

REAL-TIME PERFORMANCE MANAGEMENT FOR THE ENTERPRISE

**RtPM**



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# Unifying Transactional and Production Data for Effective Reporting



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# Agenda

- PI Data Manipulation using SQL
  - New features in PI OLEDB version 3
- Unifying Data
  - Linked Database Concept (PI  $\Leftrightarrow$  RDBMS)
  - Data Transformation Services
- Reporting and Data Mining
  - Reporting Services
  - OLAP



# PI OLEDB version 3

- Improved support for MS SQL Server Linked Server
- Direct support for Data Transformation Services 
- Direct support for Reporting Services 
- Direct support for Analysis Services 
- Direct support for Web Services 
- Oracle OLE DB Generic Connectivity



# PI SQL Enhancements

- **New SQL Engine**  
SQLSS not used anymore, very scalable
- **Multithreaded**  
Thats why it now supports the many Middleware scenarios
- **Support for new Databases**  
Appear as Catalog
- **Support for Views**  
Stored in Module Database
- **New Tables**  
pisnapshot, picomp2, piinterp2, pipoint2, pifunction  
  
→ Discover using MMC Snap-In



# Discover using MMC Snap-In

The screenshot shows the PIOLEDB\_UC2005 MMC Snap-In window. The title bar reads "PIOLEDB\_UC2005 - [Console Root\PI Servers\localhost (PI3)\Catalogs\piarchive\Views\TodaysSinusoid]". The menu bar includes File, Action, View, Favorites, Window, and Help. The toolbar contains various navigation and execution icons, including a SQL icon. The left pane shows a tree view of the database structure, with the following nodes expanded:

- Console Root
  - PI Servers
    - localhost (PI3)
      - Catalogs
        - DCSMessages
        - piarchive
          - Tables
          - Views
            - TodaysSinusoid (selected)
          - pibatch
          - pids
          - pifunction
          - piheading
          - pilog
          - pimodule
          - pipoint
          - piuser
        - Queries

The right pane displays a table with the following data:

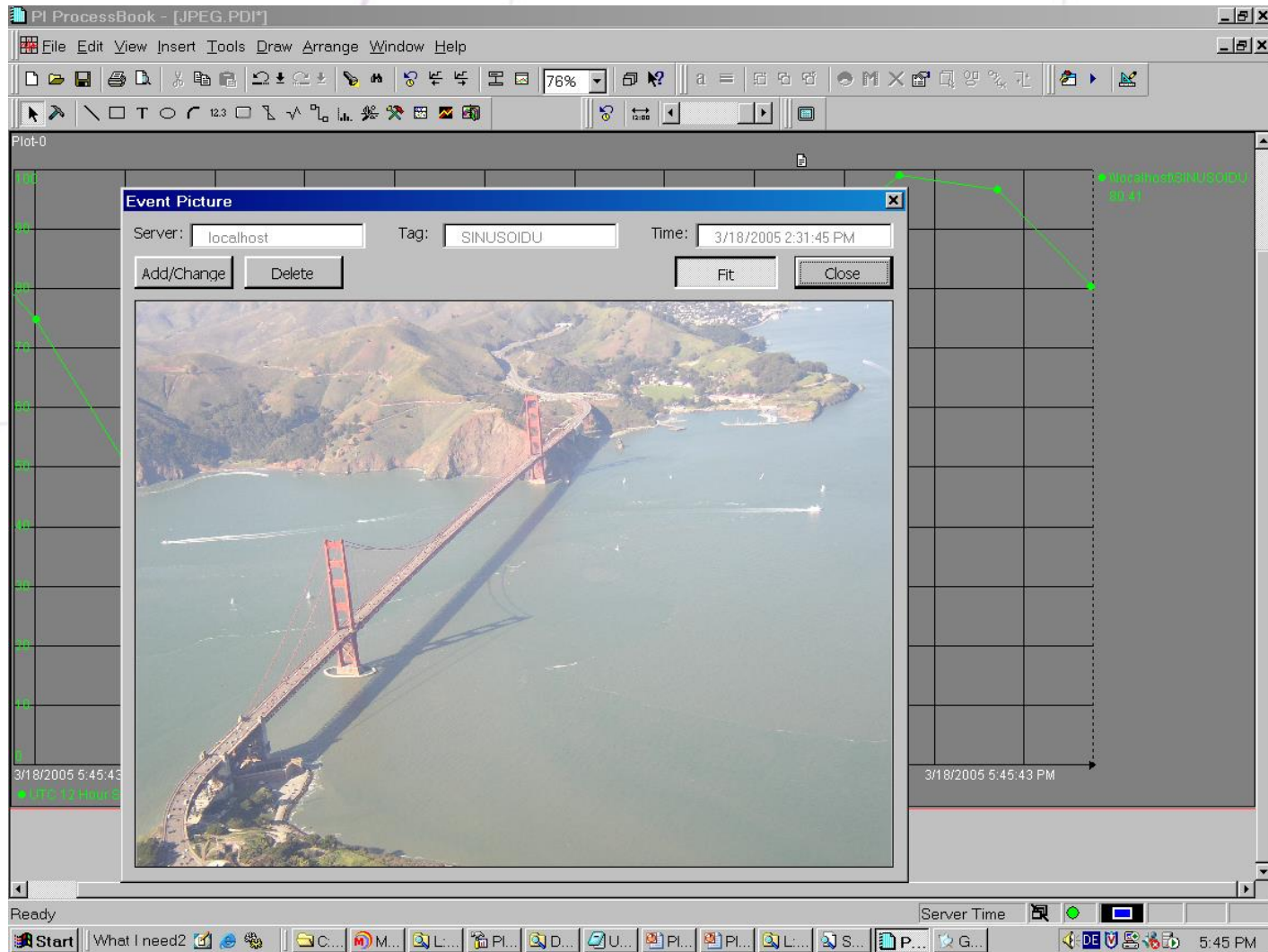
flags	status	svalue	tag	time	value
	0		SINUSOID	4/20/2004 1:36:46 AM	87.3744888
	0		SINUSOID	4/20/2004 2:36:46 AM	98.9745789
	0		SINUSOID	4/20/2004 3:35:46 AM	97.589035
	0		SINUSOID	4/20/2004 4:47:16 AM	79.6563644
	0		SINUSOID	4/20/2004 6:46:46 AM	30.1675472
	0		SINUSOID	4/20/2004 8:03:16 AM	6.0090947
	0		SINUSOID	4/20/2004 8:39:16 AM	0.8181973

The bottom pane shows the SQL query:

```
SELECT "flags", "status", "svalue", "tag", "time", "value" FROM piarchive.."TodaysSinusoid"
```



# Add Binary Annotation



# Annotation Column is VARIANT

```
Open strPath For Binary As iFile  
ReDim bytes(FileLen(strPath))
```

```
' read the file into "bytes"  
Get iFile, , bytes  
Close #1
```

```
' form an update command  
Dim strQuery As String  
strQuery = "UPDATE picomp2 SET annotations = ? WHERE tag = '" & strTag & "' AND time = '" & strTime  
& "'"
```

```
Dim cmd As New ADODB.Command  
Set cmd.ActiveConnection = con
```

```
cmd.CommandText = strQuery
```

```
' set the annotations parameter  
cmd.Prepared = True  
cmd.Parameters.Item(0).Value = bytes
```

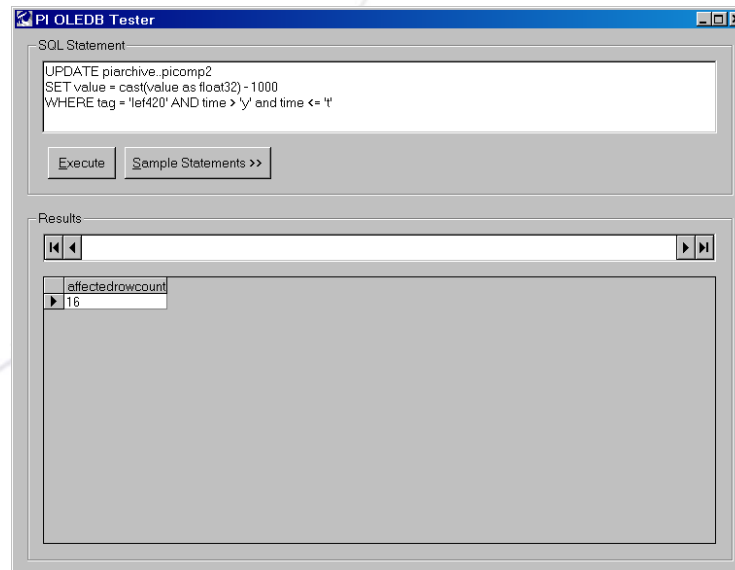




# picomp2 table fully updatable

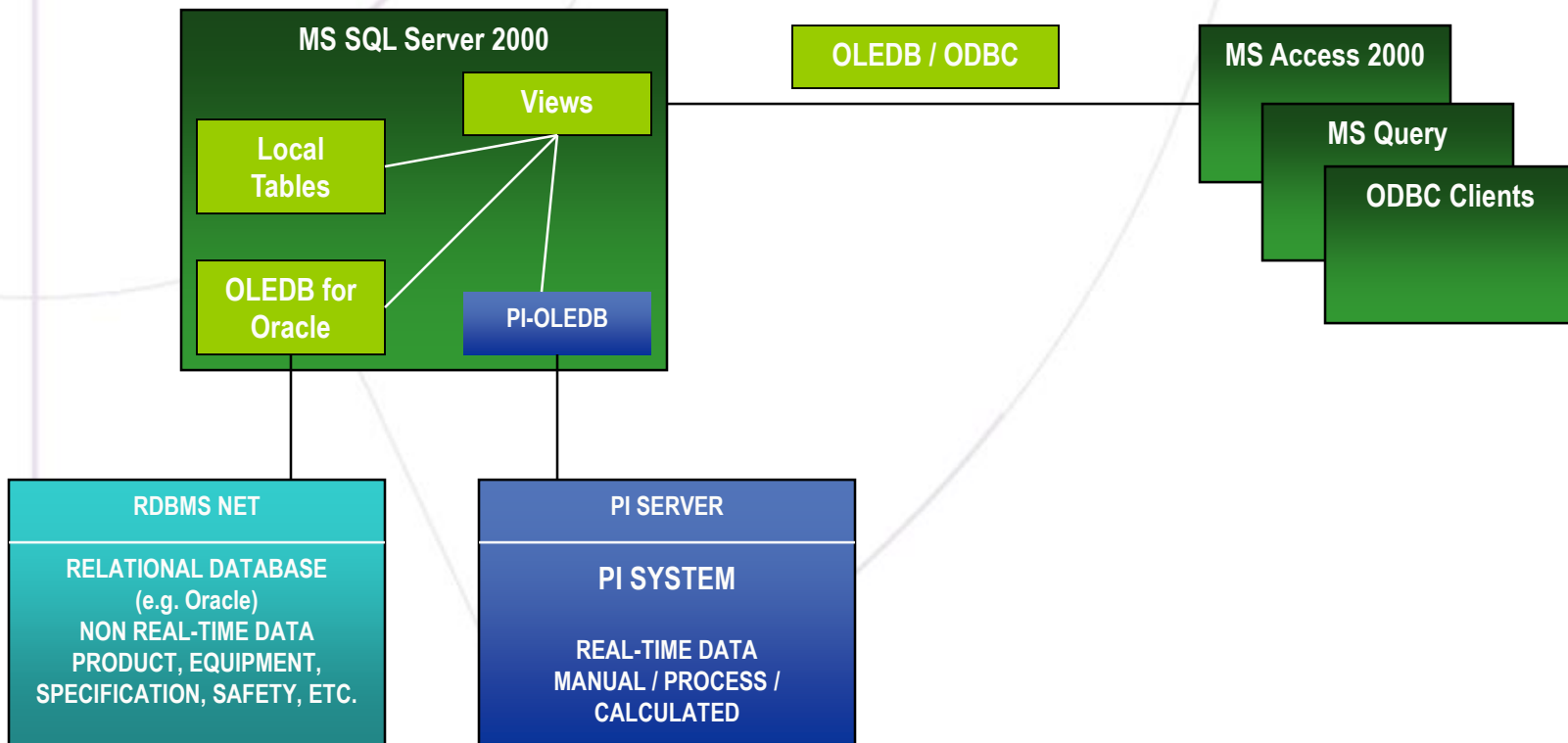
- Decrease all archive events of a tag for a certain time range by value of 1000

```
UPDATE piarchive..picomp2  
SET value = cast(value as float32) - 1000  
WHERE tag = 'lef420' AND time > 'y' and time <= 't'
```

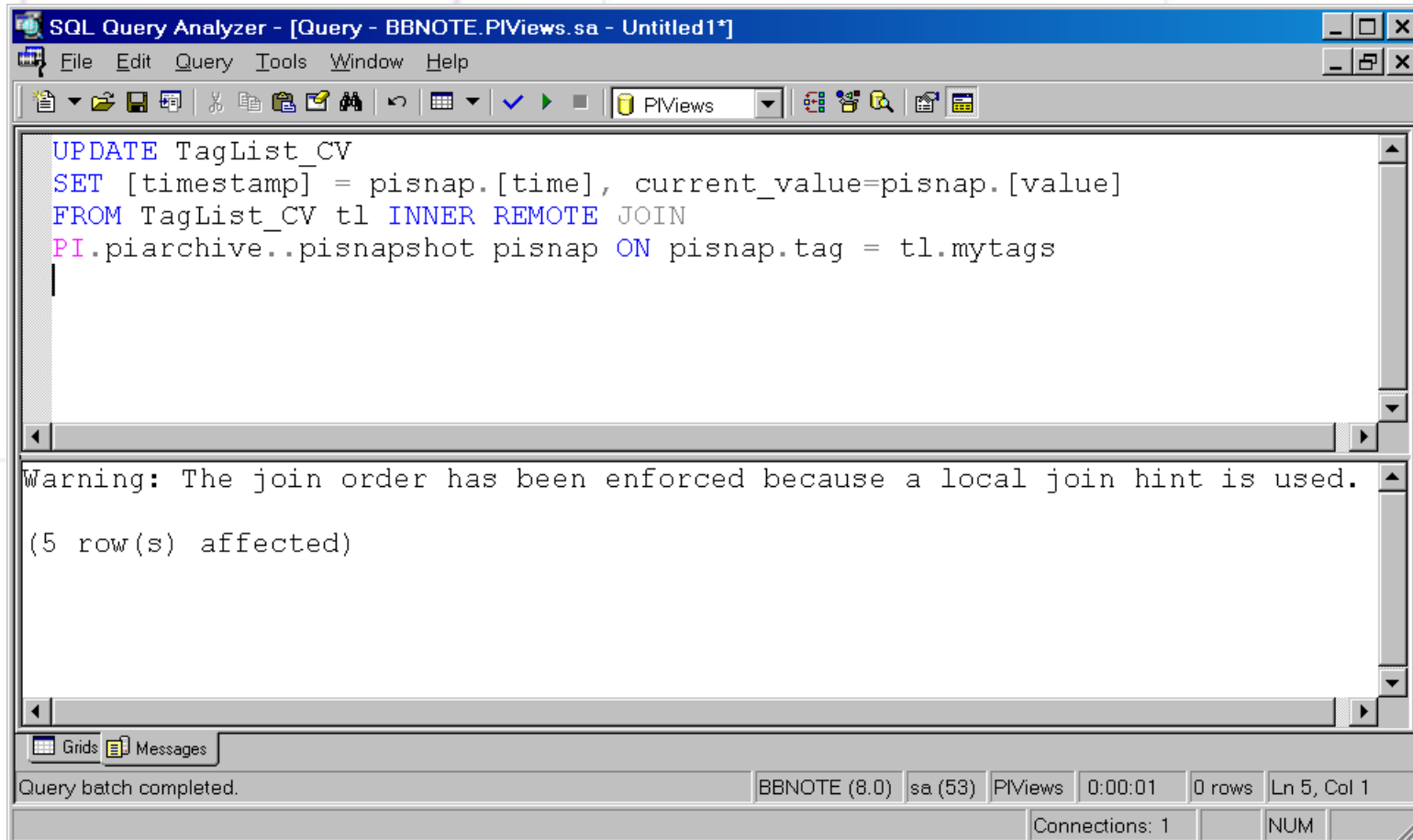


# Linked Database Concept

## MS SQL Server Linked Server



# A Heterogeneous Query



The screenshot shows the SQL Query Analyzer interface. The title bar reads "SQL Query Analyzer - [Query - BBNOTE.PViews.sa - Untitled1\*]". The menu bar includes File, Edit, Query, Tools, Window, and Help. The toolbar contains various icons for file operations and query execution. The main text area displays the following SQL query:

```
UPDATE TagList_CV
SET [timestamp] = pisanap.[time], current_value=pisanap.[value]
FROM TagList_CV tl INNER REMOTE JOIN
PI.piarchive..pisanapshot pisanap ON pisanap.tag = tl.mytags
```

Below the query, the execution results are shown:

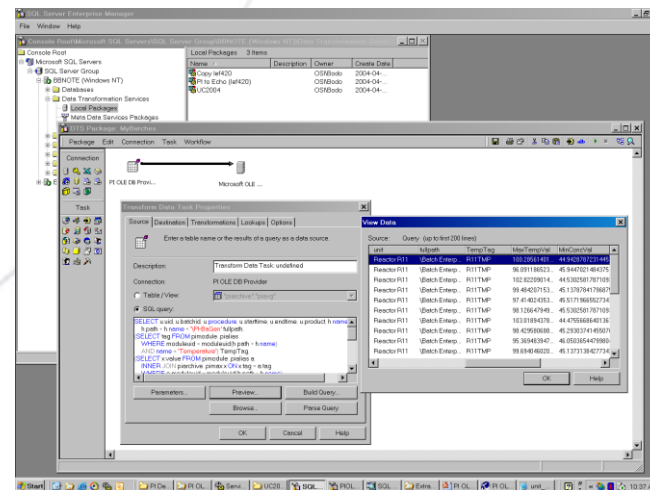
```
Warning: The join order has been enforced because a local join hint is used.
(5 row(s) affected)
```

The bottom status bar indicates "Query batch completed." and provides details about the execution: "BBNOTE (8.0) sa (53) PViews 0:00:01 0 rows Ln 5, Col 1". It also shows "Connections: 1" and "NUM".

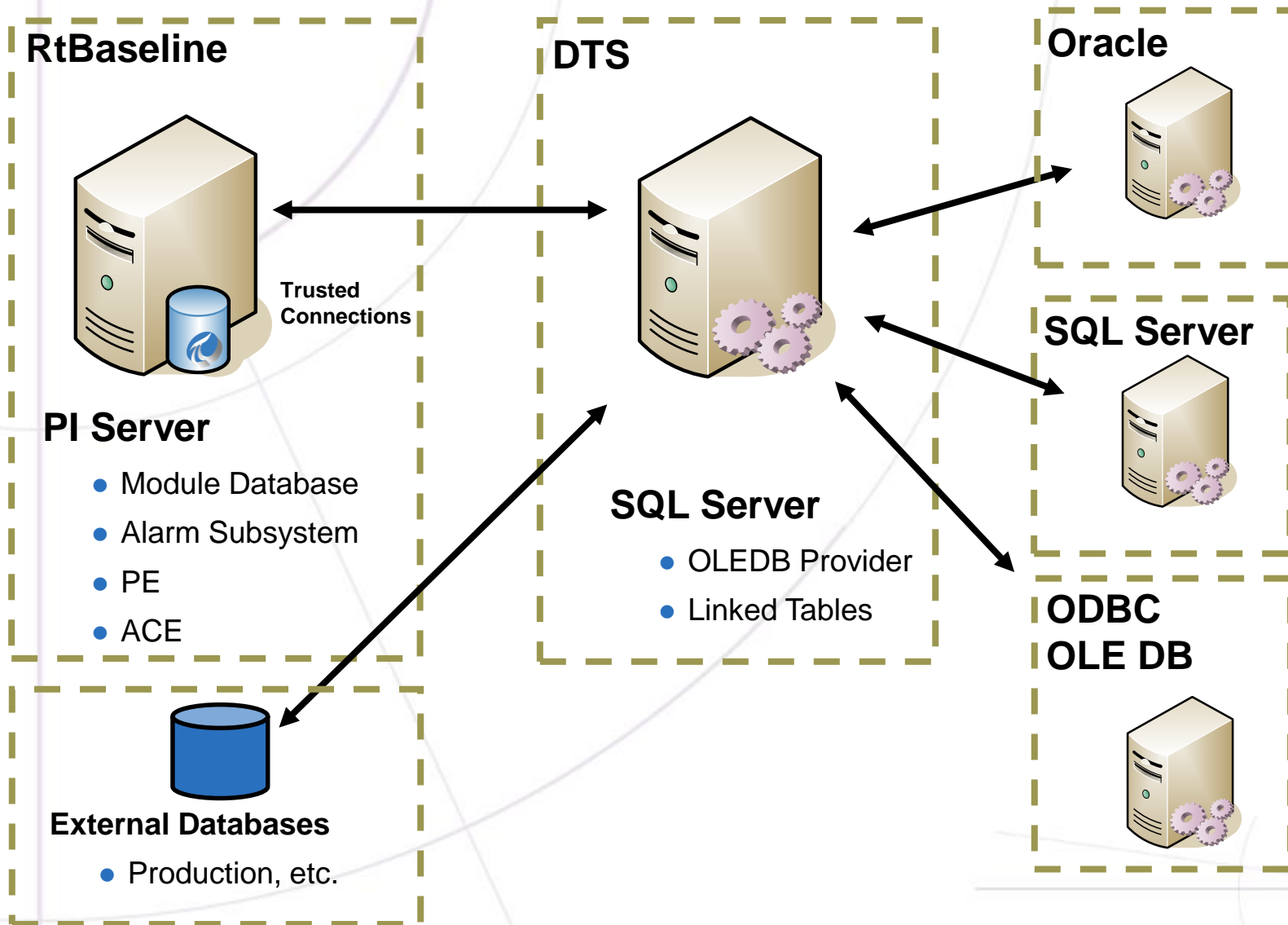
The above query updates a SQL Server table having a list of tags in column „mytags“ with related snapshots from PI.

# Data Transformation Services (DTS)

- Data transfer between SQL based data sources
- Extract, transform and consolidate
- Build custom data movement solutions
- Directly connects to PI OLEDB
- Alternative to RDBMS Interface especially for aggregated data

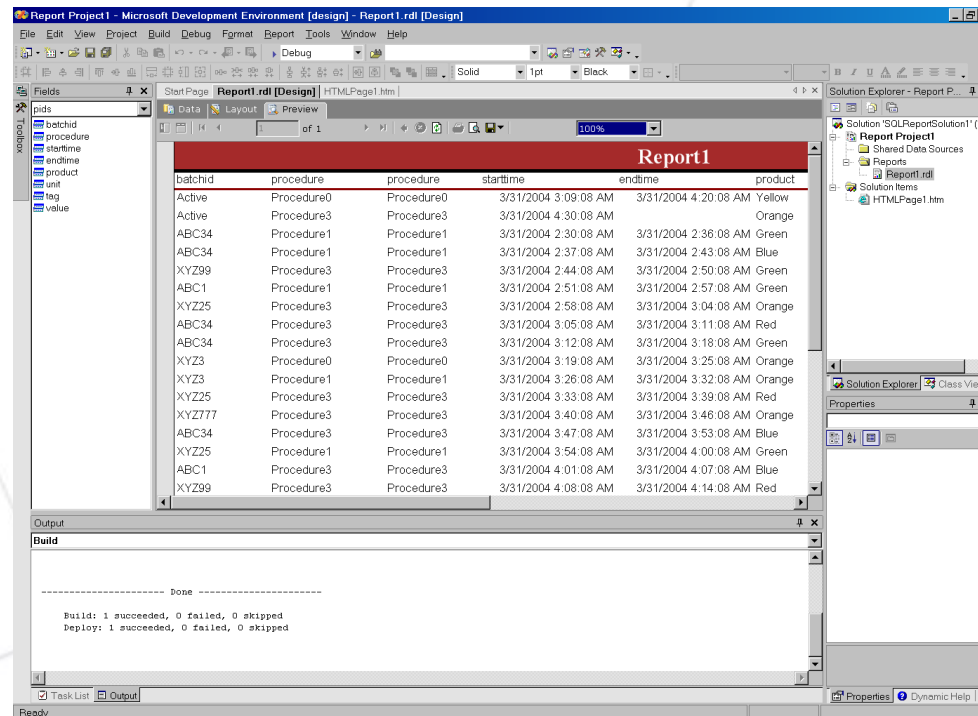


# Architecture: Data Transformation



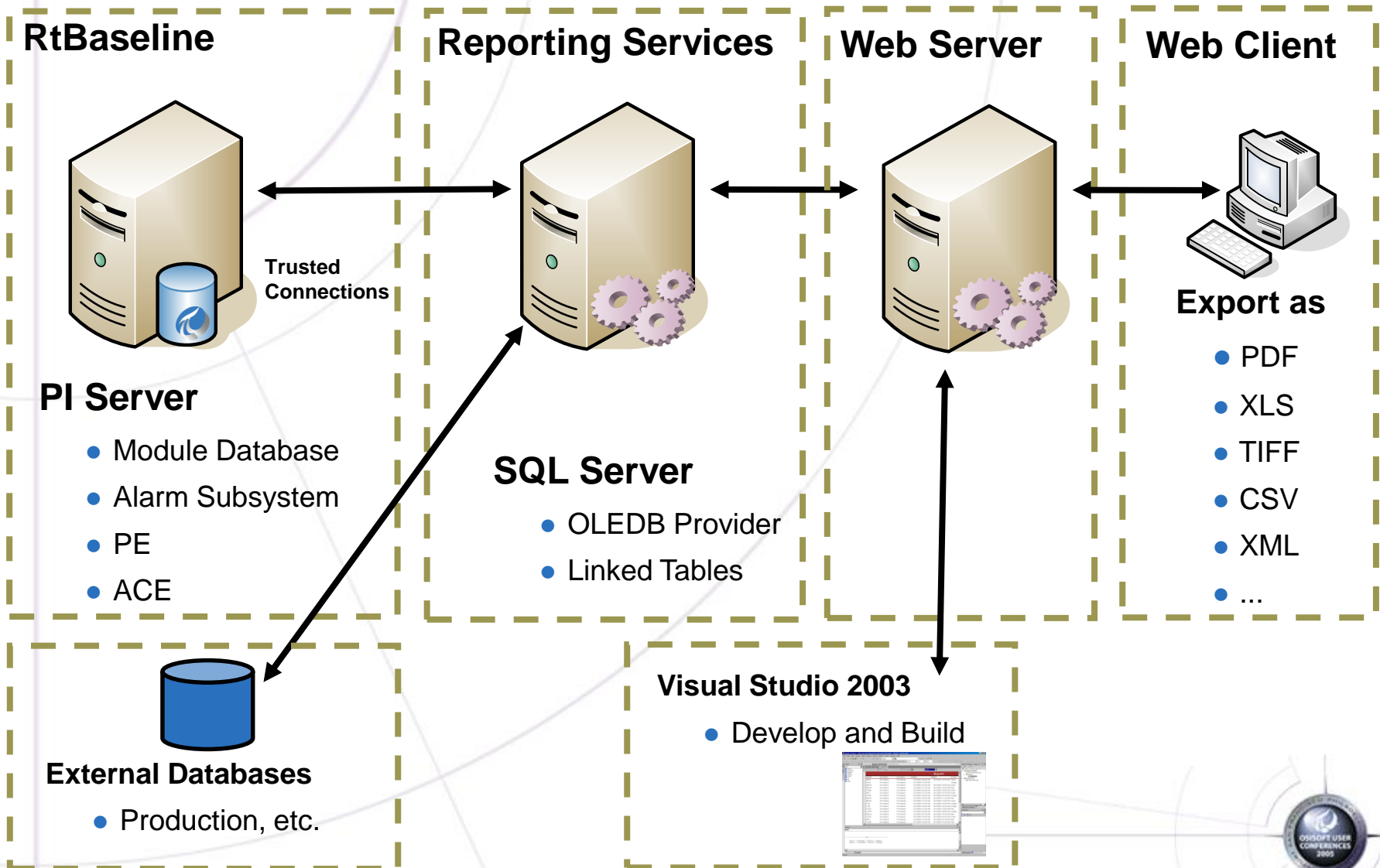
# Reporting Services

- Automatically generate Reports and publish on Web Server
- Access data from various data sources
- Can directly connect to PI OLEDB



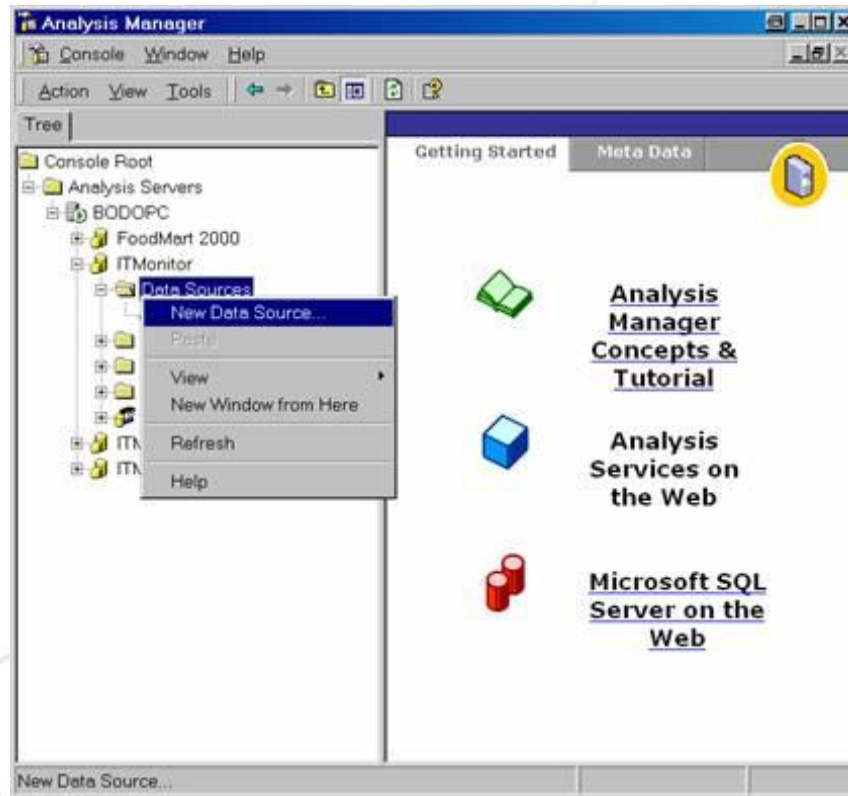


# Architecture: Reporting



# OLAP

- Data Mining and Multidimensional Data Analysis
- Support for MS Data Analysis Services
- Can directly connect to PI OLEDB



# Example:

## Operating Conditions Rollup

- Need a way to measure operating performance against expectations
- Need to summarize this based upon equipment hierarchy
- Need to analyze the problems to determine root-cause
- Need a way to mine this data for questions like:
  - ✓ "Are there more work orders issued when I run a different grade raw material?"
  - ✓ "What does it cost me in terms of maintenance to meet rush orders?"
  - ✓ "Why do I have to service a piece of equipment after we use a shipment of raw materials from one supplier vs. another?"



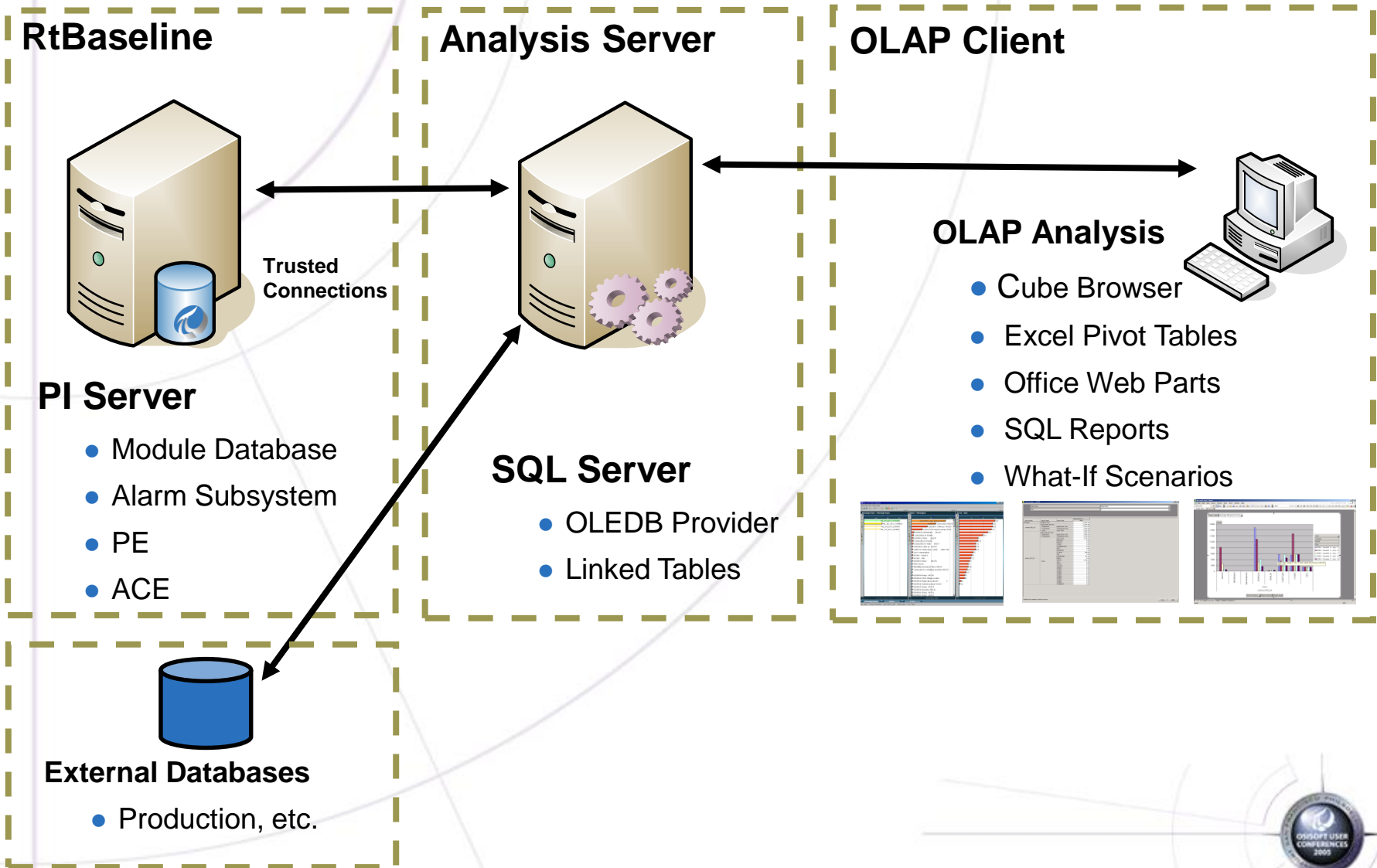
# Solution:

## Operating Conditions Rollup

- PI system to collect data
- Alarm subsystem to generate alarms
- One mechanism to rollup alarms
  - ACE (sophisticated)
  - PE (simple)
- PIOLEDB provider to read the information
- Microsoft Analysis Services (OLAP) to analyze data

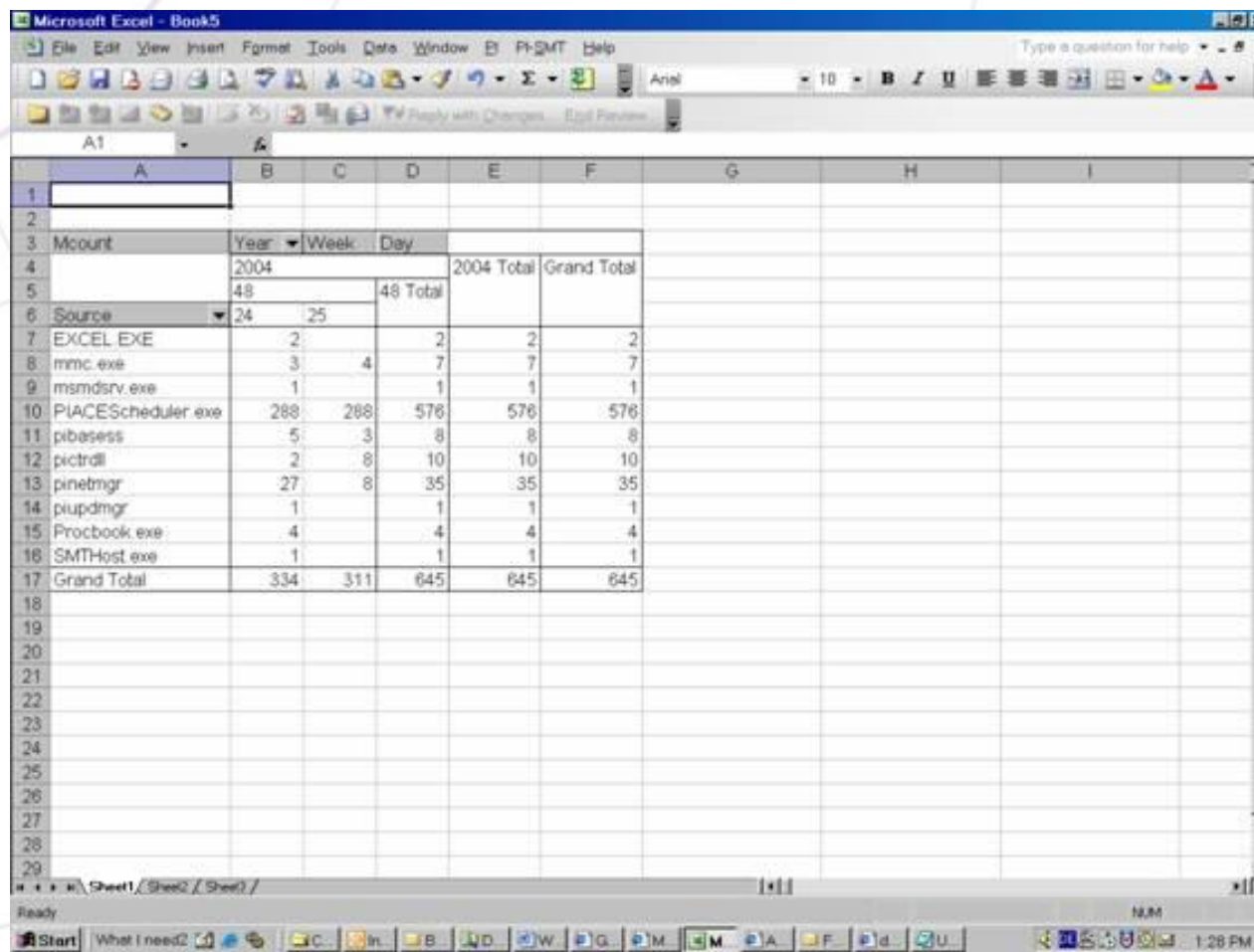


# Architecture: Operating Conditions Rollup



# OLAP White Paper

- <http://techsupport.osisoft.com>  
→ Downloadcenter → White Papers



The screenshot shows a Microsoft Excel window titled "Microsoft Excel - Book5". The spreadsheet contains data for the year 2004, organized by source, week, and day. The data is summarized by 2004 Total and Grand Total.

Source	Year	Week	Day	2004 Total	Grand Total
EXCEL EXE	2004	24	25	2	2
mmc.exe	2004	24	25	3	7
msmdsrv.exe	2004	24	25	1	1
PLACEScheduler.exe	2004	24	25	288	576
piabase	2004	24	25	5	8
pictrdl	2004	24	25	2	10
pinetmgr	2004	24	25	27	35
piupdmgr	2004	24	25	1	1
Procbook.exe	2004	24	25	4	4
SMTHost.exe	2004	24	25	1	1
Grand Total	2004	24	25	334	645



# Summary

- PI has a rich SQL interface
  - IT departments love it
  - Beginners discover capabilities using MMC Snap\_in
- Simple configuration to bring process data and transactional data together
  - Because OLE DB is a standard
- 3<sup>rd</sup> party reporting and data mining tools plug and play



# Contact

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