





Credentials on the Blockchain



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Problem

- Institutions issue physical or digital credentials
- Piece of paper / Computer file (e.g. PDF)
- Lying in CVs/Resumes
 - presenting fake credentials
- Proper validation can take weeks
 - contact the institution
 - *fake* validation services
- Several media stories regarding fake credentials

Design Parameters

- Dependent only on the blockchain (Bitcoin's for now)
- Anyone can validate fast and without contacting the issuing institution
- Anyone can validate even if the institution does not exist
 - or more likely records are lost, etc.
- Ensure there is no way to forge inauthentic certificates
- Actual credentials are easy and intuitive to use
 - view, share, etc.

Solution

- Bitcoin's Blockchain
 - Decentralized, Immutable, Transparent, Open, Secure
- We take a fingerprint of a PDF file (credential)
 - contains metadata
 - credential itself
 - validation
- We *publish* it on the blockchain
 - anchoring the actual credential
- Self-contained PDF credential
 - open source software (issuing / validation)

Production

- University of Nicosia issues since 2014
 - certificates awards for “DFIN-511 Introduction to Digital Currency” MOOC course
- From Spring 2017
 - all University’s Diplomas are issued on Bitcoin’s blockchain



Issuing Credentials

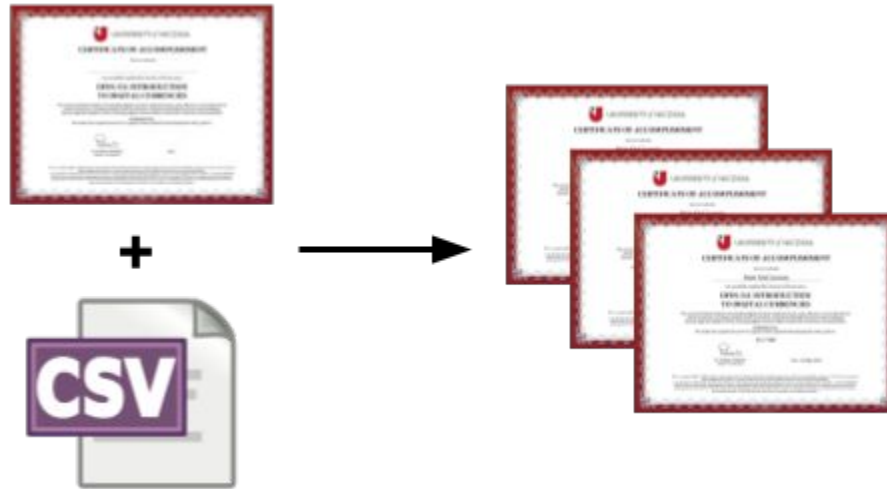
Issuing Credentials

- Open source software
 - <https://github.com/UniversityOfNicosia/blockchain-certificates>
- Single configuration file
- Your data
 - e.g. student roster
- Local Bitcoin node
- Single command

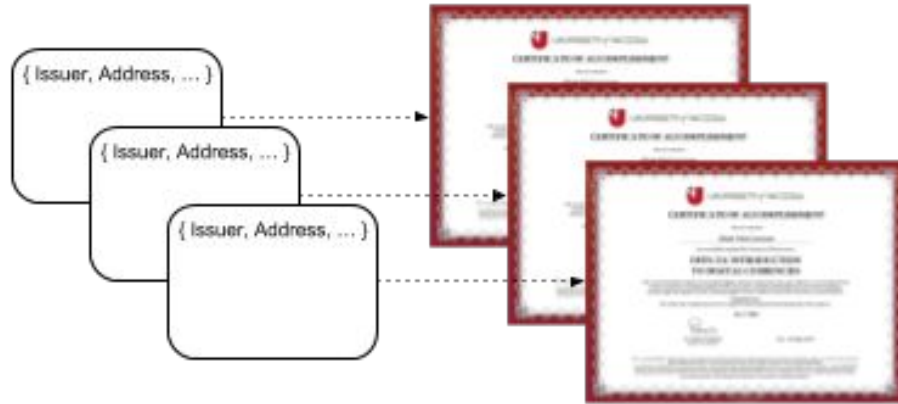


How Issuing Works

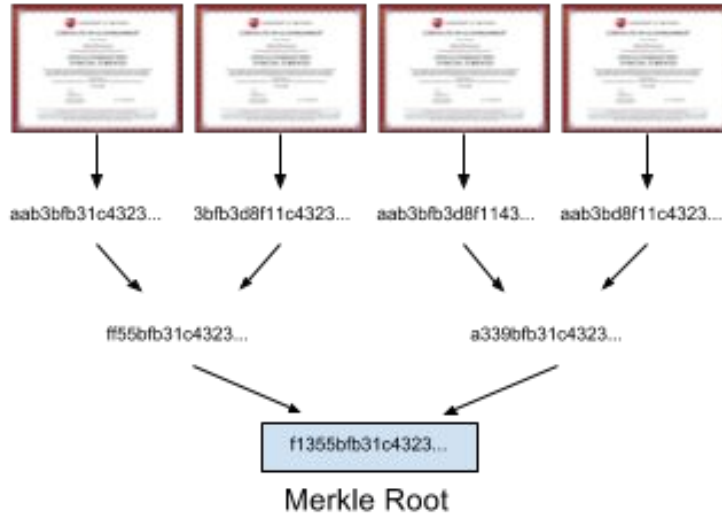
Creating credentials



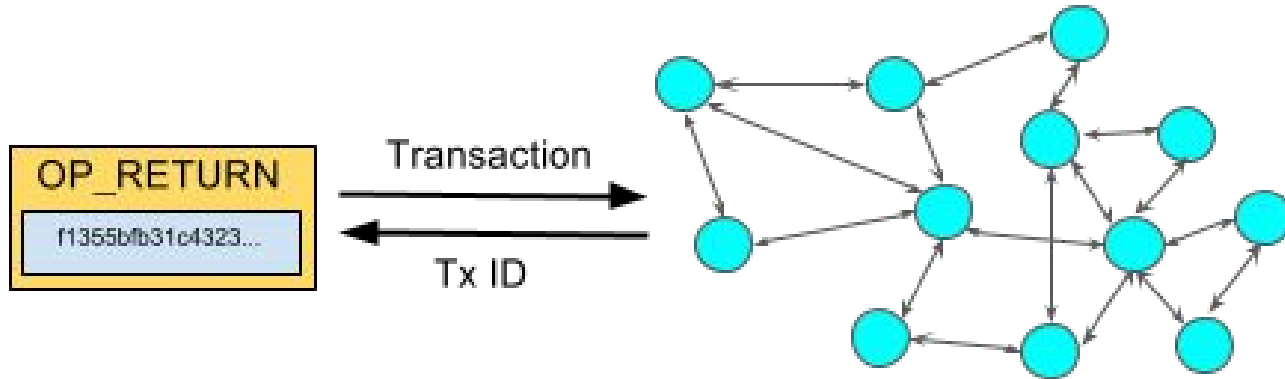
Adding metadata



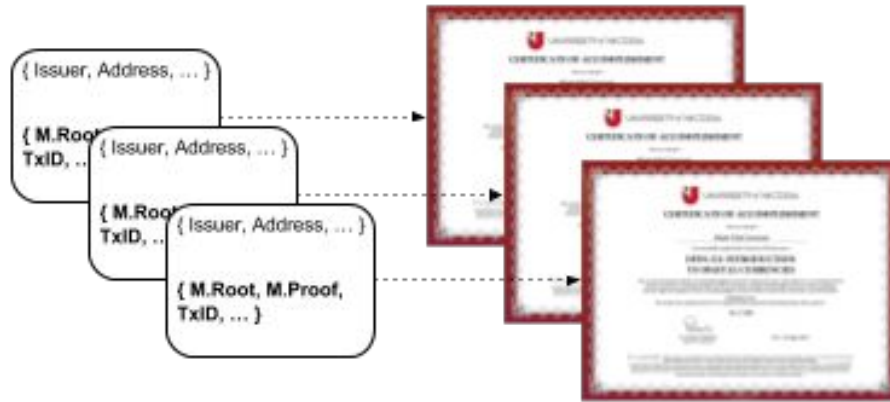
Calculating credentials fingerprint



Issuing on the blockchain



Adding blockchain proof metadata



Disseminate to users





Validating Credentials

Validating Credentials



UNIVERSITY *of* NICOSIA

C E R T I F I C A T E V E R I F I C A T I O N

The University of Nicosia, a leader in blockchain technology education, started issuing certificates into Bitcoin's blockchain from 2014 to award its "Introduction to Digital Currencies" MOOC graduates. As of Spring 2017, the University expanded the blockchain publication to all diplomas issued by the University. All graduates, in addition to getting a physical diploma, also get a PDF copy of the diploma with special metadata that anchors that certificate into the blockchain.

Please note that the actual PDF of the certificate itself is not published to the blockchain, but rather a fingerprint of the PDF, which is enough to validate that the exact document was indeed published by the University of Nicosia and timestamped by Bitcoin's blockchain.

Please upload an academic certificate for verification

Select a PDF certificate file...

► How to verify a certificate

► If a certificate is successfully validated

► If certificate validation is unsuccessful

Validating Credentials (cont.)



Certificate U111N1111 - Master Degree - 201707071234567.PDF is valid!

Transaction Id	bcbad90d35d04fe925682f239c004879331cbe177ed174b76262448d93e61d1f
Issuer	University of Nicosia
Address	1A94iDxxJijPvo8CjCWe4GLUfT6BGTWuUq
First Name	Konstantinos
Fathers Name	A
Last Name	Papadopoulos
Degree Type	Μεταπτυχιακό Δίπλωμα
Program of Study	Εκπαιδευτική Ψυχολογία
Date of Issue	12/6/2017

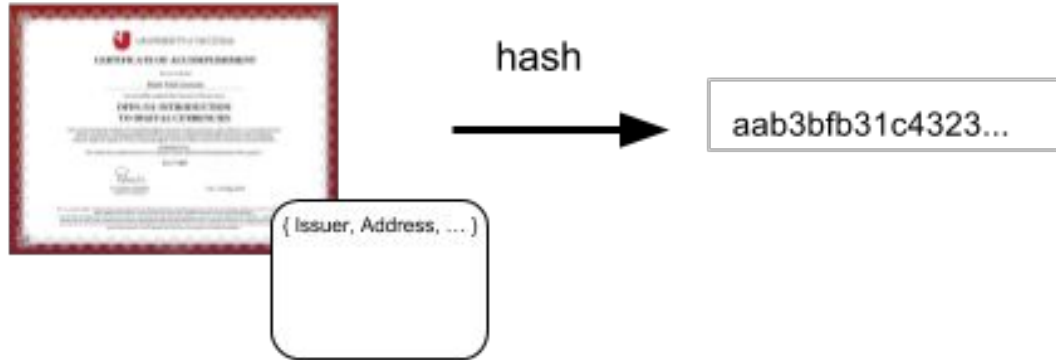


How Validation Works

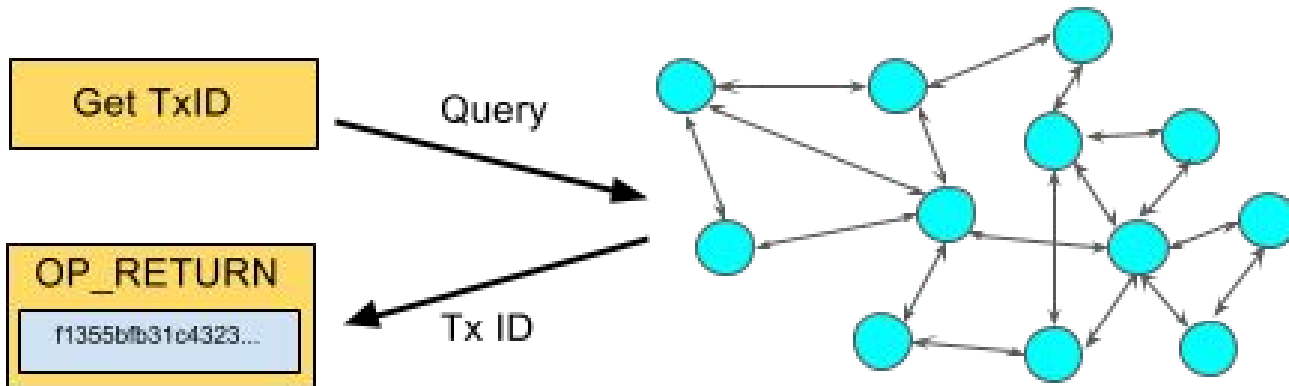
Extract blockchain proof metadata



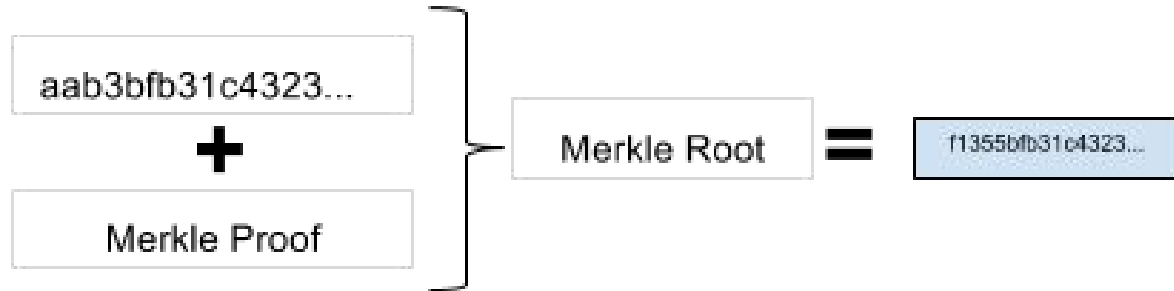
Calculate hash of credential



Get credentials fingerprint from blockchain



Calculate fingerprint from proof & compare



Current and future work

- Credential revocation
- Improve issuer identification methods
 - build on existing solutions



Conclusions

Conclusions

- Easy to issue, trivial to validate
- Intuitive medium
- Self-contained certificates
- No 3rd party dependent validation
- Production use from 2014

Questions?

- Website
 - <http://block.co>
- Open source (give it a try!)
 - <https://github.com/UniversityOfNicosia/blockchain-certificates>
- Live validator (mainnet)
 - <https://unic.ac.cy/verify>
- Contact us
 - blockchain@unic.ac.cy
 - karasavvas.k@unic.ac.cy