IBM Business Analytics

IBM Software Solutions Group

Cognos Dynamic Cubes

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Technical Panel Member

Agenda

- What is Dynamic Cube?
- Difference between Dynamic cube and Transformer/TM1 Cube
- Dynamic cube in Cognos BI environment
- Cognos Cube Designer
- Dynamic Cube Management
- Overview of Aggregate Advisor
- Reference

What is Dynamic Cube?

- Introduced as new feature from IBM Cognos BI 10.2
- Dynamic Cubes are in-memory OLAP cubes that load data directly from relational data sources that is structured in a star or snowflake schema.
- The Cognos Dynamic Cubes technology is part of the IBM Cognos BI query stack
- The goal of IBM Cognos Dynamic Cubes is to provide quick response to reports and analyses on large volumes of data.
- Enabling high-performance interactive analysis over terabytes of data

What is Dynamic Cube?

- Cognos Dynamic Cube solution consists of :-
  - IBM Cognos Cube Designer
  - IBM Cognos Dynamic Cubes Server
  - Aggregate Advisor (part of IBM Cognos Dynamic Query Analyzer)

- When to use Cognos Dynamic Cubes?
  - Data warehouse with star or snowflake schema
  - A server with adequate memory
  - A database with approximately 25 million or more fact table rows

System Requirement for Cognos Dynamic Cube

- Memory – Because Dynamic Cube stores data in-memory, sufficient server RAM is essential to the support the application.
- 64 bit Report Server enabled – Even on a 64 bit OS, the default setting for the report server is 32 bit. Change this to 64 bit.
- Cognos 10.2 or newer
- Supported Databases (in the current 10.2 release) include: IBM DB2, IBM Netezza, Microsoft SQL Server, Oracle, Teradata

System Requirement for Cognos Dynamic Cube

- Hardware specification which need to be sized for Dynamic Cubes are CPU cores, memory, and hard disk space.

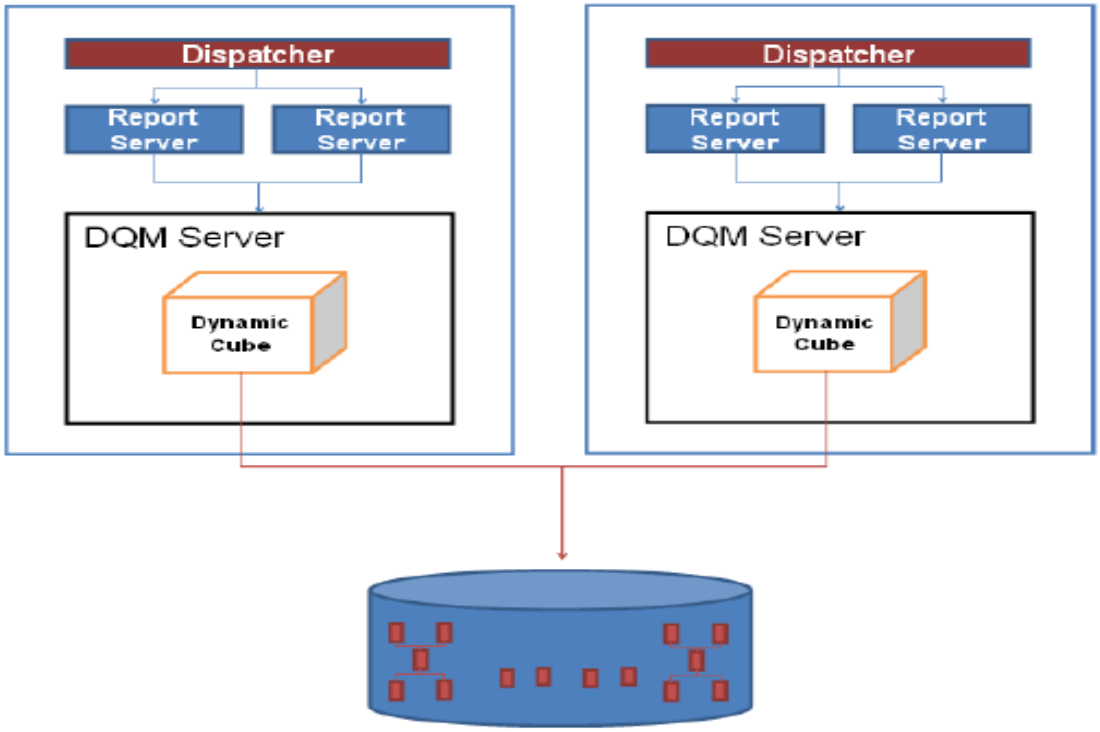
- Understanding Hardware Requirements for Dynamic Cubes
  - http://www.ibm.com/developerworks/library/ba-pp-infrastructure-cognos_specific-page659/

Difference between
Cognos Dynamic cube and Transformer/TM1 cube

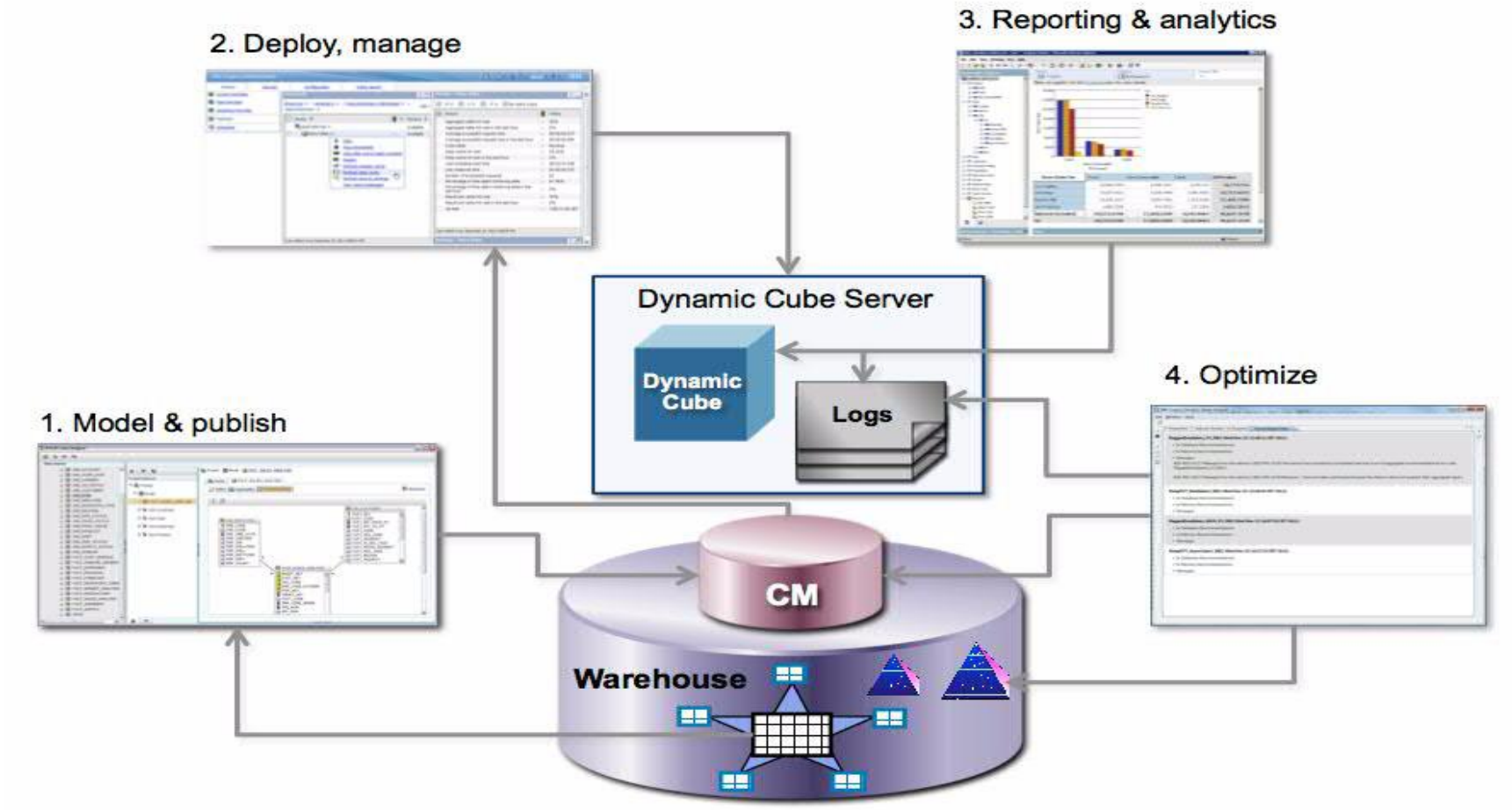
TM1 Cube	PowerPlay Cube	Dynamic Cube
In-memory cube technology with write-back support	File based cube technology	Provides extensive in-memory caching for performance
Is optimal for write-back, what-if analysis, planning and budgeting, or other specialized applications.	Interactive analysis experience to large number of users	Is optimal for read-only reporting and analytics
Star or snowflake data structure is not required	Data source is an operational or transactional system. Do not require star or snowflake data structure	Star or snowflake schema is required
Aggregation occurs on demand	File-based cube with pre-aggregation	Supports in-memory aggregation

Dynamic Cube in Cognos BI Environment

- Dynamic cube are in-memory OLAP containers that resides within DQM server



Dynamic Cube Lifecycle

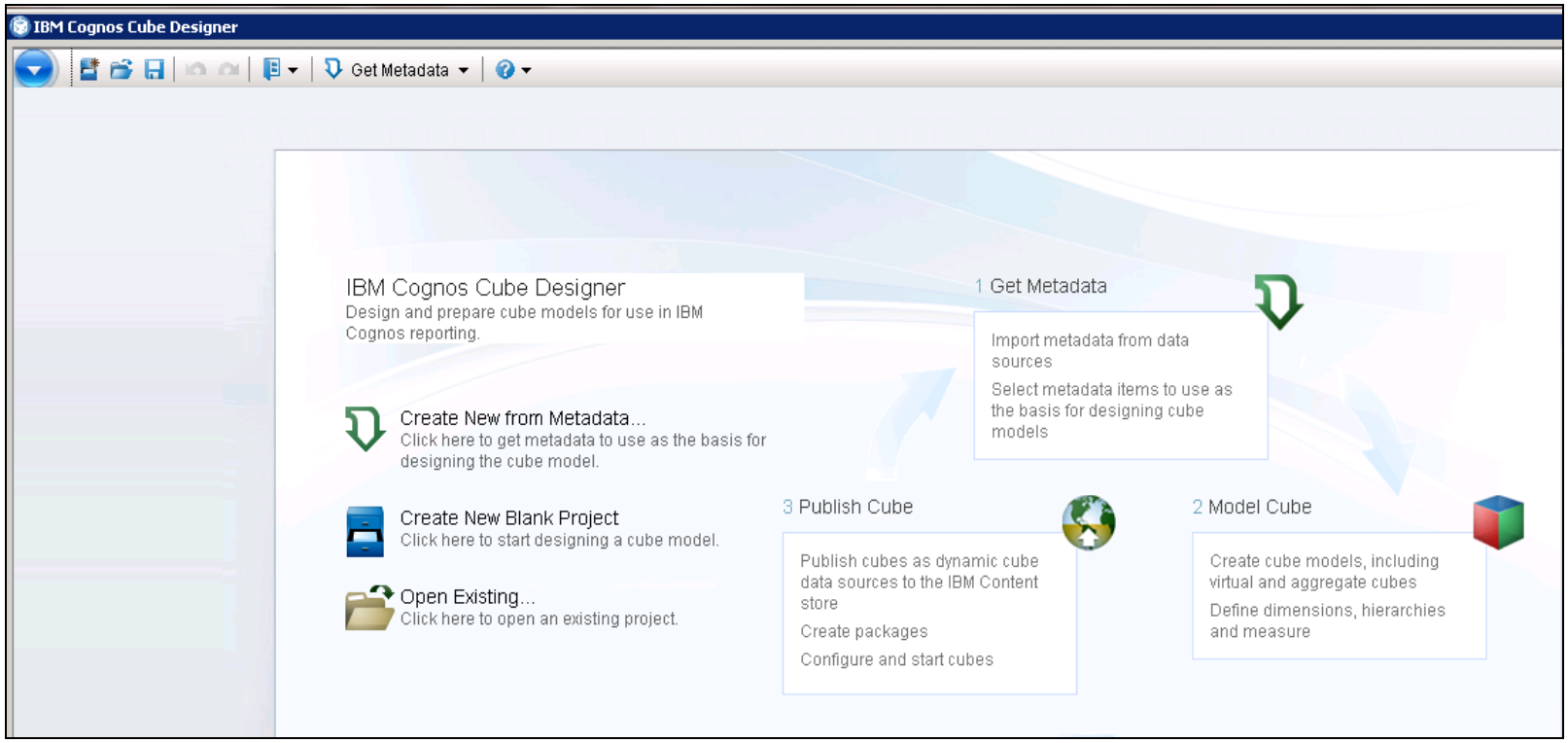


Dynamic Cube Lifecyle

- Modeled in IBM Cognos Cube Designer
- Cube model are then published to Cognos Content Manager as Cognos Dynamic cubes data source.
- From Cognos Administration console, administrator can assign dynamic cube to one or more dispatcher and configure its properties on dispatcher
- When cube is started, DQM server loads the cube model from CM and loads all dimensional members into its member cache.
- It is then made available for processing of reports and analyses.

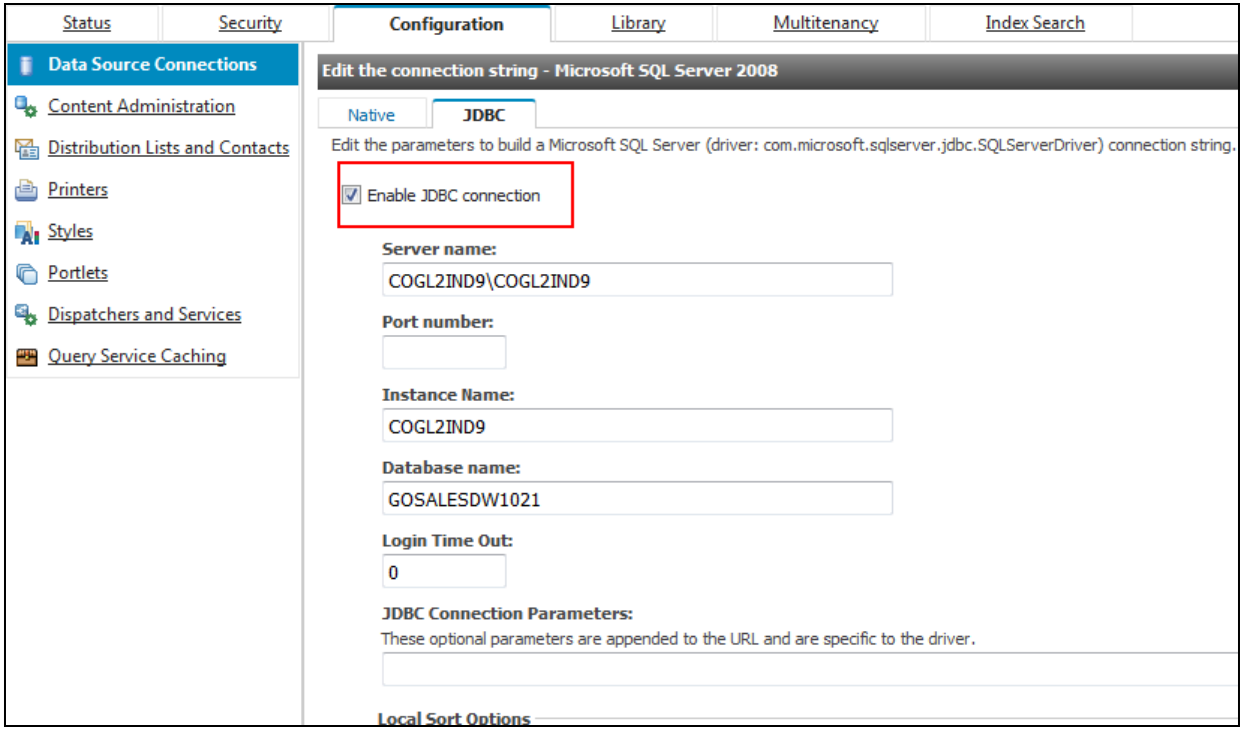
Cognos Cube Designer

- Cognos Cube Designer is used to model Dynamic Cubes
- Install IBM Cognos Cube Designer in the same location as IBM Cognos Framework Manager



Cognos Cube Designer

- We need a JDBC datasource connection created in Cognos Administration

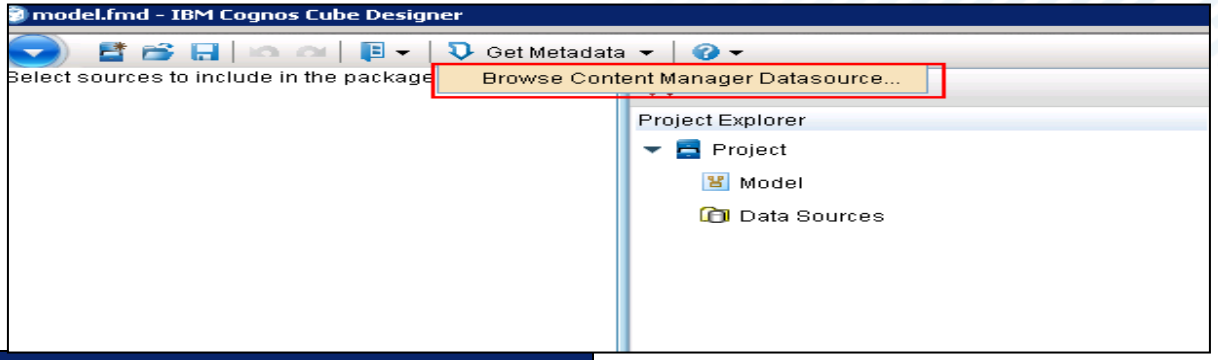


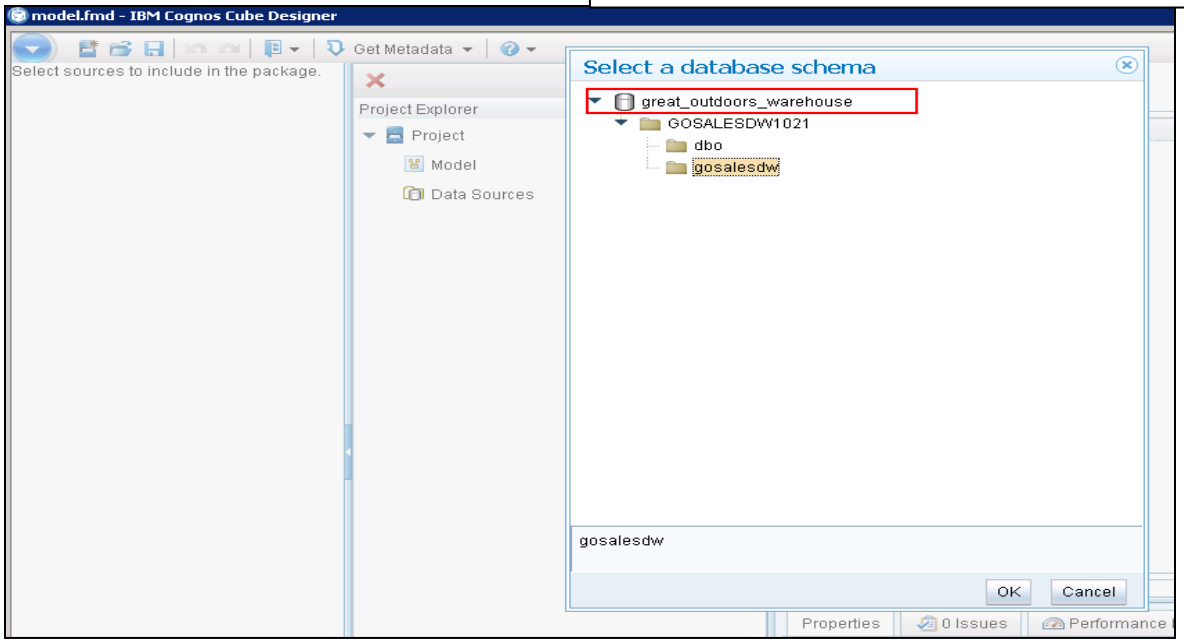
Cognos Cube Designer modeling workflow

- First model your cube definition in Cognos Cube Designer
  - select the database schema
  - import the required metadata
  - define the dimensions and measures
- Creating Dynamic cube
  - Auto-generate cube
    - Use primary-foreign key relationship to populate dimensions
  - Manually model the cube
- Deploy your dynamic cube to BI server
  - Quick-deploy options in Cognos Cube Designer with **Publish** Option
  - Option that is deselected here must be accomplished manually in FM or in Cognos Connection.

Cognos Cube Designer modeling workflow

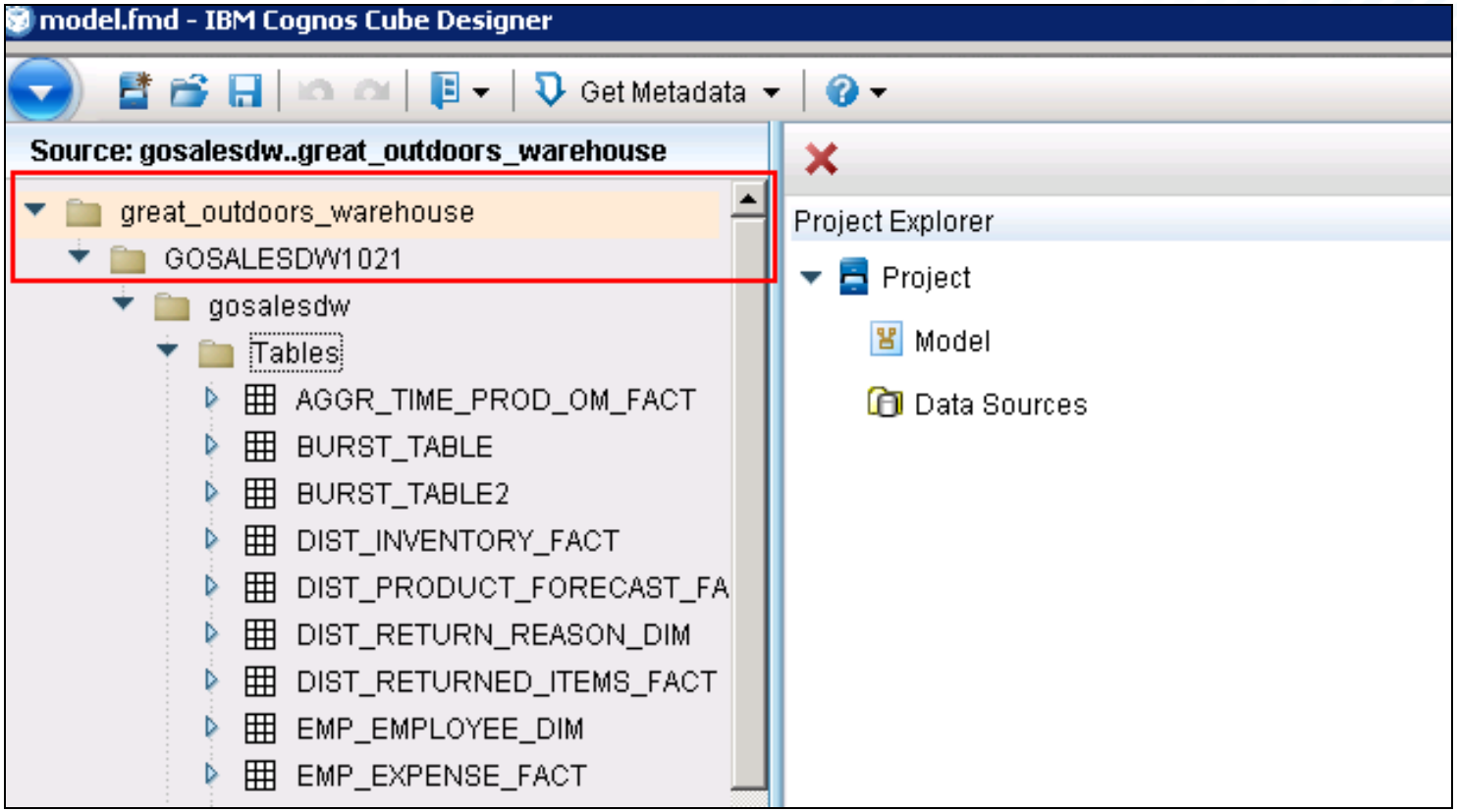
- Select the database schema and it will import the metadata





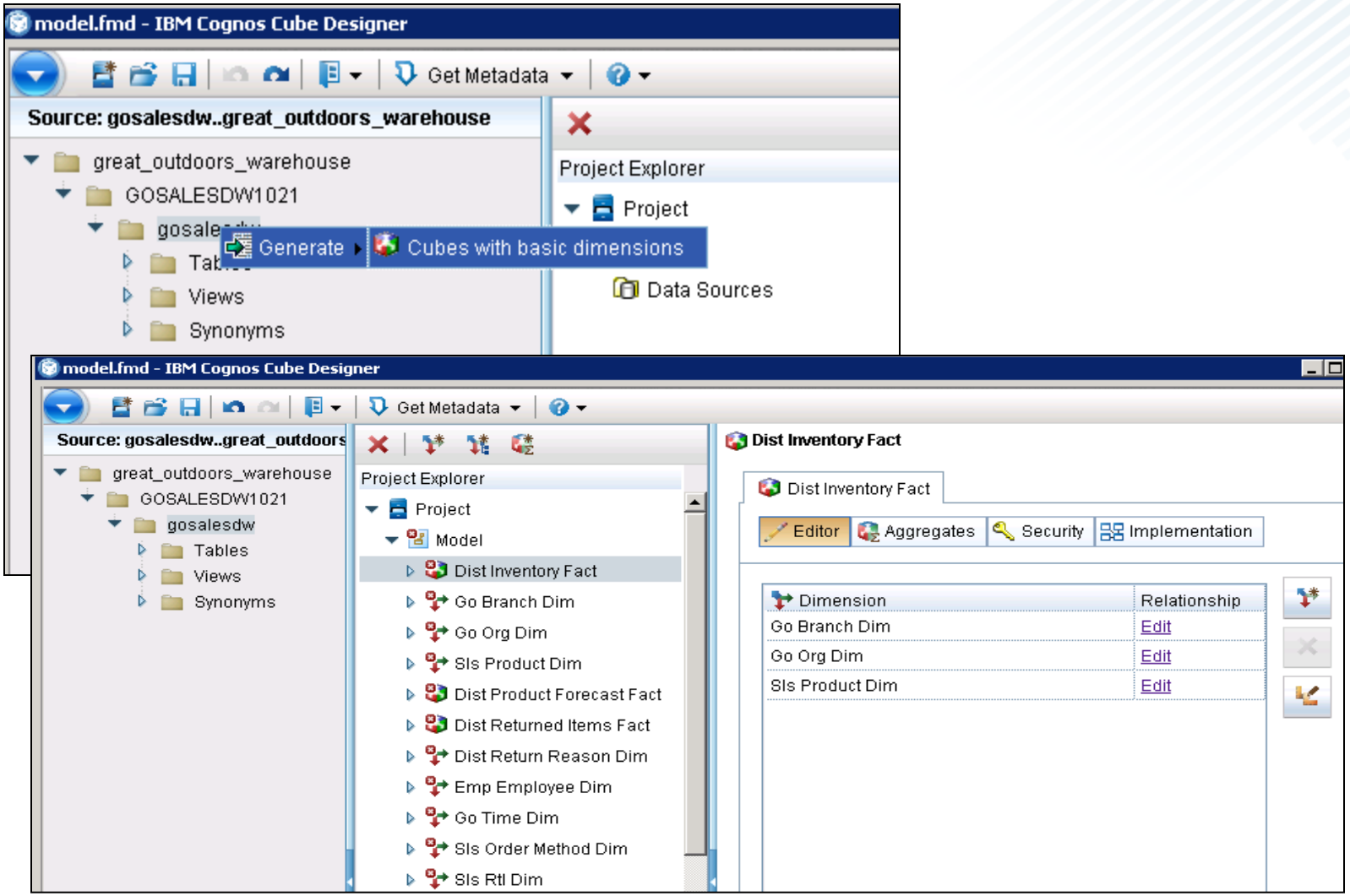
Cognos Cube Designer modeling workflow

- Matadata is imported in Cube Designer



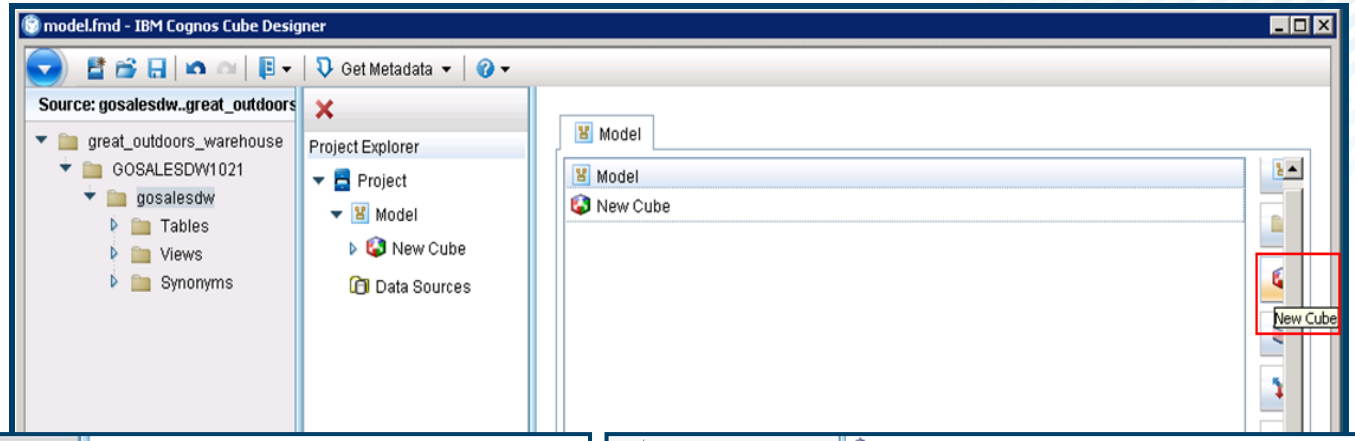
Create Cube – Auto generate method

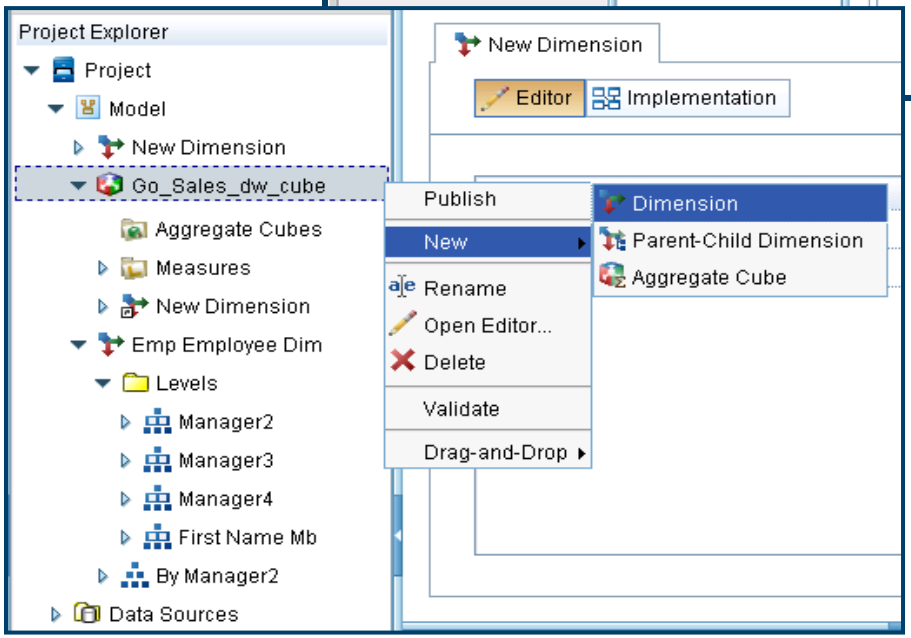
- It creates the cube along with basic Dimensions and Measures

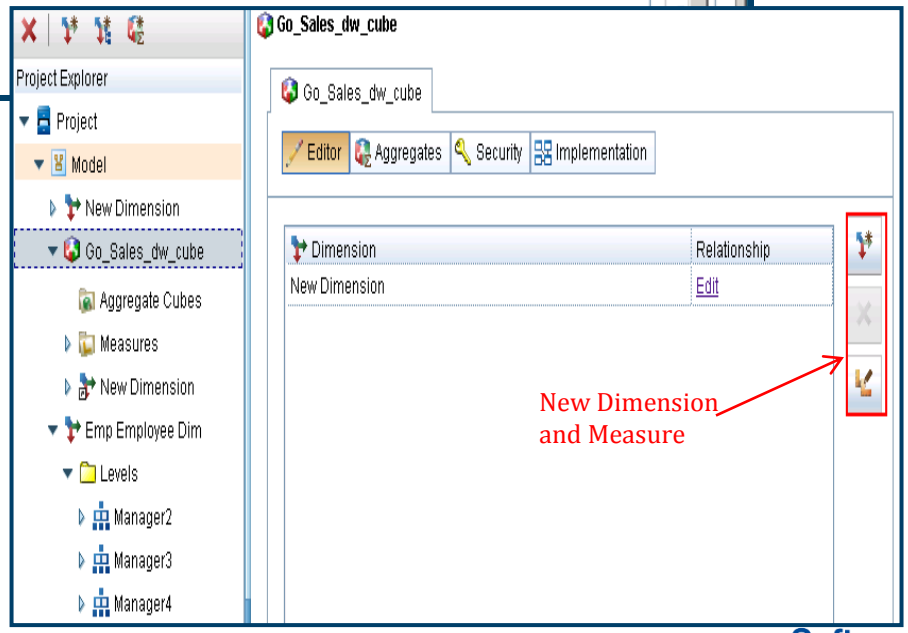


Create Cube – Manual method

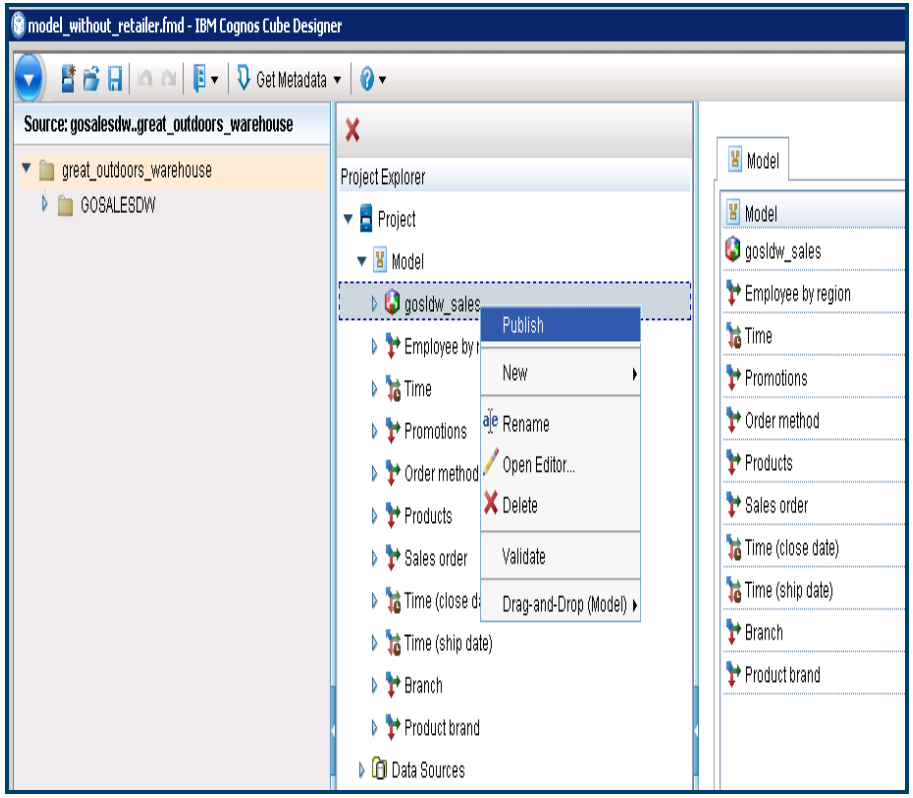
- Modeler defines the required Dimensions and Measures and creates the cube

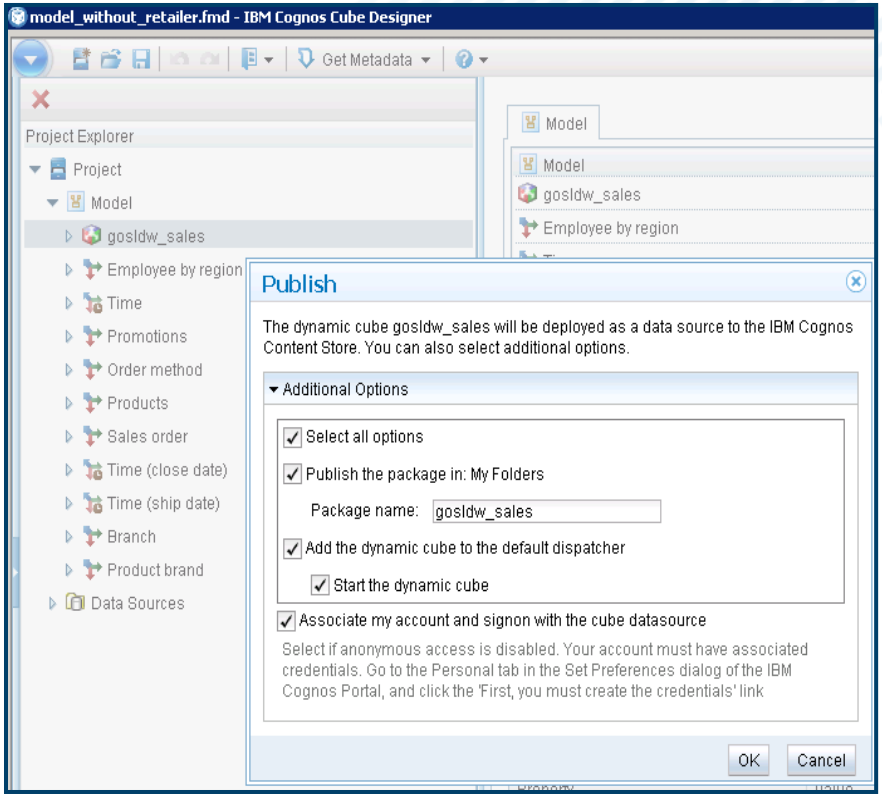






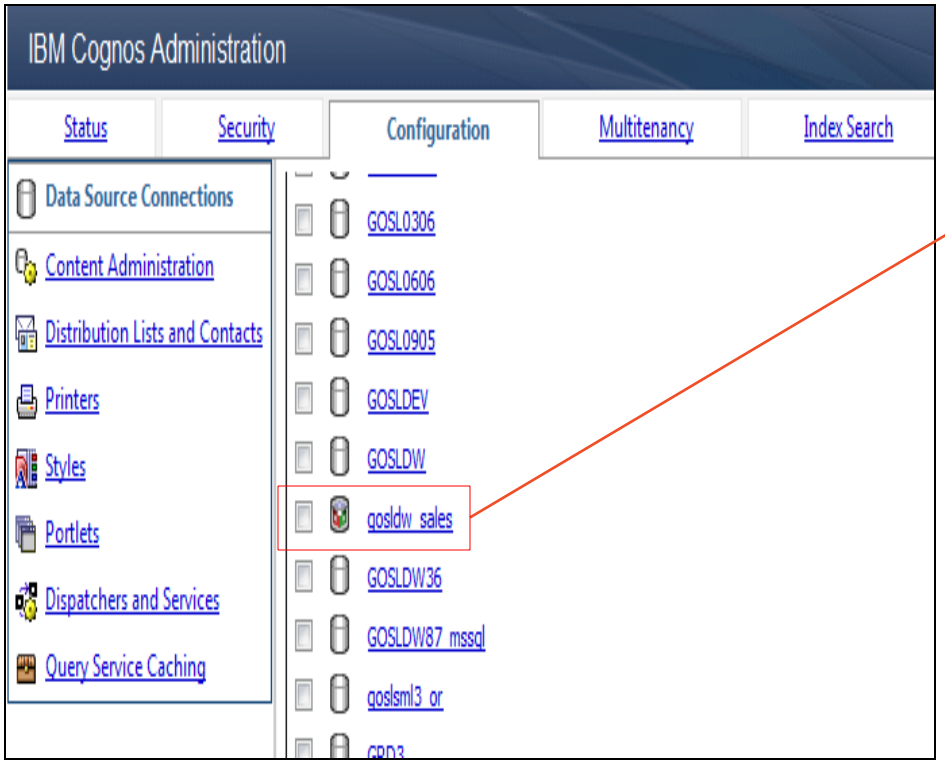
Publish the cube





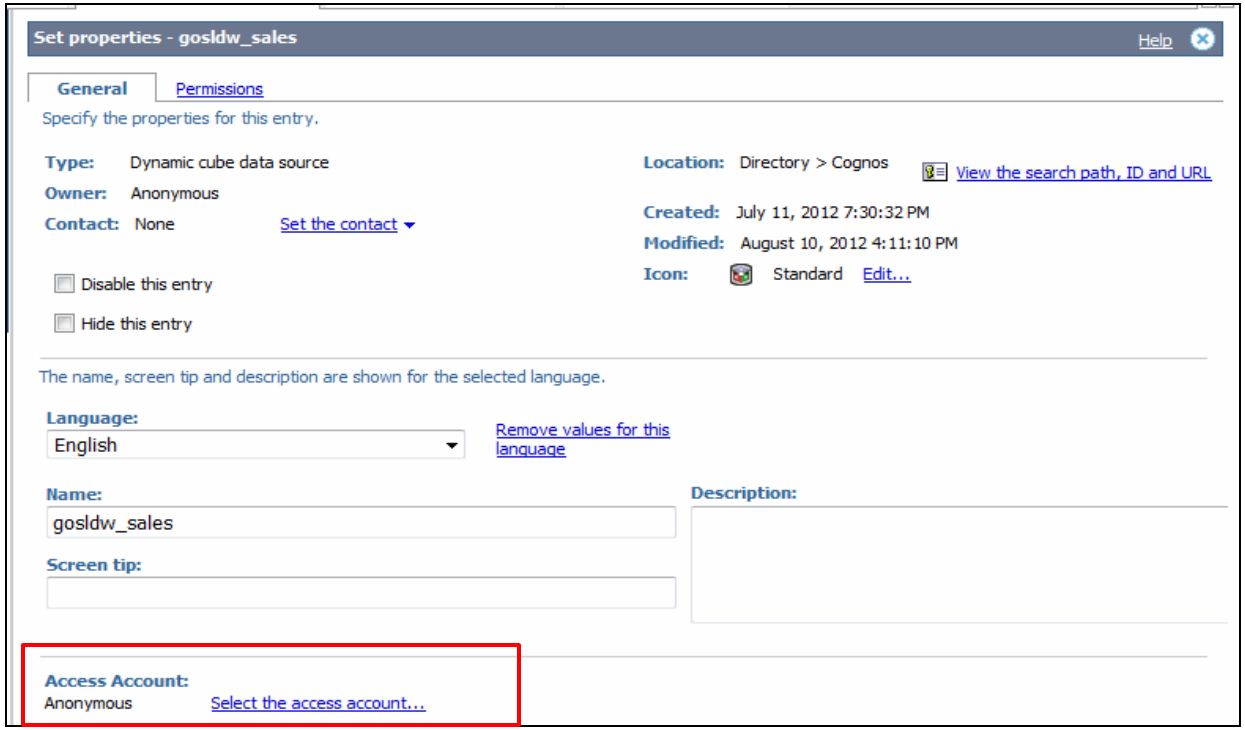
- Cube model are then published to Cognos Content Manager as Cognos Dynamic cubes data source.

- When a dynamic cube is published to Content Manager from Cognos Cube Designer it appears in the list of data sources



Dynamic cube data source connection

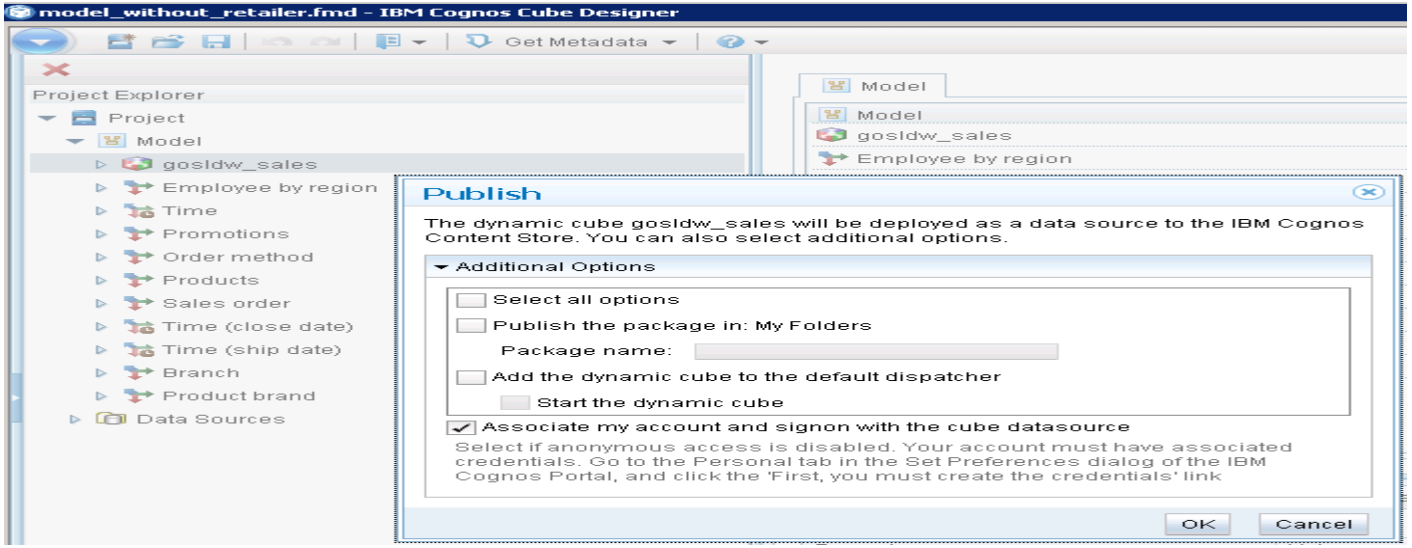
- Access account:
  - single account that is used to access the underlying relational database of the cube.



Manually Deploying a Dynamic Cube

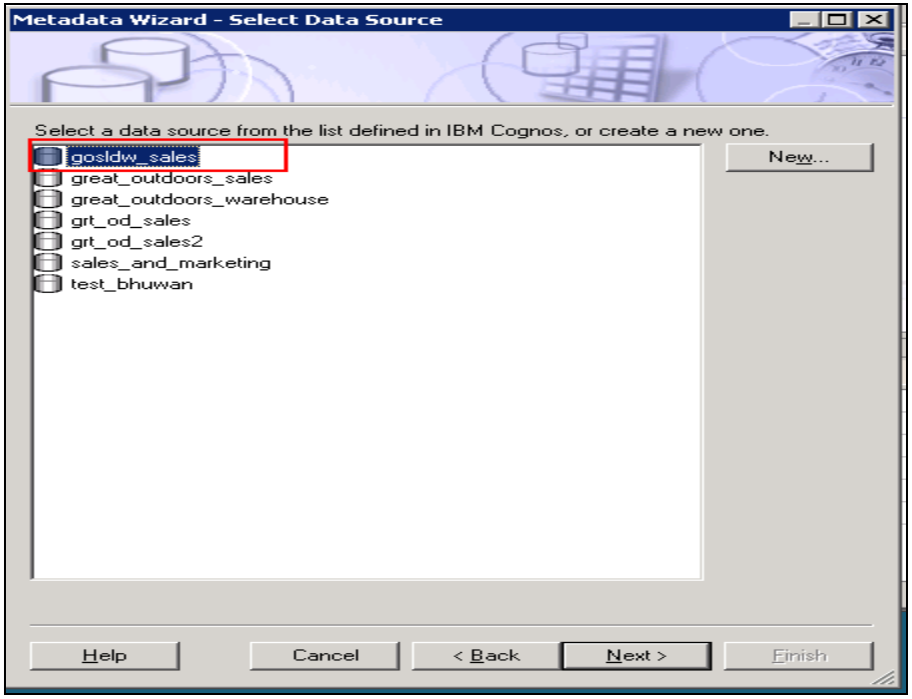
- This is the approach while publishing to Production environment

- First required step is to publish the cube from Cognos Cube Designer without the additional options selected.
  - creates a cube data source in Cognos Connection and publishes the cube model to the Cognos content store
  - Associate my account and signon with the cube datasource



Manually Deploying a Dynamic Cube

- Create a Package in FM
  - create a package in IBM Cognos Framework Manager to publish to the content store to make the cube available for reporting and analysis.
  - This process is identical to creating a Framework Manager package using any other supported OLAP source such as IBM Cognos TM1 or IBM Cognos Transformer PowerCubes.



Configuring Dynamic Cube

- Publishing a dynamic cube to Content Manager as a data source does not make a cube accessible to users as at this point only metadata definition of a cube was published.

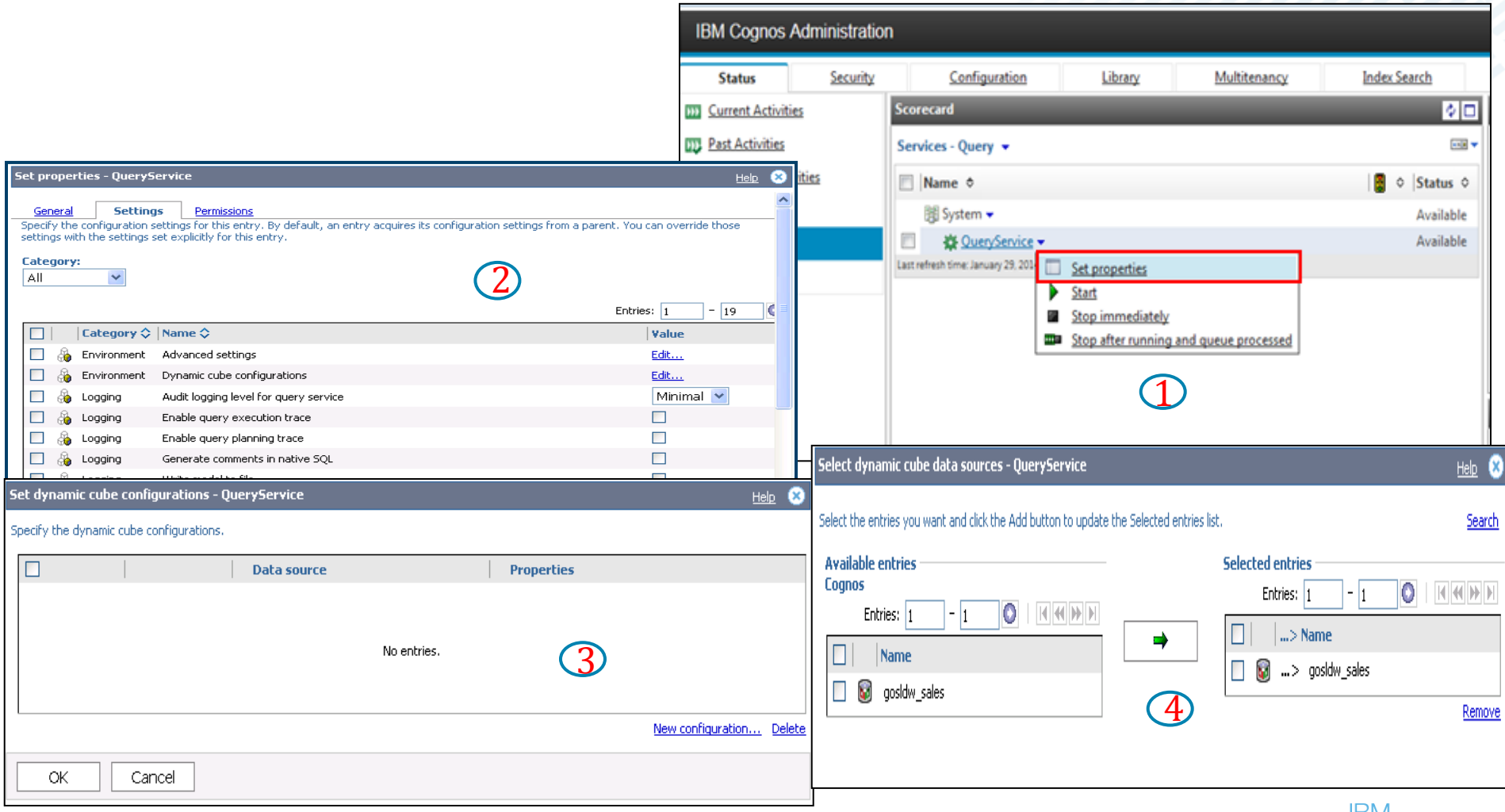
- Configuring a dynamic cube for a dispatcher requires two steps:
  - Identify a specific dispatcher on which a cube can be active.
  - Define the operational characteristics of a cube on that dispatcher.

    Properties such as- data and aggregate cache sizes, must be assigned non-default values

- Assign dynamic cube on dispatcher machine with high CPU and memory capacity in excess of what is required for DQM server.

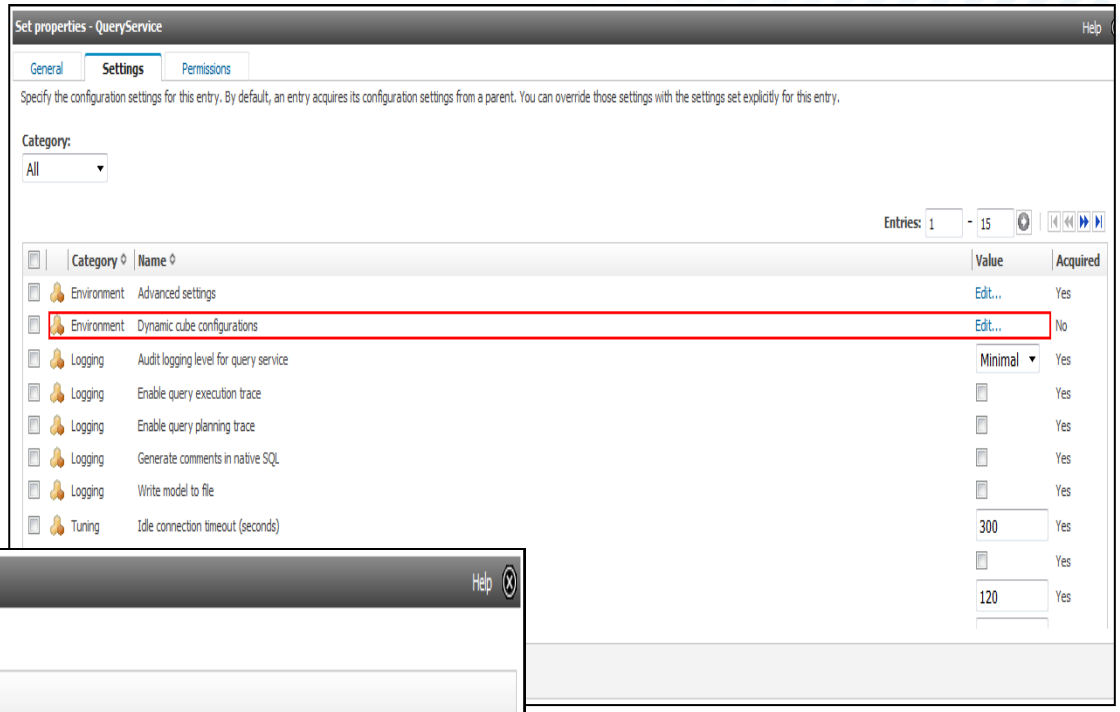
Configuring Dynamic Cube

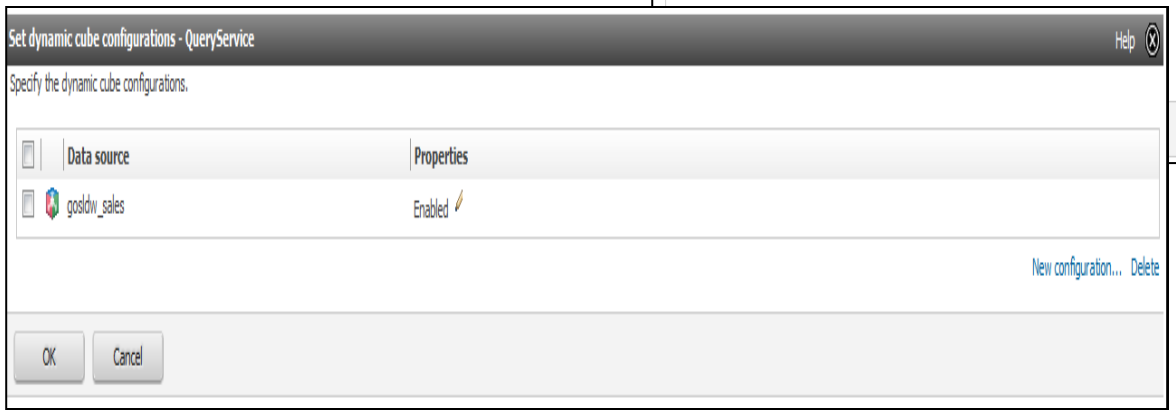
Adding a cube to the QueryService



Configuring Dynamic Cube

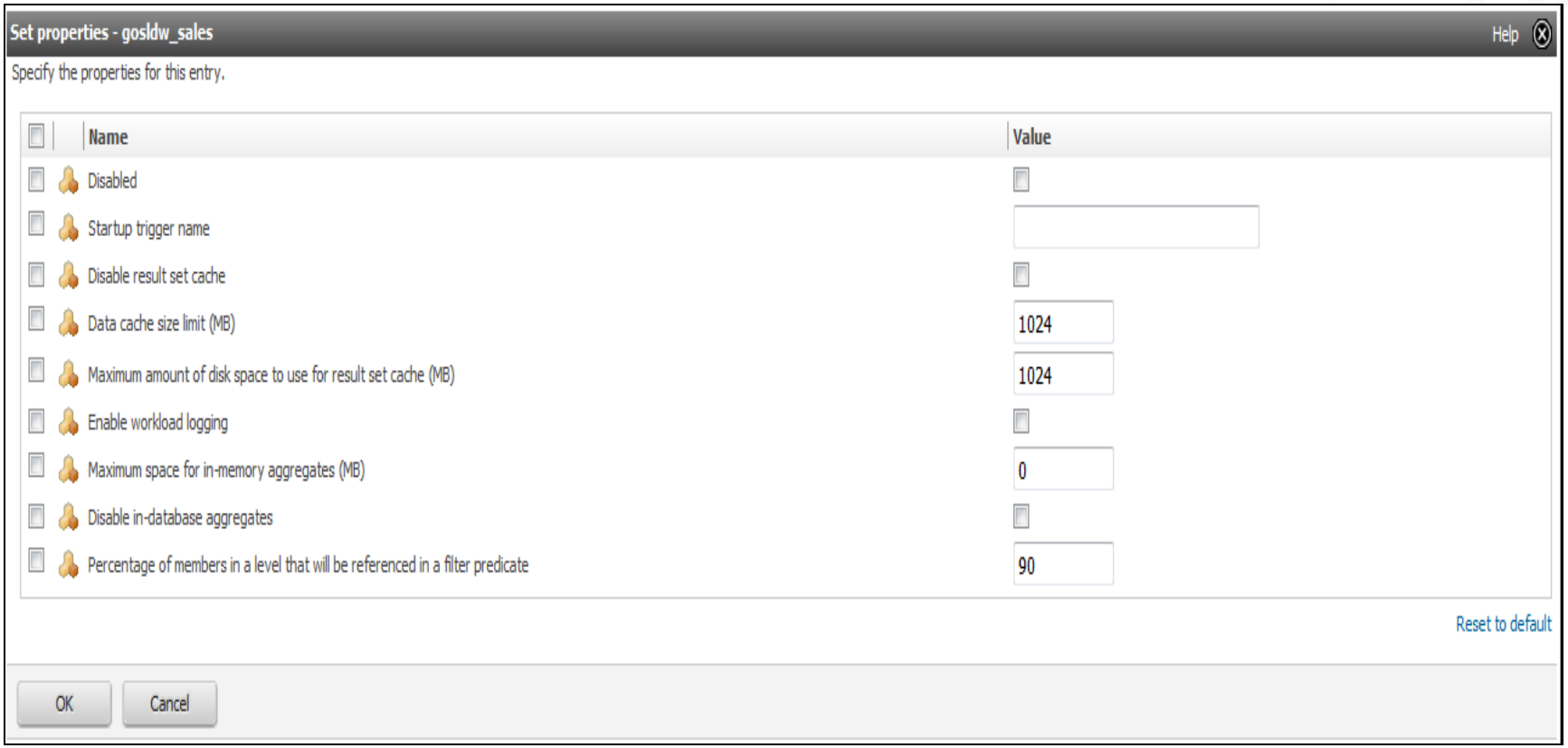
- From QueryService properties select Edit Dynamic Cube Configuration





Configuring Dynamic Cube

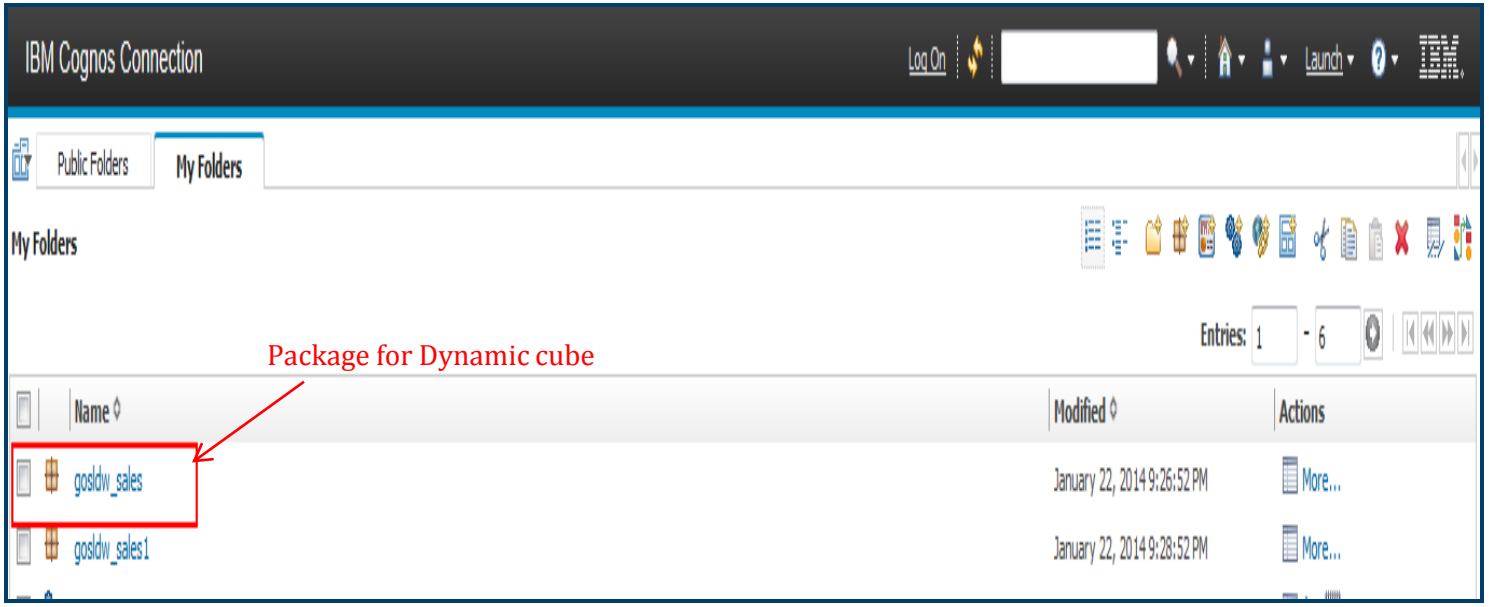
- Specify the properties of the Dynamic Cube



Configuring Dynamic Cube

- Dynamic cubes must be either explicitly or implicitly started before they can be accessible to users

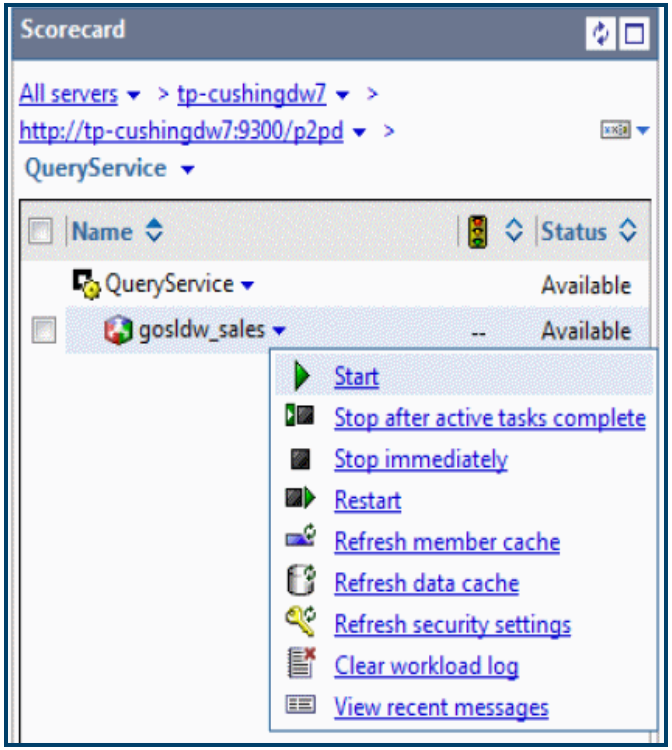
- There must also be at least one package available to users to access a cube



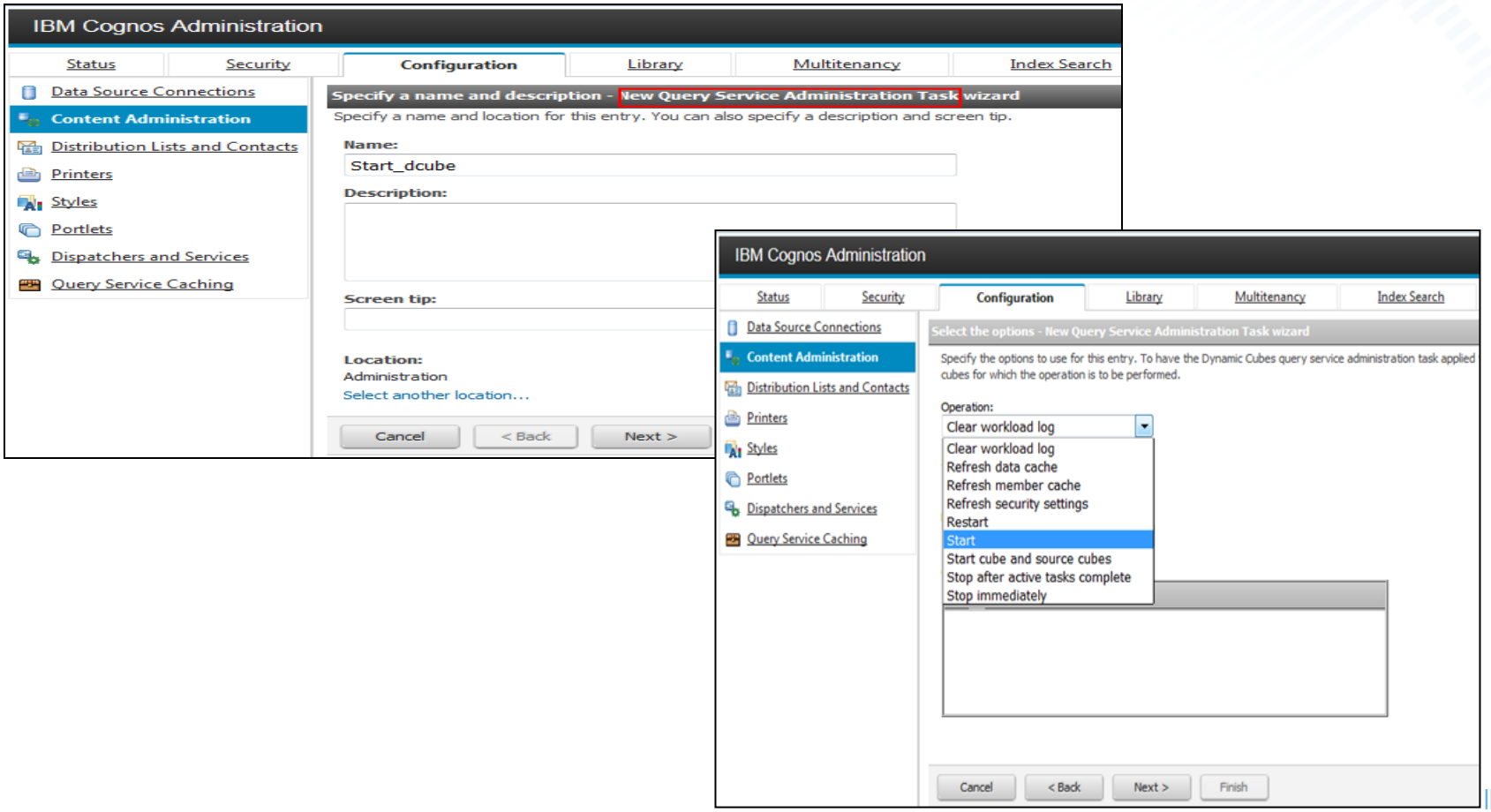
Dynamic Cube Management

Now the Cube can be Started

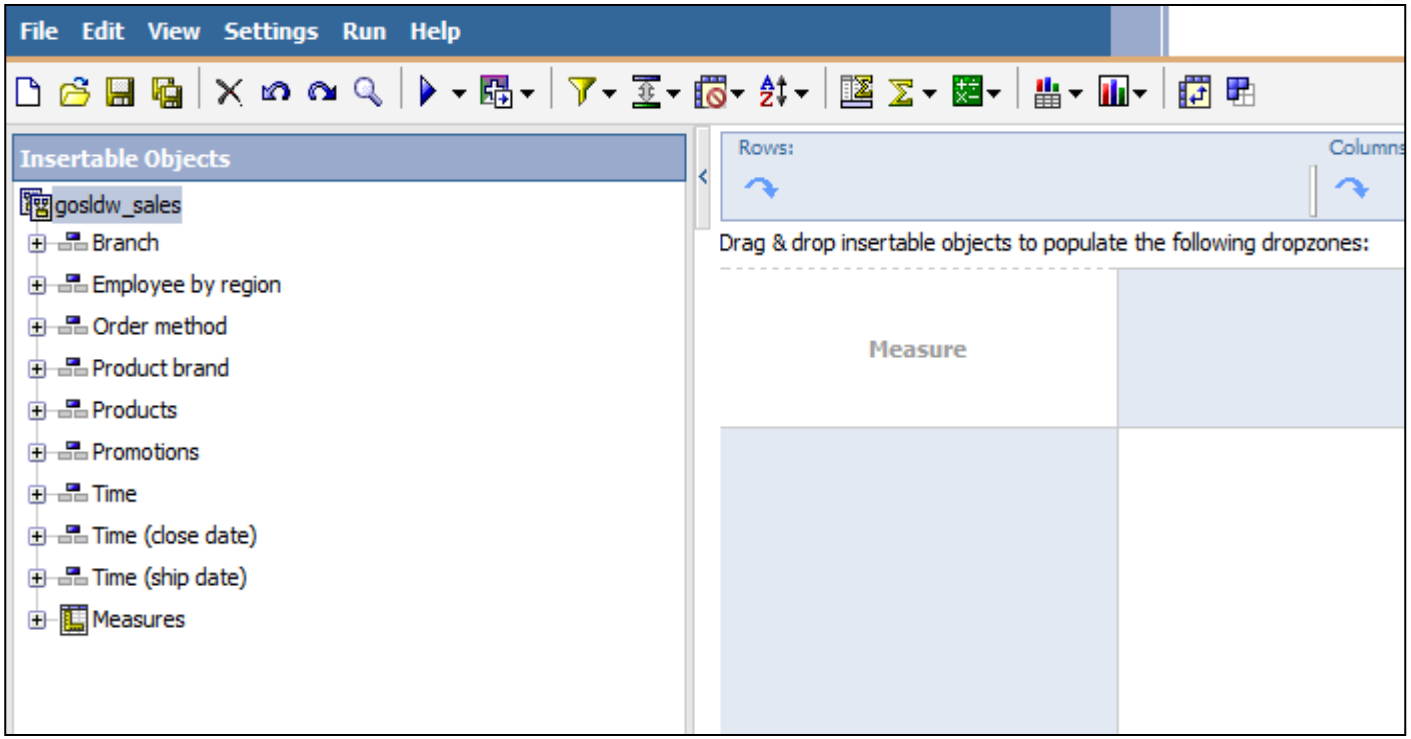
- It can be started in either of four ways:
  - Starting the QueryService
  - Starting the cube from IBM Cognos Administration
  - Creating and scheduling a ROLAP administrative task.
  - Creating an SDK application that starts a cube.



- Start the cube by creating Query Service Administration Task and select Operation as **Start**



- After the cube is started successfully it can be accessed in Cognos Studios for Reporting and Analysis



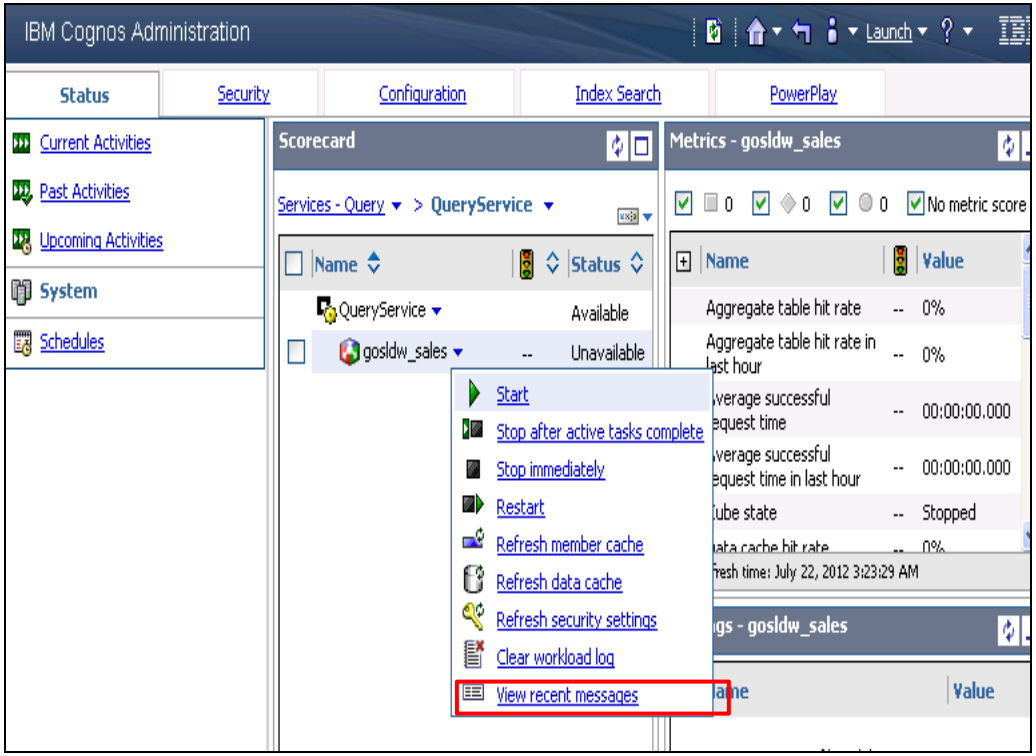
Administrating Dynamic Cube

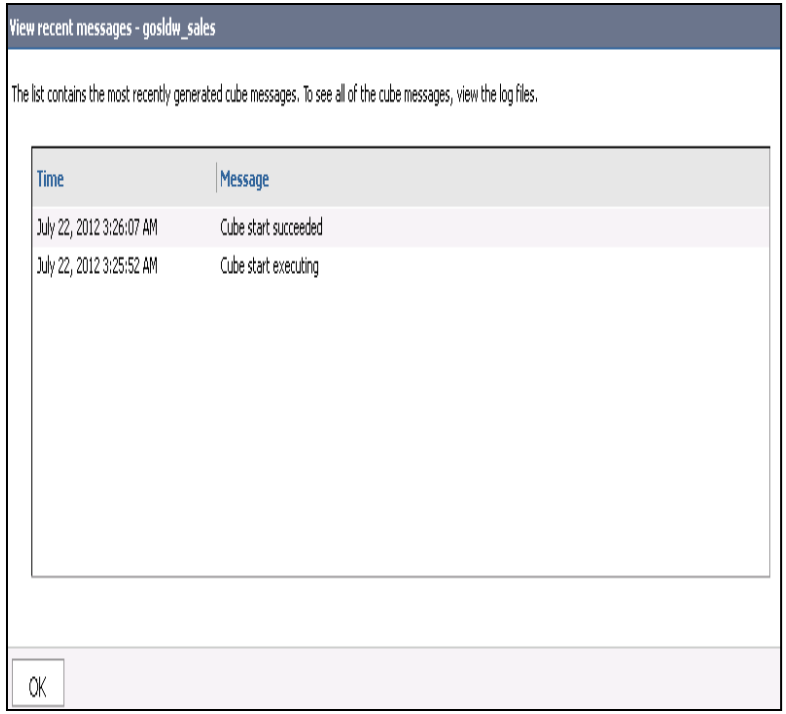
- Administration tasks include assigning the cube to the QueryService instance, starting it, monitoring its health, and refreshing its contents.
  - Start/Stop the Cube
  - Monitoring Cube
  - Managing the cache
  - Scheduling a refresh of the cache

Administrating Dynamic Cube

Start the Dynamic Cube

- When the cube starts successfully, its status changes to **Available**
- Select **View recent messages** if the cube status shows Unavailable



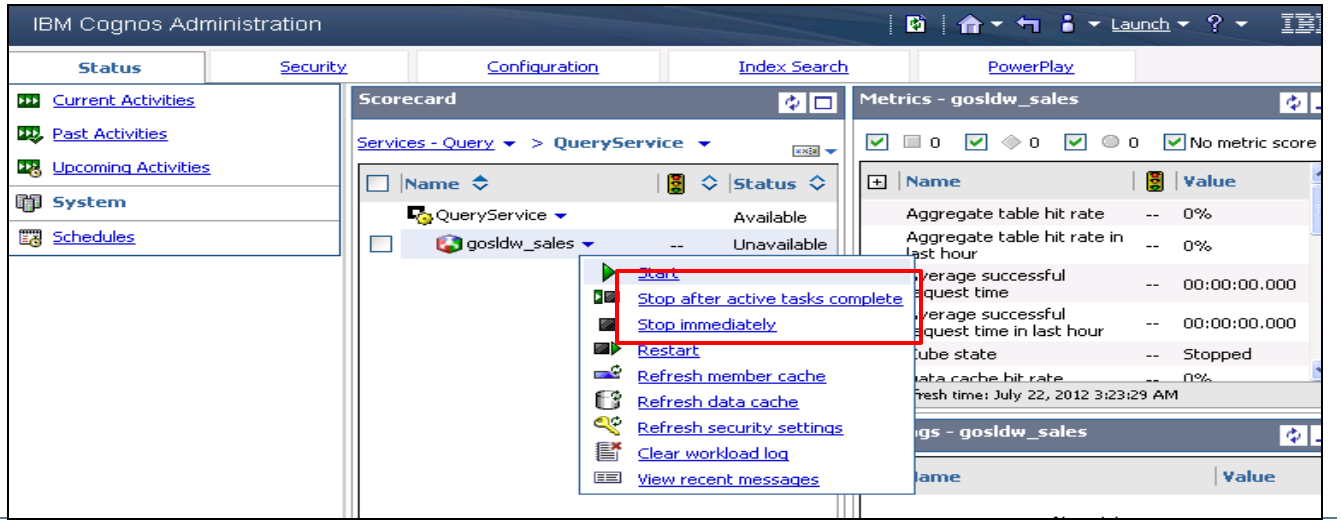


Administrating Dynamic Cube

Stopping the Dynamic Cube

There are two methods : -

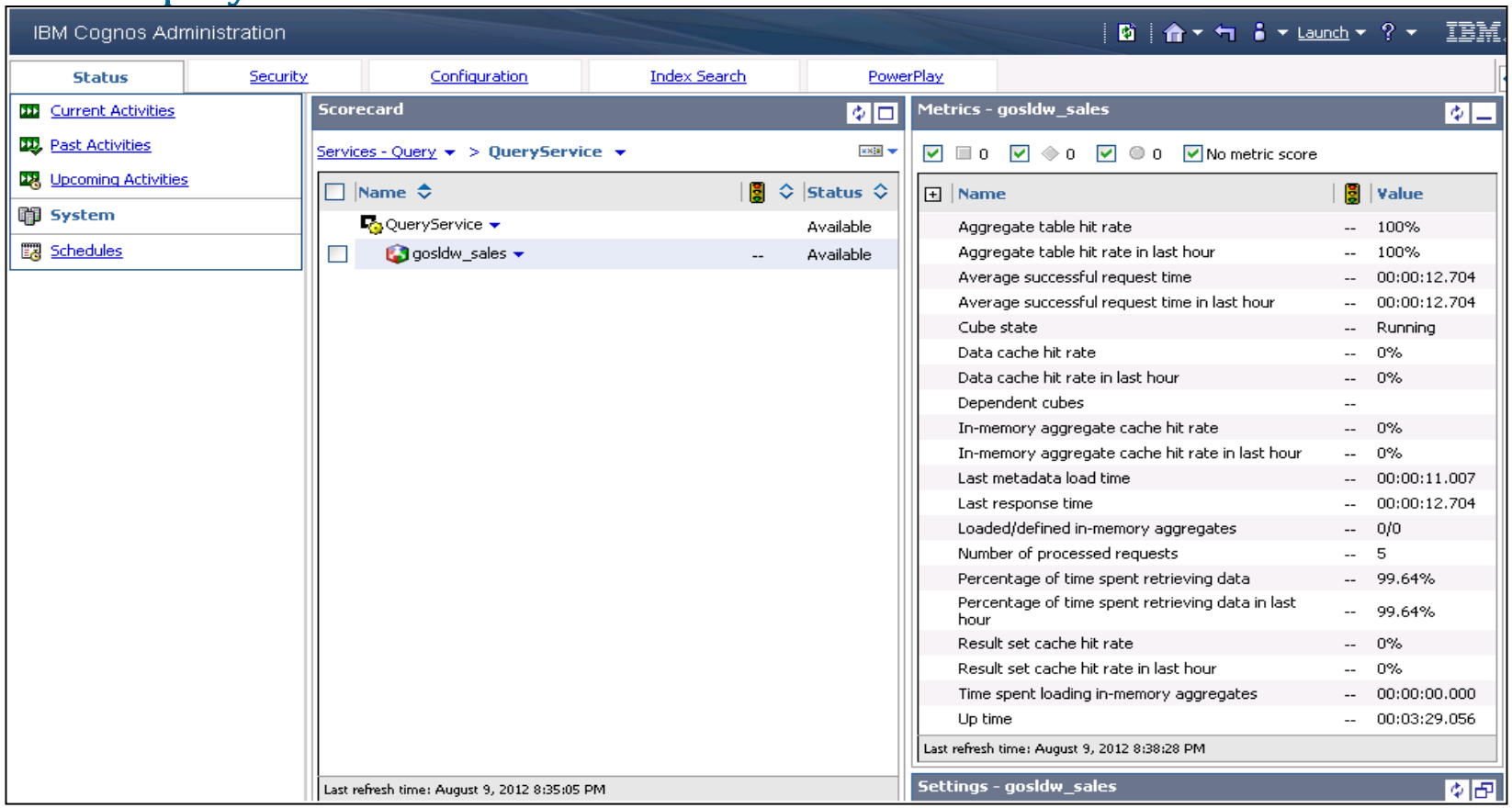
- Stop after active tasks complete
  - the cube will stop after currently executing queries are finished.
- Stop immediately
  - The cube will stop immediately, without waiting for the active queries and commands to complete. Some user queries can fail as a result.



Administrating Dynamic Cube

Monitoring cube state through metrics

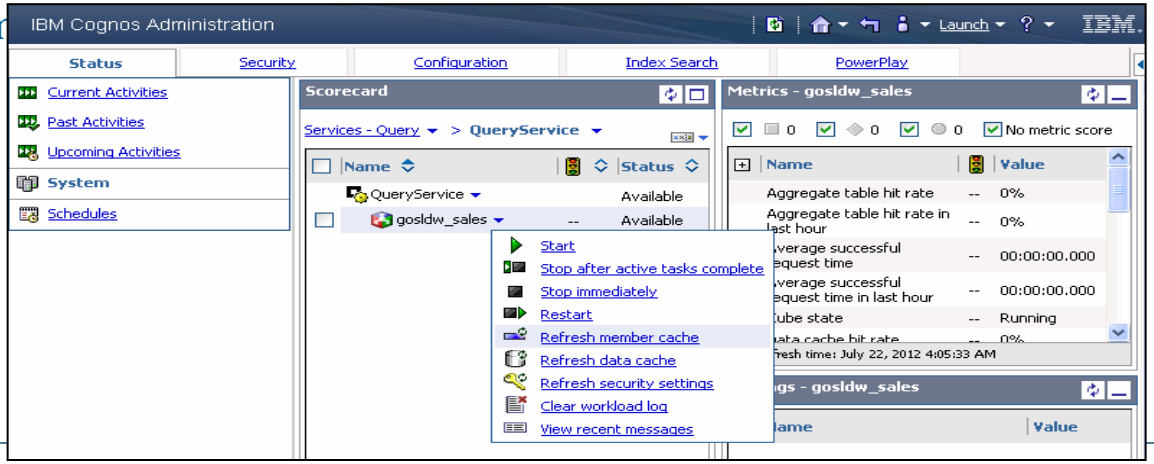
- When managing dynamic cubes, a good practice is to monitor metrics displayed for each cube in the Metrics window



Administrating Dynamic Cube

Managing Cache

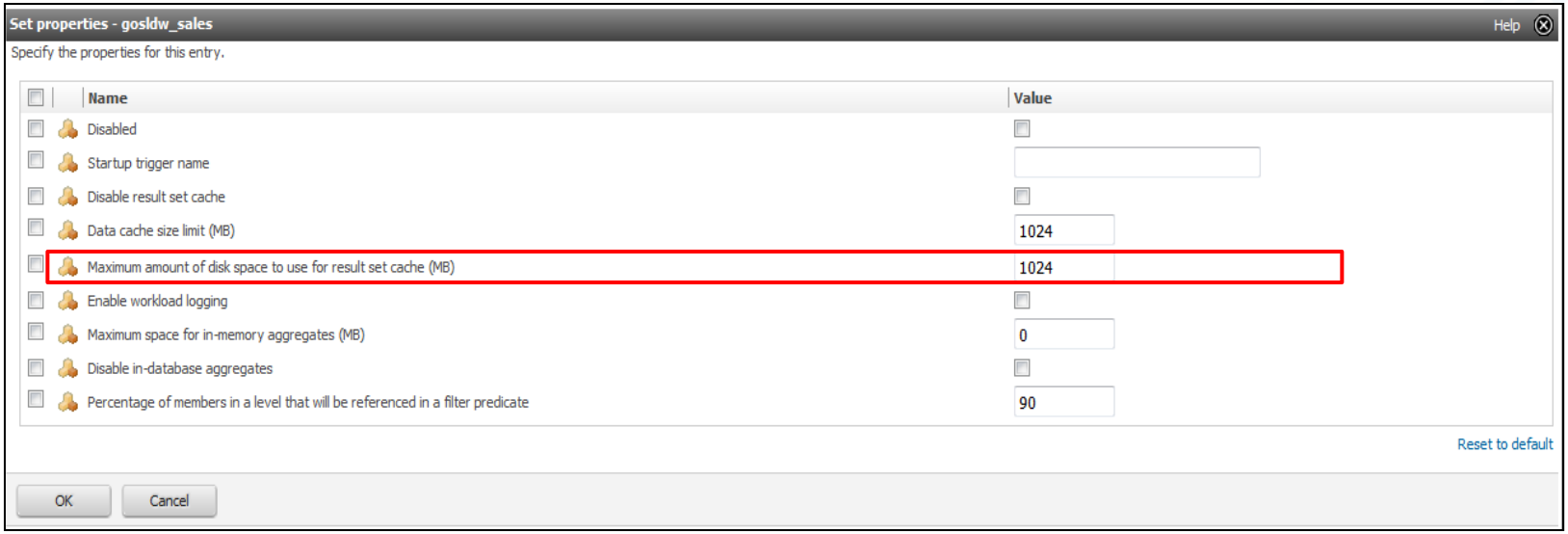
- Dynamic Cubes support below caches that can be managed by the administrator.
  - Member Cache
    - This cache contains cube members that are loaded from the source relational data source. The member cache can be refreshed when appropriate, such as when the source data is changed, to update the cube with the latest metadata.
  - Data cache
    - This cache contains data values that correspond to the current set of cache metadata. This cache can be refreshed when the data values in the source relational data source are changed. In general, data values change more frequently than cube m



Administrating Dynamic Cube

Managing Cache

- Result set cache
  - The result set of each MDX query executed by the engine is stored within the on-disk result set cache

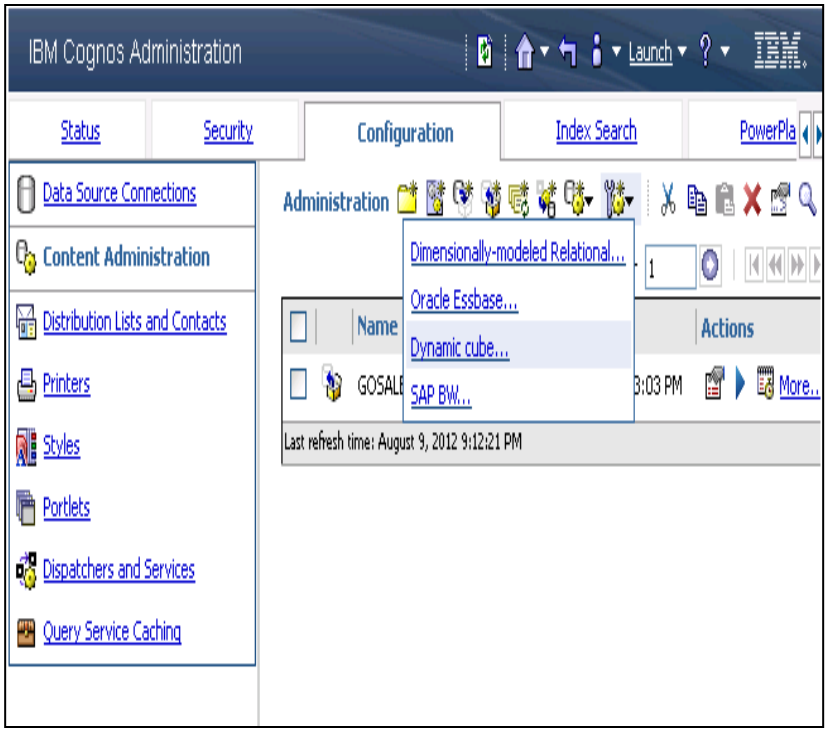


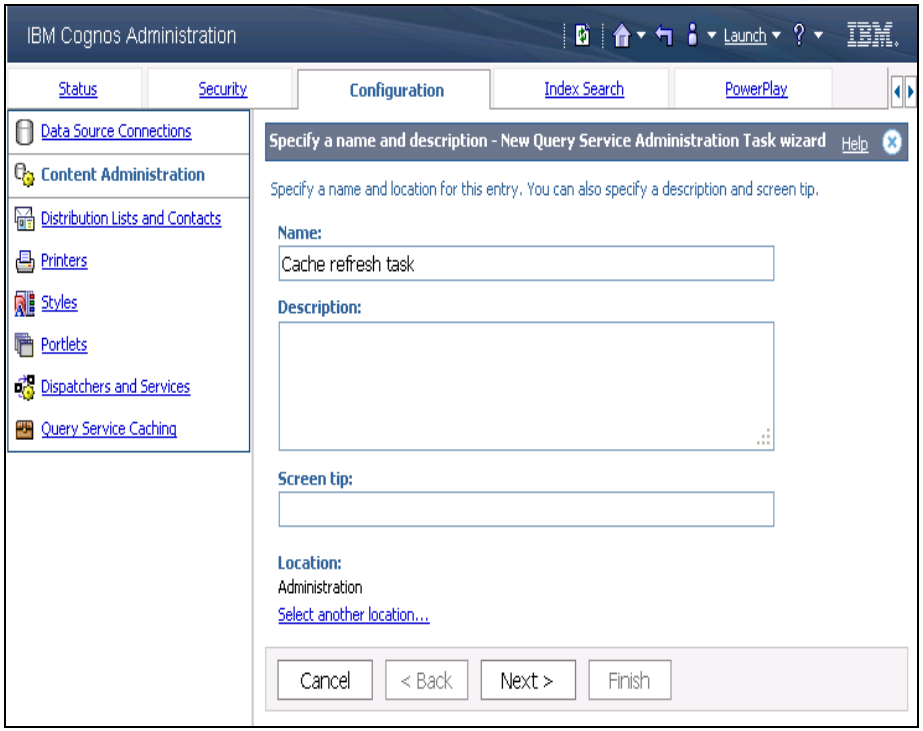
- Aggregate Cache
  - Pre-computed aggregate values are stored in Aggregate cache.

*(Discussed in detail along with Aggregate Advisor)

Scheduling a refresh of the cache

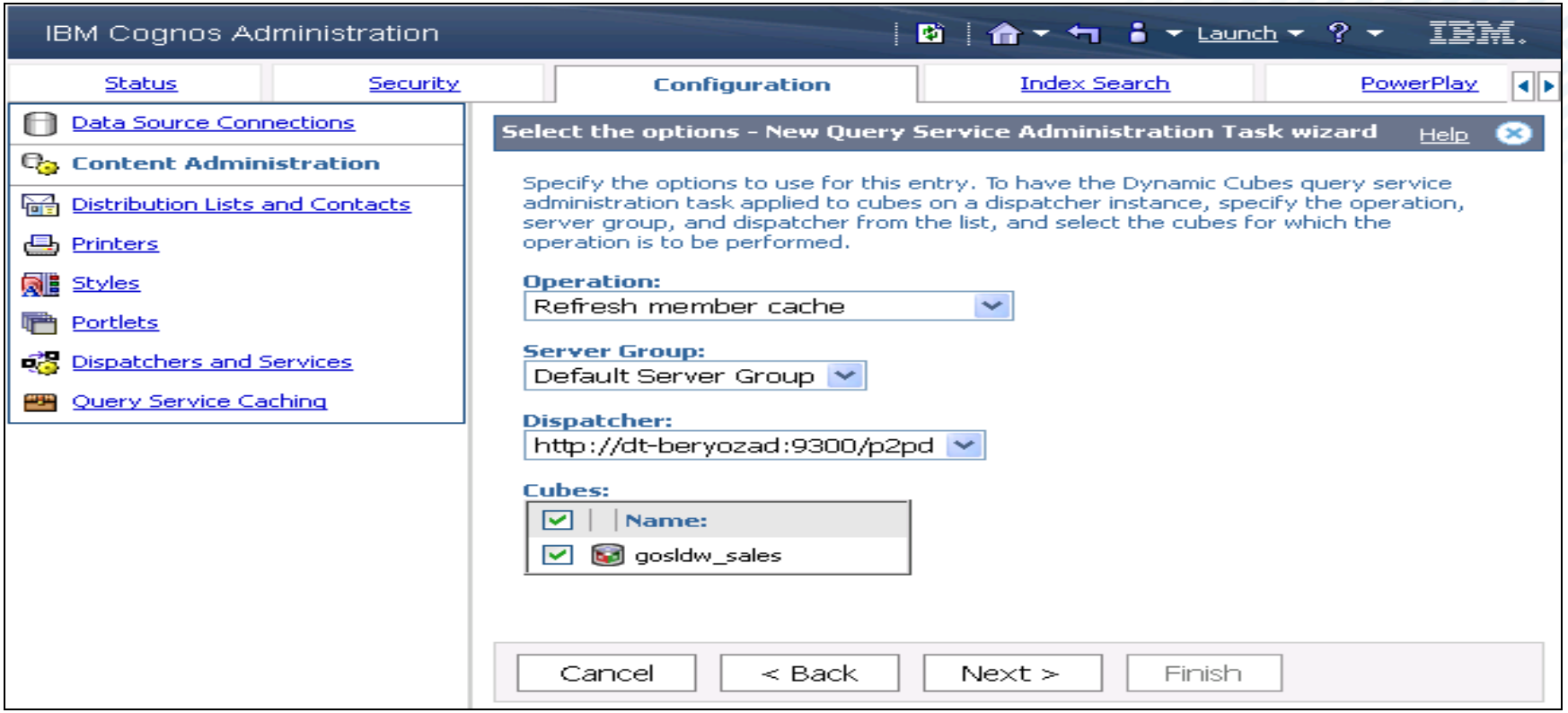
- Cube member and data caches must be updated
- Schedule a refresh of a cube metadata to run once a day



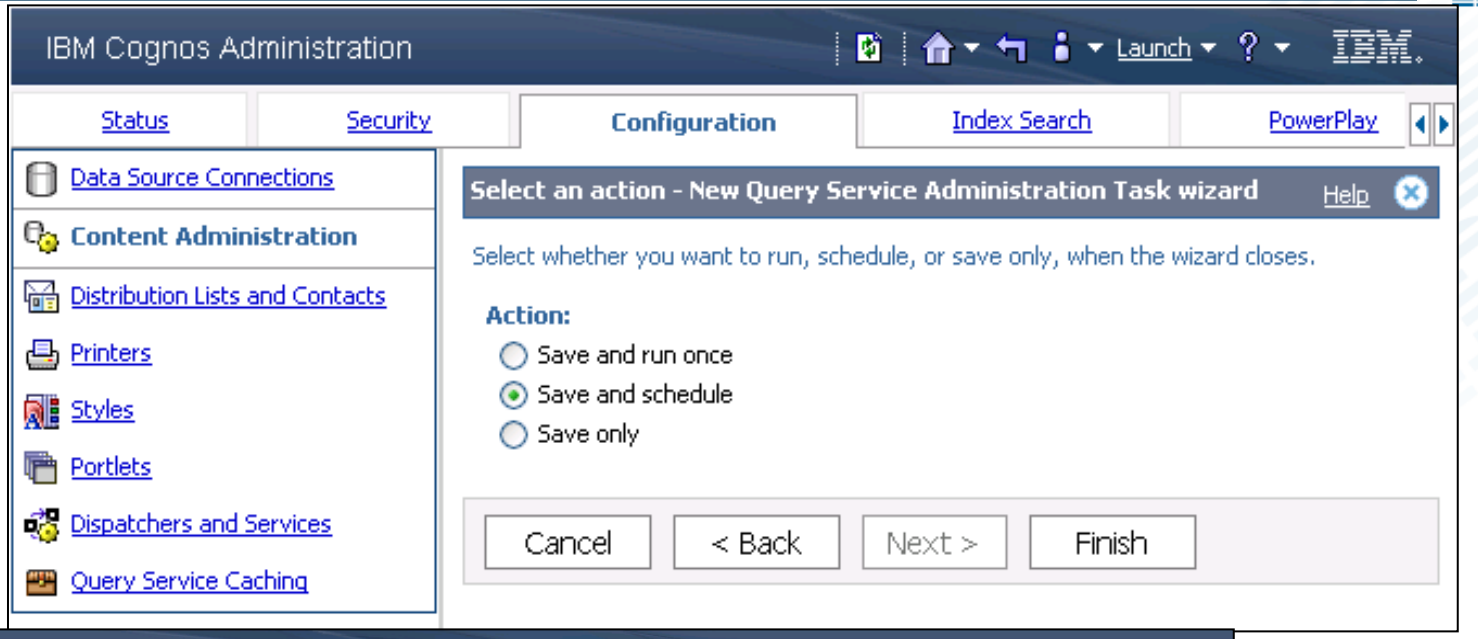


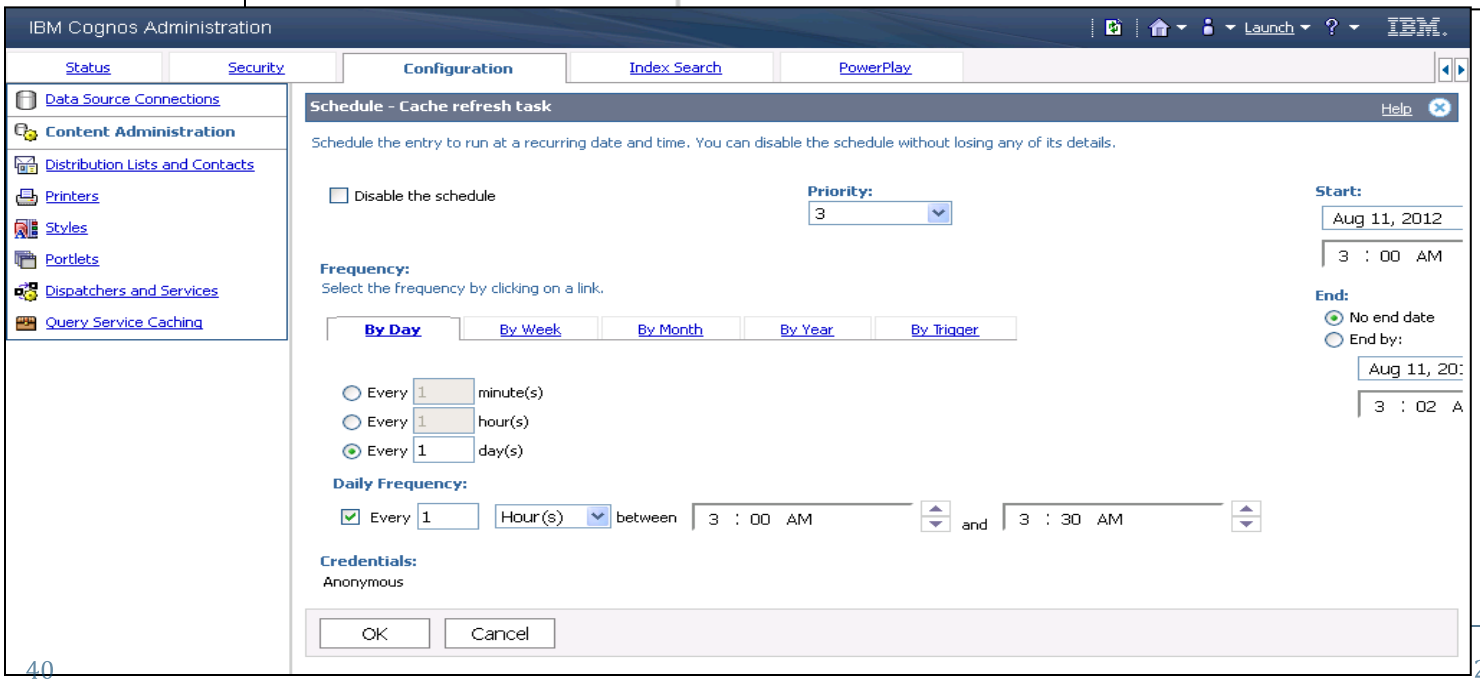
Administrating Dynamic Cube

Scheduling a refresh of the cache



In the next window, select **Save and schedule** and click **Finish** to create the task


IBM Cognos Administration
Launch
Status
Security
Configuration
Index Search
PowerPlay
Data Source Connections
Content Administration
Distribution Lists and Contacts
Printers
Styles
Portlets
Dispatchers and Services
Query Service Caching
Select an action - New Query Service Administration Task wizard
Help
Select whether you want to run, schedule, or save only, when the wizard closes.
Action:
Save and run once
Save and schedule
Save only
Cancel
< Back
Next >
Finish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Index Search
PowerPlay
Data Source Connections
Content Administration
Distribution Lists and Contacts
Printers
Styles
Portlets
Dispatchers and Services
Query Service Caching
Schedule - Cache refresh task
Help
Schedule the entry to run at a recurring date and time. You can disable the schedule without losing any of its details.
Disable the schedule
Priority:
3
Start:
Aug 11, 2012
3 : 00 AM
Frequency:
Select the frequency by clicking on a link.
By Day
By Week
By Month
By Year
By Trigger
End:
No end date
End by:
Aug 11, 201
3 : 02 A
Every 1 minute(s)
Every 1 hour(s)
Every 1 day(s)
Daily Frequency:
Every 1 Hour(s) between 3 : 00 AM and 3 : 30 AM
Credentials:
Anonymous
OK
Cancel

Overview of Aggregate Advisor

- Aggregate Advisor is a performance optimization utility
- Part of the Dynamic Query Analyzer
- Suggest database aggregate tables, in-memory aggregate, or both.
- Makes use of a cube's model and statistics
- Make use of workload log files that are generated from execution of reports
- Expectation is that the dynamic cube is published in the Content Store, can be started successfully, and that reports and analysis run and return correct results.

Overview of Aggregate Advisor

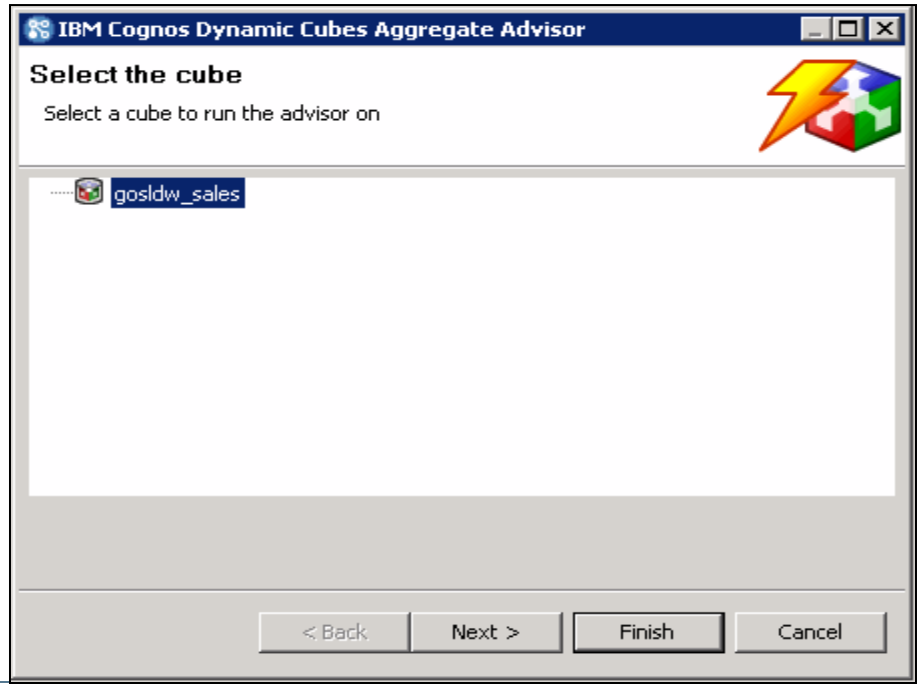
- After a cube is restarted, the aggregates execute the necessary SQL statements to retrieve the summarized values and place the values in its aggregate cache for subsequent use during query processing.

- Run during off-peak, non-critical business hours

Running Aggregate Advisor

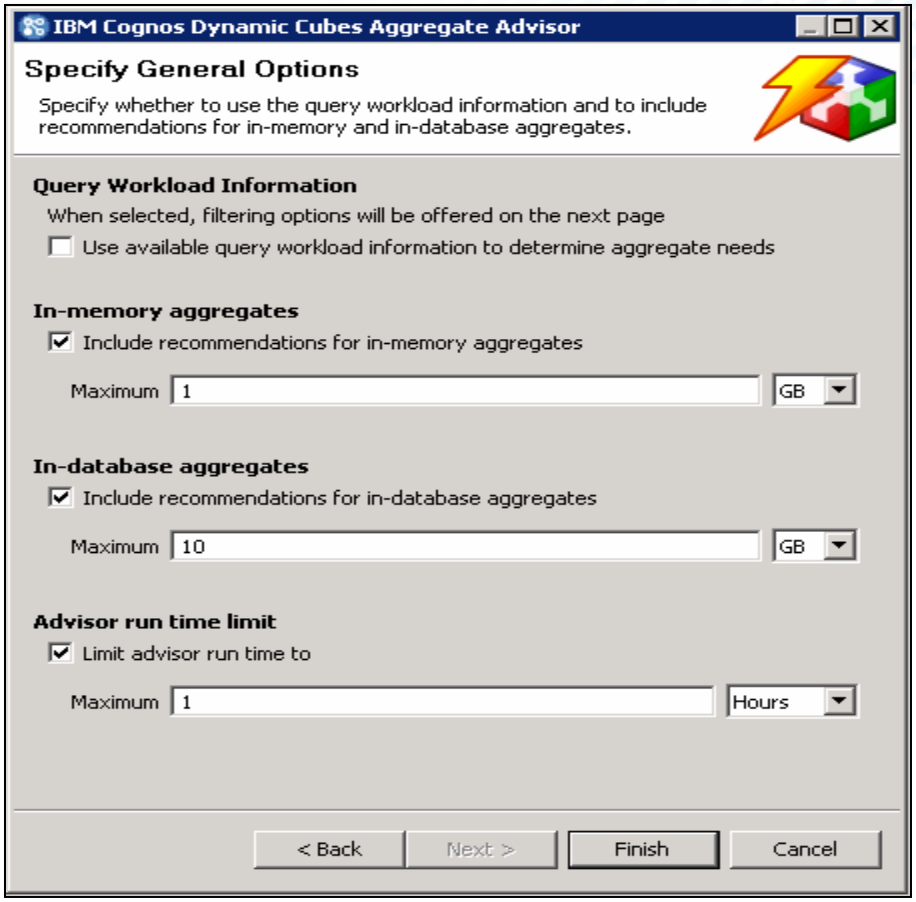
- **Launch Dynamic Query Analyzer**
  - it is the client tool to run and manage Aggregate Advisor recommendations

- To initiate a run of the Aggregate Advisor, select **File -> Run Aggregate Advisor**
  - Select the Cube



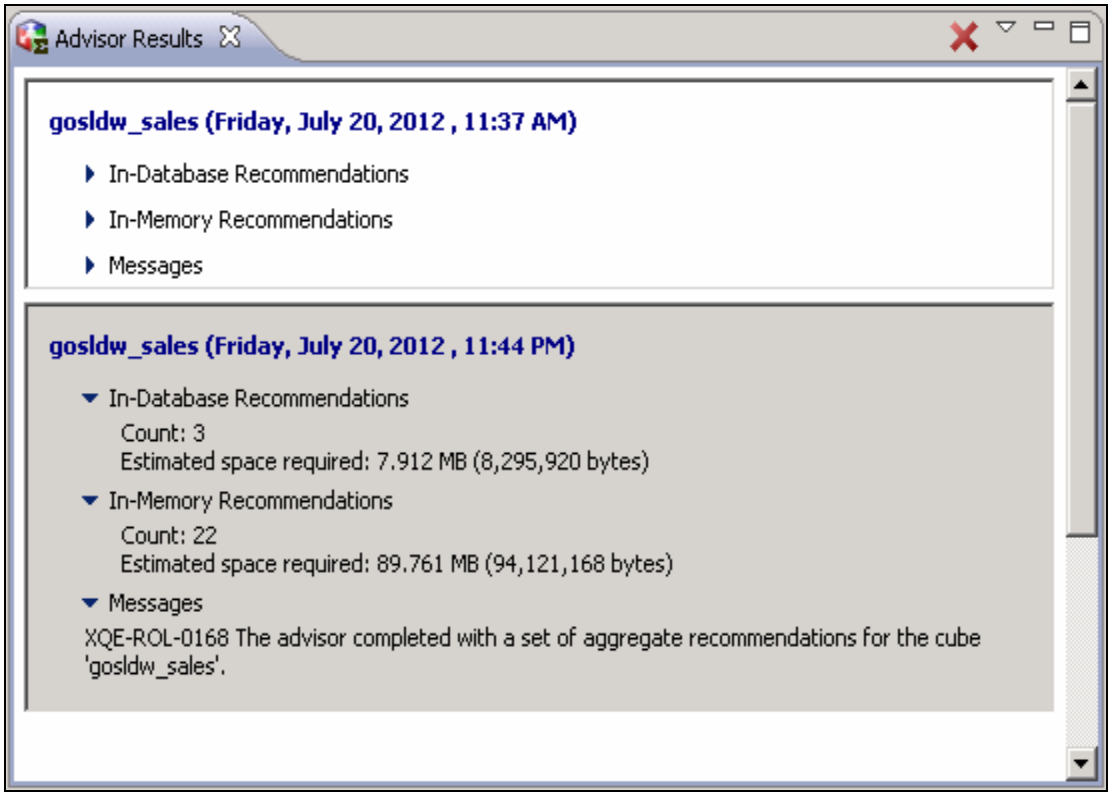
Running Aggregate Advisor

- Specify general options
  - Query Workload Information
  - In-memory aggregates
  - In-database aggregates
  - Advisor runtime limit
- Finish the wizard and run the Aggregate Advisor



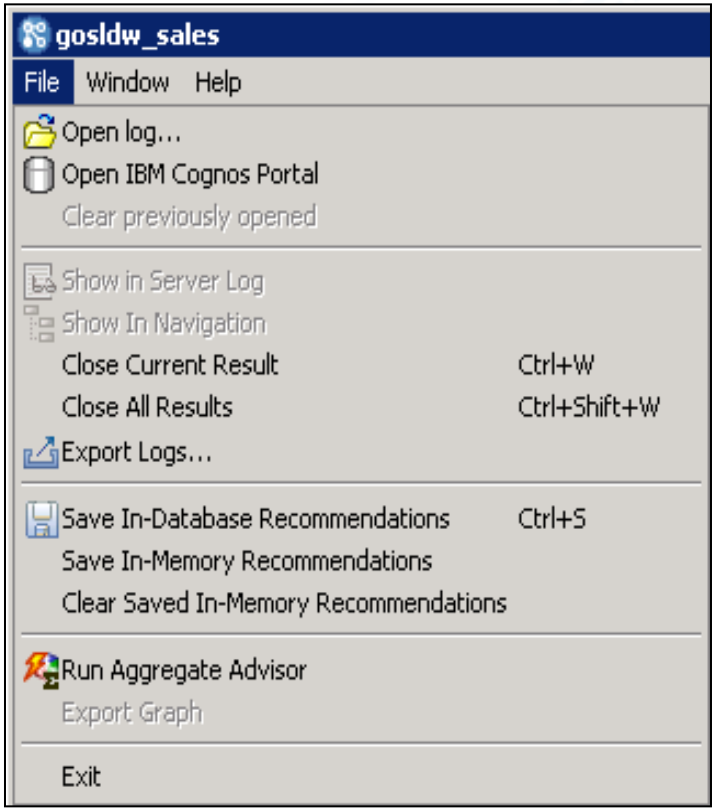
Running Aggregate Advisor

- Results is populated in the Advisor Results view



Running Aggregate Advisor

- Take action to save aggregate recommendations
  - Save In-Database Recommendations
  - Save In-Memory Recommendations
  - Clear Saved In-Memory Recommendations



Aggregate Cache

- Cognos Dynamic Cube supports two type of pre-computed aggregate values:
  - Stored in in-database tables (in-database aggregate)
  - Stored in in-memory aggregate cache
- Aggregate Advisor can suggest collection of in-memory aggregate
- In-memory aggregate do not require involvement of DBA
- Recommendations are stored in Content Manager and take effect next time a cube is started.
- The size of the aggregate cache is specified in the properties of a dynamic cube - Maximum amount of memory to use for the aggregate cache (MB).

Aggregate Cache

- Specify a value greater than the advisor estimated size
- An aggregate cache size of zero disables the aggregate cache.
- loaded on a first-come basis
- Loading of in-memory aggregate to aggregate cache
  - Cube start or cube restart
  - Refresh data cache
  - Refresh member cache
- The DBA should be aware of the aggregate cache-load activities
- Cube metrics available in Cognos Administration can be used to monitor loading of Aggregate
- Aggregate cannot be used and query performance will not be optimal until in-memory aggregate completes its loading

In-memory aggregate tips

- **Aggregate cache size**
  - Only enough memory that is required to hold the defined aggregates is used.
    - Example: 90 MB can hold the aggregates for gosldw_sales, and the aggregate cache size is set to 1 GB, only 90 MB of memory is used. Over time, if the underlying fact tables grow, the aggregates are allowed to grow to the specified maximum of 1 GB.
  - Should not use more than 30 GB for the aggregate cache.
  - Hardware sizing and guidelines for the amount of memory to use for a cube's in-memory aggregate cache - *Understanding Hardware Requirements for Cognos Dynamic*

Reference

- IBM Cognos Dynamic Cubes Redbook - *http://www.redbooks.ibm.com/redbooks/pdfs/sg248064.pdf*

- Dynamic Cubes User Guide 10.2.0

  http://pic.dhe.ibm.com/infocenter/cbi/v10r2m0/nav/5_6

- IBM Business Analytics Proven Practices: Dynamic Cubes Hardware Sizing Recommendations

  http://www.ibm.com/developerworks/library/ba-pp-infrastructure-cognos_specific-page659/

Thank you