"where PI geeks meet"

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HA PI and Virtualization: Even Better Together

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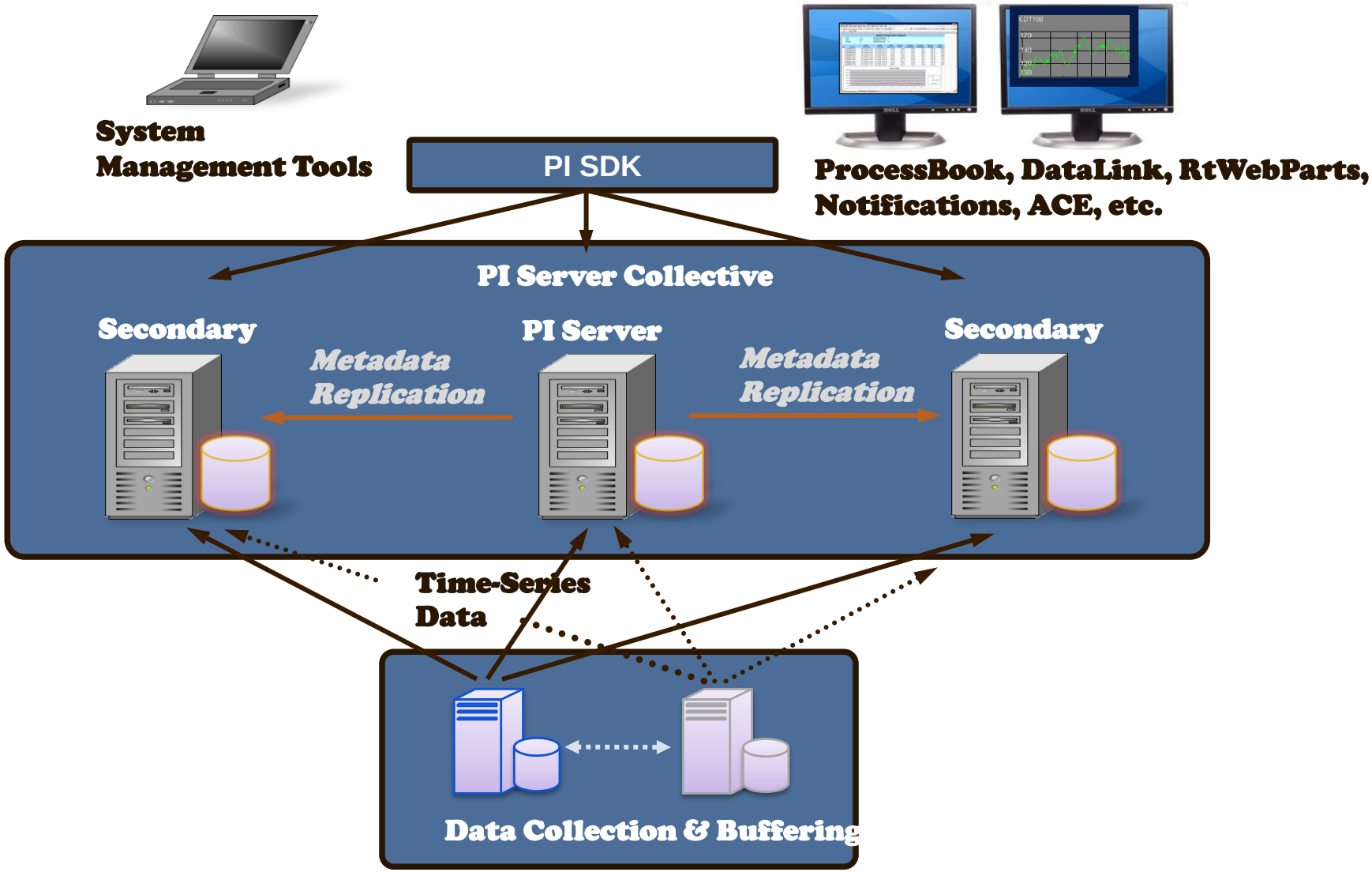
HA PI Server

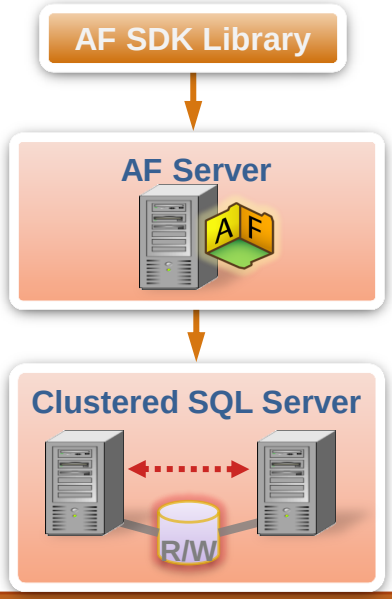


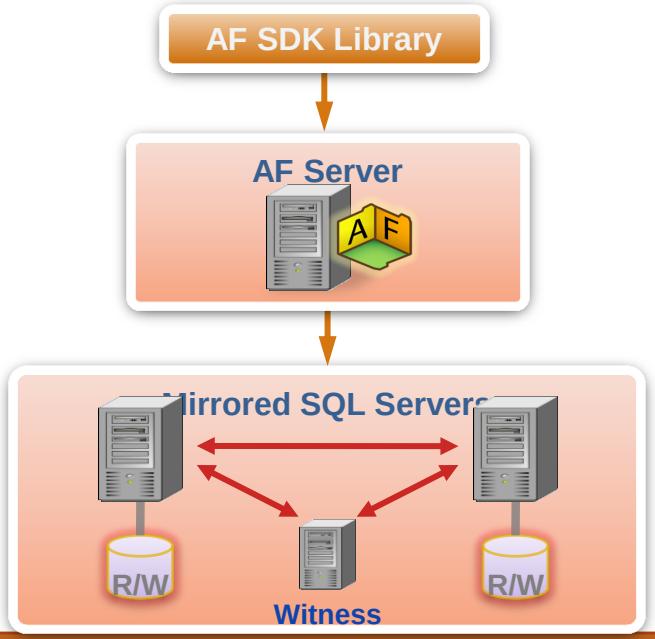
HA PI Interfaces

- Phase 1 Failover
  - Heartbeat tags track interface health
  - HA PI Collective in place
  - Additional redundancy at interface level
- Phase 2 Failover*
  - No output required to data source, shared file tracks interface health
- Disconnected startup
  - PI API 1.6.1.5 or higher
  - UniInt 4.3.0.15 or higher

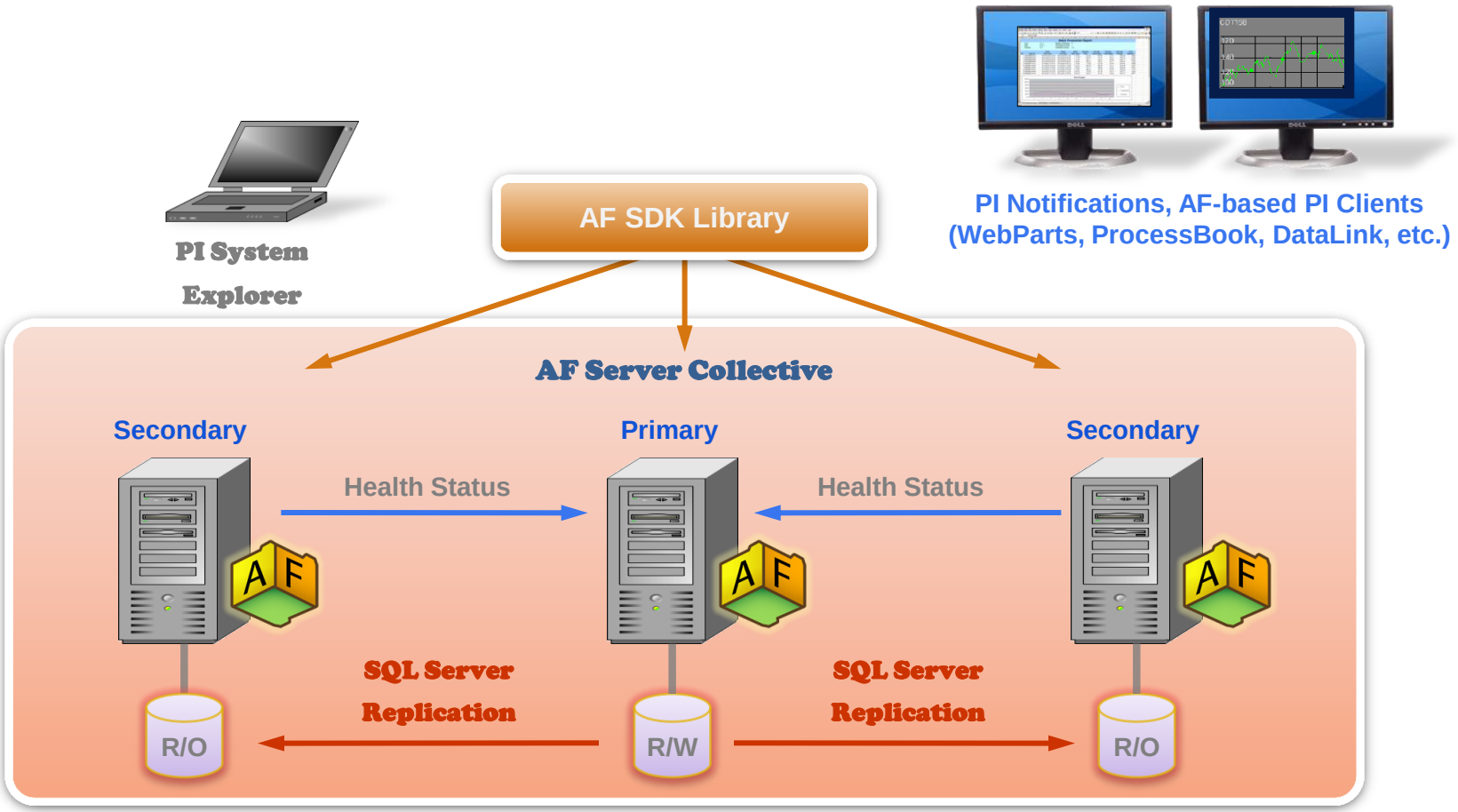
High Availability for AF 2.1

- Support Clustering, Mirroring, and Replication (HA)
- Conceptually similar to HA for the PI Server
  - Automatic Failover for clients
  - SQL replication for the AF database





High Availability AF



SQL Server (primary)	✗ Express ✓ Standard ✓ Enterprise	
SQL Server (secondary)	✓ Express ✓ Standard ✓ Enterprise	

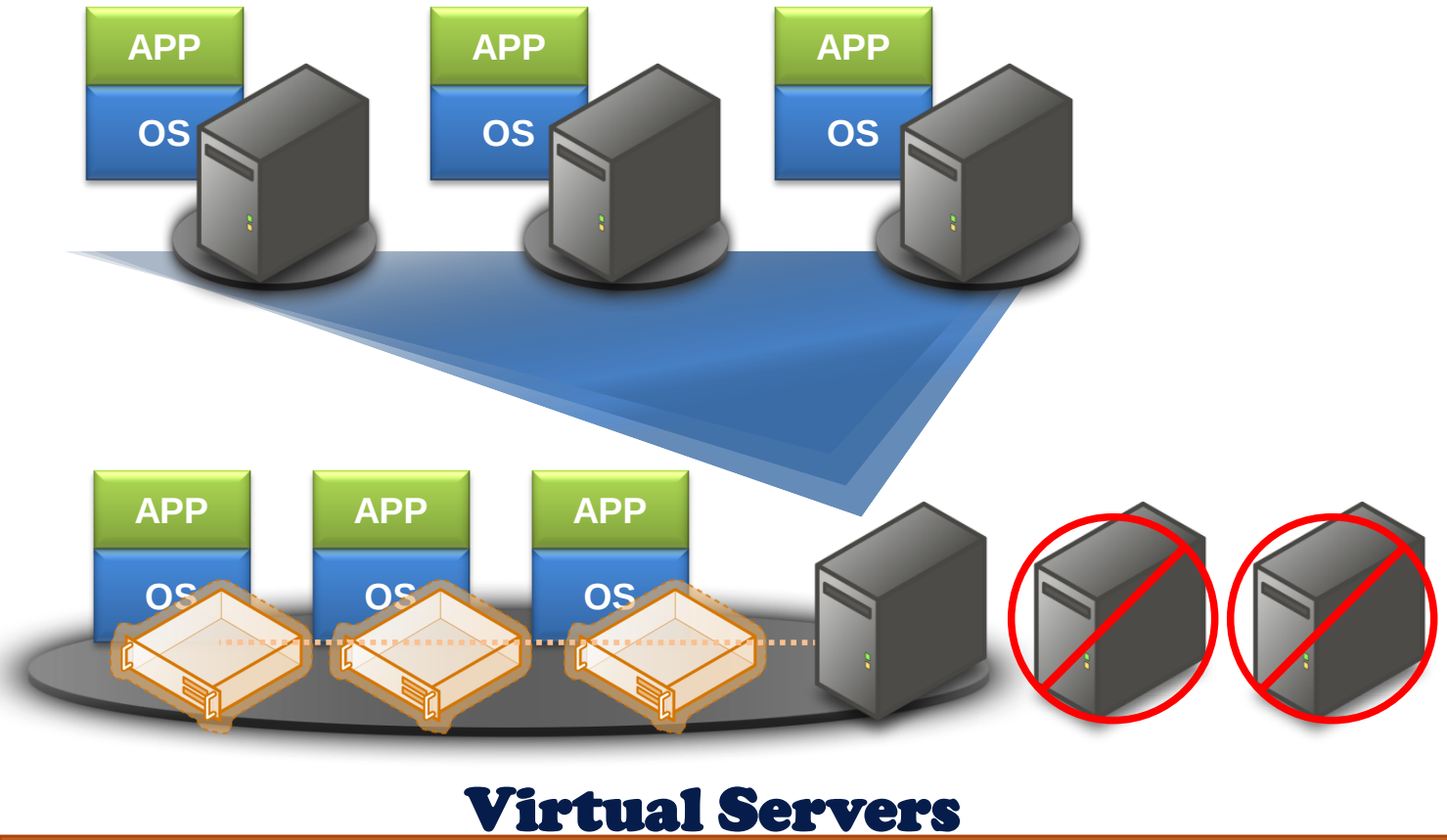
AF 2.1/SQL Server HA Deployments

	Non-HA	SQL Cluster	SQL Mirror	AF Collective (Replication)
HA Writes	No	Yes	Yes	No
HA Reads	No	Yes	Yes	Yes
Load Balanced Reads	No	No	No	Yes
Max Distance between SQL Servers	N/A	tens of meters	km	thousands of km
Read Access during Upgrade?	No	Yes	Yes	Yes
Read/Write Access during OS/SQL Upgrade?	No	Yes	Yes	No
Read/Write Access during AF upgrade?	No	No	No	Not while upgrading Primary
Special Hardware Required?	No	Yes	No	No
Minimum SQL Server Edition Required	Express	Standard	Standard	Primary: Standard Secondary: Express

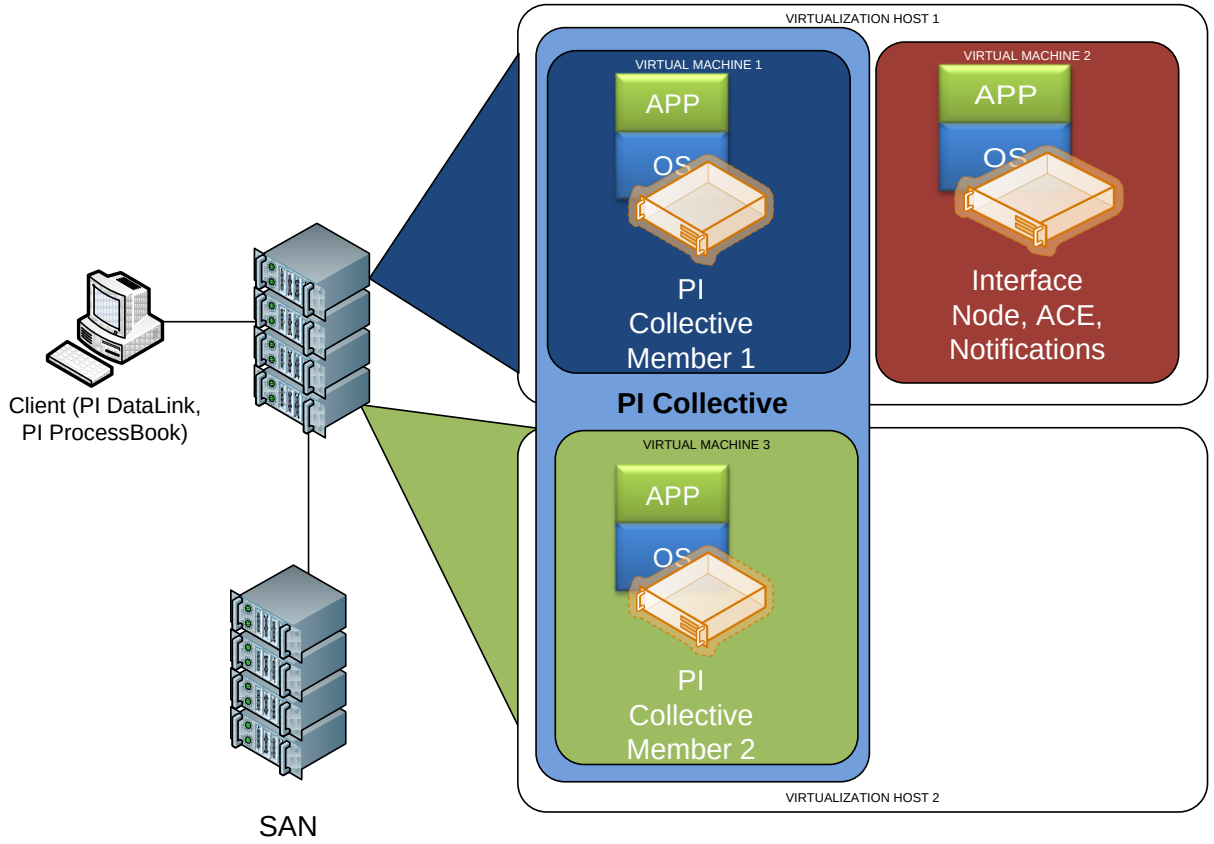
Customer Situations that Indicate HA

- Providing data users rely on, available at all times
- Restoring a backup or performing routine maintenance requires unacceptable downtime
- Fighting fear of bad backups or hardware failure
- Needing simple design that is robust, low bandwidth and supported by WANs
- Needing geographical independence of multiple servers for performance; disaster planning;
- Addressing security restrictions (NERC CIP)
- Supporting more or specialized users by partitioning use
- Facilitating capacity planning (add more members to scale out)

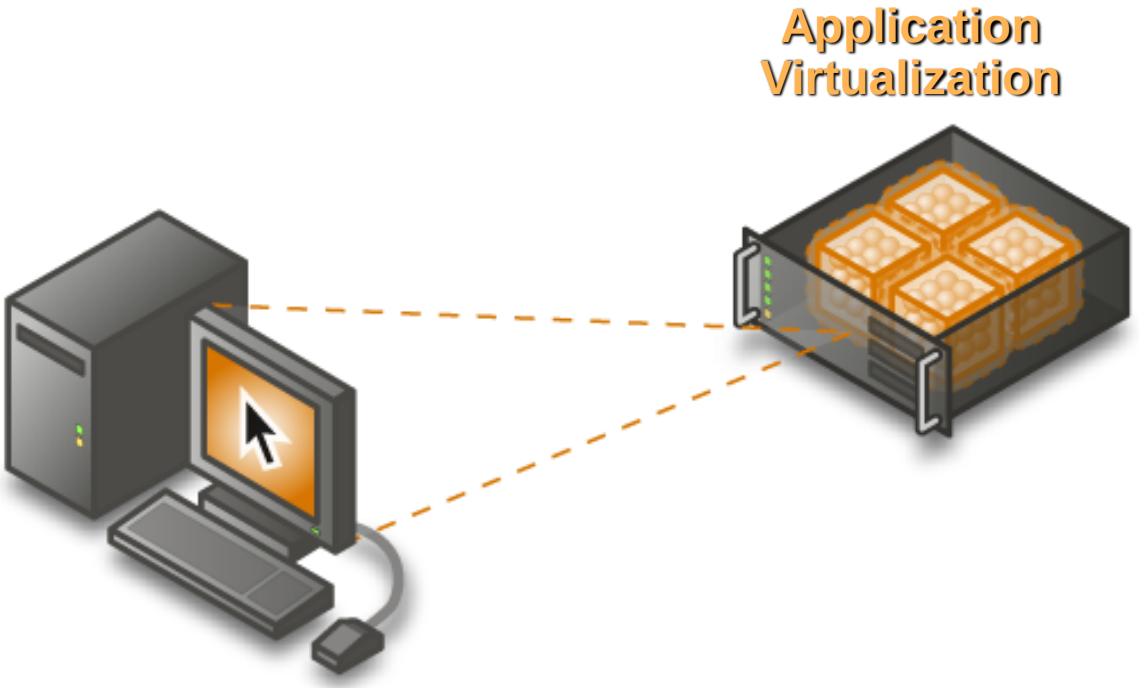
Server Virtualization



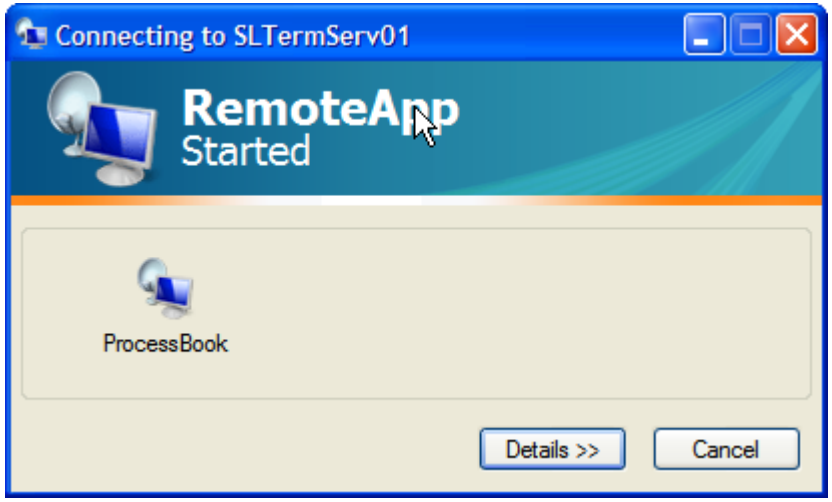
Storage Area Networks (SAN)



Application Virtualization



PI and Application Virtualization (ProcessBook)



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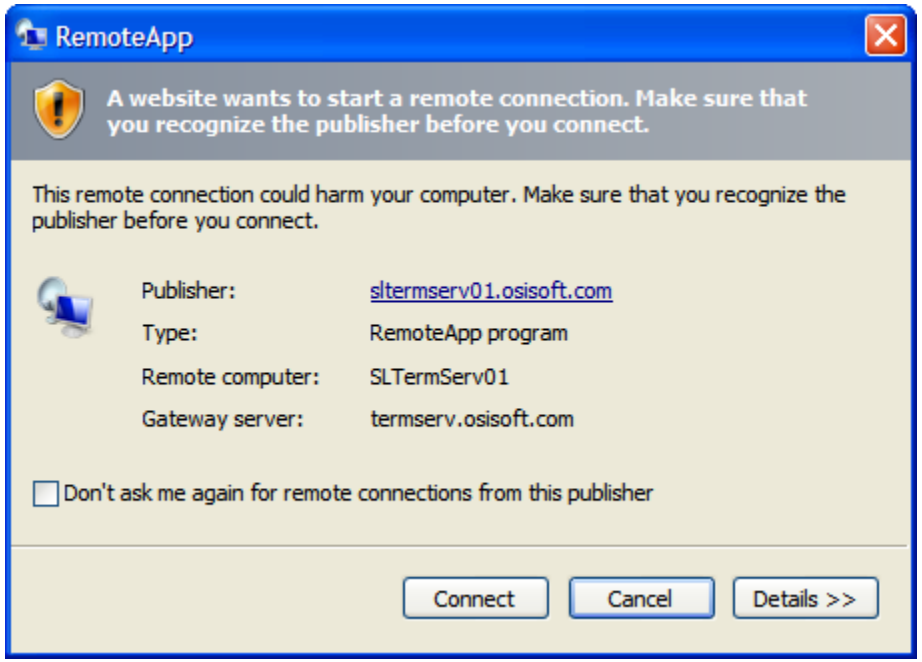

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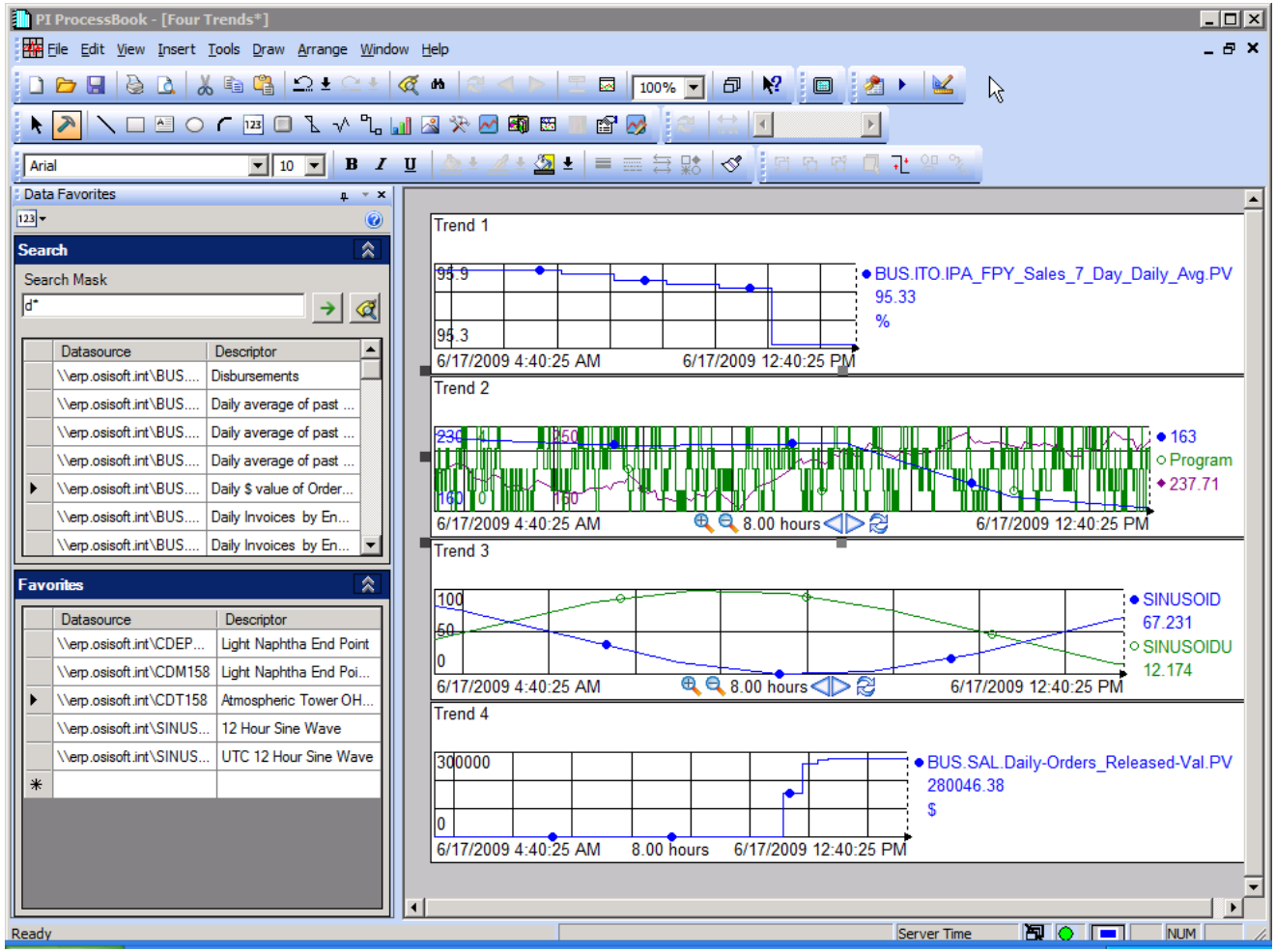


5 Principles for Virtualization Success*

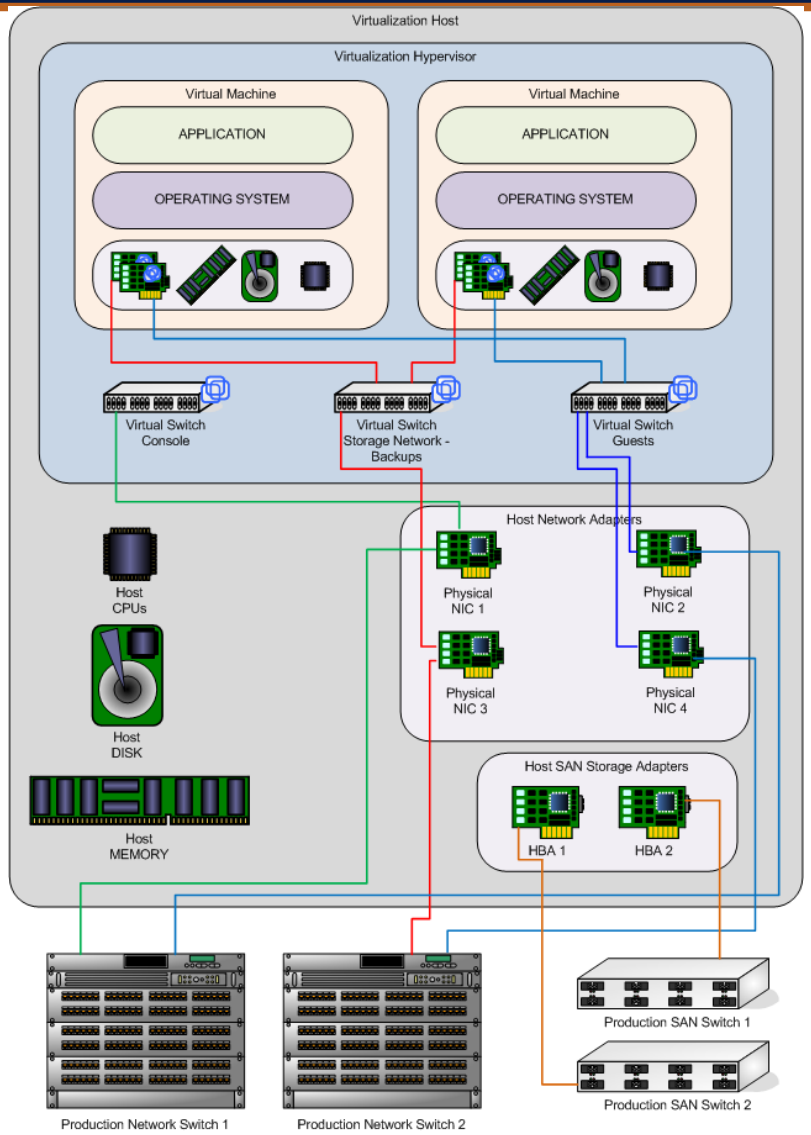
- Treat virtual machines as if they were physical machines
- Invest in Enterprise-level hardware and software
- Do not mix virtual and physical on the same host
- Use qualified Virtualization support personnel
- Test on the target platform

*OSIsoft Center of Excellence

Virtualizing PI: Some tuning parameters

- Processor requirements
  - Equal or greater than physical PI system
- Disk requirements
  - Same sizing as a physical PI system
  - SAN helps
- Memory
  - Related to PI Point count; consider VM overhead (+10%)
- Networking
  - Adapter teaming for load balancing

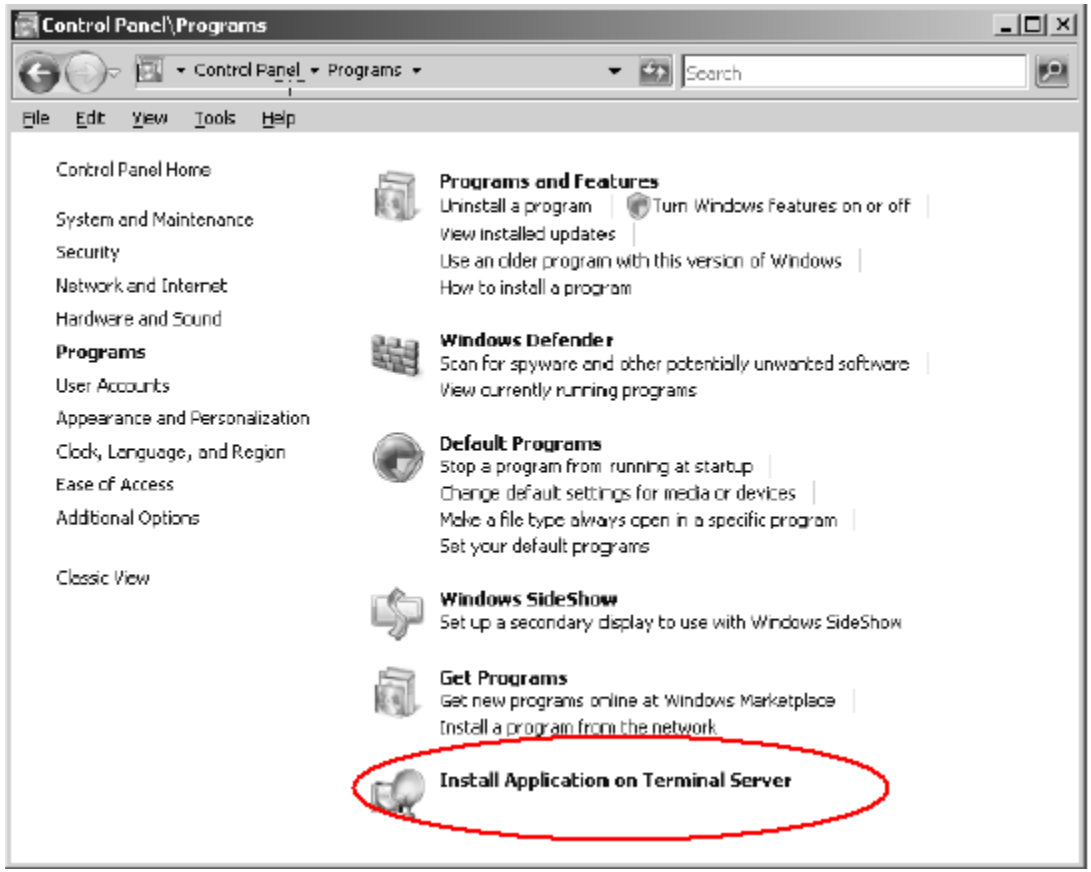
Areas to Tune



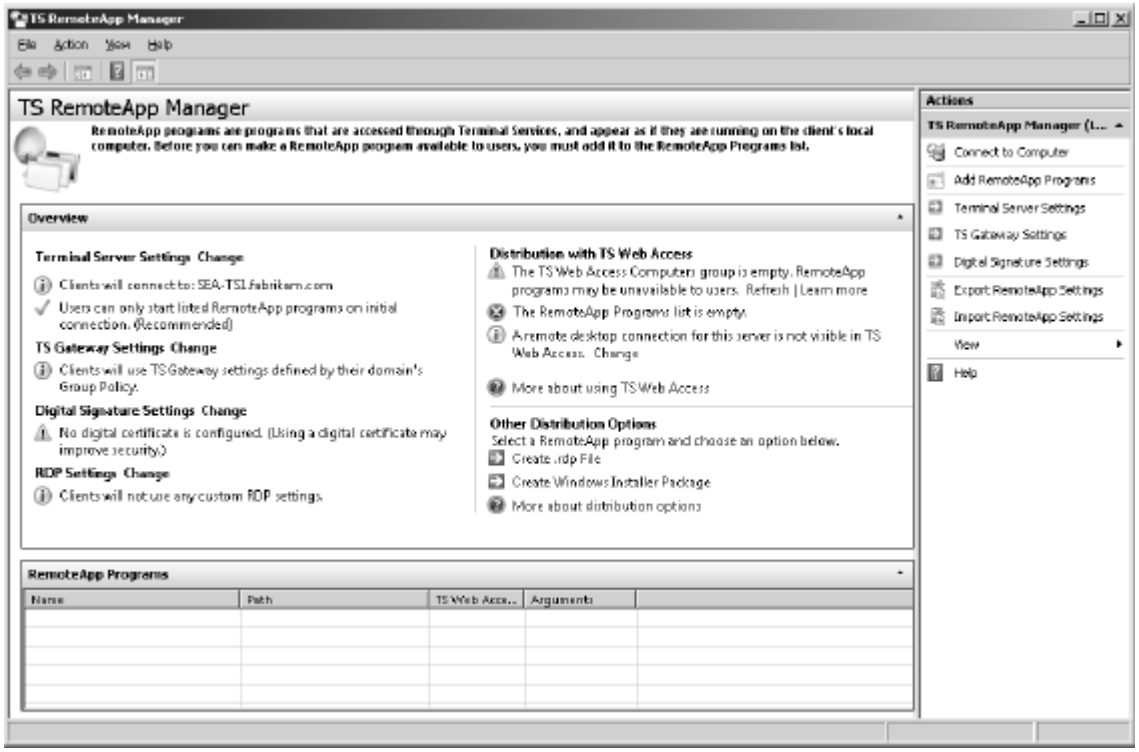
Virtualizing PI Applications: Configuration

- Windows 2008 R2 Terminal Services Gateway
- Terminal Services RemoteApp
- Limit max simultaneous connections
- Monitor Active Connections using TS Gateway Manager

Install App on Terminal Server 2008



TS RemoteApp Configuration



Customer Situations that Indicate Virtualization

- Looking to consolidate management of computing resources (fewer servers to buy and maintain)
- Looking to streamline deployment of new tools for the user community (less IT time and resources)
- Investigating new ways to provide ever-increasing amounts of storage for mission critical systems
- Scaling PI to more users and other information systems
- Investigating virtualized test environments for validating new software purchases

Additional Resources

- OSIsoft corporate web site
  - News from Georgia Tech research
  - Presentations
  - Case studies
- OSIsoft Tech Support or vCampus web site
  - Knowledge Base articles
  - Discussion boards
  - Whitepapers

Q&A

- Questions?

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THANK YOU.