concept of the proposed platform, a public service for digital registration and verification of the authenticity of academic documents was designed and implemented to combat the various types of fraud associated with this type of document. The choice of this context was due to the great occurrence of fake degrees around the world, motivated mainly by the ease of the forgery and by the financial gains involved. In Brazil, it is no different and the evidence of the scale of the problem led the Ministry of Education to recently issued mandatory legislation to be taken by universities to tackle the problem.

In February/2019, the first issue of digital academic diplomas was held in Brazil using blockchain registration through the RAP Platform. The UFPA, a Federal University in the northeast of Brazil, issued the diplomas of the graduates of 2018 of the courses of the Center of Informatics. Several other institutions have already expressed a desire to use the RAP Platform, which is open, extensible and supports multiple tenants and multiple classes of documents.

As future work, we would like to propose a federated authentication model for RDDs, especially degrees, that allows international collaboration in the fight against fraud. This presentation aims to disseminate the initiative and make it available to the community.