Document:

Essbase ASO "A Quick Reference Guide"

Description:

The document provides an overview on "Hyperion Essbase Aggregate Storage Option". The document also outlines the major differences between BSO and ASO.

History:

Version	Description	Author	Publish Date
	Change		
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Introduction: Aggregate storage technique is used when application needs more dimensions and members in order to support higher degree of analysis without compromising the cube performance. Aggregate storage is mainly used for applications where reporting on business data is considered as primary requirements. Data load in aggregate storage is faster than block storage and the data consolidation at the higher level is done automatically. Aggregate storage required less space in disk and data retrieval is also faster because data is always available in aggregated form. Aggregate storage application but it has so many new features. Aggregate storage database used where application require large dimensionality.

Customer analysis - Data is analyzed from any dimension, and there are potentially millions of customers.

Procurement analysis - Many products are tracked across many vendors. **Logistics analysis -** Near real-time updates of product shipments are provided.

Below are some benefits of ASO.

- 1. Faster load and calc times provide
- 2. Lower hardware costs
- 3. Lower maintenance costs
- 4. Higher availability

Key Difference between Aggregate storage and block storage

	Aggregate Storage	Block Storage				
1	Data load can be possible at level 0 only	Data load is possi <mark>ble a</mark> t any level				
2	Write back functionality not supported	Write back functionality supported				
3	No need to run consolidation operation	Need to run consolidation operation				
4	Can set data load value	Can't s <mark>et data load</mark> value				
5	Allow to set system resource utilization	Not available				
6	All calculation done through MDX	No calculation script				
7	Complete cube has dynamic calc feature,	Only dynamic storage members calculate				
	all formulas and aggregation executes at	fo <mark>rmula</mark> s and aggregation at runtime				
	runtime					
8	*.csc file creates for (aggregate storage)	*.csc file creates for (Block Storage)				
9	Data access is faster	Comparative slower				
10	Can have more number of dimension	Performance decrease as number of				
		dimension increase				
11	No sparse and dense dimension	Sparse and Dense dimension exist				
12	Fast query processing	Comparative slower				
13	Only level 0 data can be exp <mark>or</mark> t	No restriction on data export				
14	No currency database	Currency database exists				

1. Data load can be possible at level 0 only and write back functionality

In aggregate storage you can't load data at any level. In this example "Total Expenses" is level 1 member and if you load data in to it, Essbase will give you're an error.



Data load at any level is possible in Block Storage Application. Edit data field and click on update button for verification refresh data grid.

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Total Expenses (+) <3>	3	New York	100-20	Total Expenses	Mar	#MISSING	#MISSING	#MISSING	#MISSING
Marketing (+) Payroll (+) Misc (+)									

This example also shows that you can't write back in aggregate storage but it allow in block storage.

2. No need to run consolidation operation

When you load data in to aggregate storage, data will immediately available at all parent level of hierarchy. Load data in below combination of dimension, sales is level 0 member. We will load data in sales and verify that data will be immediately available for "Margin" level 1 member.

Data is not available for below combination.

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3	Texas	400-10	Sales	Mar	#MISSING	#MISSING	#MISSING		
4	Texas	400-10	COGS	Jan	#MISSING	#MISSING	#MISSING		
5	Texas	400-10	COGS	Feb	#MISSING	#MISSING	#MISSING		
6	Texas	400-10	COGS	Mar	#MISSING	#MISSING	#MISSING		
7	Texas	400-20	Sales	Jan	#MISSING	#MISSING	#MISSING		
8	Texas	400-20	Sales	Feb	#MISSING	#MISSING	#MISSING		
9	Texas	400-20	Sales	Mar	#MISSING	#MISSING	#MISSING		
10	Texas	400-20	COGS	Jan	#MISSING	#MISSING	#MISSING		
11	Texas	400-20	COGS	Feb	#MISSING	#MISSING	#MISSING		
12	Texas	400-20	COGS	Mar	#MISSING	#MISSING	#MISSING		
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Tex	as	-400-	-20"		Sales	Feb	858	457	
Tex	as		-20"		Sales	Mar	654	659	
Tex	as		-30"		Sales	Jan	858	457	
Tex	as		-30"		Sales	Feb	654	659	
Tex	as		-30"		Sales	Mar	547	875	
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Tex	as	"400·	-10"		COGS	Feb	458	457	
Tex	as	"400·	-10"		COGS	Mar	254	659	
Tex	as	"400-	-20"		COGS	Jan	247	300	
Tex	as	"400-	-20"		COGS	Feb	458	400	
Tex	as		-20"		COGS	Mar	554	500	
Tex	as	"400-	-30"		COGS	Jan	458	400	
Tex	as	"400-	-30"		COGS	Feb	554	600	
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Right Click on data base \rightarrow select load data



Select data file and data load value method then click ok.

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Without running any calculation script or consolidate operation data is available at level 0.

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2	Texas	400-10	Sales	Feb	858.0	457.0	401.0
3	Texas	400-10	Sales	Mar	654.0	659.0	-5.0
4	Texas	400-10	COGS	Jan	247.0	875.0	-628.0
5	Texas	400-10	COGS	Feb	458.0	457.0	1.0
6	Texas	400-10	COGS	Mar	254.0	659.0	-405.0
7	Texas	400-20	Sales	Jan	547.0	875.0	-328.0
8	Texas	400-20	Sales	Feb	858.0	457.0	401.0
9	Texas	400-20	Sales	Mar	654.0	659.0	-5.0
10	Texas	400-20	COGS	Jan	247.0	300.0	-53.0
11	Texas	400-20	COGS	Feb	458.0	400.0	58.0
12	Texas	400-20	COGS	Mar	554.0	500.0	54.0
13	Texas	400-30	Sales	Jan	858.0	457.0	401.0
14	Texas	400-30	Sales	Feb	654.0	659.0	-5.0
15	Texas	400-30	Sales	Mar	547.0	875.0	-328.0
16	Texas	400-30	COGS	Jan	458.0	400.0	58.0
17	Texas	400-30	COGS	Feb	554.0	600.0	-46.0
18	Texas	400-30	COGS	Mar	400.0	600.0	-200.0

Data at level 1

Data is consolidating automatically for parent level. Data is available for "Margin".

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	Texas	400-10	Margin	Mar	400.0	0.0	400.0	
	Texas	400-20	Margin	Jan	300.0	575.0	-275.0	
	Texas	400-20	Margin	Feb	400.0	57.0	343.0	
	Texas	400-20	Margin	Mar	100.0	159.0	-59.0	
	Texas	400-30	Margin	Jan	400.0	57.0	343.0	
	Texas	400-30	Margin	Feb	100.0	59.0	41.0	
	Texas	400-30	Margin	Mar	147.0	275.0	-128.0	

No Execute calculation option is available for aggregate storage application.

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3. Set system resource utilization

While loading data aggregate storage allows you to set resource utilization. Resource utilization option supports to execute other tasks simultaneously. Some other options those are available for aggregate storage.

Dataload in aggregate storage



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<u>A</u> lias table	SET AGGMISSG OFF; SET UPDATECALC OFF;						
	Calc Dim("Measures","Year","Market","Product","Scenario");						
Bcub.Bisp	"Marketing"="Sales"*0.05;						

5. Data access is faster

Data extraction in aggregate storage is relatively faster than block storage database. **BSO**

[Sat Jun 04 16:57:57 2011]Local/Bcub/Bisp/admin/Info(1001103) Regular Extractor Elapsed Time for [Data.rep] : [1.888] seconds

ASO

[Sat Jun 04 16:59:41 2011]Local/ASOBas/Basic/admin/Info(1001103) Regular Extractor Elapsed Time for [Data.rep] : [1.5] seconds

6. Aggregate storage dimension supports

Aggregate storage application supports more dimensions in comparison with block storage. The performance of block storage will be decrease as you increase number of dimensions in database. Aggregate storage database performance does not effects by number of dimension.

7. No sparse and dense dimension

In aggregate storage application does not have dense and sparse dimension concepts.

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8. Restriction on data export

Aggregate storage database restrict to export data only for level 0 data block. Block storage allows you to use all data export options.

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Export options	Export options
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Help OK Cancel	Help OK Cancel

9. Creating currency database

You can create currency data base in block storage database.

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Application:	
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CRdata	_
-Database type:	
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Allow duplicate member name	as
Help OK Cancel	

You can't create currency data base in aggregate storage database. Because database type of currency or normal is not applicable to aggregate storage databases therefore it is not selectable.

Create Database		×
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bispebs		-
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Help	OK Cancel	

Aggregate Storage Overview

Aggregate storage is relatively newer the block storage application. It has additional features as compare to block storage. Aggregate storage database is aggregation-intensive cubes. It supports large numbers of dimensions and members. There is no concept of dense dimension in aggregate storage. It only supports extremely sparse data sets. Aggregate storage reduced calculation times and disk footprint and also reduced complexity in database development.

Key Aggregate Storage Characteristics

- 1. Data is loaded only at level 0
- 2. Member formulas are MDX queries
- 3. All formulas and aggregations are executed at runtime
- 4. Aggregation algorithm selects and stores most expensive queries

- 5. Outlines are paged
- 6. Block storage outlines can be converted to aggregate storage outlines
- 7. Hierarchy types follow formalized rules
- 8. Data is stored in table spaces
- 9. Creating Aggregate storage manually

Design Considerations

Dimensions

Ragged hierarchies supported- Ragged hierarchy means it is not necessary that all members of hierarchy contain equal number of child.



No limit to dimensions- There is no limit on creating dimensions in aggregate storage database outline.

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+ View Dynamic <3> (Label Only)	
+ Organisation Multiple Hierarchies Enabled <6> (Label Only) {Comparability}	
+ Brand Stored # Consider Top Level Only # <4> (Alias: All Brands)	
Ownership Multiple Hierarchies Enabled <2> (Label Only)	
+ Currency Multiple Hierarchies Enabled <4> (Label Only)	
Scenario Multiple Hierarchies Enabled <4> (Label Only)	
± Item Stored # Consider All Levels # <97> (Alias: Items) {ItemType, ItemUnit, ItemWorkType}	
± ItemPriority Stored # Default # <2>	
± ItemFundedBy Stored # Default # <2>	
± ItemStatus Stored # Default # <2>	
ProjCapPlanNum Stored # Consider All Levels # <1> {ProjNo, ProjStartDt}	
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Save Verify Help Close	

Maximum level combinations

The maximum level of combinations between outline dimensions are 2^52, which is very large. Large amount of data can be store in single database.

Limitation on Database-

- 1. One database per application Restriction for ASO application
- 2. MaxL commands Eecuted on application level Because there is only one database in each application.

3. No currency conversion - Restriction for ASO application

Member Formulas

When working with aggregate storage databases, you must write all member formulas in MDX. The Hyperion implementation of MDX is a customized version; it contains a series of commands that are specific to Essbase and is embedded in the MaxL shell.

Aggregate storage supports MDX, so write all member formulas in MDX. When converting an outline from block storage to aggregate storage, you may have difficulty converting block storage member formulas to MDX. You have to convert all member formulas in to MDX manually.

	Member Properties	
	Member(s): Margin %	
1	Information Attributes Associations UDAs Formula	
1	Use aliases [Margin]-[Sales]	
	<u>A</u> lias table	
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Aggregate Storage Production Cycle

The production cycle for aggregate storage databases is similar as block storage database.

- 1. Create a database outline with database dimensions and hierarchies
- 2. Load data, using load rules to map to the database dimensions
- 3. Optional: Aggregate data by using stored or ad hoc aggregations
- 4. Analyze data in Excel through Smart View or Spreadsheet Add-in

Database aggregations decrease query times because many data values at upper-level intersections are calculated and stored, rather than being calculated dynamically on retrieval.

Instruction for creating aggregate storage database

- 1. Application and database name should be in eight characters
- 2. You can create only one aggregate storage database for each application

Application and Database Trees

Block Storage application database tree has more than one database and calculation scripts.

Aggregate storage application database tree has only one database and no calculation script exists.



Directory contains same components in both aggregate and block storage database like outlines (OTL), load rules (RUL), and report scripts (REP). Aggregate storage databases may also contain aggregation script files (CSC).

This is sample directory structure for block storage database.



Rules Files for Building Outlines

Creating rule file and building outline is same in aggregate storage as block storage.

Go to file and create new rule file.



Go to file and open relative source file either text file or SQL file.



Set "Dimension Build Properties" for source file then click ok.

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Set Dimension build settings



New outline dimension is loaded successfully.



Verify in existing outline.



Designing Aggregate Storage Outline Hierarchies

You can design outline manually by using toolbar. You can create new dimensions add siblings, add child and set properties through toolbar.



Adding Child in dimension member

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	Qtr2 (+)			
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There are three types of hierarchies in aggregate storage.

- 1. Multiple hierarchy
- 2. Stored hierarchy
- 3. Dynamic hierarchy



Aggregation hierarchies are structures usually comprising two or more levels of detail that must aggregate from the bottom up to provide a top-level total.

Multiple Hierarchy

When you tag a dimension as "Multiple hierarchies enabled" the dimension member is automatically tagged as Label Only. To use multiple hierarchies in a dimension, you must enable multiple hierarchies for that dimension.

```
        Time Time Multiple Hierarchies Enabled <3> (Label Only)

        MTD Stored # Default # (+) <2>
        ± 1st Half (+) <2>
        ± 2nd Half (+) <2>
        = QTD Dynamic (~) <12> (Label Only)
        QTD(Jan) (+) [0: [Jan]]
        QTD(Feb) (~) [0: [Jan]+[Feb]]
        QTD(Mar) (~) [0: [Jan]+[Feb]+[Mar]]
```

Stored Hierarchy

Stored hierarchy has only addition as consolidation operator. You can use the stored hierarchy type where aggregation is the only mathematical requirement. If you have some shared member in hierarchy then use multiple hierarchy.



Advantages:

- 1. Potential to store aggregated data
- 2. Enhanced query performance

Considerations:

- 1. Limited use of unary operators
- 2. Limited use of Label Only
- 3. Support for only one instance
- 4. Dynamic Hierarchy

Dynamic hierarchy

The Dynamic hierarchy allows you to do complex calculations and member formulas. Dynamic hierarchies are calculated, the data retrieval time may be longer than for data retrieved from stored hierarchies.



Advantages:

- 1. Any consolidation operator
- 2. Member formulas
- 3. No Label Only restrictions
- 4. Unlimited shared members

Considerations:

- 1. Members calculated during retrieval (never preaggregated)
- 2. Potentially reduced query performance

Designing Alternate Hierarchies

Attribute dimension hierarchy

Attribute dimension hierarchy is an alternate hierarchy used for classify additional information of dimension.

Advantages:

- 1. Attribute dimension can be assign for any base dimension
- 2. Are treated like stored alternate hierarchies
- Stores Stored # Default # <2> {Square Footage, Store Manager}
 - Brick & Mortar (+) <12>
 - 😑 Great Buys (+) <3>
 - 004118 (+) {Square Footage: 10000; Store Manager: Ambuj}
 - 011683 (+) {Square Footage: 5000; Store Manager: Bao}
 - 017589 (+) {Square Footage: 10000; Store Manager: Carrie}

Considerations:

- 1. Can perform only addition calculations
- 2. Are calculated dynamically during retrieval

Prev Year (~) (Alias: Previous Year) Variance (~) [20: [Curr Year]-[Prev Year]] Variance % (~) [20: ([Curr Year]-[Prev Year])/[Prev Year]*100]

Curr Year (+) (Alias: Current Year)

Years Dynamic <4> (Label Only)

```
Square Footage Attribute [Type: Numeric] # Default # <7>
1500
5000
10000
30000
50000
75000
100000
```

Shared members hierarchy

Shared member hierarchy is also an alternate hierarchy all shared member refers to stored members of outline. In aggregate storage application only multiple hierarchies can have shared members.

"Jan" is a shared member ... Outline Properties Query Hints Text List Manager Modifications Verification □ Outline: Demo (Active Alias Table: Default) □ Time Multiple Hierarchies Enabled <2> (Label Only) □ MTD Stored # Default # (+) <3> Jan (+) Feb (+) Mar (+) □ QTD (Dynamic (+) <2> QTD(Jan) (+) □ QTD(Feb) (+) <2> Jan (+) (Shared Member)

But "Feb" is not a shared member, So Essbase will through the below error massages.



Converting Block Storage to Aggregate Storage

There is simple way to converting block storage application to aggregate storage application through conversion wizard. There are many difference between block storage and aggregate storage, so when you convert block storage application to aggregate storage application, wizard will reject not applicable options.

Ele Edit View Outline Organize Actions Iools He New pations SO SOBas SOcub SOcub	Ip
File Edit View Outline Organize Actions New pations SO Popen SOCub	lp
Ele Edit View Outline Organize Actions Tools He New sations SO SOBas SOcub	lp
Ele Edit View Outline Organize Actions Tools He New sations So pen So SoBas Socub	ip
New pations SO SOBas SOcub SOCub	
SO <u>Open</u> SOBas SOcub	
BOcub	
Close BODEM	
SOsamp B Save	
S <u>ave as</u> sp spBK	
Page setup spPR snST	
Print preview UBE	
In MDemo	
Wizards Data Mining	
Editors	on
Send to Aggregate Storage Partition	_
Exit Ample U	

Conversion steps for Block Storage to Aggregate Storage

- 1. Select a source outline
- 2. Verify and correct block storage-only features (either manually or automatically)
- 3. Select a destination for the converted outline

Step #1 → Select Source Block storage Outline

📦 Aggregate Storage Outline Conv	version Wizard
	Select Source Outline
This wizard helps you convert block storage outlines to aggregate storage outlines. Select source block storage outline.	Select a block storage outline to convert to aggregate storage. When you click Next, the wizard examines the source outline and returns a list of corrections to be made so that the outline passes verification for aggregate storage. The source outline is not changed as part of this process.
Verify corrections necessary for aggregate storage.	File System Essbase Server
Specify destination for converted outline.	Look in: 🕞 BispDB 💌 💽
	Path: bispebs:Demo:BispDB
	File <u>n</u> ame: BispDB
	Files of type: Outline file (*.otl)
	< Back Next > Finish Cancel Help

Step #2 →

Verify and correct block storage-only features

This wizard will give you the list of features which are only supported by block storage application.

Warning comes in conversion of block storage to aggregate storage, because some properties does not support in aggregate storage. This warning information says that

shown features are not supported in aggregate storage like dynamic time series, shared member and member formula.

🍀 Aggregate Storage Outline Con	version Wizard
	Verify Corrections to Outline
This wizard helps you convert block storage outlines to aggregate storage outlines. Select source block	This panel displays the outline corrections necessary for aggregate storage. You can choose to correct all errors automatically or to correct each error interactively. If you select automatic correction, the modifications made to the outline are displayed. If you select interactive correction, Outline Editor is opened so that you can correct each error manually.
Verify corrections necessary for aggregate storage. Specify destination for converted outline.	 ✓ Verification Errors and Warnings ☐ Member Errors and Warnings Year: Aggregate storage outline does not support Dynamic Time Series, setting ignored 100-20: Aggregate storage outlines only allow a shared member once in a stored hierarchy. 200-20: Aggregate storage outlines only allow a shared member once in a stored hierarchy. 300-30: Aggregate storage outlines only allow a shared member once in a stored hierarchy. Diet: Stored hierarchy members that are not the children of a label-only member must have the addi Variance: Aggregate storage outlines only allow formulas in accounts dimension or dynamic hierarchi
	<u>A</u> utomatic outline correction O Interactive outline correction
	< Back Next > Finish Cancel Help
Modification inform	ation from BSO to ASO

Conversion wizard will automatically modify some member properties and delete invalid members.

📦 Aggregate Storage Outline Conv	version Wizard	1
This wizard helps you convert block storage outlines to aggregate storage outlines. Select source block storage outline. Verify corrections necessary for aggregate storage. Specify destination for converted outline.	Verify Corrections to Outline This panel displays the outline corrections necessary for aggregate storage. You can choose to correct all errors automatically or to correct each error interactively. If you select automatic correction, the modifications made to the outline are displayed. If you select interactive correction, Outline Editor is opened so that you can correct each error manually. Modifications necessary for aggregate storage outline '7' invalid members were modified. '2' invalid members were deleted.	
	< Back Next > Finish Cancel Help	ĺ

Step #3 → Select Target Aggregate Storage Application

You can select target application and database outline then replace the existing outline from the new one. You also can create new aggregate storage application and convert block storage to aggregate storage.

📦 Aggregate Storage Outline Con	version Wizard
	Select Destination for Aggregate Storage Outline
This wizard helps you convert block storage outlines to aggregate storage outlines. Select source block storage outline.	Browse to the location where you want to save the new aggregate storage outline. You can save to the file system or to an existing aggregate storage application on Essbase Server. To create a new aggregate storage application to contain the outline, click Create Aggregate Storage Application.
Verify corrections necessary for	File System Essbase Server
Specify destination for converted outline	Look jn: 📝 ASODEM 📃 🧧
convertes outline.	BispT
	Path: bispebs:ASODEM:BispT
	File <u>n</u> ame: BispT
	Files of type: Outline files (*.otl)
	<u>C</u> reate Aggregate Storage Application
	< Back Next > Finish Cancel Help
Select Outline	
📦 Aggregate Storage Outline Con	version Wizard
	Select Destination for Aggregate Storage Outline
This wizard helps you convert block storage outlines to aggregate storage outlines. Select source block storage outline. Verify corrections necessary for	Browse to the location where you want to save the new aggregate storage outline. You can save to the file system or to an existing aggregate storage application on Essbase Server. To create a new aggregate storage application to contain the outline, click Create Aggregate Storage Application.
aggregate storage.	Look in: BispT
converted outline.	🚰 BispT.otl
	Path: bispebs:ASODEM:BispT
	File name: BispT
	Files of type: Outline files (*.otl)
	Create Aggregate Storage Application
	< Back Next > Finish Cancel Help
Select and replace the	existing outline
©Business II	Itelligence Solution Providers Creating ASO Database 23

Aggregate Storage Outline Conversion Wizard		
	Salast Destination for Aggregate Storage Outline	
	Select Destination for Aggregate Storage Outline	
This wizard helps you convert block storage outlines to aggregate storage outlines. Select source block storage outline.	Browse to the location where you want to save the new aggregate storage outline. You can save to the file system or to an existing aggregate storage application on Essbase Server. To create a new aggregate storage application to contain the outline, click Create Aggregate Storage Application.	
Verify corrections necessary for	File System Esshage Server	
aggregate storage.		
converted outline.		
	Confirmation	
	The file already exists. Replace existing file?	
	Path: bispebs:ASODEM:BispT	
	File name: BispT	
	riles of type: Outline files (*.oti)	
	<u>C</u> reate Aggregate Storage Application	
	< Back Next > Finish Cancel Help	
Click on finish		
🛊 Aggregate Storage Outline Conversion Wizard		
	Outline Conversion Completed	
	·	
This wizard helps you convert block storage outlines to aggregate storage	The new aggregate storage outline has been saved to the specified location.	
outlines. Select source block storage		
outline.	Select this check box to convert another block storage outline	
aggregate storage.	Convert another block storage outline	
 Specify destination for converted outline. 		
	< Back Next > Finish Cancel Help	

Converted Block Storage Application

Block storage application successfully converted into aggregate storage application.

Gutline Editor: [bispebs.ASODEM.BispT]	🔂 Outline Editor: [bispebs.Demo.BispDB]
상 팀 및 문 및 수 및 분 과 및 및 관 수 Outline Properties Query Hints Text List Manager Modifications ■ Outline: BisoT (Active Alias Table: Default)	상 팀 또 온 및 수 및 온 급 및 및 알 수 ダ Outline Properties Text List Manager Modifications
Year Time Stored # Default # <4> Measures Accounts Dynamic Compression <3> (Label Only) Product Multiple Hierarchies Enabled <5> (Label Only) {Caffeinated, Intro Market Stored # Default # <4> {Population} Scenario Stored # Default # <4> (Label Only) Caffeinated Attribute [Type: Boolean] # Default # <2> Ounces Attribute [Type: Numeric] # Default # <4> Population Attribute [Type: Numeric] # Default # <4> Intro Date Attribute [Type: Date] # Default # <7>	 Year Time <4> (Active Dynamic Time Series Members: H-T-D, Q-T-D) (Dynamic C Measures Accounts <3> (Label Only) Product <5> {Caffeinated, Intro Date, Ounces, Pkg Type} Market <4> (Population} Scenario <4> (Label Only) Caffeinated Attribute [Type: Boolean] <2> Ounces Attribute [Type: Numeric] <4> Pkg Type Attribute [Type: Numeric] <3> Intro Date Attribute [Type: Date] <7>
Save Verify	Save Verify Help Close

The unsupported features replaced by supported features. 1) Year dimension is converted from dynamic to storage

- 2) Measures dimension hierarchy converted as dynamic
- 3) Product dimension storage hierarchy converted as Multiple Hierarchy
- 4) All member formulas are rejected