



OSIsoft®

Regional Seminar Series



Architecture and Best Practices: Recommendations for PI Systems




Glenn Moffett
Product Management
OSIsoft, LLC

Empowering Business in Real Time.

© Copyright 2010, OSIsoft, LLC. All rights Reserved.

Areas of discussion & Topics Outline



	Visualization
	Notifications
	Asset Framework
	Advanced Computing Engine
	PI Server
	Interfaces

Hardware/Virtualization



Operating System

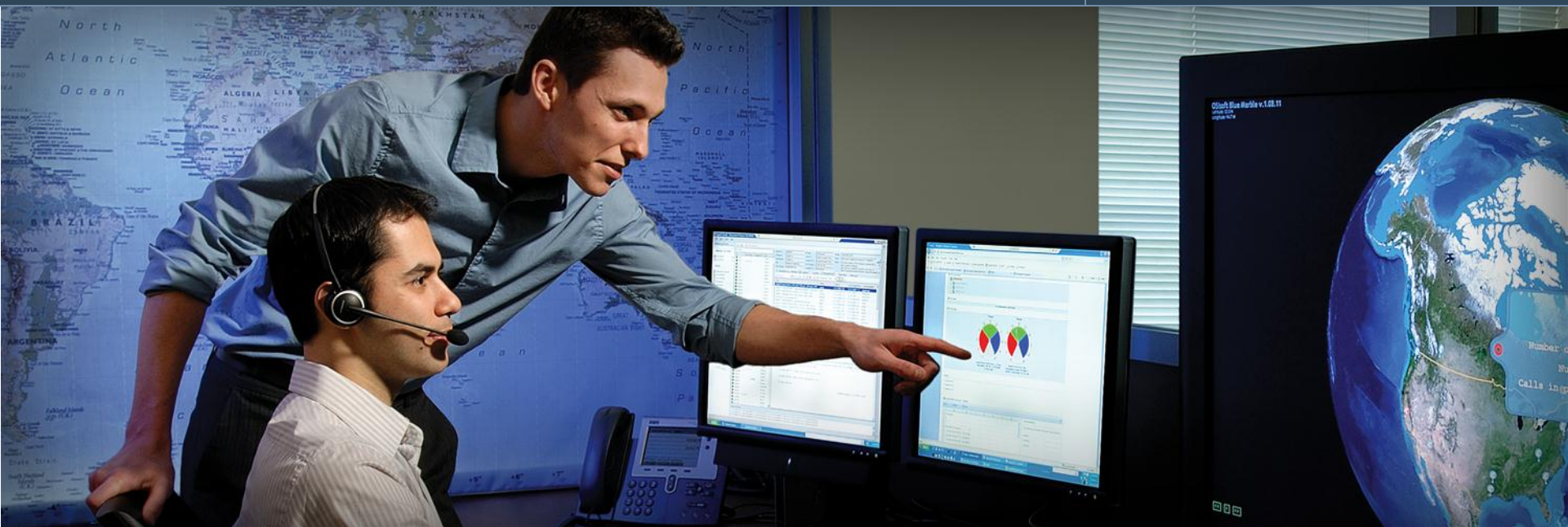


High Availability



Security



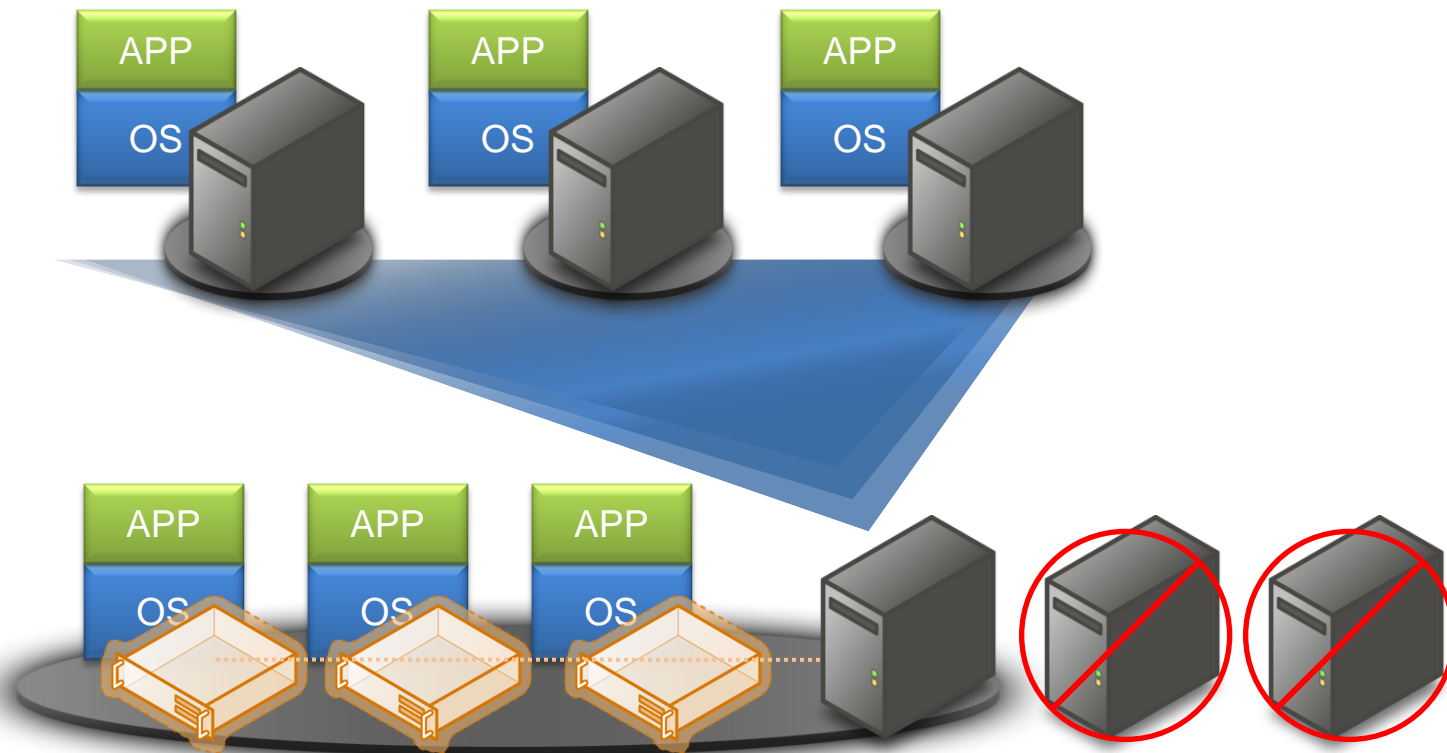


Hardware and Virtualization

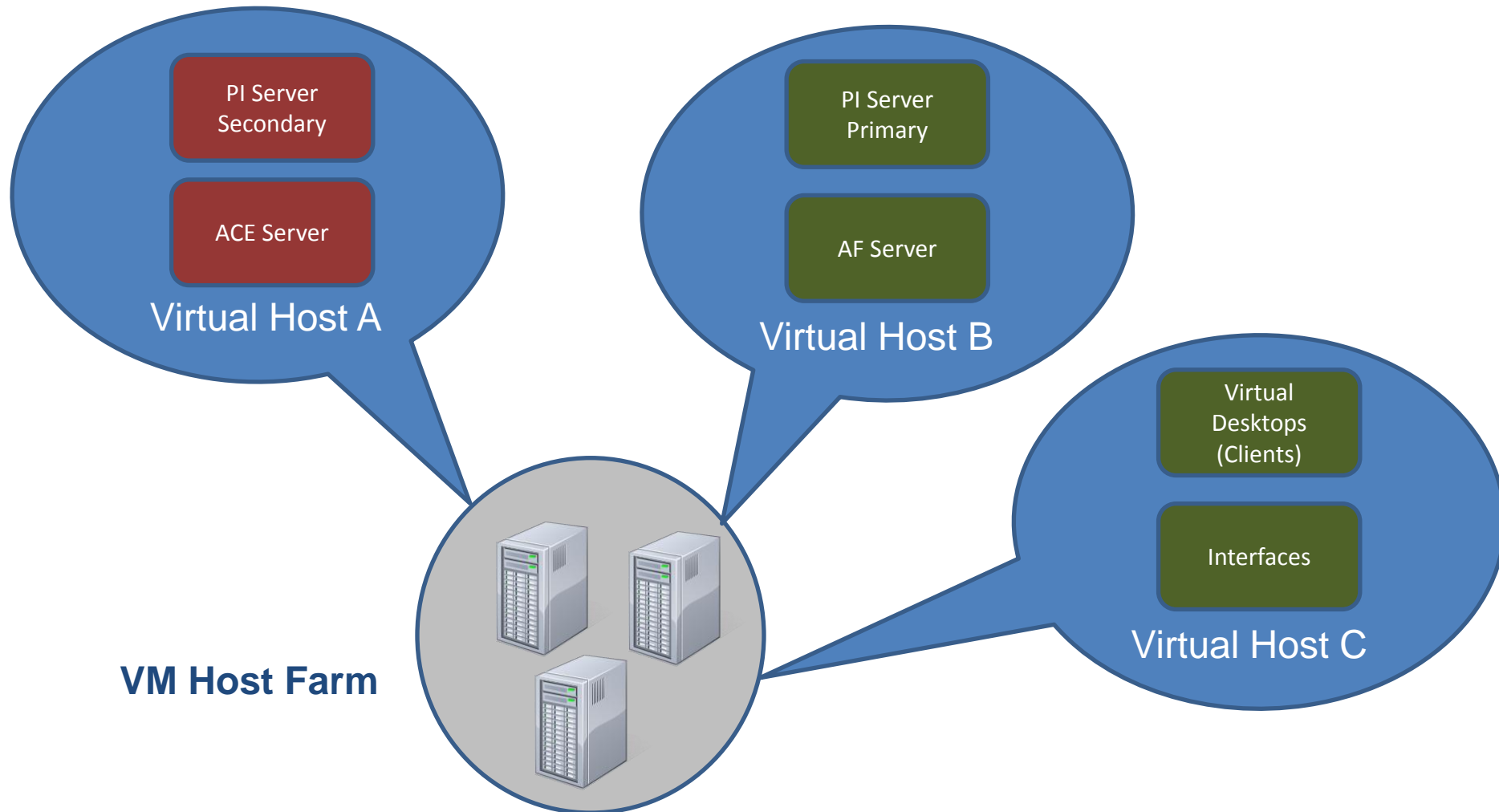
Empowering Business in Real Time.

© Copyright 2010, OSIsoft, LLC. All rights Reserved.

Overview



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



Best practices

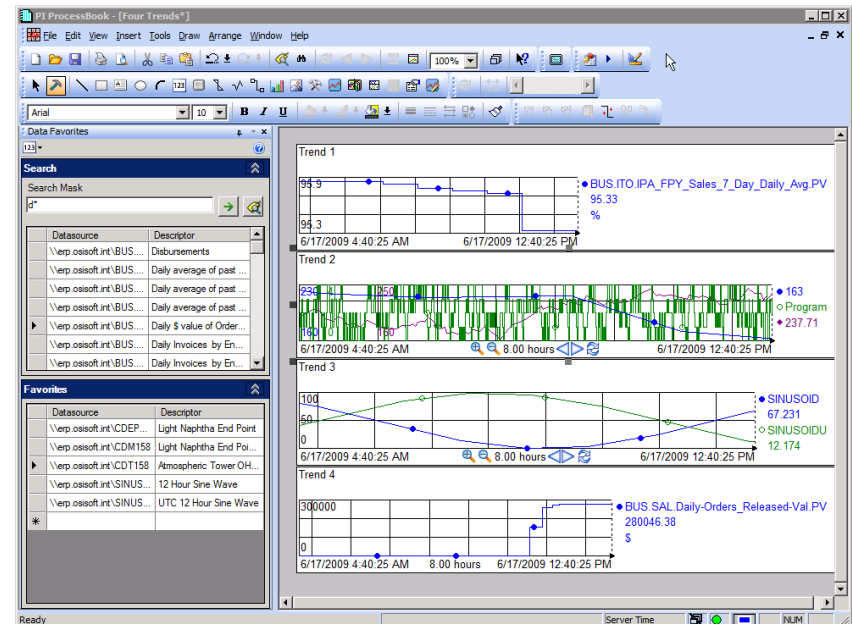
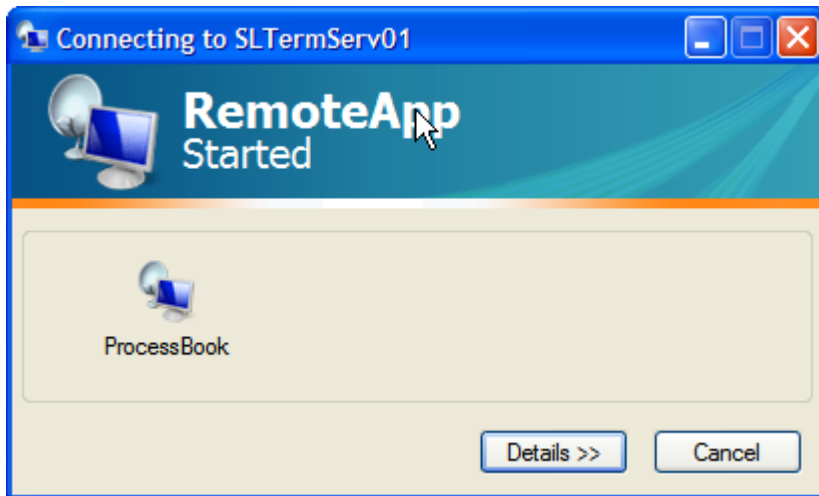
- Treat virtual machines as if they were physical machines
 - Invest in Enterprise-level hardware and software
 - Do not mix virtual and physical on the same host
 - Use qualified Virtualization support personnel
 - Test on the target platform
- * OSIsoft Center of Excellence

Application Virtualization



Overview

- Applications centrally installed and managed
- Users are remote
- OSIsoft customers are successfully using Microsoft and Citrix virtualization products



Overview

- Why 64-bit?
 - Access to larger memory footprint
 - Reduce limitation to applications
 - PI ACE contexts was limited due to 32 bit

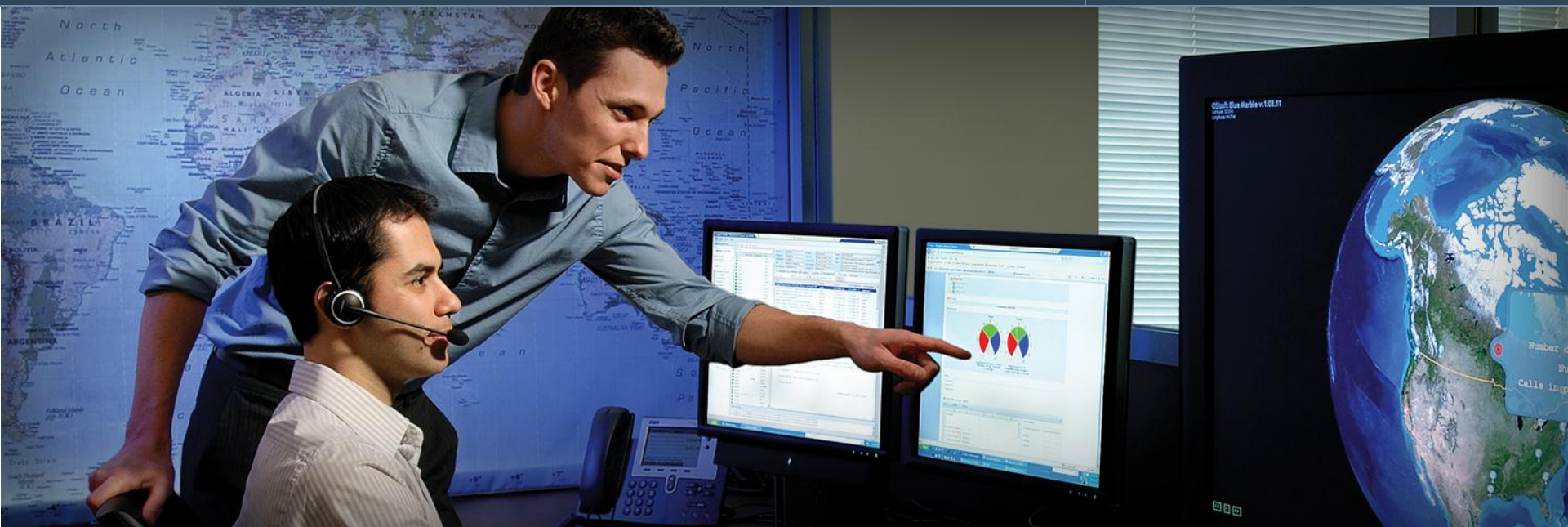


- Several products support native 64-bit operation
 - Examples: PI Server, PI WebParts, Asset Framework
- Windows compatibility layer enables 32-bit programs to run on 64-bit
 - Example: Interfaces, PI ACE
- Future product releases will support native 64 bit
 - PI ACE, PI Notifications

- Certain components work only with 32-bit versions of applications
- PI System Add-ins for Microsoft Excel
- DataLink for Excel
- RDBMS interface and 64-bit drivers
- PI ActiveView & PI Graphic (SVG) require 32-bit Internet Explorer

Best practices

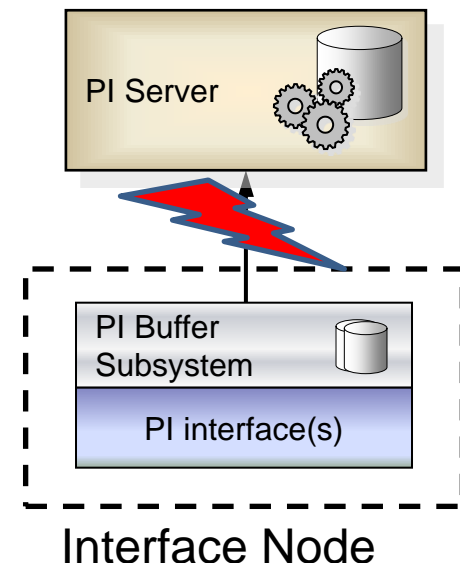
- Verify support
 - Release Notes
 - Technical support
- Scenarios to watch out for
 - Applications that are plug-ins or run by another application
 - Microsoft Internet Information Server
 - Office 2010
 - Where 3rd party libraries (dlls) need to run with another application
 - RDBMS interface



PI Interface Buffering and Failover

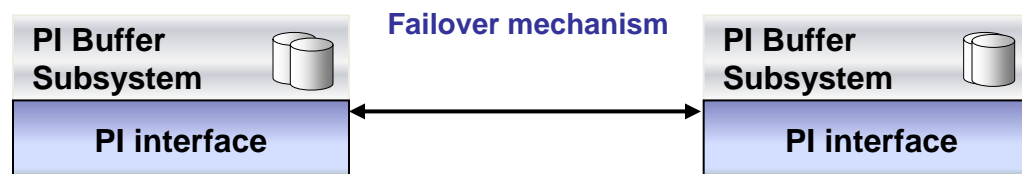
Overview

- Ability of interface node(s) to store data in the event of disconnection from PI Server(s)
- Goal: Minimize data loss
- Two flavors
 - **PI Buffer Subsystem**
 - **PI Bufserv**



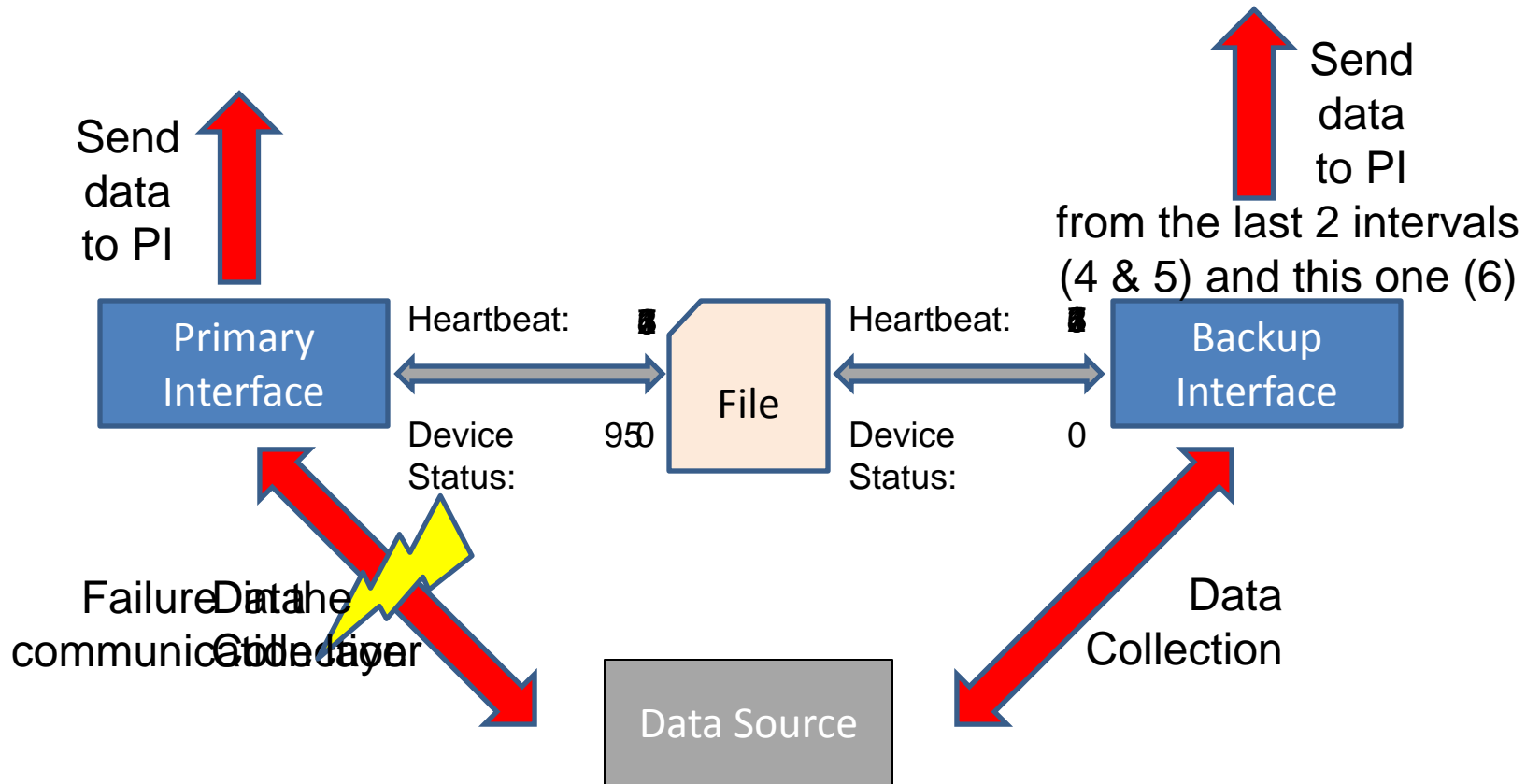
Overview

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



- Interfaces “watch” each other’s **Heartbeat** and **Status**
- Failover Types
 - **Hot** = No data loss
 - **Warm** = Maybe data loss
 - **Cold** = Some data lost
(Hint: minimize data loss by using disconnected startup)

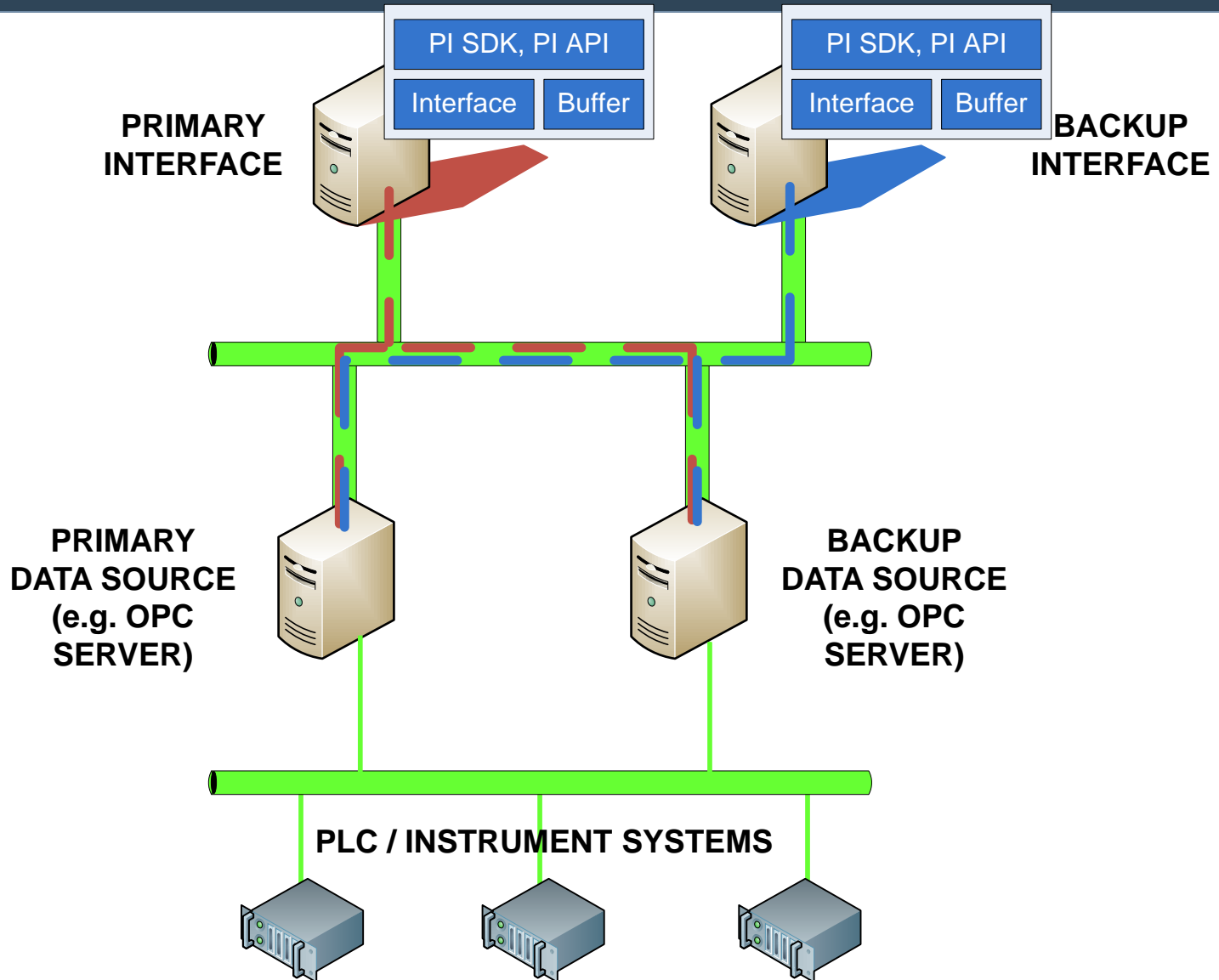
Interface failover - Hot



Timeline : 35 (interval)

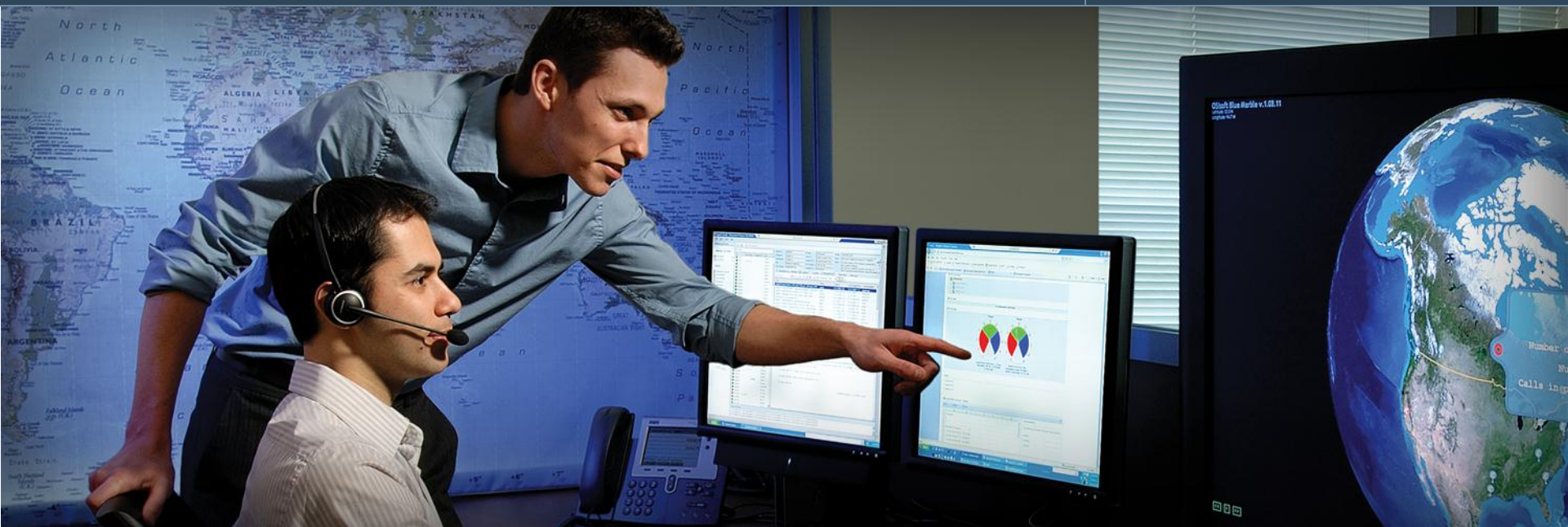
Possible overlap of data during intervals 4 and 5

OPC Server Failover and Interface Failover



Best practices

- Configure Buffering
 - PI Buffer Subsystem
- Consider implementing failover support
- Disconnected start-up
- Create interface health points
- Do not authenticate to PI using piadmin



PI Server High Availability (PI HA)

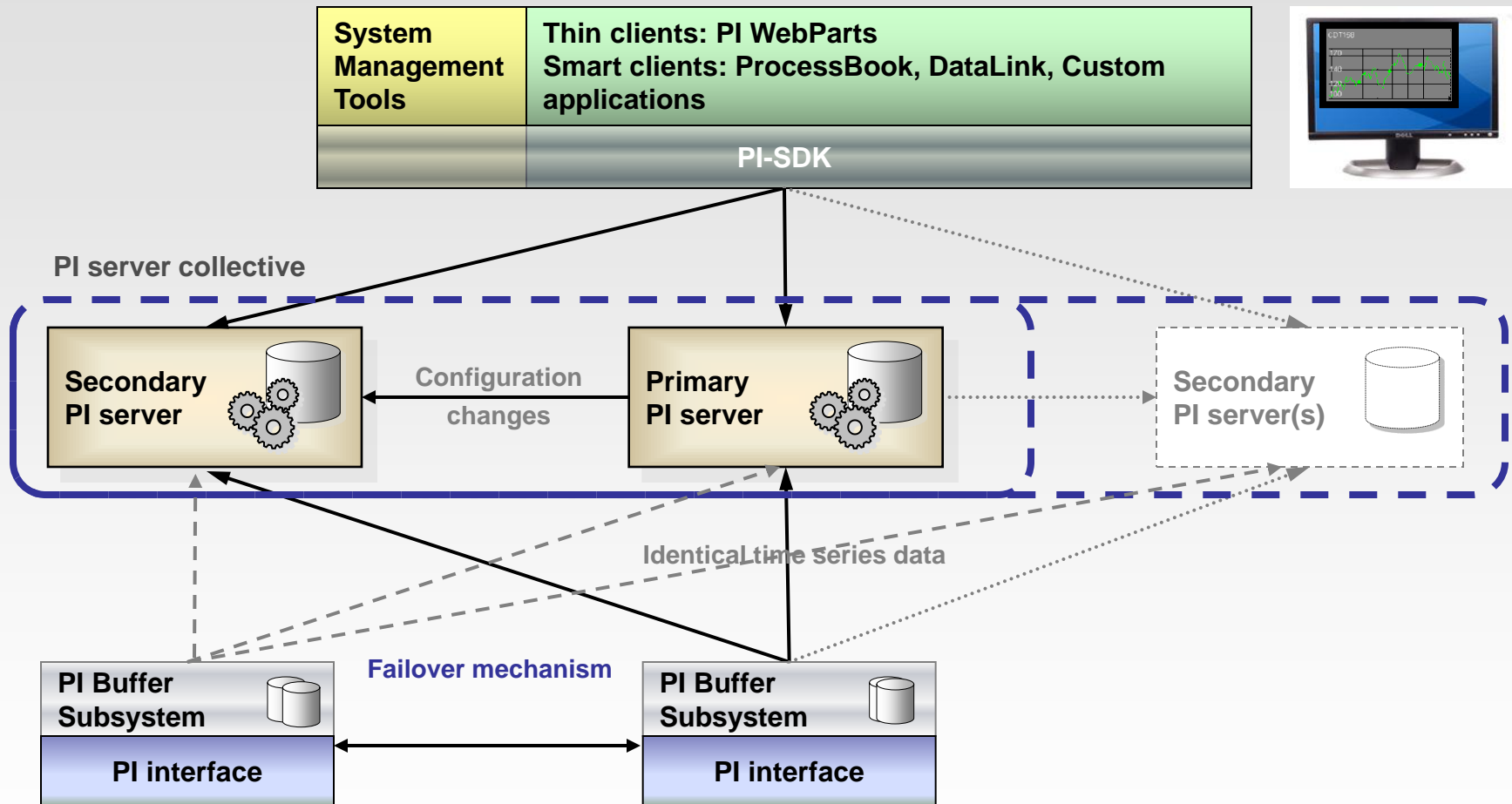
Empowering Business in Real Time.

© Copyright 2010, OSIsoft, LLC. All rights Reserved.

Overview

- Redundancy with multiple PI Servers as one collective
- Goal: Maximize data access for clients

PI Server – High Availability Architecture

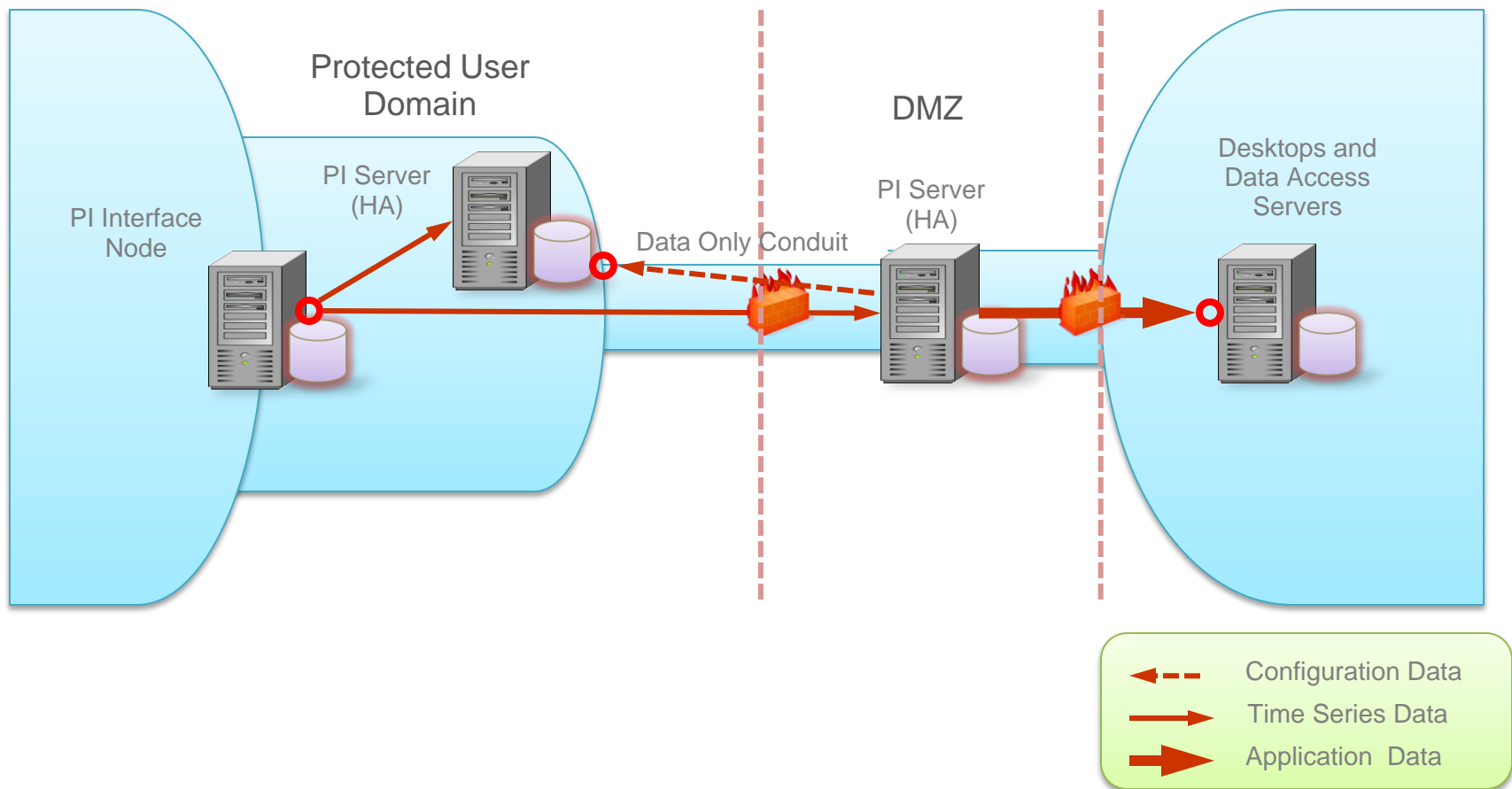


PI HA and security architecture

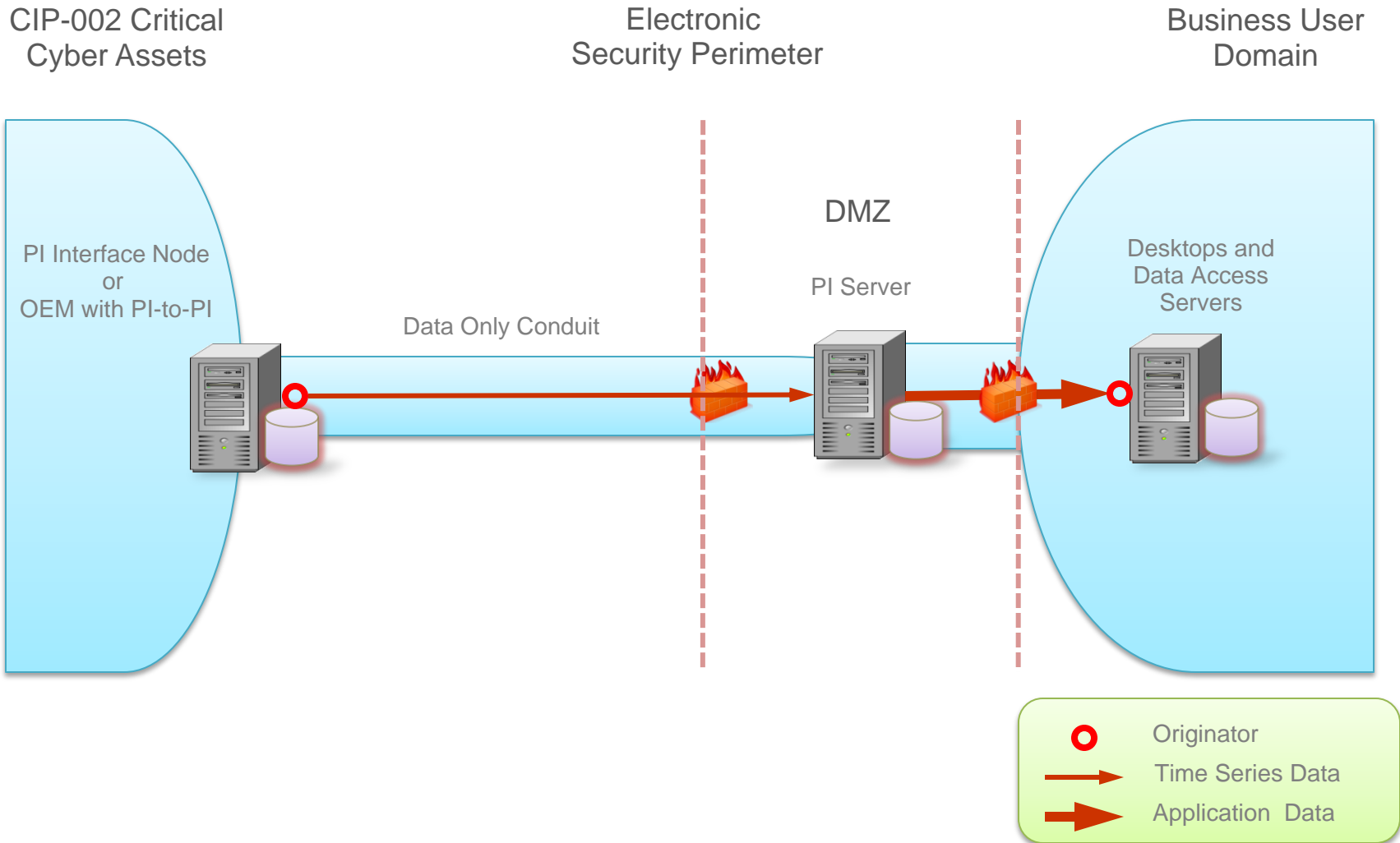
NERC CIP-002 Critical
Cyber Assets

Electronic
Security Perimeter

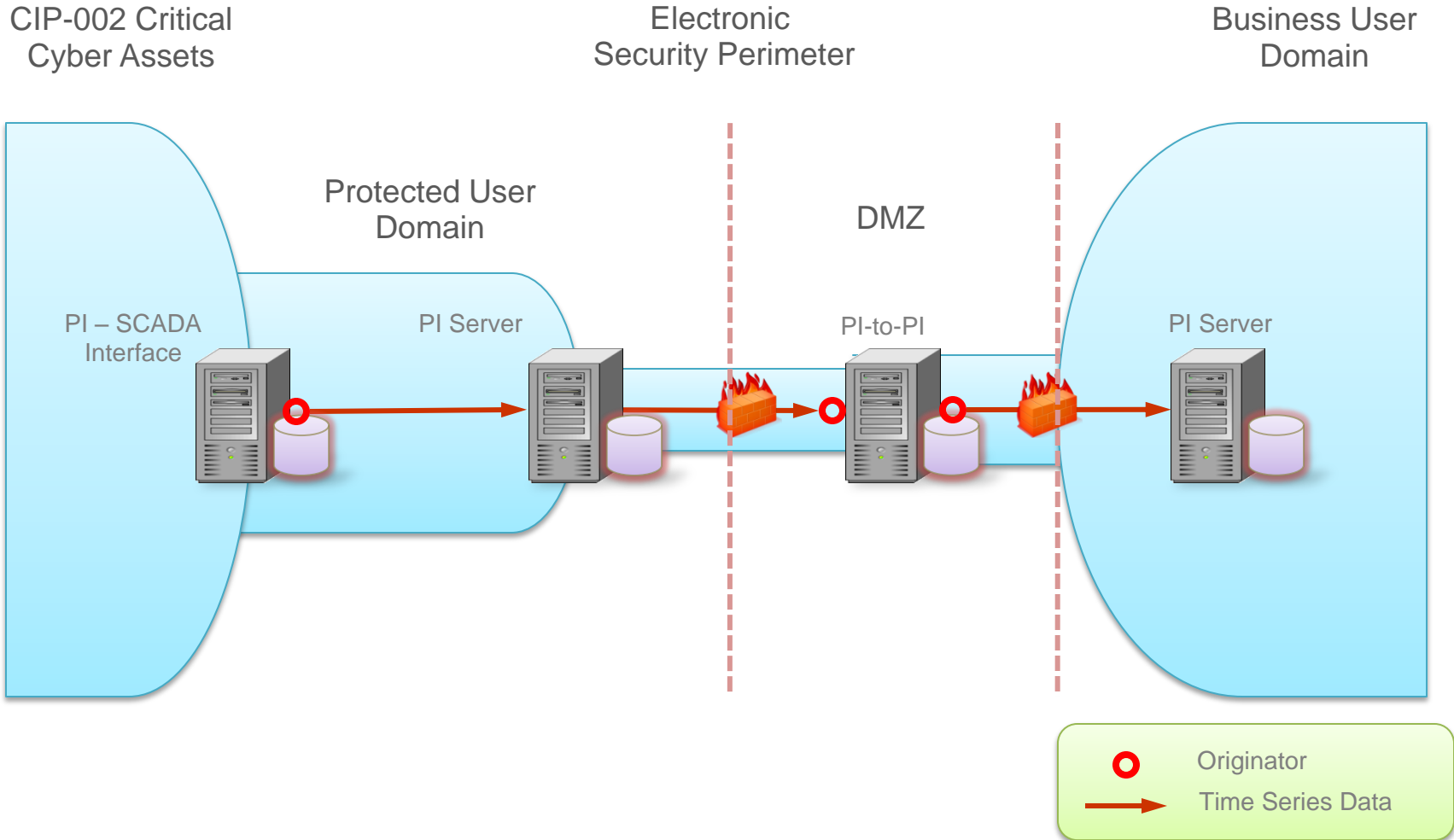
Business User
Domain



PI deployment across security zones



Replication of PI Server data

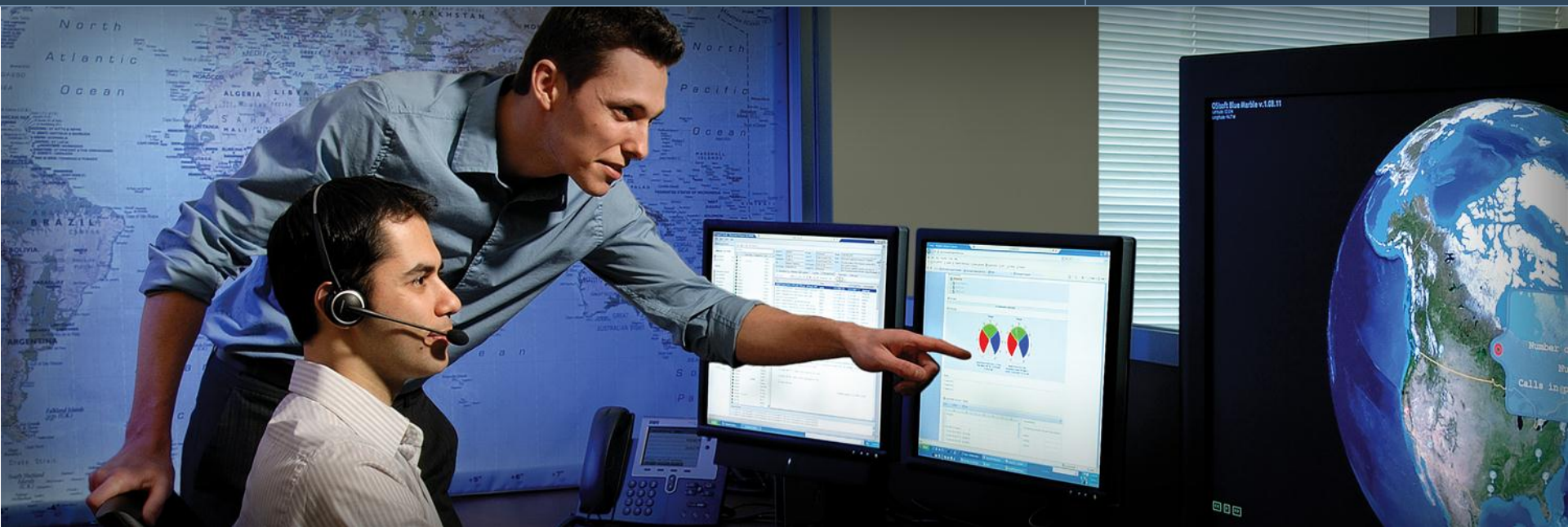


Benefits

- Maintain availability during scheduled maintenance
- Redundancy of data
- Locate PI Server member close to consumers of the data

Best practices

- Implement PI Server High Availability



New PI Server Security Concepts

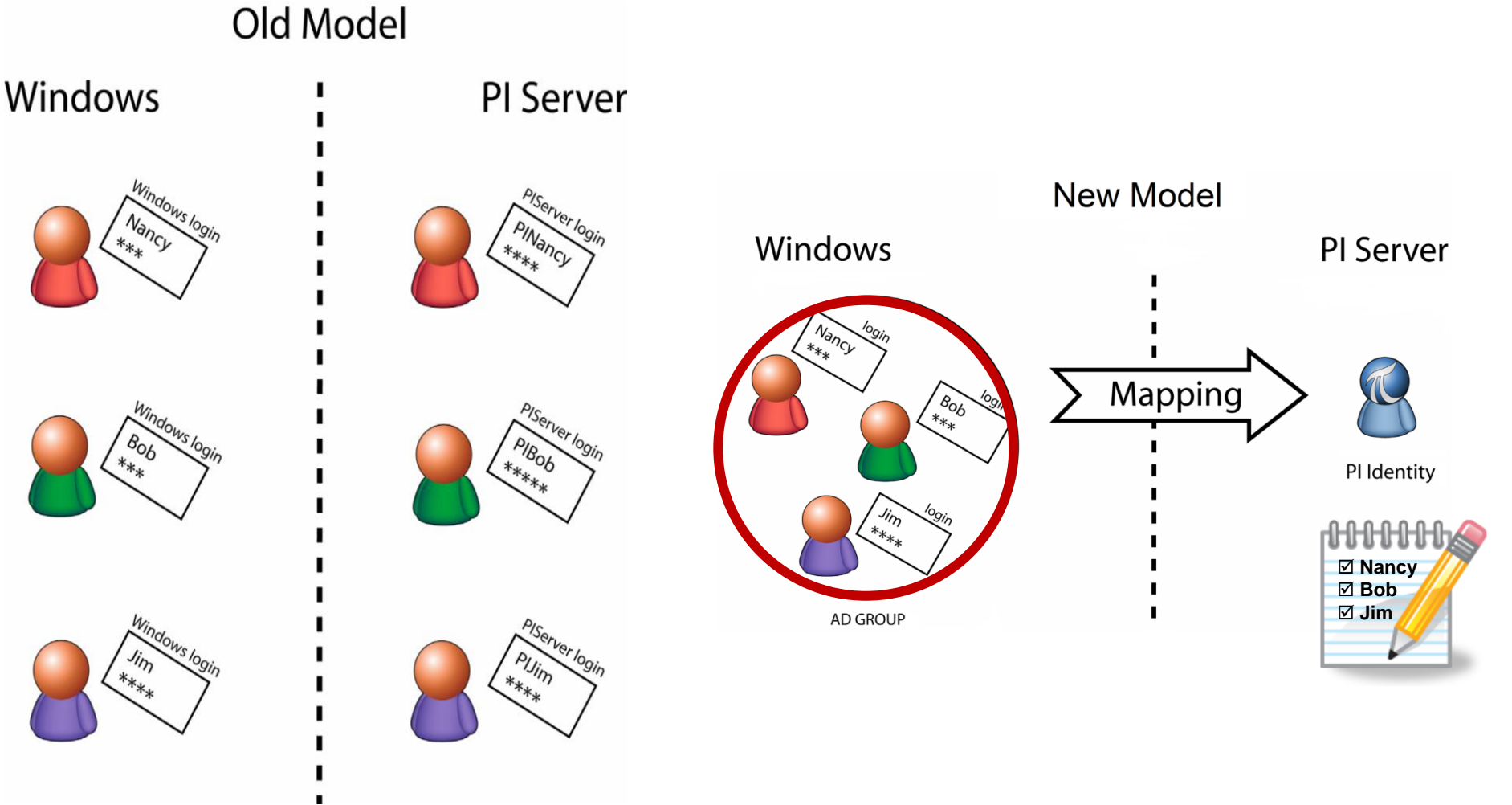
Empowering Business in Real Time.

© Copyright 2010, OSIsoft, LLC. All rights Reserved.

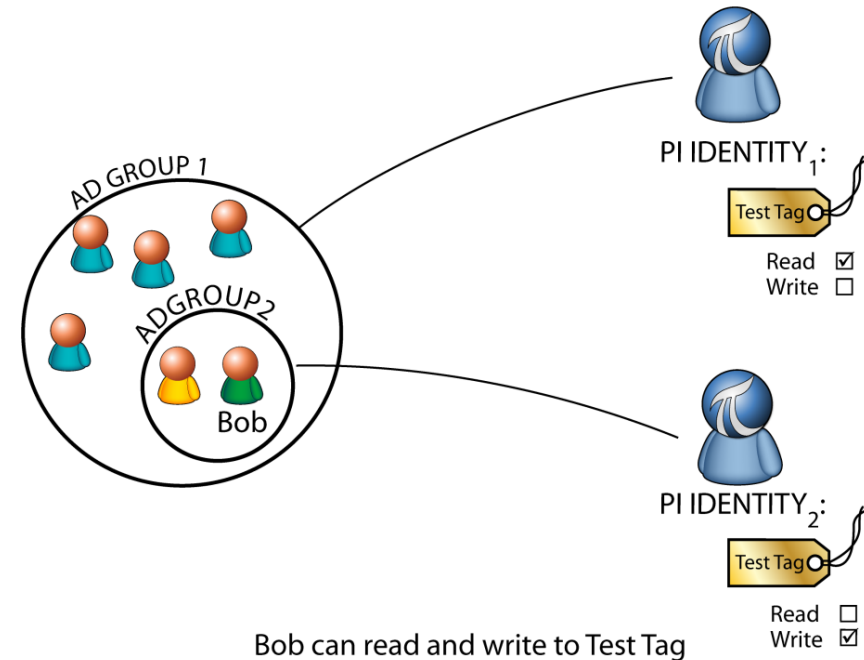
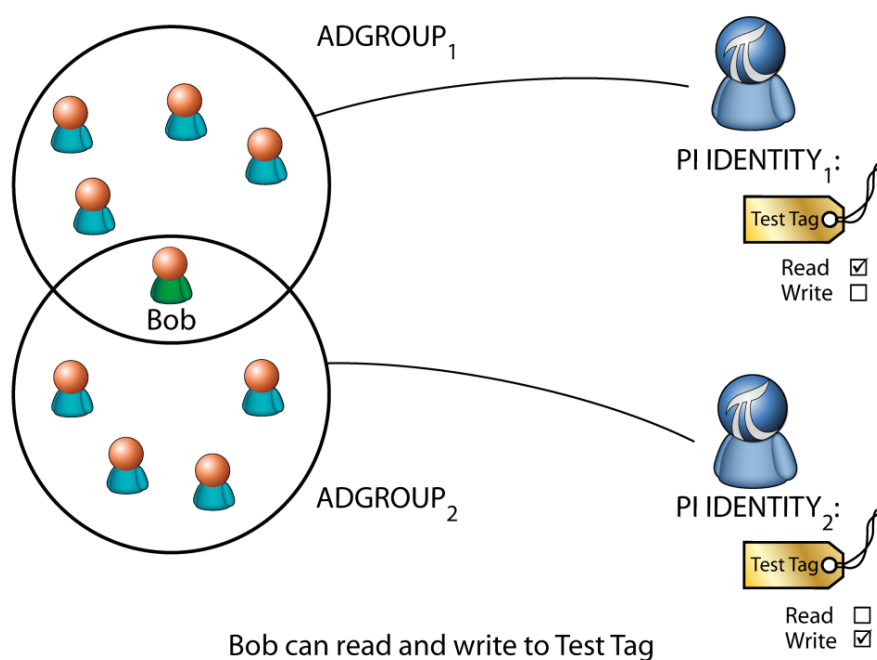
Overview

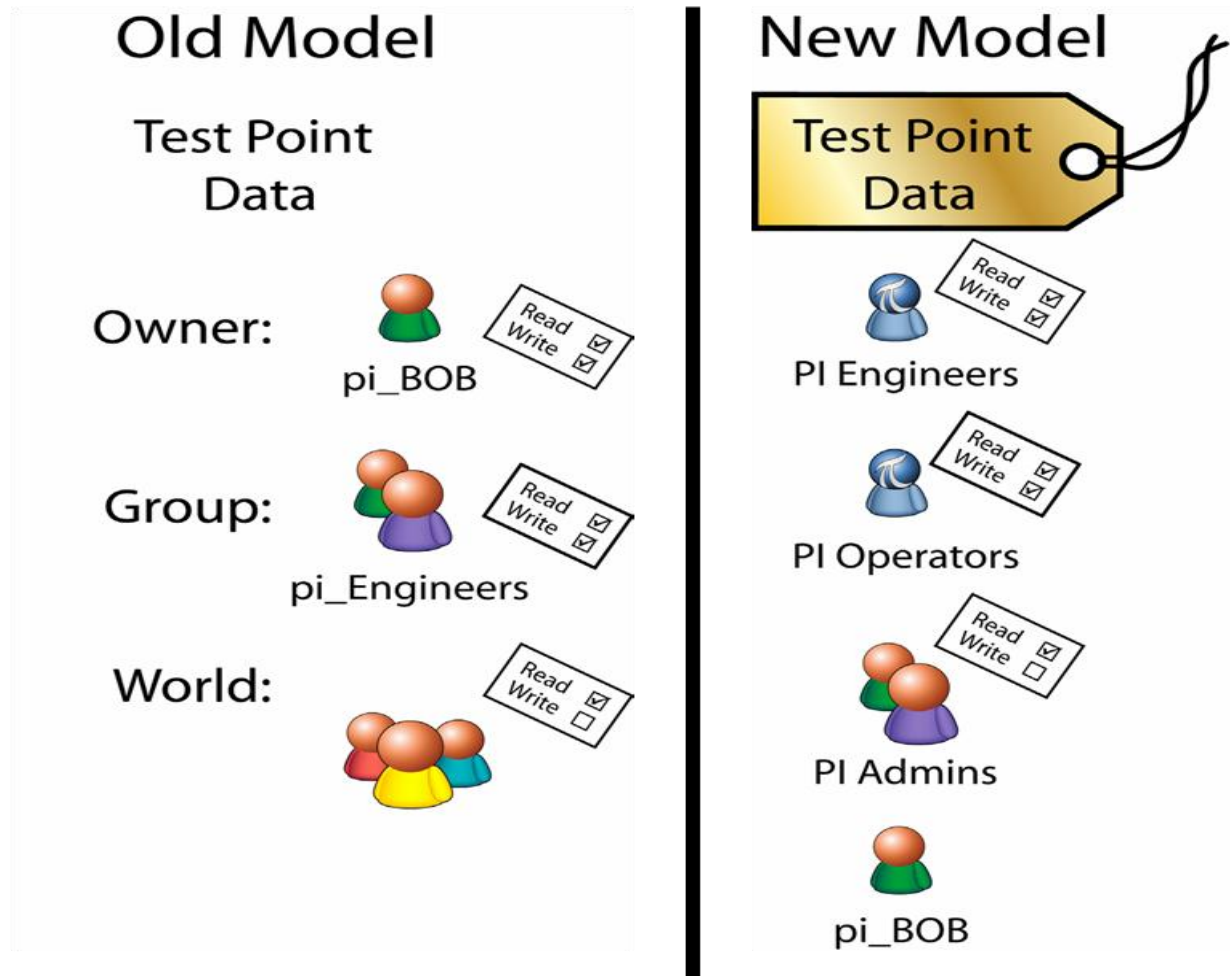
- PI Server 3.4.380.36 (2009) introduced support for Windows Integrated Security
- Microsoft Active Directory (AD) integration
- Map AD users to PI Identities
- PI Identities are roles on the PI Server
 - PIOperators, PEngineers, PISupervisor

Comparing PI Users and PI Identities



Mapping Windows users to 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)

- PI Server must be a member of a domain to leverage Kerberos authentication
- Multiple AD domains must have trusts established or users and groups from other domain cannot be used
 - 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
 - Passwords have to match for NTLM authentication

Best practices

- Develop a PI Identity Scheme for your Organization
 - Protect your data
 - Ease of maintenance
 - Organizational separation
 - Standardize
- Consider Kerberos
 - Map AD principals directly
 - Map AD principals to local groups

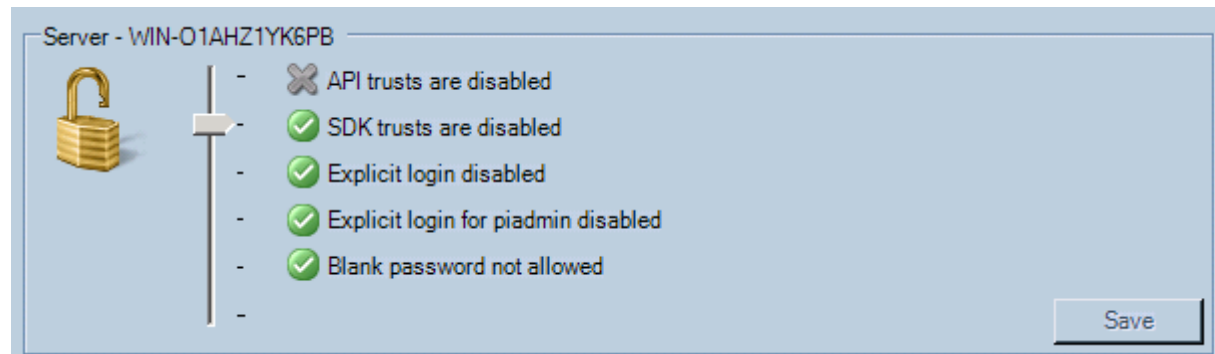


How to Tighten Security



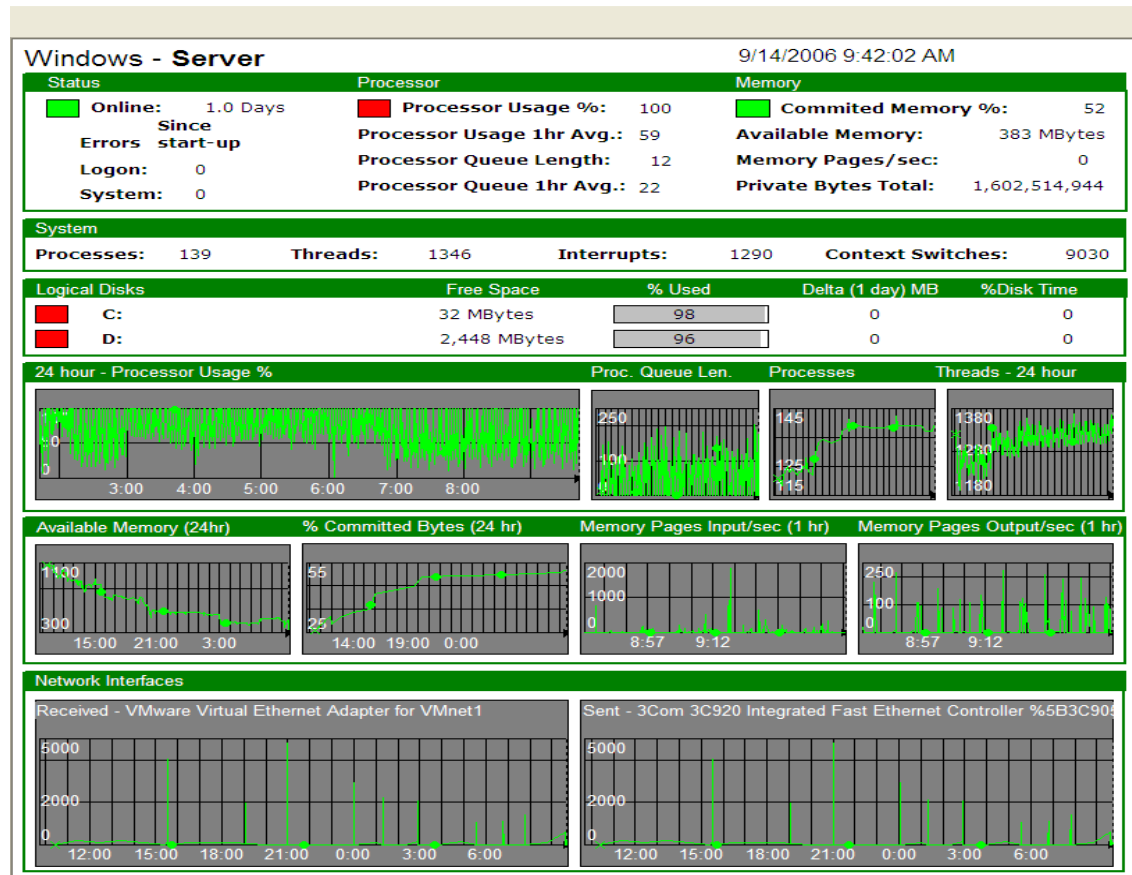
Best practices

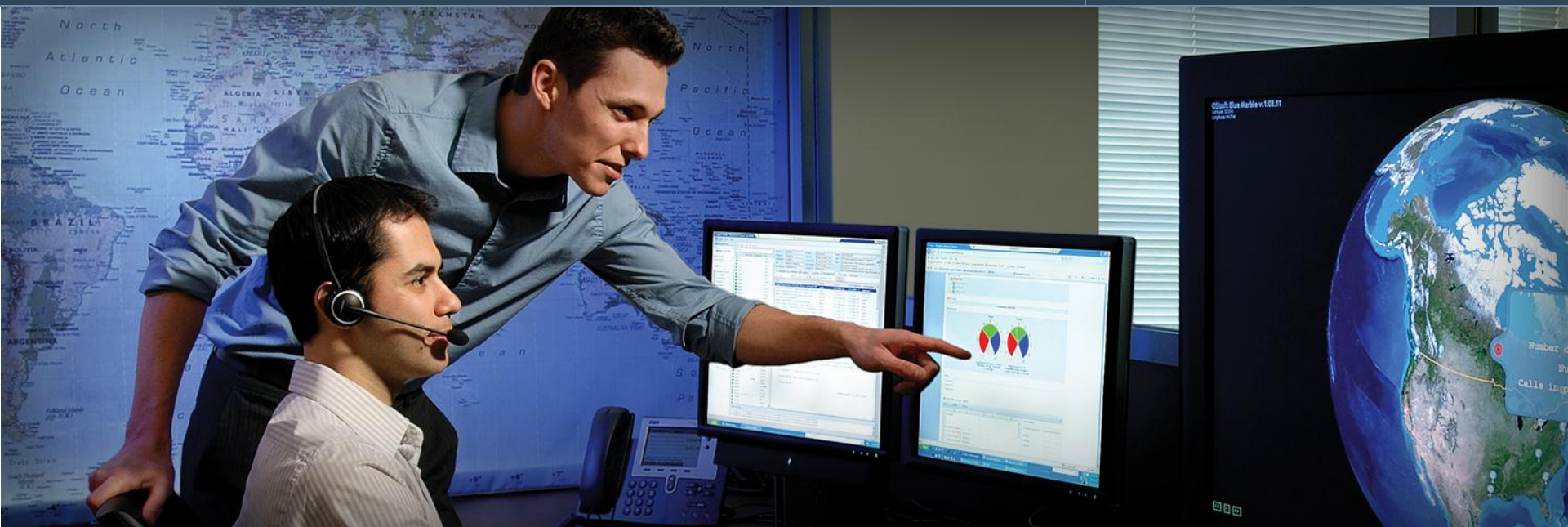
1. Use the new Security Tool to help secure your PI Server
2. Disable or protect the PIADMIN account
3. Disable PI password authentication (Explicit Logins)
4. Secure piconfig by forcing login
5. Retire PI SDK-based Trusts
6. Use Windows Integrated Security



Best practices

- Security
- Monitoring!
 - MCN Health Monitor
- Archives
- Backups





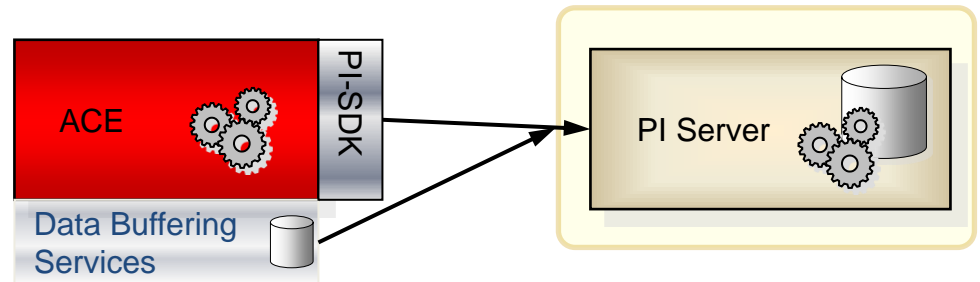
PI Advanced Computing Engine

Empowering Business in Real Time.

© Copyright 2010, OSIsoft, LLC. All rights Reserved.

Overview

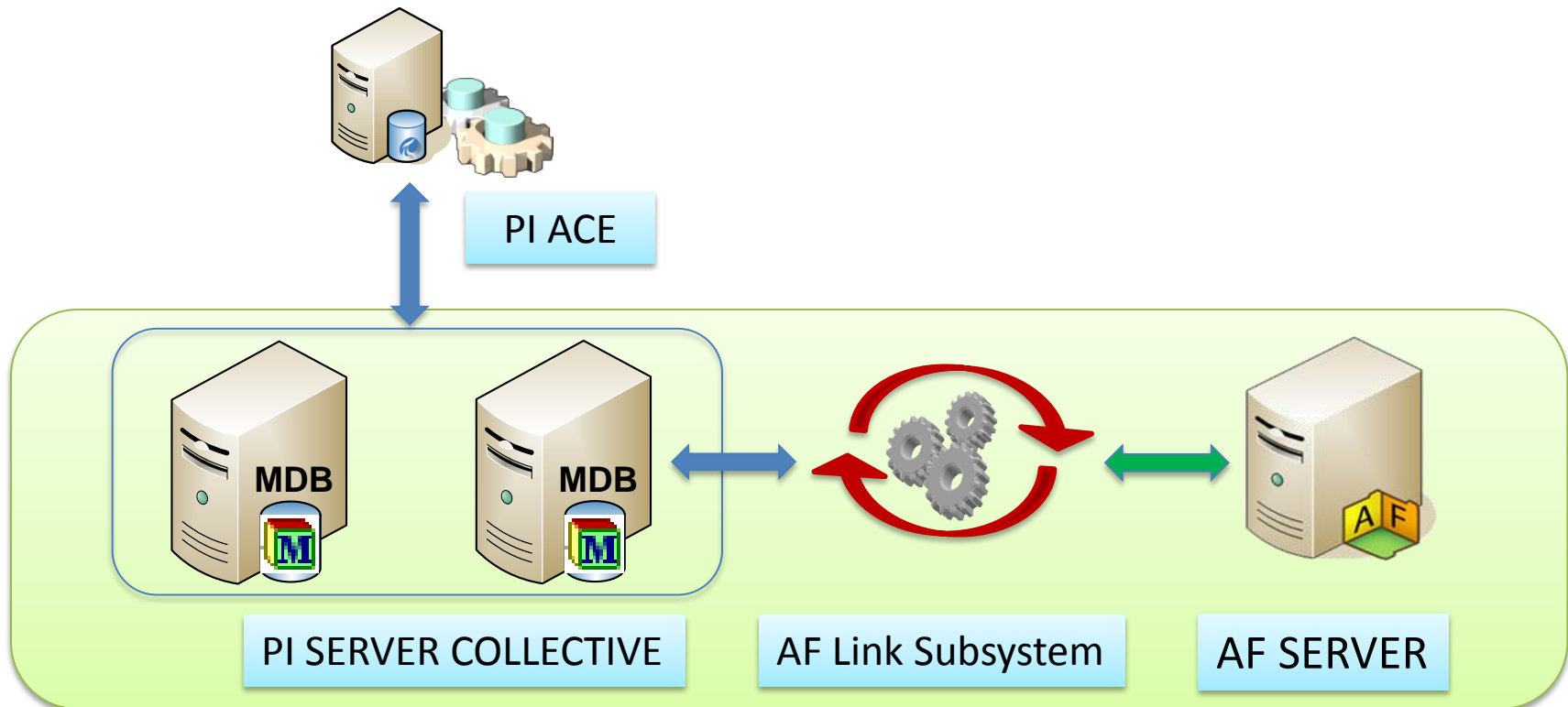
- Develop calculations in Microsoft Visual Studio
- Wizards assist configuration
- High availability

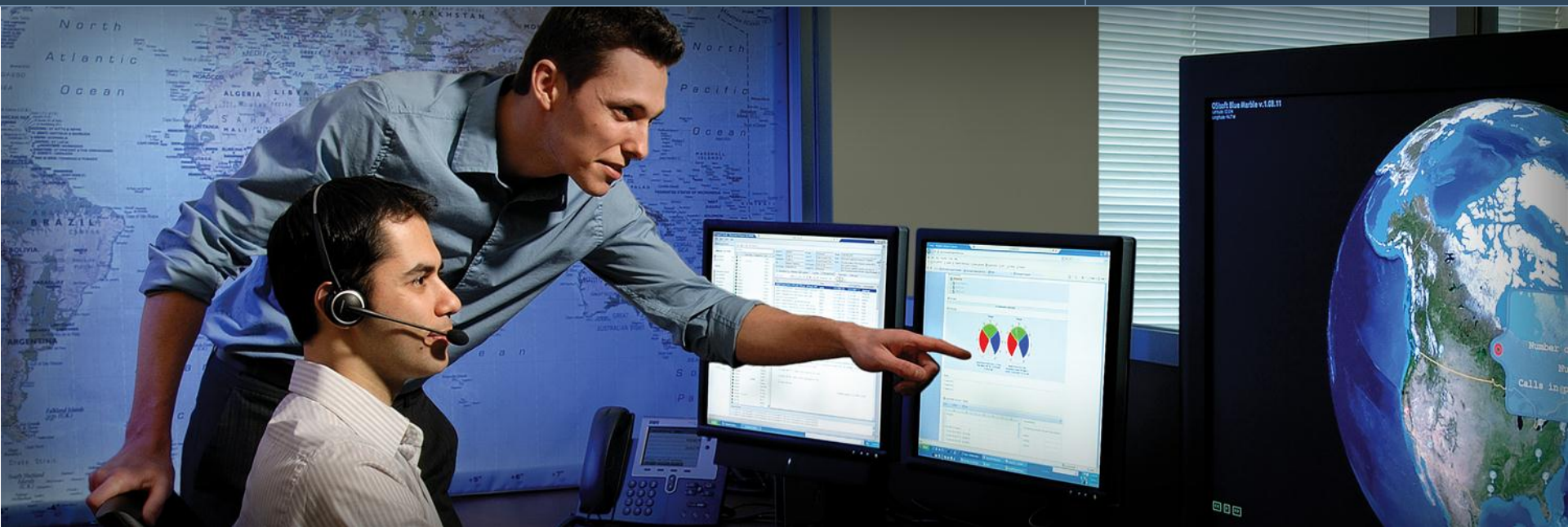


Best practices

- Configure buffering
- Error handling
- Performance Counters

ACE uses the Module Database (MDB) for configuration and calculation metadata





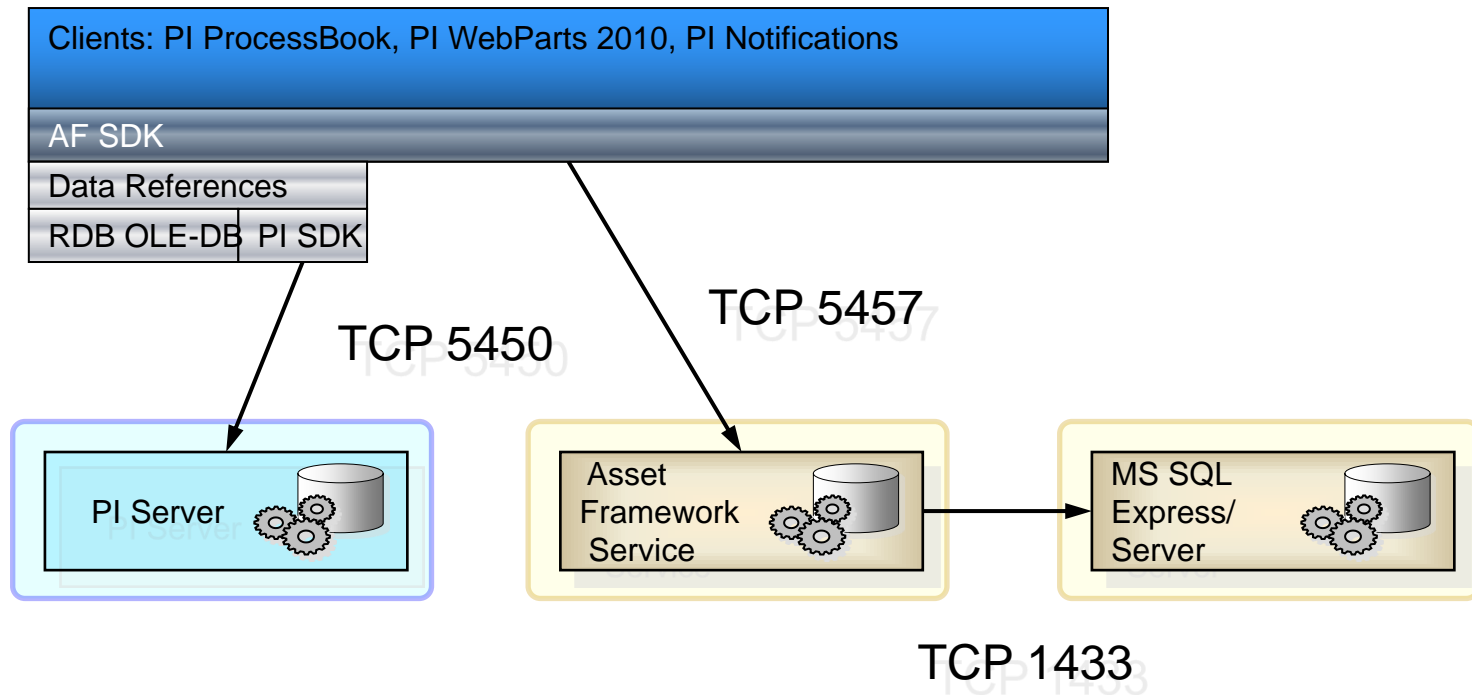
PI Asset Framework and PI Notifications

Empowering Business in Real Time.

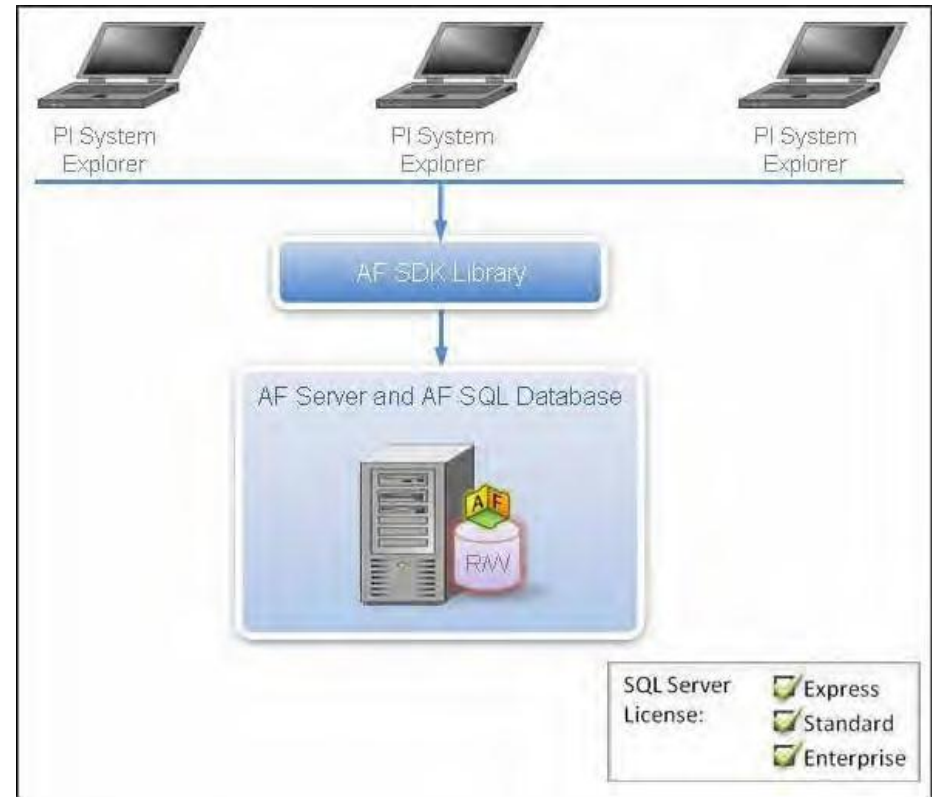
© Copyright 2010, OSIsoft, LLC. All rights Reserved.

Overview

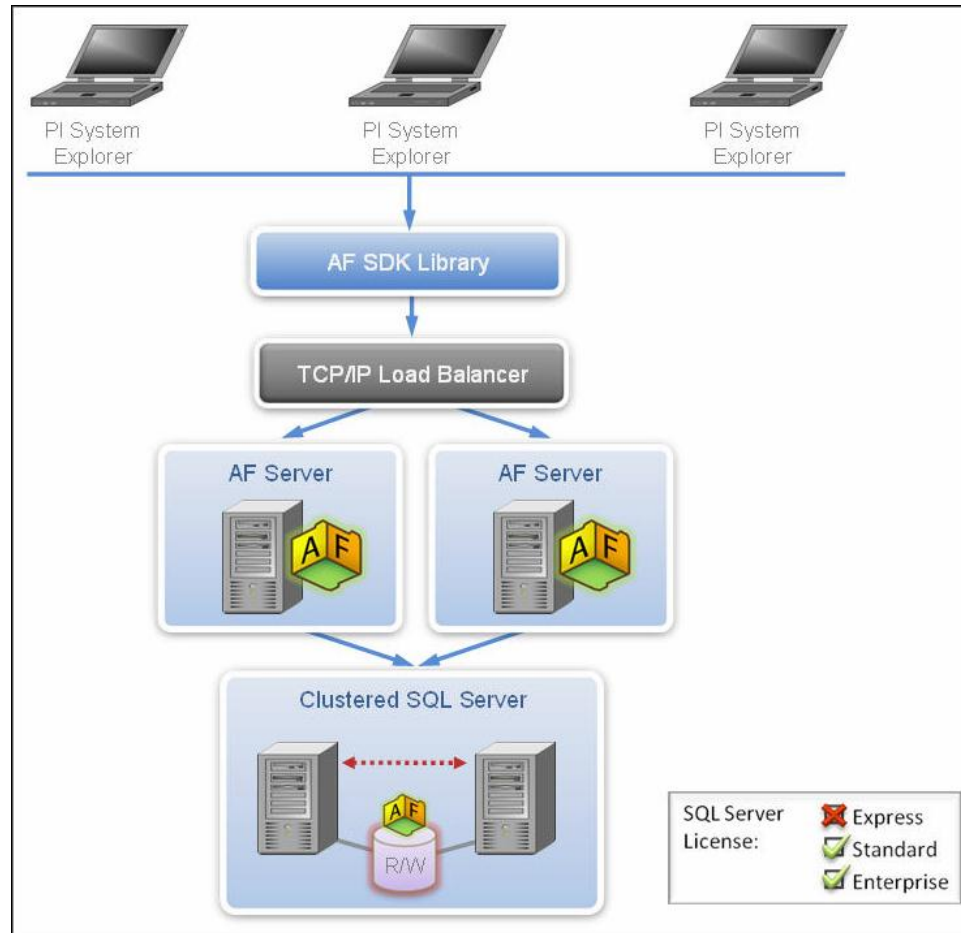
- Organize PI Server data and metadata by asset



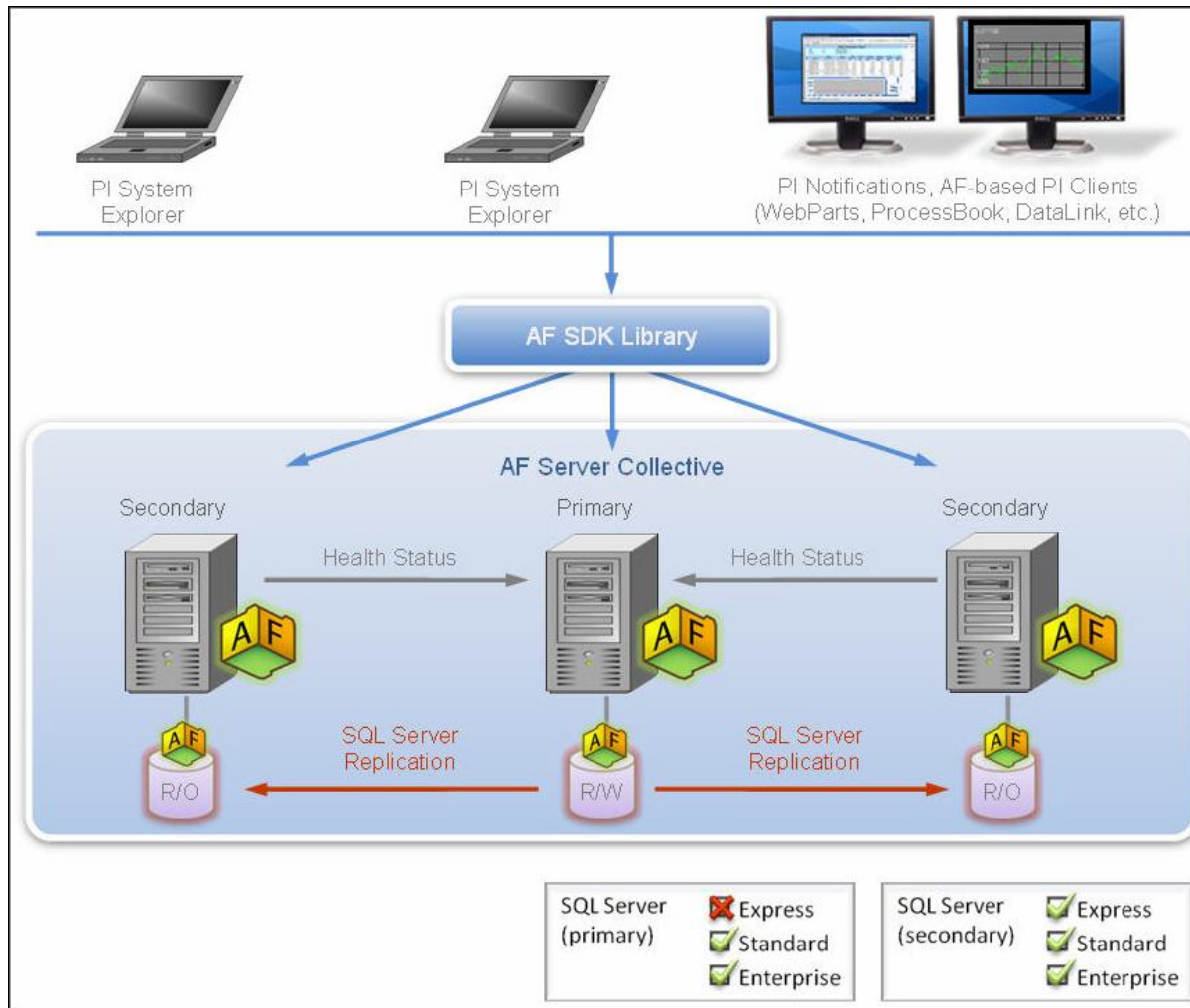
- Two key components
 - AF Server
 - SQL Server database
- SQL Server
 - Express, Standard
 - Cluster or Mirror
- AF Server
 - Behind a load balancer
 - AFSDK Collective



PI Asset Framework - High Availability



PI AF - AFSDK High Availability

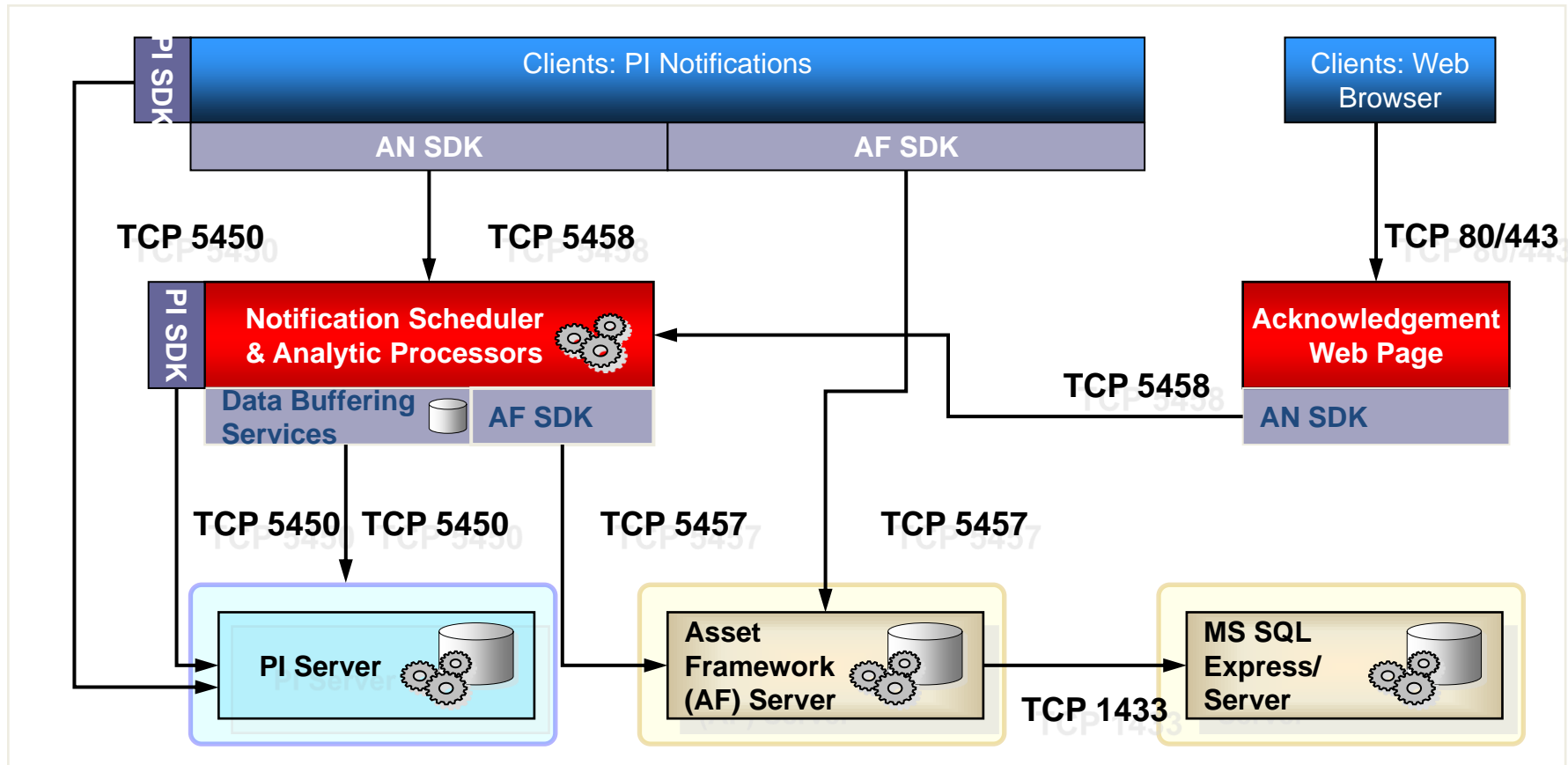


Best practices

- Backups!
- Monitor SQL Server with MCN Health Monitor
- 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)
- Minor: for AF Table, disable AF2.0 compatibility, enable impersonation

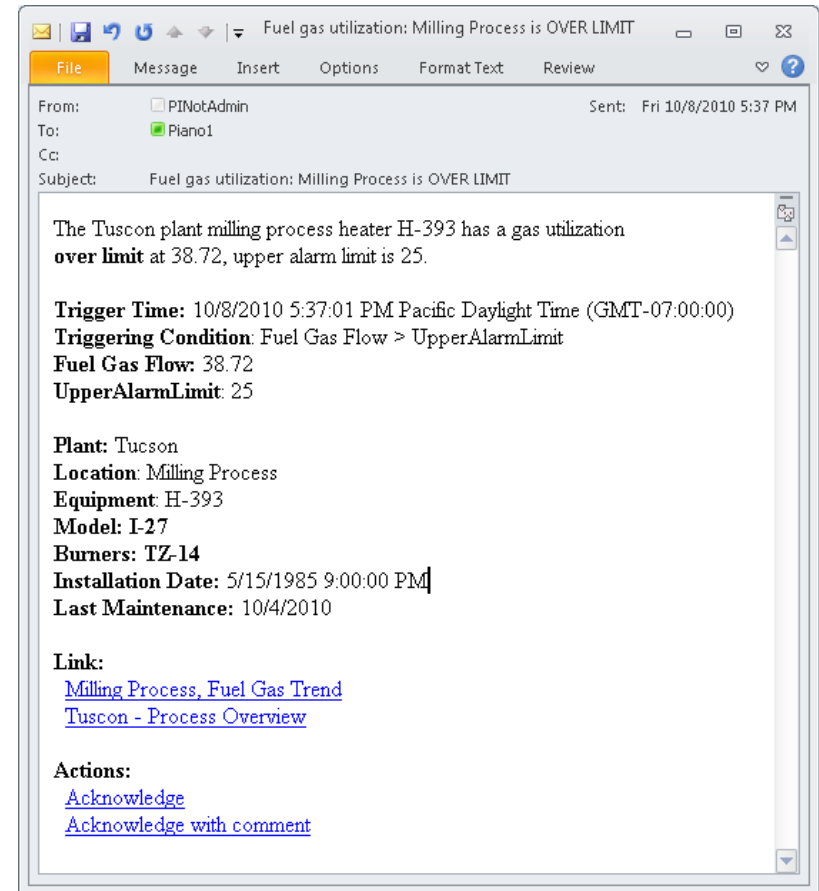
Overview

- Let the right people know when a critical event occurs



Best practices

- Configure buffering
- Performance Counters
- Configure redundant scheduler



- 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

© Copyright 2010 OSIsoft, LLC.

777 Davis St., Suite 250 San Leandro, CA 94577