



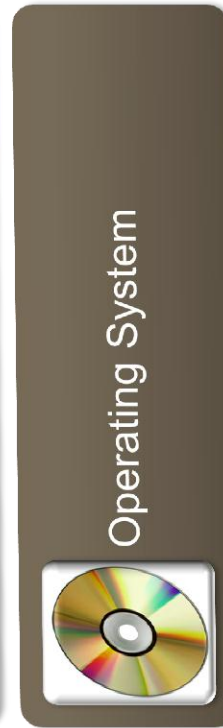
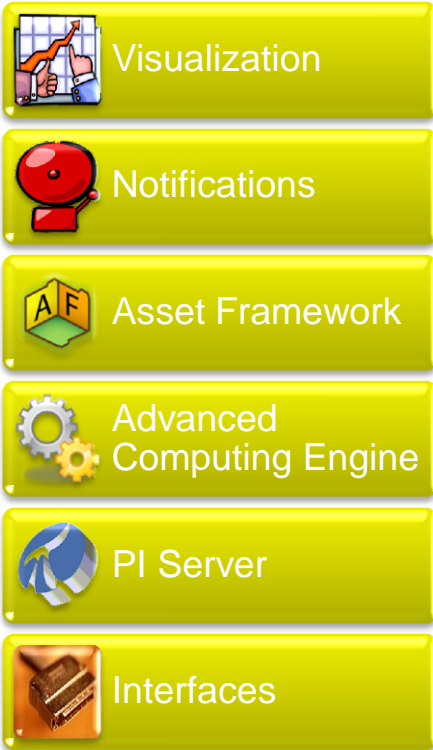
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The **Power** of **Data**



# Architecture and Best Practices Recommendations for PI Systems

Presented by **Megan Vining**

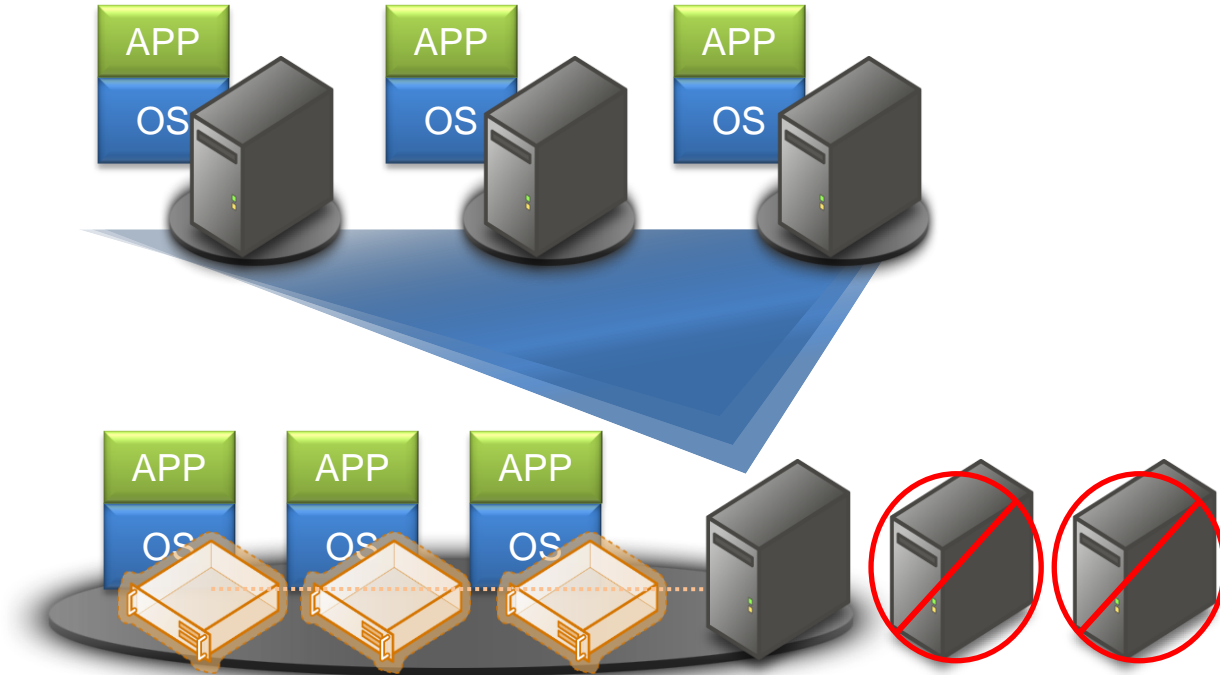
# Areas of discussion & Topics Outline





# Hardware and Virtualization

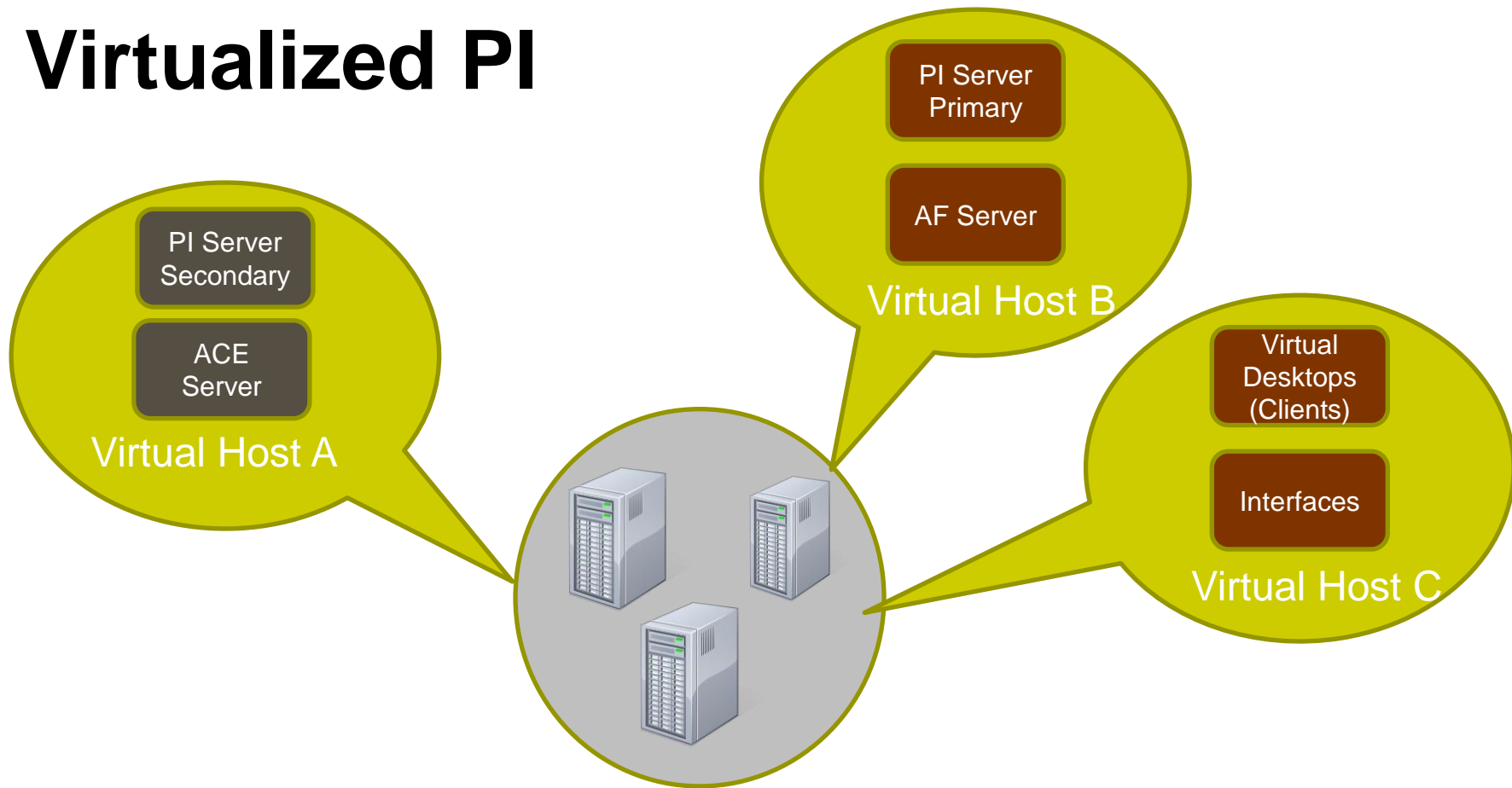
# Hardware Virtualization



# Operating System Virtualization

- Why are OS/soft customers using Virtualization?
  - Server consolidation
  - Improved availability and provisioning
- OS/soft supports virtualization
  - OS/soft Knowledge Base article 3062OSI8
  - Consider shared resources implications

# Virtualized PI



# Operating System Virtualization\*

- Give virtual machines the same resources as you would 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

\* OSIssoft 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 Web Parts, 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*

# Watch out for exceptions!



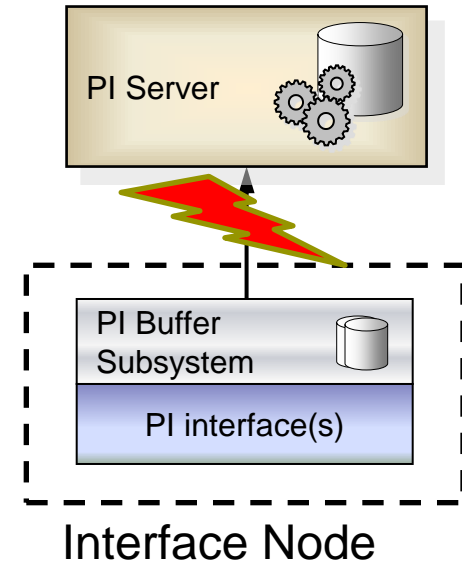
- Double check with support
  - *Release Notes, Technical support*
- Applications that are plug-ins (or run by another application)
  - *MS Office 2010, Microsoft Internet Information Server*
- Where 3<sup>rd</sup> party libraries (dlls) need to run with another application
  - *RDBMS interface*



# PI Interface Buffering and Failover

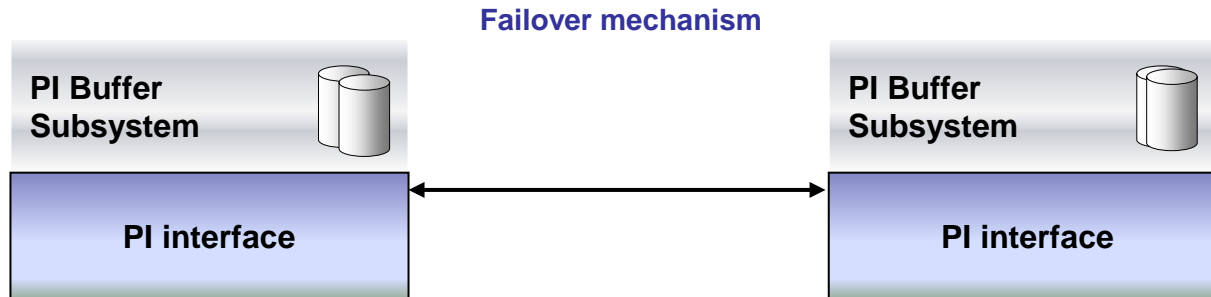
# Interface Buffering

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

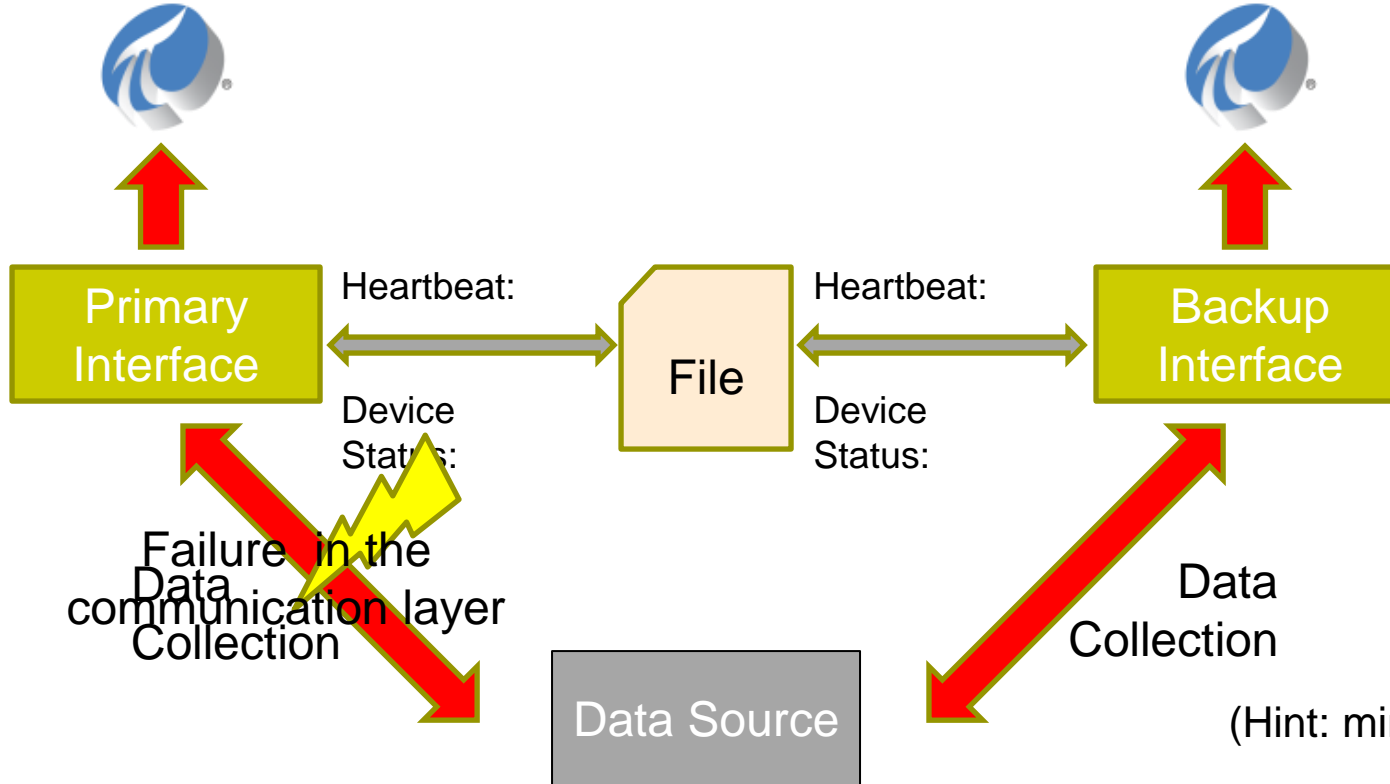


# Why use interface failover?

- Support failure of data collection
    - Minimize data loss
  - Synchronization is with the data source
- or
- **Synchronization is between the interfaces**



# How does interface failover work?



**Hot** = No data loss

**Warm** = Maybe data loss

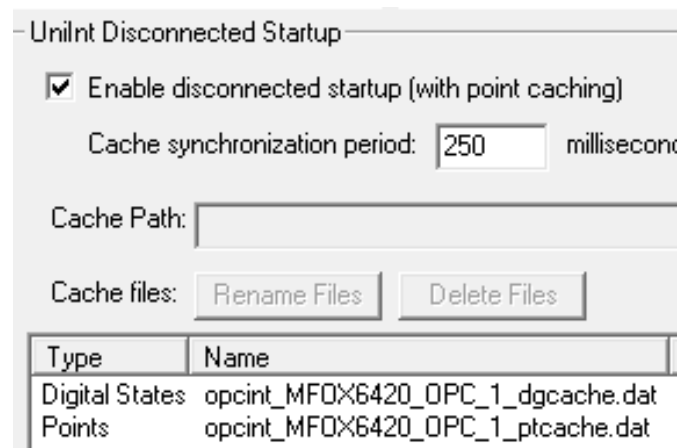
**Cold** = Some data lost

(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



# 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!

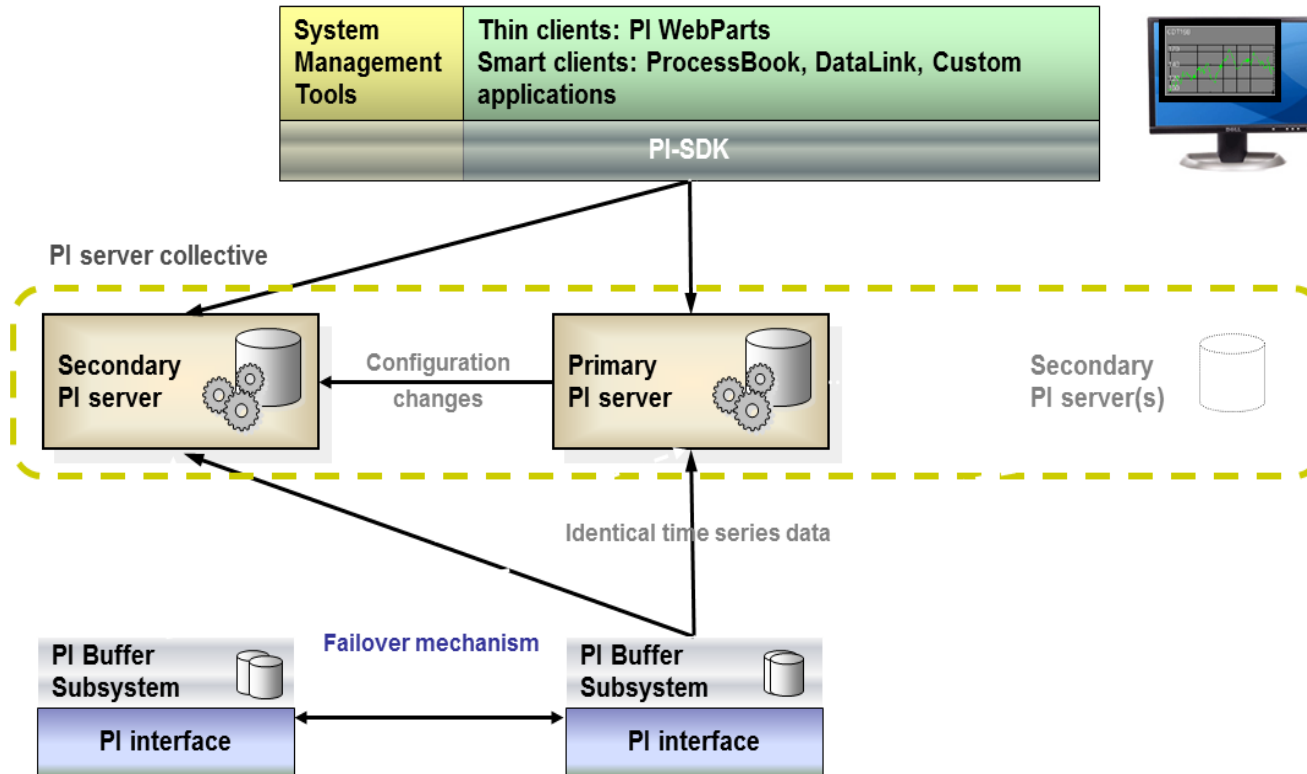


# PI Server High Availability

# PI Serve High Availability (PI 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
  - No more support to clusters with PI Server 2012

# High Availability Architecture



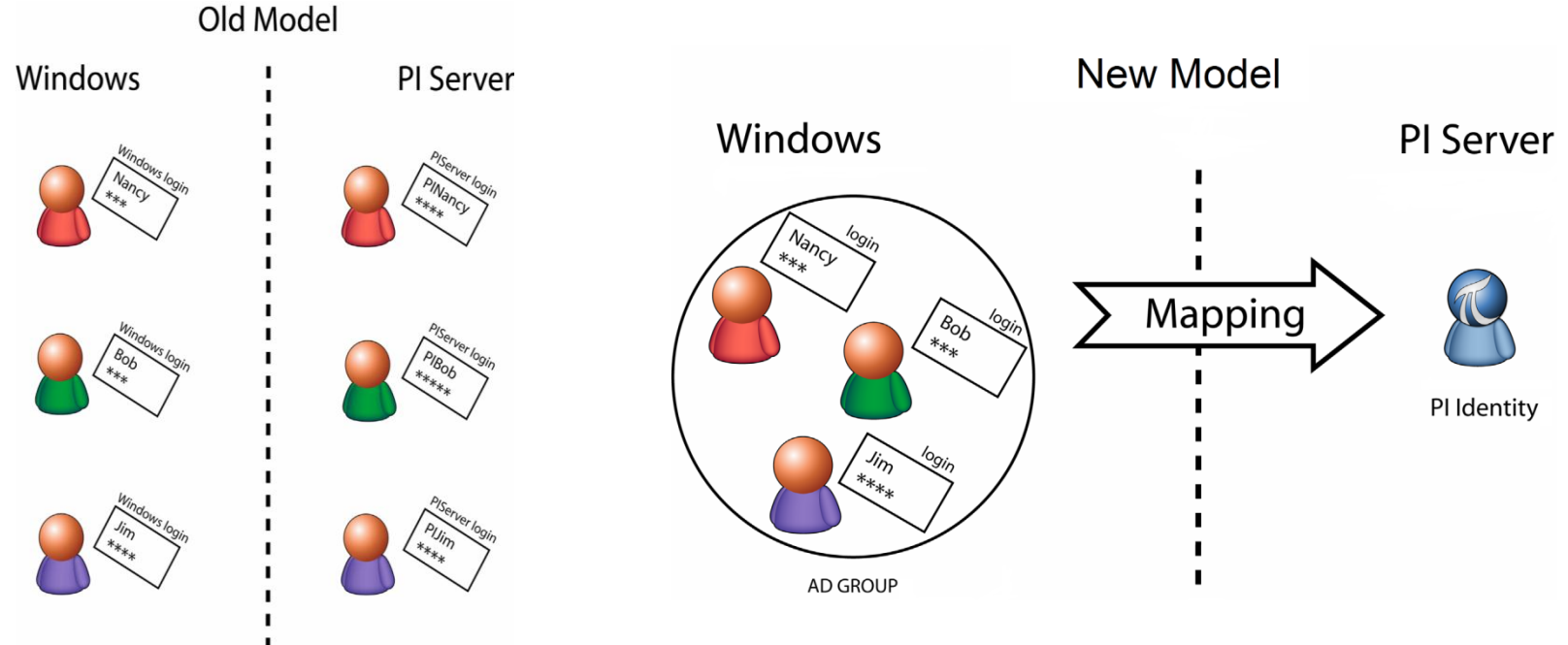


# PI Server with Windows Integrated Security

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

# Comparing PI Users and PI Identities





# Automatic Backward Compatibility

Tag	dataaccess	datagroup	dataowner
sinusoid	o:rw g:rw w:r	pi_users	bob



Tag	datasecurity
sinusoid	pi_users:A(r,w)   bob:A(r,w)   PIWorld:A(r)

# Active Directory Integration

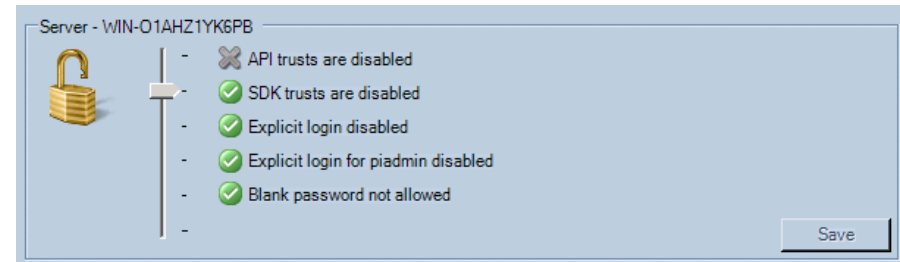
- PI Server must be a member of a domain to leverage Kerberos authentication
- Multiple AD domains must have trusts established
  - One-way trusts are supported
- For non-domain accounts, you can use Windows Local Groups from the PI Server machine

# 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

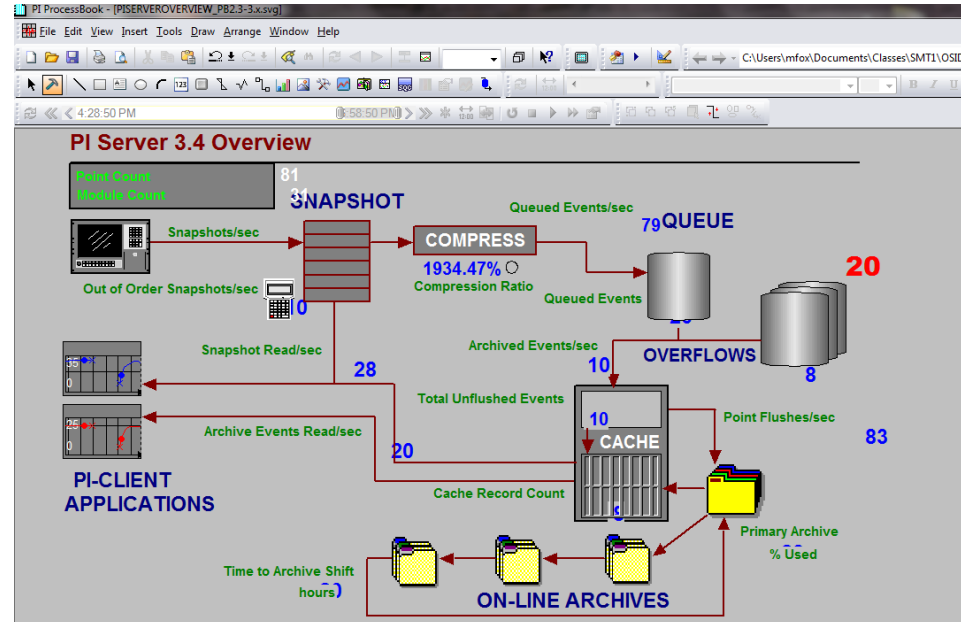
# How to tighten security – best practices

1. Physical and OS security are the first line of defense
2. Use the new Security Tool to help secure your PI Server
3. Do not use the PIADMIN account in trusts or mappings
4. Disable PI password authentication (explicit logins) (see KB00304)
5. Use WIS & Mappings
6. Retire PI SDK-based Trusts



# PI Server - Other Best Practices

- Monitor the PI Server health with PI PerfMon tags
- Auto-archive
- Take backups





# PI ACE

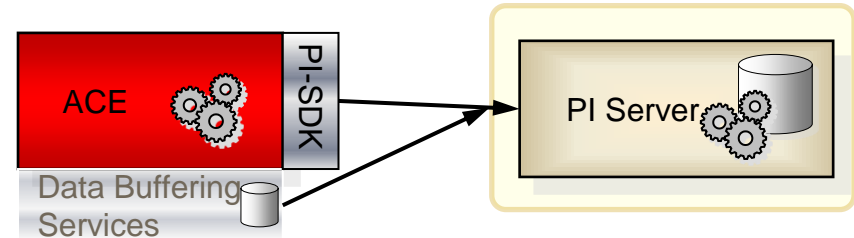
# PI Advanced Computing Engine

- **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*

# PI Advanced Computing Engine

- Best Practices
  - Configure buffering
    - *Buffer subsystem or buffer server*
  - Error handling in your code
    - *Try...catch*
  - Performance Counters
    - *Calc in error, calc skipped, etc...*







# 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

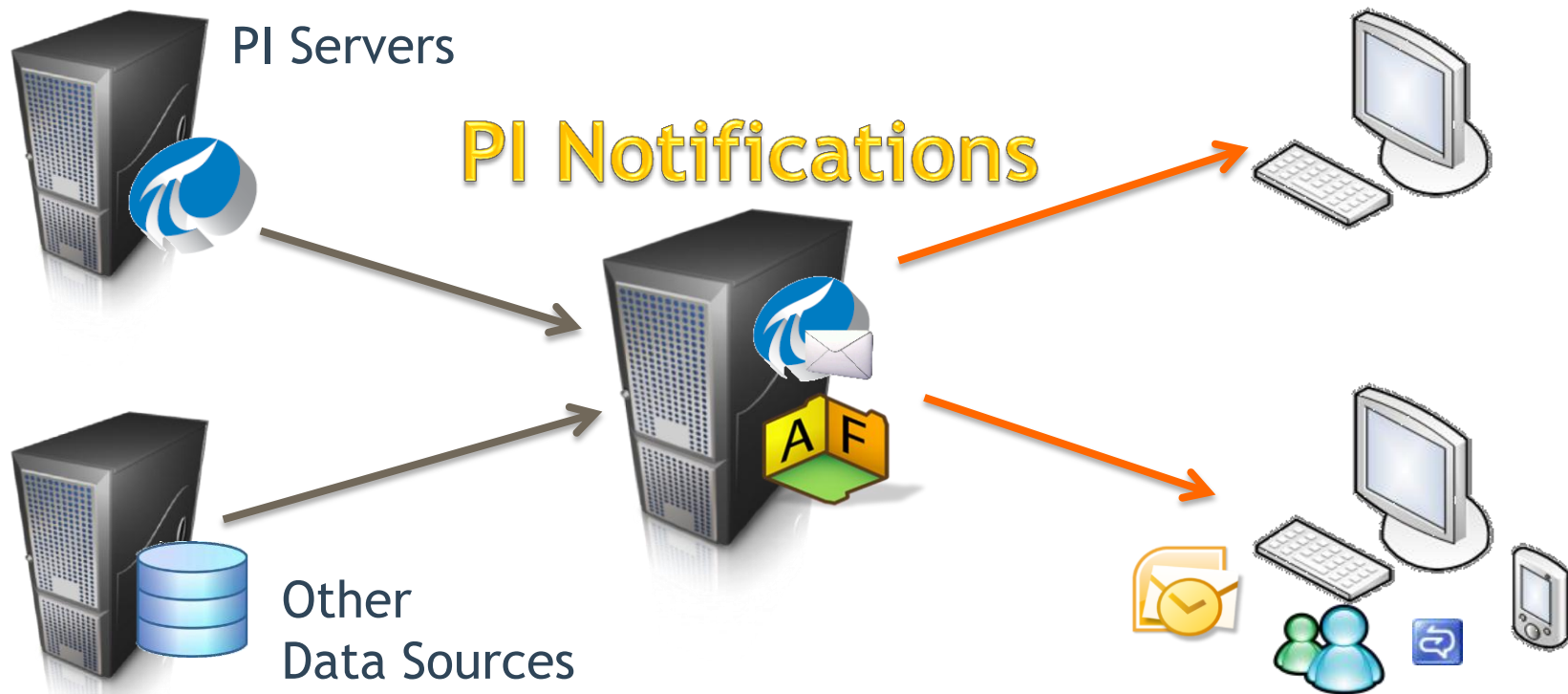


# PI AF Server – Best Practices

- 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
  - Use a domain account

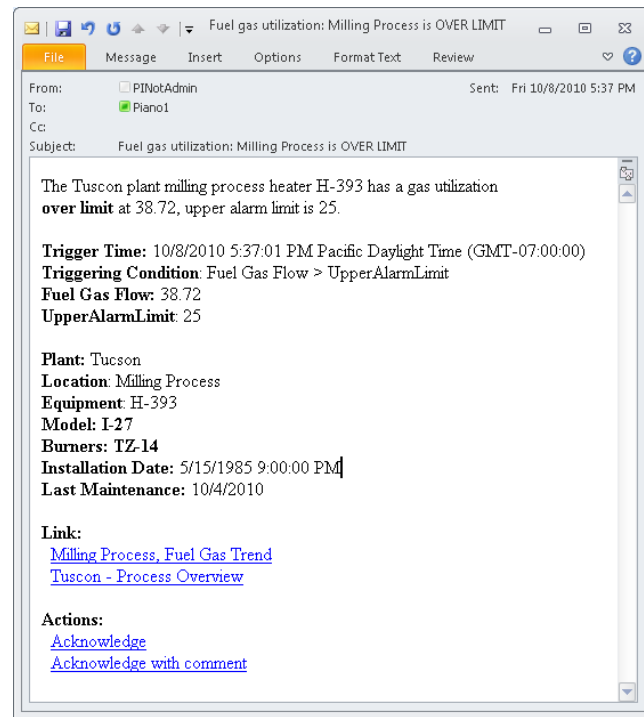
# PI Notifications - Overview

PI ProcessBook  
PI DataLink



# PI Notifications – Best Practices

- Run PI Notifications as a domain service account
- Configure PI Buffering
- Create redundant schedulers
- Monitor health with PI PerfMon tags



# More Information

- Whitepapers and Tech Support bulletins on OSIssoft web site
- User Manuals
  - PI Server 2012 Configuring Security
  - Asset Framework 2012 User's Guide
- OSIssoft vCampus – Online community
  - Forums, Whitepapers, Webinars