Oracle Database In-Memory

Ask TOM Office Hours – Automatic Data Optimization

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Automatic Data Optimization in 12.1

- An in-memory heat map tracks disk based block and segment access
  - Data is periodically written to storage
- Requires the Advanced Compression Option
- Users can attach policies to tables to compress or tier data based on access
  - Tables, Partitions or Sub-partitions can be moved between storage tiers and compression levels
  - Online, no impact to data availability
  - Allows automatic data tiering
  - It is NOT an archive and purge solution
Automatic Data Optimization with Database In-Memory

- **12.1.0.2:** The in-memory column store can contain a subset of database tables and even a subset of the partitions for a given table. The user must choose the subset (the in-memory advisor can help with this).

- **12.2+:** IM column store is managed automatically as a new data tier
  - Heat map tracks data access frequency
  - Policies can be defined to
    - Bring data into the IM column store
    - Increase compression levels as data cools
    - Evict cold data from IM column store
Automation: In-Memory Data Auto Population Policies

- Automatic Data Optimization extended to In-Memory
- In-Memory policies allow optimal use of column store based on heatmap
  - Requires only inmemory option, not advanced compression
- Policies can be defined to:
  - Bring data into the IM column store
  - Increase compression levels as data cools
  - Evict cold data from IM column store
Automatic Data Optimization with Database In-Memory Implementation

• All In-Memory features require init parameter `inmemory_size > 0`
• Compatible parameter must be set to 12.2.0 or higher
• Requires heat map feature – `heat_map=on` (init.ora parameter)
• Does NOT require the Advanced Compression Option
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ADO IM Policies

• Three In-Memory policies:
  – SET INMEMORY – sets the INMEMORY attribute
  – MODIFY INMEMORY – modifies the compression level (must be to a higher level)
  – NO INMEMORY – sets the NO INMEMORY attribute

• Policy criteria
  – <policy type> AFTER <time period> of [ no access | creation | no modification ]
  – <policy type> on <function_name>

• Policy names are system generated (i.e. P1, P2, and so on to Pn)
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ADO IM Policies

• Policies run on a daily basis during the Maintenance Window
  – It is possible to run policies manually – dbms_ilm.execute_ilm procedure

• ADO runs policies through the Job Scheduler

• Successful policy completion results in policy being disabled (i.e. all policies are segment level policies)

• Policies created on the table or inherited from the tablespace default
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ADO IM Policy Examples

• ALTER TABLE customers ILM ADD POLICY SET INMEMORY AFTER 2 days OF CREATION

• ALTER TABLE customers ILM ADD POLICY MODIFY INMEMORY MEMCOMPRESS FOR CAPACITY HIGH AFTER 5 days OF NO MODIFICATION

• ALTER TABLE customers ILM ADD POLICY NO INMEMORY AFTER 20 days OF NO ACCESS
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ADO IM Policy Examples

• CREATE OR REPLACE FUNCTION my_custom_ado_rules (objn IN NUMBER) RETURN BOOLEAN;

• ALTER TABLE customers_custom ILM ADD POLICY MODIFY INMEMORY MEMCOMPRESS FOR CAPACITY HIGH ON my_custom_ado_rules;
Automatic Data Optimization Views

• dba_ilmparameters
  – displays ADO-related parameters

• user_ilmpolicies
  – details about policies

• user_ilmobjects
  – lists policies associated with objects and whether they are enabled

• user_ilm_datamovementpolicies
  – describes data movement policy details (i.e. compression, condition, time frame, action)
Automatic Data Optimization Views

- **user_ilmtasks**
  - Displays task ids created by the EXECUTE_ILM procedure

- **user_ilmresults**
  - Displays results of data movement-related jobs (jobs can involve multiple policies)

- **user_ilmevaluationdetails**
  - The result of the evaluation of the policy (i.e. was it run or not)
Automatic Data Optimization Packages

- `dbms_ilm`
  - add_to_ilm
  - archivestatename
  - execute_ilm
  - execute_ilm_task
  - preview_ilm
  - remove_from_ilm
  - stop_ilm

- `dbms_ilm_admin`
  - customize_ilm
  - disable_ilm
  - enable_ilm
  - clear_heat_map_all
  - clear_heat_map_table
  - set_heat_map_all
  - set_heat_map_start
  - set_heat_map_table
More Information

• VLDB and Partitioning Guide
  – 5 – Managing and Maintaining Time-Based Information

• Database In-Memory Guide
  – 5.1 Enabling ADO for the IM Column Store

• Database Reference
  – Initialization Parameters
  – Static Data Dictionary Views
Where Can You Get More Information
https://blogs.oracle.com/in-memory/dbim-resources
Additional Resources

Join the Conversation

- https://twitter.com/db_inmemory
- https://twitter.com/TheInMemoryGuy

Database In-Memory Information

- Database In-Memory Blog
- oracle.com – Database In-Memory
- Database In-Memory YouTube Channel
- Ask TOM Database In-Memory Office Hours
- Database In-Memory Guide (Documentation)