

Title	Presenter(s)	Day	Time
PTC101 PTC Windchill Business and System Administration Roadmap	Walid Saad	Monday	1:15 PM - 2:00 PM
PTC205 PTC Windchill Roadmap	Darryn Kozak, Kevin Wrenn	Monday	2:15 PM - 3:00 PM
HOW102 Using PTC System Monitor to Effectively Monitor and Troubleshoot your PTC Windchill Environment	Walid Saad	Monday	4:00 PM - 6:00 PM
PTC120 Deploying PTC Windchill and Other PTC Software Solutions in the Cloud	Adam Suber	Monday	5:00 PM - 5:45 PM
PTC205 PTC Windchill Roadmap	Darryn Kozak, Kevin Wrenn	Tuesday	11:00 AM - 11:45 AM
PTC220 – Improving PTC Windchill Performance	Ram Krishnamurthy	Tuesday	4:00 PM - 4:45 PM
HOW102 Using PTC System Monitor to Effectively Monitor and Troubleshoot your PTC Windchill Environment	Walid Saad	Tuesday	4:00 PM - 6:00 PM
PTC303 Ask the Experts: PTC Windchill	Darryn Kozak, Debbie Schneider, Francois Lamy, Graham Birch, James Gehan, Michael Rygol, Steve Dertien	Wednesday	8:15 AM - 9:00 AM
PTC304 Smart, Connected Products and PLM: The Future is Here	Francois Lamy, Jill Newberg	Wednesday	9:15 AM - 10:00 AM
PTC307 Connecting PLM to PTC: Improving Support and Maintenance	Graham Birch	Wednesday	10:30AM – 11:15AM
CUST331 Connecting the Dots: Things PTC Windchill Administrators Would Benefit from Knowing But Probably Don't	Joe Priest (DePuy Synthes), Stephen Vaillancourt (PTC)	Wednesday	10:30AM – 11:15AM
PTC318 Monitoring PTC Windchill through PTC System Monitor and User Experience Management	Walid Saad	Wednesday	11:30 AM - 12:15 PM
PTC315 PTC's Smart Connected Applications	Matthew Seaman, Stephen Vaillancourt	Wednesday	11:30 AM - 12:15 PM

- This presentation contains a lot of content
- It is not meant to be overwhelming
- The last section titled “Performance Optimization Essentials” (Client, Server, Database settings) will not be covered in today’s session. Highly recommend using this section as reference after you get back
- There is a group of dedicated performance experts at PTC to help with issues
 - Their guidance can be sought by opening a PTC TS case
 - Recommend such cases be reported in a “non-escalated” scenario. Allows for better analysis

- State of PTC Windchill Performance
- What makes up performance?
- What Really Matters?
- Performance on the WAN
- Monitoring & Troubleshooting
- Important Documents and Tools
- Performance Optimization Essentials

- Large performance investments made by PTC in 10.2 and PTC Creo
- Fastest release combination to date
- 10.2 M030 w/ PTC Creo 2.0 M150 is
 - 15% faster than 9.1 M070 with PTC Creo Elements/Pro 5.0**
 - 23% faster than 10.1 M040 with PTC Creo Elements/Pro 5.0**
- 10.2 M030 w/ PTC Creo 3.0 M030 is
 - 17% faster than 9.1 M070 with PTC Creo Elements/Pro 5.0**
 - 25% faster than 10.1 M040 with PTC Creo Elements/Pro 5.0**
 - 7% faster than 10.1 M050 with PTC Creo 2.0**
- PTC continues to make performance investments
- Strongly encourage customers upgrade in order to take advantage of these performance benefits and other productivity improvements

**** - As measured by the PTC Windchill CAD Day-In-the-Life Performance Benchmark**

- **Highlights**

- Workspace refresh and synchronize actions are more efficient
- PTC Windchill Workgroup Manager for CATIA V5
 - Update action has been improved
 - Improved loading performance especially with large assemblies
- Several updates were made to improve performance when loading a large number of users and groups into a context team
- You can export and import PTC Windchill package delivery files using multiple threads as one option to optimize performance

- **Benefits**

- Complete, Up to date, Correct Information in Workspace listing
- A single Refresh action
 - It is clear what Refresh is about
 - Synchronize should be used less often
- No guess work and redundant manual Refresh
 - Better UX and implicit performance benefit

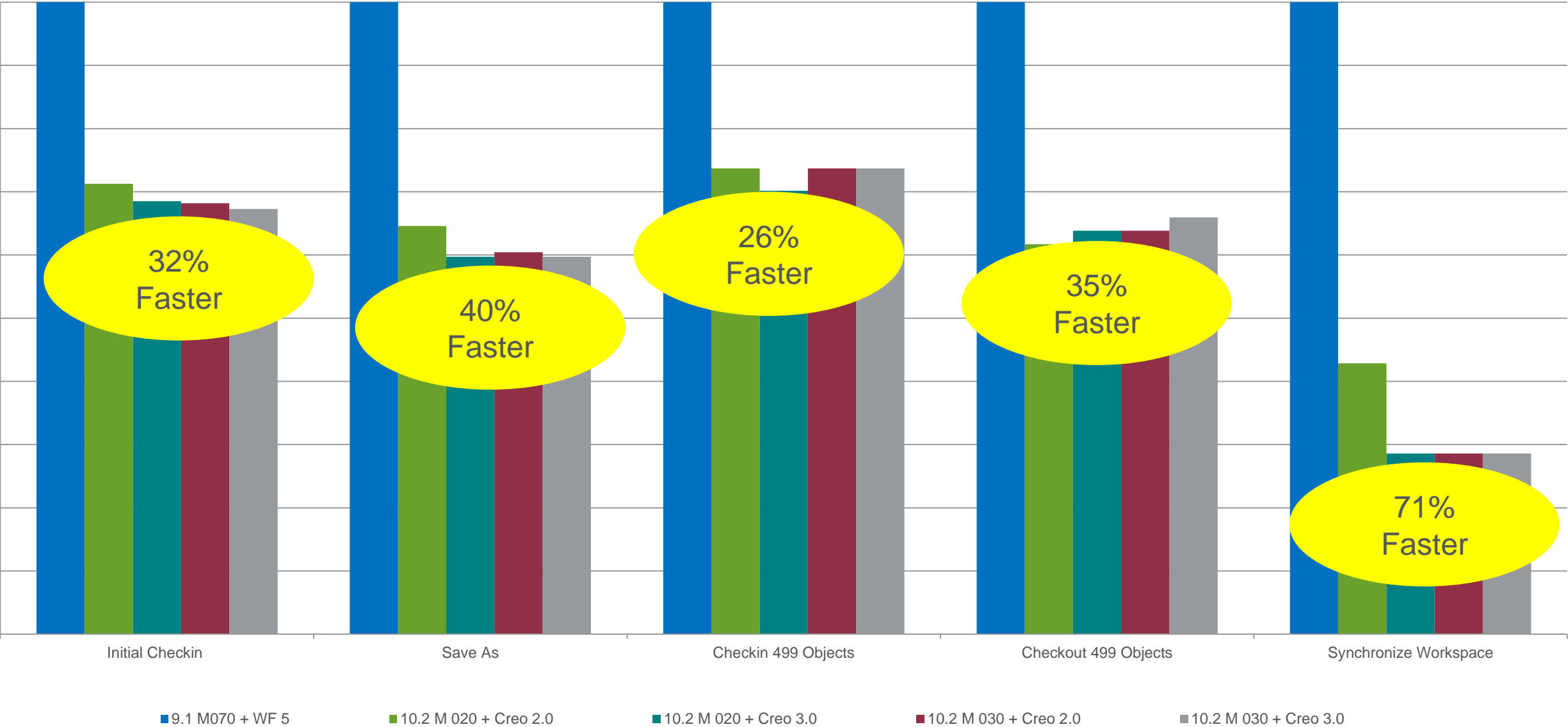
In general, we are smarter about what and how we request data from the server which ensures better performance, especially for clients on the WAN

For More Information please refer to

- [PTC Windchill What's New](#)
- [Enhancement Details: PTC Windchill 10.2 M010](#)

10.2 Best Performing Release Ever!

Normalized improvements in 10.2 M030 compared to 9.1 M070



Support for CGR download (w/o CATPart and .model primary content)

Capabilities

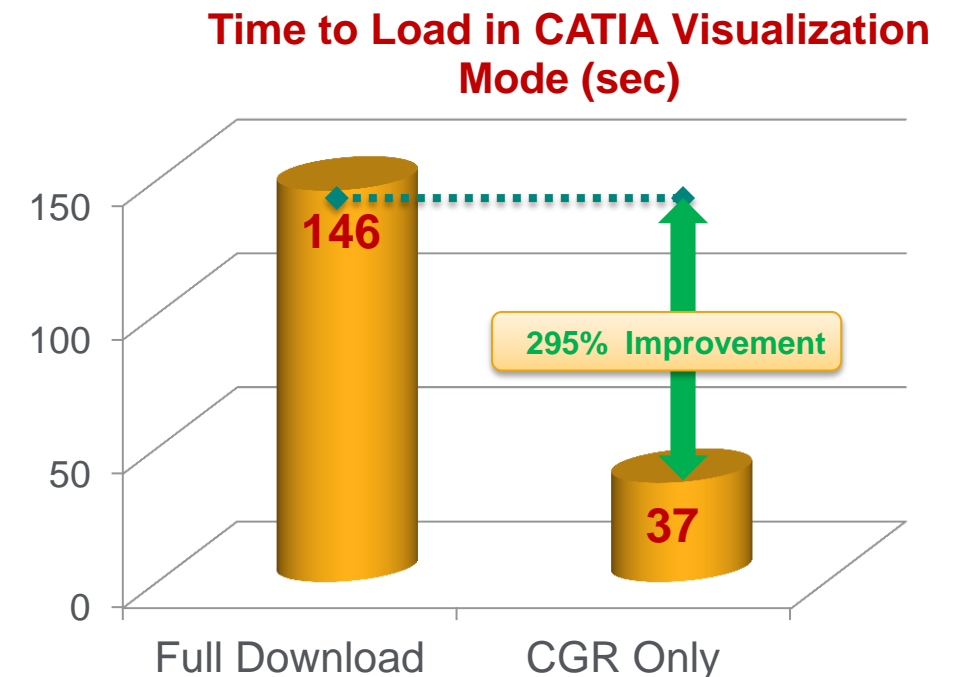
- New Option to Download and Load only CGRs files when opening CATIA Assemblies
- Enabled via client side wgmclient.ini Preference
- Native CATParts downloaded on-demand
 - On switch to Design Mode in CATIA V5

Benefits

- Improved loading performance especially with large assemblies
- Reduced overhead on network as only required files (CGRs) streamed to clients. Native content streamed on-demand

Dataset Characteristics:

- Size on disk: **1.49 GB**
- # of Unique Assemblies: **197**
- # of Unique Components: **358**



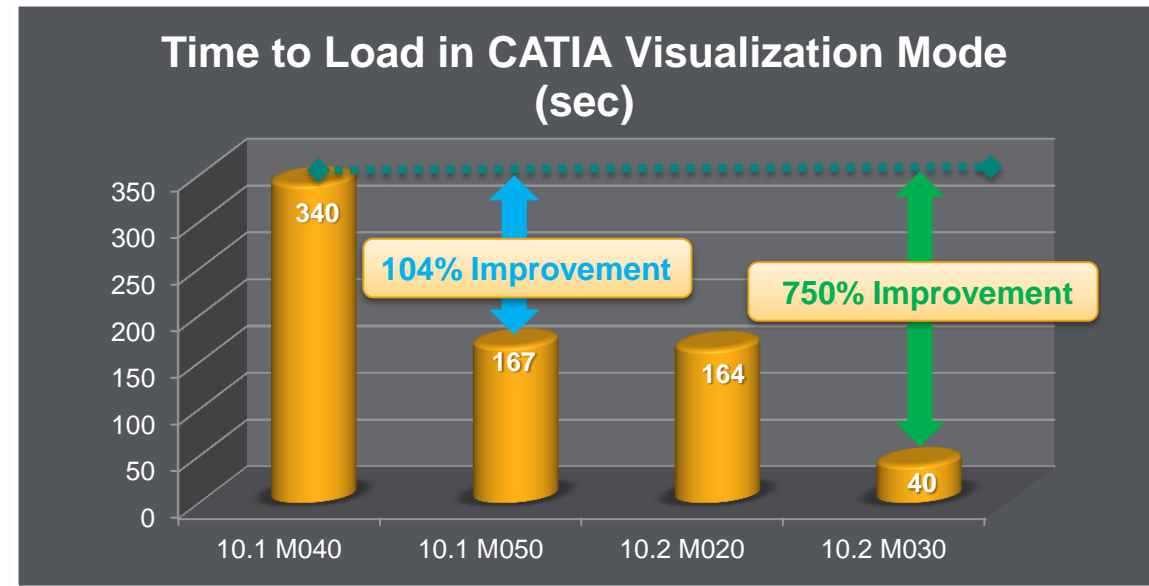
Support for CGR download (w/o CATPart and .model primary content)

Scenario Tested in R&D Lab:

- Action: Load from Commonsense
- 40% of components (145) have Windchill “pending” changes to be propagated in CATIA.
- Workspace is empty, WGM Cache is clean, CGR Cache is clean
- CGR and XML (Neutral Data) files in Windchill

Test Data set

- **Size on disk: 1.49 GB**
- **# of Unique Assemblies: 197**
- **# of Unique Components: 358**



Windchill / WGM Preference Settings used			
10.1 M040 No settings are set	10.1 M050 force.update.metadata.on.open set to No update.metadata.on.load set to No	10.2 M020 force.update.metadata.on.open set to No update.metadata.on.load set to No	10.2 M030 force.update.metadata.on.open set to No update.metadata.on.load set to No wwgm.download.method.upon.open set to CGR

Demo AVI: <http://learningexchange.ptc.com/tutorial/4354/cgr-download-option>

- Enabled via wgmclient.ini preference **wwgm.download.method.upon.open=Full/CGR**
 - **Full** (default) - The full Windchill Workgroup Manager downloading behavior. All contents (primary content and secondary attachments) are added to the workspace, regardless of whether the cache is enabled in CATIA V5.
 - **CGR** - For *.CATPart and *.model document types, CGR files are downloaded along with secondary attachments. Primary content files (.CATPart and .model files) are not downloaded unless an operation requires the full content to be available in the workspace. This setting has no effect on other document types that don't have CGR files, such as CATProduct, CATDrawing, CATProcess, CATCatalog, CATMaterial, CATAnalysis and so on. For these document types, all contents (primary content and secondary attachments) are downloaded. For these files, there is no difference between the "Full" and "CGR" options.

- Caveats – [CS194064 - Known limitations in CGR Only Download Option upon Open in CATIA \(wwgm.download.method.upon.open=CGR\)](#)

Title	Known limitations in CGR Only Download Option upon Open in CATIA (wwgm.download.method.upon.open=CGR)
Description	<ul style="list-style-type: none">• When the wwgm.download.method.upon.open preference is set to CGR in the wgmclient.ini file, only the CGR files and other secondary contents of the dependent CATParts should be added to the workspace when a CATProduct is opened from the commonspace or added to the workspace. However, performing actions like the following result in the primary content (*.CATPart) is being downloaded to the client:<ul style="list-style-type: none">• When a CATPart revised in the commonspace and updated in the workspace• When a CATPart renamed in the commonspace and updated in the workspace• When performing a Switch to Include action• When opening an annotated assembly• When CATIA V5 data has an external reference (CCP/KWE) and the reference is renamed in the commonspace
Applies To	<ul style="list-style-type: none">• Windchill Solutions 10.2 M030• Windchill Workgroup Manager• CATIA V5
Cause	
Resolution	<ul style="list-style-type: none">• These issues will be fixed in a future release. Refer to the following for additional detail:<ul style="list-style-type: none">• CS194059 - When a CATPart revised in the commonspace and updated in the workspace• CS194060 - When a CATPart renamed in the commonspace and updated in the workspace• CS194063 - When performing a Switch to Include action• CS194063 - When opening an annotated assembly• CS194065 - When CATIA V5 data has an external reference (CCP/KWE) and the reference is renamed in the commonspace

Express Mode Support

- Autodesk Inventor Express Mode is now supported and enables faster opening of large assemblies
 - 3-5x faster than loading a full assembly
 - Improved system performance
 - Reduced memory consumption
- Supports frequently used actions
 - Open
 - Save
 - Editing Attributes
- Available in Autodesk Inventor 2014

What makes up performance?



- Performance is measured by one user but is determined by the load on the system in the environment in which the system is running

Active Users

Network Latency

End User Tasks

System Configurations

Bugs /#\$/

Client Hardware

Customizations

Server Hardware

Software Versions

Background Operations

Network Bandwidth

Probable Causes of Performance problems

- **Database Related**
 - Most common cause of Performance problems
- **System Misconfigurations**
 - More common in newer systems & ones setup without guidance i.e. don't use the out of the box settings
- **Core Code and Customization Problems**
 - How often they occur depends on a number of things
 - Staying on the latest maintenance release is the most effective strategy to minimize production problems from bugs
- **Client Side Configuration**
 - If using Wildfire or Creo there are a number of configuration changes which MUST be made
- **Infrequent – Problems occurring in dependent sub-system**
 - Problems in the OS, disk I/O, corporate LDAP, Solr, the network etc.

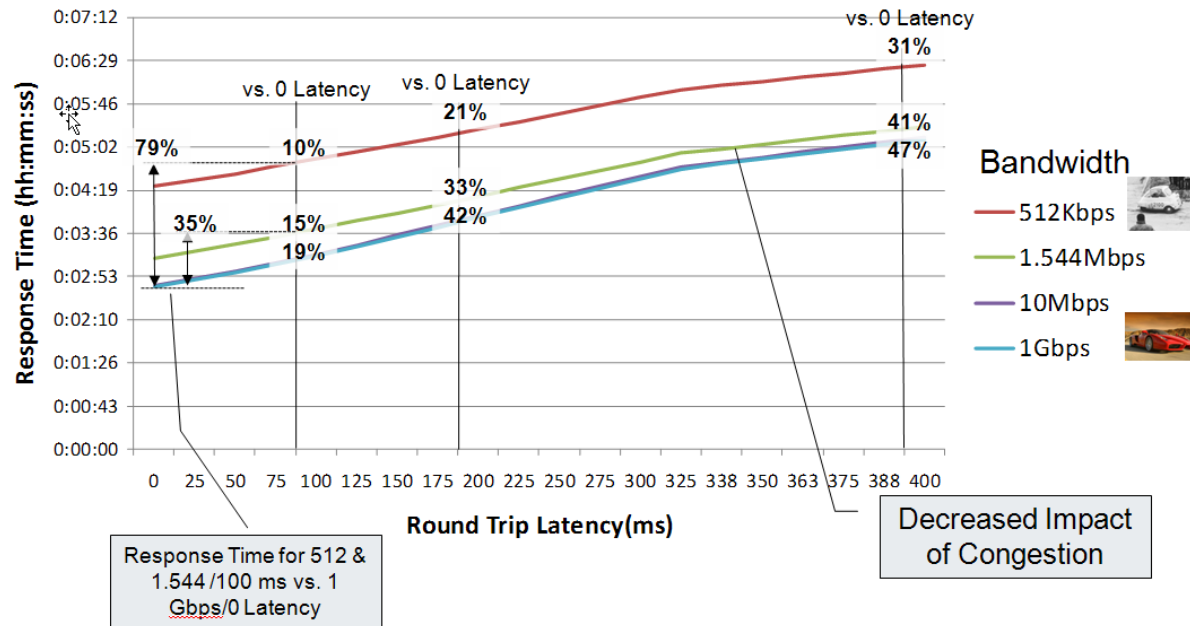
The last section in this presentation titled “Performance Optimization Essentials” contains a lot of detail such as

- What settings need to be made on Client, Server and Database to ensure optimal performance
- Links to PTC Technical Support articles

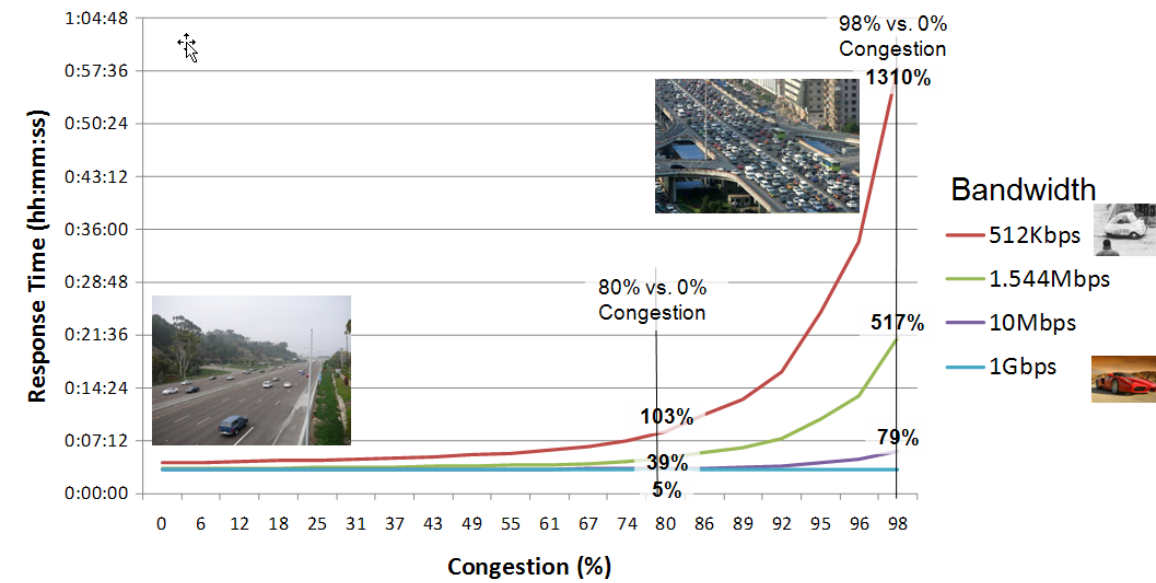
Performance on the WAN

Impact of Network Conditions on PTC Windchill Performance

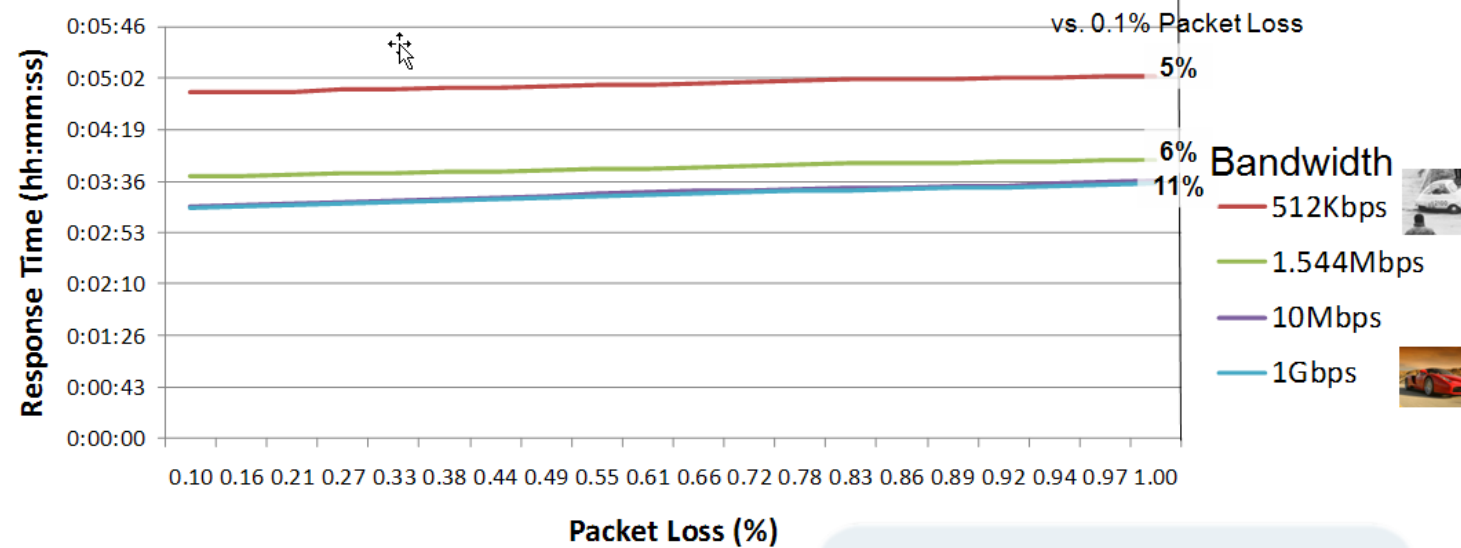
Response Time vs. Round Trip Latency
Packet Loss = 0.1%, Congestion = 40%



Response Time vs. Congestion
Packet Loss = 0%, Round Trip Latency = 100ms



Response Time vs. Packet Loss
Round Trip Latency = 100ms, Congestion = 40%



- **Impact of WAN Performance on CAD Users**
 - CAD users send files back and forth over the network frequently.
 - The performance of key CAD user transactions involves uploading or downloading CAD files between the client and the server.
 - Add to workspace, checkout, checkin and update
 - The performance of key CAD user transactions is dependent on
 - The time required to transfer CAD files over the network
 - The available bandwidth between the client and the server
 - The distance between the client and the server
 - **The more CAD users at a site the larger the bandwidth requirements for the site**

- **1. Main Server Location**
 - Minimize the average latency by minimizing the distances between main server and remote sites
- **2. WAN Performance Tuning**
 - Apply WAN Specific Performance Tuning Recommendations for Windchill Server and Clients
- **3. WAN Accelerators**
 - Deploy WAN Accelerators at the main server and remote sites to accelerate data transfer across the wide area network and reduce network congestion
- **4. Windchill Content Replication**
 - Replicate content to PTC Windchill File Servers at remote sites to improve content download and upload performance

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Optimizing Windchill Performance for Global Collaboration
Technical Brief

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Optimizing Windchill Performance for Global Collaboration - Technical Brief

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Windchill Vaulting and Replication Planning
Technical Brief

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Windchill Vaulting and Replication Planning - Technical Brief



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WAN Accelerators and Windchill Performance
Technical Brief

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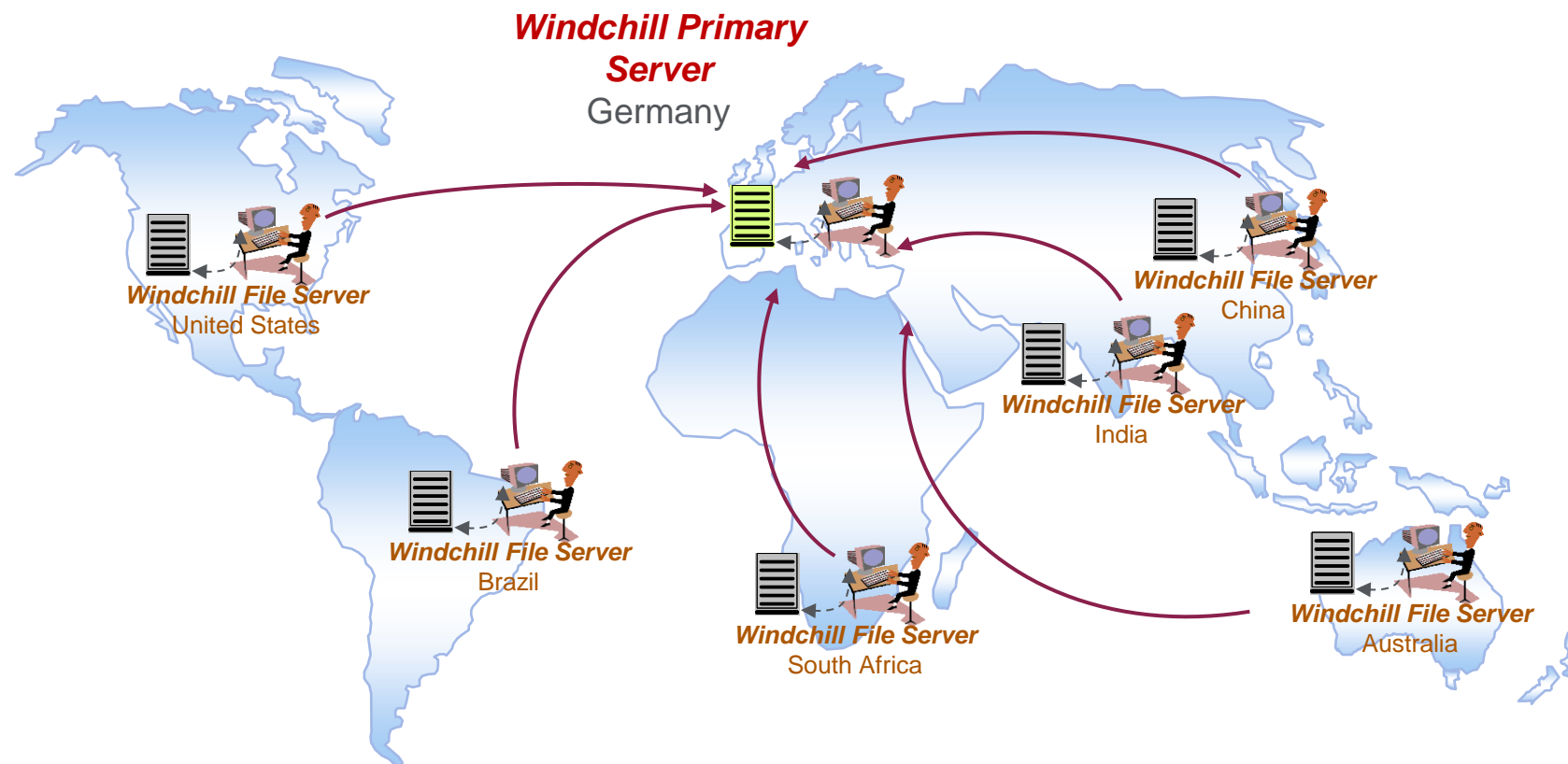
WAN Accelerators and Windchill Performance - Technical Brief

Cisco Distributed Deployment Guide for Windchill

PTC Distributed R&D Solution Deployment Guide for PTC Windchill

PTC Windchill Content Replication to Speed Access by Remote Users

- Business objects are mastered in the primary server, not replicated amongst numerous databases
 - Always indicates the correct status of the information to users at all times
- Content files are mastered in the primary server and replicated to Remote File Servers in closer proximity to the end-user.



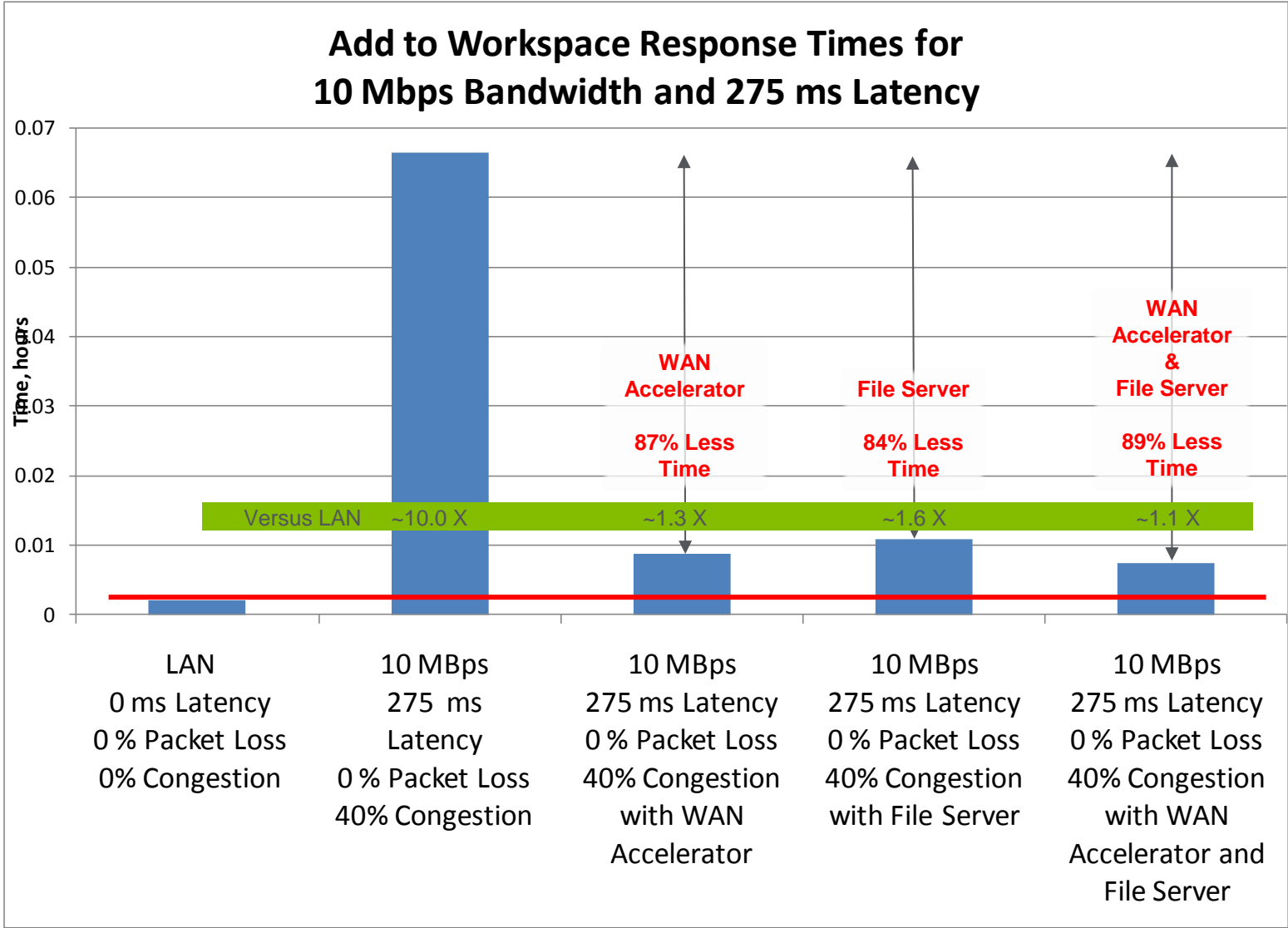
Architectural Benefits

- Avoiding network latencies and bandwidth constraints
- Guaranteed content delivery and management
- Supports ad hoc replication, scheduled replication and storage cache size/time durations at each individual site
- Sites can have proximity rules to access content as regionally available as possible before accessing content from the source location

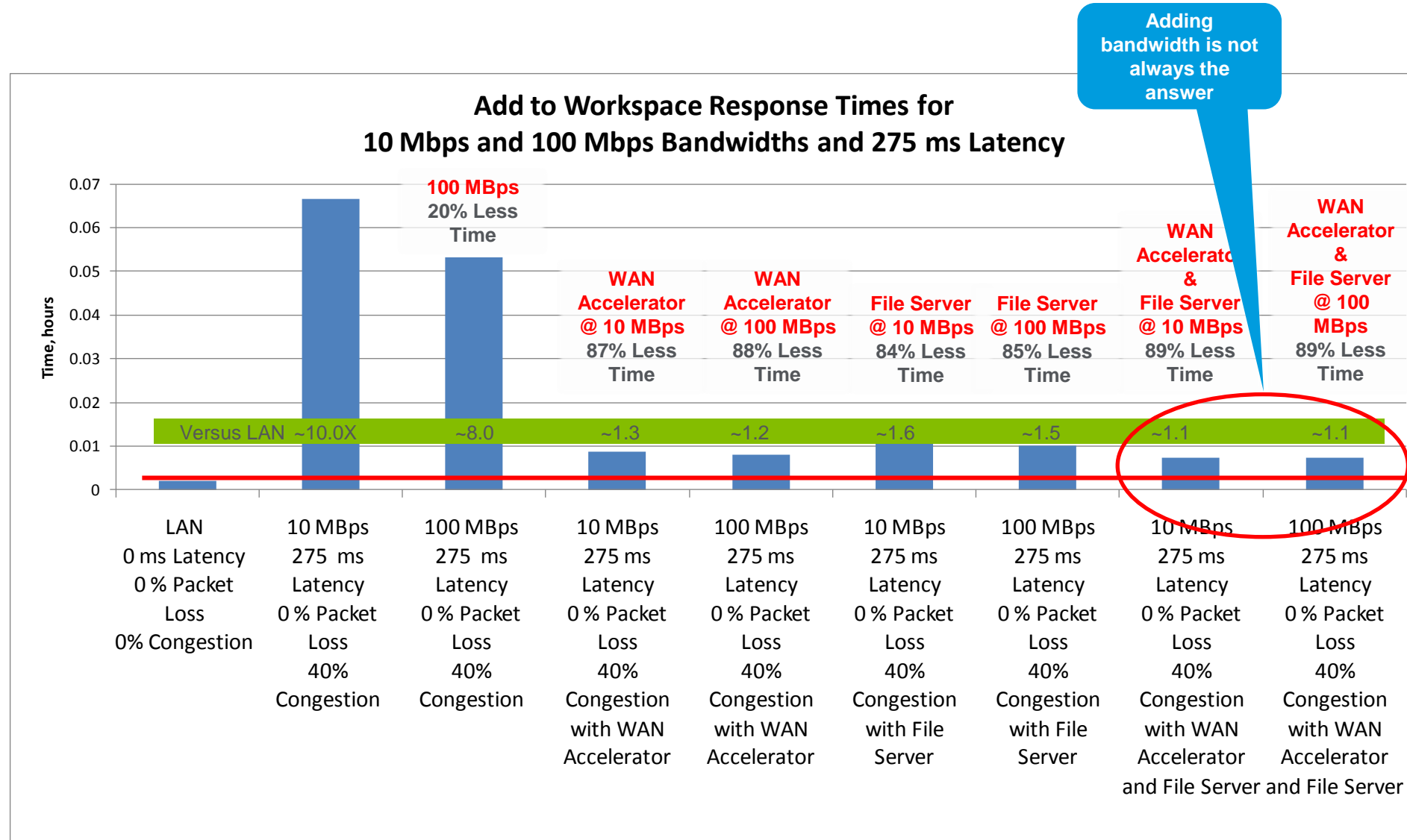
- **WAN accelerators can**
 - Substantially improve application performance for remote users accessing PTC Windchill over the WAN
 - Reduce the time to replicate content to PTC Windchill File Servers
 - Reduce bandwidth consumption and increase the quality of service
- **However, the degree to which WAN accelerators can benefit a PTC Windchill deployment depends on**
 - The current quality (bandwidth and latency) and usage (congestion) of your WANs
 - How many users are accessing PTC Windchill at each remote site
 - Whether your remote users are internal users or external users such as design or manufacturing partners
 - The type and size of data with which your users work – CAD data? Simple documents? Structured documents? Viewables (alternate graphical representations of CAD data)?
 - Whether you use replication with PTC Windchill Remote File Servers

- **Low Bandwidth and High Latency Networks**
 - WAN accelerators make the **most** improvement for application response times when they are deployed across low bandwidth / high latency network connections
 - For remote sites that are connected to the Main PTC Windchill server by networks with Latencies above 100ms, consider using WAN accelerator to improve the user experience
- **Internal and External Users**
 - WAN accelerators can typically help internal users, but what about your external Windchill users – such as customers or design or manufacturing partners?
 - If a remote user is also an external without access to a WAN accelerator nearby then the remote user does not benefit in any way from a WAN accelerator
- **CAD Users and Document Users**
 - If remote users are only working with small documents (such as PDFs or Microsoft Office files.), then using only the WAN accelerators could provide enough of an improvement.
 - WAN accelerators alone do not typically provide acceptable performance for most remote CAD users
- **With or Without Windchill Remote File Servers**
 - Use replication with PTC Windchill Remote File Servers to provide optimal performance for remote users and using WAN accelerators as a “complementary device” but not as a substitute for PTC Windchill replication
- **SSL and HTTPS**
 - Look for data from the vendor on how well HTTP and HTTPS transactions perform with their product.
 - HTTPS generally increases the data size by adding the encryption to the data stream
 - The PTC Windchill Remote File Server can be deployed with HTTP or HTTPS

Impact of adding a WAN Accelerator and a File Server on WAN Performance



Impact of Increasing Bandwidth, adding a WAN Accelerator and adding a File Server on WAN Performance



Monitoring & Troubleshooting

New tools

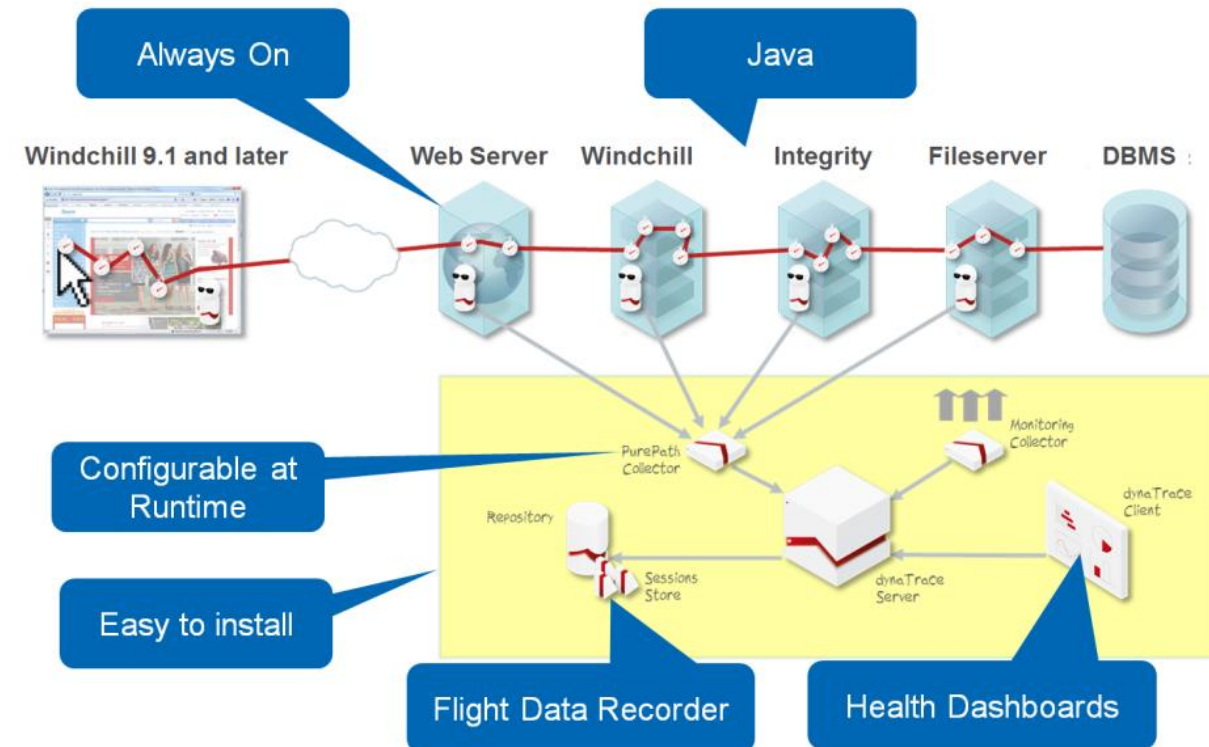
- Administrator JSP page available in R10 M20 and later

System Health Monitoring Tools

`<host>/Windchill/wtcore/jsp/jmx/index.jsp`

- [Server Status Page](#)
- [Performance Feedback Settings](#)
- [Log Levels](#)
- [Log File Viewer](#)
- [Persisted Log Events](#)
- [Log Event Histogram](#)
- [Method Context and Servlet Request Samples](#)
- [Cluster-wide Stack Traces](#)
- [Top SQL Sample Intervals](#)
- [Java Process Information](#)

- PTC System Monitor (PSM)
 - Free to Customers on Maintenance
 - Constant Monitoring
 - Thread dumps
 - Alerts
 - Charting
 - More www.ptc.com/go/psm



Based Dynatrace 6.1

- Support for Additional PTC Enterprise Products
 - PTC Windchill Quality Solutions 10.2 M040 and later
 - PTC Windchill MPMLink
 - PTC Windchill PartsLink
 - Servigistics Knowledge Management 5.4
 - Servigistics Knowledge and Diagnostics 5.5 and later
 - InService 6.0

- Additional Support for PTC Windchill Business Transactions

ProjectLink Transactions

- Convert to PDM Checkout
- Convert to Share
- Edit Multiple Assignments
- Edit Selected Objects
- Export / Import Plan
- Insert Activity
- New / Multiple Activities
- Send to PDM
- Update Project
- Update Selected Shares
- View in Gantt Explorer

PartsLink Operations

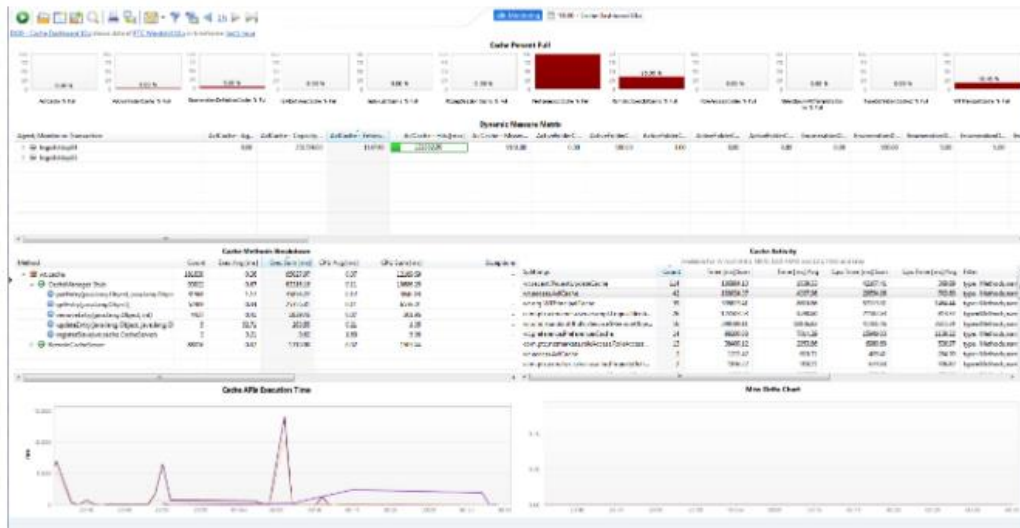
- Classification Search
- Classify Part
- Create Classification Node
- Edit Classification

MPMLink Operations

- Part Allocation
- Rename Operation
- Search in Tree Picker
- Work Instruction

Options and Variants Operations

- Assign Expression
- Configure Option Filter
- Create Rule
- Delete Operation
- Edit Option Filter
- Option Pool Structure
- Option Set Structure
- Preview Variant Structure
- View Conditional Rules
- View Enable Rules
- View Exclude Rules
- View Include Rules



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- It is possible to have acceptable performance
 - Database, MethodServer and Client configurations are necessary
- Not setting Query Limits will cause the MethodServer to crash
- Most Performance problems related to Database interaction
 - Poorly performing queries & under tuned databases
 - Code problem
- There are experts at PTC who only work on performance problems. Capturing the right data and engaging them is the quickest way to resolution
- PTC System Monitor is a value add for customers

See last section in this presentation titled “Performance Optimization Essentials” for details

Important Documents and Tools

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Reference Documents

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Browse

Product: Windchill PDMLink

Reported Release: 10.0

Document Type: Enterprise Deployment Resources

User Role: Administrator Roles

Browse

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- [Windchill 10x Client Requirements - Technical Brief - English](#)
User Role: Administrator
Published: 09-Apr-2012
This document was updated to reflect support for Windchill 10.1 on Monday, April 9. This document provides the minimum and recommended client requirements for CAD and non-CAD users of Windchill PDMLink, Windchill ProjectLink, and Pro/INTRALINK 10x for the Windows platform. The requirements include specifications for operating system, memory, CPU, and web browser. Windchill client tuning recommendations and the application of the Windchill Client Inspector is also discussed.
[Edit](#)
- [Windchill Advanced Deployment Guide - English](#)
User Role: Administrator
Published: 19-Jan-2012
This document was last updated on 19 January 2012. The Windchill Advanced Deployment Guide assists Windchill system administrators by providing advanced operations and configurations (including clusters) for Windchill solutions.
Other Languages: Japanese
[Edit](#)
- [Windchill and Pro/INTRALINK 10.x Server Hardware Sizing Guidelines - HP-UX Platform - English](#)
User Role: Administrator
Published: 16-Apr-2012
This document provides guidelines for how to size Windchill PDMLink, Windchill ProjectLink, and Pro/INTRALINK 10.0 and 10.1 servers as well as CAD worker hardware and a Content Cache Server for replication.
[Edit](#)
- [Windchill and Pro/INTRALINK 10.x Server Hardware Sizing Guidelines - IBM AIX Platform - English](#)
User Role: Administrator
Published: 16-Apr-2012
This document provides guidelines for how to size Windchill PDMLink, Windchill ProjectLink, and Pro/INTRALINK 10.0 and 10.1 servers as well as CAD worker hardware and a Content Cache Server for replication.
[Edit](#)
- [Windchill and Pro/INTRALINK 10.x Server Hardware Sizing Guidelines - Linux Platform with Oracle Database - English](#)
User Role: Administrator
Published: 12-Apr-2012
This document provides guidelines for how to size Windchill PDMLink, Windchill ProjectLink, and Pro/INTRALINK 10.0 and 10.1 servers as well as CAD worker hardware and a Content Cache Server for replication.
[Edit](#)

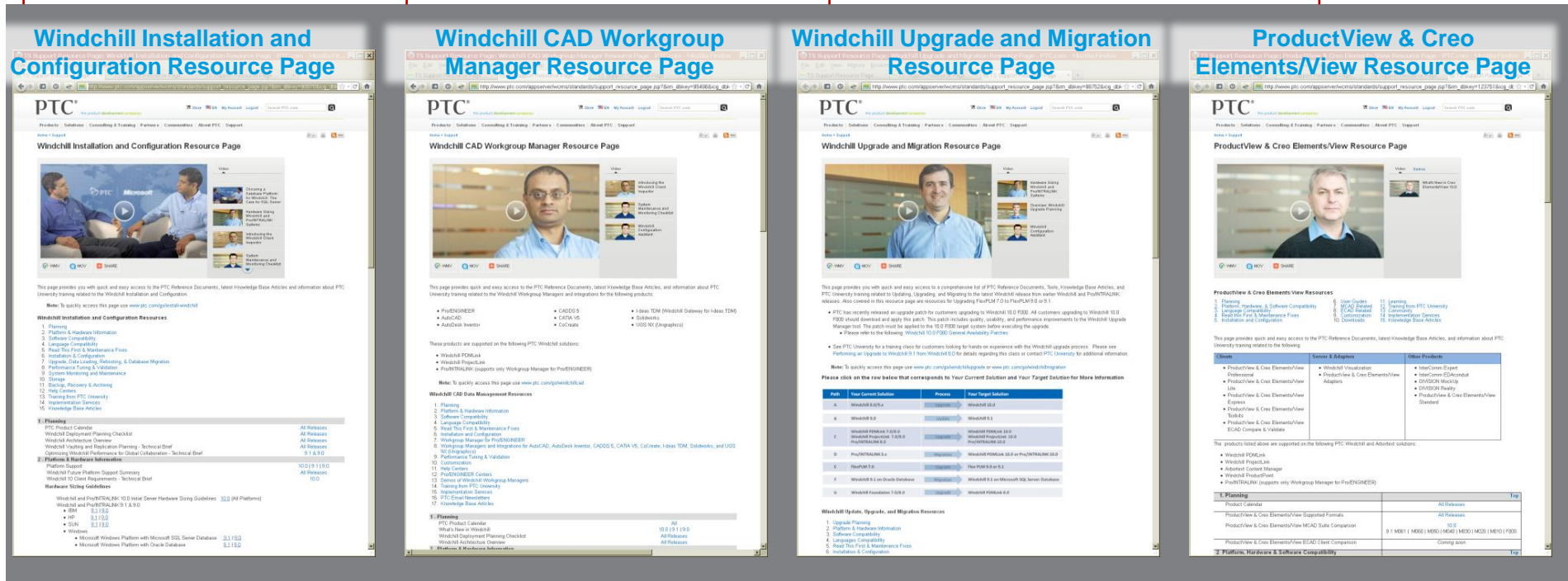
Quick access to comprehensive collection of PTC Windchill Product Documentation and Enterprise Deployment Resources

www.ptc.com/go/install-windchill

www.ptc.com/go/windchillcad

www.ptc.com/go/windchillupgrade
www.ptc.com/go/windchillmigration

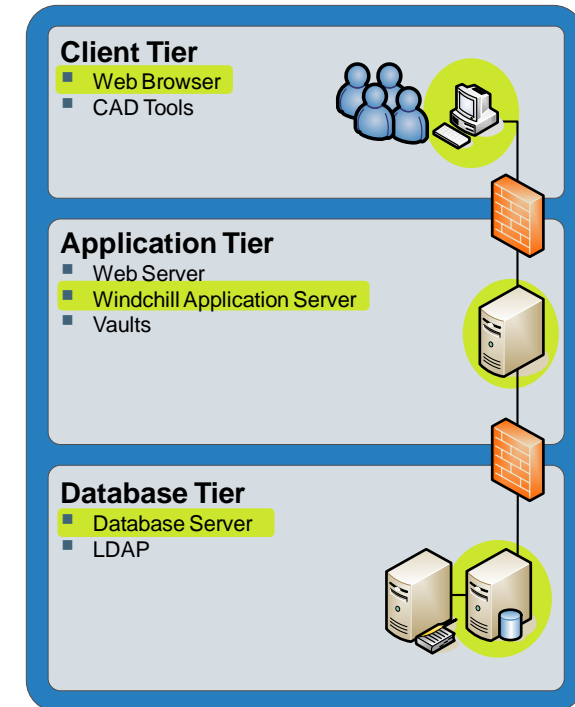
www.ptc.com/go/deploycreoview



- The objective of PTC Windchill hardware sizing is to determine the CPU & RAM Requirements for:
 - Windchill Application Server
 - Database Server
- PTC Windchill Server Hardware Sizing Guidelines
 - Help determine server requirements for a general PTC Windchill PDMLink, PTC Windchill ProjectLink, or PTC Windchill Pro/INTRALINK 10.X installation for up to 2500 weighted active CAD and non-CAD users
 - Are available for each of the supported PTC Windchill platforms and databases

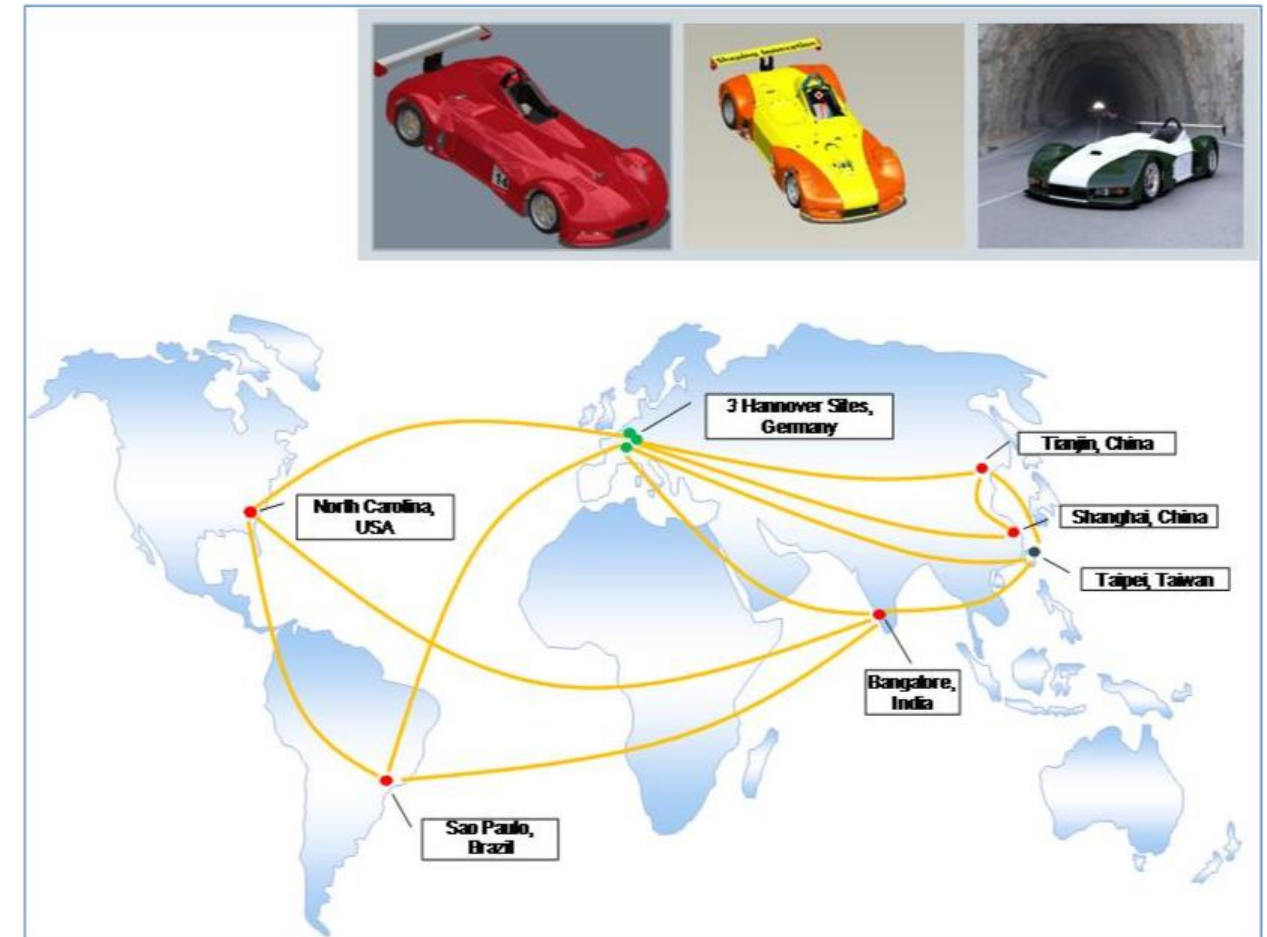
For More Information please refer to

- [Windchill and Pro/INTRALINK 10.x Server Hardware Sizing Guidelines - HP-UX Platform](#)
- [Windchill and Pro/INTRALINK 10.x Server Hardware Sizing Guidelines - IBM AIX Platform](#)
- [Windchill and Pro/INTRALINK 10.x Server Hardware Sizing Guidelines - Linux Platform with Oracle Database](#)
- [Windchill and Pro/INTRALINK 10.x Server Hardware Sizing Guidelines - Microsoft Windows Platform with Oracle Database](#)
- [Windchill and Pro/INTRALINK 10.x Server Hardware Sizing Guidelines - Microsoft Windows Platform with SQL Server Database](#)
- [Windchill and Pro/INTRALINK 10.x Server Hardware Sizing Guidelines - Sun Solaris Platform](#)



PTC determines recommendations for customers given a nominal depiction of their usage of the system compared to automated benchmark scenarios that PTC executes. Every customer workload may be considerably different from each other, and the guides will not take every usage characteristic into consideration. Therefore, the guides **provide practical minimum hardware sizing recommendations**

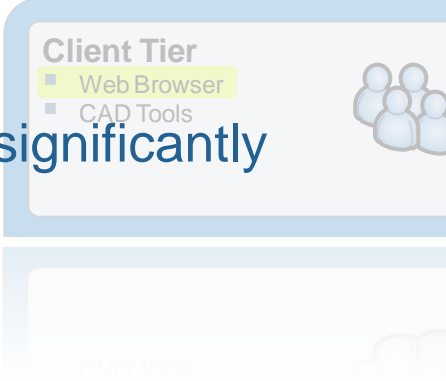
- Provides an understanding of the factors affecting Windchill performance on the WAN
 - Bandwidth
 - Latency
 - Congestion
 - Packet Loss
- Provides performance data for PTC Windchill under various WAN conditions
- Presents proven options for acceptable performance to globally distributed users
- Applies to PTC Windchill 9.0 and above



For More Information please refer to

- [Optimizing Windchill Performance for Global Collaboration](#)

- System response time is a crucial factor influencing the productivity of PTC Windchill users and the adoption of the system
- PTC Windchill client performance and scalability significantly influenced by
 - Client hardware
 - System configuration
- System response time of PTC Windchill’s user interface depends on
 - The operating system
 - Available memory (RAM)
 - CPU cores and speed
 - The type of web browser



Updated

For More Information please refer to

- [Windchill 10x Client Requirements - Technical Brief](#)
- [Windchill 10.2 Software Matrices](#)
- [Windchill Future Platform Support Summary](#)
- [Creo 2.0 Hardware Notes](#)
- [Creo 3.0 Hardware Notes](#)
- [Creo Future Platform Support Summary](#)

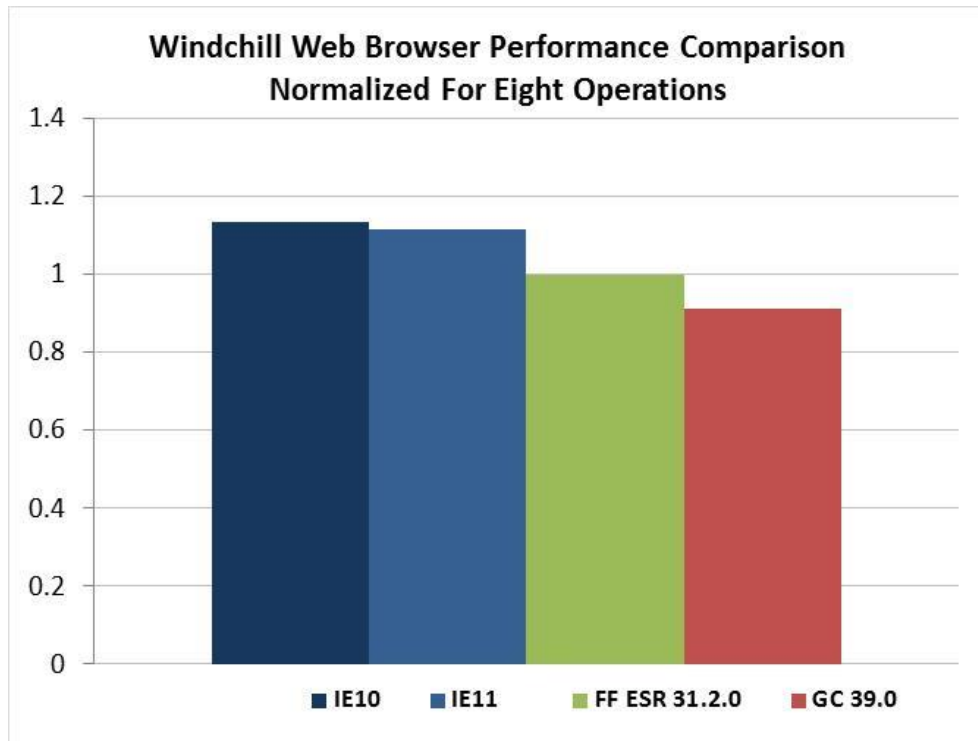
Non-CAD User System Requirements		
	Minimum	Recommended
Operating System	Windows XP – 32 bit	Windows 7- 64 bit
RAM	2 GB	4 GB
CPU	2 GHz	2.5 GHz or higher
Web Browser	Microsoft Internet Explorer 9.0	<ul style="list-style-type: none"> • Mozilla Firefox ESR 31.0.x for Windchill 10.X • Microsoft Internet Explorer 9.0 for Windchill 10.0 • Microsoft Internet Explorer 11.0 for Windchill 10.1 & 10.2
Display	Minimum resolution setting of 1280x1024	
Client Tuning	For details, refer to the Windchill Client Tuning Recommendations section of this document.	
Preference Table size limit	500 rows	3,000 rows
CAD User System Requirements		
	Minimum	Recommended
Operating System	Windows XP - 32bit	Windows 7- 64bit
RAM	4 GB	8 GB or higher
CPU	2 GHz	Quad 3 GHz or higher
Web Browser		
Standalone	Microsoft Internet Explorer 9.0	<ul style="list-style-type: none"> • Mozilla Firefox ESR 31.0.x for Windchill 10.X • Microsoft Internet Explorer 9.0 for Windchill 10.0 • Microsoft Internet Explorer 11.0 for Windchill 10.1 & 10.2
Embedded	Microsoft Internet Explorer 9.0	<ul style="list-style-type: none"> • Mozilla based browser (embedded with Creo Elements/Pro 5.0 and Creo Parametric 1.0 & 2.0) • Chromium based browser for Creo 3.0 • Microsoft Internet Explorer 9.0 for Windchill 10.0 • Microsoft Internet Explorer 11.0 for Windchill 10.1 & 10.2
Preference Table size limit	Microsoft Internet Explorer 9.0: 500 rows	<ul style="list-style-type: none"> • Mozilla Firefox ESR 31.0.x: 3000 rows • Microsoft Internet Explorer 9.0: 2000 rows • Mozilla based browser (embedded with Creo Elements/Pro 5.0 and Creo Parametric 1.0 & 2.0): 2000 rows

- Which browser is best for your company?
 - Provides comparative performance data for the supported web browsers for PTC Windchill
 - PTC Windchill 10.X Web Browser Support
 - Windchill 10.X will be supporting versions of Microsoft Internet Explorer, Firefox and Google Chrome
 - Windows Platform Support for Web Browsers
 - Not all of the supported browsers may be available on the client operating systems of your Windchill users



For More Information please refer to

– [Windchill Web Browser Comparison - Technical Brief](#)



	Microsoft Internet Explorer				Mozilla			Google-Chromium	
	IE 8	IE 9	IE 10 ¹	IE 11 ²	Firefox ESR 24.0.x	Firefox ESR 31.0.x	Embedded Mozilla XulRunner 2 ³	Chrome 39.0	Embedded Chromium 3.1750 ⁴
Release Date	9-Mar	11-Mar	Oct-12/Feb-13	13-Oct	13-Oct	14-Jul	11-Mar	11-Mar	14-Oct
Release Schedule			Yearly		Yearly	Yearly		Every 6 weeks	
Windchill 10.0 Web Browser Support⁵									
Stand Alone Browser	Yes	Yes	No	No	Yes	Yes	No	Yes	No
Workgroup Manager Browser (Embedded)	Yes	Yes	No	No	No	No	Yes	No	No
Windchill 10.1 Web Browser Support⁵									
Stand Alone Browser	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No
Workgroup Manager Browser (Embedded)	Yes	Yes	Yes	Yes	No	No	Yes	No	Yes
Windchill 10.2 Web Browser Support⁵									
Stand Alone Browser	No	Yes	Yes	Yes	No	Yes	No	Yes	No
Workgroup Manager Browser (Embedded)	No	Yes	Yes	Yes	No	No	Yes	No	Yes
Performance Refer to Corresponding Section Below									

Execute Solution Deployment Installation, Configuration, and Tuning

- **Challenge**

- Optimally configuring PTC Windchill for performance and scalability can be difficult given the amount of required knowledge of different technologies and property options

- **Description**

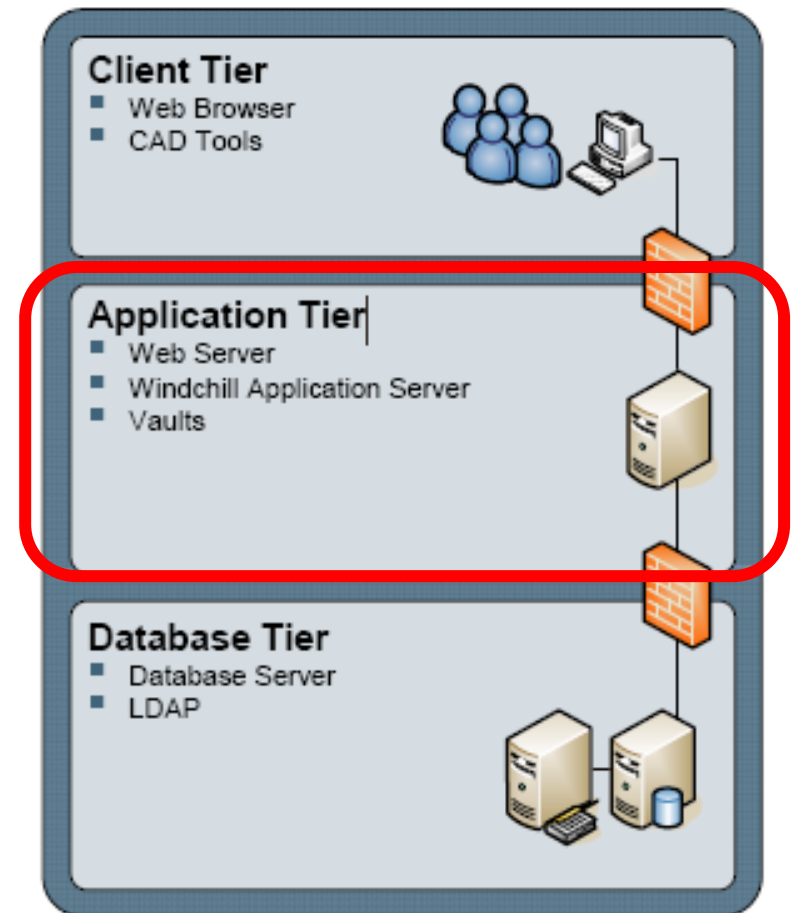
- Examines system resource information for the server on which PTC Windchill runs and calculates recommended values for PTC Windchill properties to take maximum advantage of available memory and CPU resources.
 - Percentage of memory to allocate to the method server heap and server manager heap
 - Number of foreground & background method servers
 - Heap sizes
- Additionally, the WCA can recommend configuration changes for the Tomcat servlet engine
- Running Options
 - Initial PTC Windchill Configuration Assistant Run
 - Manual PTC Windchill Configuration Assistant Runs

- **Benefit**

- Improves PTC Windchill Performance and Scalability
- Dramatically simplifies PTC Windchill System Configuration and Performance Tuning

For More Information please refer to

- [Windchill Administration - Configuring Your Windchill Environment](#)



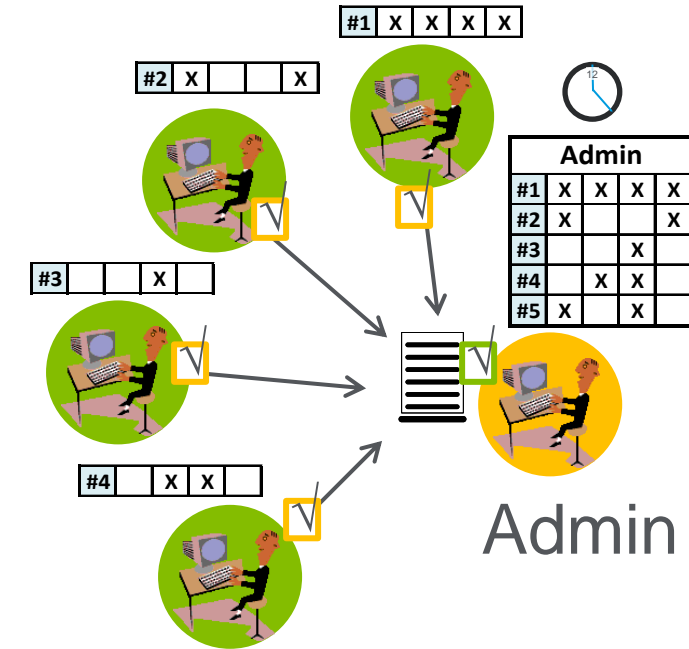
Execute Solution Deployment Installation, Configuration, and Tuning

Description

- The Client Inspector is a tool that can be run on clients (local or remote) to determine client readiness for working with PTC Creo and PTC Windchill PDMLink

Highlights

- Run remotely by administrators on local and remote client machines
- Compares a client's current settings with the settings prescribed by PTC
- Records the results of the scan
- Copies results from individual client machines to the administrator's central machine (from which it was deployed)
- Merges all individual results into master excel file



For More Information please refer to

- [Windchill Client Inspector Deployment and Administration Guide](#)
- PTC Windchill Client Inspector (WCI) Software available from www.ptc.com Order or Download Software Updates page under PTC Windchill 10.2,10.1,10.0 and 9.1

Property	Value	Location	Release or Environment	Note
dm_network_threads	6	config.pro	WAN	This controls the number of network threads (concurrent network connections) to the server. Increasing the value from the default of 3 can decrease response times but can also contribute to network saturation. See TPI 141292 for additional information.
dm_http_compression_level	3	config.pro	WAN	The server must be unregistered, Pro/ENGINEER restarted and reregistered for setting to take effect. See TAN 136108 for issues with this property in certain builds. See TPI 141292 for additional information.
dm_cache_size	0	config.pro	Wildfire 2.0 and Wildfire 3.0 M050 and earlier	Set value to 0 (disable cache limit). If not set to 0, periodically monitor how close you are to the specified by dm_cache_size (via #Tools > #Server Registry) cache limit, background Wildfire processes will remove files from the cache at the set limit. This setting can contribute to performance degradation (both in the background cleanup jobs but also during retrieval) as files that are regenerated but deleted from cache will need to be downloaded.
dm_cache_limit	0	config.pro	Wildfire 3.0 M060+	Replaces dm_cache_size. See TAN 133958.
dm_network_request_size	1000000	config.pro	All	See TPI 141292 for additional information.

Automates single user performance tests of basic PTC Windchill Creo data management operations - Based on the Pro/ENGINEER JLink toolkit

- Usage

- Build the test case that is executed
- Specify any working dataset so that the performance test executions are relevant to the work being done by your user community
- Run the tester as an asynchronous session that connects to a Windchill PDMLink server and executes a PTC Windchill interaction-based test case

- Application

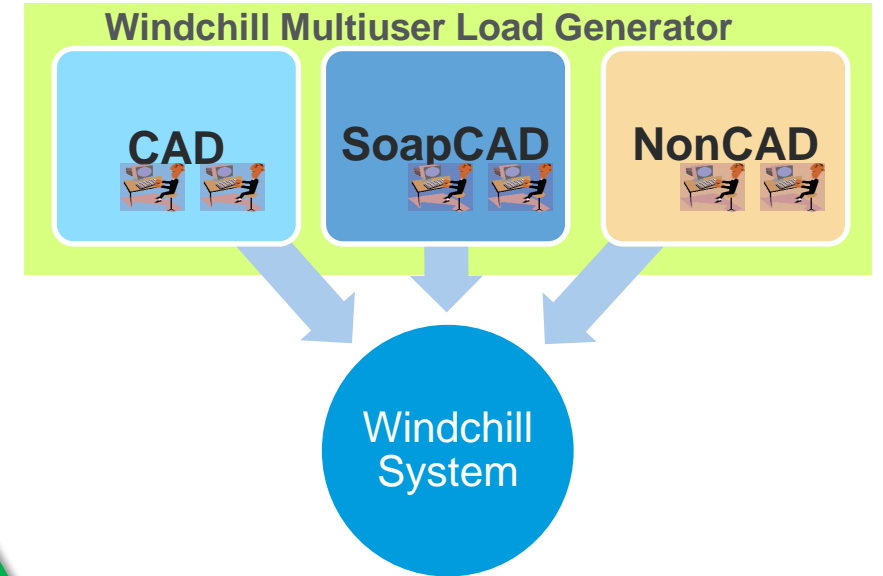
- Use to create a system performance baseline
- Use results to determine if go live performance criteria are met
- Use to baseline and compare the performance of one or more PTC Windchill systems
 - Test and production systems
- A production system before and after a release upgrade
- A production system over time
- LAN and WAN users of a production system

Updated for PTC
Windchill 10.2,
PTC Creo 2.0 &
PTC Creo 3.0

Operations
Register
Create Workspace
Import
Upload
Check In
Check Out
Download
Remove
Undo Check Out
Export
Delete Workspace
Unregister

A tool that can simulate Multi-User concurrent load on the entire technology stack (including the network, application server and database server)

- Uses JMeter
- Not directly available to customers
- Available through PTC Global Services



Updated for Windchill 10.2

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	KB/sec	Avg. Bytes
Setup User	2	36	20	52	16.00	0.00%	3.4/sec	0.00	0
Monitor Threa...	1	6	6	6	0.00	0.00%	166.7/sec	0.00	0
Fetch WTProp...	2	42	16	69	26.50	0.00%	3.7/sec	327.94	91173.0
Query Contai...	2	394	164	624	230.00	0.00%	3.2/sec	1.36	434.0
EPMWorkspa...	32	28	22	79	11.49	0.00%	50.0/min	0.19	229.0
CREATEWOR...	32	187	92	1374	290.82	0.00%	49.9/min	3.45	4250.0
SOAP FindEp...	31	261	69	641	136.22	0.00%	51.1/min	7.41	8907.2
SOAP AddTo...	30	1530	372	8802	1719.88	0.00%	50.4/min	247.72	301994.4
REMOVEWO...	30	303	208	1165	177.32	0.00%	55.8/min	1.34	1474.0
Loop Conditio...	30	2	0	17	3.16	0.00%	57.9/min	0.00	0
TOTAL	192	370	0	8802	864.09	0.00%	4.9/sec	239.80	50555.8

Summary report with response time measurements

• Contents

- PTC modeled PTC Creo dataset
- Test cases encompassing most frequently used PTC Creo Data Management operations
- Performance Benchmark Data Sheet
- Reference Performance Results

• Benefits

- Provides the information to conduct a performance benchmark test for PTC Creo Data Management operations with the Windchill family of products (PTC Windchill PDMLink, ProjectLink and Pro/INTRALINK)
- Provides a means to assess the performance of a PTC Windchill deployment

Being updated with data for PTC Windchill 10.2 M030 & PTC Creo 3.0



Time recorded by PTC (hh:mm:ss)



For More Information please refer to

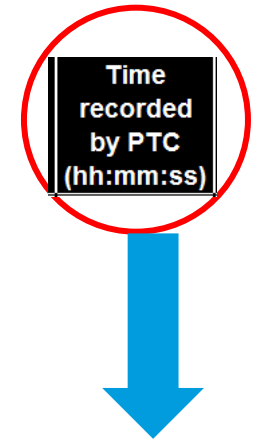
- [Windchill Creo Data Management Performance Benchmark Test - Instructions](#)
- [Windchill Creo Data Management Performance Benchmark Test - Data Sheet](#)
- [Windchill Creo Data Management Performance Benchmark Test – Preliminary Dataset \(82 KB\)](#)
- [Windchill Creo Data Management Performance Benchmark Test – World Car Dataset \(295 MB\)](#)

	A	B	C	D	E
1		**The test cases outlined below are intended for measuring system performance and kind**			
2	Action	Description	# of Objects Displayed (Expected)	# of Objects Displayed (Actual)	Time recorded by PTC (hh:mm:ss)
3		– Launch Pro/ENGINEER – Measure time to launch Pro/ENGINEER			0:00:13
4		– Click registered workspace from folder navigation pane – Log on as the first test user (user #1) on authentication dialog			
5		– Click Add to WS icon – Search for World Car Asm (ptc-edc-worldcar.asm) – Measure time to complete search	1		0:00:02
6		– Select World Car Assembly and click OK – Measure time to display Add to WS page – On Add to WS page, click new and assign new workspace name – Check Activate WS box and click OK – On Basic tab, set Dependents > None – Go to Advanced tab – Measure time to go to Advanced tab	1		0:00:03
7		– On Advanced tab, click Configuration > Add Dependency > Select Required – Measure time to collect required dependents	1		0:00:02
8		– Configuration > Add Dependency > Select All – Measure time to collect all dependents	877		0:00:13
9		– Select All and click collect related Family table objects icon – Measure time to collect related family table objects	885		0:00:09
10		– Select All items and click Link icon – Click OK	2374		0:00:23
11	Add to WS [as Link]	– Measure time to finish add to ws process	2374		0:01:15

• Contents

- PTC modeled data available in the form of loaders
- Test cases encompassing most frequently used Non-CAD operations (Administration, Document Management etc.)
- Reference Performance Results

NEW
(to be published soon)



• Benefits

- Provides the information to conduct a performance benchmark test for Non-CAD operations with the PTC Windchill family of products (PTC Windchill PDMLink and PTC windchill ProjectLink)
- Provides a means to assess the performance of a PTC Windchill deployment

The test cases outlined below are intended for measuring system performance and should not be construed as best practices of any kind					
				Windchill version: 10.2 M030 CPS01 SQL SERVER version: SQL SERVER 2014 Browser: IE 11 (64-bit)	
Category	Action	Description	# of Objects Displayed	Time recorded by PTC (In Seconds)	Time Actual (In Seconds)
Search		– Launch web browser – Login to the Windchill server as "Org1User1/Org1Pass1"	NA	2	
	Search by Name	– Click to expand the Navigator Panel – Click on the "Search" tab of the Navigator panel – Click on the "Advanced Search" tab in the "Search" panel – Check the check box for "All Types" and enter "PTC-EDC-PROD-FOLDER0_WTPART-950" in the "Name" field – Measure time to complete search	1	1	
	Search by Number	– Click "Edit Search Criteria" – Check the check box for "All Types" and enter "PTC-EDC-PROD-FOLDER0_WTPART-940" in the "Number" field – Measure time to complete search	1	1	
	Search with asterisk in name	– Click "Edit Search Criteria" – Check the check box for "All Types" and enter "500_PART*" in the "Name" field – Measure time to complete search	501	2	
	Search with asterisk in number	– Click "Edit Search Criteria" – Check the check box for "All Types" and enter "250_PART*" in the "Number" field – Measure time to complete search	502	1.5	
	Search In Table	– Click to Browse – Click on Product "ptc-edc-prod1" – Click on Folder "ptc-edc-prod-folder0" – Enter "PTC_EDC_PART*" in Search in table field – Measure time to complete search	100	2.5	
	Search In Folder	– Click to Browse – Click on Product "Product Name" – Click on Folder – In left side navigator in Search in Selected folder "PTC_EDC_PART*" and click search – Measure time to complete search	100	2	

Performance Optimization Essentials

- **Configuring for Performance**
 - Database
 - Server
 - Client
- **PTC Windchill Properties – Critical Considerations**

- **Memory Allocation – Critical for acceptable Oracle performance**
 - Use the 11g parameters **memory_max_target** and **memory_target** parameters
 - Set **sga_max_size** and **sga_target** equal to 0
 - SGA for
 - Small systems:10-15G
 - Medium systems:15-30G
 - Large systems: up to 120G
 - Set **optimizer_index_cost_adj=10** – important but not as critical as in earlier releases of Oracle
- **There is a list of recommended indexes which should be applied. See article [CS98135](#)**
 - Applies to all PTC Windchill 10.X releases
 - Oracle
 - Microsoft SQL Server

Apply the latest Service Pack or Cumulative update

- Display current version:

```
SELECT 'ProductVersion', SERVERPROPERTY('ProductVersion')
```

```
UNION ALL
```

```
SELECT 'ProductLevel', SERVERPROPERTY('ProductLevel')
```

```
UNION ALL
```

```
SELECT 'ResourceLastUpdateDateTime', SERVERPROPERTY('ResourceLastUpdateDateTime')
```

```
UNION ALL
```

```
SELECT 'ResourceVersion', SERVERPROPERTY('ResourceVersion')
```

- Check **ResourceVersion** at <http://sqlserverbuilds.blogspot.com/>

Microsoft SQL Server 2008 R2 Builds

Build	File version	KB / Description	Release Date
10.50.6525	2009.100.6525.0	3033860 An on-demand hotfix update package is available for SQL Server 2008 R2 Service Pack 3 (SP3)	February 9, 2015
10.50.6000	2009.100.6000.0	SQL Server 2008 R2 Service Pack 3 (SP3)	September 26, 2014
10.50.4331	2009.100.4331.0	2987585 Restore Log with Standby Mode on an Advanced Format disk may cause a 9004 error in SQL Server 2008 R2 or SQL Server 2012	August 27, 2014
10.50.4321	2009.100.4321.0	2977319 MS14-044: Description of the security update for SQL Server 2008 R2 Service Pack 2 (QFE)	August 12, 2014
10.50.4319	2009.100.4319.0	2967540 Cumulative update package 13 (CU13) for SQL Server 2008 R2 Service Pack 2	June 30, 2014
10.50.4305	2009.100.4305.0	2938478 Cumulative update package 12 (CU12) for SQL Server 2008 R2 Service Pack 2	April 21, 2014
10.50.4302	2009.100.4302.0	2926028 Cumulative update package 11 (CU11) for SQL Server 2008 R2 Service Pack 2	February 18, 2014
10.50.4297	2009.100.4297.0	2908087 Cumulative update package 10 (CU10) for SQL Server 2008 R2 Service Pack 2	December 16, 2013
10.50.4295	2009.100.4295.0	2887606 Cumulative update package 9 (CU9) for SQL Server 2008 R2 Service Pack 2	October 29, 2013
10.50.4290	2009.100.4290.0	2871401 Cumulative update package 8 (CU8) for SQL Server 2008 R2 Service Pack 2	August 30, 2013
10.50.4286	2009.100.4286.0	2844090 Cumulative update package 7 (CU7) for SQL Server 2008 R2 Service Pack 2	June 17, 2013
10.50.4285	2009.100.4285.0	2830140 Cumulative update package 6 (CU6) for SQL Server 2008 R2 Service Pack 2 (updated)	June 13, 2013

Tempdb

- Out-of-the-box there is one tempdb file

```
Database and files
*****
```

DB Name	dbid	FileID	Logical Name	Size(MB)	size	max_size	growth	is_percent_growth	physical_name
cognosuser	6	1	cognosuser	500	64000	-1	1280	0	C:\ptc\Windchill
cognosuser	6	2	cognosuser_log	100	12800	1280000	10	1	C:\ptc\Windchill
master	1	1	master	4	512	-1	10	1	C:\Program Files
master	1	2	mastlog	1	160	-1	10	1	C:\Program Files
model	3	1	modeldev	2	288	-1	128	0	C:\Program Files
model	3	2	modellog	0	96	-1	10	1	C:\Program Files
msdb	4	1	MSDBData	14	1888	-1	10	1	C:\Program Files
msdb	4	2	MSDBLog	3	432	268435456	10	1	C:\Program Files
tempdb	2	1	tempdev	8	1024	-1	10	1	C:\Program Files
tempdb	2	2	templog	0	64	-1	10	1	C:\Program Files
wind	5	1	wind	250	32000	-1	1280	0	C:\ptc\Windchill
wind	5	2	wind_log	741	94864	1280000	10	1	C:\ptc\Windchill
wind	5	3	wind_blobs	480	61440	-1	1280	0	C:\ptc\Windchill
wind	5	4	wind_indx	250	32000	-1	640	0	C:\ptc\Windchill
wind	5	5	wind_wcaudit	150	19200	-1	640	0	C:\ptc\Windchill

- Microsoft recommends one tempdb file per CPU
 - Best to only add a few at a time
- Move tempdb to separate disk from user database
- [http://technet.microsoft.com/en-us/library/ms175527\(v=sql.105\).aspx](http://technet.microsoft.com/en-us/library/ms175527(v=sql.105).aspx)

Set “max server memory” and “min server memory” options

- **Defaults: min=0 max=2PB**
 - memory is dynamically set based on available resources
- **Controls how much memory can be used by buffer pool**
 - This doesn't include other memory regions of SQL Server
- **Without a max OS or other services might be starved of memory**
- **Possible suggestions for max:**
 - Allow 1 GB for the OS
 - Set to 80% of total memory (Similar to how WCA sizes PTC Windchill)
 - <http://www.sqlskills.com/blogs/jonathan/how-much-memory-does-my-sql-server-actually-need/>
 - Reserve 1 GB of RAM for the OS, 1 GB for each 4 GB of RAM installed from 4–16 GB, and then 1 GB for every 8 GB RAM installed above 16 GB RAM.
- **These suggestions assume dedicated machine, adjust if necessary**

Memory Settings

<u>Physical RAM</u>	<u>MaxServerMem Setting</u>
2GB	1500
4GB	3200
6GB	4800
8GB	6400
12GB	10000
16GB	13500
24GB	21500
32GB	29000
48GB	44000
64GB	60000
72GB	68000
96GB	92000
128GB	124000

http://www.sqlservercentral.com/blogs/glennberry/2009/10/29/suggested-max-memory-settings-for-sql-server-2005_2F00_2008/

Statistics - Create statistics with FULLSCAN

- FULLSCAN = SAMPLE 100 PERCENT
- Many cases are resolved after updating statistics
- 100% sample rate ensures accurate statistics
- Can take more time on larger tables
 - May be necessary

- **Use the PTC Windchill Configuration Assistant** - see chapter 1 of the [Administrator Configuration Guide](#)
- **Apply settings described in articles**
 - [Windchill 10.x Initial Performance Tuning](#)
 - Article intends to improve the performance and stability of the Windchill system
 - Includes basic tuning with WCA, advice on how to optimize Database and WindchillDS
 - Includes several common FAQs
 - [How to enable Oracle CPU limit per call for Windchill](#)
 - By default Oracle does not impose CPU limit on any query
 - A long CPU intensive query could seize the system and preempt other important transactions
 - The article shows how to
 - Enable Oracle CPU limit per call
 - Steps to create CPU limit profile

- Don't allocate more memory to Method Servers than the machine has RAM
 - $(wt.method.maxHeap \times (wt.manager.monitor.start.MethodServer + 1 \text{ for the BGMS}) + wt.manager.maxHeap + 1G \text{ (for JVM perm space not part of the heap)}) + \text{Extra}^* < \text{Total Memory of the server}$
 - **Extra*** = memory needed for other running applications (Apache , Windchill DS, database ...) and the OS
- JVM settings
 - Keep it simple, use the defaults
 - **Don't let anyone short of a Java expert touch your JVM settings, no "best practices" no exotic settings**
 - `wt.method.maxHeap` – 3g or more
- Set query Limits (**Important!**)
 - `db.properties`
 - `wt.pom.queryLimit=250000`
 - `wt.pom.paging.snapshotQueryLimit=10000`
 - `wt.properties`
 - `com.ptc.windchill.search.queryLimit=10000`

- **wt.properties**

- Load Balancing - Maximum number of concurrent Operations in a Single Method Server before operation is balanced to a different Method Server (5-15 is a normal range)
 - **wt.method.loadbalance.activeContext**
- Load Balancing - Number of times an operation can be moved to a different Method Server (# of MS -1 is the usual setting)
 - **wt.method.loadbalance.maxRedirects**
- The two MOST important caches in PTC Windchill for Performance
 - **wt.cache.size.WTPrincipalCache & wt.cache.size.StandardUfidSrvService\$RemoteObjectIdCache**
 - See articles [CS71489](#) & [CS97931](#) for sizing instructions

- **db.properties**

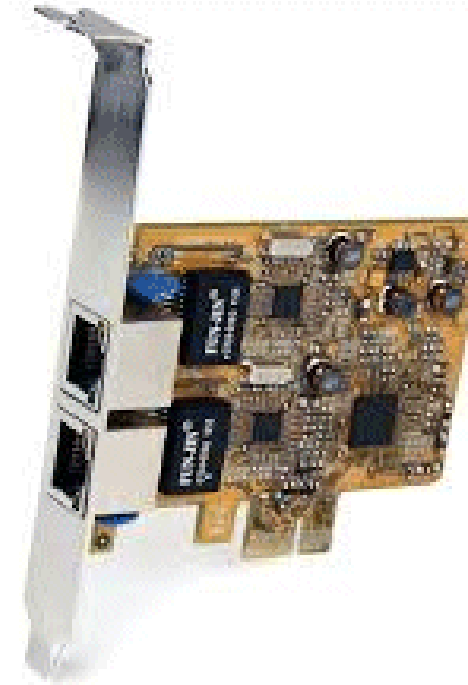
- **wt.pom.maxDbConnections** (Typical range: 10-25, maybe higher for BGMS with many queues)
- **wt.pom.minDbConnections** (Typical range:10-25)
- Use the defaults: **wt.pom.statementCacheSize** (50) & **wt.pom.rowPrefetchCount** (20)

- **Use the PTC Windchill Client Inspector**
- [Article CS24192](#) - Pro/ENGINEER Wildfire or PTC Creo Interaction with PTC Windchill PDMLink - Recommended Initial Performance Server Settings
- [Article CS23960](#) - Pro/ENGINEER Wildfire and PTC Creo Interaction with PTC Windchill PDMLink - Recommended Initial Performance Client Settings
- [Article CS140968](#) – PTC Windchill Workgroup Manager Interaction with PTC Windchill PDMLink - Recommended Initial Performance Client Settings
- /3gb switch if 32-bit OS
- Configure OS for best performance
 - Visual Effects & Pagefile
 - Ensure TEMP & TMP on local disk (if using roaming profiles) & cleaned up regularly
 - Defragment drives
- Anti-Virus can cause performance issues
 - Monitor and test w/ vs. w/o scanning of xtop.exe and uwgm_client.exe
 - Disable Anti-Virus scanning of cache directory
 - Check policy settings and reconfigure as appropriate

Note: Configuration of the Windows Registry is a **Must-do** as OOTB Windows is not tuned for PTC Windchill Interaction

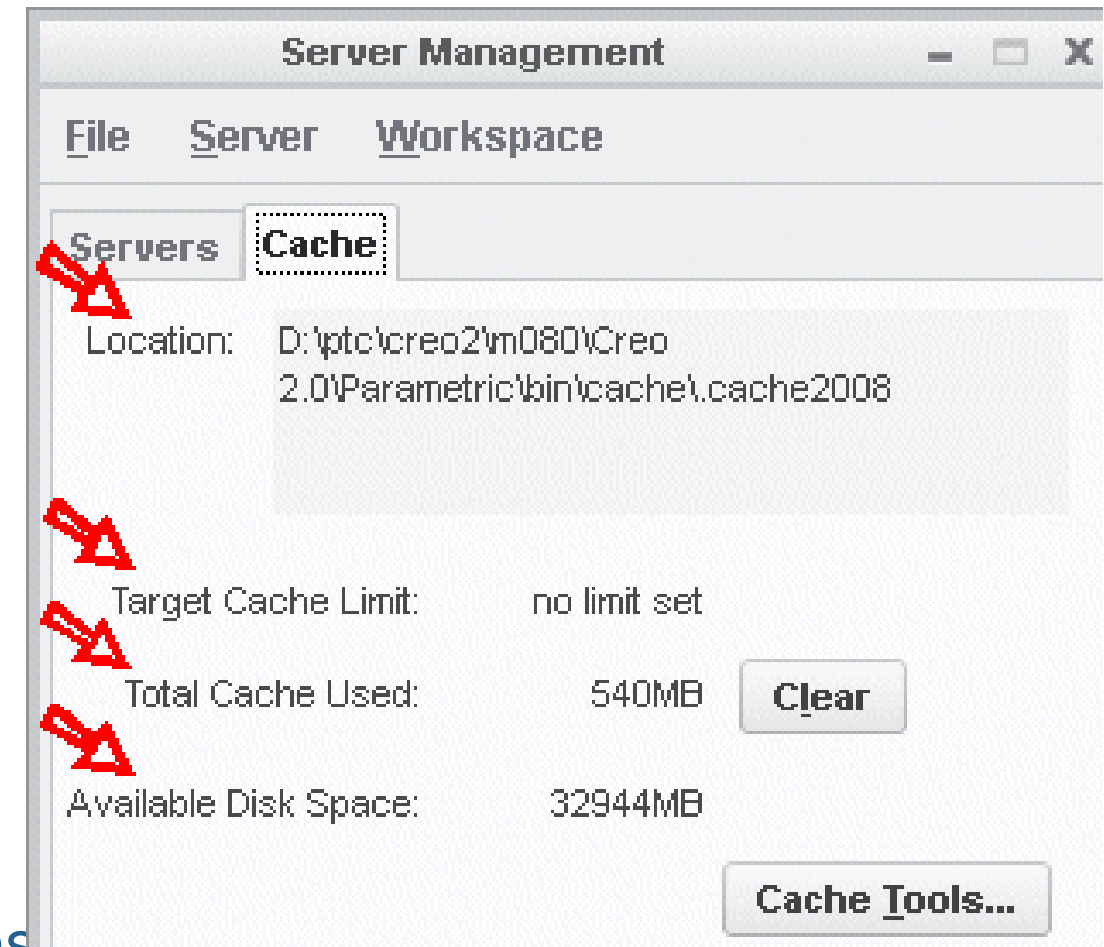
Network

- **Wired vs. Wireless**
 - Wired typically faster
 - Wired more fault tolerant
 - Wired has less overhead
- Update NIC drivers
- Bandwidth limited by slowest link anywhere along the path between the client and server
- Optimize and prioritize for highest network bandwidth infrastructure allows
 - Gbit
 - Jumbo Frames
 - Prioritize via QOS if possible



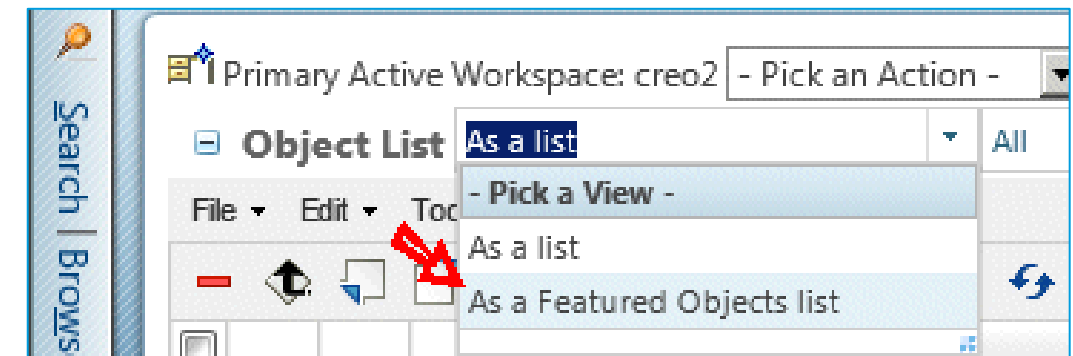
Cache

- Workspace object detail, cached server content and new/modified content all stored in client cache
- Ensure cache on local disk (roaming profiles)
 - Cache located in User Profile directory
 - Confirm location via Server Management > Cache
 - Use environment if necessary:
 - *PTC_WF_ROOT*
 - *PTC_WLD_ROOT*
- Monitor and Ensure sufficient Disk Space is available
- Disable Anti-Virus scanning of cache directory
- Client cache should be included in backup & recovery plans



Best Practices

- Selecting Top Level Object Versus Multi-Selecting All the Objects of the Assembly/Drawing when performing actions
- Perform actions from File & PTC Windchill Menus if possible
- Minimize Number of Objects in your Workspace
- When done working on particular set of objects, upload, check in and delete the old Workspace (to minimize cached metadata)
- Upload frequently
- Keep number of workspaces to a minimum (<100)
- Use Workspace Views with Minimum Columns and avoid Status Columns (i.e. Compare Status) when Possible
 - **Compare Status** column can be used in 10.2 M030 without impact to Performance
- **Featured Objects List Display** (toggle in workspace or set preference)
 - Include objects initially selected for Add to Workspace or Check Out actions
 - Include objects initially selected for opening in an authoring application
 - Include all checked-out objects
 - Include all objects modified locally or in the server-side workspace
 - Include drawings included for selected items



Best Practices

- Some actions perform faster in non-active Workspace or Standalone browser (as active workspace will trigger cache refresh)
- Perform actions like the following in non-active workspace if possible:
 - Create WTPart
 - Create CAD Document
 - Associate
 - Disassociate
 - Auto-associate
 - Set State

- Client disk performance (I/O, throughput and related CPU usage) can in some cases have significant impact on operations such as the following
 - Import to Workspace
 - Save to Workspace
 - Save
 - Browse to and selection of design directory during ECAD Import or ECAD Check In
 - Execution of ECAD Import or ECAD Check In
- Utilities such as Iometer can be used to diagnose performance issues or bottlenecks as to ensure optimal performance or areas that need improvement
- Details in article CS186682
- **Note**
 - Download of Iometer requires access to <http://www.iometer.org>. This is a 3rd Party diagnostic tool and users utilizing Iometer assume all responsibility for any and all results in its use
 - When running Iometer, it is preferable to run it when the client computer is not processing other transactions as Iometer quantifies disk performance. Running Iometer on a quiet system ensures the results are not skewed by other performance metrics on the client computer

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