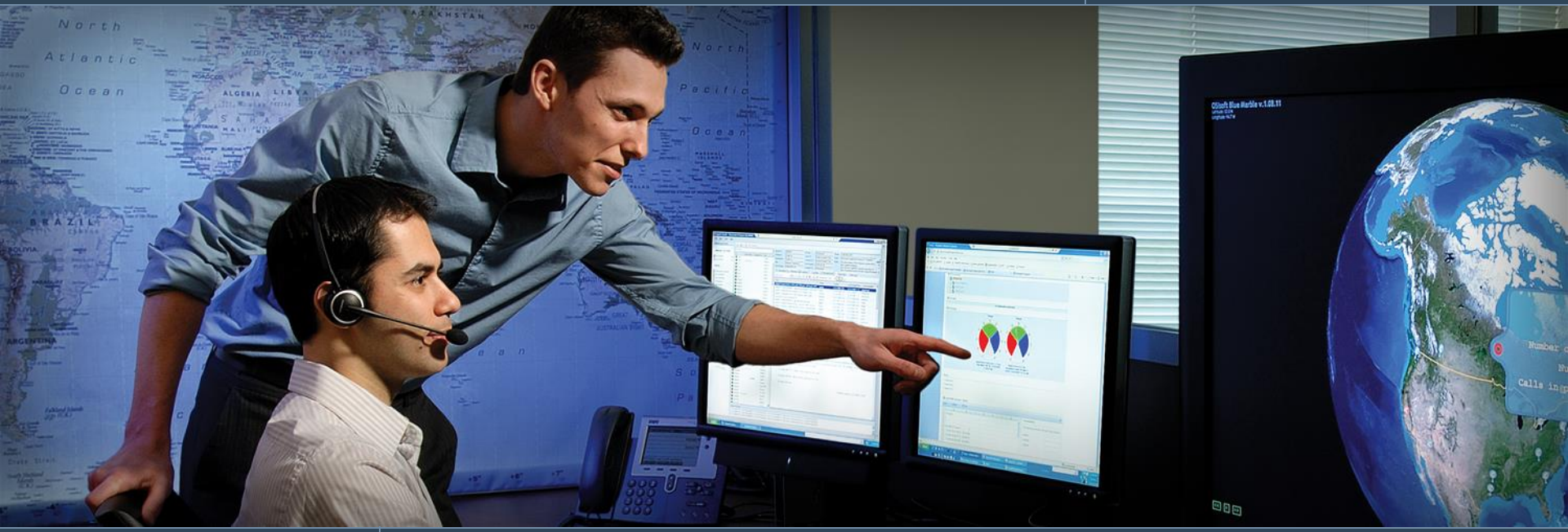


Virtualization and HA PI Systems: Three strategies to keep your PI System available, scalable, and portable

Empowering Business in Real Time.

Why Virtualization and PI?

You can realize substantial benefits using the combined strategies of virtualization, storage area networks (SAN) and PI Collectives (HA).

These strategies provide you with:

- Increased reliability
- Reduced hardware and maintenance costs
- Improved scalability

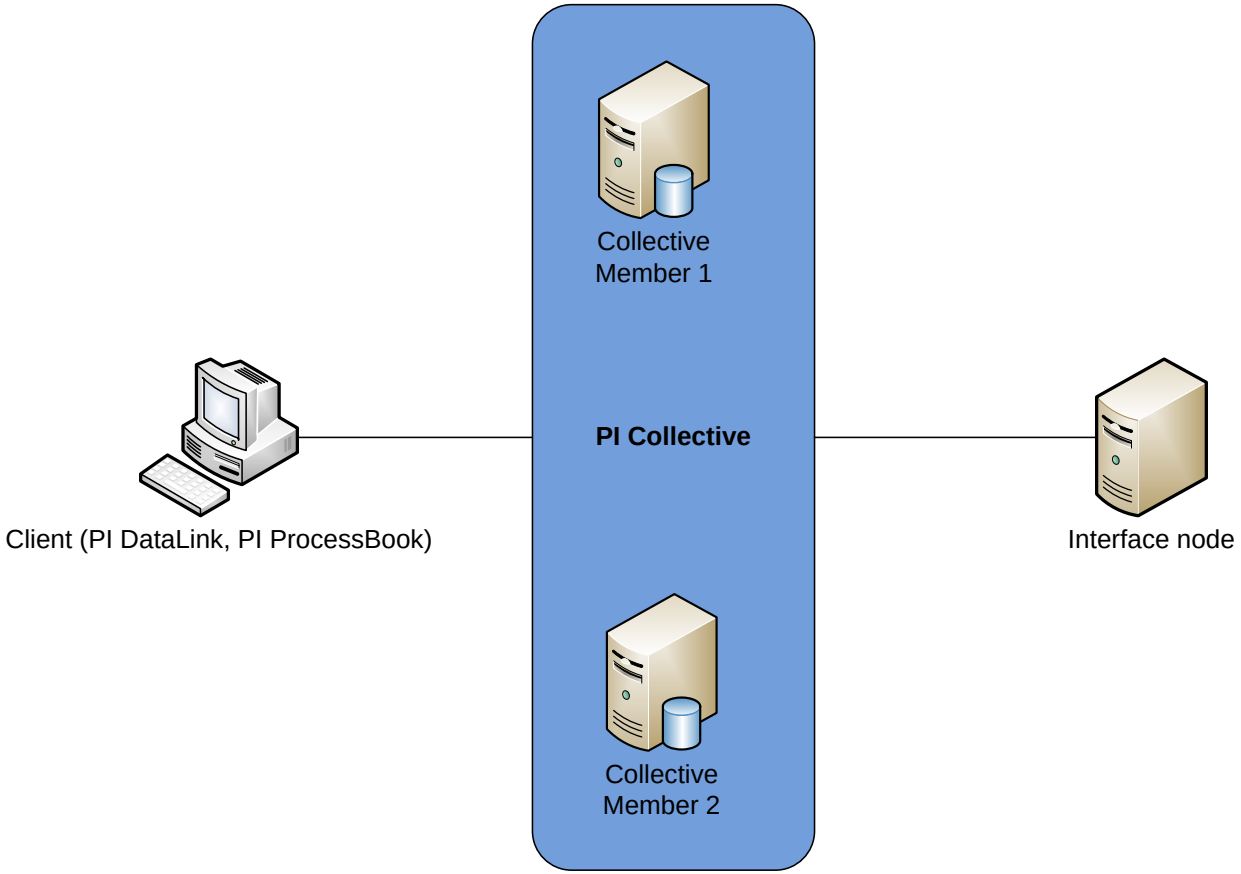
Use them separately or together

Why Now?

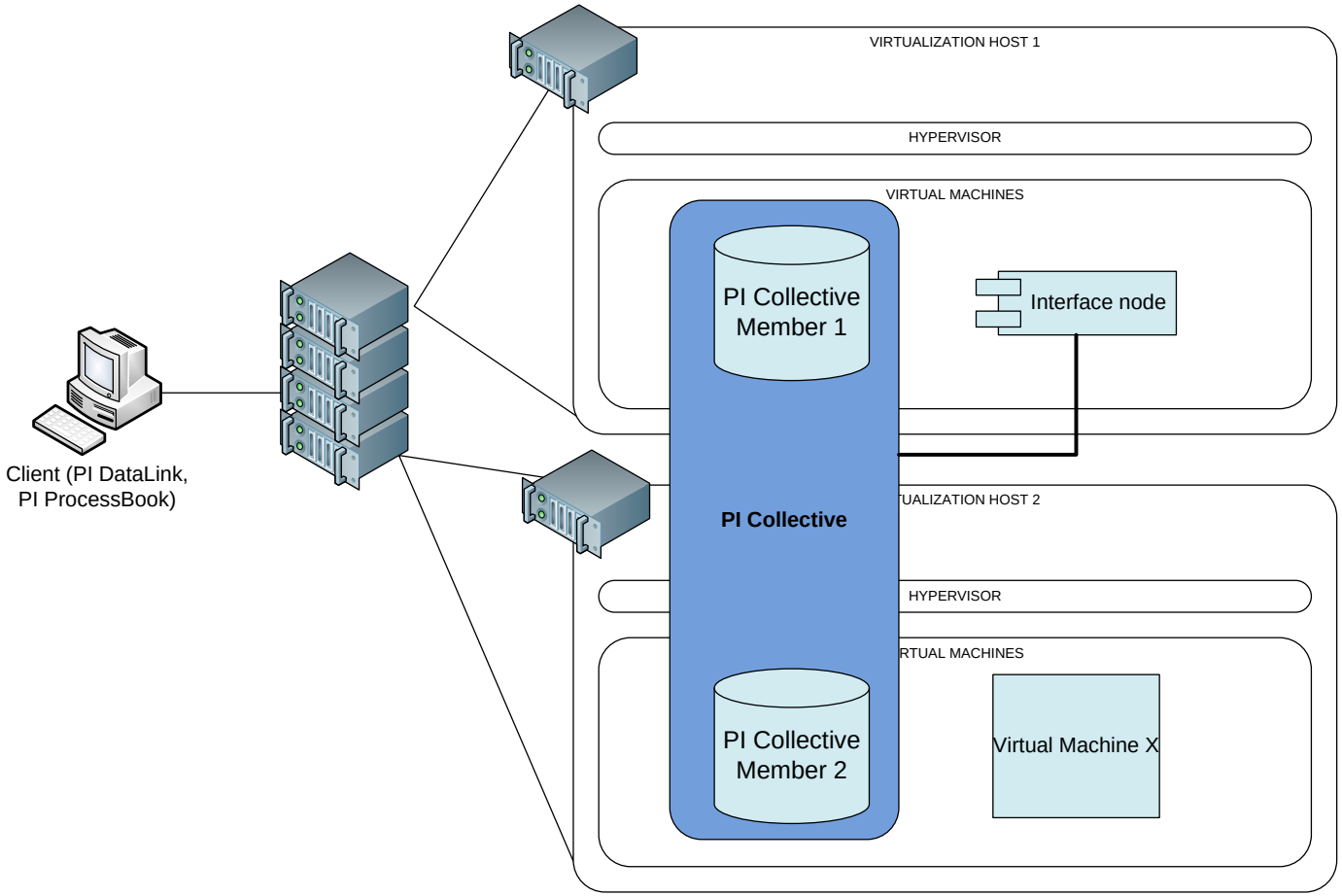
- You need to do more with less
- Your projects need to show immediate ROI
- IT is challenged to increase service levels with less staff
- Virtualization, SAN and HA are valuable separately, but better together

A Simple PI System

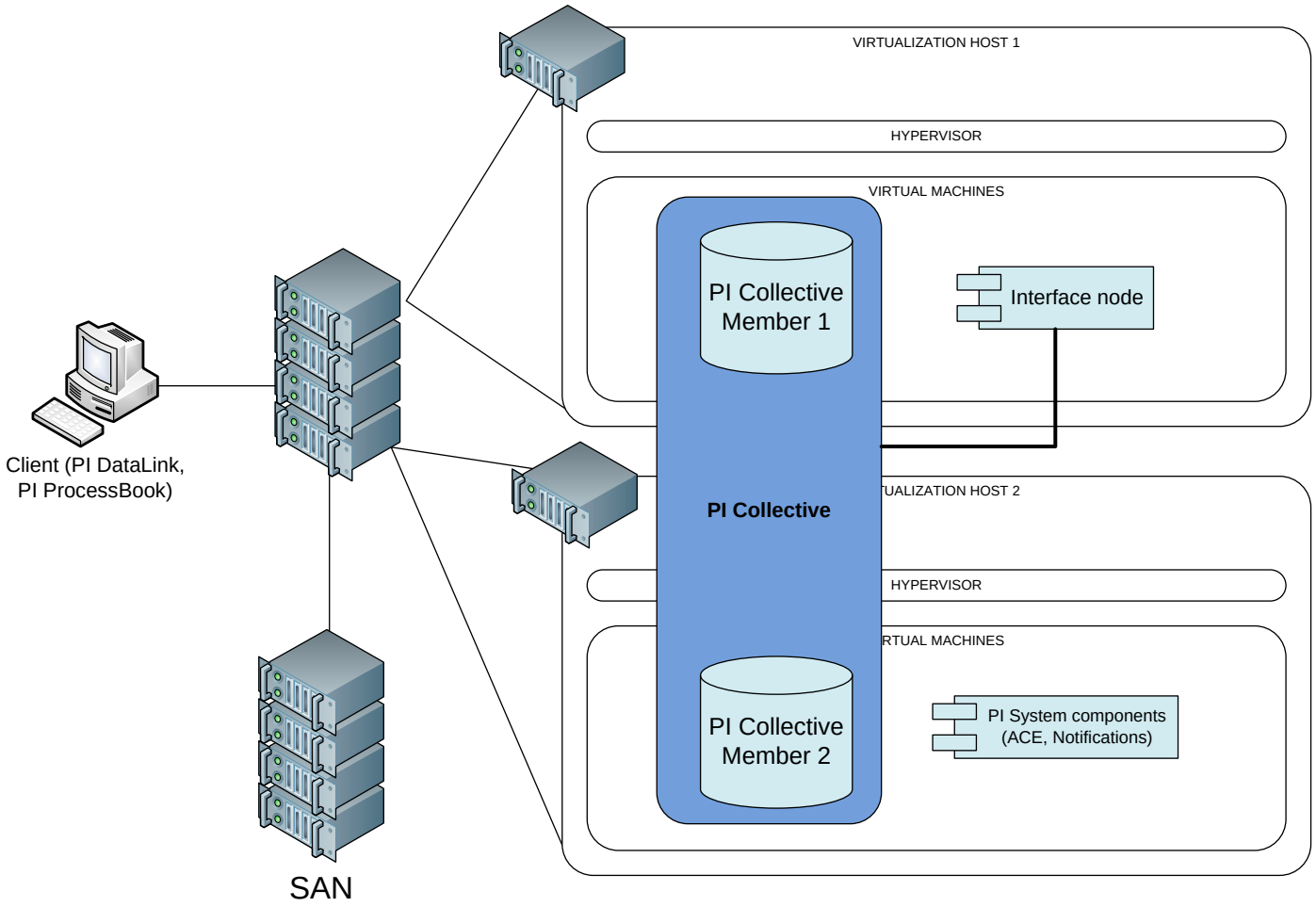
A Simple HA PI System



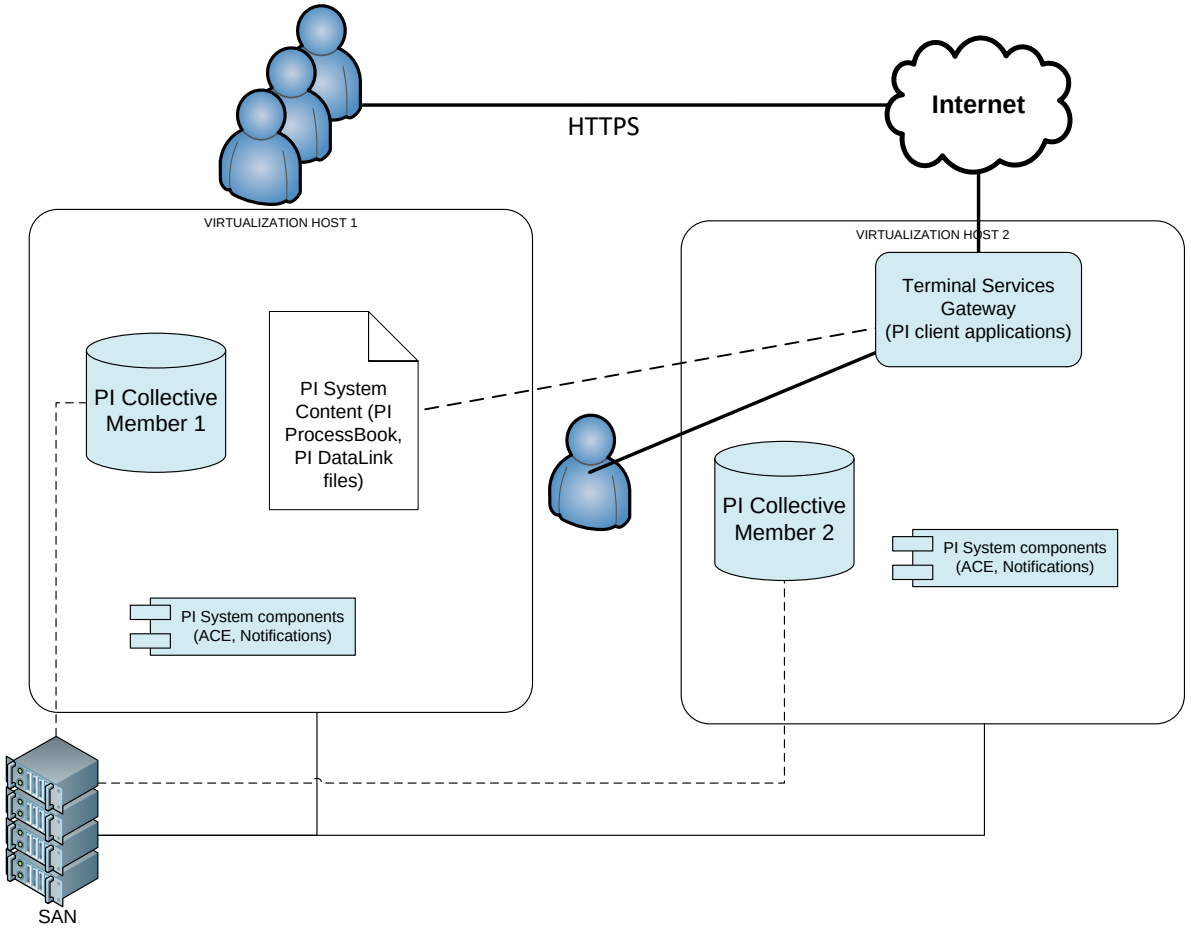
A Simple Virtual HA PI System



Virtual HA PI with SAN



Virtual System including Clients



Benefits of Virtualization*

- User density increases
- Availability improves
- Scalability is a click away
- Cost reductions

*Gillen, A., Grieser, T., Perry, R. 2008. Business Value of Virtualization: Realizing the Benefits of Integrated solutions. IDC.

Benefits of Server Virtualization

- Less hardware required (HP went from 85 data centers to 6)
  - up to 35% reduction of annual server costs per user
- Better utilization of hardware (HP decreased servers by 40%)
- Reduce power consumption (HP reduced energy by 40%)
- Provide higher availability by supporting redundancy
- Rapidly deliver adaptive and reliable IT services
- Tie diverse components together into a single managed entity
- Storage efficiency can lead to higher storage utilization

Customer Examples: Virtualization

- Validated environments need a test bed (any pharmaceutical company; BMS; Shell)
- Environments with casual client users who need low barrier to entry for system access (Inco Limited)
- Implementing new sites (Rio Tinto)

Five 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

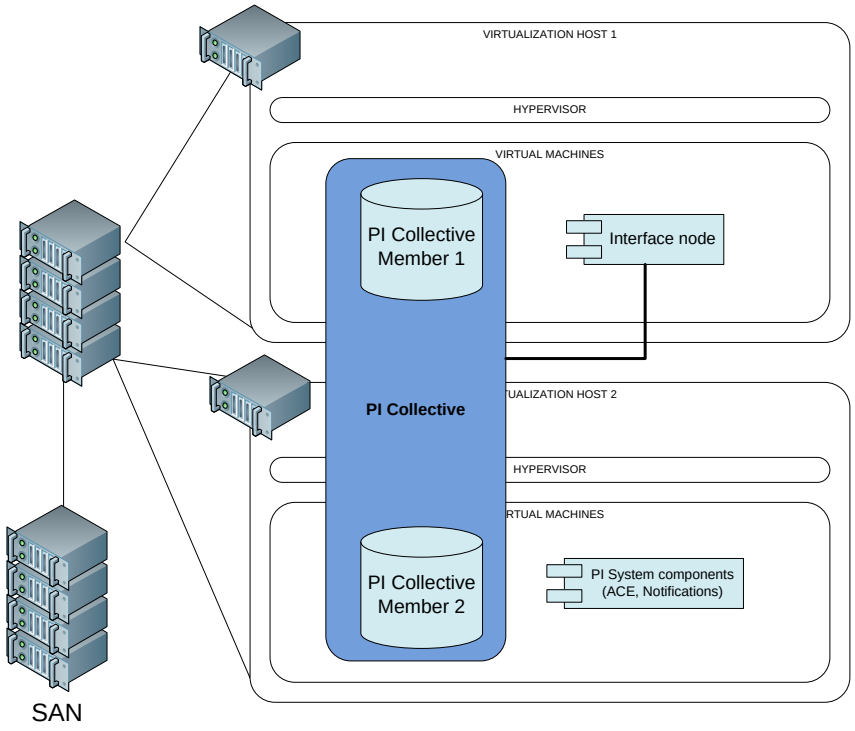
*OSIsoft Center of Excellence.

When is Virtualization NOT a good solution?

- No one in the organization is familiar with managing virtual environments
- The project is geographically dispersed to the point where there is no benefit of having multiple virtual machines on a single host
- All the equipment being used is identical and it is easier to just clone machines than to manage a new virtual environment
- Performance notes:
  - Settings and parameters may be important for performance
  - Sizing the virtual machine appropriately makes a difference
  - Sizing the virtual host appropriately makes a difference

Recommendation: Virtualized PI System

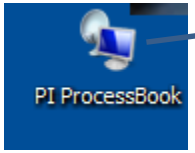
- Multiple hosts
- Collective should be split across hosts
- PI Server components can run as separate virtual machines for scalability and performance
- SAN for storage



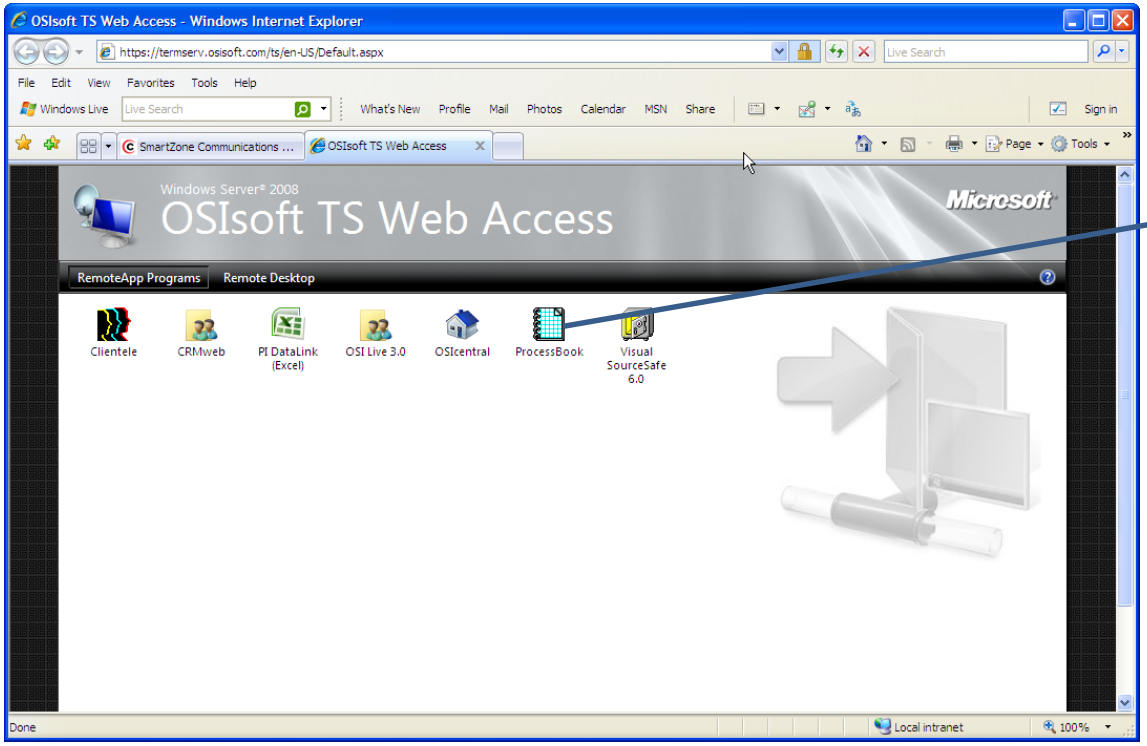
Hosted Clients (Application Virtualization)

- Customers currently use Citrix or Terminal Server to reduce deployment costs and maintenance for client apps
- Windows 2008 Server offers a service that provides applications over an SSL connection (HTTPS) without client-side deployment (a thin deployment) – Terminal Services Gateway
- Terminal Services Gateway provides URL access to a host (like Remote Desktop connections, without the VPN requirement) or to specific applications on a host (even more secure for those outside the firewall)

Hosted Clients (ProcessBook example)



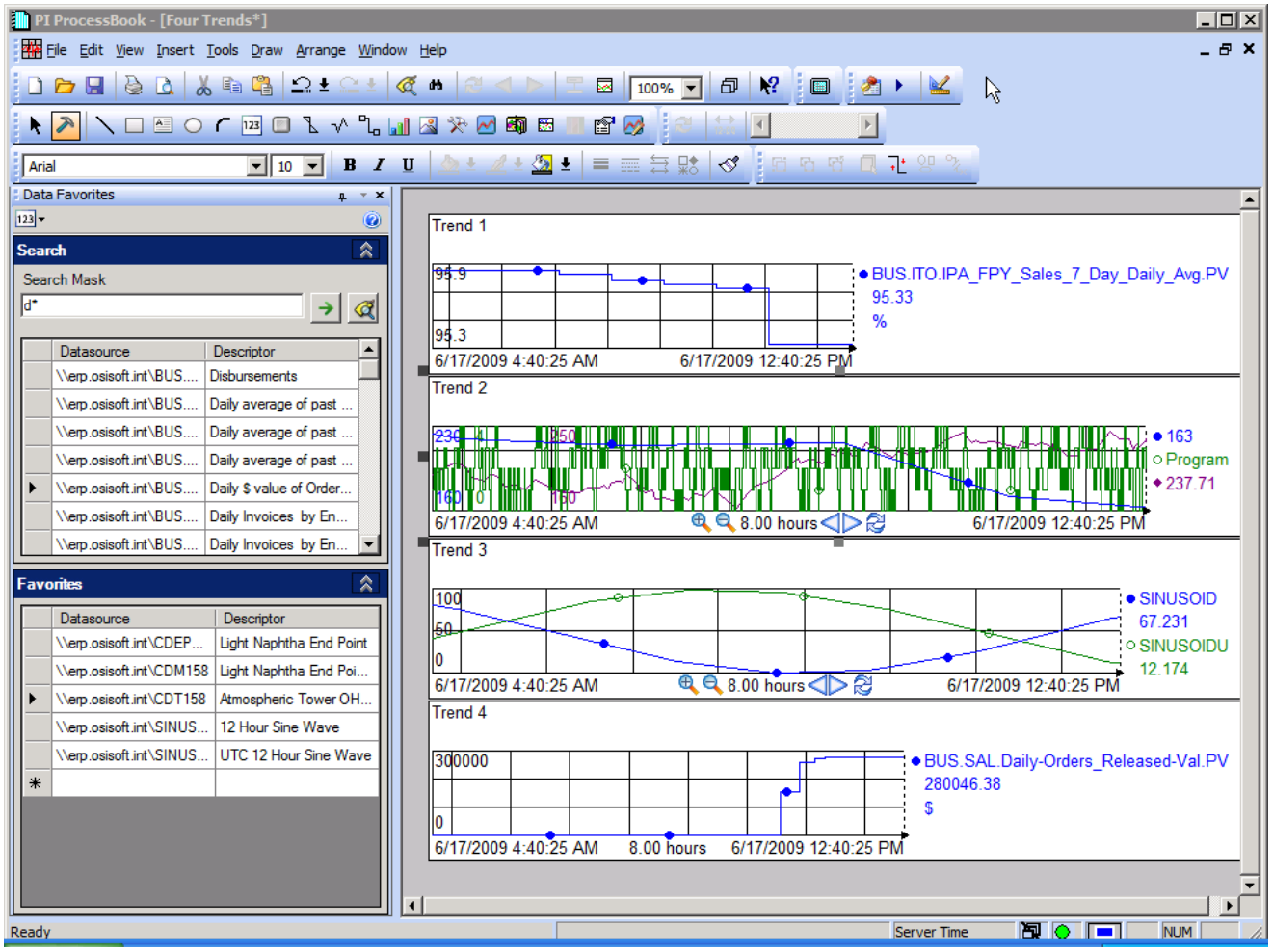
Launch from Desktop icon



Launch from web page

Empowering Business in Real Time.

Hosted Clients (ProcessBook example)



Benefits of Client Virtualization

- One point of installation makes deployment simpler
  - Version management
- Access to applications secured
- All users have the same version of the software; no version or compatibility issues
- Casual users do not need to install anything to get started
- Save on hardware investments by deploying client software in one place

Customer Examples: Client Virtualization

- Terminal Server users (a partial list)
  - Georgia Pacific, Kellogg, SASO, SAPPI Fine Paper, Wacker Chemie, Alcoa, Eli Lilly, ExxonMobil Upstream, Iberdrola, Progress Energy Services
- Citrix users (a partial list)
  - SDG&E , Water Corporation, Amgen, Bayer Material Science, Genmab, PPG, Vaxgen, Katahdin Paper, Celanese Chemicals, Novo Nordisk, Queensland Alumina, Total
- Windows 2008 Terminal Services Gateway
  - OSIsoft

What is SAN, Exactly?

- DAS: Direct Attached Storage
- NAS: Network Attached Storage
- SAN: Storage Area Network

Added Benefits of SAN Technology

- Additional storage appears to be local to the host so users don't have to know where the files are stored
- Simplify, optimize, and automate information infrastructure
- Improve the ties between centralized storage and virtual infrastructure
- Provide virtual-machine consistent backups for data stores and the ability to restore virtual machines instantly in a few clicks
- Provide relief from disk subsystem access in virtualized environments (biggest performance hit on virtual host)
- PI System backups via Volume Shadow Copy Services

Customer Examples: Network Storage

- Keep more and higher fidelity data online; add or expand PI archive files
- Support aggregated PI Systems; VSS support enables backups
- Store PI Client files centrally
- Backup virtualized application and data servers
- Backup virtualized Terminal Server hosts
- Complete system backup storage

Built-in Benefits of HA PI

- PI is there all the time – users trust it
- No late night heroics to restore a backup
- Removes fear of a bad backup
- Simple design is robust, low bandwidth and supported by WANs
- Geographical independence (replace PI to PI)
- Support more or specialized users
- Facilitates capacity planning
- New hardware deployment
- Complements virtualization strategies:
  - PI is perfect for monitoring a virtualized environment (HyperV performance counters; VMWare SNMP interface)

Customer Examples: HA

- Transmission & Distribution customers cannot lose visibility or the grid can go down (e.g., Cal ISO, MISO)
- Customers with dispersed sites can deploy collective members in each location for better client retrieval performance without losing synchronization (International Paper)
- Customers want to balance the load of data retrieval by many users (PJM, Cal ISO)
- Customers need to aggregate data into one large PI system (PSE&G)
- Load Balancing and Failover for virtual machines
- NERC CIP: dedicated PI server inside the security perimeter

Server Virtualization Vendors

- Available virtual technologies (partial list)
  - Microsoft (Hyper V, in particular)
  - VMWare (ESX server, in particular)

Virtual Vendors, Compared

	VMware ESX Server	Microsoft Hyper-V
Support for 32/64 bit hosts	Yes	Only 64 bit hosts
Support for 32/64 bit guests	Yes	Yes
Device Driver Support	Hypervisor	Guest OS
Maximum RAM	64GB	64GB
Maximum Virtual CPUs	4	4
Shared VM Memory	Yes	No
Boot VMs from SAN	Yes	Yes
Live Migration	Yes	Yes
Maximum Active VMs	128	Unlimited

Costs to Start

- No special software or hardware for HA
- Licensing models
  - One virtual PI server = one real PI server
  - One virtual PI client connection = one concurrent PI client connection
- Virtualization hardware/software (Dell estimate for complete solution ~$600K)
- Maintenance
  - Additional storage, memory, etc., as needed over time
- Virtualization Per user (from IDC)
  - Basic virtualization: $24.1 (over 3 years); benefit = $144.9
  - Advanced virtualization: $23.3 (over 3 years); benefit = $212.4

More Information

- Whitepapers and Tech Support bulletins coming
- Vendor web sites
- OSIsoft internal expertise
- Microsoft partners for Hyper V and Terminal Server Gateway solutions

Benefits of PI in a Virtualization Project

- Value of HA PI—
  - Availability, QoS
  - Scaling
  - Improved IT management
- Value of virtual machines and SAN
  - Consolidation
  - Scaling and hardware utilization
  - Improved IT management
- All adds up to higher quality of service for less cost

Next Steps

- Learn whether there are plans for (or an existing) virtualization environment in your organization
- Estimate the hardware reduction to be gained by virtualizing your existing server applications
- Estimate the hardware reduction for server applications both with and without a SAN available (more hosted servers per host if data storage is offloaded, for example).
- Estimate the hardware, software and support reduction to be gained by moving your client applications to a hosted environment (e.g., Terminal Server)
- Consider the value of monitoring the virtualized environment with PI

Thank you for your time

- Any questions?