Next Generation PI SQL

From the OSIsoft Team (Bodo Bachmann, Engineering Manager)
A little bit of history

- PI OLEDB Provider
  - Read/write
  - PI SDK based (multi-threading issues, no major enhancements)

- PI OLEDB Enterprise
  - Read
  - No integration of Data Archive
  - Scalability and performance issues
  - Complex queries (compared to PI OLEDB Provider)
Next Generation Development Goals

- Performance and scalability
- Review data model
  - Reduce query complexity
  - What are top use cases (use customer feedback)
  - Address known issues (e.g. timestep data type, PI time literals)
- Infrastructure to support multiple standards and thin clients
- Works across WAN and different time zones
- Review security and authentication
Real-Time Query Processing Engine

• Part of the PI Server integrated install kit
• Optional
Architecture

- PI SQL Client
  - OLEDB
  - ODBC
  - JDBC
  - .NET Data Provider

- Microsoft SQL Server

- PI AF Server
  - RTQP Engine

- PI Data Archive

Connections:
- HTTPS / Net.TCP
Client Installation

• No AF SDK dependency
• PI SQL Commander Lite incl. Query Compendium
Connection and Connection Options

• AF Database names can be browsed when PI Directory Service and PI Web API Core Services are configured
• Time Zone support
Catalogs and Schemas

- Connection = AF Database
- Elements and Event Frames
- Attributes and Data
- Categories and Templates
- Template based TVFs
- Multiple Value columns
- Navigation columns
Simplified Queries

Denormalization

```
SELECT eh.Path + eh.Name Element, et.Name Template
FROM NuGreen.Asset.Element e
LEFT OUTER JOIN NuGreen.Asset.ElementTemplate et
    ON et.ID = e.ElementTemplateID
INNER JOIN NuGreen.Asset.ElementHierarchy eh
    ON eh.ElementID = e.ID
WHERE et.Name IN ('Boiler', 'Heater')
```

```
SELECT e.PrimaryPath + e.Name Element, e.Template
FROM Master.Element.Element e
WHERE e.Template IN ('Boiler', 'Heater')
```
Simplified Queries

Extension

```
SELECT eh.Path + eh.Name Element, et.Name Template, ea.Name Attribute, s.Time, s.Value 
FROM NuGreen.Asset.Element e 
LEFT OUTER JOIN NuGreen.Asset.ElementTemplate et ON et.ID = e.ElementTemplateID 
INNER JOIN NuGreen.Asset.ElementHierarchy eh ON e.ID = eh.ElementID 
INNER JOIN NuGreen.Data.Snapshot s ON ea.ID = s.ElementAttributeID 
WHERE et.Name IN ('Boiler', 'Heater') 
AND eh.Path = N'\NuGreen\Houston\Cracking Process\Equipment' 
ORDER BY 1
```

```
SELECT e.PrimaryPath + e.Name Element, e.Template, ea.Name Attribute, ea.ValueTimeStamp, ea.Value 
FROM Master.Element.Element e 
INNER JOIN Master.Element.Attribute ea ON e.ID = ea.ElementID 
WHERE e.Template IN ('Boiler', 'Heater') 
AND e.PrimaryPath = N'\NuGreen\Houston\Cracking Process\Equipment' 
ORDER BY 1
```
Attribute Values and Data Types

- Only the Value column is always populated
- Unlike in PI OLEDB Enterprise, at max one native type is filled
Sample Queries and Performance
Roadmap

• **Q2/2018:**
  - PI SQL Client with OLEDB
  - PI SQL Data Access Server (RTQP Engine)

• **Q4/2018:**
  - PI SQL Client adding ODBC and JDBC support

• **Later:**
  - Direct Tag based queries
  - INSERT/UPDATE/DELETE for Event Frames and Attribute/Tag data
Questions

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Thank You

Optional: Click to add a takeaway you wish the audience to leave with.