Increasing productivity at CERN with Enterprise Manager Grid Control

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CERN

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Agenda

- Introduction to CERN
- Our Grid Control Environment
- Our Challenge
- Grid Control Solution
- User Defined Policies – Use Case
- Other examples – Hands on
- Conclusion
Introduction to CERN

- European Organization for Nuclear Research
  - The world’s largest particle physics laboratory
  - Located on Swiss/French border
  - Funded/staffed by 20 member states in 1954
  - With many contributors in the USA
  - Birth place of World Wide Web
  - Made popular by the movie “Angels and Demons”
  - [http://www.cern.ch](http://www.cern.ch)

- Oracle software and services are critical for the laboratory
  - Physics (accelerator control) and Administration databases
  - Oracle RDBMS, iAS, Grid Control
  - Oracle applications (E-Business suite and OnDemand)
CERN

Annual budget: ~ MSFr 1000 (~ M€600)
Staff members: 2650
Fellows: 270, Associates: 440
+ 8000 CERN users....

Basic research
Fundamental questions
High E accelerator:
Generate new particles
\((E=mc^2)\)
Create Big Bang conditions
LHC gets ready …
LHC Computing Challenge

- Signal/Noise $10^{-9}$
- Data volume
  - High rate * large number of channels * 4 experiments
  - **15 PetaBytes of new data each year**
- Compute power
  - Event complexity * Nb. events * thousands users
  - **100 k CPUs (cores)**
- Worldwide analysis & funding
  - Computing funding locally in major regions & countries
  - Efficient analysis everywhere
  - **GRID technology**
Grid Applications

- Medical
- Seismology
- Chemistry
- Astronomy
- Fusion
- Particle Physics
Our EM Grid Control Environment

**MONITORED TARGETS:** ~ 1500
192 INSTANCES (53 RAC DBS)
223 HOSTS

Agent versions:
- 10.2.0.2, 10.2.0.3
- 10.2.0.4, 10.2.0.5
Solaris and Linux (32 & 64 bit)
Secure agent upload
Hardware load balancer

Agent

**Maximum Availability Architecture**

Agent versions:
- 10.2.0.2, 10.2.0.3
- 10.2.0.4, 10.2.0.5
Solaris and Linux (32 & 64 bit)
Secure agent upload
Hardware load balancer

Agent

**Hardware Load Balancing**

Users (https)

OMS version 10.2.0.5
Linux RHEL 4 (64 bits)
8CPU (2.33GHz) - 16Gb RAM

Management Server

EMREP service

RAC node

Repository Database

RAC node

Repository Database

Management Server

Management Server
Our Challenge

- Minimize cost of monitoring growing architecture
- Provide timely, standardized access to meaningful information
- Enable pro-active management & problem avoidance
- Identify and remove configuration exceptions
User Defined Policies - Use case

- User Defined Metric Objective: Monitor the last RMAN backup timestamp for all databases
- User Defined Policy Objective: Check that the metric has been successfully applied
How To (1) – Using User Defined Policies
# How To (2) – Using User Defined Policies

## ORACLE Enterprise Manager 10g

### Grid Control

**Policies | Policy Groups | Security At a Glance**

### Policies: Library

The following table lists all the policies and where they are currently in-use.

<table>
<thead>
<tr>
<th>Select</th>
<th>Policy</th>
<th>Category</th>
<th>Type</th>
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<th>Owner</th>
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<th>Used by Targets</th>
<th>Edit</th>
</tr>
</thead>
<tbody>
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<td>☐</td>
<td>Default Permanent Tablespace</td>
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<td>Checks if the DEFAULT_PERMANENT_TABLESPACE database property is set to a system tablespace</td>
<td>&lt;SYSTEM&gt;</td>
<td>0</td>
<td>37</td>
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<td>71</td>
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<td>Warning</td>
<td>Security</td>
<td>Database Instance</td>
<td>Checks for users using a permanent tablespace as the temporary tablespace</td>
<td>&lt;SYSTEM&gt;</td>
<td>2</td>
<td>97</td>
</tr>
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<td>Critical</td>
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<td>&lt;SYSTEM&gt;</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

**TIP** Policies provided by Oracle are owned by <SYSTEM>. They cannot be exported or deleted.

### Related Link

Setup Monitoring Templates
### How To (3) – Using User Defined Policies

![Oracle Enterprise Manager 10g](image)

**Policies: Library**

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<td>1</td>
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<tr>
<td>RMAN database backup metric reserve</td>
<td>Warning</td>
<td>Security</td>
<td>Database Instance</td>
<td></td>
<td>SYSMAN</td>
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<td></td>
<td>1</td>
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</tr>
</tbody>
</table>

**Related Link**

- Setup Monitoring Templates

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*Oracle Enterprise Manager 10g*
How To (5) – Using User Defined Policies

Edit Policy: SQL Query

Enter a valid SQL query that returns column data to be verified:

```
SELECT target_guid as TARGET_GUID, 'VALUE' FROM mgmtStargt_metric_settings
WHERE collection_name='Age of datfile backup'
AND target_type='oracle_database'
```

One of the select columns must be target_guid. Do not end the statement with a semi-colon ()

Validate SQL

- Non-Compliant Message: Policy RMAN datfile backup metric exists is non-compliant.
- Compliant Message: Policy RMAN datfile backup metric exists is compliant.
How To (6) – Using User Defined Policies

select target_guid as TARGET_GUID, 1 "VALUE"
from mgmt$target_metric_settings
where collection_name='Age of datafile backup'
and target_type='oracle_database'
union
select target_guid as TARGET_GUID, 0 "VALUE"
from mgmt$target where
target_type='oracle_database'
and target_guid not in (select target_guid
from mgmt$target_metric_settings
where collection_name='Age of datafile backup'
and target_type='oracle_database')
How To (7) – Using User Defined Policies

**Edit Policy: Violation Condition**

Enter the violation test to be evaluated.

SQL Query:
```
select target_guid as TARGET_GUID, 1 "VALUE" from
mgmt$target_metric_settings
where collection_name='Age of datafile backup'
and target_type='oracle_database'
```

Number of Key Columns: 1

**Condition**

To check for violations, select a column name that was specified in the SQL statement above, and set the comparison operator and value to be tested. A violation is triggered if the condition returns false. If a more complex condition is needed, select SQL condition type and enter a SQL WHERE expression. If default parameters are used in the SQL expression, they can be customized during target association.

**Threshold**

<table>
<thead>
<tr>
<th>Column Name</th>
<th>Data Type</th>
<th>Comparison Operator</th>
<th>Default Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>VALUE</td>
<td>Number</td>
<td>=</td>
<td>0</td>
</tr>
</tbody>
</table>
How To (8) – Using User Defined Policies

Edit Policy: Test
Run a test evaluation against a single test target. Test results will be rendered below.

(Optional) Click Next to skip test.
+ Target RMAN_T_new

Results

General
Severity: Warning
Compliance Score (%): 76
Importance: Normal
Category: Security
Description: Policy checks for the existence of the RMAN datfile backup metric

Violations

<table>
<thead>
<tr>
<th>VALUE</th>
<th>Date Tested</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>07 Aug 2009 12:30:30 CST</td>
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</table>
### Related Link

**Setup Monitoring Templates**

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**Home | Targets | Deployments | Alerts | Compliance | Jobs | Reports | Setup | Preferences | Help | Logout**

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**About Oracle Enterprise Manager**
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<thead>
<tr>
<th>Select</th>
<th>Target</th>
<th>Type</th>
<th>Policy</th>
<th>Severity</th>
<th>Last Evaluation</th>
<th>Category</th>
<th>Description</th>
<th>Disabled</th>
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<tr>
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<td>06-Aug-2009 15:47:38 CEST</td>
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</table>
Other Examples – Using User Defined Policies

- Monitor if DB auditing is enabled
- Monitor if the audit data management procedure has been applied or if the login auditing trigger is enabled
- Monitor if the truncate audit procedure exists
## Conclusion (I): Cost benefits

- **Example:**

  - **Without Grid Control:**

    | Monitoring task (EM policy)                                   | Time consumed                                      |
    |---------------------------------------------------------------|----------------------------------------------------|
    | Time spent in a task per database per month                   | 1 task x 5 mins x 1 month x 1db = 5 mins/month     |
    | Time spent in checking a task for all the databases           | 1 task x 5 mins x 1 month x 100 db = 8 hours/month |
    | Time spent in checking all tasks for all the database         | 8 hours x 20 tasks = 166 hours/month               |

**Conclusion** => *1 post (FTE) just to check policies!!!!!!*
Conclusion (I): Cost benefits

- Example:
  - With Grid Control:

<table>
<thead>
<tr>
<th>Monitoring task (EM policy)</th>
<th>Time consumed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time spent in the initial effort in setting up:</td>
<td>It takes a few hours each. No overhead in re-running the policy.</td>
</tr>
<tr>
<td>✓ The User Defined Metric</td>
<td></td>
</tr>
<tr>
<td>✓ The User Defined Policy</td>
<td></td>
</tr>
</tbody>
</table>

Conclusion => The post (FTE) can invest the time in taking new projects without increasing costs.
Furthermore… Grid control reduces manpower needs by:

- Providing centralized access to meaningful information
- Enforcing compliance with our standards
- Decreasing time consumed by daily operations
- Reducing downtime by pro-active monitoring
- Assisting DBAs in their tuning and performance improvement tasks
- …and all with little additional effort even for a constantly expanding IT infrastructure
Questions?

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CERN Website: http://www.cern.ch