Jamf Connect and...
Accelerate Identity!

JNUC

VIRTUAL

CONFERENCE

2020

jamf

Forward-looking statement disclaimer

This presentation may contain forward-looking statements under applicable securities laws. All statements other than statements of historical facts are forward-looking statement. Forward-looking statements are based on information available to Jamf at the time they are made and provide Jamf's current expectations and projects about our financial condition, results, plans, objectives, future performance and business. You can identify forward-looking statements by the fact that they do not relate strictly to historical or current facts. Forward-looking statements may include words such as "anticipate," "estimate," "project," "plan," "intend," "believe," "may," "will," "should," "can have," "likely" and other terms of similar meaning in connection with any discussion of timing or nature of future operating or financial performance or other events.

All statements we make about our estimated and projected costs, expenses, cash flows, growth rates and financial results are forward-looking statements. In addition, our plans and objectives for future operations, growth initiatives, product plans and product strategies are forward-looking statements.

There are various factors, risks and uncertainties that may cause Jamf's actual results to differ materially from those that we expected in any forward-looking statements. These factors and risks are set forth in the documents Jamf files with the U.S. Securities and Exchange Commission (SEC). These documents are publicly available on the SEC's website.

Forward-looking statements are not guarantees of future performance and you should not place undue reliance on them. Jamf is under no obligation to update any forward-looking statements made in this presentation.

2020

JNUC

VIRTUAL

CONFERENCE

2020

zentral
Development & Professional Services

Henry Stamerjohann

Professional Services Engineer

Zentral Pro Services GmbH & Co. KG

www.zentral.pro

headmin

@head_min

Professional Services, Consulting

Research & Development

jamf | INTEGRATOR

2020

JNUC

VIRTUAL

CONFERENCE

2020

Jamf Connect and… Accelerate Identity!

JNUC

VIRTUAL

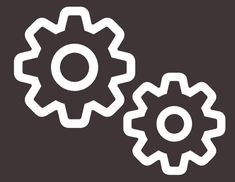
CONFERENCE

2020

zentral
Development & Professional Services

Jamf Connect and… Accelerate Identity!

Starting point and objectives



Technical elements

Demo: Identity Workflow

Conclusion & Summary

2020

Starting point

Standard Corporation

- Windows 10 experience ahead of macOS
- Variety of macOS versions in use (N-2)
- macOS AD bound / Kerberos for internal services
- Network access control with in-house Windows PKI & AD certificates

JNUC

VIRTUAL

CONFERENCE

2020

zentral
Development & Professional Services

Objective

Modern Identity Integration

- No longer bind to AD
- Authenticate from everywhere
- SSO at login with MFA option
- Keep existing network access control levels
- Reduce load for IT Help Desk

Network access control

Privileged access *(example)*

- On campus
  - Wired connection authenticated with device certificates
  - WiFi authenticated with user certificates
- Off campus
  - VPN connection with user certificate authentication

JNUC

VIRTUAL

CONFERENCE

2020

zentral
Development & Professional Services

Device identity

Jamf ADCS Connector

- Solution that works with the existing PKI without exposing it to the world.
- Designed to work with Jamf Pro

Alternative: SCEP payload with Certificate Services

JNUC

VIRTUAL

CONFERENCE

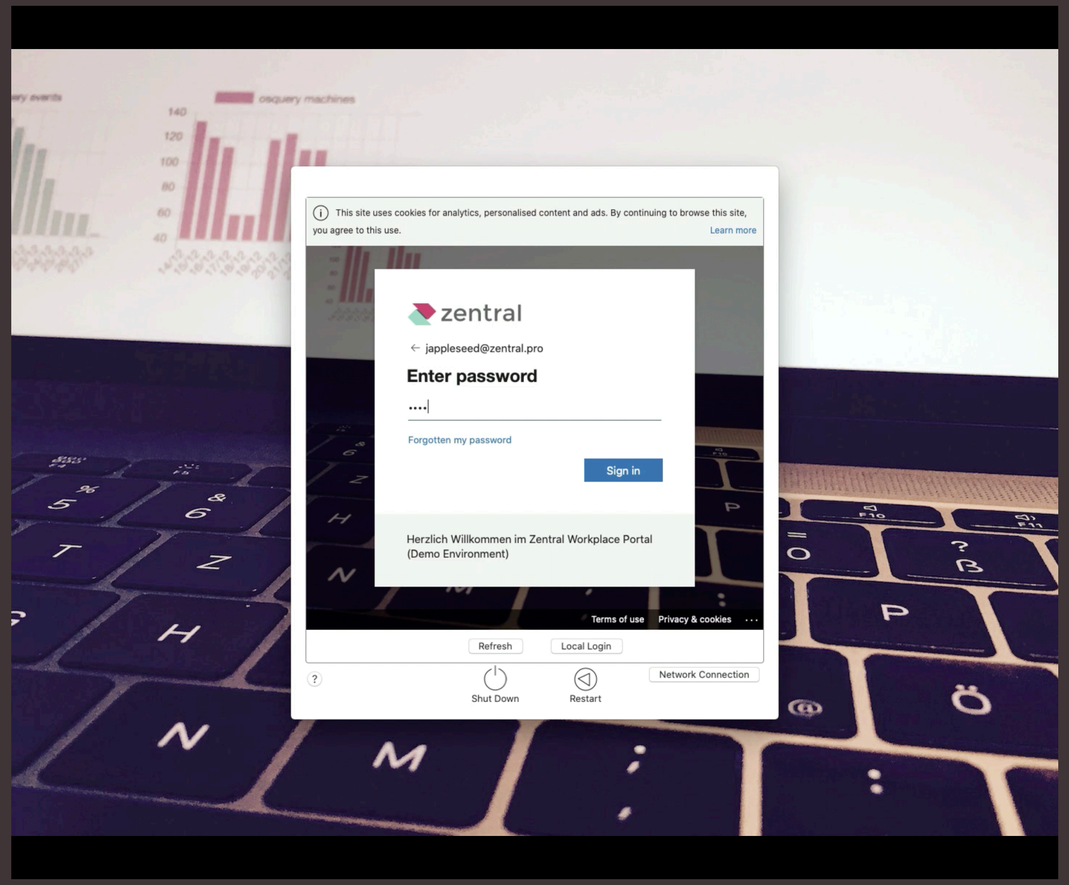
2020

zentral
Development & Professional Services

User authentication

Jamf Connect Login

- macOS loginwindow process
- Just in time User creation
- MFA options
- RunScript w/ root privileges
- Handle local user attributes



2020

JNUC

VIRTUAL

CONFERENCE

2020

zentral
Development & Professional Services

What about the User identity ?

We do need a user certificate

- With minimal user interaction
- With the correct signed information
- If possible, linked to the WiFi configuration
- Appoint for 802.1X / VPN / Web Access

802.1X

JNUC

VIRTUAL

CONFERENCE

2020

zentral
Development & Professional Services

Jamf Connect to the rescue

The JSON web tokens

- Jamf Connect can leverage the OpenID Connect protocol
- Signed claims about users sent to Jamf Connect by the IdP
- These claims are used for JIT provisioning
- Jamf Connect can pass them to a third party application
- Jamf Connect allows for Multi-User logins

JNUC

VIRTUAL

CONFERENCE

2020

zentral
Development & Professional Services

Jamf Connect to the rescue

The JSON web tokens

- Jamf Connect can leverage the OpenID Connect protocol
- Signed claims about users sent to Jamf Connect by the IdP
- These claims are used for JIT provisioning

Jamf Connect can pass them to a third party application

Jamf Connect allows for Multi-User logins

JNUC

VIRTUAL

CONFERENCE

2020

zentral
Development & Professional Services

JWTs

Token types:

Base64-encoded JSON

- Access Token
- ID Token
- Refresh Token


```
{'access_token': 'PAQABAAAAAAAGV_bv21oQQ4ROqh0_1-
SGVsbG8gSk5VQyAyMDIwIGF0dGVuZGVlIC0gd2UncmUgaGFwcHkgdG8gaGVscCB5b3Ugd2l0aCB5b3VyIEphbWYg
Q29ubmVjdCBhbmQgWC41MDkgZGlnaXRhbCBpZGVudGl0eSBjZXJ0cmlmaWNhdGUgcXVlc3Rpb25zLiBQbGVhc2Ug
Y29udGFjdCB1cyBhdCBodHRwczovL3plbnRyYWwucHJv-
QnV0IHdhaXQgdW50aWwgeW91IHNlZSB0aGUgRGVtbyBmb3IgSURlbnQgLSB3ZSBkbyBhd2Vzb21lIHRoaW5ncyB3
aXRoIEphbWYgQ29ubmVjdCBMb2dpbiBpbiBhIGhhbmRzaGFrZSBwcm9jZXNz-3EDJ1E-
V2UgY2FuIHVzZSBXaW5kb3dzIEFEQ1Mgc2VydmljZSBidXQgYWxzbyBjb25uZWN0IHdpdGggQ2xvdWQgUEtJIHNv
bHV0aW9ucywgc3VjaCBhcyBBV1MsIERpZ2ljZXJ0IGFuZCBtb3Jl-
WW91IGNhbiBmaW5kIGluZm8gb24gSURlbnQgYWxzbyBhdCBodHRwczovL2lkZW50LmhlbHAK',
 'expires_in': '3599',
 'expires_on': '1594402672',
 'ext_expires_in': '3599',
 'id_token': '<<ID_TOKEN>>',
 'id_token_decoded': {'amr': ['pwd'],
                      'aud': '9fcc52c7-ee36-4889-8517-lkjslkjoe23',
                      'exp': 1594402672,
                      'family_name': 'Appleseed',
                      'given_name': 'John',
                      'groups': ['683b6623-d148-4ff4-8071-4b4b4229bbd8',
                                 '2172f7b0-eb83-4cb4-ac11-8290c29186a4',
                                 'f1260b5a-39f0-46a9-b602-7d7d596b66de'],
                      'iat': 1594398772,
                      'ipaddr': '93.221.16.xxx',
                      'iss': 'https://sts.windows.net/c27d1b33-59b3-4ab2-a5c9-
23jf0093/',
                      'name': 'John Appleseed',
                      'nbf': 1594398772,
                      'oid': '243b8a91-5eef-4519-b39c-38417a6b4b63',
                      'sub': 'xhlPImygO6uPEK4YMVyRt0iJUy1mgc2Nmyws-ATdhZQ',
                      'tid': 'c27d1b33-59b3-4ab2-a5c9-23jf0093',
```


2020

JNUC

VIRTUAL

CONFERENCE

2020

zentral
Development & Professional Services

OpenID Connect - ID Token

Signed claims about the user

- Signed by the IdP with public keys available for verification
- Claims depend on scopes used by Jamf Connect during authentication


```
{'access_token': '<<ACCESS_TOKEN>>',
 'expires_in': '3599',
 'expires_on': '1594402672',
 'ext_expires_in': '3599',
 'id_token': '<<ID_TOKEN>>',
 'id_token_decoded': {'amr': ['pwd'],
                      'aud': '9fcc52c7-ee36-4889-8517-lkjslkjoe23',
                      'exp': 1594402672,
                      'family_name': 'Appleseed',
                      'given_name': 'John',
                      'groups': ['683b6623-d148-4ff4-8071-4b4b4229bbd8',
                                 '2172f7b0-eb83-4cb4-ac11-8290c29186a4',
                                 'f1260b5a-39f0-46a9-b602-7d7d596b66de'],
                      'iat': 1594398772,
                      'ipaddr': '93.221.16.xxx',
                      'iss': 'https://sts.windows.net/c27d1b33-59b3-4ab2-a5c9-23jf0093/',
                      'name': 'John Appleseed',
                      'nbf': 1594398772,
                      'oid': '243b8a91-5eef-4519-b39c-38417a6b4b63',
                      'sub': 'xhlPImygO6uPEK4YMVyRt0iJUy1mgc2Nmyws-ATdhZQ',
                      'tid': 'c27d1b33-59b3-4ab2-a5c9-23jf0093',
                      'unique_name': 'john.appleseed@zentral.pro',
                      'upn': 'john.appleseed@zentral.pro',
                      'uti': 'H3e719c91emNtc91eECc91e',
                      'ver': '1.0'},
 'id_token_header_decoded': {'alg': 'RS256',
                             'kid': '8bd5Pfehad0c91eDe7196drnM',
                             'typ': 'JWT',
                             'x5t': '8bd5Pfehad0c91eDe7196drnM'},
 'refresh_token': '<<REFRESH_TOKEN>>',
 'token_type': 'Bearer'}
```

JNUC

VIRTUAL

CONFERENCE

2020

zentral
Development & Professional Services

OpenID Connect - ID Token

Claims for "profile" scope:

- Family Name
- Given Name
- Name
- Unique Name
- User Principal Name (UPN)


```
{'access_token': '<<ACCESS_TOKEN>>',
 'expires_in': '3599',
 'expires_on': '1594402672',
 'ext_expires_in': '3599',
 'id_token': '<<ID_TOKEN>>',
 'id_token_decoded': {'amr': ['pwd'],
                      'aud': '9fcc52c7-ee36-4889-8517-lkjslkjoe23',
                      'exp': 1594402672,
                      'family_name': 'Appleseed',
                      'given_name': 'John',
                      'groups': ['683b6623-d148-4ff4-8071-4b4b4229bbd8',
                                 '2172f7b0-eb83-4cb4-ac11-8290c29186a4',
                                 'f1260b5a-39f0-46a9-b602-7d7d596b66de'],
                      'iat': 1594398772,
                      'ipaddr': '93.221.16.xxx',
                      'iss': 'https://sts.windows.net/c27d1b33-59b3-4ab2-a5c9-23jf0093/',
                      'name': 'John Appleseed',
                      'nbf': 1594398772,
                      'oid': '243b8a91-5eef-4519-b39c-38417a6b4b63',
                      'sub': 'xhlPImygO6uPEK4YMVyRt0iJUy1mgc2Nmyws-ATdhZQ',
                      'tid': 'c27d1b33-59b3-4ab2-a5c9-23jf0093',
                      'unique_name': 'john.appleseed@zentral.pro',
                      'upn': 'john.appleseed@zentral.pro',
                      'uti': 'H3e719c91emNtc91eECc91e',
                      'ver': '1.0'},
 'id_token_header_decoded': {'alg': 'RS256',
                             'kid': '8bd5Pfehad0c91eDe7196drnM',
                             'typ': 'JWT',
                             'x5t': '8bd5Pfehad0c91eDe7196drnM'},
 'refresh_token': '<<REFRESH_TOKEN>>',
 'token_type': 'Bearer'}
```

JNUC

VIRTUAL

CONFERENCE

2020

zentral
Development & Professional Services

OpenID Connect - ID Token

Group claims sometimes available:

- Azure tokens can contain the UUIDs of the groups a user is a member of


```
{'access_token': '<<ACCESS_TOKEN>>',
 'expires_in': '3599',
 'expires_on': '1594402672',
 'ext_expires_in': '3599',
 'id_token': '<<ID_TOKEN>>',
 'id_token_decoded': {'amr': ['pwd'],
                      'aud': '9fcc52c7-ee36-4889-8517-lkjslkjoe23',
                      'exp': 1594402672,
                      'family_name': 'Appleseed',
                      'given_name': 'John',
                      'groups': ['683b6623-d148-4ff4-8071-4b4b4229bbd8',
                                 '2172f7b0-eb83-4cb4-ac11-8290c29186a4',
                                 'f1260b5a-39f0-46a9-b602-7d7d596b66de'],
                      'iat': 1594398772,
                      'ipaddr': '93.221.16.xxx',
                      'iss': 'https://sts.windows.net/c27d1b33-59b3-4ab2-a5c9-23jf0093/',
                      'name': 'John Appleseed',
                      'nbf': 1594398772,
                      'oid': '243b8a91-5eef-4519-b39c-38417a6b4b63',
                      'sub': 'xhlPImygO6uPEK4YMVyRt0iJUy1mgc2Nmyws-ATdhZQ',
                      'tid': 'c27d1b33-59b3-4ab2-a5c9-23jf0093',
                      'unique_name': 'john.appleseed@zentral.pro',
                      'upn': 'john.appleseed@zentral.pro',
                      'uti': 'H3e719c91emNtc91eECc91e',
                      'ver': '1.0'},
 'id_token_header_decoded': {'alg': 'RS256',
                             'kid': '8bd5Pfehad0c91eDe7196drnM',
                             'typ': 'JWT',
                             'x5t': '8bd5Pfehad0c91eDe7196drnM'},
 'refresh_token': '<<REFRESH_TOKEN>>',
 'token_type': 'Bearer'}
```

JNUC

VIRTUAL

CONFERENCE

2020

zentral
Development & Professional Services

AD FS - ID Token

ADFS 4.0 - claims coming from in-house AD infra

- Unique Name
- UPN
- Custom claims mapping possible →

sAMAccountName


```
{'access_token': '<<ACCESS_TOKEN>>',
 'access_token_decoded': {'appid': '9fcc52c7-ee36-4889-8517-lkjslkjoe23',
                          'apptype': 'Public',
                          'aud': 'microsoft:identityserver:9fcc52c7-ee36-4889-8517-lkjslkjoe23',
                          'auth_time': '2020-07-10T17:21:56.419Z',
                          'authmethod':
'urn:oasis:names:tc:SAML:2.0:ac:classes:PasswordProtectedTransport',
                          'exp': 1594405316,
                          'iat': 1594401716,
                          'iss': 'http://fs.zentral.pro/adfs/services/trust',
                          'scp': 'openid',
                          'unique_name': 'japple',
                          'ver': '1.0',
                          'winaccountname': 'japple'},
 'access_token_header_decoded': {'alg': 'RS256',
                                 'typ': 'JWT',
                                 'x5t': '8bd5Pfehad0c91eDe7196drnM'},
 'expires_in': 3600,
 'id_token': '<<ID_TOKEN>>',
                        'apptype': 'Public',
                        'aud': '9fcc52c7-ee36-4889-8517-lkjslkjoe23',
                        'auth_time': 1594401716,
                        'authmethod':
'urn:oasis:names:tc:SAML:2.0:ac:classes:PasswordProtectedTransport',
                        'exp': 1594405316,
                        'iat': 1594401716,
                        'iss': 'https://fs.zentral.pro/adfs',
                        'pwd_exp': '6972695',
                        'pwd_url': 'https://fs.zentral.pro/adfs/portal/updatepassword/',
                        'scp': 'openid',
                        'sid': 'S-1-5-21-244017188-844017118-1144017115-181077',
                        'sub': 'v+iNfo2+2t+ksF3Yn9CgxHDguD9GQlLc2g7xFWB8NLk=',
                        'unique_name': 'japple',
                        'upn': 'john.appleseed@zentral.pro',
                        'ver': '1.0',
                        'winaccountname': 'japple'},
 'id_token_header_decoded': {'alg': 'RS256',
                             'kid': '8bd5Pfehad0c91eDe7196drnM',
                             'typ': 'JWT',
                             'x5t': '8bd5Pfehad0c91eDe7196drnM'},
 'refresh_token': '<<REFRESH_TOKEN>>,
 'refresh_token_expires_in': 28799,
 'resource': '9fcc52c7-ee36-4889-8517-lkjslkjoe23',
 'scope': 'openid',
 'token_type': 'bearer'}
```

JNUC

VIRTUAL

CONFERENCE

2020

zentral
Development & Professional Services

Plan of action

Exchange claims against a user certificate

- Configure Jamf Connect to pass the ID Token
- Write a tool to exchange the ID Token for a user certificate
- …

Success !!!

JNUC

VIRTUAL

CONFERENCE

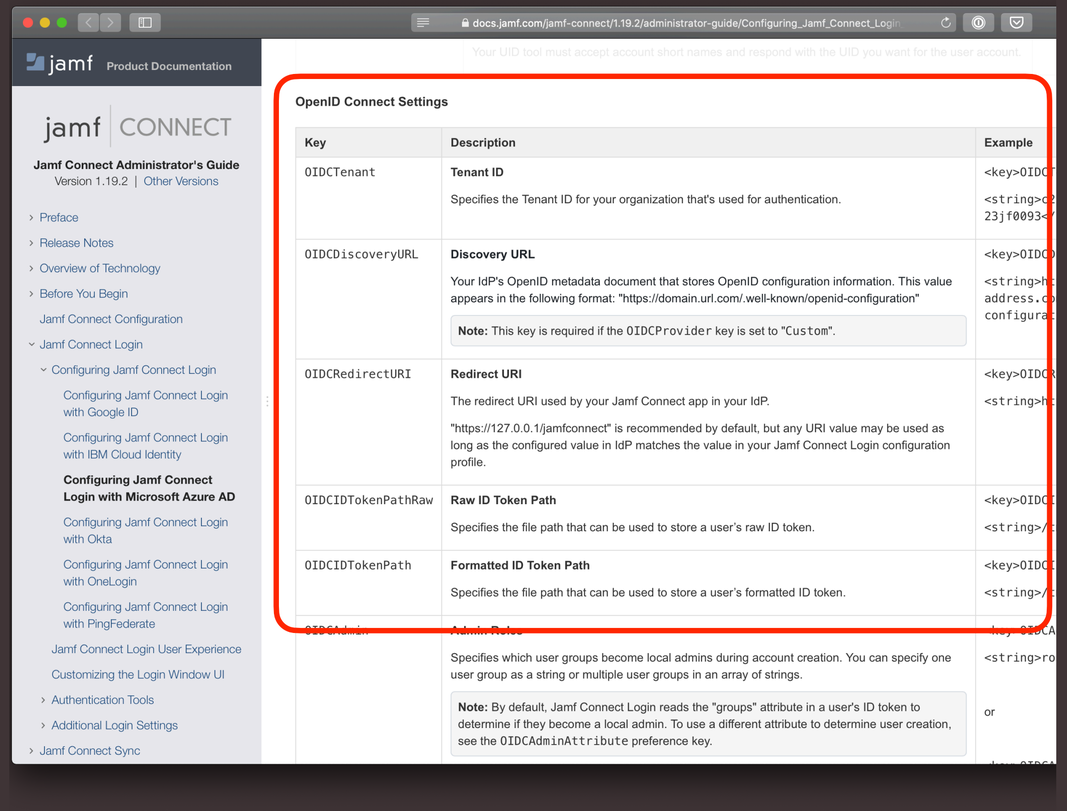
2020

zentral
Development & Professional Services

Jamf Connect Login

Documentation

- OIDCTokenPath
- Variance per IdP
- Activate with authchanger
- Deploy Config via MDM



JNUC

VIRTUAL

CONFERENCE

2020

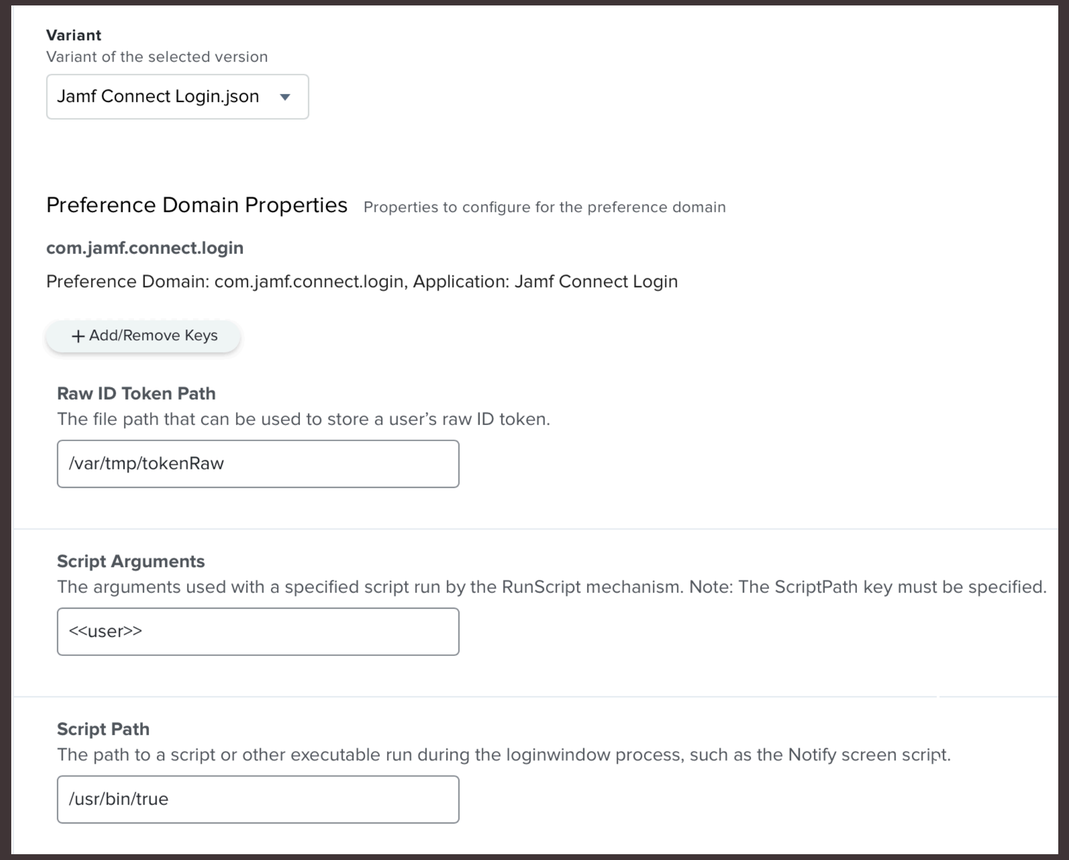
zentral
Development & Professional Services

Jamf Pro - Custom Profile

UI Properties

(com.jamf.connect.login)

- Raw ID Token Path
- Script Arguments
- Script Path



JNUC

VIRTUAL

CONFERENCE

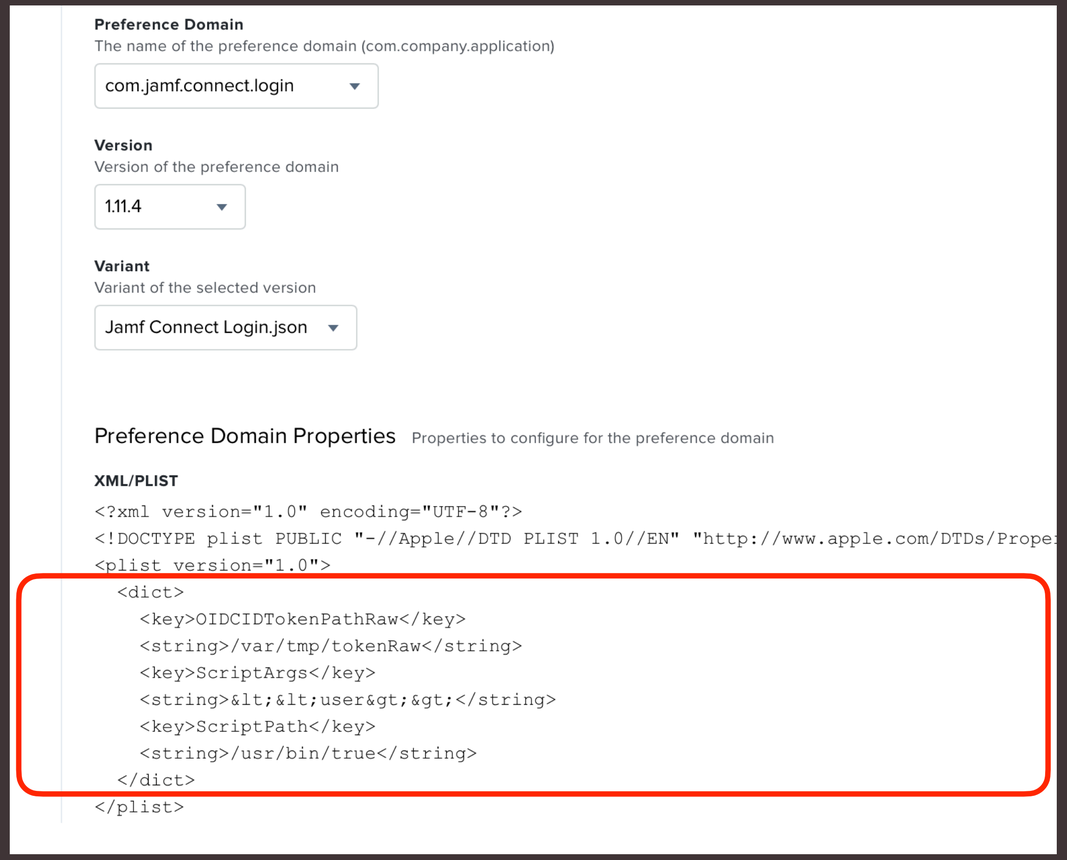
2020

zentral
Development & Professional Services

Jamf Pro - Custom Profile

Jamf Connect Login

- RunScript (authchanger)
- Script Args
- Substitute variables (ID Token)
- RawToken to gather details & validate signature



JNUC

VIRTUAL

CONFERENCE

2020

zentral
Development & Professional Services

Where do we stand now?

- Device identity *(i.e ADCS connector issued certificate)*
- Signed user claims from the IdP

Both can be used to prove to a third party that a legitimate user is requesting a certificate on a managed device.

JNUC

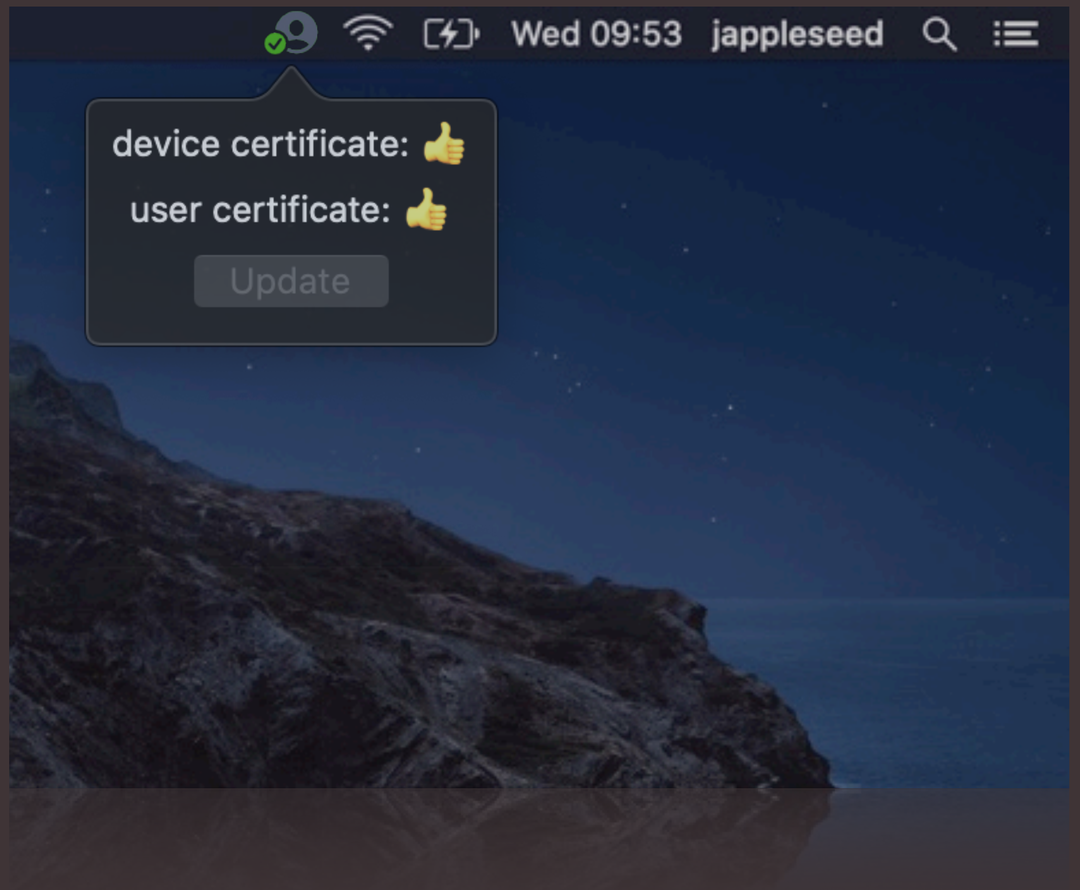
VIRTUAL

CONFERENCE

2020

Build a custom solution

IDent.app



zentral
Development & Professional Services

IDent App (macOS)

Menu bar app

- Obtain user certificates *(Single/Multi-User)*
- Validity monitoring & renewal management
- Handshake process w/ Jamf Connect Login
- Autonomous mode with direct OpenID connect auth
- Can be used to configure WiFi

zentral
Development & Professional Services

IDent Gateway

PKI proxy

- Verifies the IDent.app requests *(device cert / user cert)*
- Distributes SCEP or CSR configuration
- Use of one time challenges
- Can act as a SCEP proxy - to insulate your PKI
- Detailed requests tracing / logging

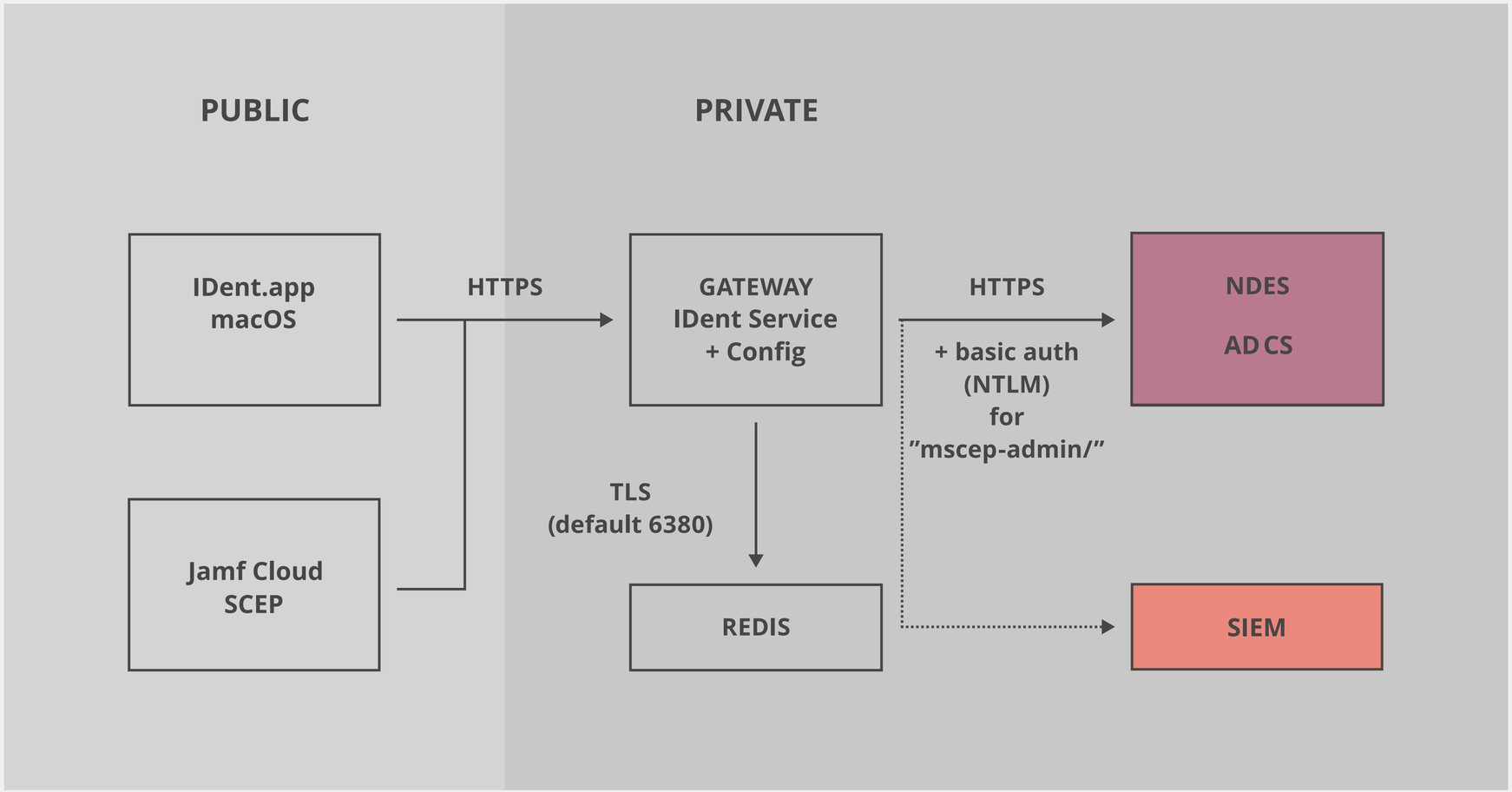
JNUC

VIRTUAL

CONFERENCE

2020

PKI Proxy - ADCS Flow



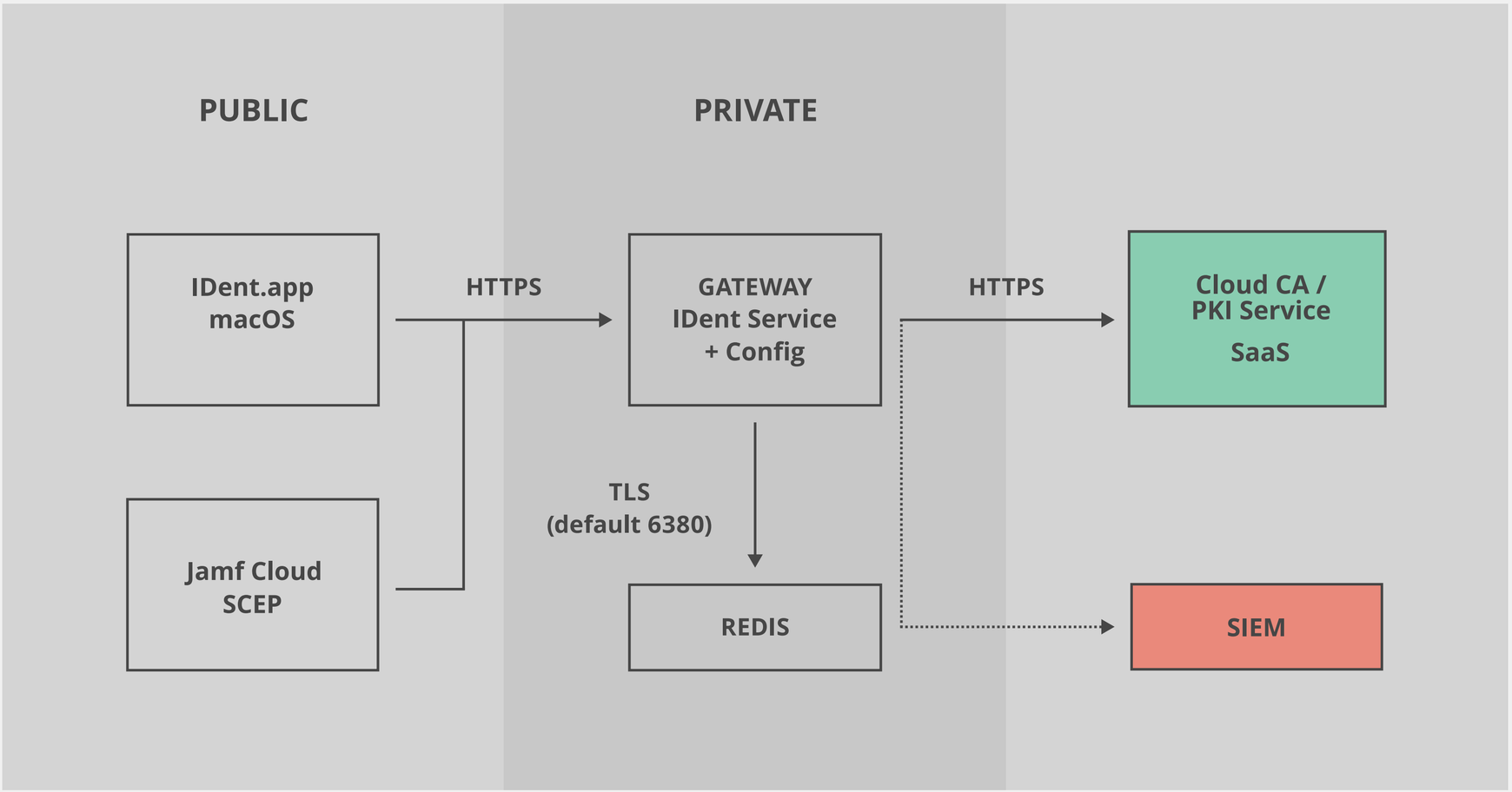
JNUC

VIRTUAL

CONFERENCE

2020

PKI Proxy - Cloud CA Flow



JNUC

VIRTUAL

CONFERENCE

2020

zentral
Development & Professional Services

Goals in review

Strong User emphasis

- Authentication in Jamf Connect Login
- Frictionless Identity Certificate provisioning
- User-driven procedure
- Ensure no one can impersonate Identity
- Full audited process
- Gated by Identity Provider

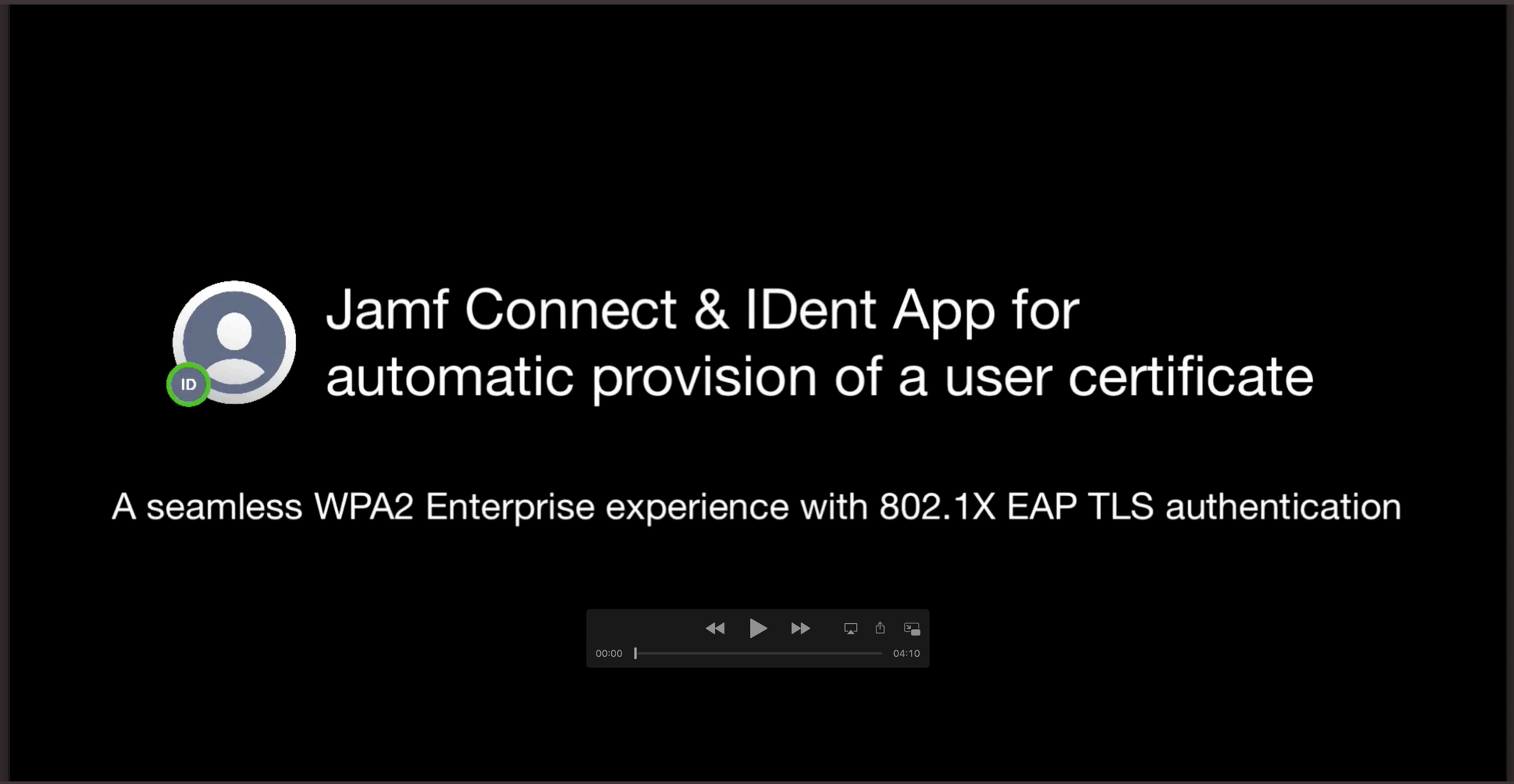
JNUC

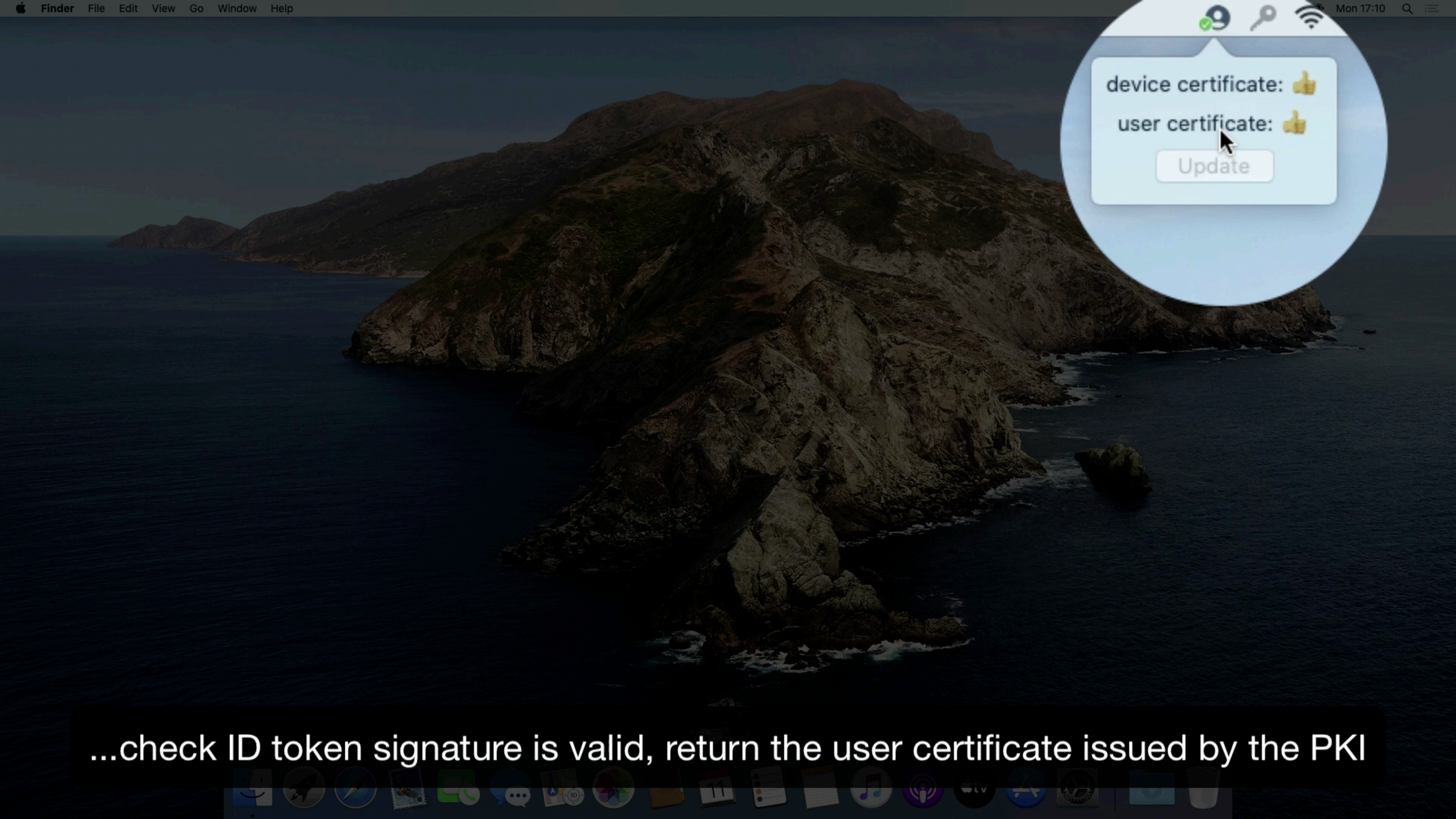
VIRTUAL

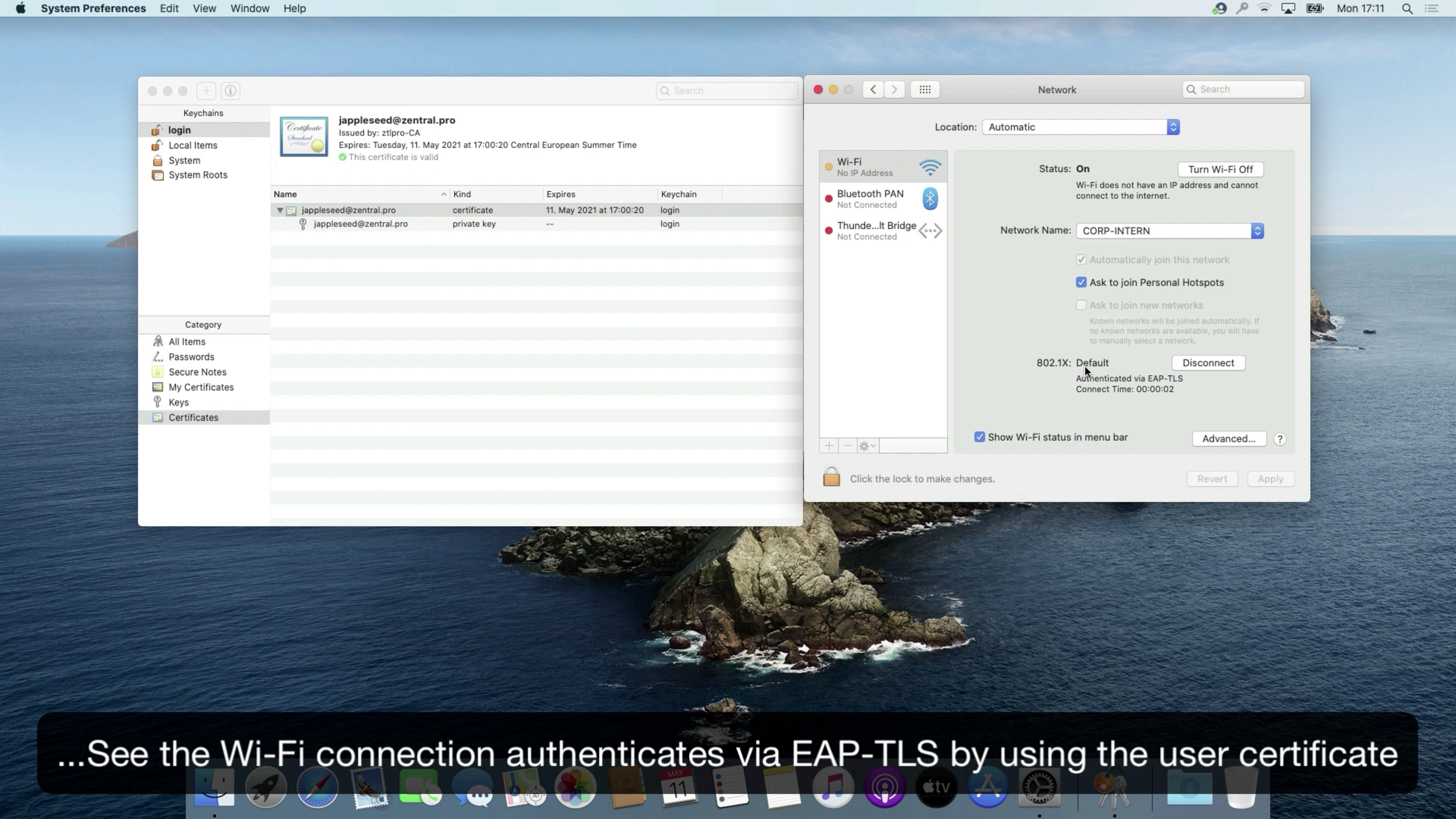
CONFERENCE

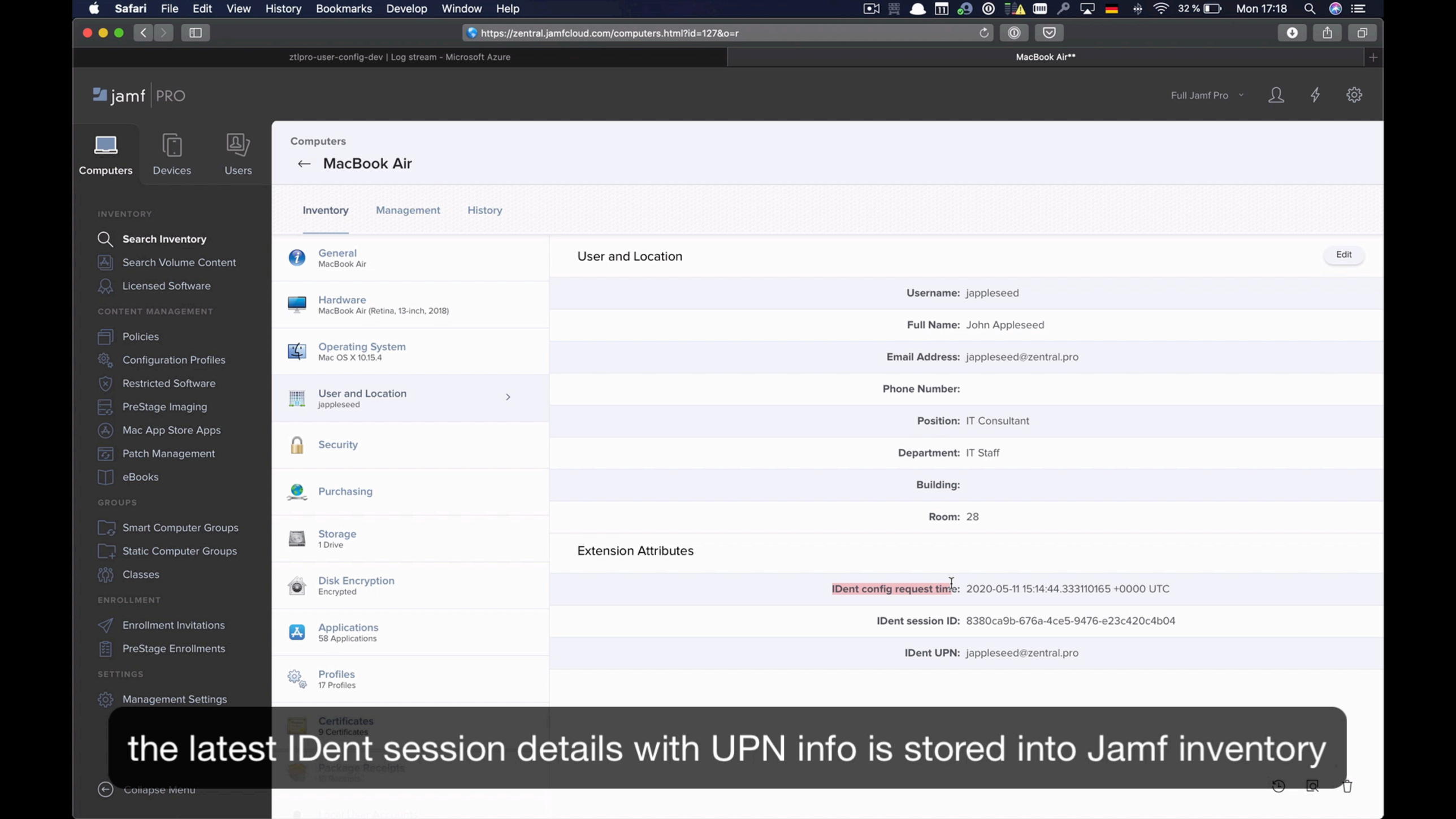
2020

Demo




Finder File Edit View Go Window Help
Mon 17:10
device certificate:
user certificate:
Update
...check ID token signature is valid, return the user certificate issued by the PKI


System Preferences Edit View Window Help
Mon 17:11
Search
Keychains
login
Local Items
System
System Roots
Category
All Items
Passwords
Secure Notes
My Certificates
Keys
Certificates
jappleseed@zentral.pro
Issued by: ztlpro-CA
Expires: Tuesday, 11. May 2021 at 17:00:20 Central European Summer Time
This certificate is valid
Name
Kind
Expires
Keychain
jappleseed@zentral.pro
certificate
11. May 2021 at 17:00:20
login
jappleseed@zentral.pro
private key
--
login
Network
Search
Location: Automatic
Wi-Fi
No IP Address
Bluetooth PAN
Not Connected
Thunde...lt Bridge
Not Connected
Status: On
Turn Wi-Fi Off
Wi-Fi does not have an IP address and cannot connect to the internet.
Network Name: CORP-INTERN
Automatically join this network
Ask to join Personal Hotspots
Ask to join new networks
Known networks will be joined automatically. If no known networks are available, you will have to manually select a network.
802.1X: Default
Disconnect
Authenticated via EAP-TLS
Connect Time: 00:00:02
Show Wi-Fi status in menu bar
Advanced...
Click the lock to make changes.
Revert
Apply
...See the Wi-Fi connection authenticates via EAP-TLS by using the user certificate


Safari File Edit View History Bookmarks Develop Window Help
https://zentral.jamfcloud.com/computers.html?id=127&o=r
ztlpro-user-config-dev | Log stream - Microsoft Azure
MacBook Air**
jamf PRO
Full Jamf Pro
Computers
Devices
Users
INVENTORY
Search Inventory
Search Volume Content
Licensed Software
CONTENT MANAGEMENT
Policies
Configuration Profiles
Restricted Software
PreStage Imaging
Mac App Store Apps
Patch Management
eBooks
GROUPS
Smart Computer Groups
Static Computer Groups
Classes
ENROLLMENT
Enrollment Invitations
PreStage Enrollments
SETTINGS
Management Settings
Collapse Menu
Computers
MacBook Air
Inventory
Management
History
General
MacBook Air
Hardware
MacBook Air (Retina, 13-inch, 2018)
Operating System
Mac OS X 10.15.4
User and Location
jappleseed
Security
Purchasing
Storage
1 Drive
Disk Encryption
Encrypted
Applications
58 Applications
Profiles
17 Profiles
Certificates
9 Certificates
User and Location
Edit
Username: jappleseed
Full Name: John Appleseed
Email Address: jappleseed@zentral.pro
Phone Number:
Position: IT Consultant
Department: IT Staff
Building:
Room: 28
Extension Attributes
IDent config request time: 2020-05-11 15:14:44.333110165 +0000 UTC
IDent session ID: 8380ca9b-676a-4ce5-9476-e23c420c4b04
IDent UPN: jappleseed@zentral.pro
the latest IDent session details with UPN info is stored into Jamf inventory

JNUC

VIRTUAL

CONFERENCE

2020

zentral
Development & Professional Services

IDent - Batteries-included

SCEP + PKI Proxy with full tracing

- Device Certificates via MDM/SCEP ✓
- Jamf API Integration ✓
- Conditional Posturing + Auditing ✓
- Automation workflows ✓

Cloud Provider

JNUC

VIRTUAL

CONFERENCE

2020

Conclusion

JNUC

VIRTUAL

CONFERENCE

2020

zentral
Development & Professional Services

Focal Point

Corporate Goals

- User Trust *(Identity)*
- Device Trust *(Identity + Posture)*
- When both look good allow entry to Services and Data
- Propel best mix of security and user experience

JNUC

VIRTUAL

CONFERENCE

2020

zentral
Development & Professional Services

Jamf Connect and...

DIY - Develop your own solution

- The IdP claims are full of information
- Get the values from Jamf Connect / use tokens directly
- Interact with Jamf API ?
- Cloud Functions ?
- or save time, …and consider our solution!

2020

JNUC

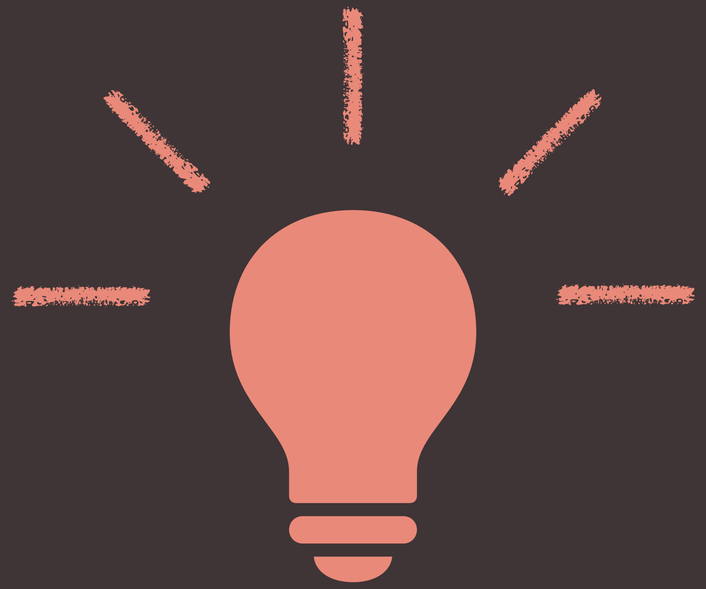
VIRTUAL

CONFERENCE

2020

zentral
Development & Professional Services

Instigate… to Accelerate Identity



JNUC

VIRTUAL

CONFERENCE

2020

zentral
Development & Professional Services

Instigate… to Accelerate Identity

- Automate user assignment & certificates workflows
- Reveal the Jamf Connect Login RunScript extra power
- Use ID tokens and claims from a cloud-identity provider
- Setup gated procedures and improve auditing

Elevate User provisioning to the next level

JNUC

VIRTUAL

CONFERENCE

2020

zentral
Development & Professional Services

IDent solution

- Requires a Professional Services delivery
- Integration provided by Regional Partners
- Allows site wide usage *(not seat based)*
- Code Level Support
- Code or deployment customization for large Orgs

  (SIEM, Cloud Deployment, et-al.)

Available on request !!!

2020

JNUC

VIRTUAL

CONFERENCE

2020

Summary

- Employ Jamf Connect in a user provisioning process
- Use the Jamf Connect Login ID Token feature
- Enhance certificate-based identity workflows
- (Re-)Establish a full Multi User setup when needed*

**(gone missing with AD certificate payload, on devices no longer bound to AD)*

Jamf Connect strikes a great balance between corporate security and user experience !

JNUC

VIRTUAL

CONFERENCE

2020

Don't hesitate to contact us for help:

hi@zentral.pro

https://zentral.pro

https://ident.help

Thank you!

https://t1p.de/eqt9

Thank you for listening!

Give us feedback by completing the survey using the widget below

JNUC2020
VIRTUAL CONFERENCE

JNUC

VIRTUAL

CONFERENCE

2020

zentral
Development & Professional Services

Terminology

- **PKI** - (Public Key Infrastructure) for creation, storage, and distribution of digital certificates used to verify that a particular public key belongs to a certain entity
- **RADIUS** - (Remote Authentication Dial In User Service) is a protocol that provides centralized authentication, authorization, and accounting management (AAA).
- **802.1X** - is a standardized method for authenticating the identity of a user before providing network access to the user.
- **802.1X EAP-Transport Layer Security** - defines an X.509 digital certificate authentication mechanism for devices that need to attach to a WiFi or a wired LAN.
- **SCEP** - Simple Certificate Enrollment Protocol
- **OpenID Connect** - Allows Clients to verify the identity obtain basic profile information of the End-User based on the authentication performed by an Authorization Server