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PI OLEDB

A new product for
Universal Data Access to the PI System

Presentation Overview

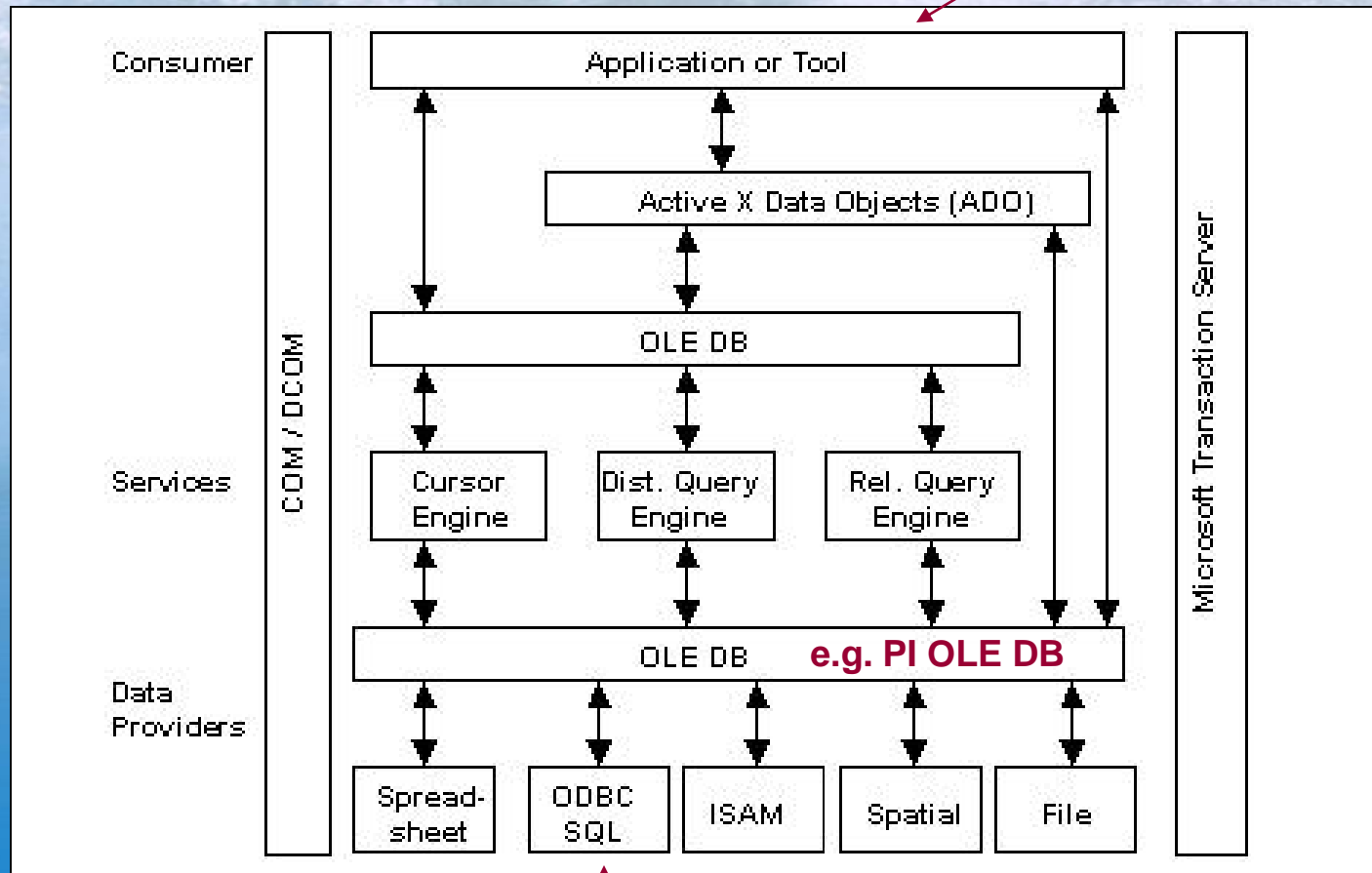
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About OLE DB

- OLE DB is part of Universal Data Access
 - ODBC, OLE DB, ADO
 - MDAC (mdac_ttypxx.exe)
- COM based set of interfaces
- OLE DB provides uniform access to tabular data, not limited to RDBMS's
- Command Language is optional, e.g. SQL, MDX,...
- OLE DB is the native communication technology for MS SQL Server and MSDE
- Via OLE DB, MS SQL Server can link foreign tables, as MS Access can do for ODBC data sources
- Less sophisticated data applications (non SQL) can become data providers
e.g. Spreadsheets. E-Mail, Directory Services..

Architecture

e.g. PI COM Connector for OLE DB



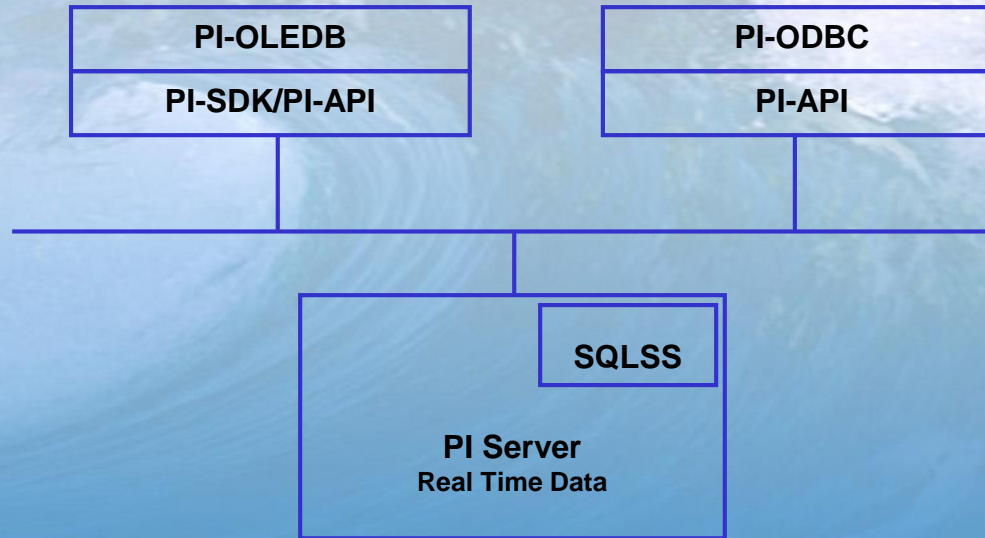
e.g. PI ODBC

OLE DB versus ODBC

ODBC	OLE DB
1992	1997
C-level API	COM API
SQL-based tabular data	All tabular and multidimensional data
No events	Support of Events
3rd party gateways for OLE DB SQL provider	MSDASQL, OLE DB Provider for ODBC

PI ODBC	PI OLEDB
1995	2001
PI2, PI3	PI3
Archive, Point DB (classic), Batch	Archive, Point DB (all classes), Batch, User, Digital States, ModuleDB (v2.0)
ANSI SQL 92 subset	ANSI SQL 92 subset
SQLSS: Read Only, except picomp	SQLSS tables: Read Only, except picomp Local tables: Read, Write, Create, Delete
Linked Server via MSDASQL (only pass through queries)	Linked Server (MS SQL Server 2000 and above)

PI OLEDB 1.1



- Support for nested queries and subqueries **NEW**
- Additional keywords (IN, NOT IN, ANY, ALL...) **NEW**
- “INSERT INTO ... SELECT ...” construction **NEW**

Enhancements in SQL support

```
SELECT u.batchid, u.procedure, u.starttime, u.endtime,  
       u.product, h.name unit, (SELECT tag FROM  
       pimodule..pialias WHERE moduleuid = moduleuid(h.path +  
       h.name + '\PI-BaGen') AND moduleversion =  
       moduleversion(moduleuid) AND name = 'temp') tag,  
       (SELECT x.value FROM pimodule..pialias a INNER JOIN  
       piarchive..piavg x ON x.tag = a.tag WHERE a.moduleuid =  
       moduleuid(h.path + h.name + '\PI-BaGen') AND  
       a.moduleversion = moduleversion(a.moduleuid) AND  
       a.name = 'temp' AND x.time >= u.starttime AND x.time <=  
       u.endtime) value FROM pimodule..pimoduleh h INNER JOIN  
       pibatch..piunitbatch u ON u.moduleuid = h.uid WHERE  
       u.starttime >= '*-3h' AND h.path = '\PI-BaGenExamples\'
```

Better?

```
SELECT u.batchid, u.procedure, u.starttime, u.endtime, u.product, h.name unit,  
  (SELECT tag FROM pimodule..pialias  
   WHERE moduleuid = moduleuid(h.path + h.name + '\PI-BaGen') ← Subquery  
   AND moduleversion = moduleversion(moduleuid)  
   AND name = 'temp') tag,  
  (SELECT x.value FROM pimodule..pialias a  
   INNER JOIN piarchive..piavg x ON x.tag = a.tag  
   WHERE a.moduleuid = moduleuid(h.path + h.name + '\PI-BaGen') ← Function  
   AND a.moduleversion = moduleversion(a.moduleuid)  
   AND a.name = 'temp'  
   AND x.time >= u.starttime  
   AND x.time <= u.endtime) value  
FROM pimodule..pimoduleh h ← Correlated Subquery  
INNER JOIN pibatch..piunitbatch u ON u.moduleuid = h.uid  
WHERE u.starttime >= '*-3h'  
AND h.path = '\PI-BaGenExamples'
```


Demo1: Tag Copy

PI - ProcessBook - [NESTED QUERY.PDI*]

File Edit View Insert Tools Draw Arrange Window Help

Run Query

```
INSERT INTO picomp (tag, time, value)
SELECT 'UC2002-I1' pi_tag, time, value
FROM picomp where tag = 'lef420'
and time >= '*-8h' and time <= '*'
```

Plot-0

Time	Value
3/4/2002 5:11:22 PM	1,000.00
3/4/2002 6:00:00 PM	2,500.00
3/4/2002 7:00:00 PM	3,500.00
3/4/2002 8:00:00 PM	4,500.00
3/4/2002 9:00:00 PM	5,000.00
3/4/2002 10:00:00 PM	5,500.00
3/4/2002 11:00:00 PM	6,000.00
3/5/2002 1:11:22 AM	6,157.59

LEF420
6,157.59
BBL/D

3/4/2002 5:11:22 PM 8.00 Hour(s) 3/5/2002 1:11:22 AM

Depropanizer feed

Plot-0

Time	Value
3/4/2002 5:11:22 PM	1,000.00
3/4/2002 6:00:00 PM	2,500.00
3/4/2002 7:00:00 PM	3,500.00
3/4/2002 8:00:00 PM	4,500.00
3/4/2002 9:00:00 PM	5,000.00
3/4/2002 10:00:00 PM	5,500.00
3/4/2002 11:00:00 PM	6,000.00
3/5/2002 1:11:22 AM	6,157.59

UC2002-I1
6,157.59

3/4/2002 5:11:22 PM 8.00 Hour(s) 3/5/2002 1:11:22 AM

data input via nested quer

Ready

Plug & Play Scenarios

Plug & Play by Configuration

- PI OLEDB → Office Data Connection → MS Excel 2002
- PI OLEDB → Office Data Connection → WWW
- PI OLEDB → MS SQL Server (Linked Server) → ODBC
- PI OLEDB → MS SQL Server (Linked Server) → MS Access.ADP
- PI OLEDB → MS SQL Server (Linked Server) → MS Data Analysis Services (OLAP) → MS Data Analyzer / MS Excel
- PI OLEDB → Attunity Connect → ODBC
- PI OLEDB → Data Control → Data Grid
- PI OLEDB → winAllora → XML, DOM
- ...

Data Access in Programming Environment

- PI OLEDB → ADO
- PI OLEDB → System.Data.OLEDB → ADO.NET
- PI OLEDB → Data Control
- PI OLEDB → winAllora → SAX
- ...

Demo2: Nested Query to use TagList

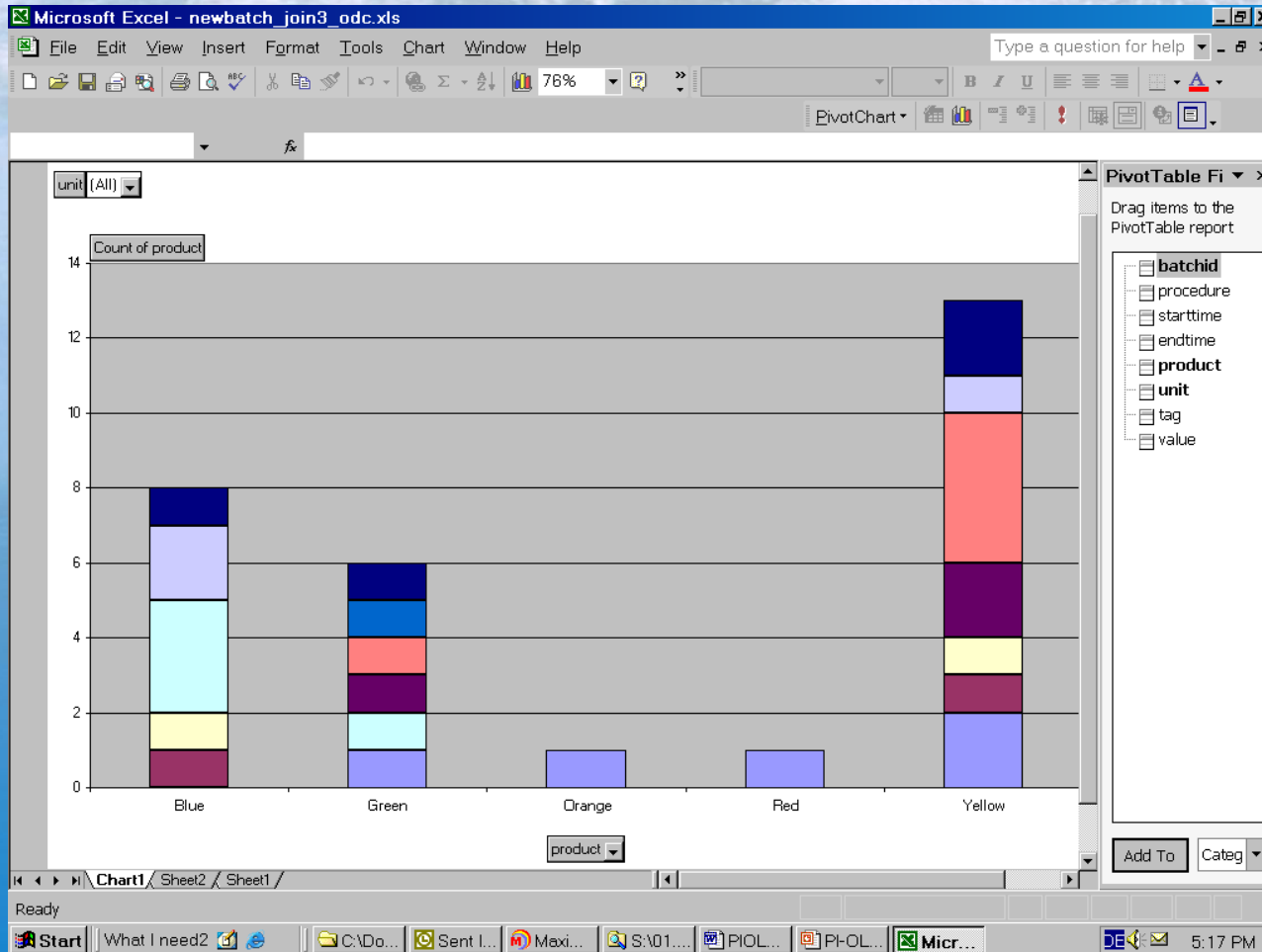
The screenshot shows the Microsoft Access interface with a query view titled "Compressed Data for TagList : View". The query is named "picomp_1" and is set to display all columns. The design grid below shows the query structure:

Column	Alias	Table	Output	Sort Type	Sort Order	Criteria	Or...	Or...
*			✓					
time						> '28-Feb-2002 00:00:00'		
tag						IN (SELECT mytags FROM TagList)		
time						< '28-Feb-2002 01:00:00'		

The SQL view at the bottom of the window displays the following query:

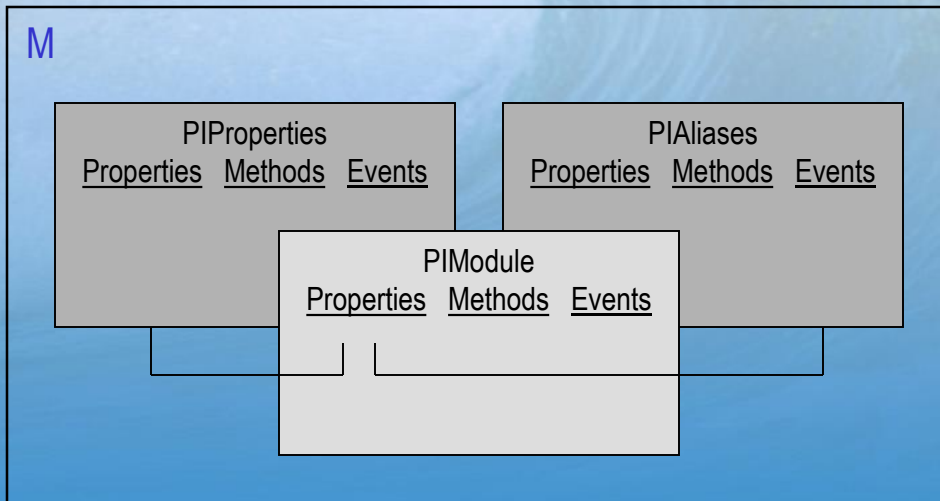
```
SELECT *
FROM PI.piarchive..picomp picomp_1
WHERE (time > '28-Feb-2002 00:00:00') AND (tag IN
      (SELECT mytags
        FROM TagList)) AND (time < '28-Feb-2002 01:00:00')
```

Demo3: PivotChart in MS Excel

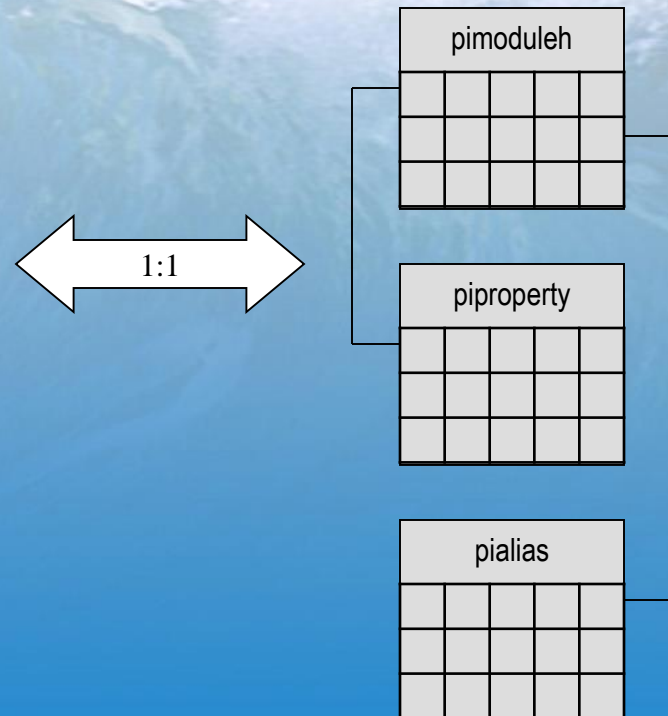


Module DB support in PI OLEDB 2.0

Object DB



Relational DB



Why SQL for ModuleDB?

- Provides different access mechanism
- ADO as programming alternative to PI SDK
- Best integration in RDBMS's
- Join with Data Archive possible
- Ideal to answer questions like:
 - <Tell me all Units that have an Alias „Temperature“ defined>
 - <List all Unit Types, in which PIBatch with id=4711 was processed>
- Many Tools for SQL type OLE DB Providers, see Plug & Play

Demo4: ModuleDB Table Structure

The screenshot shows the PIOLEDBSnapln application interface. The left pane displays a tree view of the database structure under 'Console Root' and 'PI Servers'. The right pane shows a data grid for the 'pimodule.piversion' table, with the following data:

version	effectivedate	revision	aliascount	propertycount	comment
19700101 0 0 1.0Z\5	1/1/1970 1:00:01 AM	5	2	2	
20020222 9 9 3.0Z\7	2/22/2002 10:09:03 AM	7	4	4	
*					

Below the grid, the SQL query used to retrieve the data is displayed:

```
SELECT v.moduleuid, v.version, v.effectivedate, v.revision, (SELECT COUNT(*) FROM pimodule..pialias WHERE moduleuid = v.moduleuid AND moduleversion = v.version) AS aliascount, (SELECT COUNT(*) FROM pimodule..piproperty WHERE moduleuid = v.moduleuid AND moduleversion = v.version) AS propertycount, v.comment, v.creator, v.creationdate, v.modifydate, v.obsoletedate, v.querydate FROM pimodule..piversion v WHERE v.moduleuid =
```

Demo5: Query Examples

- What modules do have a Tag Alias named “TEMP”?

```
SELECT m.name  
FROM pimodule m, pimodule..pialias a  
WHERE m.uid=a.moduleuid and a.name='TEMP'
```

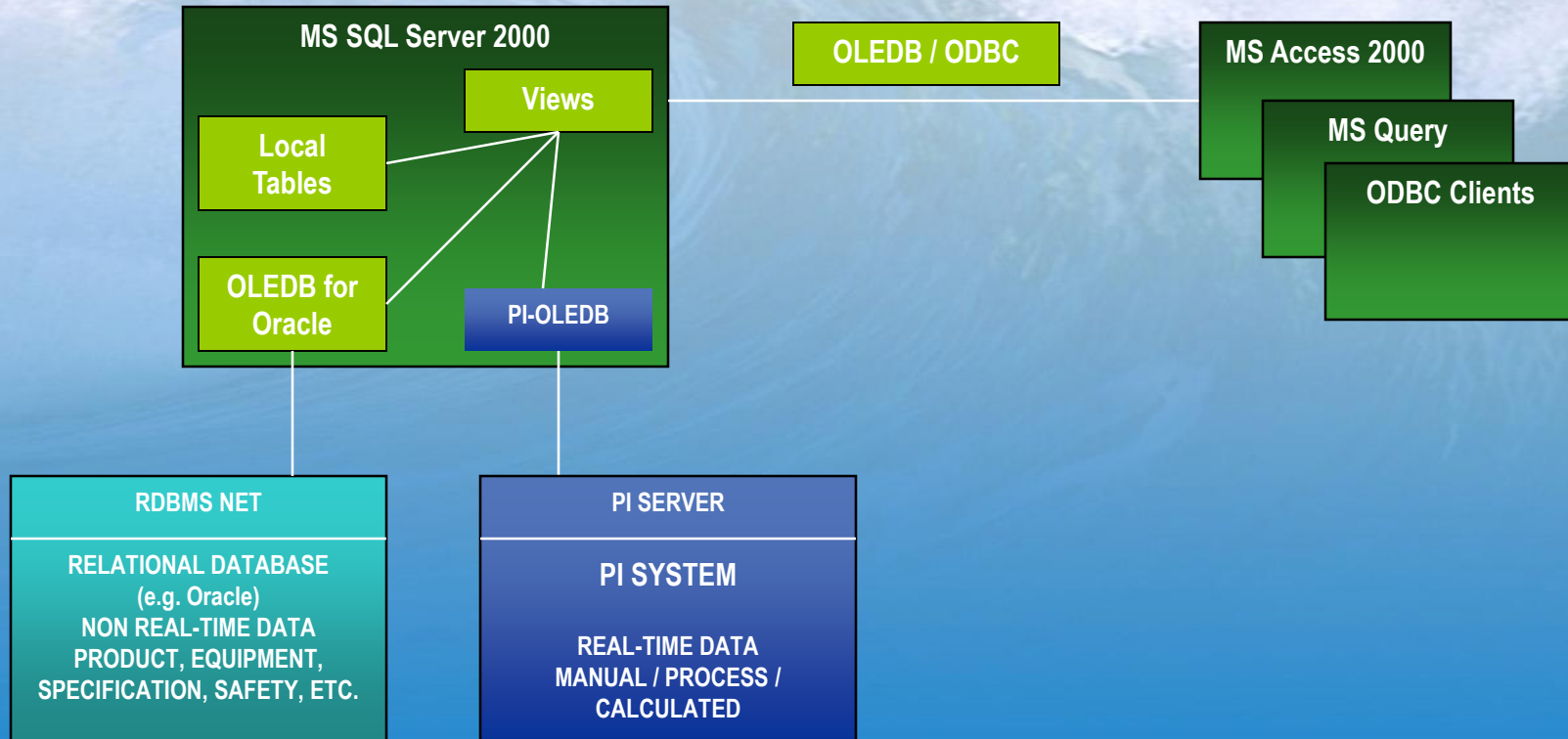
- How many units are defined in the ModuleDB?

```
SELECT count (*)  
FROM pimodule  
WHERE ispiunit = TRUE
```

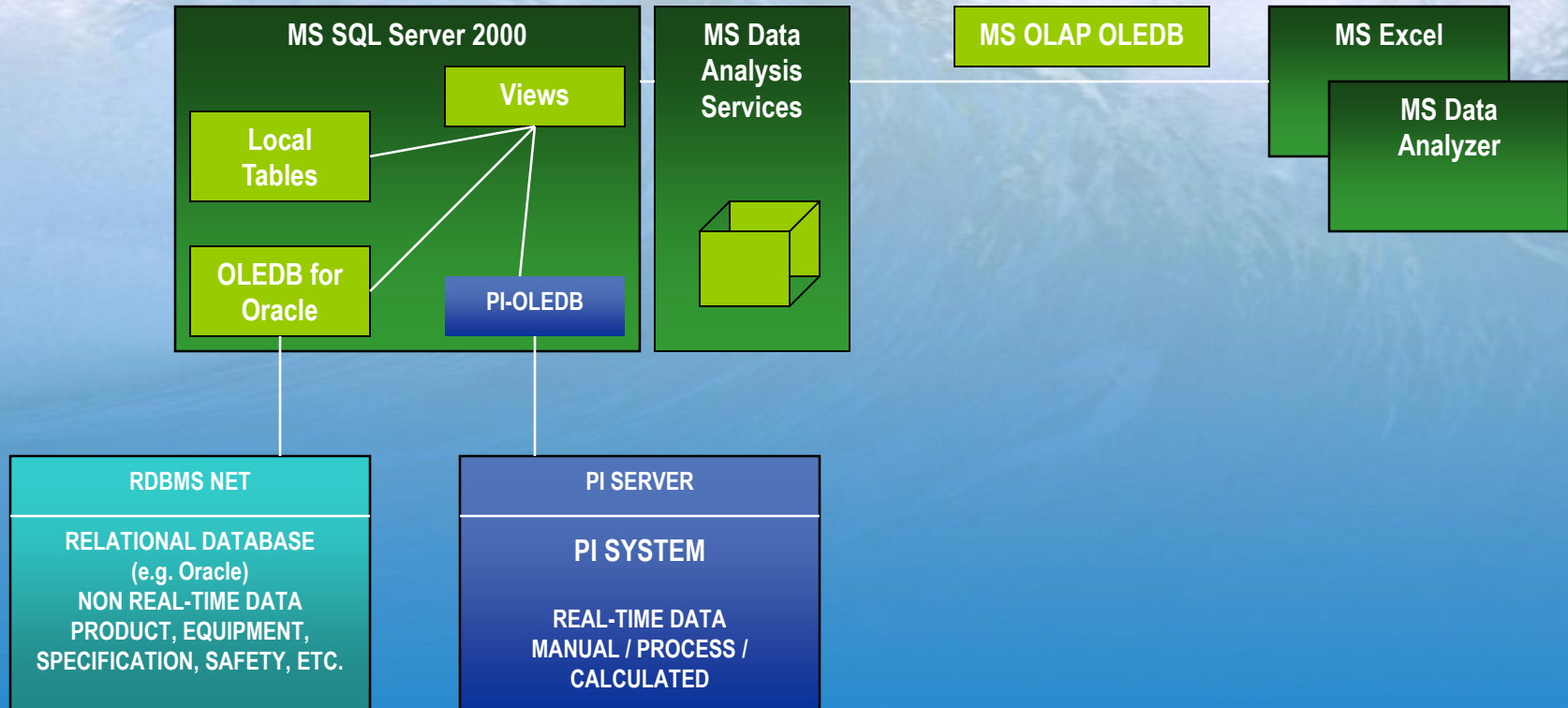
- What are the modules under the %OSI tree?

```
SELECT m.name, m.path  
FROM pimoduleh m  
WHERE path like '\%OSI\*'
```


PI OLEDB and MS SQL Server



PI OLEDB 2.0 and OLAP



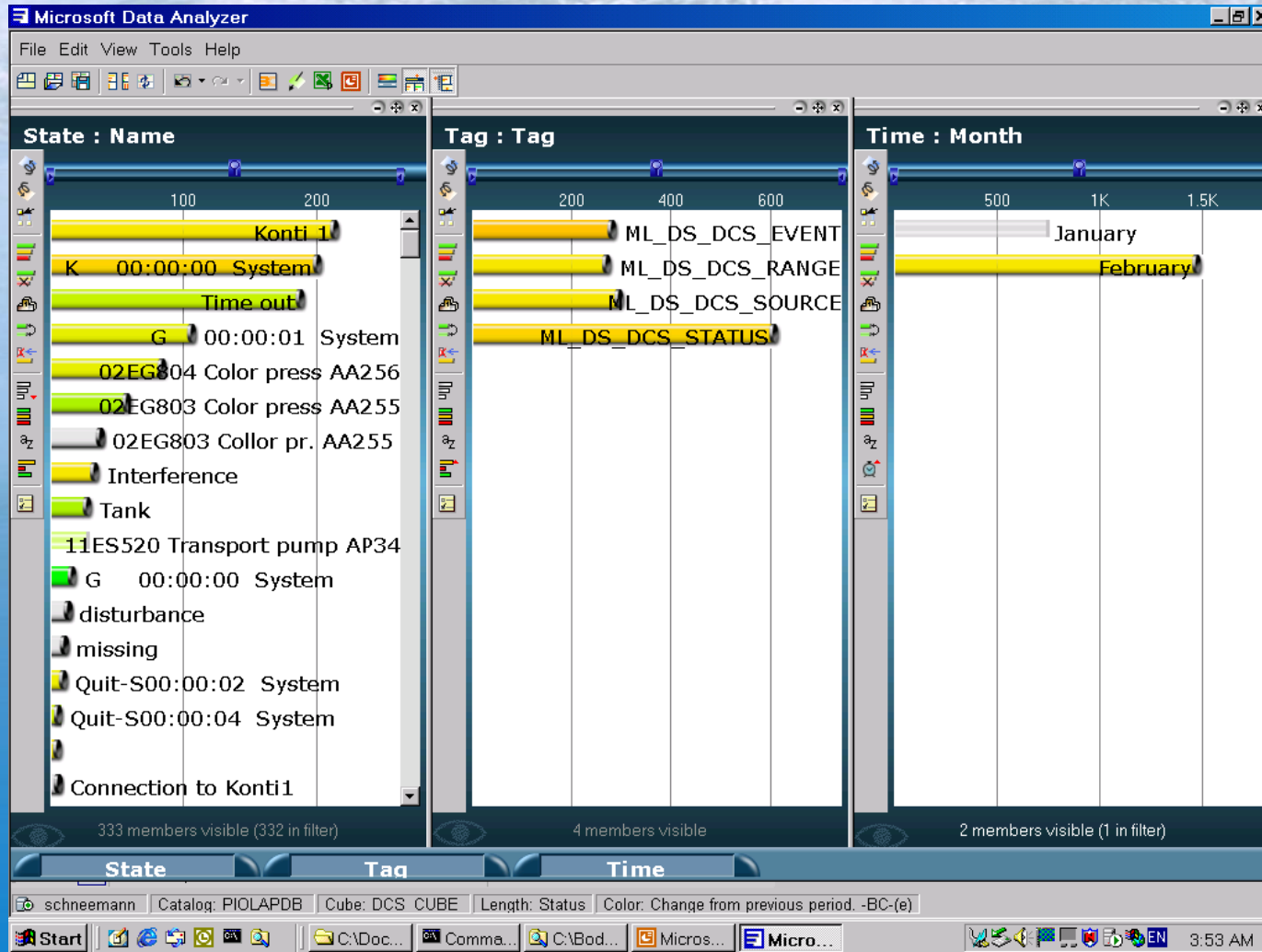
Steps to use MS Data Analyzer for PI

- Configure **Linked Server** in MS SQL Server
- Create **Views** for Fact table and Dimension tables (data amount must be limited)
- Connect to **Data Source** (the DB containing the Views) in Analysis Manager
- Create a **Cube** in Analysis Manager (define Dimensions and Measures)
- **Process** the Cube
- Connect to Cube from **Data Analyzer**

Demo6: Data Analysis Services (OLAP)

The screenshot displays the Microsoft Analysis Manager interface. On the left, the 'Tree' pane shows a hierarchy: Console Root > Analysis Servers > SCHNEEMANN > FoodMart 2000 > PIOLAPDB > Data Sources > Cubes > DCS_CUBE. The main window is the 'Cube Editor' for 'DCS_CUBE'. The left pane of the editor shows the cube's structure: Dimensions (State, Tag, Time) and Measures (Status, Calculated Members, Actions, Named Sets). The right pane shows two data sources: 'dbo.PICOMP_DCS' (Fact Table) and 'dbo.PIDS_DCS' (Dim). The 'dbo.PICOMP_DCS' source lists fields: flags, status, svalue, tag, time, value. The 'dbo.PIDS_DCS' source lists fields: code, offset, name. Below the panes is a 'Properties' section with 'Basic' and 'Advanced' tabs. The 'Basic' tab shows: Name: DCS_CUBE, Description: (empty), Data Source: SCHNEEMANN. A 'Cube' description is also present: 'The cube is a store of multidimensional data. It is defined by dimensions and measures. The cube dimensions'. The bottom status bar shows 'Done' and the Windows taskbar with the time 3:55 AM.

Demo6: Data Analysis Services (OLAP)



PI OLEDB Product Information

- Part of PI Data Access Package
 - Individual Version
 - Enterprise Version (Linked Server, Server Apps.)
- PI OLEDB 1.1
 - SQL Improvements
 - Bug fixes
 - Release Q1/2002
- PI OLEDB 2.0
 - Access to ModuleDB (read/write)
 - Enterprise Version accessible from MS Data Analysis Services (OLAP)
 - Beta Q2/2002
 - Release Q4/2002