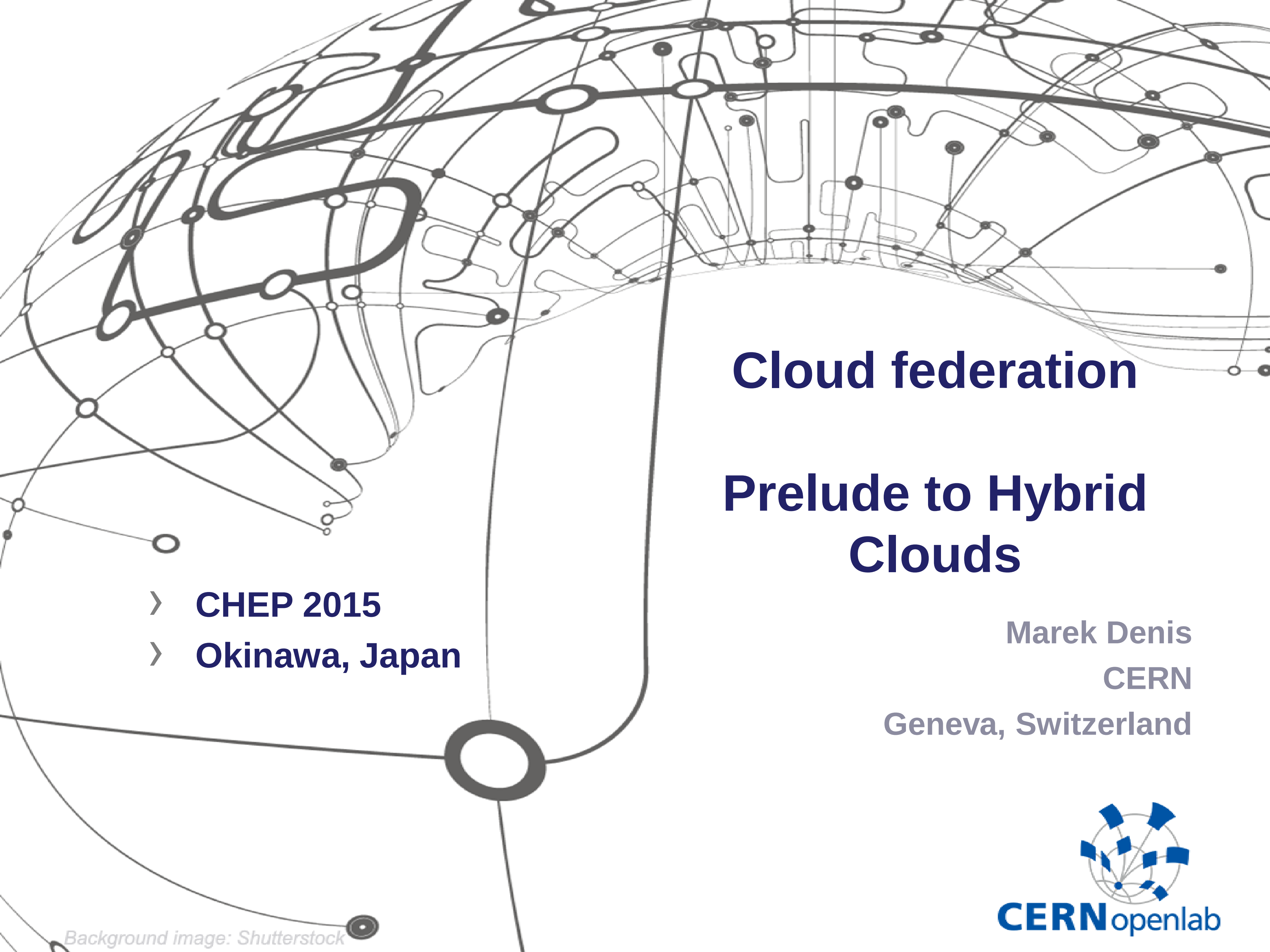

Background image: Shutterstock

Cloud federation

Prelude to Hybrid Clouds

- CHEP 2015
- Okinawa, Japan

Marek Denis
CERN
Geneva, Switzerland

Basic definitions

OpenStack:

An Open Source Cloud Managing System which allows implementors to:

-- Provision and manage compute, network, and storage resources quickly

-- Monitor and alert on those resources

-- Auto-scale cloud resources

-- Standardize and control disk & server images

Keystone:

The Identity service that comes bundled with OpenStack.

Keystone allows implementors to:

-- Provision users, projects, roles

-- Manage their authorization (and authentication)

-- Programmatically discover implemented cloud services

Cloud Federation:

Deployment and management of multiple external and internal cloud computing services to match business needs. A federation is the union of several smaller parts that perform a common action.

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OS-FEDERATION timeline

OpenStack Summit (November 2013)

Basic concept and initial discussions during design sessions

OpenStack Icehouse (April 2014)

Server-side OS-FEDERATION delivered (located in the extensions namespace)

OpenStack Juno (October 2014)

OS-FEDERATION marked as stable. Client code integrated with official OpenStack libraries and CLIs (CERN uses OS-FEDERATION internally since September 2014)

OpenStack Kilo (April 2015)

Added WebSSO support in keystone. Mapping engine enhancements

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OS-FEDERATION advantages

- One account per multiple remote clouds
- Better user experience
- Easier to burst into remote clouds
- Increased overall security

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OS-FEDERATION - characteristics

- User identities are stored in the Identity Provider, not in the OpenStack backend
- Identity Provider can be trusted by multiple Service Providers (clouds)
- Cloud federated users are ephemeral (they don't exist in the cloud infrastructure)
- Ephemeral users are granted access to the resources by dynamically assigned group membership.
- OpenStack utilizes a *Mapping Engine* for translating external assertions/claims into set of local parameters. This is used for other authN mechanisms e.g. *X509, Kerberos*.
- OpenStack utilizes "Cloud Auditing Data Format" (CADF) for cloud auditing.

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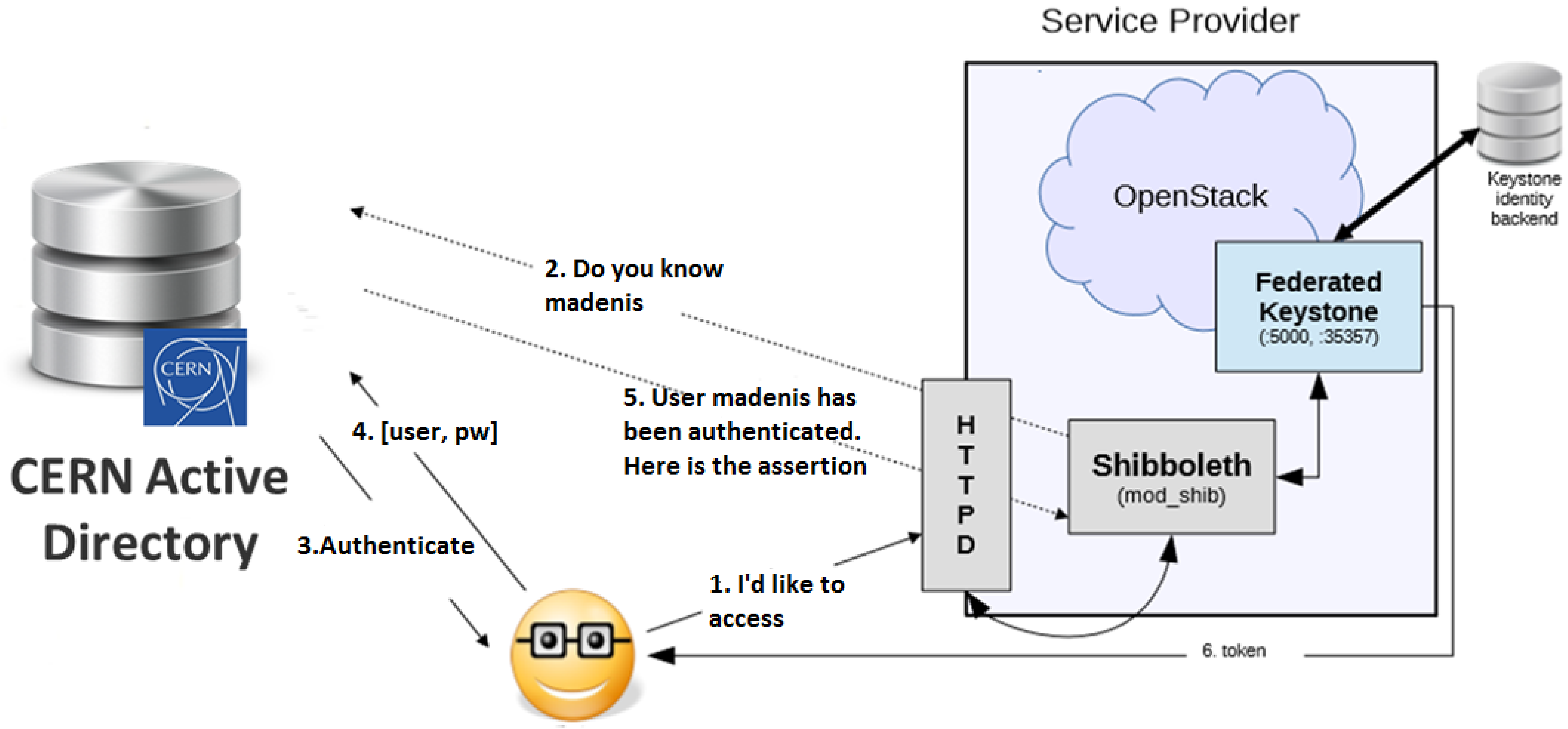
OS-FEDERATION - deployment

- **Deployments recommended and tested with established protocols**
  - SAML2
  - OpenID Connect
- **Keystone must be deployed on top of Apache HTTPD webserver…**
  - …and corresponding modules must be installed
    - mod_shib/mod_mellon for SAML2
    - mod_oidc for OpenID Connect
- **Keystone is federation protocol agnostic…**
  - …however it understands the concept of Identity Provider and Protocol
- **Works with**
  - Shibboleth IdP
  - Microsoft ADFS
  - IBM TFIM

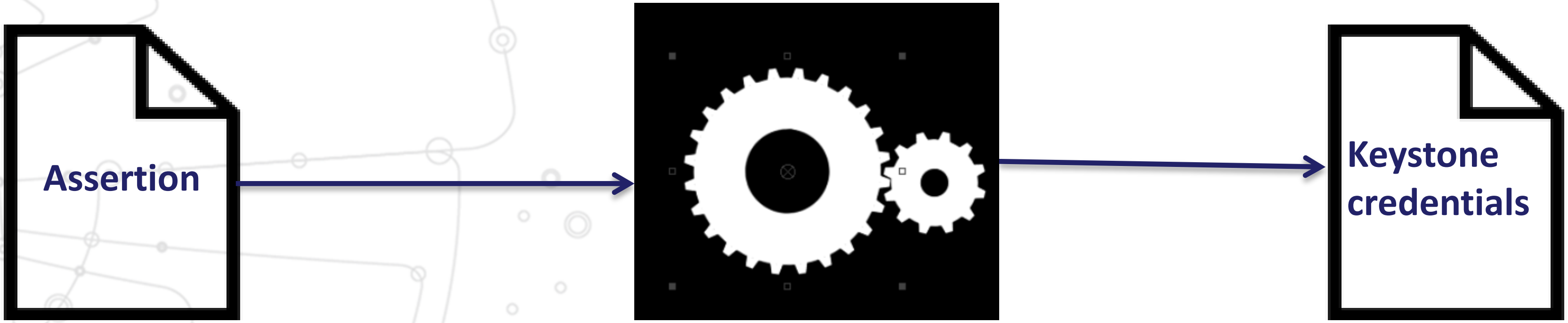
Background image: Shutterstock

Federated authN & authZ



Credits Luca Tartarini

Transforming assertion into local credentials



Assertion

Keystone credentials

LOGIN: madenis
LANGUAGE: EN
DEPARTMENT: IT/OIS
FULLNAME: Marek Denis

```
[
  { "local":
      [ { "user": { "name":   "{0}" } } ],
    "remote":
      [ { "type": "ADFS_LOGIN" } ]
   },
   {
    "local":
       [ { "group": { "id": “devs" } } ,
         {“group”: {“ïd”:”openlab”} } ],
     "remote":
       [ { "type":"DEPARTMENT",
           "any_one_of": ["IT/OIS"] } ]
   }
]
```

```
{
   name: madenis
   groups: [
    “devs”,
    “openlab”
   ]
}
```

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Cloud Federation at CERN

- OpenStack@CERN web access utilizes Web Single-Sign-On
- Command Line Interface access also available with help of SAML ECP
- Successful tests with INFN
- CERN is a member of eduGAIN federation

  (cloud resources sharing to be available soon)
- Many academic institutions and universities are also interested
  - (INFN, SLAC, University of Victoria, UTSA, EMBL)

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More information

“Cloud Federation – Are we there yet?”

Presentation from OpenStack Summit in Paris

(with a federation demo)

http://goo.gl/7x91Eb

OpenStack OS-FEDERATION API

http://goo.gl/cQSrfD

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Thank you

Marek Denis

marek.denis@cern.ch

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Backup slides

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Keystone2Keystone federation

- Keystone can also act as an Identity Provider
- Transform your project scoped token into corresponding SAML assertion
- Burst into other non-OpenStack services or operators

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