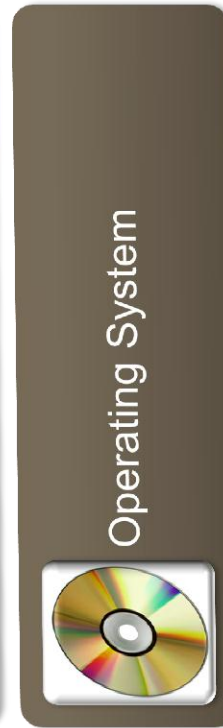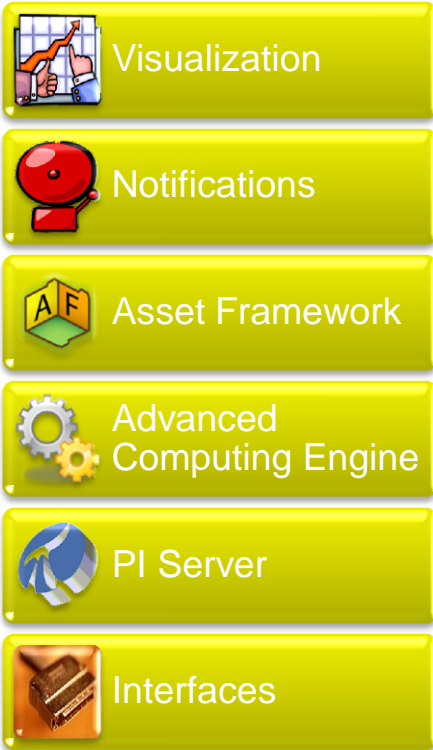**OSIsoft®**

REGIONAL SEMINARS 2012

The **Power** of **Data**

Architecture Recommendations and Best Practices for PI Systems

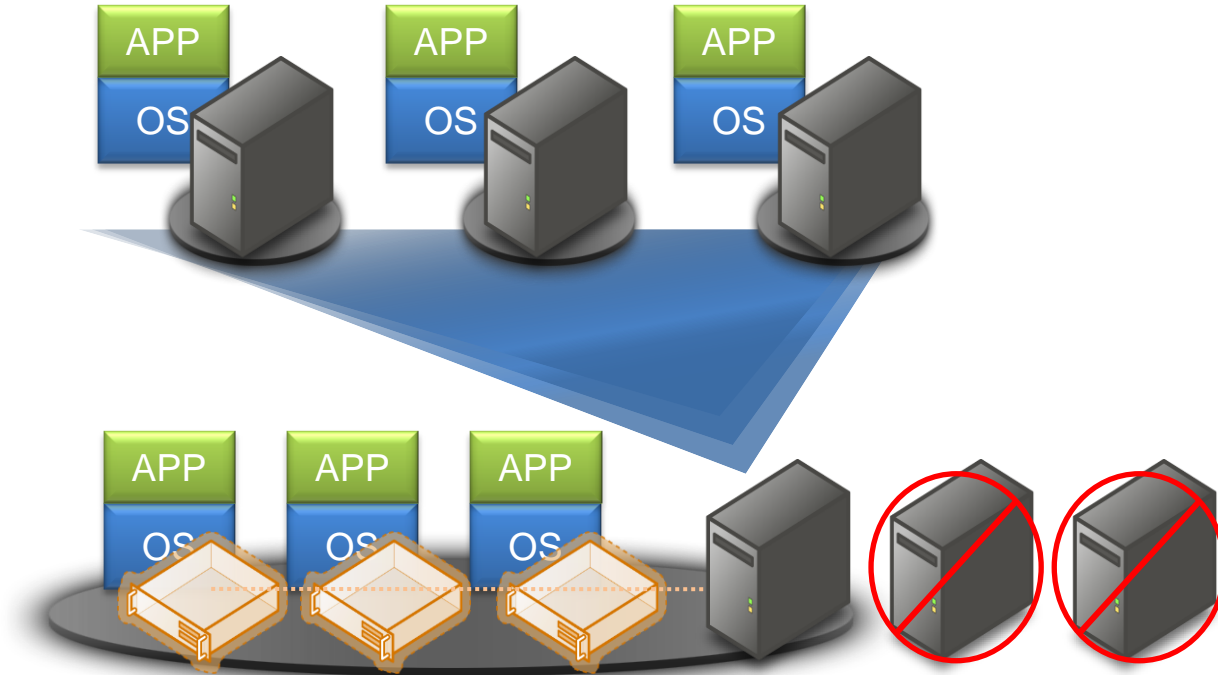Presented by **Bruno Bachiega & Megan Vining**

Areas of discussion & Topics Outline

- Visualization
- Notifications
- Asset Framework
- Advanced Computing Engine
- PI Server
- Interfaces

- Hardware/Virtualization
- Operating System
- High Availability
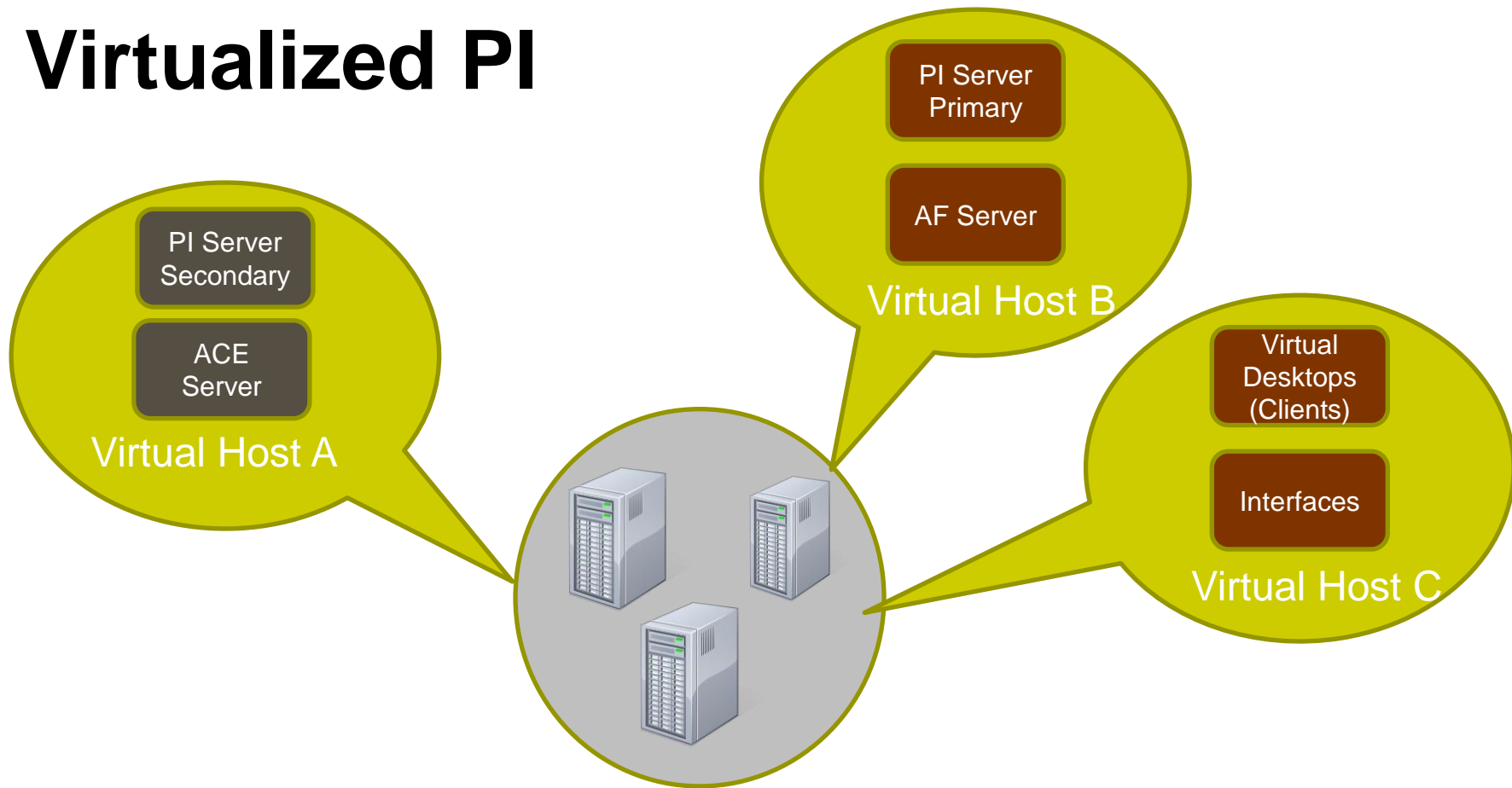- Security

Hardware and Virtualization

4

Hardware Virtualization

Operating System Virtualization

- Why are OSIsoft customers using Virtualization?
  - Server consolidation
  - Improved availability and provisioning

- OSIsoft supports virtualization
  - OSIsoft Knowledge Base article 3062OSI8
  - Consider shared resources implications

Operating System Virtualization*

- Treat virtual machines as if they were physical machines

- Invest in Enterprise-level hardware and software

- Do not mix virtual and physical on the same host

- Use qualified Virtualization support personnel

- Test on the target platform

* OSIsoft Center of Excellence

64-bit Support

Why 64 bit?

Access to larger memory footprint

- *No more 2GB limitation on windows for 32-bit processes*

Example:

- *PI ACE can support more contexts per calculation*

PI System 64-bit OS Support

- Several products support native 64-bit operation
  - *Examples: PI Server, PI Webparts, Asset Framework, PI ACE Scheduler*

- Windows compatibility layer enables 32-bit programs to run on 64-bit
  - *Example: Interfaces*

- Future product releases will support native 64 bit
  - *Example: PI Datalink*

PI System 64-bit (Exceptions)

- PI Add-ins for MS Excel
  - *Example: PI Datalink*
- PI-RDBMS Interface
  - *Interface version , ODBC driver and Data source need to match*
- PI ActiveView & PI Graphic (SVG) require 32-bit Internet Explorer
 - *Add-ons are 32 bit only for now*

Watch out!

- Double check with support
  - *Release Notes, Technical support*
- Applications that are plug-ins (or run by another application)
  - *Microsoft Internet Information Server, MS Office 2010*
- Where 3rd party libraries (dlls) need to run with another application
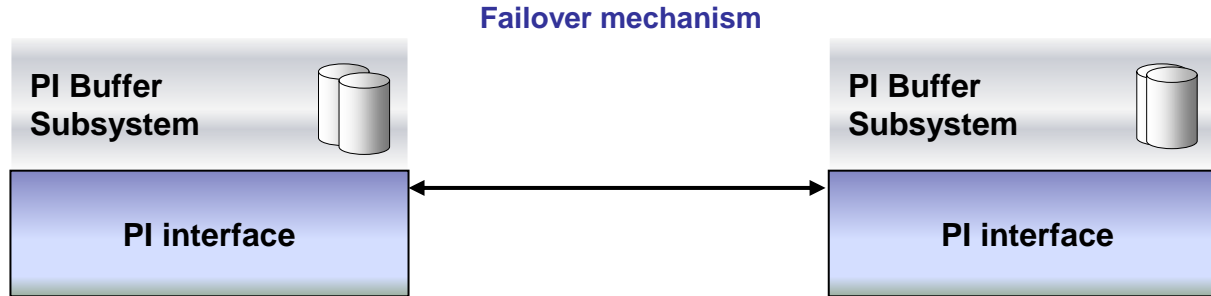 - *RDBMS interface*

PI Interfaces

Interface Buffering

- Stores data in the event of disconnection from PI Server(s)
  - ➢ Minimize data loss
- Two flavors
  - **PI Buffer Subsystem (pibufss)**
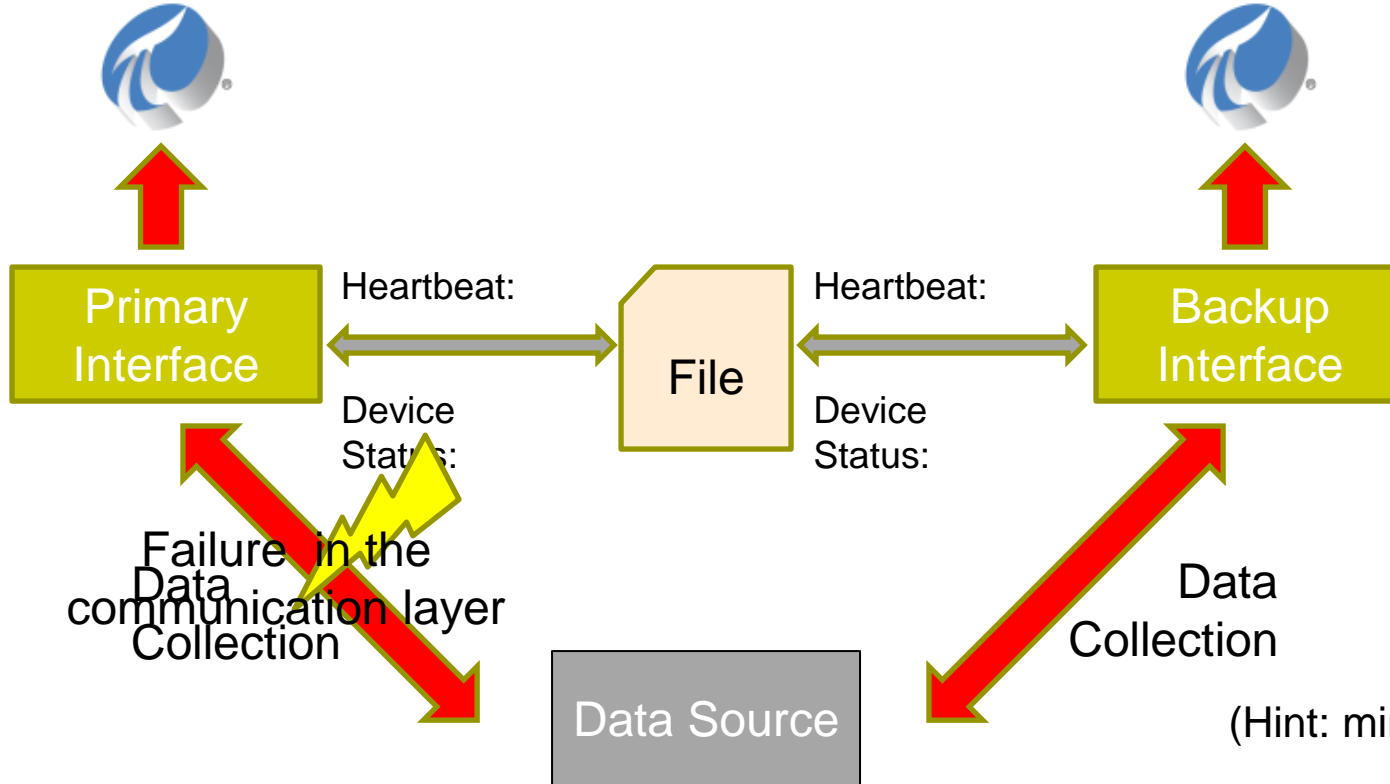 - PI Buffer Server (bufserv)
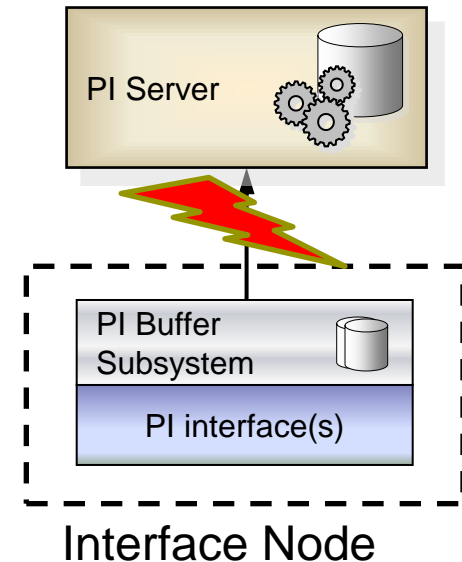
Interface Node

Why use interface failover?

- Support failure of data collection
  - Minimize data loss
- Synchronization is with the data source (Phase 1)

or

- **Synchronization is between the interfaces (Phase 2)**

Failover mechanism

How does interface failover work?

Primary
Interface

Heartbeat:

File

Heartbeat:

Backup
Interface

Device
Status:

Device
Status:

Failure in the
communication layer

Data
Collection

Data
Collection
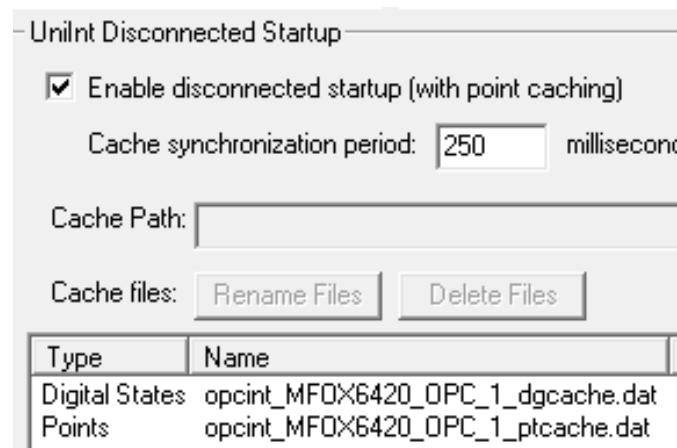
Data Source

Hot = No data loss
Warm = Maybe data loss
Cold = Some data lost

(Hint: minimize data loss by using disconnected startup)

Disconnected Startup

- PI Interfaces connect to the PI Server to get their tag definitions

  - No PI Server = No tags = Interface can't start

- Creates a local cache of all tags

  - Don't need the PI Server to start

- Faster interface startup times

- Lots of edits? Delete the cache files before restarting

UniInt Disconnected Startup

☑ Enable disconnected startup (with point caching)

Cache synchronization period: 250 millisecond

Cache Path:

Cache files: Rename Files   Delete Files

Type	Name
Digital States	opcint_MFOX6420_OPC_1_dgcache.dat
Points	opcint_MFOX6420_OPC_1_ptcache.dat

PI Interfaces - Best Practices

- Configure buffering with PI Buffer Subsystem
- Consider implementing failover support
- Disconnected start-up
- Create interface health points
- Configure 2+ trusts using a limited account (not piadmin)
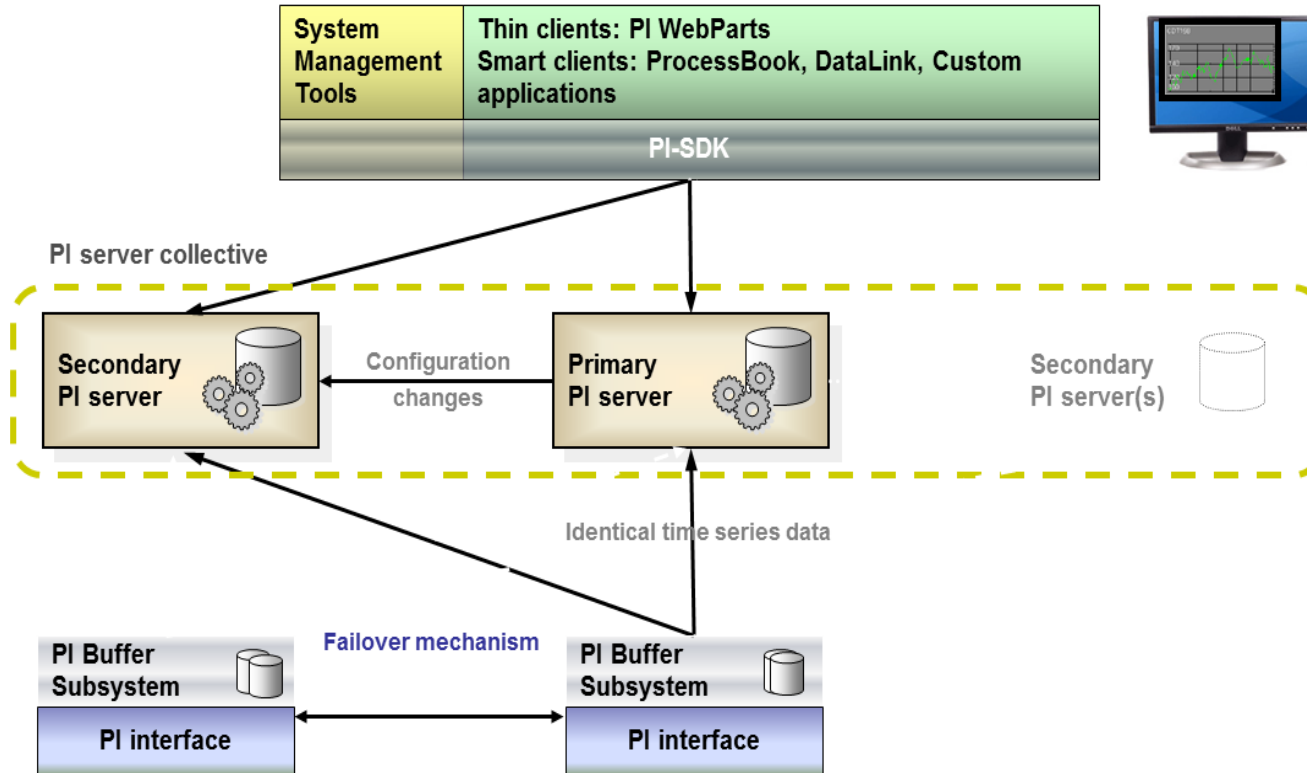- Don't forget to test!

PI Server High Availability

PI Serve High Availability (collective)

- Benefits
  - Maximize data access for clients
    - availability during scheduled maintenance
  - Load balance
    - Connect to closest PI Server member
- Best Practices
  - Implement PI Server High Availability

High Availability Architecture

Things to keep in mind…

- You can only change the MDB in the primary
  - *PI ACE*
  - *PI Batch*

- Configure server priority on PI-SDK
  - *Connect to the PI Server closest to you*

- No more support for clusters on 2012

PI Server with Windows Integrated Security

26

PI Server Security - Overview

- PI Server 3.4.380.36 (2009) introduced support for Windows Integrated Security

- Microsoft Active Directory (AD) integration

- Map AD users to PI Identities

- PI Identities are roles on the PI Server
  - PIAdministrators, PIReaders, PIInterfaces

Comparing PI Users and PI Identities
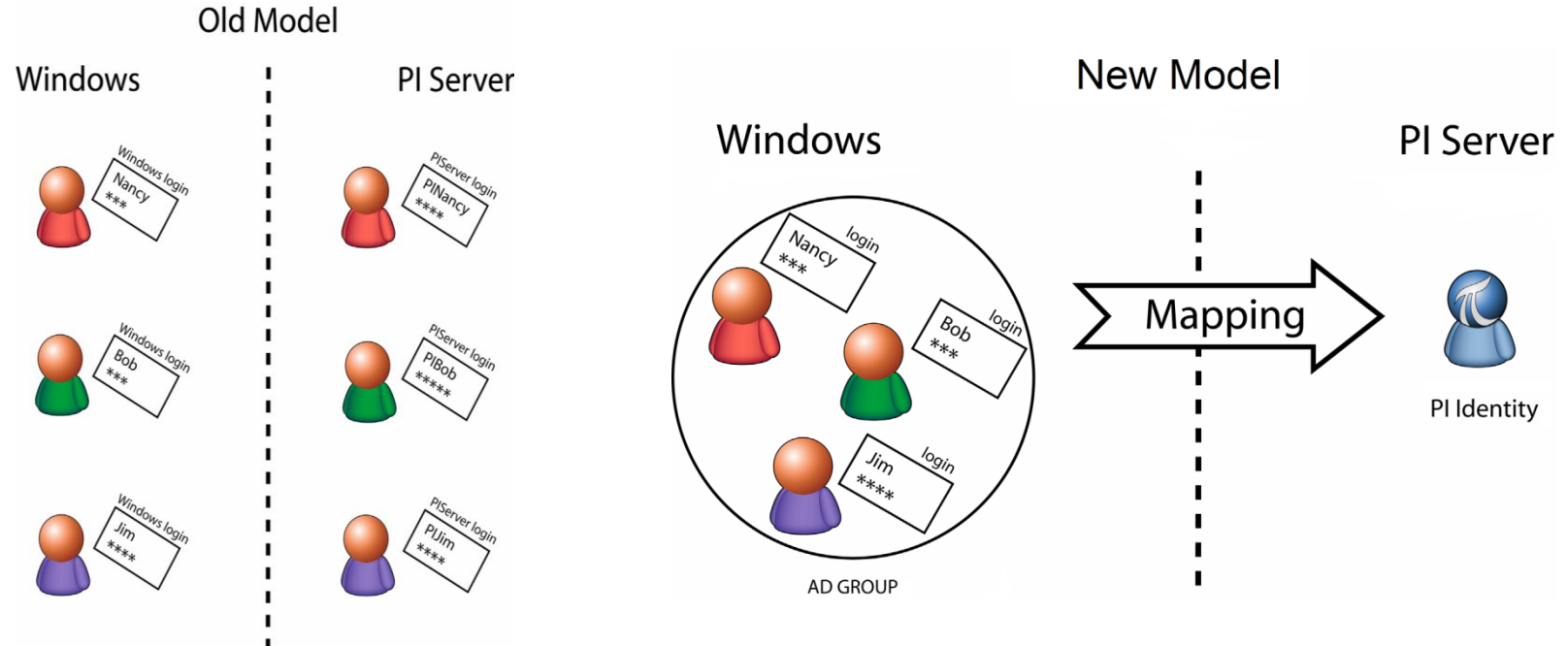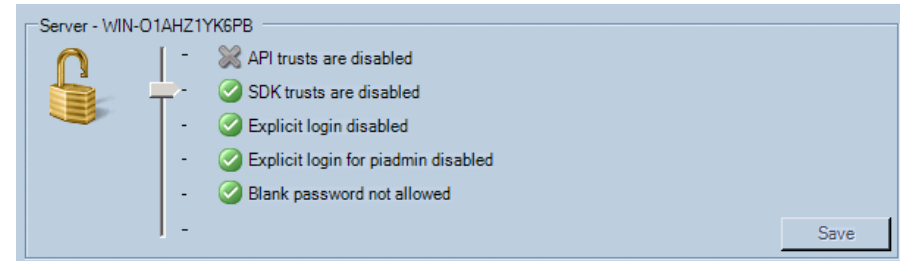
Active Directory Integration

- Domain membership needed
- Multiple AD domains must have trusts
  - One-way trusts are supported: the server domain must trust the client domain
- For non-domain accounts, you can use Windows Local Groups from the PI Server machine

PI Identity Planning with the AD

- Develop a PI Identity Scheme for your Organization
  - Who uses PI data?
  - Who writes to PI data?
  - Who needs Admin access?
- Who manages the AD Security?
  - Map identities and or groups directly
  - Add AD users to local groups that are mapped

How to tighten security – best practices

1. Use the new Security Tool to help secure your PI Server
2. Do not use the PIADMIN account in trusts or mappings
3. Disable PI password authentication (explicit logins) (see KB00304)
4. Retire PI SDK-based Trusts
5. Use Windows Integrated Security

Server - WIN-O1AHZ1YK6PB
- ✖ API trusts are disabled
- ✅ SDK trusts are disabled
- ✅ Explicit login disabled
- ✅ Explicit login for piadmin disabled
- ✅ Blank password not allowed

Save

PI ACE

PI Advanced Computing Engine

- **Overview**
  - Develop calculations in Microsoft Visual Studio
    - *Wizard*
  - Easy to manage and deploy calculations
    - *Manager*
  - Service runs calculations
    - *Scheduler*
  - Support for 64-bit
    - *PI ACE 2010 and up*
   - *Recompile calculations*

PI Advanced Computing Engine

- Best Practices
  - Configure buffering
    - *Buffer subsystem or buffer server*
  - Error handling
    - *Try…catch (calc error)*
  - Performance Counters
    - *Calcs in error, calcs skipped, etc…*
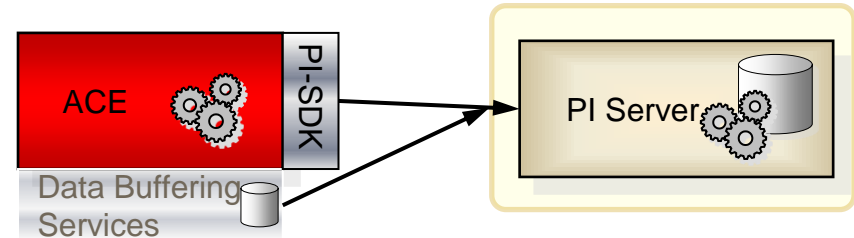
Module database and Asset Framework

PI Server 2010 enables MDB to AF link and synchronization

PI ACE

MDB

MDB

PI SERVER COLLECTIVE   AF Link Subsystem   AF SERVER
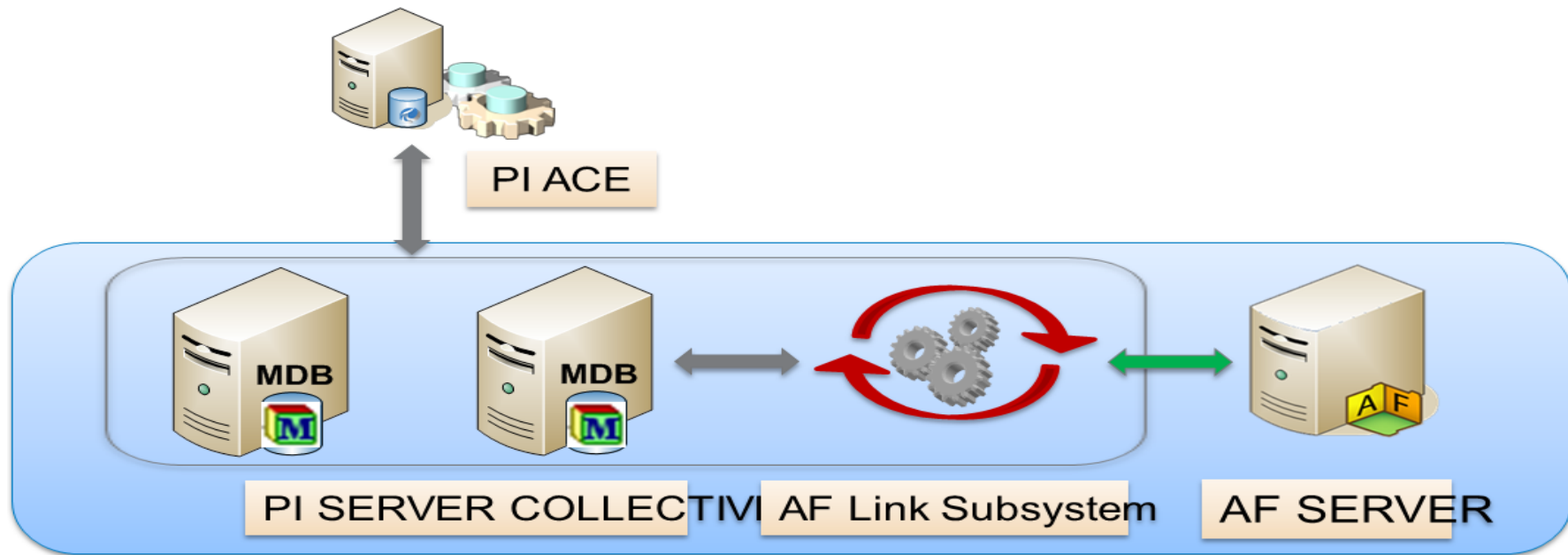
PI Advanced Computing Engine

- ## High availability
  - *Run multiple schedulers in parallel*

- ## Load balance
  - *Run multiple schedulers against the same PI Server*
  - *PI ACE 2010*

PI Asset Framework and PI Notifications

PI Asset Framework Overview

- Adds context to PI data
  - Define relationships
  - Build hierarchy
  - Relate to non-PI data
- Usable
  - Provides context to end users
  - Integrated calculations and search tools
- Scalable
  - 10s of 1,000s of assets
  - Connect to multiple PI Servers & data sources
- Extensible
  - Access with PI OLEDB & PI Webservices
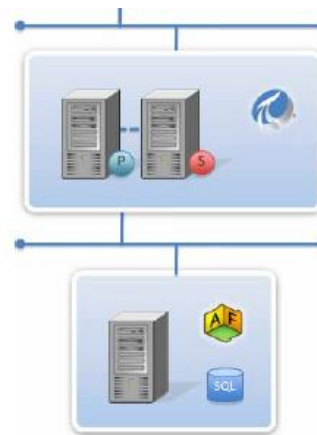 - Customizable data references and plug-ins

PI AF Server - Components

- Two key components
  - AF Server
  - SQL Server database
- SQL Server
  - Express, Standard
  - Cluster or Mirror
- AF Server
  - Behind a load balancer
  - AFSDK Collective

PI System Architecture

1. "Small" systems - <10,000 assets & <25,000 tags

   – PI, AF, & SQL on one node

2. Larger systems

   – Two nodes min
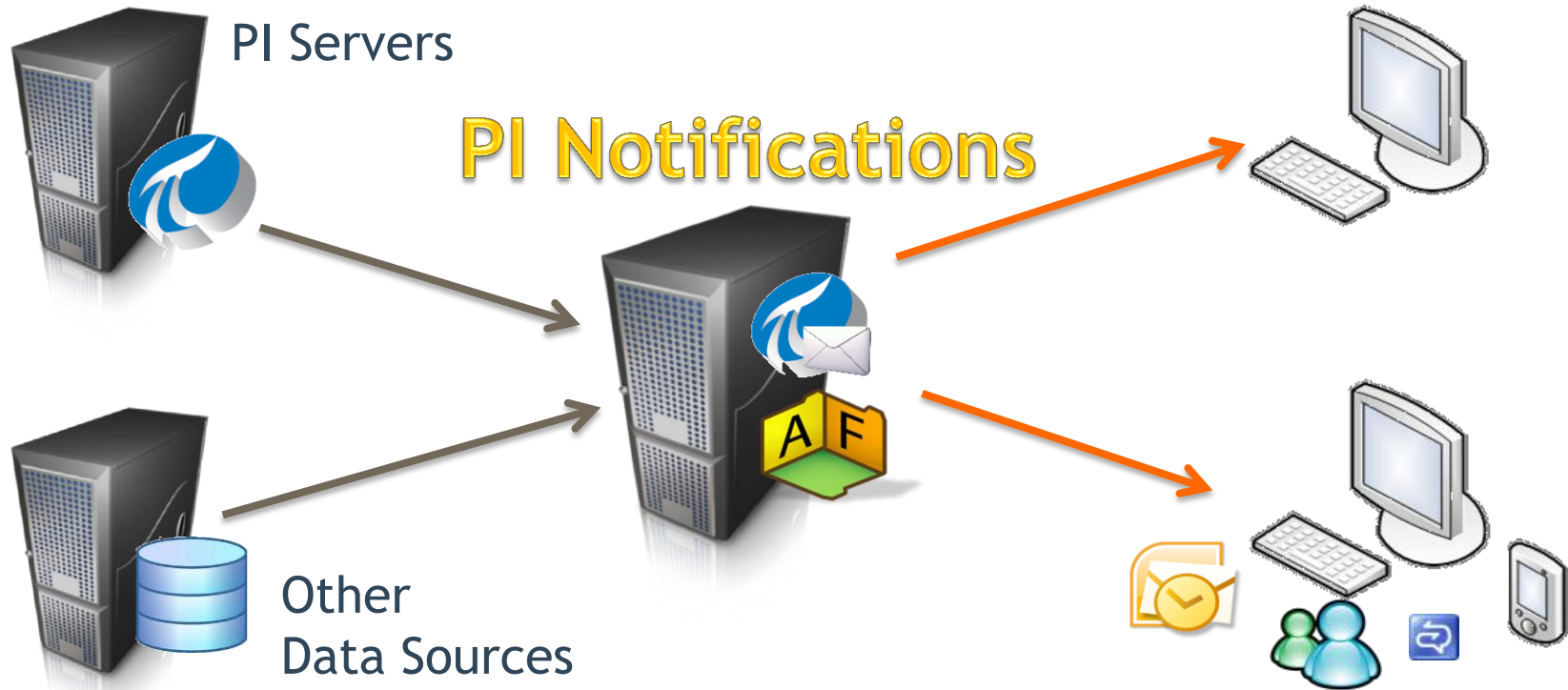
   – Separate PI and SQL

3. HA systems

PI AF Server – Best Practices

- Configure AF backups – Backup PIFD and/or run afbackup.bat

- Monitor SQL Server health

- Do not run the SQL Server database engine as LOCALSYSTEM, admin, or domain admin.

- DO NOT RUN the AF Server with SysAdmin privilege (don't use SA account, LOCALSYSTEM, or admin)
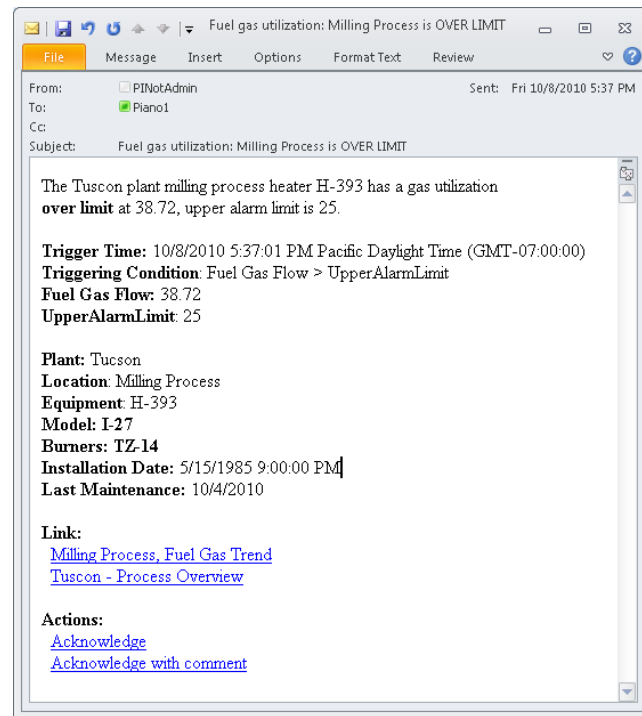 - Use a domain account

PI Notifications - Overview

PI Notifications – Best Practices

- Run PI Notifications as a domain account

- Configure PI Buffering

- Create redundant schedulers

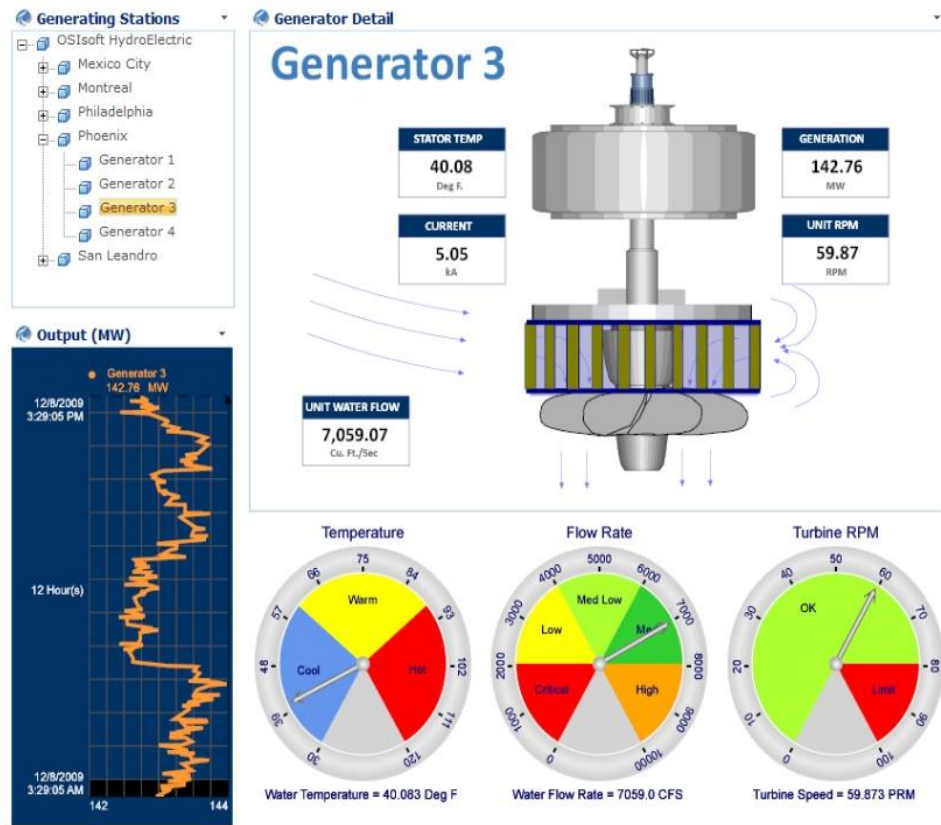- Monitor health with PI PerfMon tags
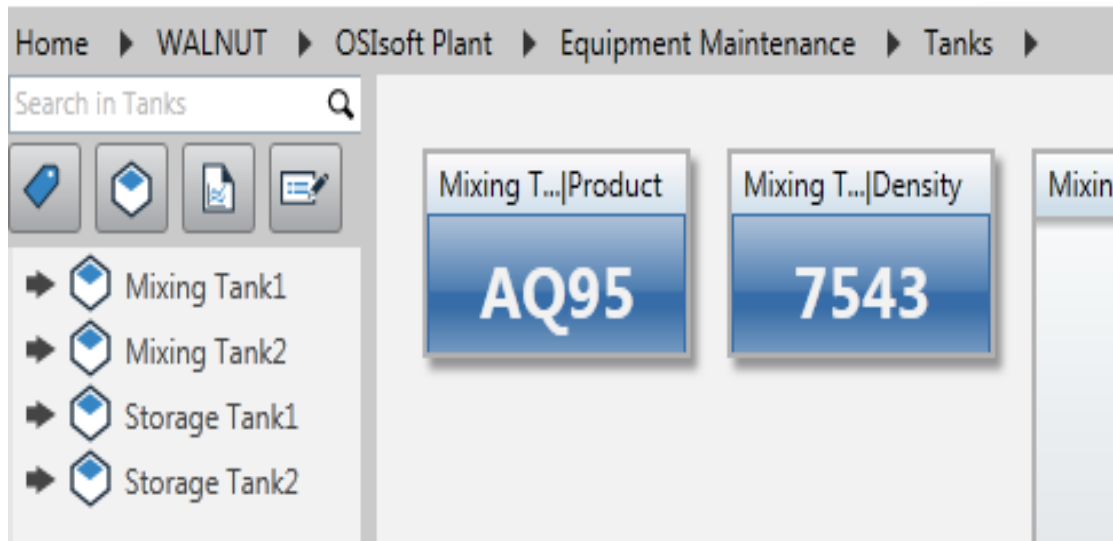
PI WebParts & PI Coresight

PI Webparts

- Overview
  - Visualization with Microsoft SharePoint

- Best Practices
  - Backup SharePoint
  - Explore querystrings
  - Use PI AF!

PI Coresight

- Fast visualization tool
- Well integrated with AF
  - Work with elements not tags
- New iPad app
  - *Beta version*
  - *Read only*

More Information

- Whitepapers and Tech Support bulletins on OSIsoft web site

- User Manuals
  - PI Server 2010 Configuring Security
  - Asset Framework 2010 User's Guide

- OSIsoft vCampus – Online community
  - Forums, Whitepapers, Webinars

THANK YOU

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