Modelling and evaluating complex user entitlements in directory services using JSON and REST

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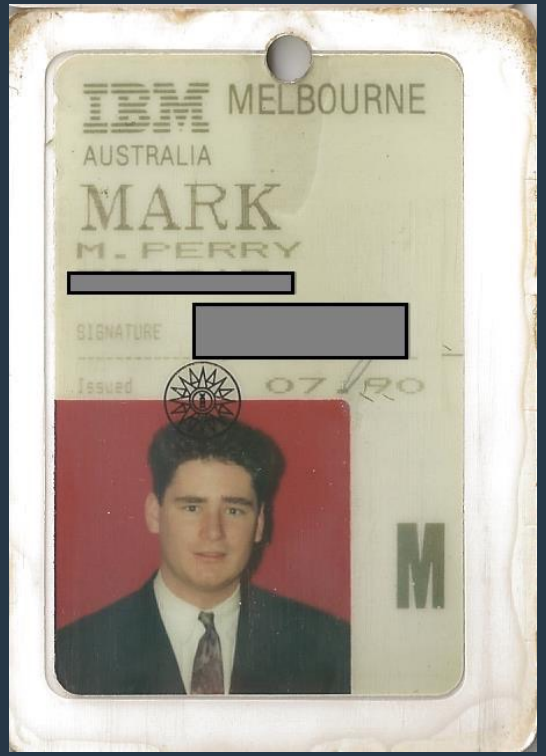
- Based in Melbourne, Australia
- Nearly 30 years in IT
  - Most in Identity
- Likes whiskey, good coffee
- Passionate about Australian Rules Football
- Plays golf



Career in IAM and Digital Identity

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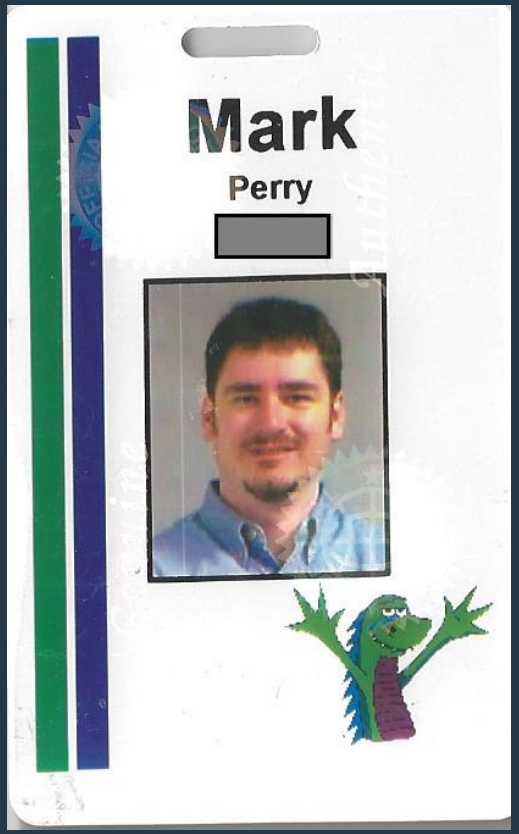
  - /etc/password, YP, NIS



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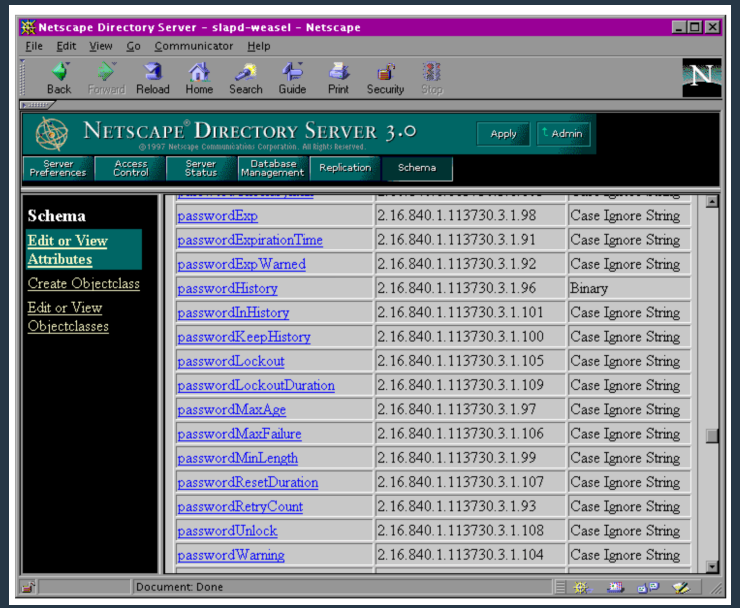

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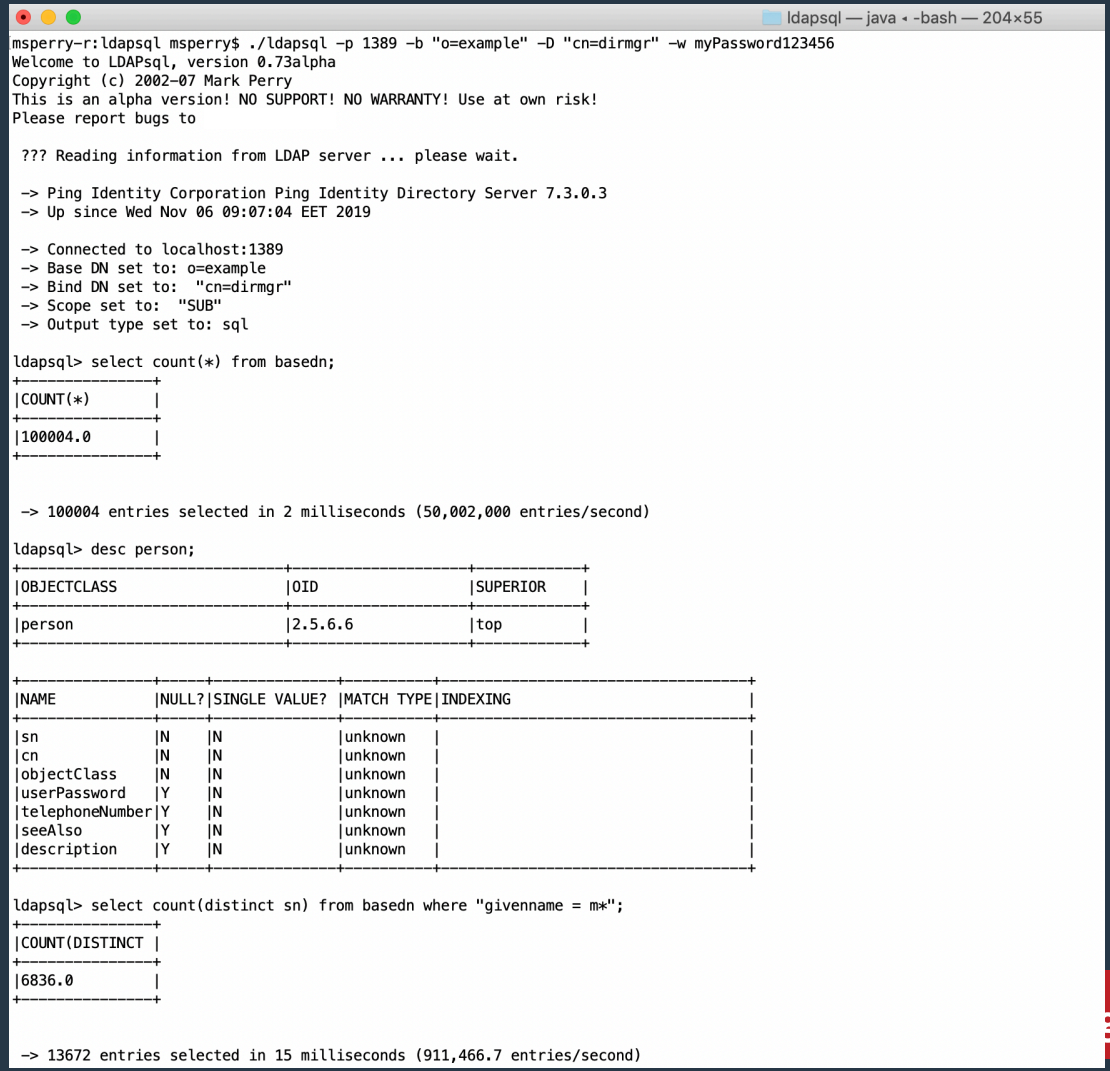
  - Ping Identity
    - OAuth2, OIDC
    - Open Banking

LDAPsql

- Command line tool
- PL/SQL-like
- Use SQL syntax against directories
- Create views, synonyms, etc.
- DISTINCT, COUNT, MAX, MIN, ORDER BY ASC DESC, etc.
- Written in Java
- Pretty output & LDIF
- CRUD
  - INSERT is wizard-driven



Ping Data Products

pingidentity.com

Product	Usage
PingDirectory	Data Store LDAP, REST, JSON
Ping DataSync	High speed data synchronisation
Ping Directory Proxy	LDAP proxy Load balancing Rate limiting Operation balancing
Ping DataGovernance	Data Access Proxy/Service Policy Engine Data transformation

Entitlements

- What can Bob do in this context?
- What do you know about Alice? (all authorisations)

Two Questions
Entitlements
Answer

- Centralisation
  - Single View, Audit
- Control
  - Limit rogue admins
- Performance
  - vs CRM, MDM, etc.
- Access
  - Developer friendly

Why Store Entitlements In The Directory?

- Group memberships
  - memberOf
- nsRole
  - Static, dynamic
- Attribute-based
  - Delimited attribute
  - JSON

Ways of Managing Entitlements

Using JSON Attributes

- Schema Definition

```
dn: cn=schema
objectClass: top
objectClass: ldapSubentry
objectClass: subschema
cn: schema
attributeTypes: ( jsonAttr1-OID NAME 'entitlement' DESC
'entitlement json attribute' EQUALITY
jsonObjectExactMatch SYNTAX 1.3.6.1.4.1.30221.2.3.4
USAGE userApplications )
objectClasses: ( jsonObjectClass-OID NAME
'jsonObjectClass' AUXILIARY MAY entitlement )
```

Modelling JSON Attributes

- Matching Rules
  - `jsonObjectCaseSensitiveNamesCaseSensitiveValues`
  - `jsonObjectCaseInsensitiveNamesCaseInsensitiveValues`
  - `jsonObjectCaseInsensitiveNamesCaseSensitiveValues`
- Constraints
  - Requiring values of the field to have a specified data type.
  - Indicating whether the field is required or optional.
  - Indicating whether the field can have multiple values in an array. If a field is permitted to have array values, restrictions can also be placed on the number of elements that can be present in the array.
  - Indicating whether the field can have a value that is the null primitive as an alternative to values of the indicated data type.
  - Restricting values of string fields to a predefined set of values, that match a given regular expression, or a specified length.
  - Restricting values of numeric fields with upper and lower bounds.

Using JSON Attributes

- Searches

Equals field filter type

```
$ bin/ldapsearch -p 1389 -b dc=example,dc=com  -D
"cn=Directory Manager" -w password
'(entitlement:jsonObjectFilterExtensibleMatch:={
"filterType" : "equals", "field" : ["stuff",
"onetype", "name"], "value" : "John Doe" })'
```

Contains field filter type

```
$ bin/ldapsearch -p 1389 -b dc=example,dc=com  -D
"cn=Directory Manager" -w password
'(entitlement:jsonObjectFilterExtensibleMatch:={
"filterType" : "containsField", "field" : "age",
"expectedType" : "number" })'
```

Modelling Entitlements

```
{"entitlement": {
    "location": "East",
    "role": "Teller"
}}
```

Nesting is possible!

```
{"entitlement": {
    "location": "East",
    "role": {
        "desc": "Teller",
        "jobCode": "3458645"
        …
    }
}}
```

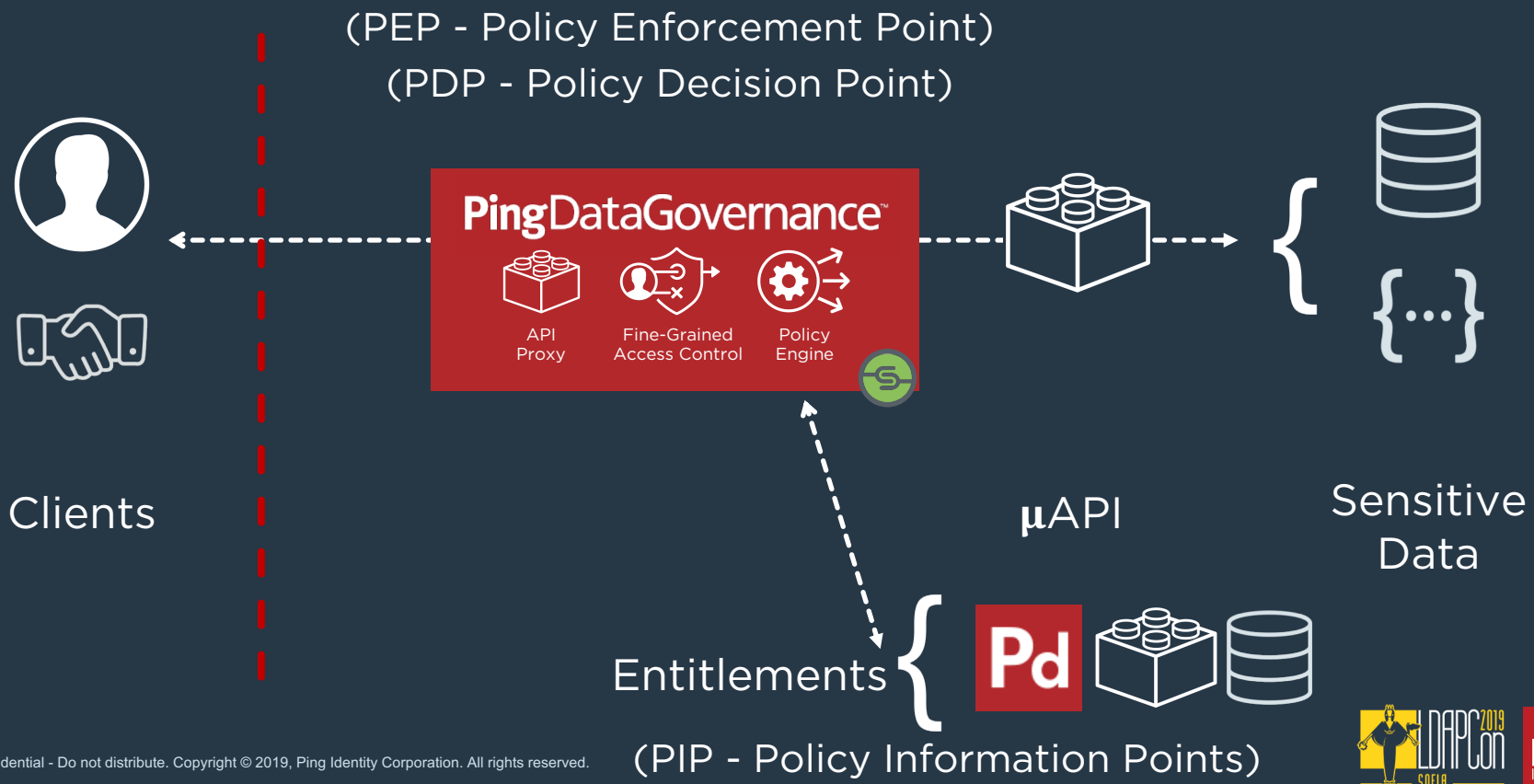
Examples

- Employees
  - Access rights for applications
  - Role, location, time, etc.
  - Relationships
    - Teams
    - Cross-brand
- Consumers
  - Access rights for services
  - Cross-product
  - Consent
  - Relationships
    - Families
    - Associations
  - Churn

Evaluating Entitlements

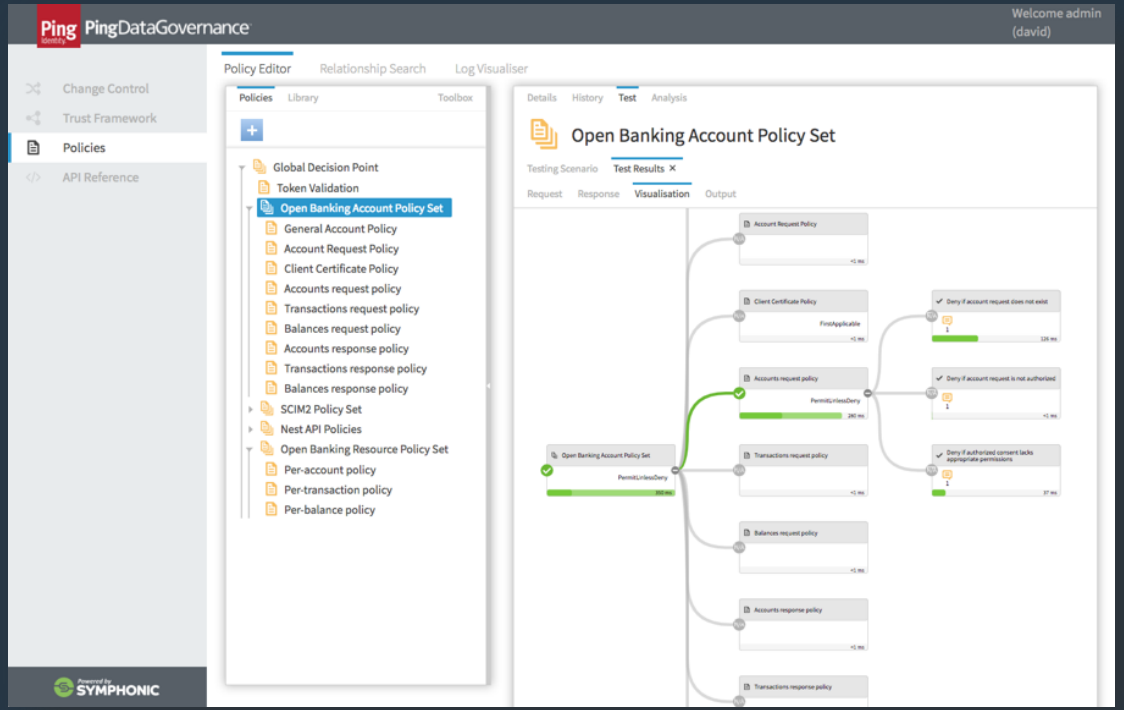
- How much to model and maintain in schema?
- Do different apps need different values?
- Represent in OAuth scopes? Or apps to perform REST calls at runtime?
- Dynamic creation of entitlements in a data access gateway

Ping Data Governance



Enables Flexibility and Ease of Modelling

- Can modify data returned to clients depending on their requirements
- OAuth Token Exchange (soon)
- Drag and drop policy creation tool (no XACML!)



Summary

- Entitlements are growing in importance for customers
  - And they want guidance from us
- Modelling entitlements using JSON
- Evaluating entitlements via REST APIs
- Directories continue to have a huge role to play in securing access