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High Availability PI
A Better Way to Manage a PI System

Harry Smith – Development

Chuck Thompson – Field Service

Sam Jenkins – Field Service

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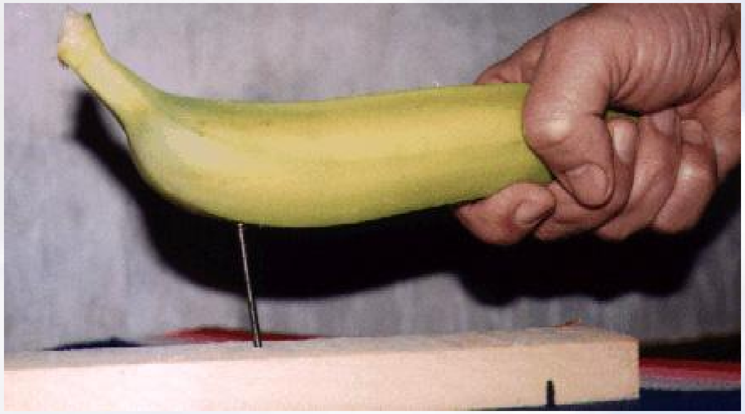
Massive Highly Available Systems

HA-PI Purposeful Design

HA-PI is for …

HA-PI is for …

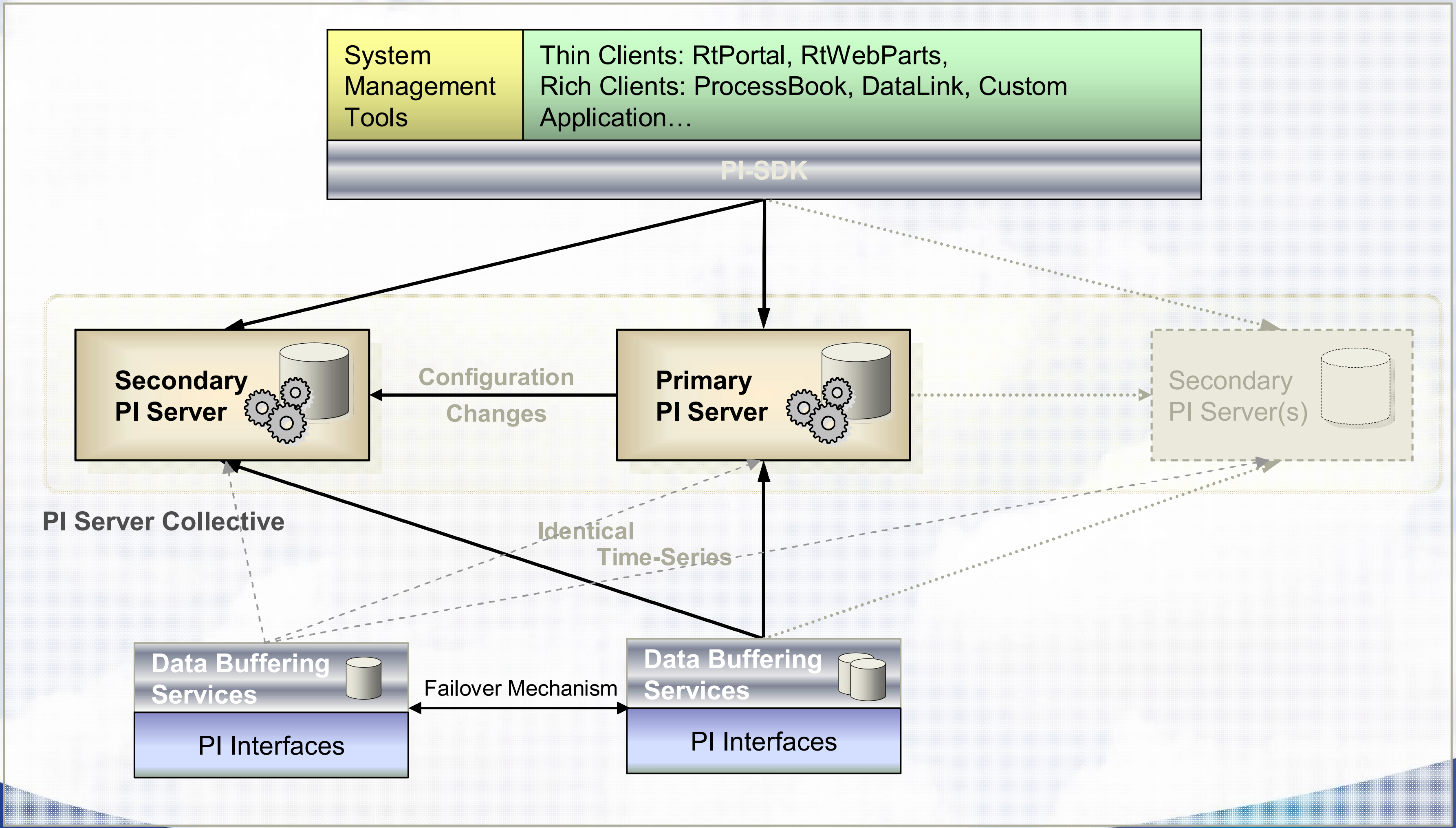
HA-PI is for …



Upgrades are not always timely …

But the results are worth it

PI Replication Architecture



System Management Tools

Thin Clients: RtPortal, RtWebParts,
Rich Clients: ProcessBook, DataLink, Custom Application…

PI Replication Summary

- Features
  - Synchronization of PI Server configuration
  - Transparent client failover, simple load balancing
  - Fanning of real-time data to multiple servers
- Value
  - High Availability to your PI System
  - Peace of mind for Administrators
  - Direct support for existing PI Clients
  - Simple, scalable and flexible architecture

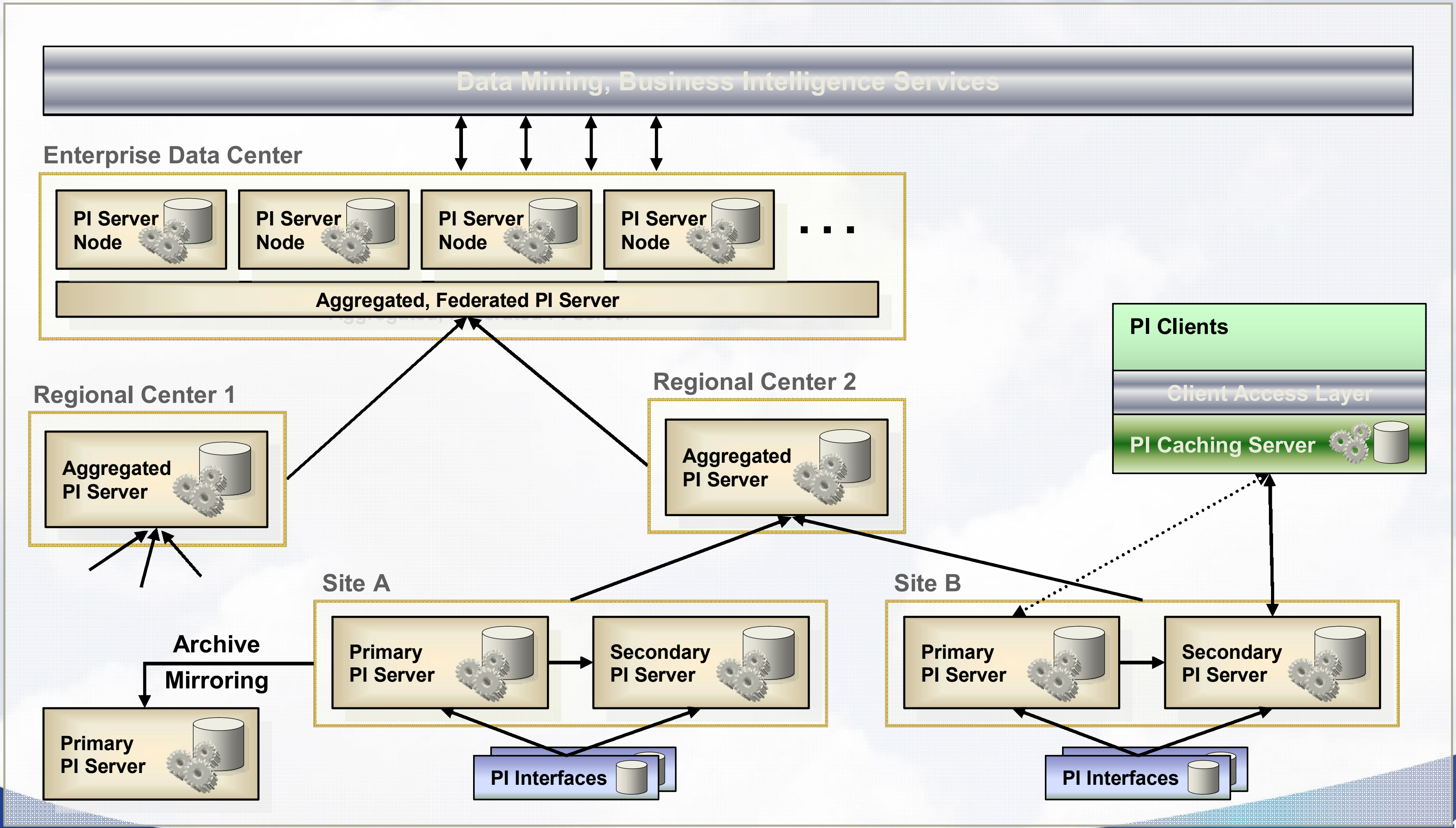
PI-HA Components

- PI Server
  - Replication specific features:
    - Configuration change logging & replication services
    - Monitoring services & troubleshooting tools
  - Performance, reliability features
- SDK
  - Automatic failover mechanisms for existing SDK clients
  - Advanced HA services OSI clients
- Bufserv
  - Fanning of data to multiple servers
- Bufss
  - Guarantees identical archive data between replicated servers
  - Increased buffering capacity, efficiency & throughput
- SMT
  - Collective Manager - HA monitoring & administration

Limitations

- No automatic replication of non interface data
- No replication of batch records
- Post processed data calculated independently
- PI ACE management requires primary

PI Replication Future



Straight talk from the Pros

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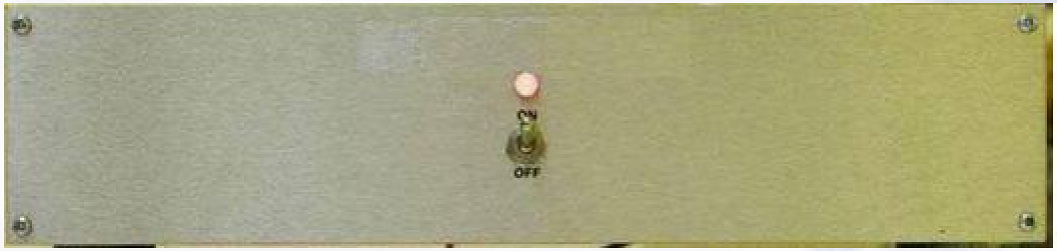
How High Availability PI can work in a test Environ

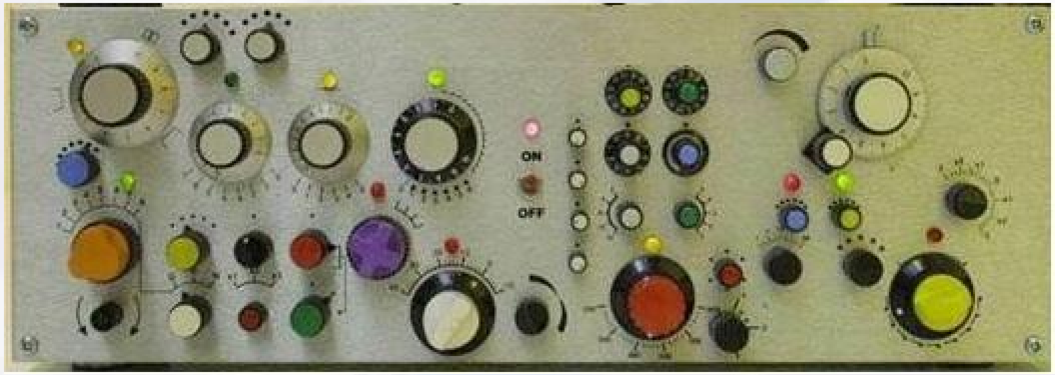
Chuck Thompson – Field Service

HA – It's Simple



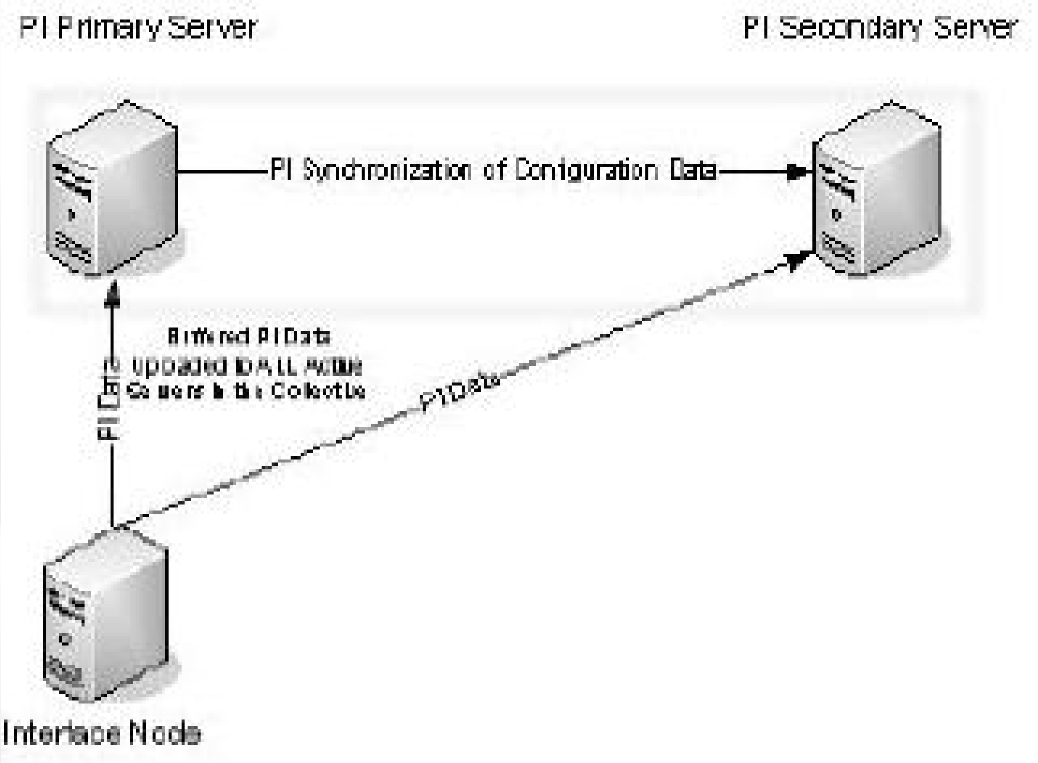
HA is not quite this simple….

….but neither is HA so complicated as all this.



How HA & PR1 can work in a test environ

- In the test – you continue to use the existing PI3 server



Preparing for the test

You'll need -

- One or more test servers
  - Standard hardware and operating system is all that's required
- Upgrade underlying PI-API & PI-SDK on your interface nodes
  - If you can use a secondary or test interface node, you may want to consider this
- Consider upgrading your interface to the latest version
- Use SMT or ICU on the interface node to setup and monitor the test

Setting up for the test

- Start your upgrades at the PI server
  - Prepare the new server (O/S, network, etc)
  - Use documented procedure for moving PI to a new server)
  - Upgrade PI clone to latest version
  - Update PI management tools to latest version and apply patches, if any
  - Use PI collective manager to promote your PI clone into a collective with one member
  - Optionally add in additional test PI servers to your collective

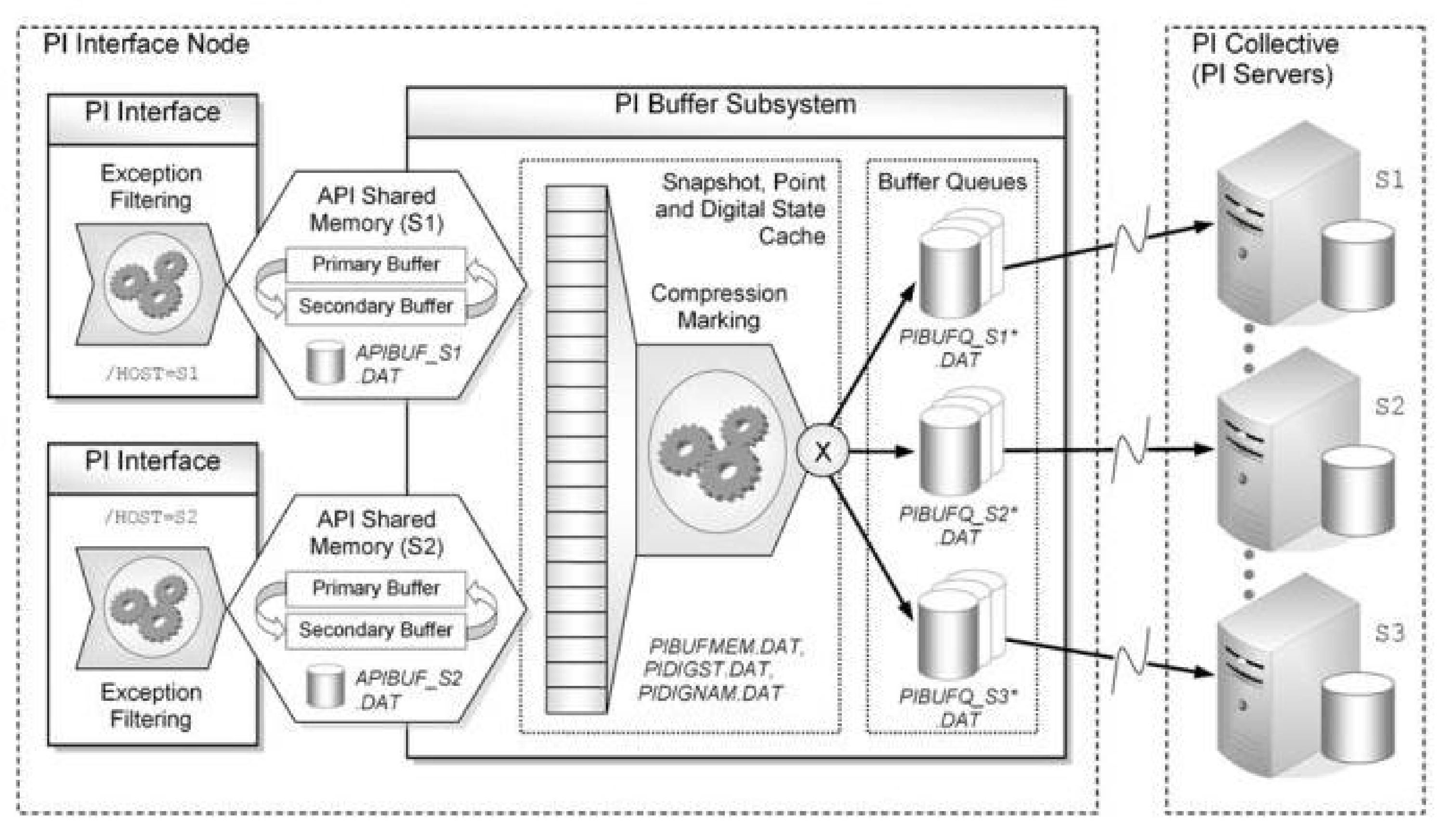
Continue with interface nodes

- If the interfaces aren’t already on interface nodes, move them off of the PI server
- Upgrade PI-API & PI-SDK
  - Easy way to do this is to install latest SMT or ICU
- Optionally upgrade your interface(s) to latest version
- Set up N-Way buffering using latest PI-API Buffering version
  - PI-ICU makes it easy to implement buffering and to set your interface(s) dependencies

The Test

- What’s running?
  - At the test PI3 server(s) you have PR1 version of PI
  - The interface nodes should be buffering data to both old and new PI3 servers
  - The snapshot and archive data of existing PI3 server and test PI3 server should be identical
- Copy some of your existing applications (ProcessBook files, DataLink spreadsheets) and use PR1 client versions to test against data from test PI3 server

The Test


PI Interface Node
PI Interface
Exception Filtering
/HOST=S1
PI Interface
/HOST=S2
Exception Filtering
API Shared Memory (S1)
Primary Buffer
Secondary Buffer
APIBUF_S1 .DAT
API Shared Memory (S2)
Primary Buffer
Secondary Buffer
APIBUF_S2 .DAT
PI Buffer Subsystem
Snapshot, Point and Digital State Cache
Compression Marking
X
PIBUFMEM.DAT, PIDIGST.DAT, PIDIGNAM.DAT
Buffer Queues
PIBUFQ_S1* .DAT
PIBUFQ_S2* .DAT
PIBUFQ_S3* .DAT
PI Collective (PI Servers)
S1
S2
S3

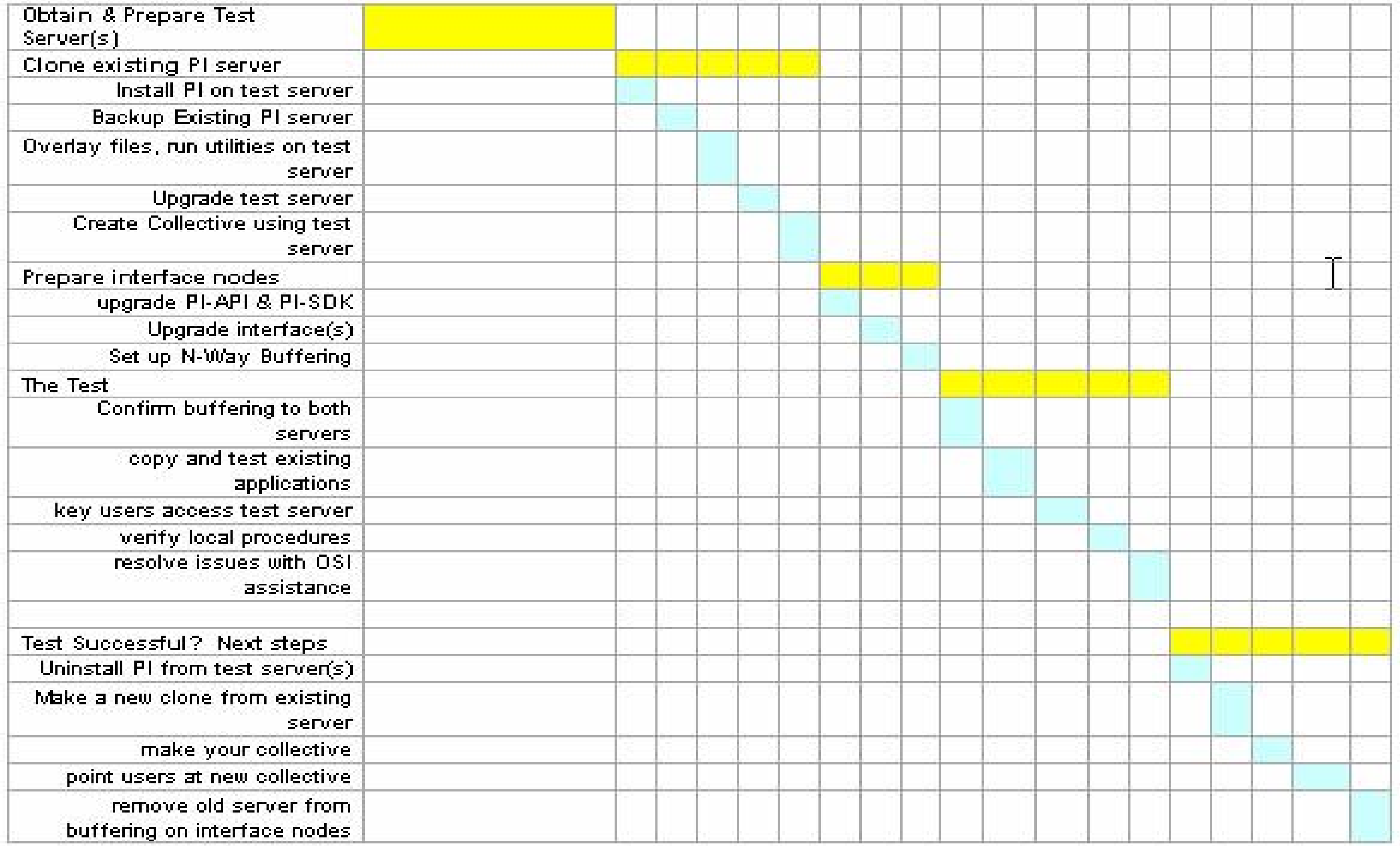
Next Steps

- Test client applications against the test server
  - Allow key users to switch to the test server
  - If you have more than one server in your collective, test failover
- Test your local procedures, e.g. backup, O/S patches, and other system management or maintenance tasks
- With OSI’s Tech Support, Training, and Field Service – resolve any issues or problems you encounter

Test as long as you like

- Both systems operational
  - If you don’t like the test, abandon the test
    - Just shutdown and uninstall the test PI server(s)
    - Remove additional server(s) from buffering configuration on each interface node
- Configuration changes made to existing system during the test are not reflected in the test system during the period of parallel operation

A time line



Obtain & Prepare Test Server(s)	🟨																		
Clone existing PI server		🟨	🟨	🟨	🟨	🟨													
Install PI on test server		🟦																	
Backup Existing PI server			🟦																
Overlay files, run utilities on test server				🟦															
Upgrade test server					🟦														
Create Collective using test server						🟦													
Prepare interface nodes							🟨	🟨	🟨										
upgrade PI-API & PI-SDK							🟦												
Upgrade interface(s)								🟦											
Set up N-Way Buffering									🟦										
The Test										🟨	🟨	🟨	🟨	🟨					
Confirm buffering to both servers										🟦									
copy and test existing applications											🟦								
key users access test server												🟦							
verify local procedures													🟦						
resolve issues with OSI assistance														🟦					
Test Successful? Next steps															🟨	🟨	🟨	🟨	🟨
Uninstall PI from test server(s)															🟦				
Make a new clone from existing server																🟦			
make your collective																	🟦		
point users at new collective																		🟦	
remove old server from buffering on interface nodes																			🟦

Test successful! What next?

- Uninstall PI from test server(s)
- Make a new clone from the existing PI server (e.g. move PI to new server)
- Make your PI collective
- Point users at new collective
  - Upgrade to PR1 versions
- Remove old PI server from buffering on interface nodes

Benefits

- Test on a clone of your PI system without disrupting your user community or data
- Version Management
  - It becomes easier to stay current – apply changes to secondary node and test
  - Updates can be applied to a single collective member without having to take an outage of entire PI system
  - This opportunity applies not only to OSI software releases but more especially to updates from Microsoft, your Anti-Virus vendor, backup system, etc.
- Test applications on parallel test system before "going live"
- Test system management features and local procedures against test system using live data

Summary –

It’s time

- You have a 2 or 3 year old version of PI on Windows and you have been putting off upgrades, patches, etc
- If you have PI3 server on UNIX, this would be a good time to switch to PI3 server on Windows
- HA and PR1 are there, OSI built them for all to use
- HA is already at work for dozens of customer’s critical systems

Useful Resources

- OSI’s PI3 System Manager II class, Advanced Skills
  - Large portion of the class gives practical hands on with redundant interface and HA PI server
- OSI has field service to provide on-site assistance and help in planning.
- Contact your OSI sales person for questions on licensing & quotes for field service

High Availability PI Experiences From the Trenches

Sam Jenkins – Field Service

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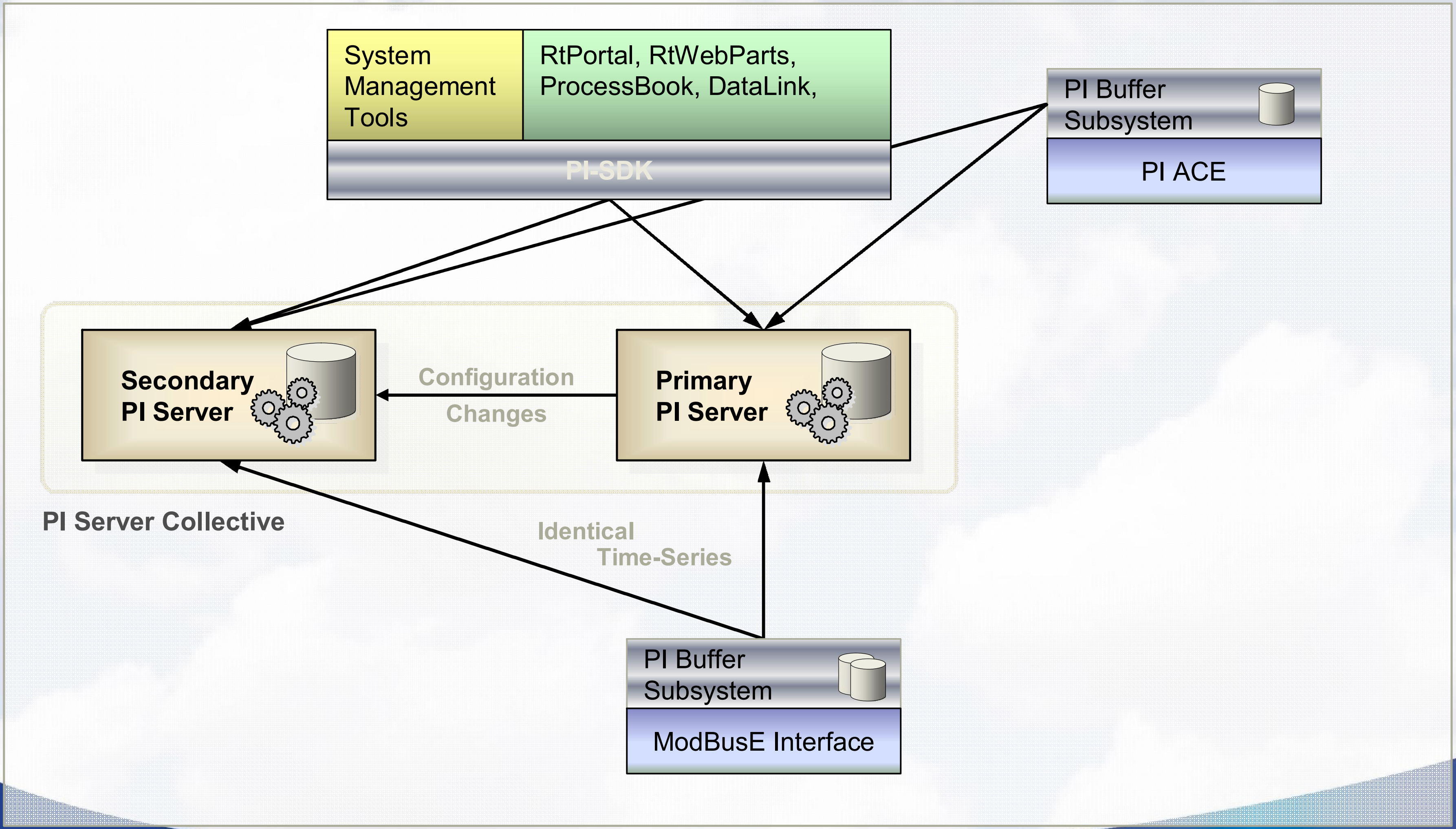
High Availability Solves Problems

High Availability Solves Problems

High Availability Case Studies

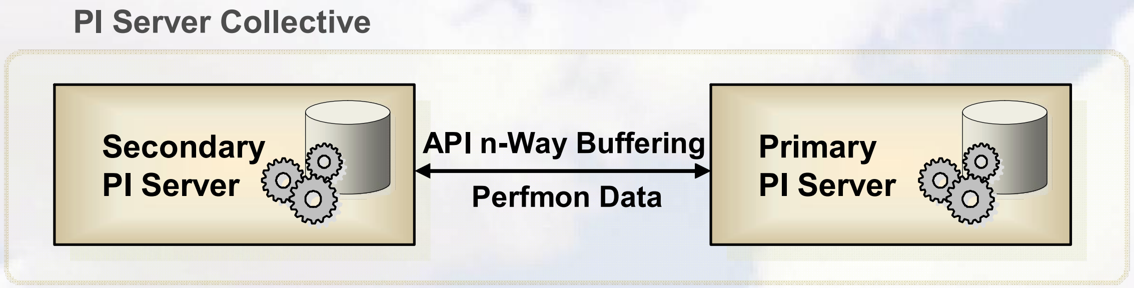
- Case Study A
  - Traditional High Availability Scenario
  - Rapid Deployment
  - Managed PI Environment
- Case Study B
  - High Availability Solves a Unique Problem

Case Study A


System Management Tools
RtPortal, RtWebParts, ProcessBook, DataLink,
PI-SDK
PI Buffer Subsystem
PI ACE
Secondary PI Server
Configuration Changes
Primary PI Server
PI Server Collective
Identical Time-Series
PI Buffer Subsystem
ModBusE Interface

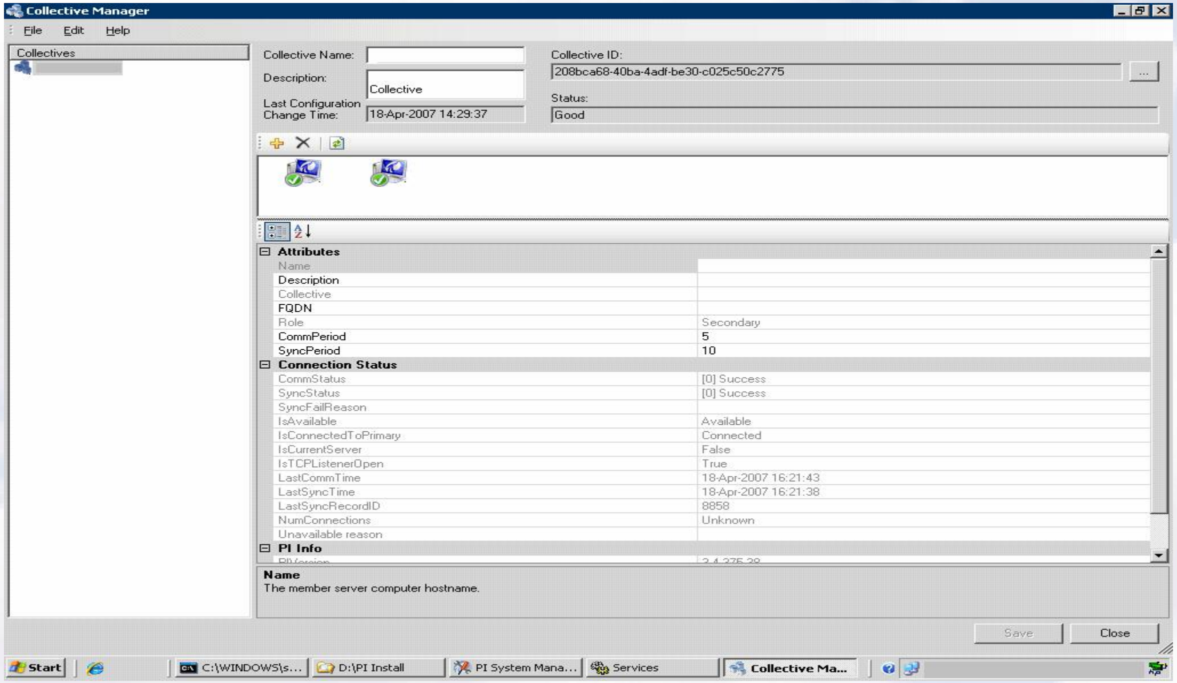
Case Study A

- Managed PI Environment
  - API N-Way Buffering used to send local Performance Monitor data between servers in the collective



Case Study A

- Rapid Deployment
  - High Availability Architecture Implemented at 8 sites in 5 Weeks
  - Collective Manager Simplifies Collective Creation



Collective Name:

Description: Collective

Last Configuration Change Time: 18-Apr-2007 14:29:37

Collective ID: 208bca68-40ba-4adf-be30-c025c50c2775

Status: Good

Attributes	
Name	
Description	
Collective	
FQDN	
Role	Secondary
CommPeriod	5
SyncPeriod	10
Connection Status	
CommStatus	[0] Success
SyncStatus	[0] Success
SyncFailReason	
IsAvailable	Available
IsConnectedToPrimary	Connected
IsCurrentServer	False
IsTCPListenerOpen	True
LastCommTime	18-Apr-2007 16:21:43
LastSyncTime	18-Apr-2007 16:21:38
LastSyncRecordID	8858
NumConnections	Unknown
Unavailable reason	
PI Info	
PIVersion	3.4.375.38

Name
The member server computer hostname.

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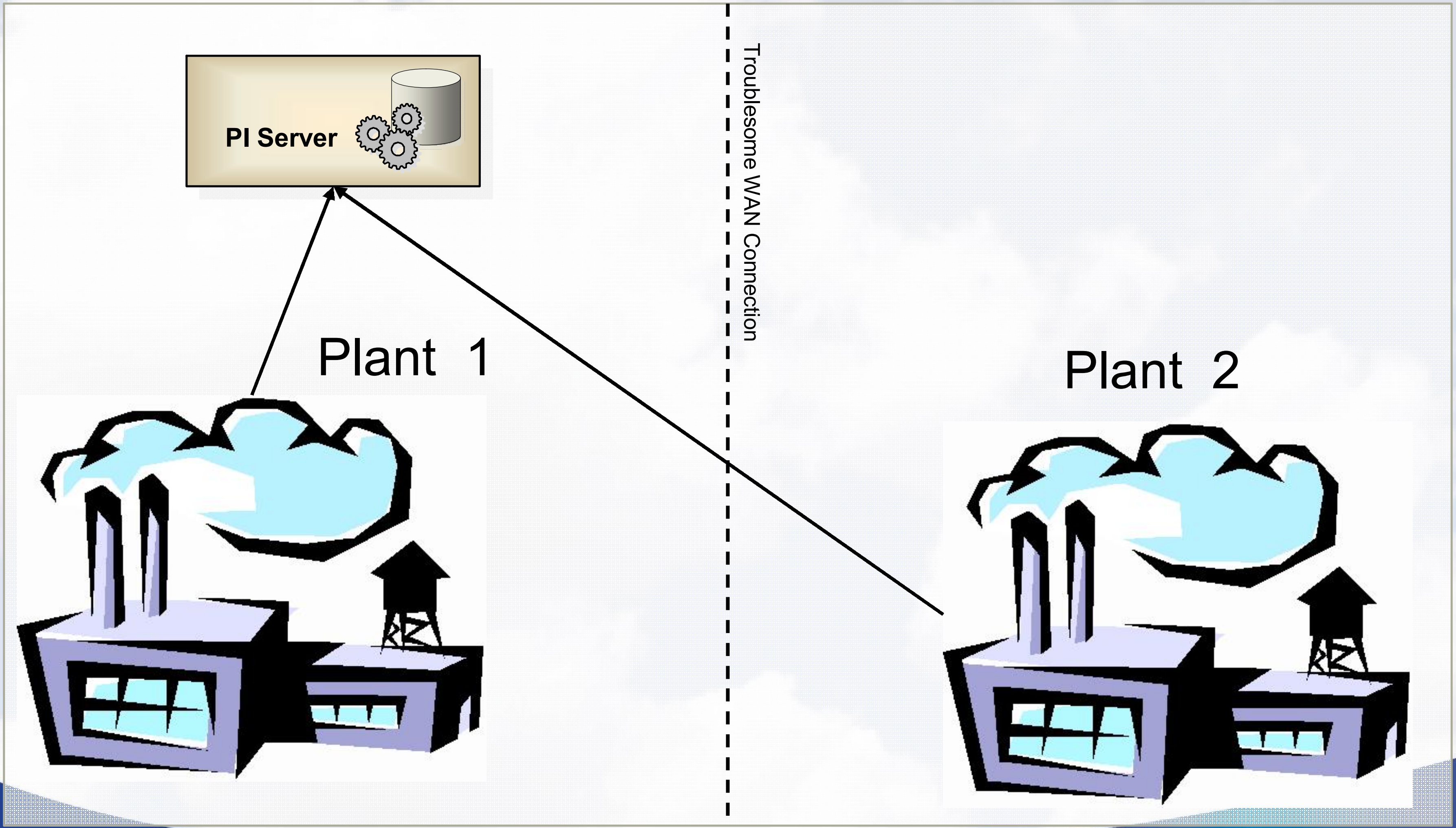
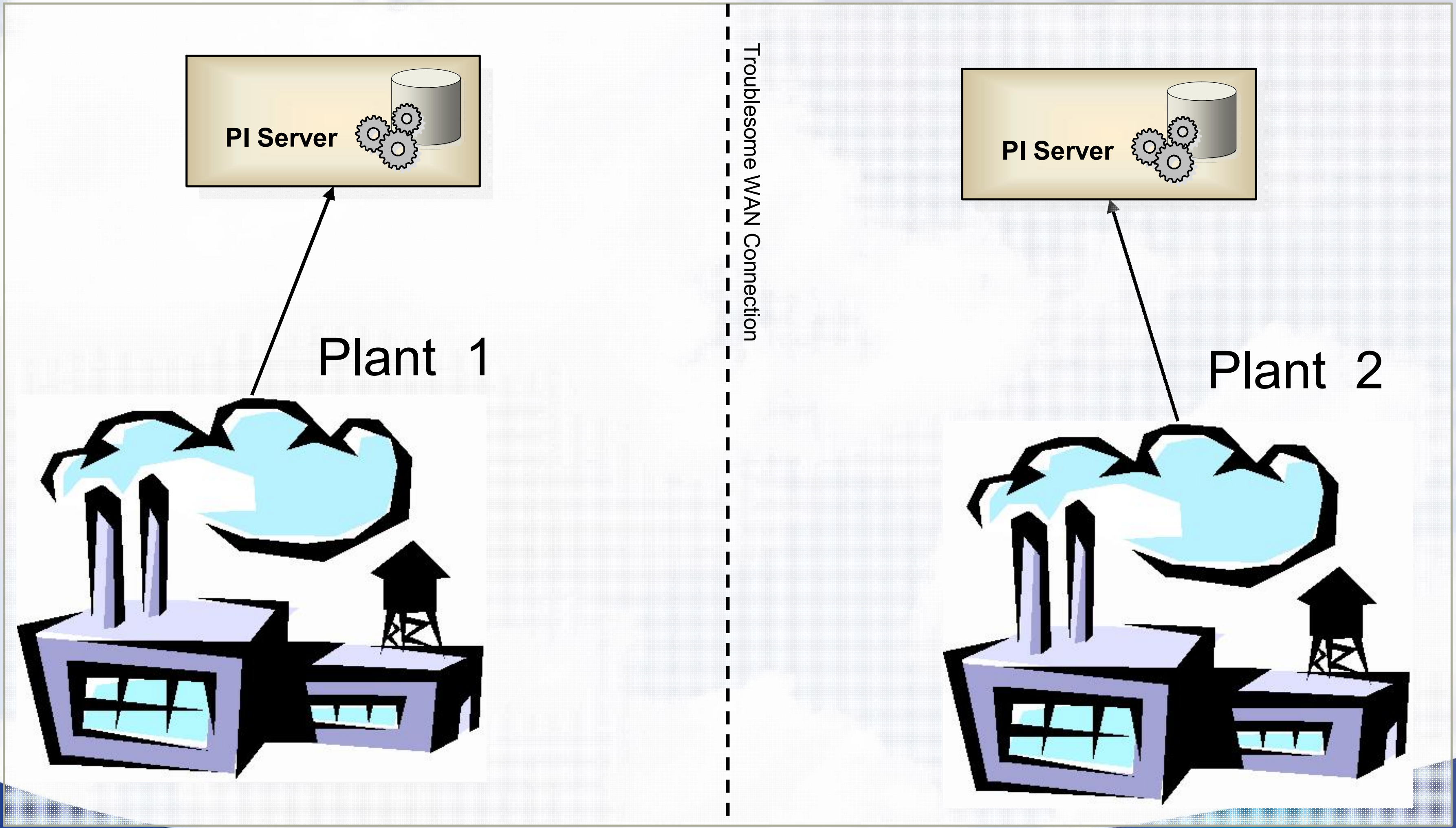
Case Study B



Case Study B

- Initial Problems
  - Users at Plant 2 cannot reliably access PI system
  - Plant 2 data archival constantly delayed

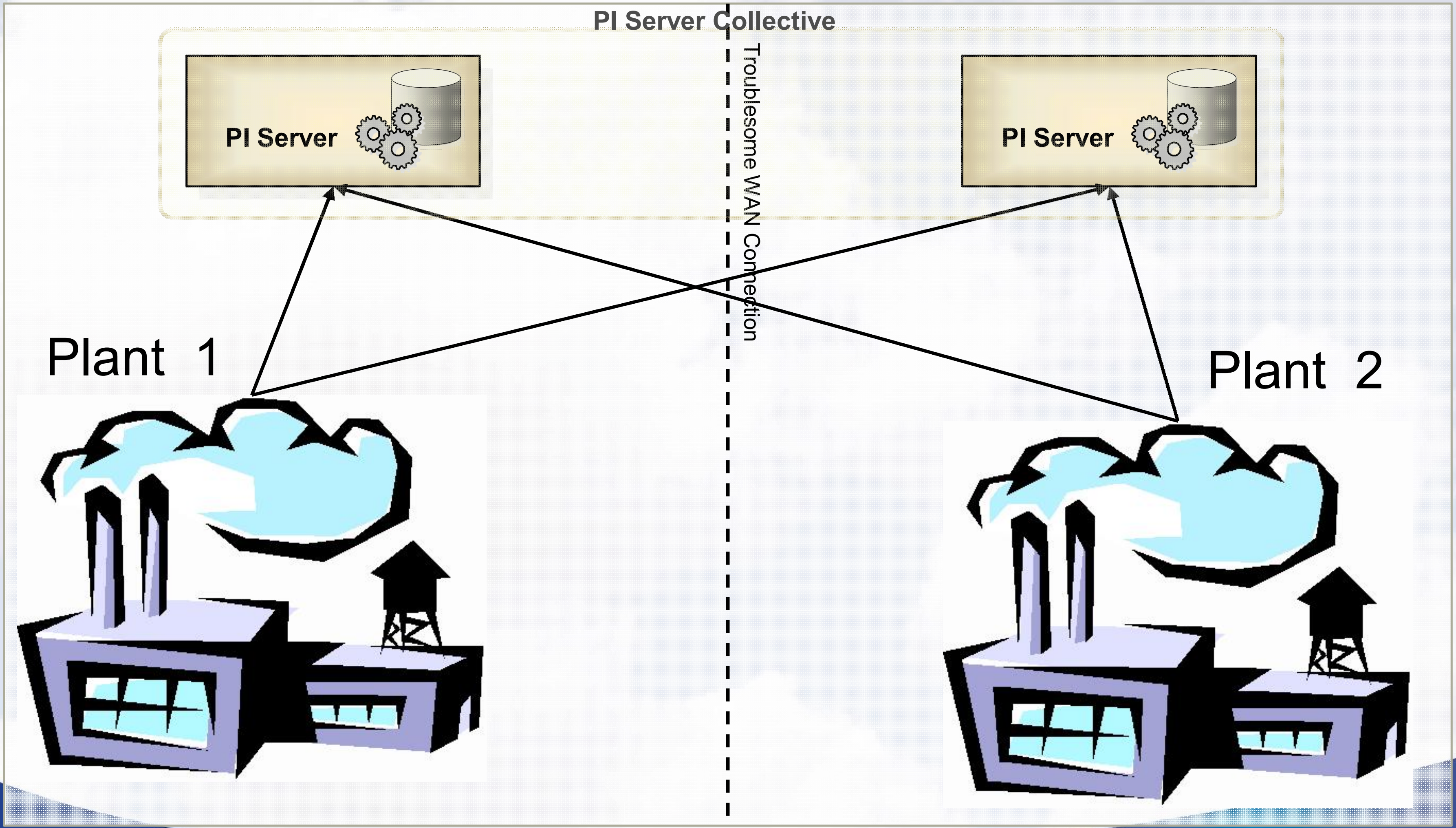
Case Study B: Solution 1



Case Study B: Solution 1

- Solution 1 Problems
  - All client applications needing data for Plant 2 must be redirected to new server
  - Additional task of splitting existing PI server required

Case Study B: Better Solution



Case Study B: Better Solution

- Implement High Availability
  - One member of the collective resides at each plant
  - Collective named to match that of the existing PI server so existing client applications don’t need reconfiguration
  - Users connections at each plant set to prefer their local PI server collection member

Case Study B: Result

- Each server continues to archive and buffer data locally during network disruptions and forwards the data to other collective members as they become available
- Avoided cost of splitting existing PI server and reconfiguring client nodes
- PI data is highly available

Conclusions

- There are many uses for High Availability
  - Traditional HA
  - Managing version upgrades
  - Solving unique implementation challenges

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Thank You

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