Evolveum

MidPoint 4.4 – Tasks

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Agenda

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- Activities (big redesign)

- Simplified task definition

- Improvements

- New features

- Migration

- Tasks are here since first versions of midPoint (2011)

  - 3.1 (2015): multiple threads

  - **3.8 (2018): multiple nodes (clustering)**

  - 4.0 (2019): thresholds on a single node (lightweight partitioning)

- Not all the features were easy to use, though.

- After gathering enough experience, we were able to redesign the task execution from scratch.
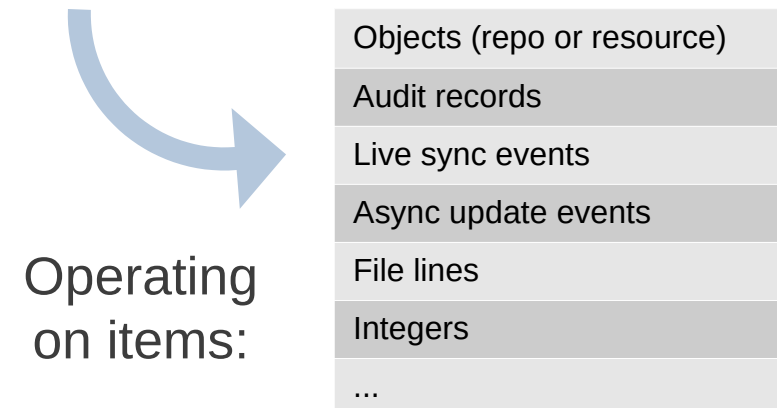
Activity-based Conceptual Model

Activity = work that needs to be done

Simple activity = action + item set
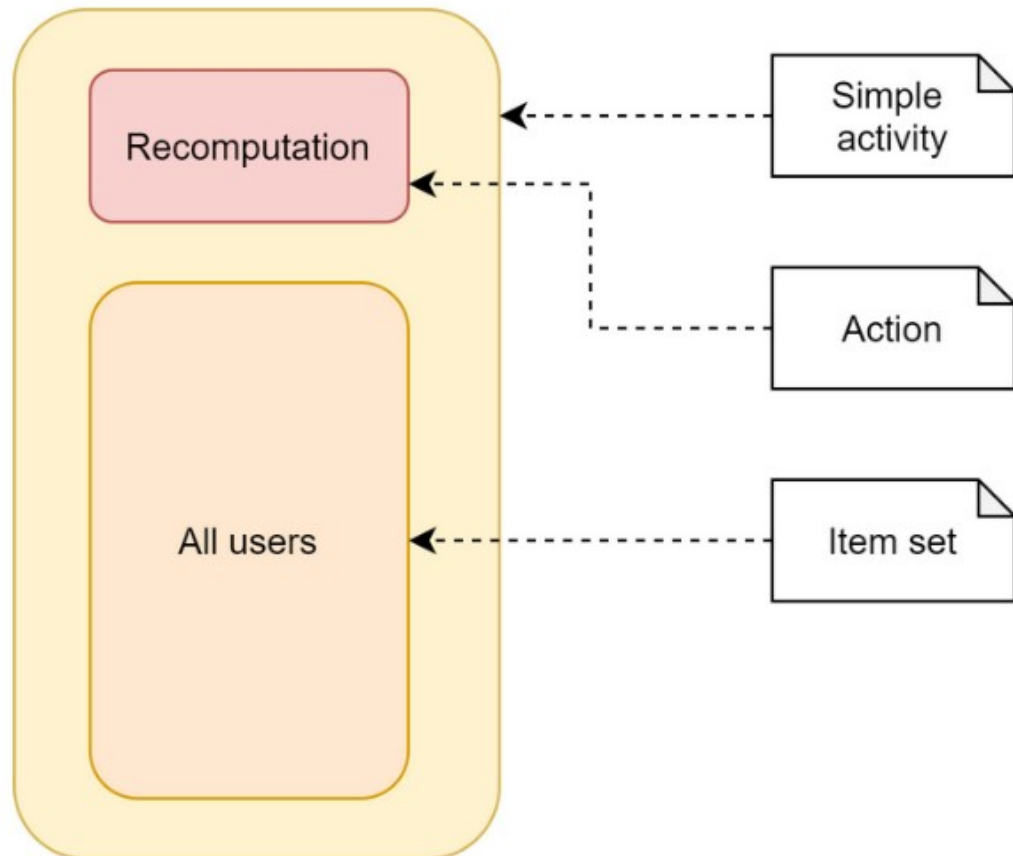
Actions for simple activities

recomputation	triggerScan
import	shadowRefresh
asynchronousUpdate	shadowCleanup
liveSynchronization	reindexing
reportExport	objectIntegrityCheck
reportImport	shadowIntegrityCheck
iterativeScripting	activityAutoScaling
nonIterativeScripting	propagation
changeExecution	multiPropagation
noOp	

Operating on items:

Objects (repo or resource)
Audit records
Live sync events
Async update events
File lines
Integers
...

Composite Activities

Composite activity: contains sub-activities
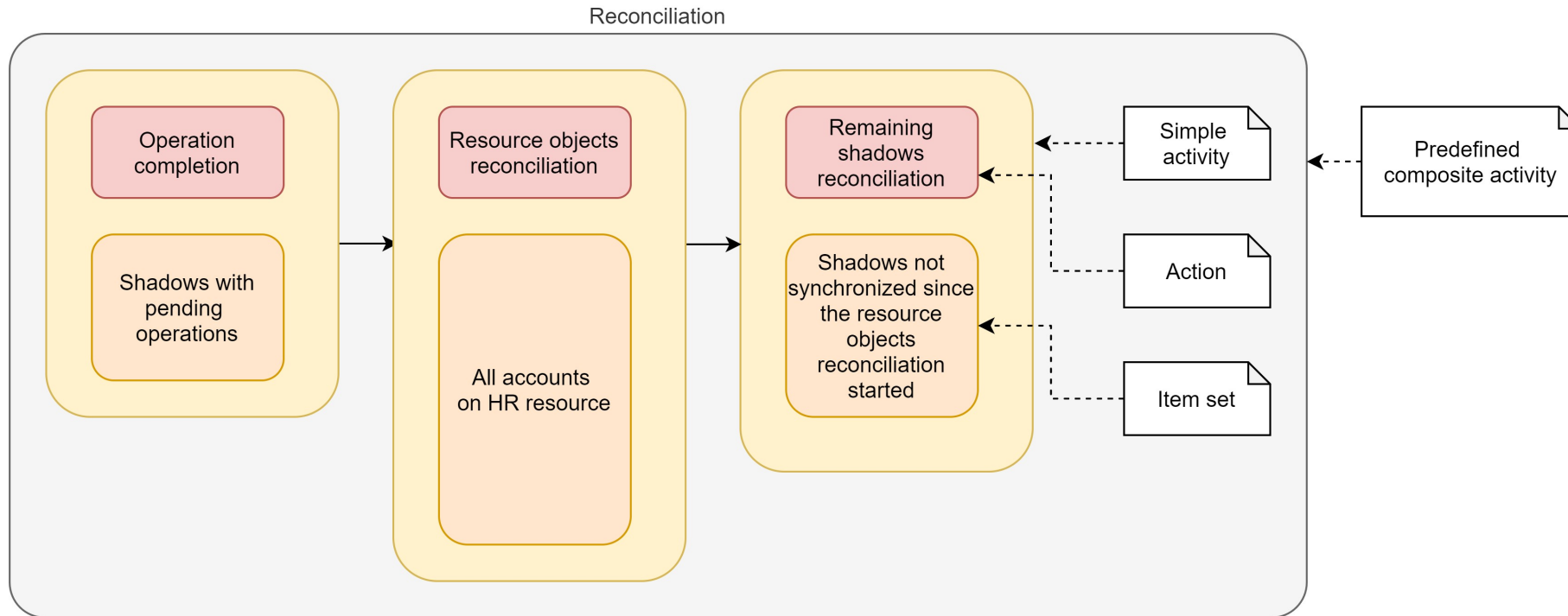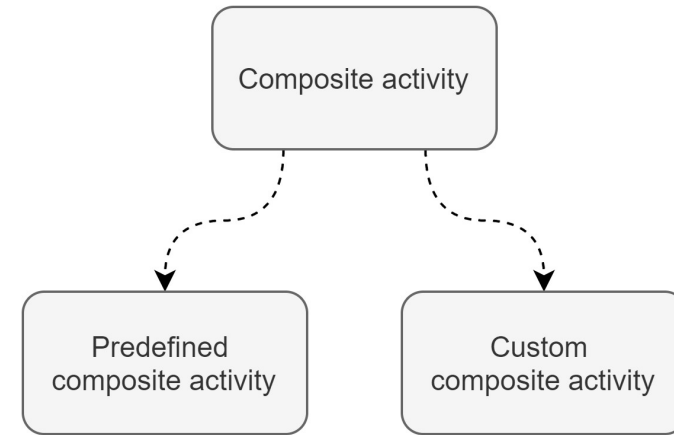
Types of predefined composite activities:

| reconciliation |
| cleanup |
| distributedReportExport |
| focusValidityScan |

Custom Composite Activities

Custom composition (recomputation + script execution)

- Recomputation
- All users
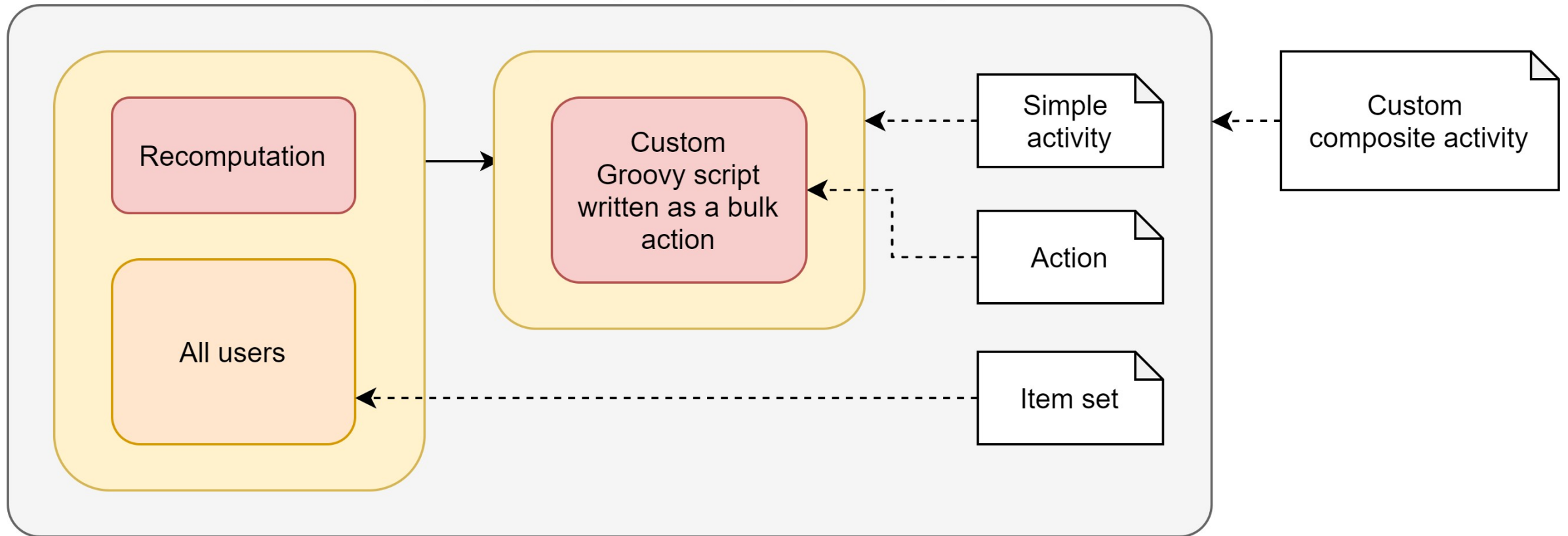- Custom Groovy script written as a bulk action
- Simple activity
- Action
- Item set
- Custom composite activity

Simplified Task Definition

```xml
<task
    xmlns="http://midpoint.evolveum.com/xml/ns/public/common/common-3"
    xmlns:ext="http://midpoint.evolveum.com/xml/ns/public/model/extension-3">

    <name>Reconciliation</name>
    <extension>
        <ext:kind>account</ext:kind>
        <ext:intent>default</ext:intent>
    </extension>
    <ownerRef oid="a59e4b45-12e7-44e8-bf8c-b51d3a1bbc3e" type="UserType"/>
    <executionState>runnable</executionState>
    <handlerUri>http://midpoint.evolveum.com/xml/ns/public/model/synchronization/task/reconciliation/handler-3</handlerUri>
    <objectRef oid="9125fb57-9f62-4c82-9122-839fa12cf74b" type="ResourceType"/>
</task>
```

- Generic structures: extension, handler URI, object reference

- Dynamic & flexible, but hard to write
  (e.g. what extension items are supported?)

The Clustered Reconciliation Example

```xml
<task oid="..." xmlns="...">
    ...
    <extension>
        <mext:objectclass>ri:AccountObjectClass</mext:objectclass>
        <mext:workerThreads>4</mext:workerThreads>
    </extension>

    <handlerUri>http://.../partitioned-reconciliation/handler-3</handlerUri>
    <objectRef oid="c845f703-b3c9-..." type="ResourceType" />

    ...
    <workManagement>
        <partitions>
            <partition>
                <index>2</index> <!-- 2 = resource reconciliation -->
                <handlerUri> ... </handlerUri> <!-- optional -->
                <workManagement>
                    <taskKind>coordinator</taskKind>
                    <buckets>
                        <stringSegmentation> ... </stringSegmentation>
                    </buckets>
                    <workers>
                        <workersPerNode> ... </workersPerNode>
                    </workers>
                </workManagement>
            </partition>
        </partitions>
    </workManagement>
</task>
```

Red = what to do
Dark red = on which objects
Blue = work distribution

The New Style

```xml
<task
    xmlns="http://midpoint.evolveum.com/xml/ns/public/common/common-3">

    <name>Reconciliation</name>
    <ownerRef oid="a59e4b45-12e7-44e8-bf8c-b51d3a1bbc3e" type="UserType"/>
    <executionState>runnable</executionState>
    <activity>
        <work>
            <reconciliation>
                <resourceObjects>
                    <resourceRef oid="9125fb57-9f62-4c82-9122-839fa12cf74b"/>
                    <kind>account</kind>
                    <intent>default</intent>
                </resourceObjects>
            </reconciliation>
        </work>
    </activity>
</task>
```

- Everything in one place

- Statically-typed, yet customer-extensible

- Easy to read, easy to write

Even more important when advanced features (like clustering) are to be configured!

Activity Definition Overview

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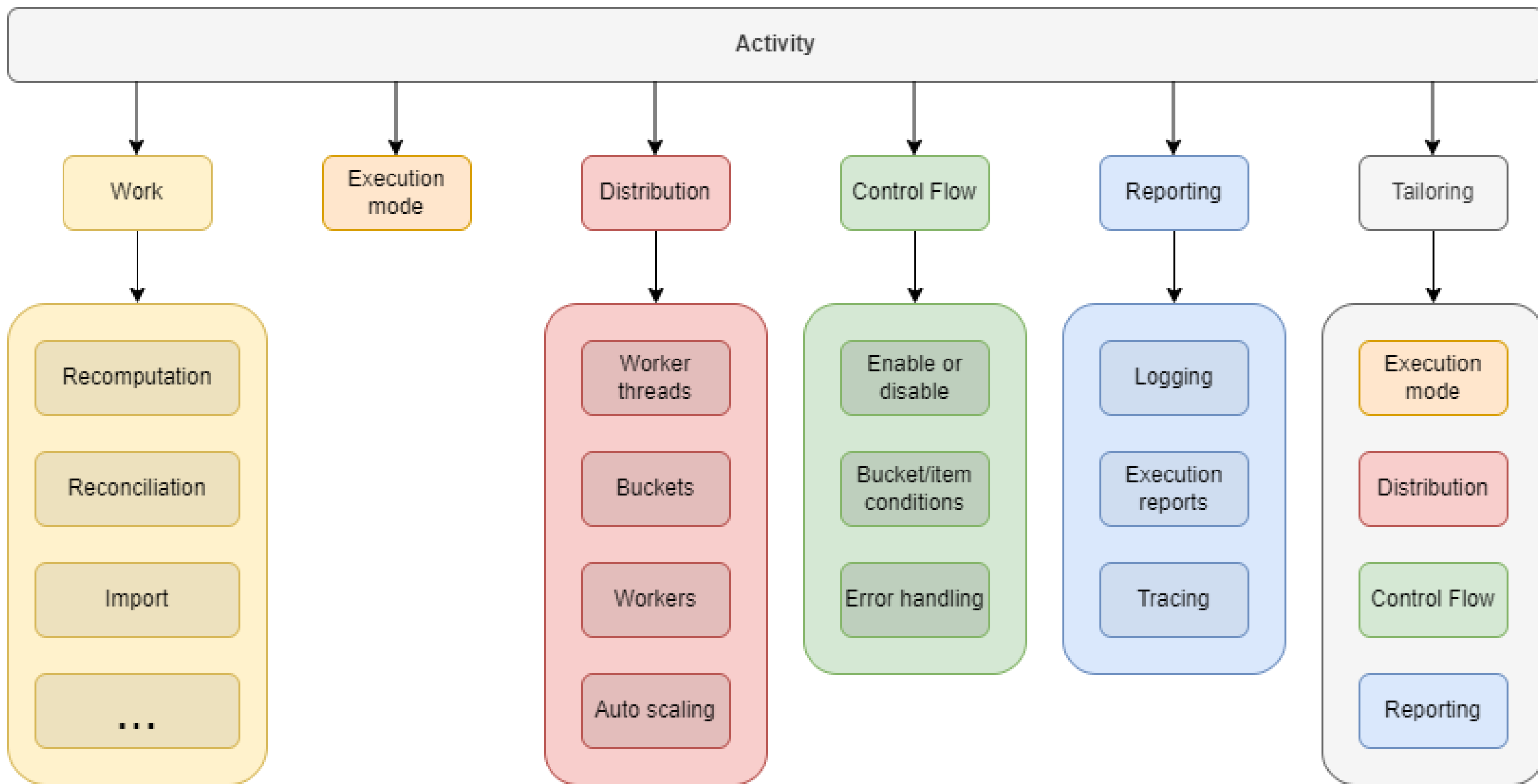
What are Buckets, Anyway?

- A task obtains objects typically through a query.

  - (They are then processed in single or multiple worker threads.)

- If we want to have multiple worker tasks, we need to split the objects set to smaller chunks, called buckets.

- Worker tasks then allocate and process individual buckets.
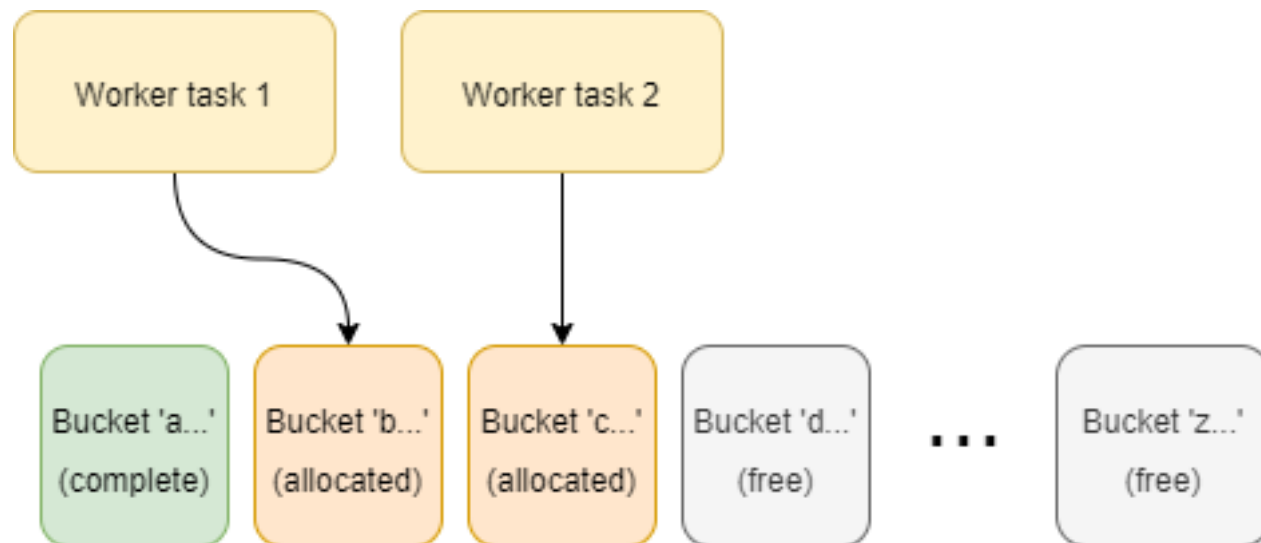

```xml
<distribution>
    <buckets>
        <stringSegmentation>
            <discriminator>attributes/icfs:name</discriminator>
            <boundary>
                <characters>a-z</characters>
            </boundary>
        </stringSegmentation>
    </buckets>
    <workers>
        <workersPerNode>
            <count>1</count>
        </workersPerNode>
    </workers>
</distribution>
```

Visibility Improvements

Progress, Items Processed, and Throughput

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- **Progress** = how far we have got up to now

- **Items processed** = how many items we have processed

- **Throughput** = items processed per time unit

Progress + throughput

⇓

Estimated time to complete (future)

User recomputation
34.6% (89 of 257 buckets) (suspended) ← 35,174 users (not shown)
Started 2/1/22, 10:50:12 PM (00:11:02.627 ago)

- Suspended
- In Progress
- Recomputation task

Operations
- ← Back
- 💾 Save
- 💾 Save & Run
- 🗑 Delete object
- Edit raw

Task operations
- ✔ Resume

Refresh
- ↻
- ▶
- (no refreshing)

- ○ Basic
- ⚙ Activity ‹
- Schedule
- Operation statistics
- ❶ Errors
- Performance ‹
- Subtasks
- Result
- Advanced options

Objects processed: 36,481 (might contain duplicates in case task was suspended/resumed)

Wall clock average: 17.8 ms, throughput: 3,375.2 per minute

- Success (36,481)
- Failure (0)
- Skip (0)

LAST SUCCESS ON TUESDAY, 1. FEB 2022 23:01:13
u197630
420 miliseconds

Activity Tree Overview

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Key information in the root task – no more need to "click through" to see it

		Name	Category	Execution	Object reference	Executing at	Current run time	Scheduled to start again	Progress	Errors	Status	
☐	🗑	Cleanup	Cleanup task	Runnable				in 23 hours 5 minutes 40 seconds	Complete	0	✓	
☐	⬆	Import	Import task	Closed	🗄 CSV 100K		closed at 2/1/22, 10:24:40 PM		100001	0	✓	
☐	💾	Trigger Scanner	System task	Runnable				in 40 seconds	0	0	✓	
☐	⚙	User recomputation	Recomputation task	Running		DefaultNode (4)			3.5%	0	🕐	
☐	💾	Validity Scanner	System task	Runnable				in 5 minutes 40 seconds	0	0	✓	

1 to 5 of 5

New Features

Auto-Scaling

- Starting or suspending worker tasks when adding/removing nodes

- Manually or automatically

```xml
<task>
    <name>Auto scaling</name>
    <!-- ownerRef and execution state -->
    <schedule>
        <interval>60</interval>
    </schedule>
    <activity>
        <work>
            <activityAutoScaling/>
        </work>
    </activity>
</task>
```

		Name	Category	Execution	Object reference	Executing at	Current run time	Scheduled to start again	Progress	Errors	Status	
☐	🗑	Cleanup	Cleanup task	Runnable				in 22 hours 29 minutes 1 second	Complete	0	✅	
☐	⬆	Import	Import task	Closed	CSV 100K		closed at 2/1/22, 10:24:40 PM		100001	0	✅	
☐	💾	Trigger Scanner	System task	Runnable				in 4 minutes 1 second	0	0	✅	
☐	⚙	User recomputation	Recomputation task	Running		DefaultNode (4)			34.6%	0	🕐	
☐	💾	Validity Scanner	System task	Runnable				in 14 minutes 1 second	0			

Name ⓘ [   ] ✕ More... ▾ 🔍 Basic ▾

Suspend
Delete
Reconcile workers
Suspend (root only)
Resume (root only)
Suspend and delete workers and work state
Suspend and delete work state

Cluster-wide Thresholds

- Sometimes we want to block unexpected actions before they cause a catastrophe.

- MidPoint allows to declare limits on actions in the form of policy rules.

```xml
<role>
    <name>Stop on delete 10 users</name>
    <inducement>
        <policyRule>
            <policyConstraints>
                <modification>
                    <operation>delete</operation>
                </modification>
            </policyConstraints>
            <policyThreshold>
                <lowWaterMark>
                    <count>10</count>
                </lowWaterMark>
            </policyThreshold>
            <policyActions>
                <suspendTask/>
            </policyActions>
        </policyRule>
        <order>2</order>
    </inducement>
</role>
```

- Roles with such rules are then assigned to tasks.

- After the threshold is reached, a task is suspended.
  - Optionally, a simulation activity can be run right before the execution takes place.

- In midPoint 4.0 the counters were held in memory, so this feature was limited to single node only.

- In 4.4 we maintain the counters directly in the tasks. Therefore, cluster-wide operation is possible.

Execution Reports

- Allows reporting on the execution at the levels of:

  - buckets,

  - items (~ objects),

  - individual ConnId operations,

  - individual internal midPoint operations.

- Easy default configuration, but with great level of flexibility

Buckets Report

#	content	content-from	content-to	size	itemsSuccessfullyProcessed	itemsFailed	itemsSkipped	startTimestamp	startTimestamp-millis	endTimestamp	endTimestamp-millis	duration
1	[5-230004)	5	230004	2935	2927	8	0	2021-10-08T11:00:19.015Z	1633690819015	2021-10-08T11:02:38.528Z	1633690958528	139513
6	[1150000-1379999)	1150000	1379999	2297	2291	6	0	2021-10-08T11:02:38.734Z	1633690958734	2021-10-08T11:04:35.088Z	1633691075088	116354
10	[2069996-2299995)	2069996	2299995	2061	2055	6	0	2021-10-08T11:04:35.239Z	1633691075239	2021-10-08T11:06:17.209Z	1633691177209	101970
14	[2989992-3219991)	2989992	3219991	3747	3734	13	0	2021-10-08T11:06:17.307Z	1633691177307	2021-10-08T11:09:25.689Z	1633691365689	188382
18	[3909988-4139987)	3909988	4139987	1462	1460	2	0	2021-10-08T11:09:25.791Z	1633691365791	2021-10-08T11:10:40.895Z	1633691440895	75104
20	[4369986-4599985)	4369986	4599985	1920	1919	1	0	2021-10-08T11:10:41.018Z	1633691441018	2021-10-08T11:12:15.892Z	1633691535892	94874
23	[5059983-5289982)	5059983	5289982	2426	2419	7	0	2021-10-08T11:12:15.987Z	1633691535987	2021-10-08T11:14:13.690Z	1633691653690	117703
35	[7819971-8049970)	7819971	8049970	505	499	6	0	2021-10-08T11:14:13.805Z	1633691653805	2021-10-08T11:14:38.003Z	1633691678003	24198
38	[8509968-8739967)	8509968	8739967	1468	1461	7	0	2021-10-08T11:14:38.093Z	1633691678093	2021-10-08T11:15:51.241Z	1633691751241	73148
47	[10579959-10809958)	10579959	10809958	17	15	2	0	2021-10-08T11:15:51.406Z	1633691751406	2021-10-08T11:15:52.899Z	1633691752899	1493

```
<reporting>
    <executionReports>
        <buckets/>
    </executionReports>
</reporting>
```

Configurability:

- Row selection (using filter and/or expression)

Items (Objects) Report

#	name	displayName	type	oid	bucket#	outcome	outcome-qualifier	startTimestamp	startTimestamp-millis	endTimestamp	endTimestamp-millis	duration	errorMessage
0	ht	ht (ACCOUNT - default - AccountObjectClass)	{http://midpoint.evolveum.com/xml/ns/public/common/common-3}ShadowType	e010c326-071a-4666-b791-4be5e8480527	1	SUCCESS		2021-10-19T11:50:18.744+02:00	1634637018744	2021-10-19T11:50:18.832+02:00	1634637018832	88.09	
1	guybrush	guybrush (ACCOUNT - default - AccountObjectClass)	{http://midpoint.evolveum.com/xml/ns/public/common/common-3}ShadowType	22226666-2200-6666-6666-444400004444	1	SUCCESS		2021-10-19T11:50:18.917+02:00	1634637018917	2021-10-19T11:50:19.028+02:00	1634637019028	110.6	
2	daviejones	daviejones (ACCOUNT - default - AccountObjectClass)	{http://midpoint.evolveum.com/xml/ns/public/common/common-3}ShadowType	bb6a968d-3a0c-4753-9b58-6c932b1a5245	1	SKIP		2021-10-19T11:50:19.050+02:00	1634637019050	2021-10-19T11:50:19.051+02:00	1634637019051	0.29	
3	calypso	calypso (ACCOUNT - default - AccountObjectClass)	{http://midpoint.evolveum.com/xml/ns/public/common/common-3}ShadowType	a4793302-0624-42bd-9527-98a39ede2621	1	SKIP		2021-10-19T11:50:19.055+02:00	1634637019055	2021-10-19T11:50:19.056+02:00	1634637019056	0.28	
4	elaine	elaine (ACCOUNT - default - AccountObjectClass)	{http://midpoint.evolveum.com/xml/ns/public/common/common-3}ShadowType	c0c010c0-d34d-b33f-f00d-22220004000e	1	SUCCESS		2021-10-19T11:50:19.061+02:00	1634637019061	2021-10-19T11:50:19.191+02:00	1634637019191	129.55	
5	rapp	rapp (ACCOUNT - default - AccountObjectClass)	{http://midpoint.evolveum.com/xml/ns/public/common/common-3}ShadowType	c70312bb-a6fd-48d7-b2ed-303007a2e190	1	SUCCESS		2021-10-19T11:50:19.206+02:00	1634637019206	2021-10-19T11:50:19.331+02:00	1634637019331	125.03	
6	stan	stan (ACCOUNT - default - AccountObjectClass)	{http://midpoint.evolveum.com/xml/ns/public/common/common-3}ShadowType	22220000-2200-0000-0000-444400004455	1	SUCCESS		2021-10-19T11:50:19.348+02:00	1634637019348	2021-10-19T11:50:19.404+02:00	1634637019404	55.81	

ConnId Operations Report

#	itemName	itemOid	bucket#	identifier	resourceRef	resourceRef-name	objectClass	operation	status	message	size	startTimestamp	startTimestamp-millis	endTimestamp	endTimestamp-millis	duration
1	guybrush	22226666-2200-6666-6666-444400004444	1	1634637018962-0-1	10000000-0000-0000-0000-000000000004	Dummy Resource	{http://midpoint.evolveum.com /xml/ns/public/resource /instance-3}AccountObjectClass	ICF_GET				2021-10-19T11:50:18.962+02:00	1634637018962	2021-10-19T11:50:18.962+02:00	1634637018962	0.0
1	guybrush	22226666-2200-6666-6666-444400004444	1	1634637018965-0-1	10000000-0000-0000-0000-000000000004	Dummy Resource	{http://midpoint.evolveum.com /xml/ns/public/resource /instance-3}AccountObjectClass	ICF_UPDATE				2021-10-19T11:50:18.965+02:00	1634637018965	2021-10-19T11:50:18.965+02:00	1634637018965	0.0
1	guybrush	22226666-2200-6666-6666-444400004444	1	1634637019003-0-1	10000000-0000-0000-0000-000000000004	Dummy Resource	{http://midpoint.evolveum.com /xml/ns/public/resource /instance-3}AccountObjectClass	ICF_GET				2021-10-19T11:50:19.003+02:00	1634637019003	2021-10-19T11:50:19.004+02:00	1634637019004	1.0
4	elaine	c0c010c0-d34d-b33f-f00d-22220004000e	1	1634637019094-0-1	10000000-0000-0000-0000-000000000104	Dummy Resource Red	{http://midpoint.evolveum.com /xml/ns/public/resource /instance-3}AccountObjectClass	ICF_GET				2021-10-19T11:50:19.094+02:00	1634637019094	2021-10-19T11:50:19.095+02:00	1634637019095	1.0
4	elaine	c0c010c0-d34d-b33f-f00d-22220004000e	1	1634637019099-0-1	10000000-0000-0000-0000-000000000204	Dummy Resource Blue	{http://midpoint.evolveum.com /xml/ns/public/resource /instance-3}AccountObjectClass	ICF_GET				2021-10-19T11:50:19.099+02:00	1634637019099	2021-10-19T11:50:19.099+02:00	1634637019099	0.0
			1	1634637018739-0-1	10000000-0000-0000-0000-000000000004	Dummy Resource	{http://midpoint.evolveum.com /xml/ns/public/resource /instance-3}AccountObjectClass	ICF_SEARCH				2021-10-19T11:50:18.739+02:00	1634637018739	2021-10-19T11:50:19.414+02:00	1634637019414	0.0

Internal midPoint Operations Report

itemSequentialNumber	itemName	itemOid	operation	qualifiers	status	start	microsecond	params
0	ht	e010c326-071a-4666-b791-4be5e8480527	com.evolveum.midpoint.repo.cache.RepositoryCache.searchObjects	FocusType	SUCCESS	2021-10-19T11:50:18.772+02:00	1939	query=[Q{REF: linkRef, PRV(oid=e010c326-071a-4666-b791-4be5e8480527, targetType=null, relation={http://prism.evolveum.com/
0	ht	e010c326-071a-4666-b791-4be5e8480527	com.evolveum.midpoint.repo.api.RepositoryService.searchObjects	FocusType	SUCCESS	2021-10-19T11:50:18.772+02:00	1704	query=[Q{REF: linkRef, PRV(oid=e010c326-071a-4666-b791-4be5e8480527, targetType=null, relation={http://prism.evolveum.com/
0	ht	e010c326-071a-4666-b791-4be5e8480527	com.evolveum.midpoint.repo.cache.RepositoryCache.modifyObject	ShadowType	SUCCESS	2021-10-19T11:50:18.774+02:00	5267	oid=[e010c326-071a-4666-b791-4be5e8480527]; type=[http://midpoint.evolveum.com/xml/ns/public/common/common-3#ShadowTy
0	ht	e010c326-071a-4666-b791-4be5e8480527	com.evolveum.midpoint.repo.api.RepositoryService.modifyObject	ShadowType	SUCCESS	2021-10-19T11:50:18.774+02:00	5045	oid=[e010c326-071a-4666-b791-4be5e8480527]; type=[com.evolveum.midpoint.xml.ns._public.common.common_3.ShadowType];
0	ht	e010c326-071a-4666-b791-4be5e8480527	com.evolveum.midpoint.repo.cache.RepositoryCache.invalidateCacheEntries		SUCCESS	2021-10-19T11:50:18.779+02:00	95	additionalInfo=[ModifyObjectResult]; oid=[e010c326-071a-4666-b791-4be5e8480527]; type=[http://midpoint.evolveum.com/xml/ns/
0	ht	e010c326-071a-4666-b791-4be5e8480527	com.evolveum.midpoint.model.impl.lens.projector.Projector.focusActivation	INITIAL.e0p0	SUCCESS	2021-10-19T11:50:18.790+02:00	26	
0	ht	e010c326-071a-4666-b791-4be5e8480527	com.evolveum.midpoint.model.impl.lens.projector.Projector.focusActivation	INITIAL.e0p0	SUCCESS	2021-10-19T11:50:18.790+02:00	6	
0	ht	e010c326-071a-4666-b791-4be5e8480527	com.evolveum.midpoint.model.impl.lens.projector.Projector.focusActivation	INITIAL.e0p0	SUCCESS	2021-10-19T11:50:18.791+02:00	7	
0	ht	e010c326-071a-4666-b791-4be5e8480527	com.evolveum.midpoint.model.impl.lens.projector.Projector.focusCredentials	INITIAL.e0p0	SUCCESS	2021-10-19T11:50:18.791+02:00	11	
0	ht	e010c326-071a-4666-b791-4be5e8480527	com.evolveum.midpoint.repo.cache.RepositoryCache.getVersion	ResourceType	SUCCESS	2021-10-19T11:50:18.810+02:00	11	oid=[10000000-0000-0000-0000-000000000004]; type=[http://midpoint.evolveum.com/xml/ns/public/common/common-3#Resource
0	ht	e010c326-071a-4666-b791-4be5e8480527	com.evolveum.midpoint.repo.cache.RepositoryCache.getVersion	ResourceType	SUCCESS	2021-10-19T11:50:18.820+02:00	9	oid=[10000000-0000-0000-0000-000000000004]; type=[http://midpoint.evolveum.com/xml/ns/public/common/common-3#Resource
0	ht	e010c326-071a-4666-b791-4be5e8480527	com.evolveum.midpoint.repo.api.RepositoryService.hasConflict		SUCCESS	2021-10-19T11:50:18.831+02:00	767	watcherClass=[com.evolveum.midpoint.repo.sqlbase.ConflictWatcherImpl]; oid=[7bef09cb-8ee4-4746-8694-0d71eba86489]
0	ht	e010c326-071a-4666-b791-4be5e8480527	com.evolveum.midpoint.repo.api.RepositoryService.getVersion	ObjectType	SUCCESS	2021-10-19T11:50:18.831+02:00	744	oid=[7bef09cb-8ee4-4746-8694-0d71eba86489]; type=[com.evolveum.midpoint.xml.ns._public.common.common_3.ObjectType]
4	elaine	c0c010c0-d34d-b33f-f00d-22220004000e	com.evolveum.midpoint.repo.cache.RepositoryCache.searchObjects	FocusType	SUCCESS	2021-10-19T11:50:19.063+02:00	2277	query=[Q{REF: linkRef, PRV(oid=c0c010c0-d34d-b33f-f00d-22220004000e, targetType=null, relation={http://prism.evolveum.com/x
4	elaine	c0c010c0-d34d-b33f-f00d-22220004000e	com.evolveum.midpoint.repo.api.RepositoryService.searchObjects	FocusType	SUCCESS	2021-10-19T11:50:19.063+02:00	1936	query=[Q{REF: linkRef, PRV(oid=c0c010c0-d34d-b33f-f00d-22220004000e, targetType=null, relation={http://prism.evolveum.com/
4	elaine	c0c010c0-d34d-b33f-f00d-22220004000e	com.evolveum.midpoint.repo.cache.RepositoryCache.modifyObject	ShadowType	SUCCESS	2021-10-19T11:50:19.066+02:00	4180	oid=[c0c010c0-d34d-b33f-f00d-22220004000e]; type=[http://midpoint.evolveum.com/xml/ns/public/common/common-3#ShadowTy
4	elaine	c0c010c0-d34d-b33f-f00d-22220004000e	com.evolveum.midpoint.repo.api.RepositoryService.modifyObject	ShadowType	SUCCESS	2021-10-19T11:50:19.066+02:00	4001	oid=[c0c010c0-d34d-b33f-f00d-22220004000e]; type=[com.evolveum.midpoint.xml.ns._public.common.common_3.ShadowType];
4	elaine	c0c010c0-d34d-b33f-f00d-22220004000e	com.evolveum.midpoint.repo.cache.RepositoryCache.invalidateCacheEntries		SUCCESS	2021-10-19T11:50:19.070+02:00	78	additionalInfo=[ModifyObjectResult]; oid=[c0c010c0-d34d-b33f-f00d-22220004000e]; type=[http://midpoint.evolveum.com/xml/ns/p
4	elaine	c0c010c0-d34d-b33f-f00d-22220004000e	com.evolveum.midpoint.model.impl.lens.projector.Projector.focusActivation	INITIAL.e0p0	SUCCESS	2021-10-19T11:50:19.085+02:00	65	
4	elaine	c0c010c0-d34d-b33f-f00d-22220004000e	com.evolveum.midpoint.model.impl.lens.projector.Projector.focusActivation	INITIAL.e0p0	SUCCESS	2021-10-19T11:50:19.086+02:00	8	
4	elaine	c0c010c0-d34d-b33f-f00d-22220004000e	com.evolveum.midpoint.model.impl.lens.projector.Projector.focusActivation	INITIAL.e0p0	SUCCESS	2021-10-19T11:50:19.087+02:00	37	
4	elaine	c0c010c0-d34d-b33f-f00d-22220004000e	com.evolveum.midpoint.model.impl.lens.projector.Projector.focusCredentials	INITIAL.e0p0	SUCCESS	2021-10-19T11:50:19.087+02:00	12	
4	elaine	c0c010c0-d34d-b33f-f00d-22220004000e	com.evolveum.midpoint.repo.cache.RepositoryCache.getVersion	ResourceType	SUCCESS	2021-10-19T11:50:19.151+02:00	15	oid=[10000000-0000-0000-0000-000000000004]; type=[http://midpoint.evolveum.com/xml/ns/public/common/common-3#Resource
4	elaine	c0c010c0-d34d-b33f-f00d-22220004000e	com.evolveum.midpoint.repo.cache.RepositoryCache.getVersion	ResourceType	SUCCESS	2021-10-19T11:50:19.159+02:00	13	oid=[10000000-0000-0000-0000-000000000004]; type=[http://midpoint.evolveum.com/xml/ns/public/common/common-3#Resource
4	elaine	c0c010c0-d34d-b33f-f00d-22220004000e	com.evolveum.midpoint.repo.api.RepositoryService.hasConflict		SUCCESS	2021-10-19T11:50:19.189+02:00	1017	watcherClass=[com.evolveum.midpoint.repo.sqlbase.ConflictWatcherImpl]; oid=[c0c010c0-d34d-b33f-f00d-11111111e1e]
4	elaine	c0c010c0-d34d-b33f-f00d-22220004000e	com.evolveum.midpoint.repo.api.RepositoryService.getVersion	ObjectType	SUCCESS	2021-10-19T11:50:19.190+02:00	968	oid=[c0c010c0-d34d-b33f-f00d-11111111e1e]; type=[com.evolveum.midpoint.xml.ns._public.common.common_3.ObjectType]
5	rapp	c70312bb-a6fd-48d7-b2ed-303007a2e190	com.evolveum.midpoint.repo.cache.RepositoryCache.searchObjects	FocusType	SUCCESS	2021-10-19T11:50:19.208+02:00	2157	query=[Q{REF: linkRef, PRV(oid=c70312bb-a6fd-48d7-b2ed-303007a2e190, targetType=null, relation={http://prism.evolveum.com/:
5	rapp	c70312bb-a6fd-48d7-b2ed-303007a2e190	com.evolveum.midpoint.repo.api.RepositoryService.searchObjects	FocusType	SUCCESS	2021-10-19T11:50:19.208+02:00	1918	query=[Q{REF: linkRef, PRV(oid=c70312bb-a6fd-48d7-b2ed-303007a2e190, targetType=null, relation={http://prism.evolveum.com/:
5	rapp	c70312bb-a6fd-48d7-b2ed-303007a2e190	com.evolveum.midpoint.repo.cache.RepositoryCache.modifyObject	ShadowType	SUCCESS	2021-10-19T11:50:19.210+02:00	8219	oid=[c70312bb-a6fd-48d7-b2ed-303007a2e190]; type=[http://midpoint.evolveum.com/xml/ns/public/common/common-3#ShadowTy
5	rapp	c70312bb-a6fd-48d7-b2ed-303007a2e190	com.evolveum.midpoint.repo.api.RepositoryService.modifyObject	ShadowType	SUCCESS	2021-10-19T11:50:19.210+02:00	8032	oid=[c70312bb-a6fd-48d7-b2ed-303007a2e190]; type=[com.evolveum.midpoint.xml.ns._public.common.common_3.ShadowType];
5	rapp	c70312bb-a6fd-48d7-b2ed-303007a2e190	com.evolveum.midpoint.repo.cache.RepositoryCache.invalidateCacheEntries		SUCCESS	2021-10-19T11:50:19.219+02:00	74	additionalInfo=[ModifyObjectResult]; oid=[c70312bb-a6fd-48d7-b2ed-303007a2e190]; type=[http://midpoint.evolveum.com/xml/ns/
5	rapp	c70312bb-a6fd-48d7-b2ed-303007a2e190	com.evolveum.midpoint.model.impl.lens.projector.Projector.focusActivation	INITIAL.e0p0	SUCCESS	2021-10-19T11:50:19.248+02:00	32	
5	rapp	c70312bb-a6fd-48d7-b2ed-303007a2e190	com.evolveum.midpoint.model.impl.lens.projector.Projector.focusActivation	INITIAL.e0p0	SUCCESS	2021-10-19T11:50:19.248+02:00	6	
5	rapp	c70312bb-a6fd-48d7-b2ed-303007a2e190	com.evolveum.midpoint.model.impl.lens.projector.Projector.focusActivation	INITIAL.e0p0	SUCCESS	2021-10-19T11:50:19.249+02:00	8	
5	rapp	c70312bb-a6fd-48d7-b2ed-303007a2e190	com.evolveum.midpoint.model.impl.lens.projector.Projector.focusCredentials	INITIAL.e0p0	SUCCESS	2021-10-19T11:50:19.249+02:00	14	
5	rapp	c70312bb-a6fd-48d7-b2ed-303007a2e190	com.evolveum.midpoint.repo.cache.RepositoryCache.getVersion	ResourceType	SUCCESS	2021-10-19T11:50:19.292+02:00	14	oid=[10000000-0000-0000-0000-000000000004]; type=[http://midpoint.evolveum.com/xml/ns/public/common/common-3#Resource
5	rapp	c70312bb-a6fd-48d7-b2ed-303007a2e190	com.evolveum.midpoint.repo.cache.RepositoryCache.getVersion	ResourceType	SUCCESS	2021-10-19T11:50:19.301+02:00	12	oid=[10000000-0000-0000-0000-000000000004]; type=[http://midpoint.evolveum.com/xml/ns/public/common/common-3#Resource
5	rapp	c70312bb-a6fd-48d7-b2ed-303007a2e190	com.evolveum.midpoint.repo.api.RepositoryService.hasConflict		SUCCESS	2021-10-19T11:50:19.330+02:00	873	watcherClass=[com.evolveum.midpoint.repo.sqlbase.ConflictWatcherImpl]; oid=[c0c010c0-d34d-b33f-f00d-11111111c008]
5	rapp	c70312bb-a6fd-48d7-b2ed-303007a2e190	com.evolveum.midpoint.repo.api.RepositoryService.getVersion	ObjectType	SUCCESS	2021-10-19T11:50:19.330+02:00	845	oid=[c0c010c0-d34d-b33f-f00d-11111111c008]; type=[com.evolveum.midpoint.xml.ns._public.common.common_3.ObjectType]
6	stan	22220000-2200-0000-0000-444400004455	com.evolveum.midpoint.repo.cache.RepositoryCache.searchObjects	FocusType	SUCCESS	2021-10-19T11:50:19.350+02:00	1651	query=[Q{REF: linkRef, PRV(oid=22220000-2200-0000-0000-444400004455, targetType=null, relation={http://prism.evolveum.com/
6	stan	22220000-2200-0000-0000-444400004455	com.evolveum.midpoint.repo.api.RepositoryService.searchObjects	FocusType	SUCCESS	2021-10-19T11:50:19.350+02:00	1445	query=[Q{REF: linkRef, PRV(oid=22220000-2200-0000-0000-444400004455, targetType=null, relation={http://prism.evolveum.com/
6	stan	22220000-2200-0000-0000-444400004455	com.evolveum.midpoint.repo.cache.RepositoryCache.modifyObject	ShadowType	SUCCESS	2021-10-19T11:50:19.352+02:00	4134	oid=[22220000-2200-0000-0000-444400004455]; type=[http://midpoint.evolveum.com/xml/ns/public/common/common-3#ShadowTy
6	stan	22220000-2200-0000-0000-444400004455	com.evolveum.midpoint.repo.api.RepositoryService.modifyObject	ShadowType	SUCCESS	2021-10-19T11:50:19.352+02:00	3970	oid=[22220000-2200-0000-0000-444400004455]; type=[com.evolveum.midpoint.xml.ns._public.common.common_3.ShadowType];
6	stan	22220000-2200-0000-0000-444400004455	com.evolveum.midpoint.repo.cache.RepositoryCache.invalidateCacheEntries		SUCCESS	2021-10-19T11:50:19.356+02:00	69	additionalInfo=[ModifyObjectResult]; oid=[22220000-2200-0000-0000-444400004455]; type=[http://midpoint.evolveum.com/xml/ns/
6	stan	22220000-2200-0000-0000-444400004455	com.evolveum.midpoint.model.impl.lens.projector.Projector.focusActivation	INITIAL.e0p0	SUCCESS	2021-10-19T11:50:19.366+02:00	23	
6	stan	22220000-2200-0000-0000-444400004455	com.evolveum.midpoint.model.impl.lens.projector.Projector.focusActivation	INITIAL.e0p0	SUCCESS	2021-10-19T11:50:19.366+02:00	6	
6	stan	22220000-2200-0000-0000-444400004455	com.evolveum.midpoint.model.impl.lens.projector.Projector.focusActivation	INITIAL.e0p0	SUCCESS	2021-10-19T11:50:19.367+02:00	7	
6	stan	22220000-2200-0000-0000-444400004455	com.evolveum.midpoint.model.impl.lens.projector.Projector.focusCredentials	INITIAL.e0p0	SUCCESS	2021-10-19T11:50:19.367+02:00	10	
6	stan	22220000-2200-0000-0000-444400004455	com.evolveum.midpoint.repo.cache.RepositoryCache.getVersion	ResourceType	SUCCESS	2021-10-19T11:50:19.384+02:00	20	oid=[10000000-0000-0000-0000-000000000004]; type=[http://midpoint.evolveum.com/xml/ns/public/common/common-3#Resource
6	stan	22220000-2200-0000-0000-444400004455	com.evolveum.midpoint.repo.cache.RepositoryCache.getVersion	ResourceType	SUCCESS	2021-10-19T11:50:19.392+02:00	13	oid=[10000000-0000-0000-0000-000000000004]; type=[http://midpoint.evolveum.com/xml/ns/public/common/common-3#Resource
6	stan	22220000-2200-0000-0000-444400004455	com.evolveum.midpoint.repo.api.RepositoryService.hasConflict		SUCCESS	2021-10-19T11:50:19.403+02:00	800	watcherClass=[com.evolveum.midpoint.repo.sqlbase.ConflictWatcherImpl]; oid=[0aea041e-2369-46fc-a78e-8d13a5bb47ab]
6	stan	22220000-2200-0000-0000-444400004455	com.evolveum.midpoint.repo.api.RepositoryService.getVersion	ObjectType	SUCCESS	2021-10-19T11:50:19.403+02:00	777	oid=[0aea041e-2369-46fc-a78e-8d13a5bb47ab]; type=[com.evolveum.midpoint.xml.ns._public.common.common_3.ObjectType]

Bucket Size Analysis

- Important for attaining top performance

  - Large/few buckets

    - inefficient distribution, coarse %, wasteful restarts

  - Small/many buckets

    - large overhead (including the contention)

  - Uneven distribution

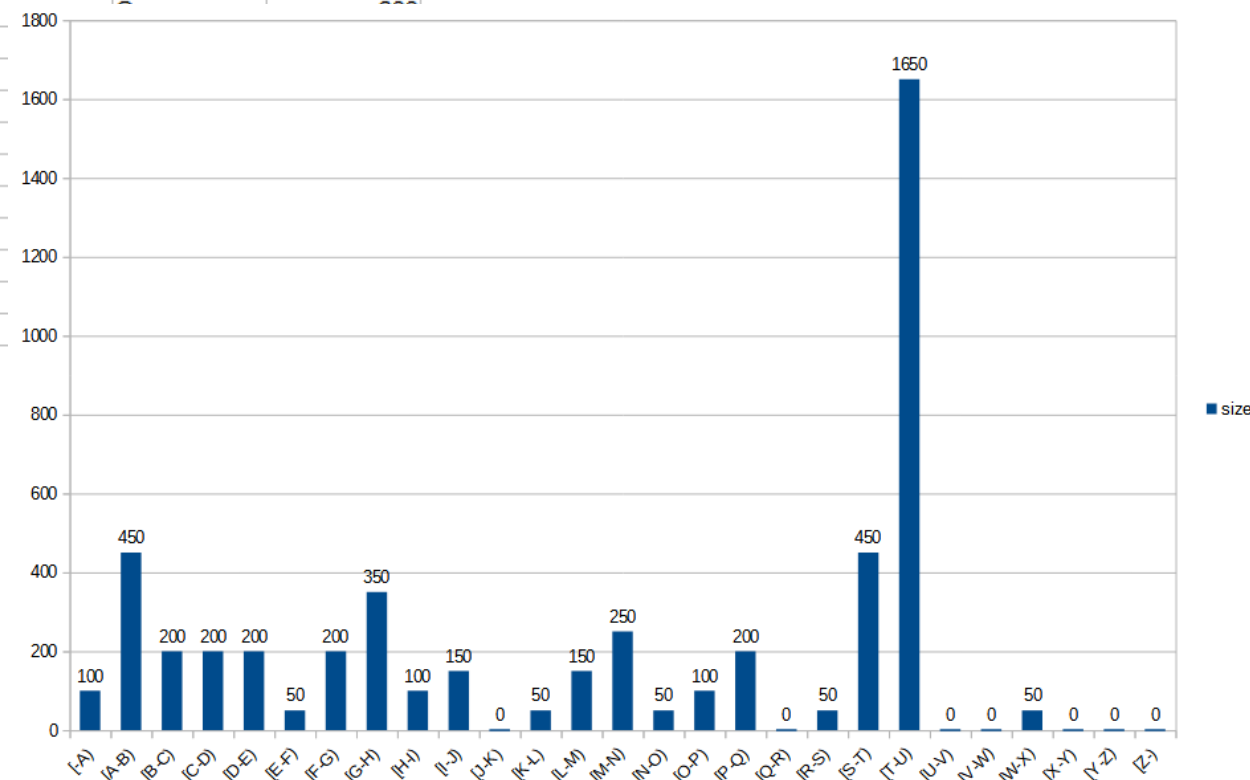   - short & long runners

- Options: ex-post, ex-ante

Bucket Sampling

```xml
<activity>
    <work>
        <noOp>
            <steps>10000</steps>
            <delay>10</delay>
            <stepInterruptibility>full</stepInterruptibility>
        </noOp>
    </work>
    <executionMode>bucketAnalysis</executionMode>
    <distribution>
        <buckets>
            <implicitSegmentation>
                <!-- 10000 steps divided into 200 buckets -->
                <numberOfBuckets>200</numberOfBuckets>
            </implicitSegmentation>
            <sampling>
                <regular>
                    <sampleSize>10</sampleSize>
                </regular>
            </sampling>
        </buckets>
    </distribution>
    <reporting>
        <executionReports>
            <buckets/>
        </executionReports>
    </reporting>
</activity>
```

Other options: counting all buckets, using random sampling (by sample size or probability), or using custom expression.

Beware: Counting may not be supported by all resources!

sequentialNu▸	content	content-from	content-to	size
1	[-A)		A	100
2	[A-B)	A	B	450
3	[B-C)	B	C	200
4	[C-D)	C	D	200
5	[D-E)	D	E	200
6	[E-F)	E	F	50
7	[F-G)	F	G	200
8	[G-H)	G	H	350
9	[H-I)	H	I	100
10	[I-J)	I	J	150
11	[J-K)	J	K	0
12	[K-L)	K	L	50
13	[L-M)	L	M	150
14	[M-N)	M	N	250
15	[N-O)	N	O	50
16	[O-P)	O	P	100
17	[P-Q)	P		
18	[Q-R)	Q		
19	[R-S)	R		
20	[S-T)	S		
21	[T-U)	T		
22	[U-V)	U		
23	[V-W)	V		
24	[W-X)	W		
25	[X-Y)	X		
26	[Y-Z)	Y		
27	[Z-)	Z		

Other New Features

- Failed objects re-processing (since 4.3)

  - Re-process failed objects during separate task execution

  - Re-synchronize failed accounts automatically after given time

- Buckets and items logging configuration

  - E.g. logging full information for each bucket completion, and brief one for each item

- Flexible tracing (before/after conditions), e.g. ⚗

  - Trace each 100-th item (fully) and each 10-th item (briefly)

  - Trace all failed items

  - Trace all items that took longer than 5,000 milliseconds

- Buckets and items processing conditions ⚗

  - Choosing what buckets and/or items to process, and what to skip.

Migration from 4.0.x/4.3.x

Migration & GUI Support

- Legacy-style task execution is supported for simple tasks

  - but no GUI support for these tasks,

  - and no support for advanced features (buckets, workers, partitions) at all.

- Task state data structures has changed

  - so it is strongly advisable to re-import even simple tasks,

  - an exception: live sync token and last scan timestamp are migrated automatically.

- The guide to tasks migration is in docs

  - https://docs.evolveum.com/midpoint/reference/tasks/activities/migration/

- But midPoint Studio can help with the migration! ⚗

Migration: An Example

- Assuming you are running 4.0.4 or 4.3.2

- Before stopping midPoint:

  - suspend the tasks,

  - export the tasks (unless kept externally e.g. in Studio).

- Do the upgrade according to the documentation

- Start midPoint and either:

  - migrate the tasks in Studio and re-import them,

  - or simply resume them – but there will be warnings in logs and some pieces missing in GUI.

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Conclusion

Conclusion

- Tasks were substantially changed in midPoint 4.4.

- Besides quality improvements, there are a lot of new features.

- Have a look at them, try them, and let us know.

  - (We are interested especially in the experimental ones.)

- Everything is in the docs!

  - https://docs.evolveum.com/midpoint/reference/tasks/activities/

Webinars

- Customizing GUI, February 10, 2022 by Katarína Bolemant

- Native reports, February 16, 2022 by Lukáš Škublík

Thank you for your time!

See other talks at https://docs.evolveum.com

Also **follow us** on our social media for further information!

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