

Working with OLAP Cubes

Intellicus Enterprise Reporting and BI Platform



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For details, visit: <http://www.intellicus.com/acknowledgements.htm>

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Designing Cube Objects

Intellicus can connect to an OLAP Server, import OLAP cube metadata in Intellicus repository, which in turn can be used to create OLAP layouts (OLAP reports). OLAP layouts are then used by your end-users to perform data analysis.

Intellicus provides creating cubes and persisting cube data in its own system. This document explains the steps for a data administrator to design and build cubes.

Intellicus cubes are multi-dimensional, pre-aggregated data of your source data. The cubes are persisted in file system under Intellicus folders.

Pre-requisites

License

Ensure that Intellicus system you are using is licensed for OLAP designer feature. This is an add-on feature in many editions.

Disk Space

Each cube can take from few KBs of disk space to many GBs based on certain factors used to design the cube. We will study the factors later in this document. The designer cum build tool shows you the current size occupied by the cube on the disk.

Ensure you have enough disk space for all the cubes you plan to create and build.

Memory

Cube building is an activity of pre-aggregation. It requires sorting and other data processing activities. Intellicus uses minimum required memory at a given point in time, using streaming-in data and disk swapping.

Ensure that each cube being built in parallel has at least 1 GB of RAM available to it during the build time. This is considering building cube of 2-3 GB size from a 5-10 million transaction rows.

Refer to our benchmark document for different scenarios.

Intellicus OLAP Glossary

Cube Object: Cube Object is definition of cube, which is editable by data administrator. It is not visible to end user till it is built into a cube with data.

Cube: Cube is a persistent data representation of a cube object. Data administrator builds a cube from Cube Object. End User can browse a cube on OLAP Viewer or View reports that draws data from a Cube.

OLAP Viewer: A browser based viewer with grid and charting options that helps end user to slice and dice a cube. OLAP Viewer allows end user to save the slice and dice status for future use.

OLAP Report: A slice and dice status saved by end user on the OLAP Viewer is an OLAP Report.

Preparing Data Source for Cubes

To Design a cube you will need two types of data.

Fact Data: Transactional data with multiple value fields that need to be pre aggregated. Each of these value fields is called a **Measure**. Fact data also has multiple keys on which aggregation needs to be grouped upon.

Dimension Data: Master Data that maps to grouping keys in the fact data.

You can source both these types from Intellicus **Query Objects**. Intellicus Query Objects can fetch data from RDBMS or file sources. Refer to Query Objects manual for more details.

You will design Query Objects – one for the fact data that gives transaction records and as many query objects one for each master.

Cube Designer

Following are main sections in the cube designer.

- 1) Editor or design canvas - the central area of the cube designer that diagrammatically represents the design of the currently opened cube.
- 2) Query Object Selector – the left pane from where you can drag required Query Objects to design the cube object
- 3) Properties tab – the right bottom area where you can edit properties of any selected item on the editor
- 4) Button palette – action buttons on the top for CRUD operations and Build
- 5) Build Status tab – status of the build activity

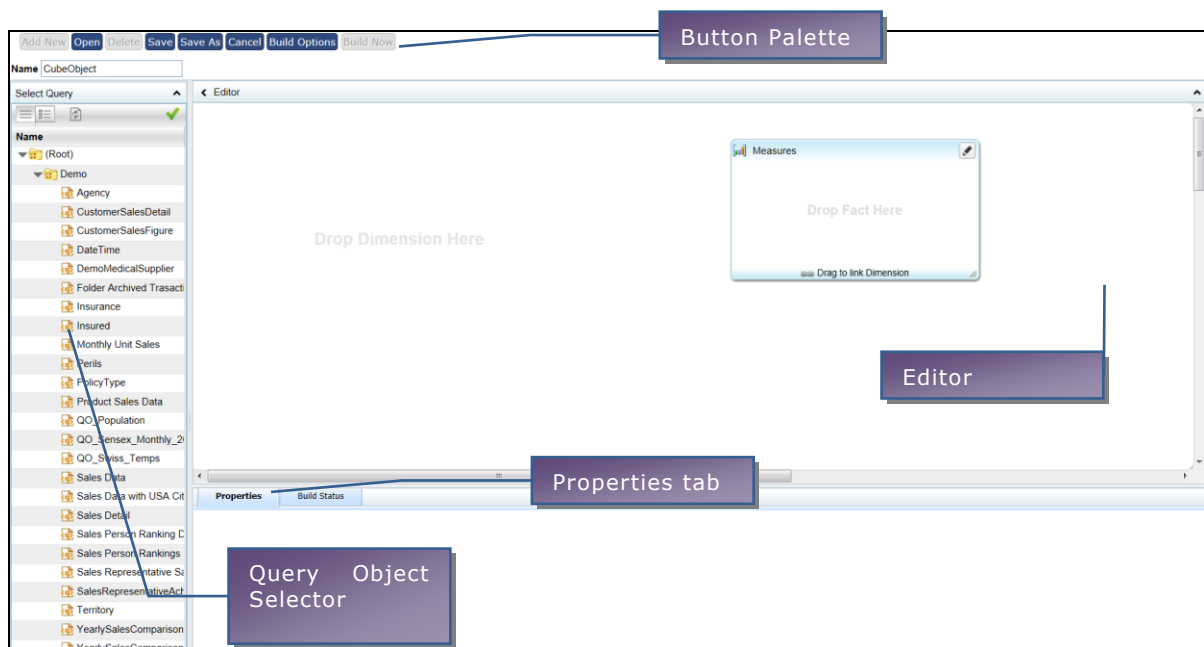


Figure 1: Cube Designer

Editor

Editor section shows two sub sections

- 1) A box titled - Measures
- 2) A canvas area for dropping Dimension on

Drag the transaction Query Object into the measures box.

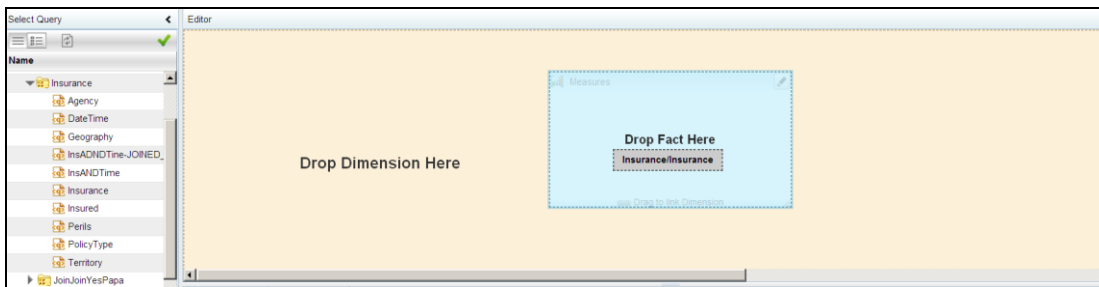


Figure 2-a: Editor

Now it shows that Measures is 'sourced' by selected Query Object.

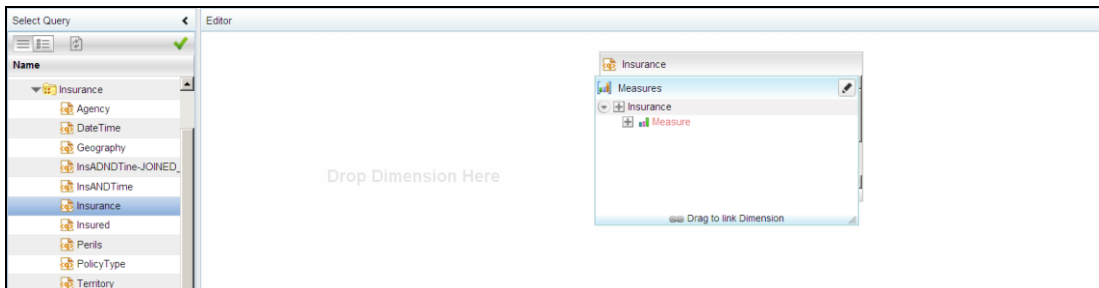


Figure 2-b: Editor

You can click + to add measures to the cube definition and select the source field in the property tab below.

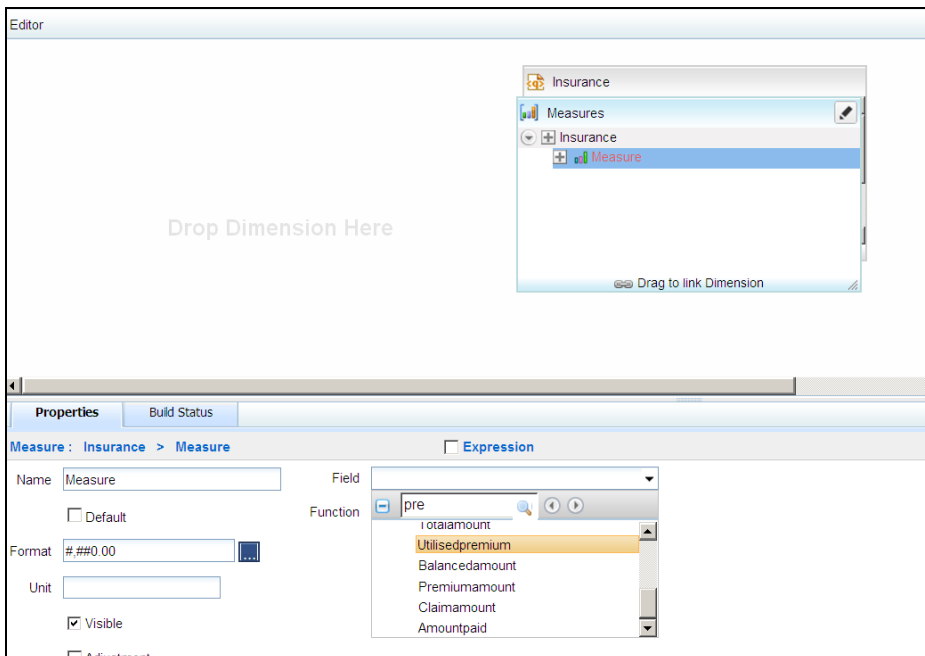


Figure 3: Properties Tab

Drag the Master Query Object to the Dimension area.

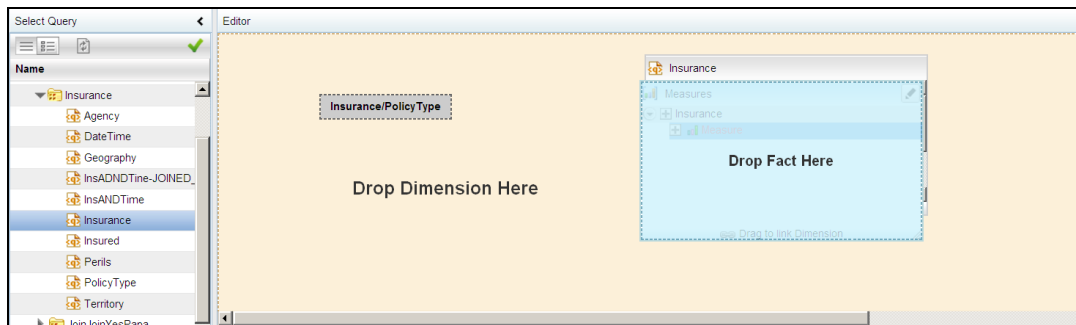


Figure 4: Drag QO to Dimension

Now a dimension is created with the dragged Query Object as source.

Select Hierarchy item and set the Hierarchy name in property tab.

Select Level item and set the Level source field from the source Query Object and set the level name.

The Joining line appears Red till the time Key joining attributes are not set.

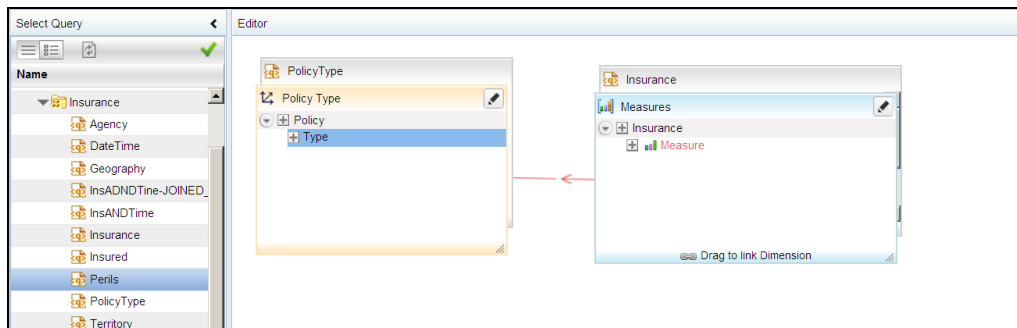


Figure 5: Line Joining Attributes- Key not set

Select the line and set the key joining attributes in the properties tab. As soon as you set the Key joining attributes the line turns blue.

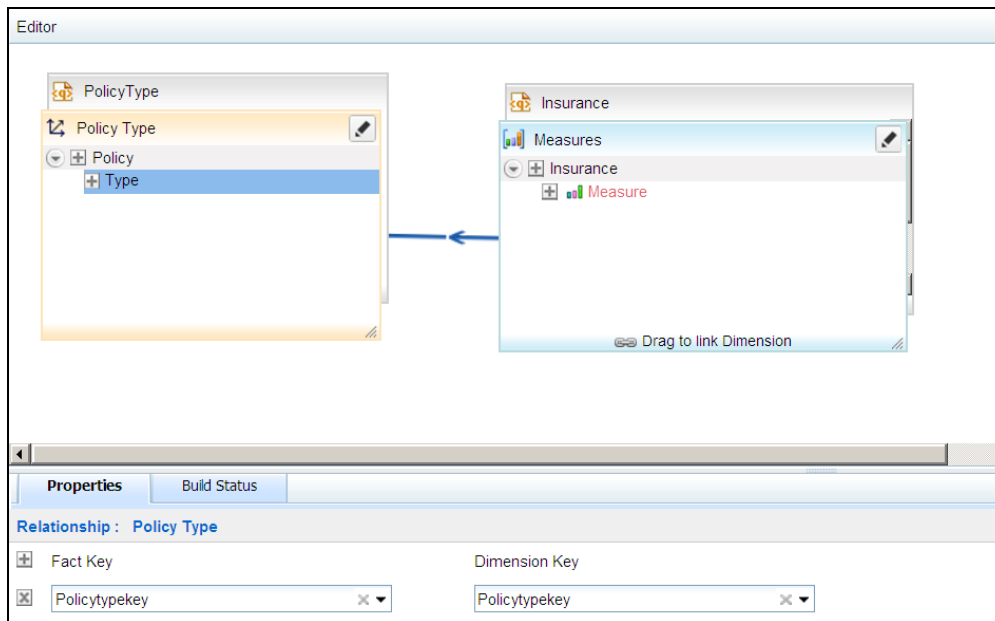


Figure 6: Line Joining Attributes- Key set

You can add multiple measures each sourcing a field from the Query Object. You can add multiple dimensions by dragging multiple Query Objects on the dimension area.

You can also add measures/dimensions by dragging and dropping field from under Fields pane anywhere on the Editor.

It helps to create levels if you drag the fields inside an existing measure/dimension.

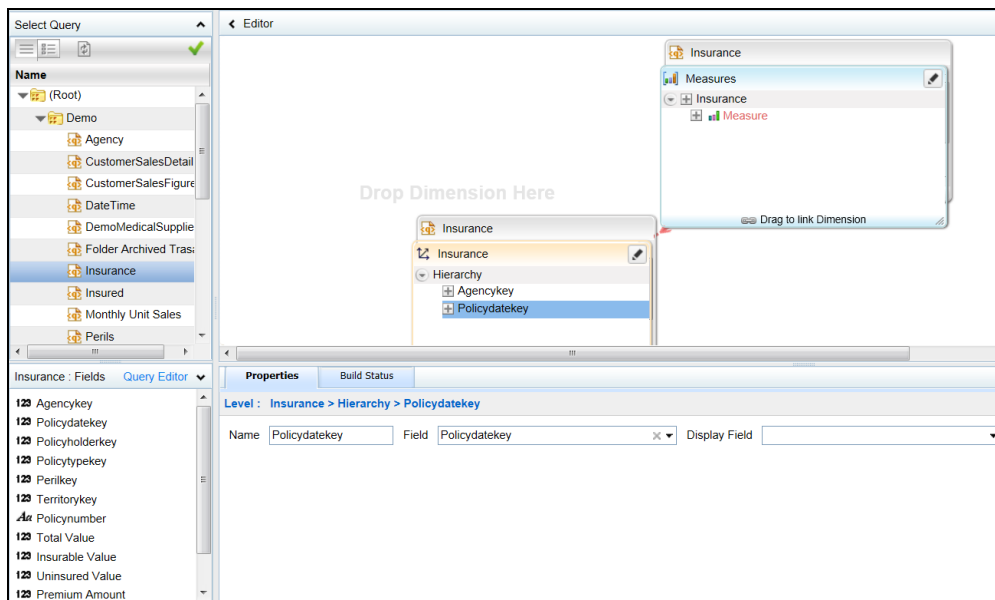


Figure 7: Levels of Fields

You can directly open the Query Editor from here in case you want to make any changes to the selected Query Object.

A typical designed Cube Object shall look like below:

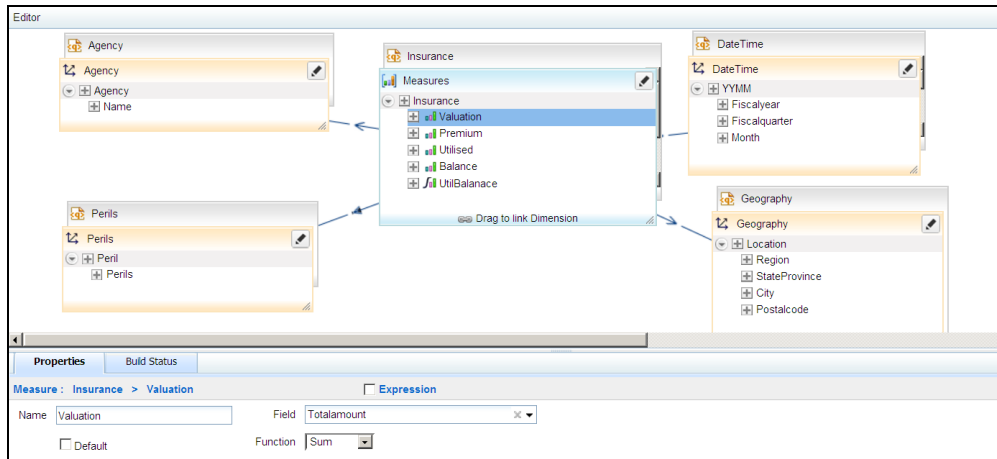


Figure 8: Cube Object

Query Selector

Query Selector provides a categorized list of Query Objects accessible to current user. It allows dragging Query Objects from the list to the design area.

Once the Cube Object is designed, the Query Selector can be collapsed for larger design area.

Properties tab

The properties tab shows and captures properties of selected item on the design area.

Following is the list of properties:

Measure Properties

Item	Property	Values	Comments
Measure	Name	Type yourself	You can see this name for this measure on the OLAP viewer and reports.
	Field	Select from the Query Object Fields	The list of Query Object Fields appears here.
	Function	SUM, COUNT, MINIMUM, MAXIMUM	Select from the list as per need.
	Default	Yes/No	Specifies if this is the default measure for this

			cube.
	Format	Format String #,##0.00	This format will applied on this measure on Viewer and reports.
	Unit	Type yourself	Currently used as a suffix for the measure value. True value will be used in future when we implement conversions.
	Visible	Check/Uncheck	Check – You can see this measure on viewer Uncheck – You cannot see this measure. You can only use it to express another calculated measure.
	Adjustment	Check/Uncheck	This is a waterfall type chart related property. If you check this property, then this measure becomes a floating bar on a waterfall type of chart.
	Adjustment-Yes Negative/ Positive	Negative/ Positive	If the adjustment property is checked, then you will see this property. If you set as negative adjustment – the floating bar will be Red in color and will be drawn downwards from previous measure's top. If you set as positive adjustment – the floating bar will be Green in color and will be drawn upwards from previous measure's top.
	Expression	Check/Uncheck	Check – This is a calculated measure. Uncheck – This is a field sourced measure.
	Solve Order	0-N	You can set any number from 0 to N. The lower Solve Order Calculated Measures will be evaluated prior to higher Solve Order Calculated Measures.

Calculated Measures

Calculated Measures are expressions based on existing field based measures. Calculated measures are NOT calculated during cube build and they don't consume any disk space.

Calculated Measures are evaluated at the time of slicing and dicing on the result set extracted for current view and analysis.

If you can achieve a measure using an expression, it is always efficient to make it a calculated measure. For example: Field1 + Field2, % of contribution etc.

Calculated measures are evaluated in the increasing order of "Solve Order" value.

Expression Syntax

The basic syntax supported is MDX liner syntax.

Measure values at the same level are accessed by

```
[Measures].[Field1]
```

Linear calculation

To Sum field1 and field2 in a calculated measure field3, do the following:

Select Field3 measure -> Check Expression in properties tab.
In the Expression box, type:

```
[Measures].[Field1] + [Measures].[Field2]
```

Previous Row Value

To calculate Running Total of field1 in a calculated measure field3, do the following:

Select Field3 measure -> Check Expression in properties tab.

In the Expression box, type:

```
[Measures].[Field1]  
+ ( [Measures].[Field3], prevRowMember() )
```

Contribution calculation – inner most group

To find Contribution of field1 in field1's lowest grouped total, in a calculated measure field3, do the following:

Select Field3 measure -> Check Expression in properties tab.
In the Expression box, type:

```
(( [Measures].[Field1] ) /  
( [Measures].[Field1], currRowMember().PARENT ))
```

Contribution calculation – outer most group

To find Contribution of field1 in field1's lowest grouped total, in a calculated measure field3, do the following:

Select Field3 measure -> Check Expression in properties tab.
In the Expression box, type:

```
(( [Measures].[Field1] ) /  
( [Measures].[Field1], currentDim().defaultMember ))
```

Dimension Properties

Item	Property	Values	Comments
Dimension	Name	Type yourself	You can see this name for this dimension on the OLAP Viewer and reports.
	Type	Regular	Type of the dimension as Regular.
	GIS Enabled	Check/Uncheck	Check = If this dimension needs to be plotted on a map.
On Incremental Build	Processing Mode	Options: Skip Processed Files And folders Reiterate And Skip Processed Records	This governs the action in case of Incremental Build. Skips processed files and folders while building. Skips only processed records under files and folders while building.

Hierarchy Properties

Item	Property	Values	Comments
Hierarchy	Name	Type yourself	You can see this name for this Hierarchy on the OLAP viewer and reports.
	'All' member caption	Type yourself	Caption to be displayed on OLAP Viewer to show the summarized value.

Level Properties

Item	Property	Values	Comments
Level	Name	Type yourself	You can see this name for this Level on the OLAP viewer and reports.
	Field	Select from list	Value of the field.
	Display Field	Select from list	Display name of the field.

Button Palette



Action Buttons

Item	Action
Add New	Closes currently opened cube object and provides a clean designer screen for designing a new Cube Object.
Open	Opens Cube Selector dialog and opens the selected Cube Object for editing.
Delete	After a confirmation prompt dialog, deletes currently opened Cube Object from repository. This action is not reversible.
Save	Saves any editing work done on the Cube Object to the repository. This saves the definition of Cube Object only. It doesn't refresh Cube Data.
Save As	Saves currently edited Cube Object with a new ID and Name in repository. You can choose a different folder location to Save As. The Cube Data from previous Cube Object will not be connected to this new Cube Object. Build will be required before end user can see and use this Cube.
Cancel	Cancels current editing action of Add New or Open and closes currently opened Cube Object.
Build Options	<p>The options provided include:</p> <p>Full: To be able to schedule a full build on the saved cube either once or in recurring mode.</p> <p>Incremental: To be able to schedule a build picking differential data after the last build was run.</p> <p>Consolidation: Consolidates previous run builds.</p> <p>You can also choose to build on Local File System or Hadoop.</p>
Build Now	<p>Initiates the Cube Build activity in the background. Cube build activity is a background activity. You can leave this screen after initiating the build, leaving the screen doesn't cancel Build activity.</p> <p>The Build Status tab shows up when Build starts. You can initiate Build only once concurrently for a given cube.</p> <p>If you Open a Cube Object and its Build activity is going on, then you will see a disabled Build button.</p> <p>You may need to wait till build is completed or you can Cancel the Build before you can reinitiate Build activity.</p>

Build Status

Build Status is a Tab shown next to the properties tab.

When the Build activity is going on, then this tab shows:

- Log entries of current data processing details by OLAP Engine.
- Status: Building, Error, Completed
- Size on Disk
- Time elapsed from initiation
- An eraser icon  to clear the logs from this screen
- A Cancel icon  to cancel the background Build activity.

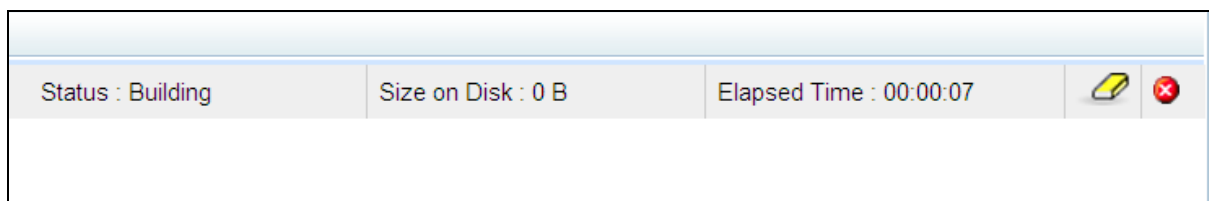


Figure 9: Build Status

When No Build activity is going on, then this tab shows:

- Last Build Status
- Size on Disk
- Time elapsed in building last cube

Miscellaneous

Navigating to and editing desired Cube

From Repository Explorer select the folder containing the cube object. Select Object Type - Cube Objects. Select the desired Cube Object. Double click on the Cube Object name or Select Edit Details icon from the toolbar.

From the Cube Object Designer, click on the Open action button. On the Cube Object selector dialog, select the folder containing desired cube and click on Open.