Evolveum

How to Search for Information in MidPoint

MidPoint Query Language for Engineers

Martin Špánik, March 2024

Senior Identity Engineer

Agenda

- Overview
- midPoint Query Language
  - Language structure and elements
  - Querying references
  - Expressions
- Examples and tips
  - Basic search
  - Displaying object relations
  - Search in audit
- Real usage example
- Tools and documentation

Why MidPoint Query Language?

- XML Query

```
<and>
  <substring>
    <path>emailAddress</path>
    <value>gmail.com</value>
    <anchorEnd>true</anchorEnd>
  </substring>
  <equal>
    <path>locality</path>
    <value>Stockholm</value>
  </equal>
</and>
```

- MidPoint Query Language

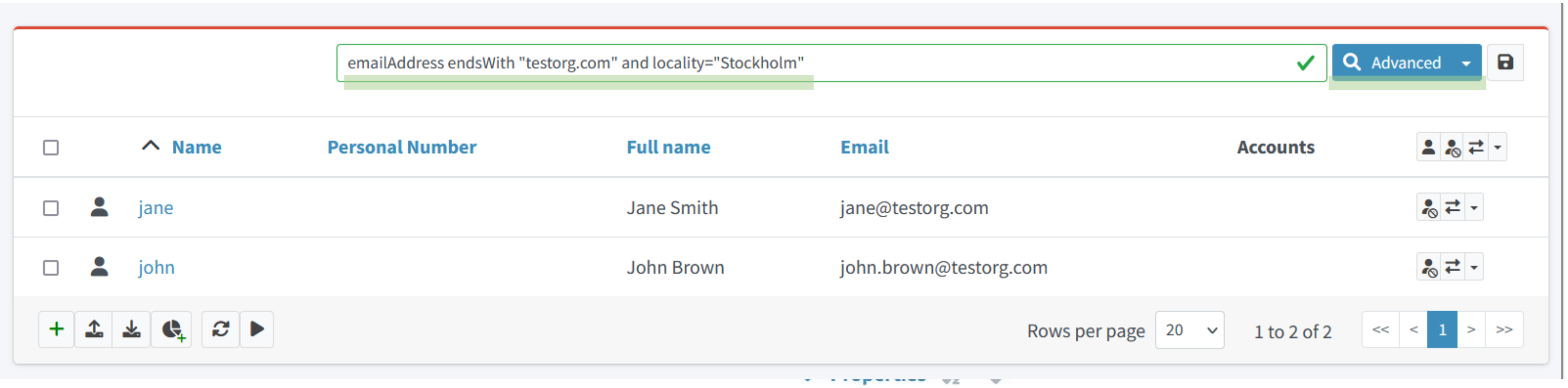
```
emailAddress endsWith ‘gmail.com' and
locality = "Stockholm"
```

Overview of MidPoint Query Language

- Primary query language in midPoint
- Bounded to midPoint object model
  - Querying object relations
- Infix instead of prefix notation
- Available everywhere in midPoint
  - GUI – as advanced search
  - Configuration files
  - Code

Advanced Search – MidPoint Query Language in GUI

- Object type for query defined by view

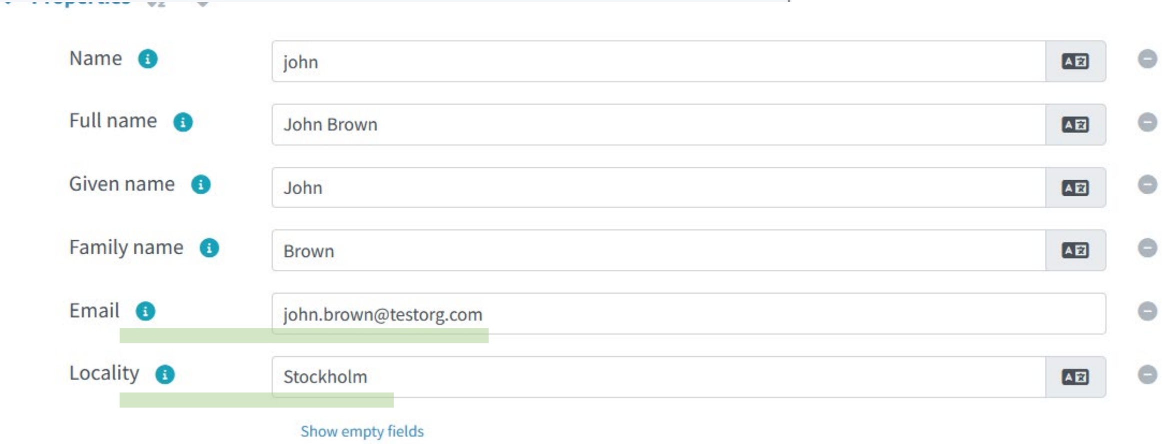


```
emailAddress endsWith "testorg.com" and locality="Stockholm"
```

□	Name	Personal Number	Full name	Email	Accounts
□	jane		Jane Smith	jane@testorg.com	
□	john		John Brown	john.brown@testorg.com	

Rows per page 20

1 to 2 of 2



Name	john
Full name	John Brown
Given name	John
Family name	Brown
Email	john.brown@testorg.com
Locality	Stockholm

MidPoint Query Language in Configuration

- XML - wrapped inside **<text>** element inside **<filter>** element within query

  -
    ```
    <query>
      <filter>
        <text>name startsWith "J"</text>
      </filter>
    </query>
    ```
  - Object type must be defined

- Query in Groovy code (API)

  -
    ```
    import com.evolveum.midpoint.xml.ns._public.common.common_3.*
    def query = midpoint.queryFor(UserType.class, "name startsWith ’J’")
    def result = midpoint.searchObjects(query)
    ```

MidPoint Object Structure - User

```
<user xmlns...
 oid="346b732b-95f1-417d-b632-e5324d45dd00">
    <name>amkin</name>
    <extension xmlns:gen987="http://custom-schema/midpoint">
        <gen987:empStartDate>2021-09-01T00:00:00.000+02:00</gen987:empStartDate>
    </extension>
    <lifecycleState>active</lifecycleState>
    <assignment>
        <targetRef oid="a5f9fe1e-69a2-459b-ae65-f914bb0d40b1" relation="org:default" type="c:ArchetypeType"/>
    </assignment>
    <assignment>
        <targetRef oid="13b0c900-4849-4bb7-99cc-30a4998606e6" relation="org:default" type="c:RoleType"/>
    </assignment>
    <linkRef oid="b61df42d-ff8b-405d-bb6c-23b0f9675440" relation="org:default" type="c:ShadowType"/>
    <linkRef oid="f8888ae5-be2f-41c8-b048-b8d4f4b8dfa3" relation="org:default" type="c:ShadowType"/>
    <activation>
        <effectiveStatus>enabled</effectiveStatus>
        <enableTimestamp>2024-02-29T21:55:48.297+01:00</enableTimestamp>
    </activation>
    <locality>Leeds</locality>
    <emailAddress>amanda.king@testorg.com</emailAddress>
    <givenName>Amanda</givenName>
    <familyName>King</familyName>
    <organizationalUnit>D2</organizationalUnit>
    <personalNumber>50</personalNumber>
</user>
```

MidPoint Query Language – Basic Info

- Item filterName value
  - `fullName = "John Doe"`
  - `givenName startsWith "J"`
  - `activation/effectiveStatus = "enabled"`
- Item
  - Item path to the attribute (name, not display name)
- Filters:
  - `=, <, >, !=, <=, >=`
  - `startsWith, endsWith, contains, fullText`
  - `exists`
  - Dates are compared as strings (ISO 8601 date format)
- Logical operators
  - `and, or, not`
  - `familyName="Doe" and not (givenName="John" or givenName="Bill")`
- String values enclosed by single (‘) or double quotes (")

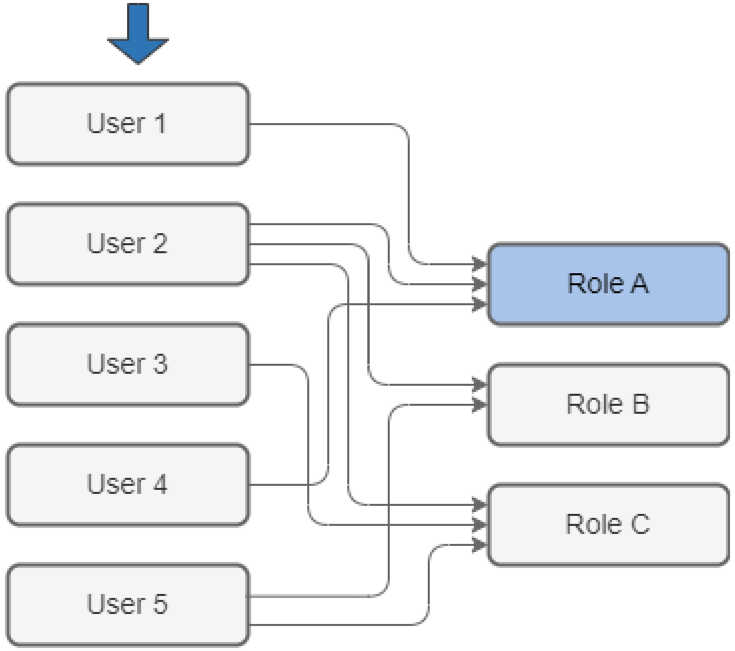
MidPoint Query Language – Query Matching Rules

- Case sensitivity specification of comparison filters (mostly)
  - `filter[matchingRuleName]`
- Matching rules are different for polyStrings and strings !
  - `stringIgnoreCase` – for string attributes
  - `origIgnoreCase`– for polystrings
- Examples
  - `emailAddress endsWith[stringIgnoreCase] "@testorg.com"`
  - `familyName contains[origIgnoreCase] "son"`
- Check attribute type at “Searchable items” page in docs

MidPoint Query Language - Querying References 1/2

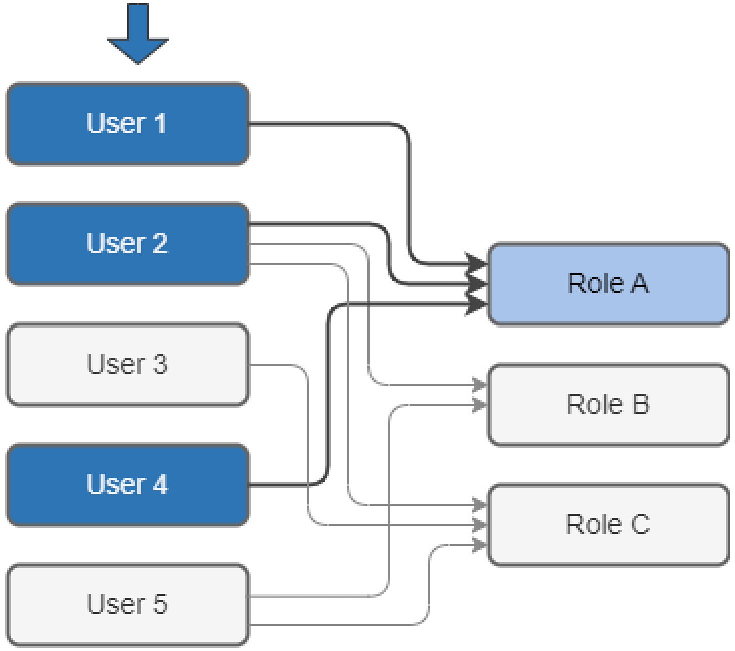
- Search for all objects that “**have reference**” of the object

- Assignments / Inducements
  - `assignment/targetRef`
  - `inducement/targetRef`
- Linked accounts on resources
  - `linkRef`
- Archetypes
  - `archetypeRef`
- Indirect assignments
  - `roleMembershipRef`



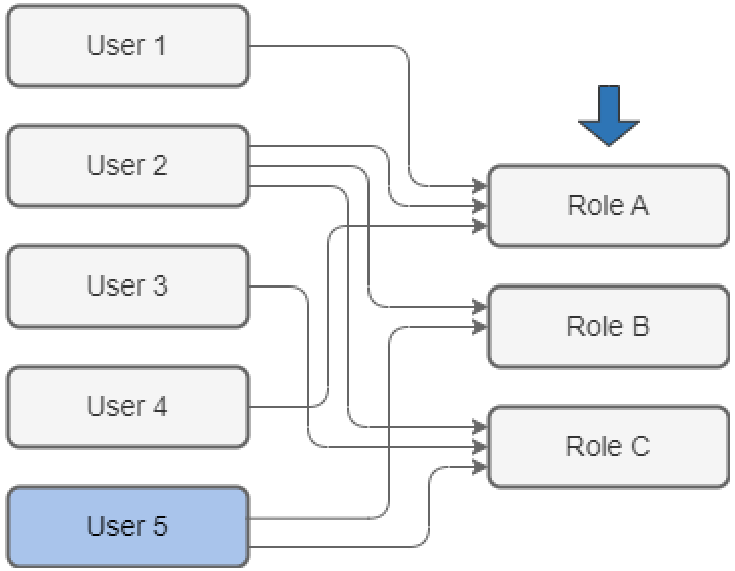
MidPoint Query Language - Querying References 1/2

- Filter: **matches**
  - `assignment/targetRef matches (oid = efaf89f4-77e9-460b-abc2-0fbfd60d9167)`
    - In All users view, list all users that have role with following OID directly assigned
- Dereferencing: @
  - `assignment/targetRef/@/name = “Superuser”`
    - In All users view, list all users that have role “Superuser” directly assigned
- Type operator
  - `roleMembershipRef/@ matches ( . type ServiceType )`
    - All services directly or indirectly assigned.



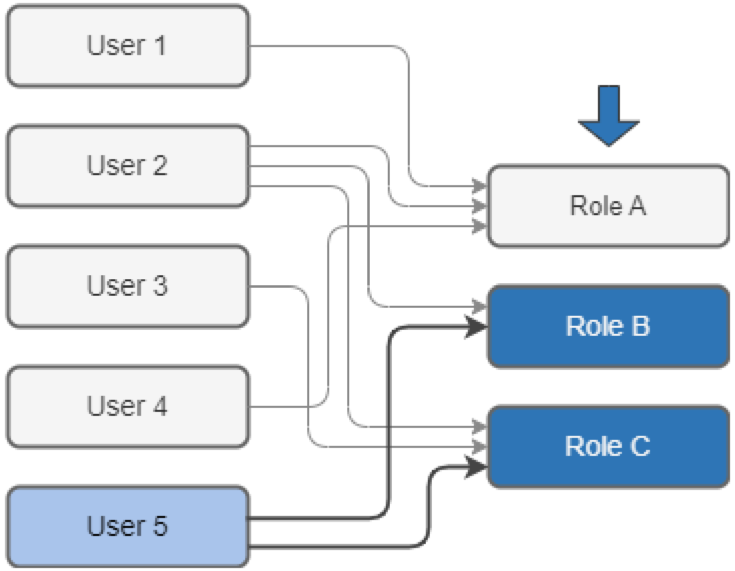
MidPoint Query Language - Querying References 2/2

- Search for all objects that “**are referenced**” by the object



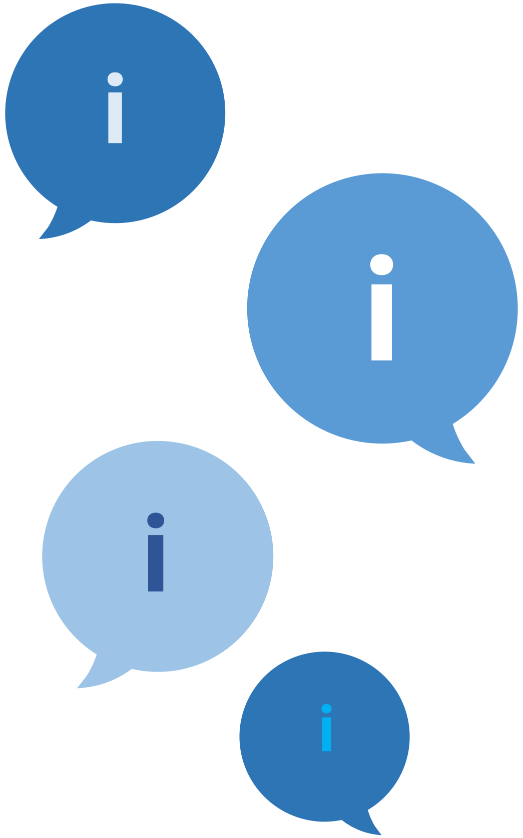
MidPoint Query Language - Querying References 2/2

- Filter: **referencedBy**
  - `. referencedBy ( @type=UserType  and @path=assignment/targetRef and name= "administrator" )`
    - In All roles view, list all roles directly assigned to user administrator
- Referenced object identifier: .
- **@type** operator



MidPoint Query Language - Expressions

- Supported in configuration only (not allowed in GUI)
- Script
  - `metadata/createTimestamp > `basic.fromNow(“-P30D”)``
    - Expression is identified by ` (backtick character)
    - Multiline by ``` (triple backtick, followed by newline)
    - Can use midPoint functions
- Evaluation of search expressions is limited. Fully works in:
  - Dashboards
  - Reports
  - Object collections



Examples – Expressions in Queries

- Object collection – all users created within last 48 hours:

```
<objectCollection ...

    <name>Users created in the last 48 hours</name>
    <type>UserType</type>
    <filter>
        <q:text>
            metadata/createTimestamp greater ```
                calendar = basic.addDuration(basic.currentDateTime(), "-P2D")
                return calendar
                ```
        </q:text>
    </filter>
</objectCollection>
```

https://docs.evolveum.com/midpoint/reference/concepts/query/midpoint-query-language/expressions/

```

Examples – Queries in Groovy Code

- Standard definition of the query in groovy code

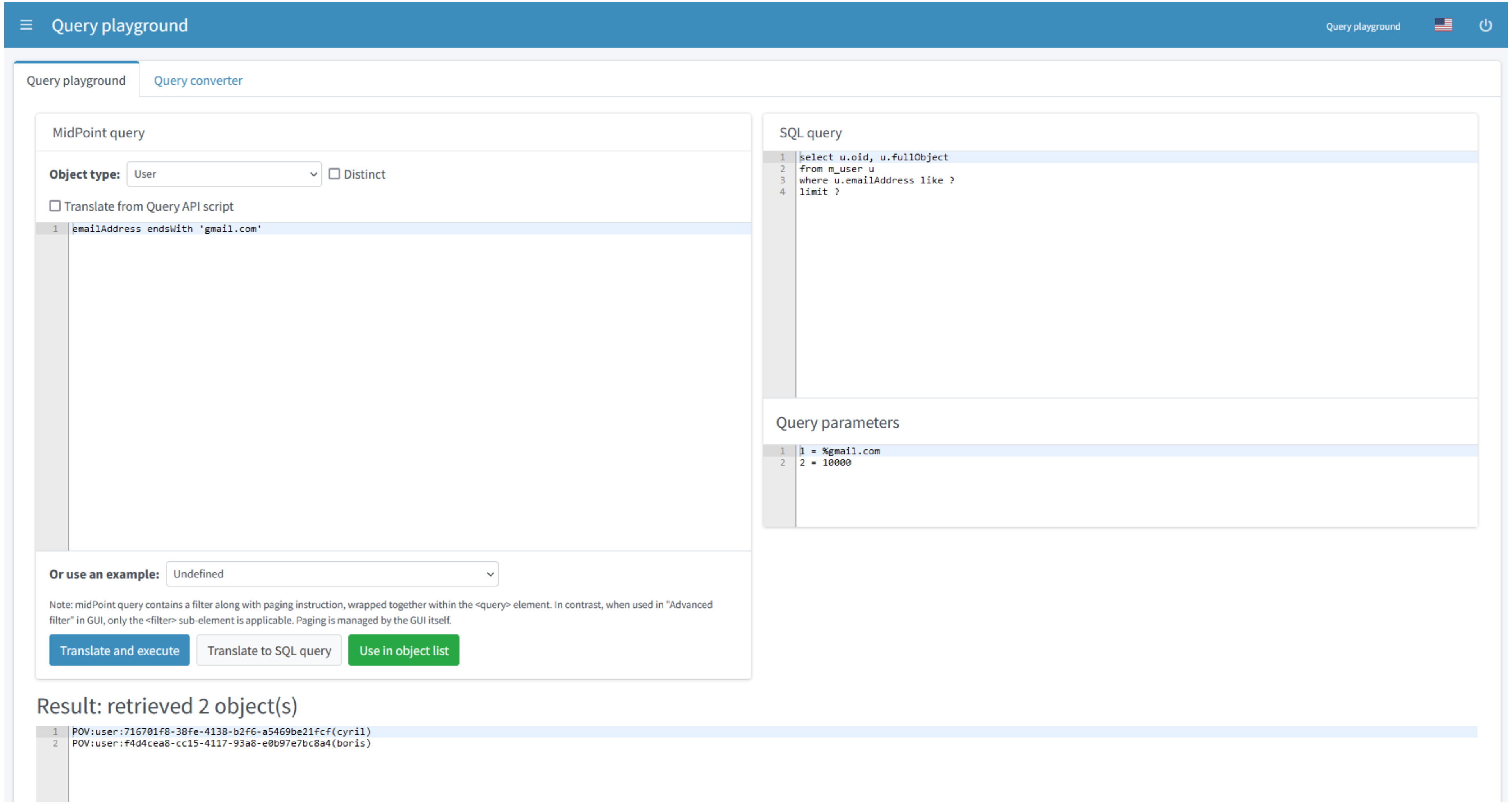
```
import com.evolveum.midpoint.xml.ns._public.common.common_3.*;

def query = midpoint.queryFor(UserType.class, “activation matches
(effectiveStatus = ‘enabled’ and enableTimestamp >= ‘2024-03-01’)”)

def result = midpoint.searchObjects(query)
```

https://docs.evolveum.com/midpoint/reference/concepts/query/midpoint-query-language/query-language-in-groovy/

Query in AUDIT

- **What has happened**
- Searching in
  - Audit events – AuditEventRecordType
  - Deltas – ObjectDeltaOperationType
- Check “Searchable Items” for attribute names
- Limit each search in large audits by timestamps
  - `timestamp >= "2024-03-01"`
- Limitation of querying elements in database columns – can’t go with query to delta objects

Query Playground and Query Converter



MidPoint query

Object type: User ☐ Distinct

☐ Translate from Query API script

```
emailAddress endsWith 'gmail.com'
```

Or use an example: Undefined

Note: midPoint query contains a filter along with paging instruction, wrapped together within the <query> element. In contrast, when used in "Advanced filter" in GUI, only the <filter> sub-element is applicable. Paging is managed by the GUI itself.

SQL query

```
select u.oid, u.fullObject
from m_user u
where u.emailAddress like ?
limit ?
```

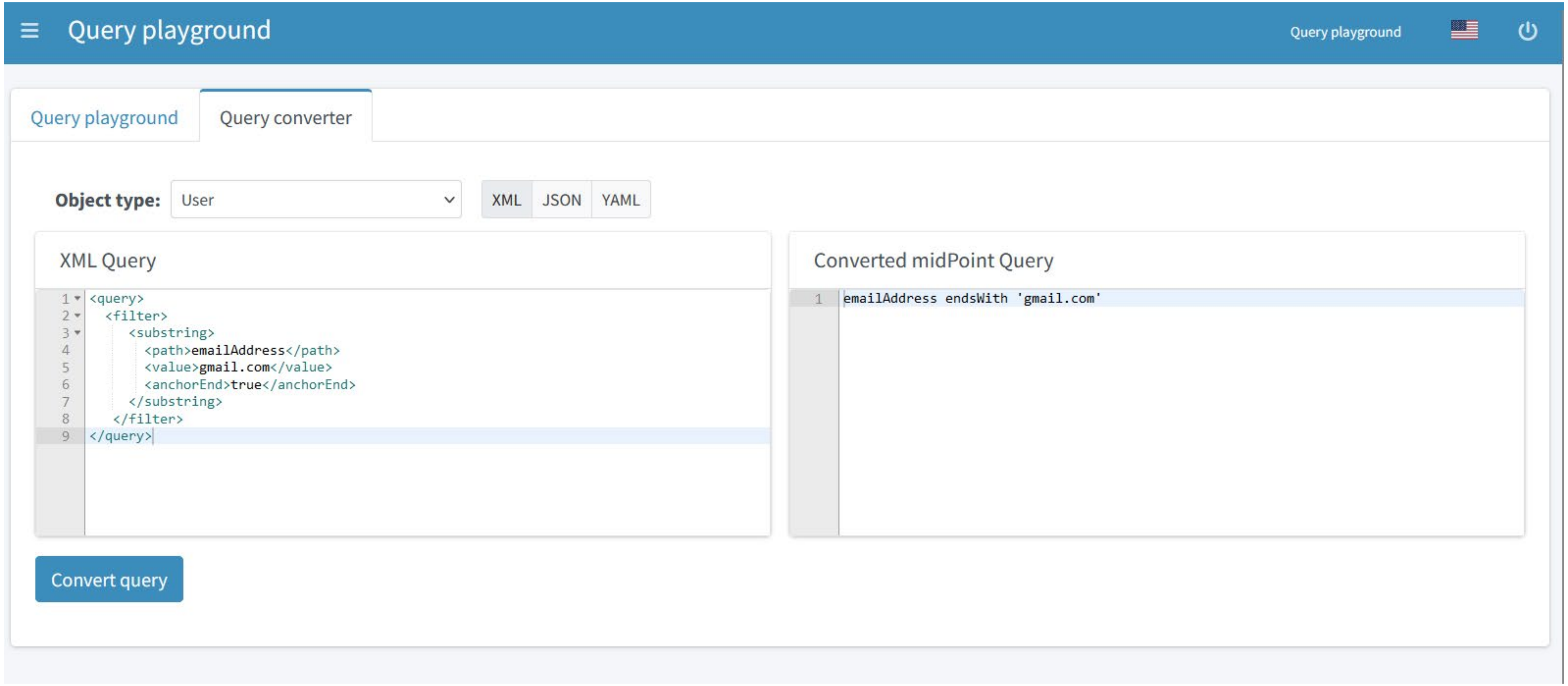
Query parameters

```
1 = %gmail.com
2 = 10000
```

Result: retrieved 2 object(s)

```
POV:user:716701f8-38fe-4138-b2f6-a5469be21fcf(cyril)
POV:user:f4d4cea8-cc15-4117-93a8-e0b97e7bc8a4(boris)
```

Query Playground and Query Converter

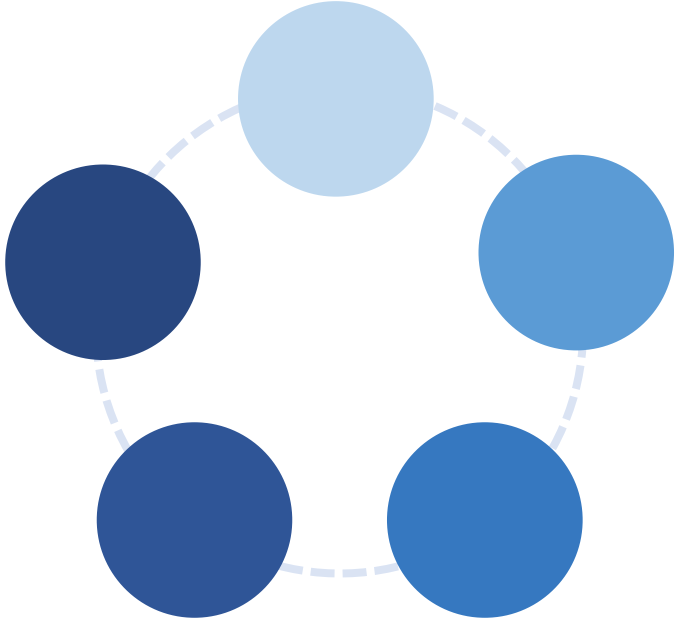


```
<query>
  <filter>
     <substring>
       <path>emailAddress</path>
       <value>gmail.com</value>
       <anchorEnd>true</anchorEnd>
     </substring>
   </filter>
</query>
```

```
emailAddress endsWith 'gmail.com'
```

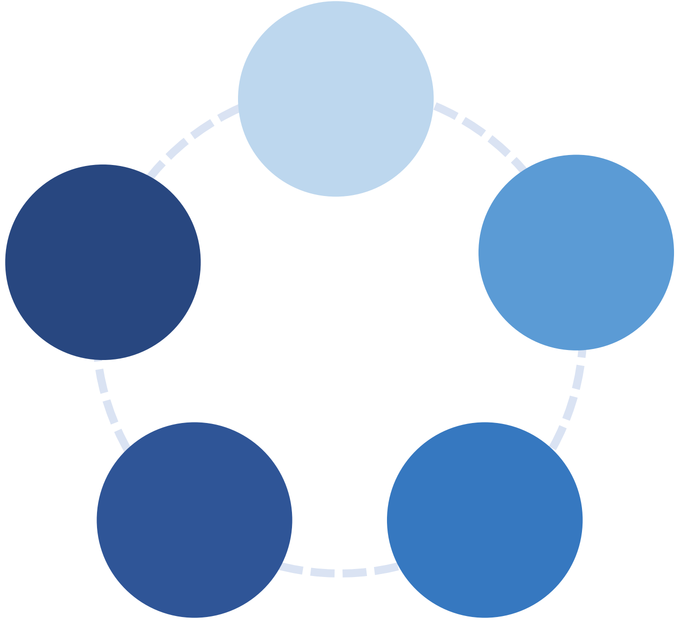
Real example

- Using midPoint query in GUI
  - Actual state information
    - Users, Roles, Assignments, Accounts
  - What happened – audit search
- Using midPoint query in midPoint Studio
- Converting queries with Query converter



Real example: Environment

- midPoint 4.8.3-SNAPSHOT
- 2 resources
  - Users – inbound – 50 users – HR import
  - AppAccess – outbound
- Application roles
  - Defining access to applications
  - Assignment creates account and assigns entitlement in AppAccess resource
  - Some roles with riskLevel defined
- Business role
- Assignments and inducements



Documentation

- https://docs.evolveum.com
- Search for “query” or “midPoint query”
- https://docs.evolveum.com/midpoint/reference/concepts/query/midpoint-query-language

Future

- Semantic autocompletion
  - in 4.9 – easier queries preparation
- Webinar for advanced usage of MQL
  - deeper explanation of language structure
  - more complex examples
- Continual updates of documentation and examples

Conclusion

- Midpoint Query Language
  - More natural and user friendly
  - Same queries available everywhere in midPoint
  - Possible to use by advanced users
  - Query playground and Query converter
- https://docs.evolveum.com

Thank you for your attention

Do you have any **questions**? Feel free to contact us at **info@evolveum.com**

Follow us on social media or **join us** at GitHub or Gitter!

/Evolveum

@Evolveum

/Evolveum

/Evolveum

/Evolveum

/Evolveum

Evolveum

Examples: Basic Queries

- Users located in London
  - `locality = "London"`
- Inactivated users
  - `activation/effectiveStatus = "disabled‶`
  - `lifecycleState = 'suspended'`
- Users without locality
  - `locality not exists`
- Active users without locality
  - `lifecycleState = "active" and locality not exists`
- Users created this year
  - `metadata/createTimestamp >= "2024-01-01"`
- Users with email – case insensitive
  - `emailAddress endsWith[stringIgnoreCase] "testorg.com"`

Examples: Queries in All accesses panel of User

- The panel is searching in roleMembershipRef element of the user.

- Does the user have role AppB:End user assigned ?
  - `@/name = "AppB:End user"`
- All services where the user has access
  - `. matches (targetType= ServiceType)`
- All Applications where user have access (querying archetype)
  - `@/archetypeRef/@/name = "Application"`

Examples: Querying References – 1/2

- Users with role AppA:Reader assigned (directly)
  - `assignment/targetRef/@/name = "AppA:Reader"`
- Users with role AppA:Reader assigned (directly or indirectly)
  - `roleMembershipRef/@/name = "AppA:Reader "`
- Users without the role AppA:Reader
  - `roleMembershipRef/@/name != "AppA:Reader"`
- Internal users (users of archetype “Internal User”)
  - `archetypeRef/@/name = "Internal User"`
- Users with account on resource “AppAccess”
  - `linkRef/@/resourceRef/@/name = "AppAccess"`
  - `linkRef/@ matches ( . type ShadowType and resourceRef/@/name = "AppAccess" )`

Evolveum

Examples: Querying References – 2/2

- Querying in All Roles view

- Which roles are assigned to user alpet or amkin
  - `. referencedBy ( @type = UserType and name = "amkin" and @path = roleMembershipRef )`
- Which risky roles are assigned (somehow) to users
  - `riskLevel>3 and . referencedBy ( @type = UserType and @path = roleMembershipRef )`
- Do we have any roles not assigned to users ?
  - `not (. referencedBy ( @type = UserType and @path = roleMembershipRef ))`

Evolveum

Examples: Search in Audit events – 1/2

- Events created since specific date
  - `timestamp >= "2024-03-01"`
    - Add this to all queries for large audit logs
- All events related to specific user
  - `targetRef/@/name= "amkin"`
- All failed events since specific time
  - `eventStage = "execution" and outcome != "success" and timestamp >= "2024-01-15T08:00:00"`
- All events where specific attribute was updated
  - `changedItem = c:fullName`

Evolveum

Examples: Search in Audit Events – 2/2

- All events related to resource “AppAccess”
  - `delta matches (resourceName = "AppAccess")`
- All events related to account “amkin" on the resource “AppAccess"
  - `delta matches (resourceName = "AppAcces" and shadowKind = "account" and objectName = "amkin" )`
- All events related to user “amkin” (user in midPoint) on the resource “AppAccess”

  -
    ```
    targetRef/@/name= "amkin" and
    delta matches (resourceName = "AppAccess" )
    ```