

Selecting the Right Analytics Tool

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Introduction



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Agenda

- Introduction
- Background
- Fundamental Types of Analytics
- Comparison of PE and Asset Analytics
- Questions to Ask
- Rules of Thumb

Background

- The key purpose of an analytic is to convert data into useful information
- The good thing about PI Analytics is that there are so many options
- The bad thing about PI Analytics is that there are so many options

Two Fundamental Types of Analytics

- Back-End (Server-Side, Persistent)
 - Calculations performed by a server
 - Results are stored (typically to a PI data archive)
 - Results can be queried like any raw data
 - Calculations only have to be executed once no matter how many times they are queried
- Front-End (Client-Side, Ad-hoc)
 - Calculations performed by the client (or an intermediary)
 - Results are NOT stored
 - Calculation is performed each time the result is queried
 - Calculations are run every time a query is performed

Back-End Analytic Engines

- Performance Equations, Alarms, & Totalizers
- PI Asset Analytics
- PI Notifications
- PI ACE
- Third-Party Tools (R, Python, MATLAB, etc.)
- Custom Code

Front-End Analytic Engines

- AF Formulas
- Excel
- BI Tools (Power BI, Tableau, Spotfire, etc.)
- ProcessBook DataSets
- VBA (ProcessBook, Office Apps)
- AF Plug-ins (Sigmafine, custom, ...)
- Third-Party Tools (R, Python, MATLAB, etc.)
- Custom Code

Comparison of PE and Asset Analytics

- Equivalent Syntax (well ... almost)
- Asset Analytics has the following advantages:
 - Supports Templates
 - Supports Backfill
 - More Scalable than PE
 - Multi-line
 - Comments
 - Can trigger on multiple tags
- Performance Equations have the following advantages:
 - Can trigger on a tag not used in the calculation
 - No AF structure is needed
 - Won't stop calculating when an AF element is deleted or an AF database is deleted

Comparison of PE and Asset Analytics

- Syntax Differences
 - Date calculations in PE can sometimes be converted to scalars whereas in AA they stay Date/Time objects
 - The formula `("*" - Bod("*")) / 3600` works in PE but fails in AA
 - Some PE's don't require the time parameter (assume '*')
 - `TagVal('Sinusoid')` is the same as `TagVal('Sinusoid', '*')`
 - `PrevVal('Sinusoid')` is the same as `PrevVal('Sinusoid', '*')`
 - AA will reject the formulas missing the time parameter
 - Using Day, Month, Year, etc. as a string in a PE includes a period, AA does not
 - PE: `Year('*')` yields "2019."
 - AA: `Year('*')` yields "2019"

Comparison of PE and Asset Analytics

- Syntax Differences (cont'd)
 - The following PE functions are NOT supported in AA:
 - AlmAckStat
 - AlmCondition
 - AlmCondText
 - AlmPriority
 - Arma
 - Delay
 - Impulse
 - IsDST
 - MedianFilt

Before Picking the Analytic Engine

- Understand the need for the Analytic
 - How is it going to be used
 - How many people will use it
 - How often will it be used
- Decide if it should be Front-End or Back-End
 - Make this assessment independent of the Analytic Engine ... keep an open mind
- Understand the scalability requirements

Questions to Ask

- Sizing
 - How complex and numerous are my calculations?
 - Are my calculations iterative?
- Recalculation
 - Recalculate existing results due to possible input value changes
 - Recalculate due to missed calculations

Questions to Ask

- Positioning
 - Where is the data that feeds the analytics?
 - Where will the analytics be run?
 - Where are the users that need the analytics results?
 - Access to SMTP server (or other delivery endpoint)
 - Do I have an existing AF deployment (including both the installed software and a well-developed asset hierarchy)?

Questions to Ask

- What level of reliability is required
 - Is an HA environment required
 - Note an AF Server Collective does NOT maintain write access upon failure of the primary node
 - Also, OSIssoft no longer recommends PI AF Collectives for years
 - Is back-fill and/or history recovery needed
 - Does the source provide history
- Do the calculations have to trigger mechanisms other than writing results (i.e.: sending an SMS message or email)
- Do you need access to third-party libraries

Questions to Ask

- Is the data available in streaming or batch mode?
- Is data in time series order?
- What are the expected throughput rates?
- How often is the data collected? (frequency)

Rules of Thumb - Complexity

- Avoid Front-End calculations that are highly complex or use a lot of history
- Build layered simple calculations
- Simple calculations are typically easy to validate
- Complex calculations are typically hard to validate

Rules of Thumb - Iterative Calculations

- Iterative calculations tend to require coding
 - Custom Code
 - R
 - Python
 - Excel
- Iterative calculations tend to be expensive
 - Make them Back-End calculations (i.e.: persist results)

Rules of Thumb - Re-used Calculations

- Calculation results that are used as input for other calculations
 - Typically better making these Back-End calculations

Rules of Thumb - Visualization Calculations

- Calculations performed specifically for visualization purposes
 - Typically better off being Front-End calculations
 - Caveats:
 - The calculations should be simple
 - May use Back-End calculations to better prepare the data for the Front-End
 - If the same visualization calculation is needed for multiple displays, consider moving the calculation to the Back-End

Rules of Thumb - ACE Calculations

- Don't build new ACE calculations
 - ACE is good for iterative calculations but:
 - ACE uses PI SDK
 - ACE is Module Database Centric
 - Better off using custom code that uses the AF SDK

Rules of Thumb - Building AF Plug-ins

- AF Plug-ins can give Asset Analytics access to custom analytics and foreign data sources
- AF Plug-ins can be difficult to build (custom code)
 - Improperly coded Plug-ins can negatively affect the performance of PI AF
- Note: Many Plug-ins are “Front-End”

Rules of Thumb - Asset Analytics

- Limit the number of variables/lines
- Keep in mind that Asset Analytics is more scalable than PE, but it is NOT horizontally scalable (yet)

Questions?

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the **microphone**

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