

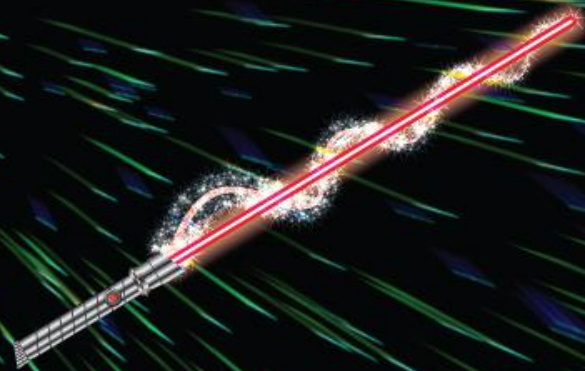
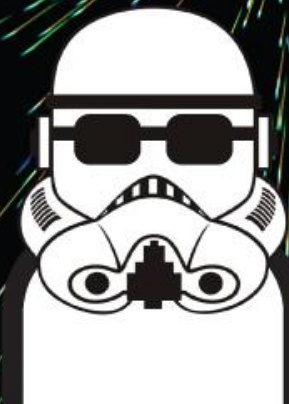


# PI Developer Community

Presented by **Ahmad Fattahi**

**Group Leader, Technology Enablement, OSIsoft**

# WELCOME TO THE GEEK SIDE





**Welcome to TechCon!**

# PI Developers Club



**Community of PI  
System Builders**

**Developer  
Technologies**

**Data Science**

**Innovation**

Members  
4700

Social  
interactions  
3000+

Webinars  
9

Hackathons  
6

**Interested in Hackathon as a Service?  
Talk to us!**

# Upcoming Enhancements

Trial Subscription

Self-service Account Management

Enhanced User Experience

# GitHub

- 23 repositories
- Collaboration
- White papers, UC labs
- Wishing for **Open Source**? Talk to us!





Learn how to add a custom symbol, created with JavaScript and HTML, to PI Vision 3

Add topics

77 commits 1 branch 2 releases 5 contributors

Branch: master

New pull request

Create new file

Upload files

jgolla committed on GitHub Merge pull request #30 from danielElopez/master

Community Samples Updated the readme for the FFT symbol

tutorials update product name

LICENSE Update copyright year

README.md fixed link to the documentation

# OSIssoft on GitHub

## github.com/osisoft



# TechCon

**Thursday all-day**

**18 hands-on labs  
15 presentations**

**Partner and  
Product Expo**

**Closing  
Reception**

# Users Conference Hackathon

Data sponsor:  
**Vitens**

- Innovation for Better Drinking Water

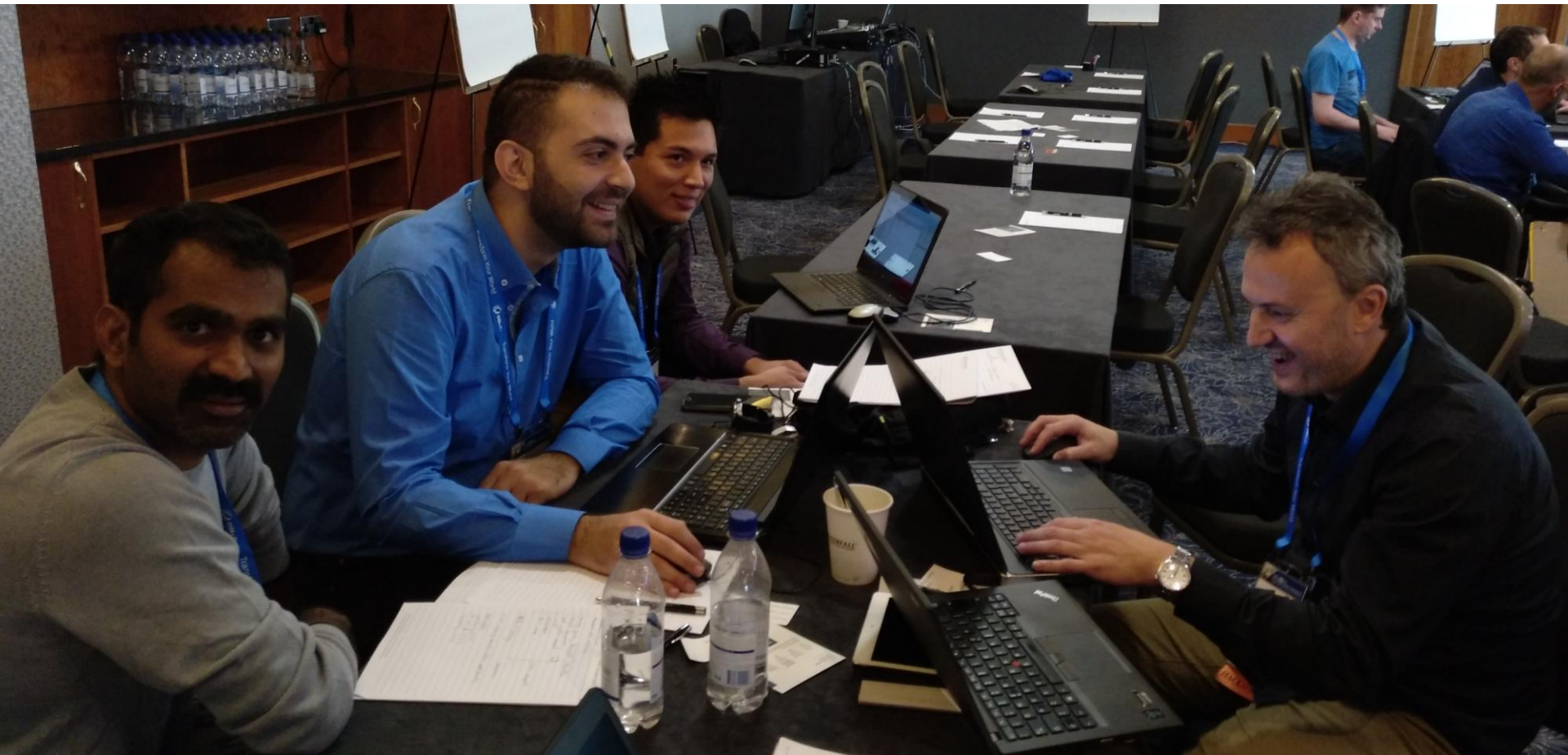
7 Teams

- 24 Hackers
- 23 Hours



















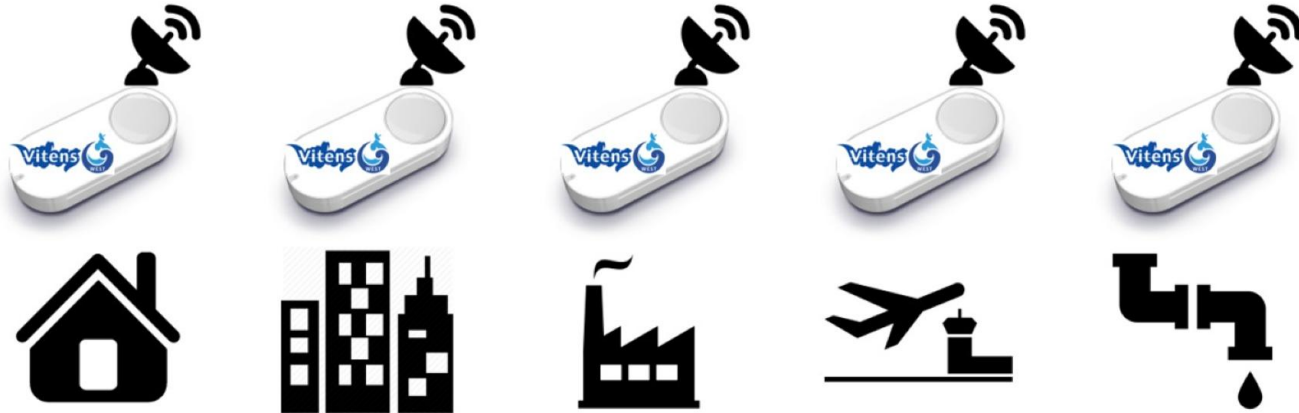


# Team Living on the edge – 3<sup>rd</sup> Place

Rhys Kirk, Jason Sandy, Francis Agyei, Chris Cody

- OSIssoft Edge Historian that allows customers to send instant feedback and telemetry to Vitens

- Raspberry Pi 3 **Retro Gaming Bundle**
- One **free subscription to PI DevClub**
- **Public recognition**
- Presenting at the **Pitch Panel**



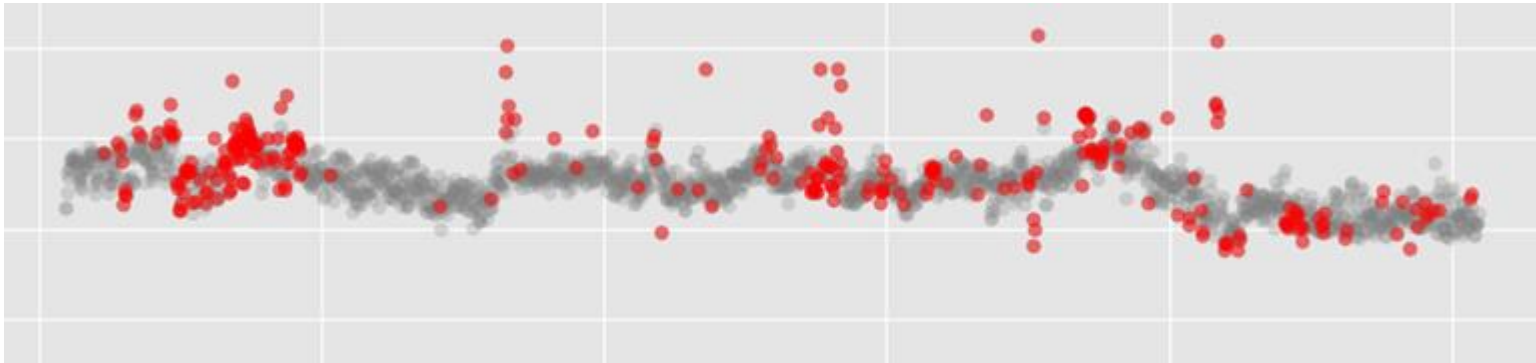


# Team Diet Coke – 2<sup>nd</sup> Place

Alexander Gleim, Achilleas Kasfikis, Albert Barstad, Christopher Schröpfer

- Monitoring water quality by combining multiple sensors to get robust anomaly indication
- Spatial density-adaptive anomaly detection to monitor water quality

- Ultimate 4tronix initio 4WD **Robot Car Kit**
- One **half-priced registration to the UC** over the coming year
- One **free subscription to PI DevClub**
- **Public recognition**
- Presenting at the **Pitch Panel**



# Team connectPoint – 1<sup>st</sup> Place

Gregor Biering, Marek Zajac, Jakub Kowalski,  
Przemyslaw Kuczynski

- A connected system that combines real-time data, detects anomalies
- Provide the information to the right person to enable the right action

- Kuman Professional WiFi **Smart Robot Car kit with Camera**
- One **free registration to the UC**
- One **free subscription to PI DevClub**
- **Public recognition**
- Presenting at the **Pitch Panel**





OSIsoft®

PI World

Users Conference • San Francisco 2018

APRIL 23 - 27, 2018



# Contact Information

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Group Leader, Technology Enablement



# Roadmap for PI Developer Technologies

Presented by **Ray Verhoeff, David Hearn,  
Mike Sloves, Bodo Bachmann**



# Custom Applications for Your Business

- Desktop applications
- Mobile applications
- Business system integration
- Web services:
  - Much like PI Web API but built by you based on your own service designs
  - Same requirements as us:
    - Performance, scalability
    - Security
    - Large number of users

# PI Developer Technologies

## PI AF SDK

- A single high-performance .NET Framework SDK that gives you to access all PI System data

## PI Web API

- Modern REST-based web service standard, ideally suited for many platforms

## PI SQL Products

- Use SQL client applications to access PI System Data
- Integration with business systems

## PI OPC Servers

- Enables access to PI from OPC client applications
- Integration with industrial information systems

# Pricing



# PI Developer Technologies

- [Overview on the Technical Support website](#)
- [Product Roadmap](#)
  - Look for the “Developer Technologies” group
- [PI Developers Club](#)
  - Part of [PI Square](#)
- Code samples on [GitHub](#)
  - See OSIsoft’s organization at <http://www.github.com/osisoft>

# Getting ideas from you!



USERVOICE

- <https://feedback.osisoft.com/>
- Making it easier to send us suggestions
- Vote suggestions up or down
- Embedding UserVoice into our products
- *Problems should still go to Technical Support*

# At the Conference



- Presentations
- Product Expo
- PI Geek Bar
- Learning Labs

## Presentation

- “How to pick the right PI Developer Technology for your Project”
  - Today, 11:15 – 12:00
  - Arora 16

## Hands-On Lab

- “Build Applications for the PI System: Learn Basics of Developer Technologies”
  - Today, 10:10 –13:10





# AF SDK

# AF SDK: What's new and what's coming

- Notifications and Analytics
- Multicultural support:
  - UOM Group Mapping
  - Attribute Description Override
- Ongoing initiatives:
  - More context
  - Performance
  - Search, Aggregation
- Other Enhancements and New initiatives

# Notifications and Asset Analytics

## *How can I interact with PI System Services?*

- New architecture for Notifications – much more scalable (2016 R2)
  - Configure via AFNotificationRule (no more AN SDK)
  - Triggers on Event Frames matching search criteria
  - History stored on Event Frame
- Asset Analytics
  - Queue backfilling, auto-recalculation of analyses
  - Output to Event Frames created from Analyses
  - New analytic functions for linear regression, covariance
  - Derive Event Frame context from Start Time, End Time, and Duration

# UOM Group Mapping

*How can I see values in my desired units?*

- Select desired UOM Group (e.g. Metric or US Customary)
- Clients automatically convert value to mapped UOM

General

Name: inch

Abbreviation: in

Description:

Origin: System Defined

Canonical UOM: meter

Reference UOM: meter

Method: Type  
 Simple  Formula

Factor: 0.0254

Offset: 0

0.0254 m

UOM Group Mappings

Group	Mapping
Metric	centimeter (cm)
My Custom Mapping	centimeter (cm)
US Customary	centimeter (cm) foot (ft) International nautical mile (nmi) kilometer (km) meter (m) mile (mi) millimeter (mm) sixteenth of an inch (sixteenth of an inch)

Default UOM: inch

Value Type: Double

Value: 457.2 cm












Data Reference: <None>

Settings...

# Attribute Description Override

*How can I specify region-specific names for an attribute?*






- You can now override attribute descriptions defined by a template.*
- Searches updated to support description overrides.*


     Name	Value	Description
  Area	200 ft2	Area
  Cold Side Temperature Difference	110.37917327...	Diferencia de temperatura en la cara fría
  Hot Side Temperature Difference	168.71165466...	Diferencia de temperatura en la cara caliente

# Attribute Traits

*How can I know what to query without user input?*

- Automatically use relationships without configuration
  - Forecast, Limits, Analysis Triggers (2016)
  - Locations (2016 R2)
  - Reason (2017 R2)
- Evaluate limits for attribute
- Trend prediction with actual
- Relate asset to its location
- Identify reason for Event Frame

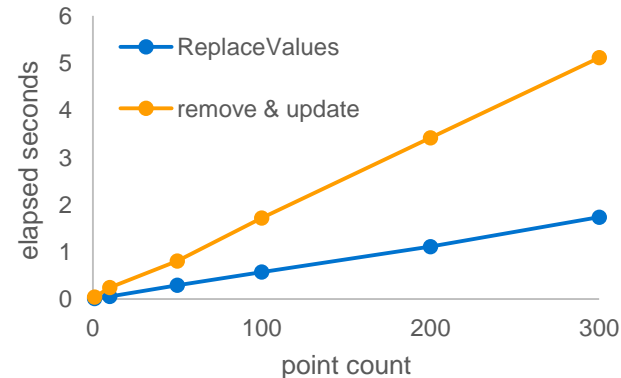
Name	Value	Trait
 Level	34.02396	
 High Level	80	Hi
 Low Level	20	Lo
 Predicted	58.4995155	Forecast
 Target	37.67728	Target

Name	Value	Trait
 Reason Code	Maintenance	Reason

# Performance and Efficiency

*How can I get data in and out of PI System more efficiently?*

- Asynchronous data read/write calls (2016)
- Replace values in bulk call (2016 R2)



# Search

*How can I quickly get the data I need from the PI System?*

- Filter-based searches - much more flexible (>40 filters)
- Many new fields to filter on
  - “Template:‘Tank Event’ Start:>=’\*-3d’ |Level:>=45.0”
- Server cache, full load of matches, client-side matching (2016)
- Light-weight search (2017)
  - No SDK object loaded
  - Only gets requested fields
- PI Point search by value/timestamp/status (2017)
- Search for attributes (2017 R2)

```
class Dto
{
    public Guid ID;
    public DateTime StartTime;
    [AFSearch.ObjectField("|Level")]
    public AFValue Level;
}
IEnumerable<Dto> matches =
    search.FindObjectFields<Dto>();
```



# Search Aggregates

## *How can I aggregate data efficiently?*

- Search aggregates (2017)
  - Summaries (min, max, count average, total, etc.)
  - Grouping (discrete)
  - Binning (continuous)
  - Can be layered, done in bulk
  - Built on light-weight search
- Server-side support for aggregates (Future)

```
// outage count by week
search.Histogram(
  field: "StartTime",
  bins: beginningOfWeeks);

// average duration by reason
search.GroupedSummary(
  groupedField: "|Reason",
  summaryField: "Duration",
  summaryTypes:
    AFSummaryTypes.Average);
```

## Other Enhancements in 2017 R2

- *Identify OSI provided UOMs*
- *Hierarchical enumeration sets*
- *No longer need to specify "AllowExtensions" to add categories to an element defined by a template.*
- *Element attribute value in naming pattern*
- *Various audit trail and viewer enhancements*

# Future Initiatives

## *What's next?*

- Data quality
  - Flag stale data
  - Propagate quality information
- Improved search capability and performance
- Display digits for Attributes
- Analytics 3rd party integration (e.g. MATLAB)
- Event frame scale-out
- .NET Standard (Core compatible) option

## Also of interest for AF SDK developers

- Presentations
  - PI Server 2017 (11:15-12:00 – Arora 11)
  - Best Practices for Building AF SDK Applications (12:15-13:00 – Arora 16)
  - Best Practices for Implementing PI AF – Customer Testimonials (14:30-15:15 – Arora 11)
- Hands on Lab (requires pre-registration)
  - Getting Started with the AF SDK (14:30-17:30)

# PI Web API

# PI Web API 2017 R2

- Releasing November 2017
- Continued Performance Improvements
  - Overall query performance
  - Concurrent Users
- Support Mixed Authentication in Chrome
- StreamSetController streams results
- Batch calls in Read-only mode
- Point Counts & License Limits
- Swagger improvements
- Web ID 2.0
- New AF Search syntax support
- Federal Information Processing Standards (FIPS) Support in Indexed Search
- Bug Fixes

# PI Web API 2018

- MORE performance improvements
- Support File Annotations
- Support Notifications
- Support PI System Health Services
- Services to find changes in the PI System
- Support NEW AF Search

# Presentation

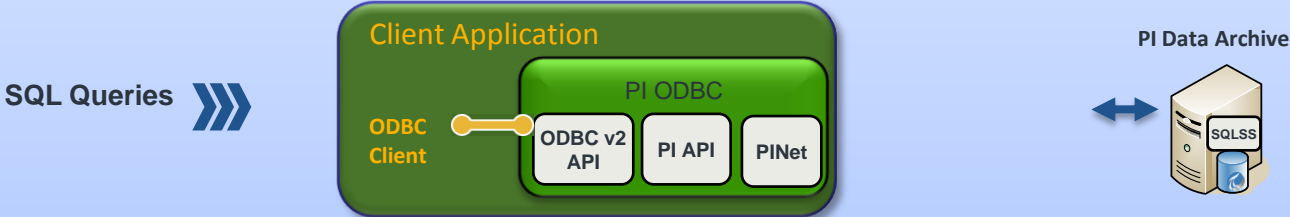
- “Build a Secure, Public-Facing PI Web API Environment”
  - Today, 15:25 – 16:10
  - Arora 16



# PI SQL Family

# PI SQL Family Evolution

## PI ODBC

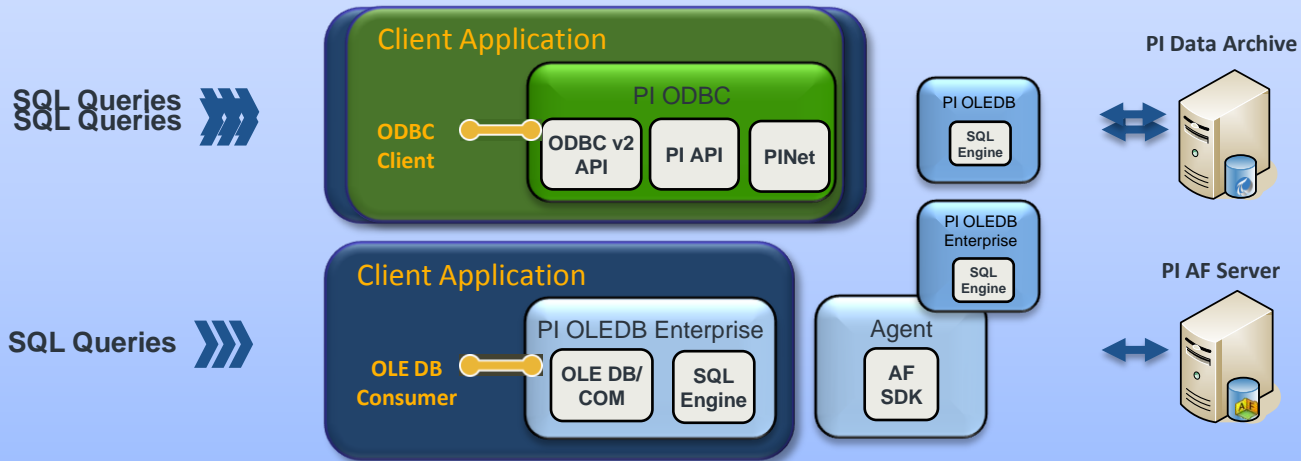


# PI SQL Family Evolution

PI ODBC

PI OLEDB Provider

PI OLEDB Enterprise



# PI SQL Family Evolution

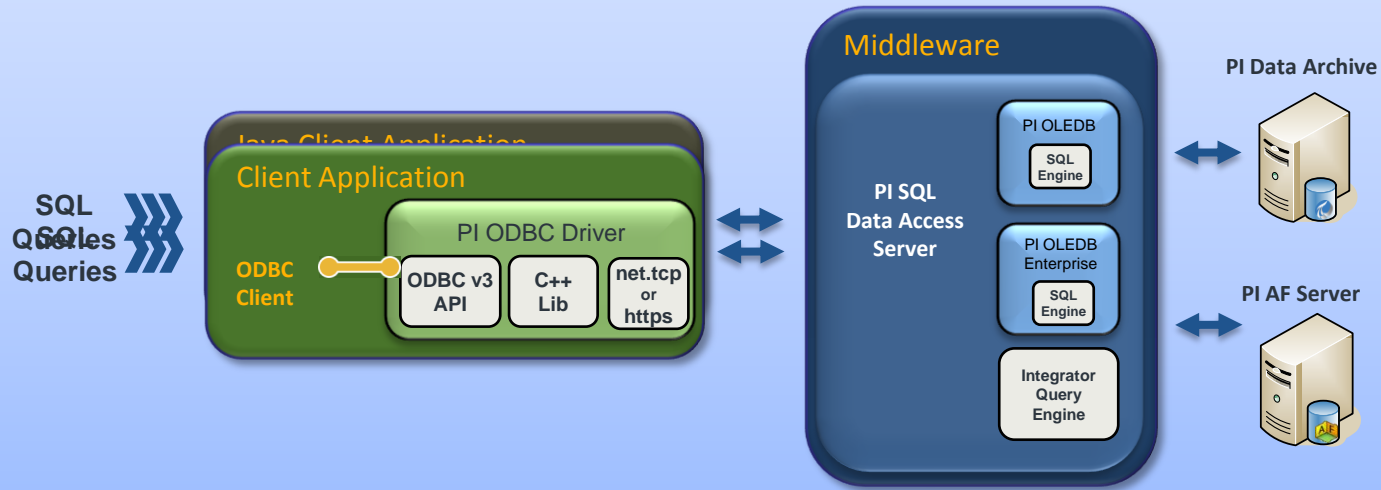
PI ODBC

PI OLEDB Provider

PI JDBC Driver

PI OLEDB Enterprise

PI ODBC Driver



# PI SQL Family Evolution – in Development

PI ODBC

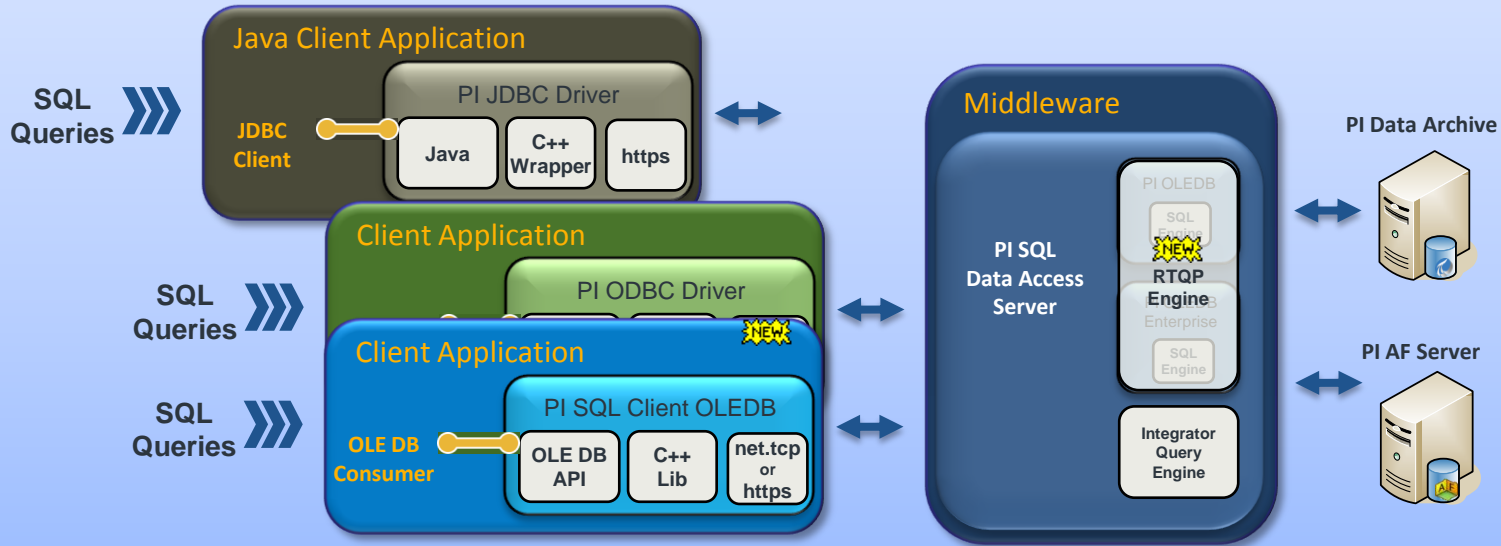
PI OLEDB Provider

PI JDBC Driver

PI OLEDB Enterprise

PI ODBC Driver

PI SQL Client OLEDB

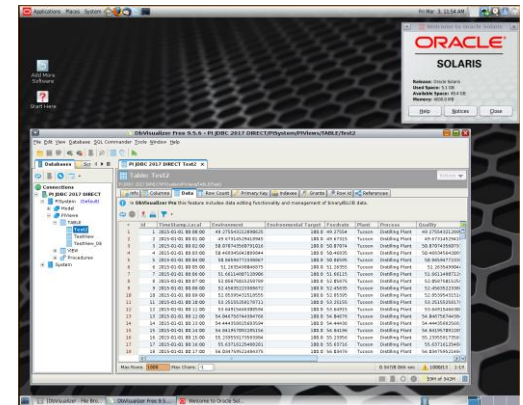
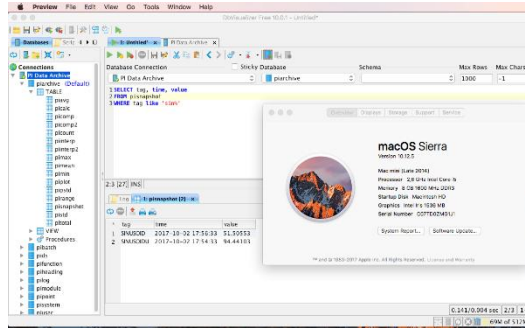


# Goals

- Performance
  - Scalability
  - Simplify E-R Model
- 
- Community Technology Preview (CTP) program under way
  - Talk to Ray Verhoeff, Product Manager

# PI SQL Family Evolution – in Development

- New Real-Time Query Processing Engine (**RTQP Engine**)
  - Redesign PI SQL access to AF
- New OLE DB Provider (**PI SQL Client OLEDB**)
  - Leverage new architecture (query execution close to data store)
- PI JDBC
  - Pure Java version (more platforms)



## Hands-On Lab

- “Utilizing MS SQL Server Integration Services for Reporting PI Data via Email or Flat File”
  - Today, 10:10 – 13:10
  - Arora 16



# PI SDK

# PI SDK 2016

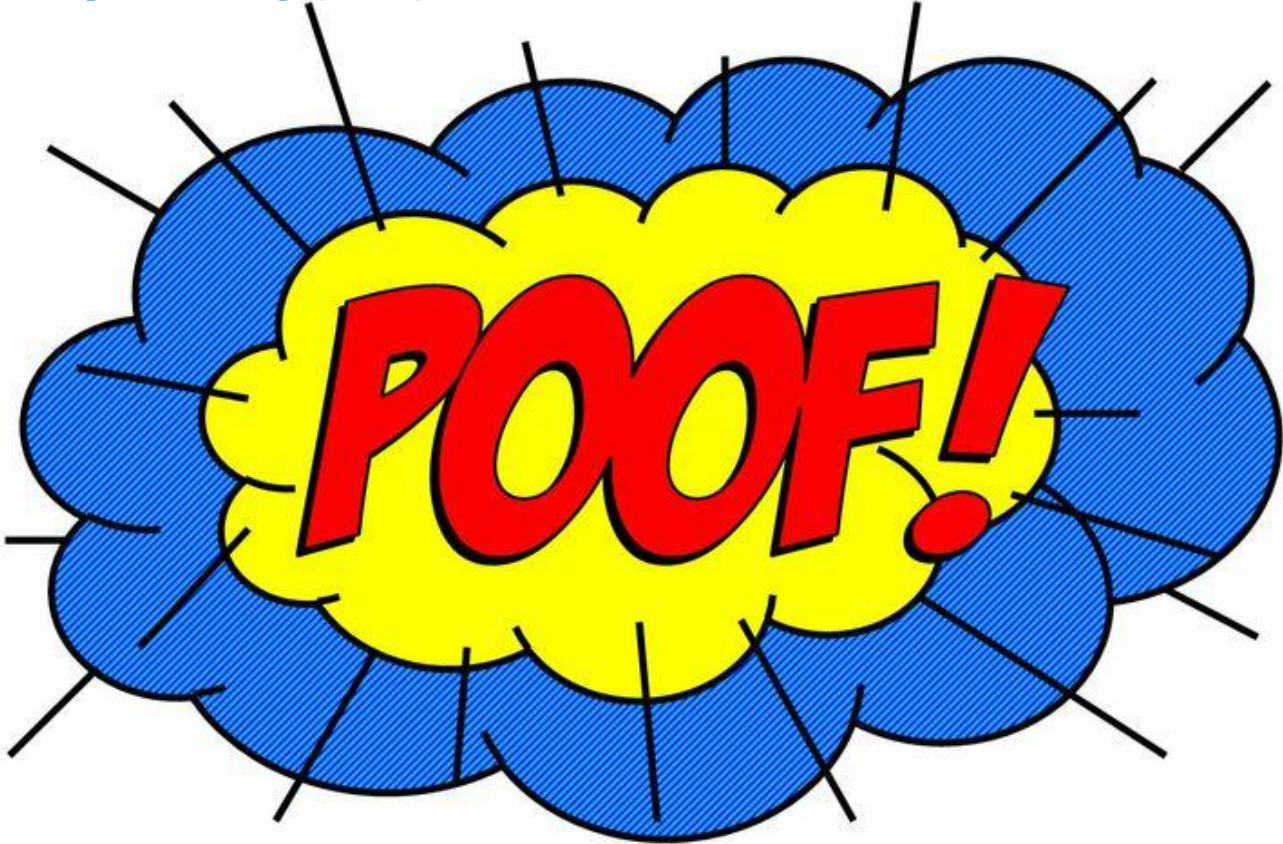
- Big Security Improvements
  - Transport Security (with PI Data Archive 3.4.395 or later)
  - Takes advantage of newer, more secure compiler
    - SafeSEH Exception Handling Protection
    - SEHOP
    - Heap Metadata Protection
    - Increased protection against buffer overrun exploits
    - Control Flow Guard
    - SDLC Checks
  - VB6 ActiveX components
    - Update to latest PI SDK to mitigate known security issues fixed by Microsoft

# PI SDK 2018

- More improvements to security
  - Use of static analysis tools to find known problems
  - Removing of deprecated calls
- Bug Fixes

# PI OPC DA/HDA Server

# PI OPC DA/HDA Server



# PI OPC HDA Server

# PI OPC HDA Server 2016

- Bug Fixes
  - 2 Memory leaks addressed
    - TimeAverage reads
    - Repeated connection / disconnection
  - OPC HDA v1.2 compliance issue – PercentGood is now time-weighted
  - Misc Bug Fixes: Null pointers, empty strings, ItemHandle release
- End of support of Module Database

# PI OPC DA Server

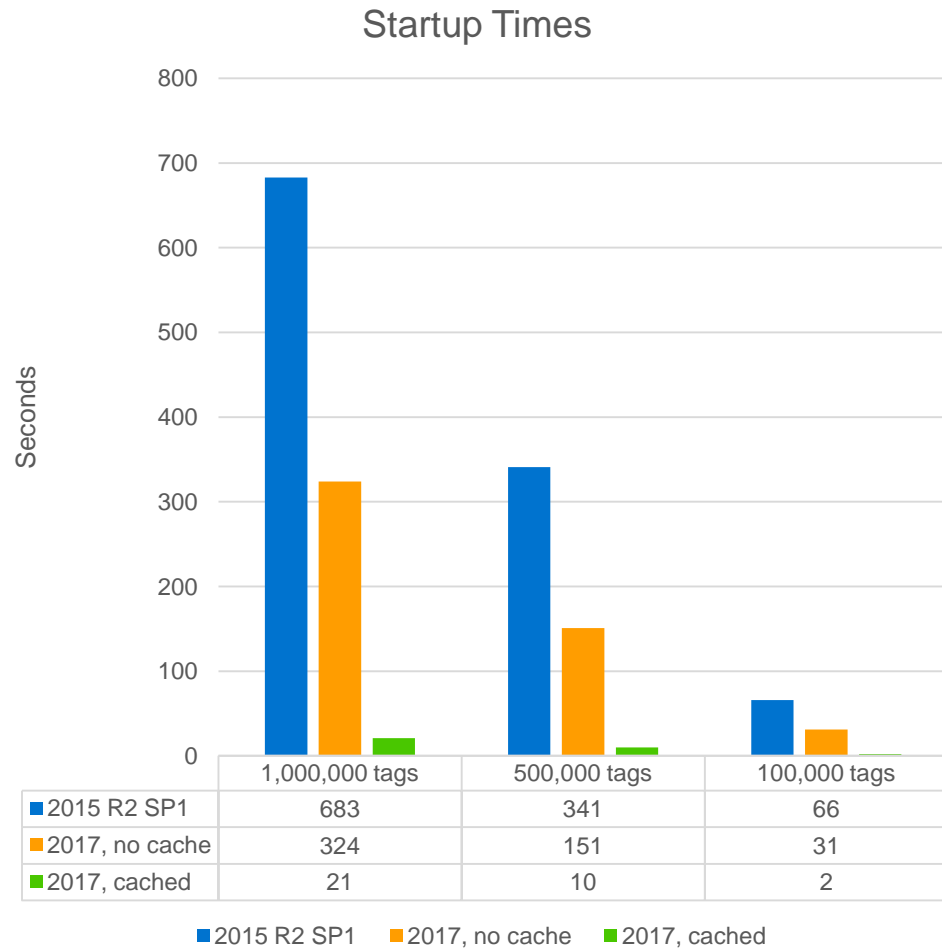


# PI OPC DA Server 2015

- Uses AF SDK to access PI Data Archive
  - Eliminates server-crashing bug inherent to previous architecture / design
  - Improved security (vs. using PI SDK / PI API)
- Very long start-up time ☹️

# PI OPC DA Server 2017

- 50% faster initial startup time than 2015
- Namespace Data cached on shutdown leads to...
  - 95% faster startups!



# PI OPC DA Server 2018

- Additional optimization to initial times
- Advise event when only the timestamp changes
- Future data support
- Whitelist/blacklist of PI Data Archives
- Bundle OPC Tools

# Contact Information

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Engineering Manager

감사합니다

Danke

谢谢

Merci

Gracias

**Thank You**

ありがとう

Спасибо

Obrigado