



**MidPoint Community
Meetup 2025**

Latest Features in Connector Development

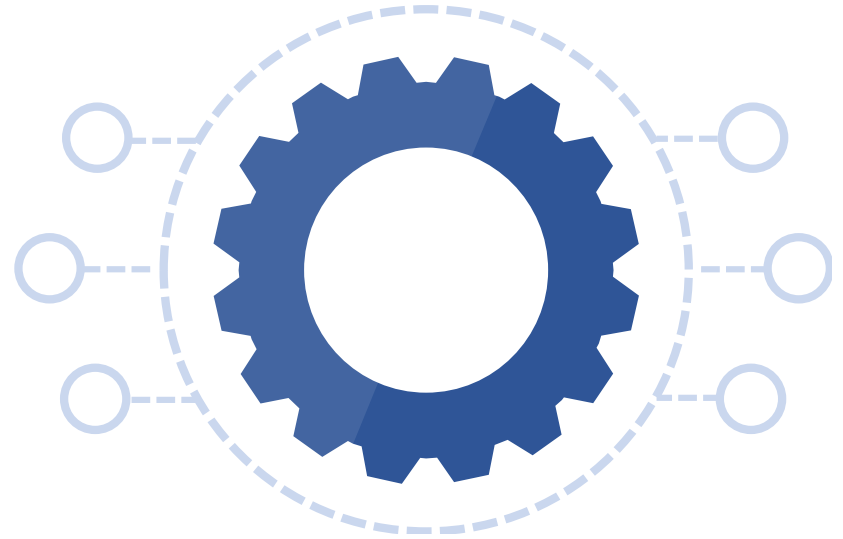
Agenda

- **Introduction**
- **New Features**
 - Configuration Values Enumeration
 - Configuration Discovery
 - Native References
 - Last Login Timestamp



Introduction

- **ConnId Framework**
 - Provisioning Operation Abstraction
 - **Interfaces for System Integration**
- New features fom **ConnId 1.5.0.0 to ConnId 1.6.0.0**
- Spans the midPoint **Versions 3.9 up to 4.9.3** (1.6.0.0-RC1)



Configuration Values Enumeration

- Implementation in you “**Configuration**” class
- New field of the annotation “**ConfigurationProperty**”
- **Enumerates** valid values (**array**)
 - “**allowedValues**” array of string
- Enum **ValueListOpenness**
 - “**allowedValuesOpenness**” {Open, Closed}
- **Configuration Discovery**

```
@ConfigurationProperty(order = 2, allowedValues = { "389", "636" },  
    allowedValuesOpenness = ValueListOpenness.OPEN)
```

```
public int getPort() {  
    return port;  
}
```



Configuration Discovery

- Discover **configuration options** at runtime
 - Database table names, data delimiters, open ports, root DSE, paging options ...
- **Minimal** connector **configuration**
- **Lists suggested** configuration **values**
- **Selected** values are used to **complete** the **configuration**



Configuration Discovery #2

- **DiscoverConfigurationOp** interface used for implementation
- **API** requires implementation of two methods:
 - **testPartialConfiguration()** method
 - Test minimal valid configuration (if no exception occurs, it means success)
 - **discoverConfiguration()**
 - attempts to discover additional configuration properties, and returns a map of suggested values



Configuration Discovery #3

New resource Resources > All resources > New resource

1 Basic information

2 Configuration

3 Discovery

4 Schema

Establish a connection

Fill in the fields down below with correct information which midPoint needs to access your resource in order to continue in the next step

Configuration

Client Id * ⓘ
foo-baar-foo-baar-foo

Client Secret ⓘ
☒ Use clear value
☐ Use secret provider
Password is set Change Remove

Tenant Id * ⓘ
foo.baar.com

Show empty fields

← Back Next: Discovery →

Configuration Discovery #4

New resource

Resources > All resources > New resource

1 Basic information

2 Configuration

3 Discovery

4 Schema

MidPoint discovery

Your resource has gone through the discovery process and midPoint found following parameters for you that you can configure

Discovered options

Validate With Failover Truststore ⓘ

True

Path To Failover Truststore ⓘ

/usr/lib/jvm/java-21-openjdk/lib/security/cacerts

Disabled License Plans ⓘ

Add value

Clear all

Undefined

Throttling Maximum Retry Count ⓘ

3

Page Size ⓘ

100

Throttling Maximum Wait Time ⓘ

10

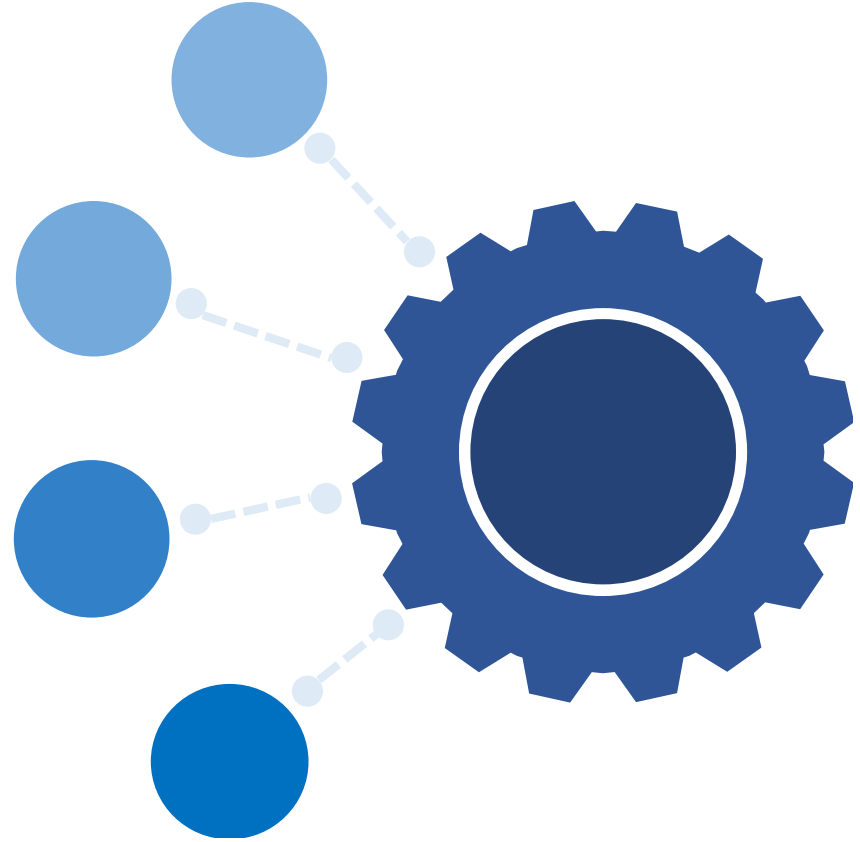
Show empty fields

← Back

Next: Schema →

Configuration Discovery #5

- **Connector** examples:
 - **LDAP/AD, MS Entra, CSV and others ...**

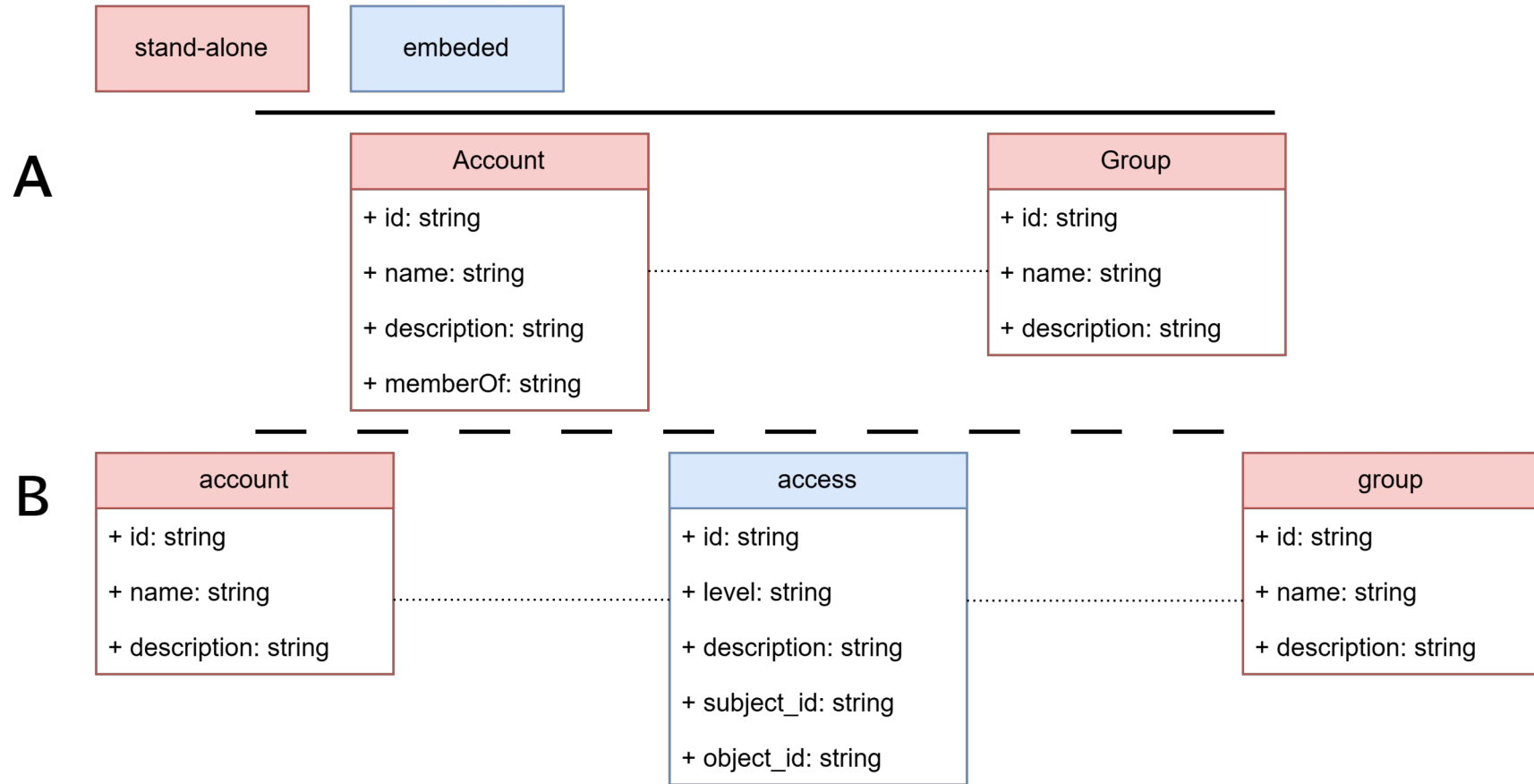


Native References

- Referencing a coupled Object from another Object
 - **ConnectorObjectReference**
- Referencing stand-alone objects or embedded ones
- **Subject**
 - **Receives** the **entitlement**, usually an account
 - **Object**
 - **Represents** the **entitlement**, usually a group.



Native References #2



Native References Schema

- **Define** Reference attribute
 - **Type** set to '**ConnectorObjectReference**'
 - '**ReferencedObjectClassName**' OC name of referenced object
 - Unique '**SubType**' string value identifying the reference
 - '**RoleInReference**', role of the current OC in this reference
- RoleInReference
 - **Subject** (e.g. Account)
 - **Object** (e.g. Group)
- **Embedded** Object class flag (if not stand-alone)



Native References - Read

- Use '**AttributeBuilder**'
- Same as any other '**Connector Object**' attribute
 - Attribute with proper **name** (as in schema)
 - Value a set of '**ConnectorObjectReference**' objects
- **ConnectorObjectReference**(BaseConnectorObject value)
 - '**ConnectorObject**'
 - '**ConnectorObjectIdentification**' (**NULL** object class is permitted)



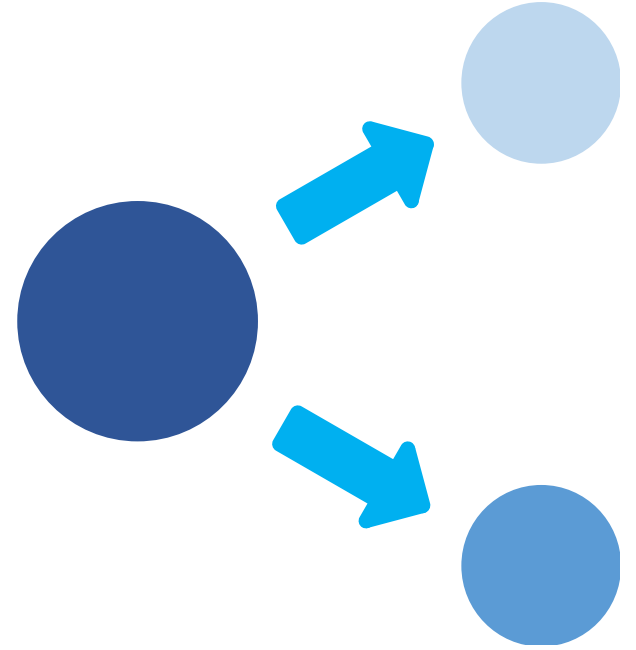
Native References - Write

- Part of the **Attribute set** from the client
- Contains “**ConnectorObjectReference**” type object
- Should contain a **BaseConnectorObject**
 - **ObjectClass** information
 - **Attributes** (Unusually “Name.NAME”)
- Some times the Subject attribute is only operational
 - An update of the Object has to be executed



Native References - Integrity

- **Changes** of Subject or Object might need to be **reflected in the reference parameter values**
- **Referential integrity**
 - Deletions
 - Updates
- **Some** systems handle this **out of the box** (DB's, AD, LDAP)
- Consider both **Subjects** (members) and **Objects** (groups)



Native References #3

- The capability can also be **configured**
- **Connector** examples:
 - **LDAP/AD** and **CSV**



Native References #4

Account

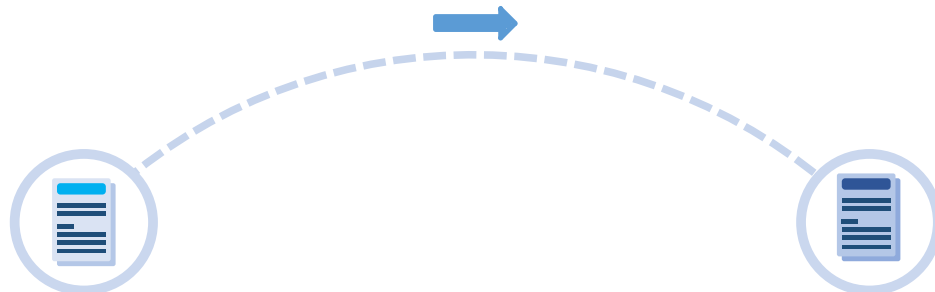
```
1 id;name;occupation
2 xa-005;Polluxia;External Employee
```

Group


```
1 id;name;description
2 f3g8h5j1k6;infrastructure;mailing-list
3 l9m2n7p4q3;software-engineering;mailing-list
4 rls6t3u8v5;network-engineering;mailing-list
```

Access

```
1 id;level;description;subject_id;object_id
2 2xf3g8h5j1k6;default;infrastructure-mailing-list;xa-005;f3g8h5j1k6
3 3xf3g8h5j1k6;admin;infrastructure-mailing-list;xa-005;f3g8h5j1k6
4 2xl9m2n7p4q3;default;software-engineering-mailing-list;xa-005;l9m2n7p4q3
5 2xr1s6t3u8v5;default;network-engineering-mailing-list;xa-005;rls6t3u8v5
```



Native References #5

 (Polluxia)
External Employee


Operations

[← Back](#) [Save](#) [Preview changes](#) [Delete object](#) [Edit raw](#)


Options


[Options](#)


● Basic


 Projections 1


● All accesses


 Assignments 4 <


 Activation



 Password

 History

 Cases 0

 Personas 0

 Delegations 0

 **xa-005** 

Resource: csv-account-access-group
ACCOUNT/default

Basic

Associations

Search

access

☐ **Objects ***

☐ r1s6t3u8v5

☐ l9m2n7p4q3

☐ f3g8h5j1k6

☐ f3g8h5j1k6

level

default

default

admin

default

-

-

-

-

-

Native References #6

Edit user

Users > All users > Edit user

(Polluxia)

External Employee

✓ Enabled

✗ No organization

Operations

← Back

Save

Preview changes

Delete object

Edit row

Options

Options

Basic

Projections 1

All accesses

Assignments 4

All

Role

Organization

Service

Policy

Resource

More...

Basic

| | Name | Activation | Relation | Identifier | Tenant reference | Organization reference | |
|--------------------------|----------------------|------------|---------------|------------|------------------|------------------------|------------------|
| <input type="checkbox"/> | infrastructure | enabled | Administrator | f3g8h5j1k6 | | | <div>– ↗ ↻</div> |
| <input type="checkbox"/> | infrastructure | enabled | Default | f3g8h5j1k6 | | | <div>– ↗ ↻</div> |
| <input type="checkbox"/> | software-engineering | enabled | Default | l9m2n7p4q3 | | | <div>– ↗ ↻</div> |
| <input type="checkbox"/> | network-engineering | enabled | Default | r1s6t3u8v5 | | | <div>– ↗ ↻</div> |

Last Login Timestamp

- Predefined Schema Attribute
“**LAST_LOGIN_DATE_NAME**”
- **Already present** in ConnId for some time
- Support in MidPoint **since 4.9.1**
- Usually used to determine **account Inactivity**



`org.identityconnectors.framework.common.objects.PredefinedAttributes.java`

Last Login Timestamp #2

- Data Type “**Long**”
 - Represents date-time in **milliseconds**
- MidPoint recognizes a **new connector capability**
- “**lastLoginTimestamp**” added as a **shadow property** (behavior/lastLoginTimestamp)
- Special ‘**behavior**’ configuration container used

```
<behavior>  
  <lastLoginTimestamp>  
    <fetchStrategy/>  
  </lastLoginTimestamp>  
</behavior>
```



Last Login Timestamp #3

- CSV File Connector

```
<shadow oid="f5147298-d46c-4f21-99ac-c431008b8a7d">
  <name>lyra</name>
  <resourceRef><!-- ABll --></resourceRef>
  <objectClass>ri:AccountObjectClass</objectClass>
  <primaryIdentifierValue>lyra</primaryIdentifierValue>
  <kind>unknown</kind>
  <intent>unknown</intent>
  <exists>true</exists>
  <attributes>
    <ri:name>lyra</ri:name>
  </attributes>
  <behavior>
    <lastLoginTimestamp>2025-04-15T14:50:11.747Z</lastLoginTimestamp>
  </behavior>
</shadow>
```



Last Login Timestamp #4

- Capability is also **configurable**

```
<capabilities>
  <configured>
    <cap:behavior>
      <cap:lastLoginTimestamp>
        <cap:attribute>ri:lastLogin</cap:attribute>
        <cap:format>yyyy-MM-dd'T'HH:mm:ss.SSSXXX</cap:format>
        <cap:ignoreAttribute>true</cap:ignoreAttribute>
      </cap:lastLoginTimestamp>
    </cap:behavior>
  </configured>
</capabilities>
```



Conclusion

- Evolveum **Github**
- Evolveum Docs: **List of Identity Connectors**
- Evolveum Docs: **ConnId 1.x Connector Development Guide**
- Any connector **contributions** are welcome :)



Evolveum

Thank you for your attention

Feel free to ask your questions now!



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