

# Data security in SAS OLAP cubes and reports

Dec 2012

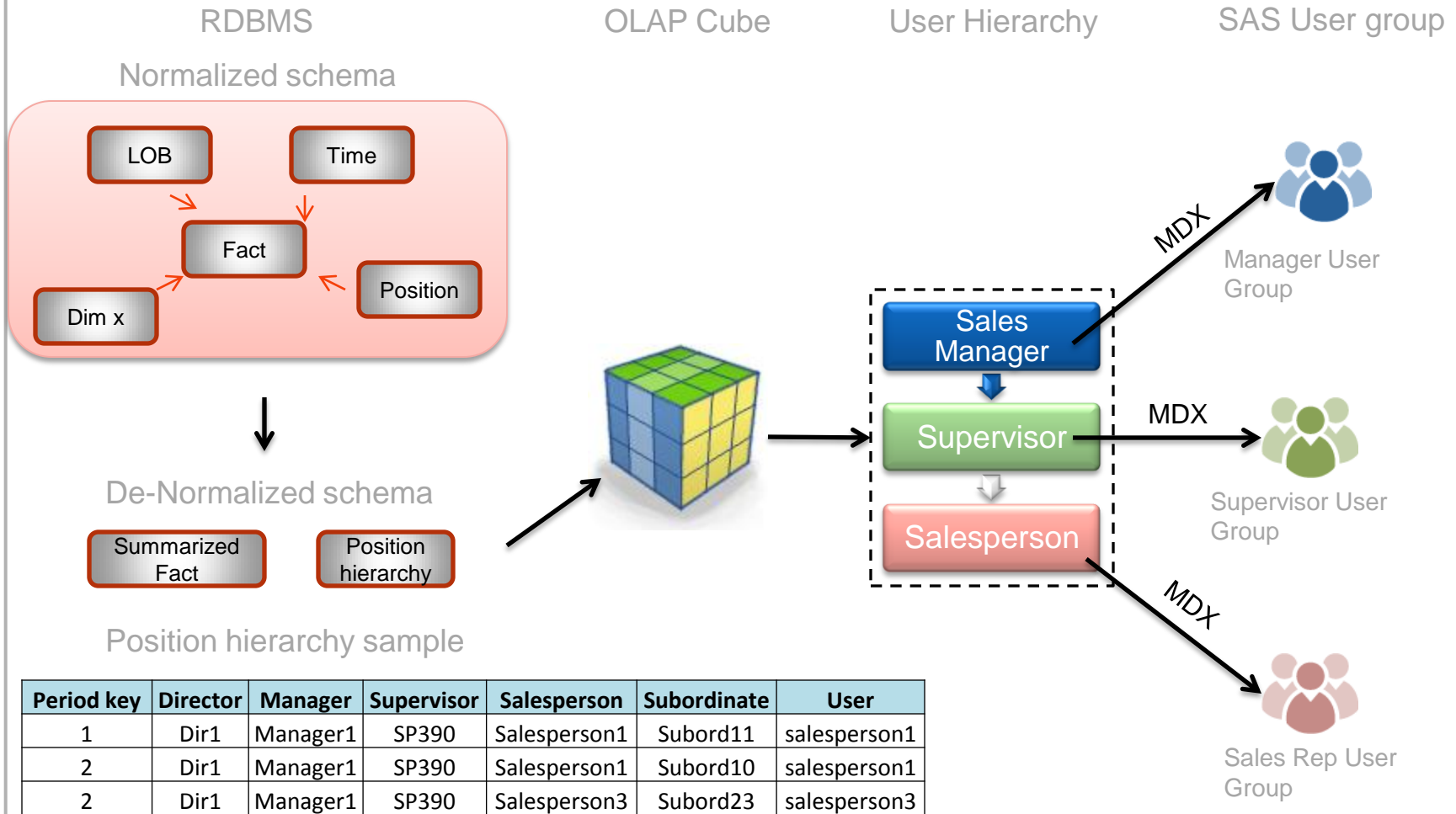
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# Scenario

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- » User should view its own data and its sub-ordinates' data if available.
- » If there are multiple levels in the user hierarchy, all levels need to be visible once authorized.
- » Handle user hierarchy changes based on Time dimension.
- » Multiple lines of business in a single view.
- » Dynamic data in the reports based on Period granularity.
- » Single report when viewed by different users will present data which they are authorized to view.

# Solution – part 1 – Cube

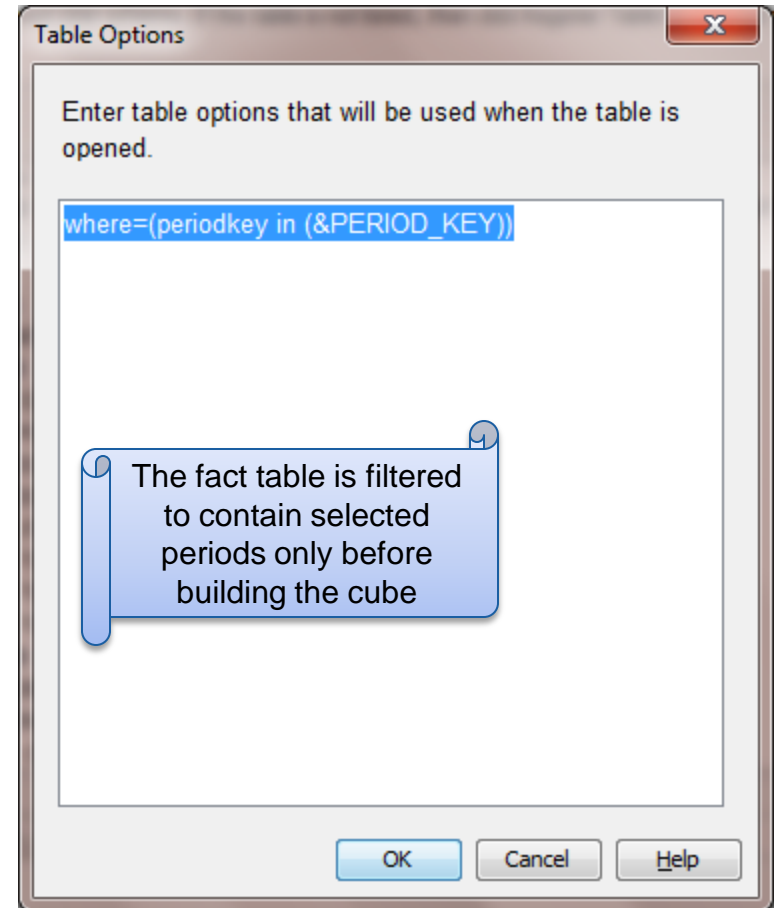
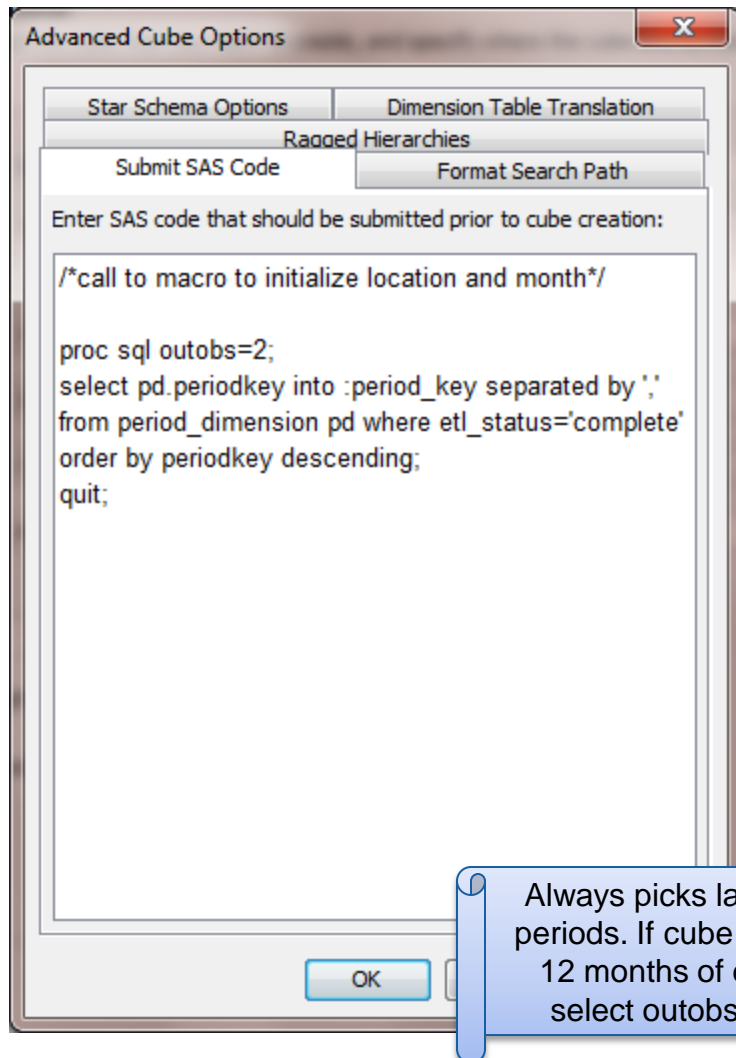


# Cube Components

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- » Data model for reporting tables.
  - Plan the table structure to be used for OLAP cubes.
  - Summarized fact table to have all dimensions with unique identifier per position and Time.
  - Position hierarchy built upon position dimension which has the same unique identifier as mentioned above.
  - Have a column which has SAS users mapped across positions.
- » OLAP cube.
  - Cube built using a star schema.
- » SAS code to select Time periods.
  - Add code to save the x values of Time dimension into a macro variable and use this in table options.
- » Dimensions, levels, hierarchies and Measures.
  - Dimensions – In addition to Time, Geo etc, define 2 position dimensions one (on user column) for MDX and the other (on position column) for Metadata security.
  - Define Levels – Manager, supervisor, sales person.
  - Define hierarchies and measures as needed.

# Cube components – Time selection



# Supervisor – MDX and metadata security

Build Formula

Expression Text:

```
{Descendants(Filter(PPOSITION_USER_DIMENSION.PPOSITION_USER_DIMENSION.SUPERVISOR_USERID.Members,PPOSITION_USER_DIMENSION.PPOSITION_USER_DIMENSION.CurrentMember.Name='SUB::SAS.PersonName').Item(0))}
```

Categories:

- All Functions
- Array Functions
- Date Functions
- Dimension Functions
- Hierarchy Functions
- Level Functions
- Logical Functions
- Member Functions
- Numeric Functions
- Other Functions
- Set Functions
- String Functions

Functions:

OK

Applying the MDX on Supervisor User group selecting Position user dimension

User groups should be denied Readmetadata to parent Levels in Position Dimension

Access Control Templates    Properties

Effective Permissions:

Permissions	Grant	Deny
ReadMetadata	<input type="checkbox"/>	<input checked="" type="checkbox"/>
WriteMetadata	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Read	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Administer	<input type="checkbox"/>	<input checked="" type="checkbox"/>

# Cube Components contd..

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» Metadata user groups.

- Create SAS user groups i.e. Manager, Supervisor, Sales person.

» MDX for user security.

```
{Descendants ( Filter (<Dimension_name>.<Hierarchy_name>.<Level_name>.Members,  
                    <Dimension_name>.<Hierarchy_name>.Currentmember.Name  
                    ="SUB::SAS.PersonName").Item(0))}
```

- **Text marked in Green:** The global variable SAS.PersonName stores the Username/User ID of the person logged into the Web portal. The statement loops through each of the values in the particular level specified and compares it against the value of the logged in user.
- **Text marked in Red:** The second parameter to the filter statement would then be reduced to a particular value of the level. Filter statement then filters all the rows of the cube which has the matching value.
- **Text marked in Blue:** Filter statement will return all the rows matched, which can be more than one row (based on the data in cube). Item(0) ensures that a single value is passed on as parameter to the descendants function.
- **Text marked in Brown:** Descendants function, as the name suggests, will return all the children of the particular value of level parameter

# Cube Components contd..

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## » Security on metadata.

- In OLAP cube studio, under Inventory tab, open the Position Dimension (user) and apply the MDX on all 3 user groups. (In Authorization tab, select Edit Authorization). If the user group doesn't exist, contact administrator to add the same.
- Open the Position Dimension (Position) and apply the metadata security for every level i.e.
  - For Manager level, Check Deny readmetadata for Supervisor and Sales person user group.
  - For Supervisor level, Check Deny readmetadata for Sales person user group.
  - For Sales person level, there is no need to deny readmetadata.

## » Web report.

- The security applied on the Cubes will be applicable for any report built over this Cube.

» At this stage, the security setup is complete. Any user when accesses the cube will only see authorized data.



# Cube example – login as salesperson1 in EG

- » A Manager can see its own data along with Supervisors under it and Sales persons under their respective Supervisors.
- » A Supervisor cannot see Manager's view i.e. peer information is not available to view. But it can see its data along with Sales persons under it if it has any.
- » A sales person cannot view its Supervisor's or its Manager's or its peer's data but can view only its data. It doesn't have any sub-ordinates.

The image displays two screenshots of a data cube interface. The left screenshot shows a list of managers from MANAGER10 to MANAGER18, with MANAGER7 having a value of 6451.00. The right screenshot shows a detailed view for 2012, with columns for Year, Quarter, Month, and MEASURES, and rows for each manager. MANAGER7's data is visible in the 2012 Q2 M12 row.

Year	2012	2012		
Quarter	2012	12:2	12:2	
Month			MAY12	JUN12
MEASURES	MEASURE2	MEASURE2	MEASURE2	MEASURE2
DIRECTOR				
MANAGER9				
MANAGER8				
MANAGER7	6451.00	6451.00	3074.50	3376.50
MANAGER6				
MANAGER5				
MANAGER4				
MANAGER3				
MANAGER2				
MANAGER18				
MANAGER17				
MANAGER16				
MANAGER15				
MANAGER14				
MANAGER13				
MANAGER12				
MANAGER11				
MANAGER10				

# Cube example contd..

View 1 View 2

Roles Show Columns Rows Filters Highlights

			Year	2012		
			2012	12:2		
				12:2	12:2	
			Quarter	MAY12 JUN12		
			Month			
			MEASURES	MEASURE2	MEASURE2	
DIRECTOR	MANAGER	SUPERVISOR				
MANAGER7	SP383		.	.	.	
	SP384		.	.	.	
	SP385		.	.	.	
	SP386		.	.	.	
	SP387		.	.	.	
	SP388		.	.	.	
	SP389		.	.	.	
	SP39		.	.	.	
	<b>SP390</b>		6451.00	6451.00	3074.50	3376.50
		SALESPERSON1	6451.00	6451.00	3074.50	3376.50
		SALESPERSON2	.	.	.	.
		SALESPERSON3	.	.	.	.
		SALESPERSON4	.	.	.	.
		SP391	.	.	.	.
		SP392	.	.	.	.

Salesperson1 can view only its info and its subordinates' info if available

# Cube example – login as salesperson3

View 1 View 2

Roles Show Columns Rows Filters Highlights

Year	2012			
Quarter	2012	12:2		
Month		12:2	12:2	
			MAY12	JUN12
MEASURES	MEASURE2	MEASURE2	MEASURE2	MEASURE2
DIRECTOR ▼				
+ ↕ MANAGER9	.	.	.	.
+ ↕ MANAGER8	.	.	.	.
+ ↕ MANAGER7	1070.00	1070.00	190.00	880.00
+ ↕ MANAGER6	.	.	.	.
+ ↕ MANAGER5	.	.	.	.
+ ↕ MANAGER4	.	.	.	.
+ ↕ MANAGER3	.	.	.	.
+ ↕ MANAGER2	.	.	.	.
+ ↕ MANAGER18	.	.	.	.
+ ↕ MANAGER17	.	.	.	.
+ ↕ MANAGER16	.	.	.	.
+ ↕ MANAGER15	.	.	.	.
+ ↕ MANAGER14	.	.	.	.
+ ↕ MANAGER13	.	.	.	.
+ ↕ MANAGER12	.	.	.	.

View 1 View 2

Roles Show Columns Rows Filters Highlights

Year	2012				
Quarter	2012	12:2			
Month		12:2	12:2		
			MAY12	JUN12	
MEASURES	MEASURE2	MEASURE2	MEASURE2	MEASURE2	
DIRECTOR ▼	MANAGER	SUPERVISOR			
- ↕ MANAGER7	+ ↕ SP385		.	.	
	+ ↕ SP386		.	.	
	+ ↕ SP387		.	.	
	+ ↕ SP388		.	.	
	+ ↕ SP389		.	.	
	+ ↕ SP39		.	.	
	SP390		1070.00	1070.00	190.00
	+ ↕ SALESPERSON1		.	.	
	+ ↕ SALESPERSON2		.	.	
	- ↕ SP390		.	.	
	+ ↕ SALESPERSON3		1070.00	1070.00	190.00
	+ ↕ SALESPERSON4		.	.	
	+ ↕ SP391		.	.	
	+ ↕ SP392		.	.	
	+ ↕ SP393		.	.	

# Cube example – login as manager7

View 1 View 2

Roles Show Columns Rows Filters Highlights

				Year	2012			
				2012	12:2	12:2		
						Quarter	Month	MAY12
				MEASURES	MEASURE2	MEASURE2	MEASURE2	MEASURE2
DIRECTOR ▼	MANAGER	SUPERVISOR	SALESPERSON					
MANAGER7	SP390			6451.00	6451.00	3074.50	3376.50	
	SP390	SALESPERSON1		6451.00	6451.00	3074.50	3376.50	
		SALESPERSON1	SUBORD1	73.50	73.50	37.50	36.00	
			SUBORD10	63.00	63.00	23.00	40.00	
			SUBORD11	130.00	130.00	61.00	69.00	
			SUBORD12	71.50	71.50	32.50	39.00	
			SUBORD13	245.50	245.50	108.00	137.50	
			SUBORD14	178.00	178.00	73.00	105.00	
			SUBORD15	.	.	.	.	
			SUBORD16	166.00	166.00	71.50	94.50	
			SUBORD17	46.50	46.50	24.00	22.50	
			SUBORD18	151.00	151.00	66.00	85.00	
			SUBORD19	233.50	233.50	95.00	138.50	
			SUBORD2	0.00	0.00	0.00	0.00	

# Cube example – login as a Director

View 1					View 2					
Roles					Roles					
Show Columns Rows Filters Highlights					Show Columns Rows Filters Highlights					
Year	2012				Year	2012				
Quarter	2012	12:2			Quarter	2012	12:2			
Month		12:2	12:2		Month		12:2	12:2		
			MAY12	JUN12				MAY12	JUN12	
MEASURES	MEASURE2	MEASURE2	MEASURE2	MEASURE2	MEASURES	MEASURE2	MEASURE2	MEASURE2	MEASURE2	
<b>DIRECTOR</b> ▼					<b>DIRECTOR</b> ▼					
MANAGER9	0.00	0.00	0.00		MANAGER	SP384	200.00	200.00	101.00	99.00
MANAGER8	0.00	0.00	0.00	0.00	MANAGER	SP385	0.00	0.00	0.00	0.00
MANAGER7	49697.00	49697.00	23705.00	25992.00	MANAGER	SP386	95.00	95.00	42.50	52.50
MANAGER6	37044.00	37044.00	16964.00	20080.00	MANAGER	SP387	0.00	0.00	0.00	0.00
MANAGER5	3605.00	3605.00	1585.00	2020.00	MANAGER	SP388	94.50	94.50	65.00	29.50
MANAGER4	.	.	.	.	MANAGER	SP389	0.00	0.00	0.00	0.00
MANAGER3	76.00	76.00	.	76.00	MANAGER	SP39	0.00	0.00	0.00	0.00
MANAGER2	8582.80	8582.80	4166.50	4416.30	MANAGER	SP390	8411.00	8411.00	3668.50	4742.50
MANAGER18	42737.71	42737.71	19070.53	23667.18	MANAGER	SALESPERSON1	6451.00	6451.00	3074.50	3376.50
MANAGER17	0.00	0.00	0.00	0.00	MANAGER	SALESPERSON2	169.00	169.00	77.50	91.50
MANAGER16	721.50	721.50	320.00	401.50	MANAGER	SALESPERSON3	1070.00	1070.00	190.00	880.00
MANAGER15	.	.	.	.	MANAGER	SALESPERSON4	721.00	721.00	326.50	394.50
MANAGER14	0.00	0.00	0.00	0.00	MANAGER	SP391	2371.50	2371.50	1068.50	1303.00
MANAGER13	193.00	193.00	114.00	79.00	MANAGER	SP392	171.50	171.50	91.50	80.00
MANAGER12	25401.94	25401.94	11899.04	13502.90	MANAGER	SP393	0.00	0.00	0.00	0.00
MANAGER11	.	.	.	.	MANAGER	SP4	.	.	.	.
MANAGER10	210.50	210.50	200.50	10.00	MANAGER	SP40	.	.	.	.
MANAGER1	6380.20	6380.20	2892.80	3487.40						

## Solution – part 2 – Reports

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- » Create an information map selecting the cube as the source.
- » Add dimensions and measures as needed
- » Add filters and prompts on the dimensions if necessary.
- » Connect to Web report studio and create a new report selecting the information map.
- » Create a table and select dimensions across x and y axes. Add column totals / sub-totals if necessary
- » For all the values of the Time dimension, based on the user logged in, the results will be displayed based on the MDX and Metadata security set on the group to which the user belongs to.

# Report examples – login as salesperson 1 and 3

Demo\_report Log Off Salesperson3 | Preferences | Help

File Edit View Data Edit View

Organization > MANAGER7 > SP390  
 Period > 2012 > 12:2

Applied filters: None

SUPERVISOR	LOB	Group	Type	MAY12		JUN12	
				Measure1	Measure2	Measure1	Measure2
	Books	Subgroup1	Health	-	0.00	-	0.00
		Subgroup1	Ginger	262.00	190.00	964.00	880.00
SALESPERSON3	Chocolates	Subgroup2		-	0.00	-	0.00
		Subgroup3		-	0.00	-	0.00
		Subgroup4		-	0.00	-	0.00
	Games	Subgroup1	Digdug	-	-	-	-
<b>Total</b>				<b>262.00</b>	<b>190.00</b>	<b>964.00</b>	<b>880.00</b>

Demo Report Log Off Salesperson1 | Preferences | Help

File Edit View Data Edit View

Organization > MANAGER7 > SP390  
 Period > 2012 > 12:2

Applied filters: None

SUPERVISOR	LOB	Group	Type	MAY12		JUN12	
				Measure1	Measure2	Measure1	Measure2
	Books			-	0.00	-	0.00
	Chips			-	0.00	-	0.00
		Subgroup1	Coconut	-	-	-	0.00
			Ginger	4228.00	3074.50	4475.50	3376.50
SALESPERSON1	Chocolates	Subgroup2		-	0.00	-	0.00
		Subgroup3		-	0.00	-	0.00
		Subgroup4		-	0.00	-	0.00
	Games			-	0.00	-	0.00
<b>Total</b>				<b>4228.00</b>	<b>3074.50</b>	<b>4475.50</b>	<b>3376.50</b>

# Report examples – login as a Director

Chaitanya Kalavgunta | Preference

Demo Report

File Edit View Data Edit View

Month		MAY12		JUN12	
		Measure1	Measure2	Measure1	Measure2
DIRECTOR	LOB				
+	Chocolates		0.00		0.00
+	Books		0.00		0.00
+	MANAGER1	3276.50	2892.80	3861.80	3487.40
+	Games				
+	MANAGER10	214.00	200.50	61.00	10.00
+	Games				
+	Books		0.00		0.00
+	MANAGER12		0.00		0.00
+	Chips		0.00		0.00
+	Chocolates	15858.00	11899.04	17697.50	13502.90
+	Games		0.00		0.00
+	MANAGER13	136.00	114.00	231.00	79.00
+	Games				
+	MANAGER14				
+	Fruits	0.00	0.00	0.00	0.00
+	MANAGER16	513.50	320.00	603.00	401.50
+	Games				
+	MANAGER17		0.00		0.00
+	Chocolates				0.00
+	MANAGER18	27401.50	19070.53	32307.50	23667.18
+	Games				
+	Books		0.00		0.00
+	MANAGER2	4980.60	4166.50	5303.40	4416.30
+	Games				
+	MANAGER3			98.00	76.00
+	Chocolates				
+	Books		0.00		0.00

Chaitanya Kalavgunta | Preference

Demo Report

File Edit View Data Edit View

Organization > MANAGER7  
Period > 2012 > 12-2

Applied filters: None

Month		MAY12		
MANAGER	SUPERVISOR	LOB	Measure1	Measure2
+	SP388	Games		
+	SP389	Chocolates		0.00
+	SP39	Games		
+		Chocolates		0.00
+		Books		0.00
+		Chips		0.00
+	SALESPERSON1	Chocolates	4228.00	3074.50
+		Games		0.00
+		Books		0.00
+	SALESPERSON2	Chocolates	113.00	77.50
+		Games		
+		Books		0.00
+	SALESPERSON3	Chocolates	262.00	190.00
+		Games		
+		Chips		0.00
+	SALESPERSON4	Chocolates	417.00	326.50
+		Games		
+		Books		0.00
+		Chips		0.00
+	SP391	Chocolates	1308.00	1068.50
+		Games		0.00



# Advantages

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- » Data security with ease.
- » Solution can be leveraged for multiple hierarchy levels.
- » Can cater to multiple users with a single cube and a single report.
- » With a supported batch process, report gets refreshed data dynamically.
- » Limited number of SAS user groups.

## Notes

- » OLAP cube studio, Information map studio and Web report studio used to build the solution.
- » Enterprise Guide and Web report studio used to view data.

# Thank you

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## » Contact:

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## » References:

- <http://support.sas.com/documentation/cdl/en/olapug/59574/HTML/default/viewer.htm#a003212399.htm>
- SAS OLAP Server: MDX Guide
- <http://support.sas.com/documentation/cdl/en/olapug/59574/HTML/default/viewer.htm#a003212372.htm>