# Providing Authentication Identity Management Workshop

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or

# The role of directories in Single Sign on Systems





#### Outline

The Dark Ages



#### **Outline**

- The Dark Ages
- 2 The Enlightenment





#### **Outline**

- 1 The Dark Ages
- 2 The Enlightenment
- The Industrial Revolution





#### **Outline**

- 1 The Dark Ages
- 2 The Enlightenment
- The Industrial Revolution
- 4 The XXI century





#### The Dark Ages of Authentication

there were no directories

There is no central credential repository



#### The Dark Ages of Authentication

there were no directories

- There is no central credential repository
- Each and every application has its own credential repository





#### The Dark Ages of Authentication

there were no directories

- There is no central credential repository
- Each and every application has its own credential repository
- Users are in the midst of their worst nightmare





# The Enlightenment of Authentication there IS a directory

Directories appear



- Directories appear
- We have a centralised credential repository





- Directories appear
- We have a centralised credential repository
- We don't really know what to do with it





- Directories appear
- We have a centralised credential repository
- We don't really know what to do with it
- Every application does its own authentication





- Directories appear
- We have a centralised credential repository
- We don't really know what to do with it
- Every application does its own authentication
- Fortunately, users only have to remember one set of credentials





# The Revolution in Authentication Single Sign On

The directory disappears into the back stage





- The directory disappears into the back stage
- Kerberos can use the directory for AuthN





- The directory disappears into the back stage
- Kerberos can use the directory for AuthN
- Web Single Sign On systems also use the directory for AuthN

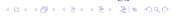


- The directory disappears into the back stage
- Kerberos can use the directory for AuthN
- Web Single Sign On systems also use the directory for AuthN
- Polite applications know how to do AuthN against a directory





- The directory disappears into the back stage
- Kerberos can use the directory for AuthN
- Web Single Sign On systems also use the directory for AuthN
- Polite applications know how to do AuthN against a directory
- There are some applications left that have an attitude and we must find a way to provision them



# XXI century directories do AuthR Storing privileges in the directory

• The directory is used as an unique point for AuthoRisation



# XXI century directories do AuthR Storing privileges in the directory

- The directory is used as an unique point for AuthoRisation
- A sole authorisation model





# XXI century directories do AuthR Storing privileges in the directory

- The directory is used as an unique point for AuthoRisation
- A sole authorisation model
- Agent-Function-Qualifier





# Getting AuthR to applications out of the directory

Direct directory search



## Getting AuthR to applications out of the directory

- Direct directory search
- Web services





### Getting AuthR to applications out of the directory

- Direct directory search
- Web services
- Authorisation assertions for Web SSO systems





### Getting AuthR to applications out of the directory

- Direct directory search
- Web services
- Authorisation assertions for Web SSO systems
- Provisioning for applications with an attitude





#### Summary

No one is using multiple credentials anymore





#### Summary

No one is using multiple credentials anymore, true?



- No one is using multiple credentials anymore, true?
- A single set of credentials



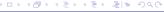


- No one is using multiple credentials anymore, true?
- A single set of credentials
- Central AuthN/AuthR management



- No one is using multiple credentials anymore, true?
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- Central AuthN/AuthR management
- Fast provision





- No one is using multiple credentials anymore, true?
- A single set of credentials
- Central AuthN/AuthR management
- Fast provision and deprovision





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#### Introduction to technical matters

How we can achieve XXI century directory based AuthN/Z

We have different options depending on





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#### Introduction to technical matters

How we can achieve XXI century directory based AuthN/Z

We have different options depending on

the kind of applications we want to integrate



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#### Introduction to technical matters

How we can achieve XXI century directory based AuthN/Z

We have different options depending on

- the kind of applications we want to integrate
- the kind of infrastructure we are using





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#### Introduction to technical matters

How we can achieve XXI century directory based AuthN/Z

We have different options depending on

- the kind of applications we want to integrate
- the kind of infrastructure we are using
- the desired level of interoperability





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We have different options depending on

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Web applications, easier to integrate into the SSO picture





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## Introduction to technical matters

How we can achieve XXI century directory based AuthN/Z

We have different options depending on

- the kind of applications we want to integrate
- the kind of infrastructure we are using
- the desired level of interoperability

Web applications, easier to integrate into the SSO picture Traditional applications are a much different issue





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# Active Directory Server The MS way of things

Designed for a Microsoft centric environment



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## **Active Directory Server**

- Designed for a Microsoft centric environment
- Works for web and non web applications





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## Active Directory Server

- Designed for a Microsoft centric environment
- Works for web and non web applications as long as they are on MS-Windows



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## Active Directory Server

- Designed for a Microsoft centric environment
- Works for web and non web applications as long as they are on MS-Windows
- Not much interoperable





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## **Active Directory Server**

- Designed for a Microsoft centric environment
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- Can do AuthN to another LDAP using ADAM





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## **Active Directory Server**

- Designed for a Microsoft centric environment
- Works for web and non web applications as long as they are on MS-Windows
- Not much interoperable
- Can do AuthN to another LDAP using ADAM
- Can be tamed with the help of Kerberos





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## Active Directory Federation Services

The F word comes into play

 Designed for interoperating with non Microsoft environments



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## Active Directory Federation Services

- Designed for interoperating with non Microsoft environments
- Works with LDAP for AuthN thanks to ADAM



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## Active Directory Federation Services

- Designed for interoperating with non Microsoft environments
- Works with LDAP for AuthN thanks to ADAM
- Uses SAML for federating



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## Active Directory Federation Services

- Designed for interoperating with non Microsoft environments
- Works with LDAP for AuthN thanks to ADAM
- Uses SAML for federating
- Only for Web SSO





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## Active Directory Federation Services

- Designed for interoperating with non Microsoft environments
- Works with LDAP for AuthN thanks to ADAM
- Uses SAML for federating
- Only for Web SSO
- Available on Windows 2003 Server R2





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## Oracle SSO

You play by our rules

Centred around iAS and OID





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## **Oracle SSO**

- Centred around iAS and OID
- Mainly Web SSO





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## Oracle SSO

- Centred around iAS and OID
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## **Oracle SSO**

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- It is not clear it can integrate non web apps
- Can integrate external web apps via Apache module (mod\_osso) or SDK





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## **Oracle SSO**

- Centred around iAS and OID
- Mainly Web SSO
- It is not clear it can integrate non web apps
- Can integrate external web apps via Apache module (mod\_osso) or SDK
- Has an API for interoperation but needs user synchronisation





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## **PERMIS**

X.509 based AuthR policies





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## **PERMIS**

X.509 based AuthR policies

Permis is an AAI with a Privilege Management Infrastructure

Based on X.509 Attribute Certificates





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## PERMIS

X.509 based AuthR policies

- Based on X.509 Attribute Certificates
- The certificates do a strong bind between holder and granted privilege



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## **PERMIS**

X.509 based AuthR policies

- Based on X.509 Attribute Certificates
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- Privileges granted can range from University degrees through file access





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## **PERMIS**

X.509 based AuthR policies

- Based on X.509 Attribute Certificates
- The certificates do a strong bind between holder and granted privilege
- Privileges granted can range from University degrees through file access
- Attribute certificates are stored in the holder's entry in the directory





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## **PERMIS**

X.509 based AuthR policies

- Based on X.509 Attribute Certificates
- The certificates do a strong bind between holder and granted privilege
- Privileges granted can range from University degrees through file access
- Attribute certificates are stored in the holder's entry in the directory
- Digitally signed policies are also stored in the owner's entry





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## **PERMIS**

X.509 based AuthR policies

Some PERMIS key terms





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## **PERMIS**

X.509 based AuthR policies

### Some PERMIS key terms

PMI

## Privilege Management Infrastructure

Strong authorisation infrastructure that extends X.509 PKIs. It is based upon the same cryptographic principles.





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## **PERMIS**

X.509 based AuthR policies

### Some PERMIS key terms

- PMI
- AC

#### **Attribute Certificate**

Strong binding of owner and attribute, based on digital signatures.





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## PERMIS

X.509 based AuthR policies

### Some PERMIS key terms

- PMI
- AC
- AA

### **Attribute Authority**

The entity that grants the privileges by issuing the Attribute Certificate to the holder. E.g. a University, the owner of a file or a manager.





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## **PERMIS**

X.509 based AuthR policies

### Some PERMIS key terms

- PMI
- AC
- AA
- Owner

### Certificate owner

The entity to which the privileges have been granted.





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## **PERMIS**

X.509 based AuthR policies

### Some PERMIS key terms

- PMI
- AC
- AA
- Owner
- Attributes

### **Attributes**

Part of the certificate that is signed, like the public key in a PKI.

Can be used to store privileges and policies.



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## **PERMIS**

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Some PERMIS key terms





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## **PERMIS**

X.509 based AuthR policies

### Some PERMIS key terms

SOA

## Source Of Authority

Equivalent to a PKI's Root CA.

It is the root of trust.

A resource access control system implicitly trusts the SOA for for granting access rights and privileges to it.

The SOA issues ACs to AAs and end users.



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## **PERMIS**

X.509 based AuthR policies

### Some PERMIS key terms

- SOA
- PDP

## **Policy Decision Point**

Entity where AuthR policies are stored, in a signed AC, and AuthR decisions are taken based on such policies.





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## **PERMIS**

X.509 based AuthR policies

### Some PERMIS key terms

- SOA
- PDP
- PEP

## Policy Enforcement Point

The entity that protects access to a resource and acts based on queries to the PDP.



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## **PERMIS**

X.509 based AuthR policies

### Some PERMIS key terms

- SOA
- PDP
- PEP
- DIS

## **Delegation Issuing Service**

An entity used by the AAs to issue delegation ACs. It allows for better control, auditing and logging of the delegation of privileges. It can also reduce complexity of the privilege issuing chain.



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## **PERMIS**

X.509 based AuthR policies

### Some PERMIS key terms

- SOA
- PDP
- PEP
- DIS
- Non assertion

## Preventing privilege abuse

The owner of an AC marked as *no assertion* can grant the indicated privileges but cannot use them. Useful for the DIS.



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# Kerberos

taming the beasts





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#### Kerberos taming the beasts

Kerberos, though old, will take us into the XXI century of SSO.

It can use the directory for AuthN



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#### Kerberos taming the beasts

- It can use the directory for AuthN
- It can control access to many kinds of applications





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# Kerberos

taming the beasts

- It can use the directory for AuthN
- It can control access to many kinds of applications
- ADS can use Kerberos for AuthN





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# Kerberos

taming the beasts

- It can use the directory for AuthN
- It can control access to many kinds of applications
- ADS can use Kerberos for AuthN
- There are rumours of someone using it for AuthN with OID



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# Kerberos

taming the beasts

- It can use the directory for AuthN
- It can control access to many kinds of applications
- ADS can use Kerberos for AuthN
- There are rumours of someone using it for AuthN with OID
- Unfortunately it cannot be used for AuthN to web apps from non Windows clients



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# eduPermission and eduPermissionGroup a work in progress

It is a discussion in progress in MACE about ways of storing permissions in the directory.





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# eduPermission and eduPermissionGroup a work in progress

It is a discussion in progress in MACE about ways of storing permissions in the directory.

Subentries

eduPermission: as objects subentries (Tom Barton's)

The permissions objects are stored as subentries of the holder's entry. It might have scaling problems if holders are persons, numbers may explode.



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# eduPermission and eduPermissionGroup a work in progress

It is a discussion in progress in MACE about ways of storing permissions in the directory.

- Subentries
- Groups

#### eduPermissionGroup (Brendan Belina's)

Permissions are described as group entries in the directory and are granted to persons by way of inclusion in the group, using standard membership mechanisms.





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# eduPermission and eduPermissionGroup a work in progress

It is a discussion in progress in MACE about ways of storing permissions in the directory.

- Subentries
- Groups
- Objects

#### Permissions are objects

Both approaches share the way they describe permissions, as objects with multiple attributes for storing properties such as the application to which they are applied.





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# **URNs** in Entitlements for AuthR

as it is in use at UMA (by example)

irisUserEntitlement = urn:mace:rediris.es:uma.es: entitlement:applAccess:SolicitudGasto:*LEVEL* 

Assigns access rights to the designated application:





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# **URNs** in Entitlements for AuthR

as it is in use at UMA (by example)

irisUserEntitlement = urn:mace:rediris.es:uma.es: entitlement:applAccess:SolicitudGasto:LEVEL

Assigns access rights to the designated application:

Function

entitlement

the URN describes a right for a user or role





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irisUserEntitlement = urn:mace:rediris.es:uma.es: entitlement:applAccess:SolicitudGasto:LEVEL

Assigns access rights to the designated application:

Function

applAccess

kind of right, access to an application in this case.





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Assigns access rights to the designated application:

Function

SolicitudGasto

application the right is granted on.



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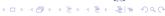
Assigns access rights to the designated application:

Function

#### LEVEL

granted access level, application specific: RUG, ROU, RGE





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- Function
- Usage

#### LDAP search

The application does a standard directory search to find out if the user that has been authenticated has the right to use it and the access level that has been granted to her.



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# **URNs** in Entitlements for AuthR

as it is in use at UMA (by example)

irisUserEntitlement = urn:mace:rediris.es:uma.es: entitlement:applAccess:SolicitudGasto:*LEVEL* 

- Function
- Usage

#### Query via web service

The application queries a web service with user and application identifier as inputs and obtains the access level or the absence of the right to use.



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# **URNs** in Entitlements for AuthR

as it is in use at UMA (by example)

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- Function
- Usage

#### WebSSO AuthR assertion

The authentication server has information about the accessed resource, once the user is AuthN'd, retrieves application specific AuthR information from the entitlements in the user's entry in the directory, and passes them onto the resource



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# **URNs** in Entitlements for AuthR

as it is in use at UMA (by example)

irisUserEntitlement = urn:mace:rediris.es:uma.es: entitlement:applAccess:SolicitudGasto:*LEVEL* 

- Function
- Usage
- Advantages

#### Unique authorisation point

All of an object's authorisations, both explicit and implicit, are centrally kept in a directory entry.





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## **URNs** in Entitlements for AuthR

as it is in use at UMA (by example)

irisUserEntitlement = urn:mace:rediris.es:uma.es: entitlement:applAccess:SolicitudGasto:*LEVEL* 

- Function
- Usage
- Advantages

#### A sole authorisation model

URNs allow us to express all authorisation in a common form, with application specific semantics.





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as it is in use at UMA (by example)

irisUserEntitlement = urn:mace:rediris.es:uma.es: entitlement:applAccess:SolicitudGasto:*LEVEL* 

- Function
- Usage
- Advantages

Agent-Function-Qualifier

Who can do What on Which object





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## **SPOCP**

multiple source AuthR policies

With regard to AuthR, we can consider SPOCP as





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### **SPOCP**

multiple source AuthR policies

With regard to AuthR, we can consider SPOCP as

Engine

#### AuthR policy engine

AuthR policies can be described and applied to resources using SPOCP



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### **SPOCP**

multiple source AuthR policies

With regard to AuthR, we can consider SPOCP as

- Engine
- Service

#### AuthR policy service

SPOCP is implemented as a service that resources query for taking AuthR decisions based on the policy engine.



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### **SPOCP**

multiple source AuthR policies

With regard to AuthR, we can consider SPOCP as

- Engine
- Service
- Aggregator

#### AuthR source aggregator

We can use SPOCP for aggregating information on which AuthR decisions can be based, through the use of boundary conditions.





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#### **SPOCP**

multiple source AuthR policies

With regard to AuthR, we can consider SPOCP as

- Engine
- Service
- Aggregator

Most important, it allows us to use most of the presented methods of AuthR, and then some.





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### **SPOCP**

multiple source AuthR policies

Some SPOCP key terms



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### **SPOCP**

multiple source AuthR policies

#### Some SPOCP key terms

S-Expression

#### Policy language

The access policies to resources are described using expressions like: (spocp (resource etc passwd) (action write)(subject (uid 0)))





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### **SPOCP**

multiple source AuthR policies

#### Some SPOCP key terms

- S-Expression
- Policy engine

#### the Less-Permissive function

By applying this function, the engine guarantees that the querying party will receive a formally correct answer, thus assuring the right AuthR decision.





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### **SPOCP**

multiple source AuthR policies

#### Some SPOCP key terms

- S-Expression
- Policy engine
- AuthR server

#### Answer to resource AuthR queries

SPOCP can be implemented as a server that listens on a socket and resolves application queries for AuthR decisions.





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#### Attributes from many sources

SPOCP can use different sources for getting attributes on which to base the AuthR decision. One of this sources is the directory, as well as relational databases, network information or whatever anyone wants to program for.





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- Boundary condition
- Plug-in

#### The way to reach the attribute sources

This is the basis for boundary conditions. It is based on a modular approach like Apache's. Any needed boundary condition can be implemented in a module that will be loaded at runtime.





# A glimpse of the future A passwordless world

InfoCard





# A glimpse of the future A passwordless world

- InfoCard
- Higgins, the OpenSource response





# A glimpse of the future

A passwordless world

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- OpenID





# Some URLs for further information

PERMIS http://www.openpermis.org/

SPOCP http://www.spocp.org/

Higgins http://www.eclipse.org/higgins/

http://spwiki.editme.com/HigginsIntroduction

OpenID http://openid.net/



