ENSURING WINDCHILL PERFORMANCE

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June 6-9, 2016 | Boston, MA

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ADVANCE NOTICE

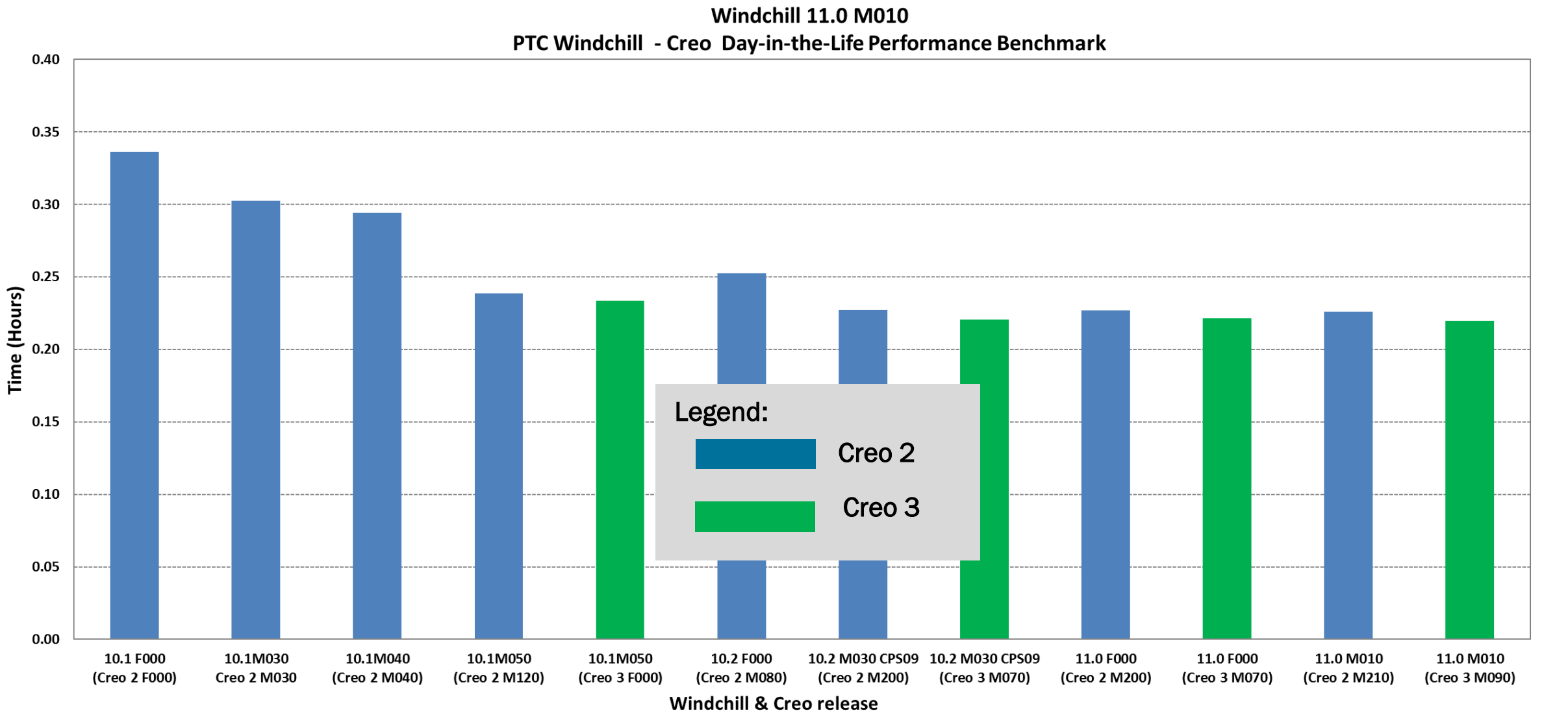
- This presentation contains a lot of content
- The last section titled “Performance Optimization Essentials” (Client, Server, Database settings) will not be covered in today’s session. Highly recommend using this section as reference after you get back
- There is a group of dedicated performance experts 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

AGENDA

- ❑ State of Windchill Performance
- ❑ Performance on the WAN
- ❑ Monitoring & Troubleshooting
- ❑ Important Documents and Tools
- ❑ Windchill 11 – CAD Data Management Best Practices & Performance Improvements
- ❑ Performance Optimization Essentials

STATE OF WINDCHILL PERFORMANCE

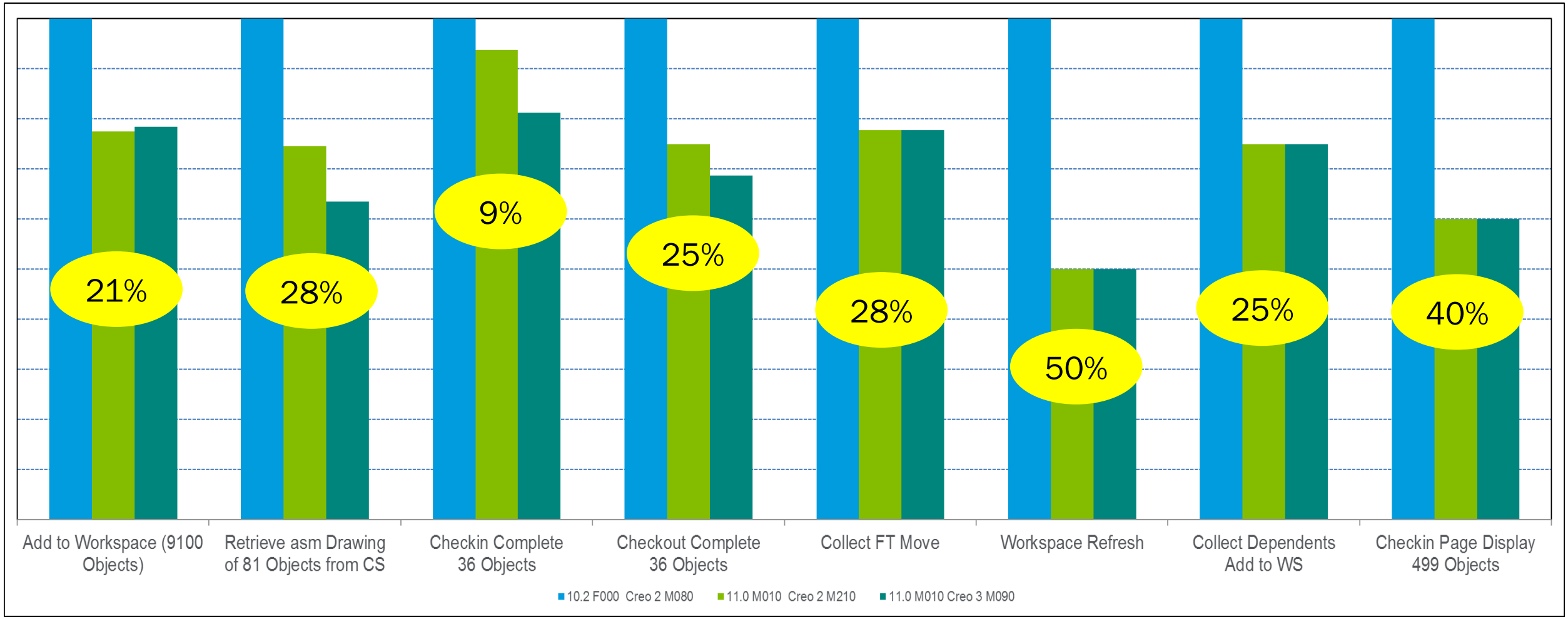
STATE OF WINDCHILL PERFORMANCE



Forward looking information, subject to change without notice

STATE OF WINDCHILL PERFORMANCE

Normalized improvements in 11.0 M010 compared to 10.2



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STATE OF WINDCHILL PERFORMANCE

Single User Performance as measured by the Windchill CAD Day-In-the-Life Performance Benchmark

	Download Auditing Disabled		Download Auditing Enabled in 11.X**	
	Creo 2.0	Creo 3.0	Creo 2.0	Creo 3.0
11.0 F000 vs. 10.1 F000	-33%	-34%	-32%	-33%
11.0 F000 vs. 10.2 M030	Par	Par	+1%	+2%
11.0 M010 vs. 10.1 F000	-33%	-35%	-32%	-33%
11.0 M010 vs. 10.2 M030	Par	-1%	+1%	+2%

- ** - To enable enhanced security, auditing Download Events has been turned on out-of-the-box in Windchill 11 – see page 26 of PTC Windchill What's New
- ** - Details on how to configure Audit Event Recording are in the Windchill Help Center
- ** - Single user response times without load

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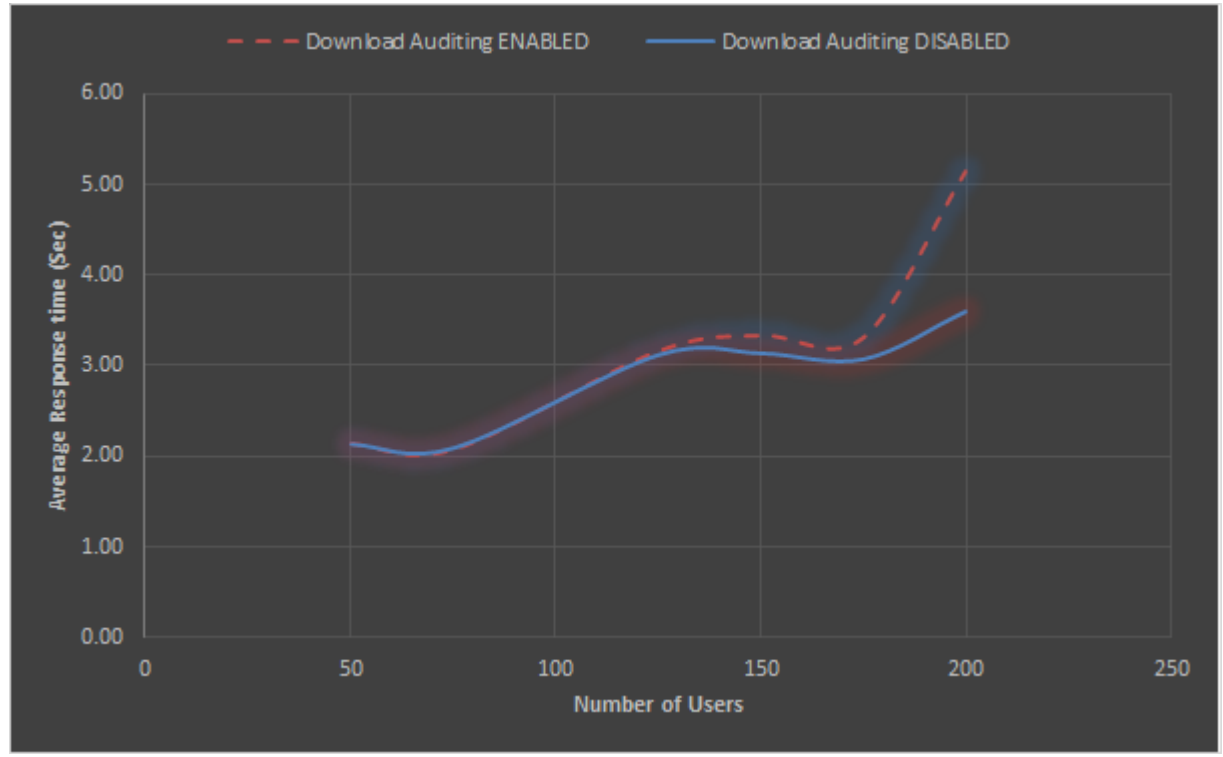
STATE OF WINDCHILL PERFORMANCE

Impact of Download Auditing on a server under load

- Average response times begin to diverge from the “DISABLED” option as load increases
  - 8% higher than when the option is turned off**
- 5-10% increase in CPU utilization on Windchill server
- Smaller increase in CPU utilization on Database server



** - See note on page 6 of Windchill 11 Hardware Sizing Guide

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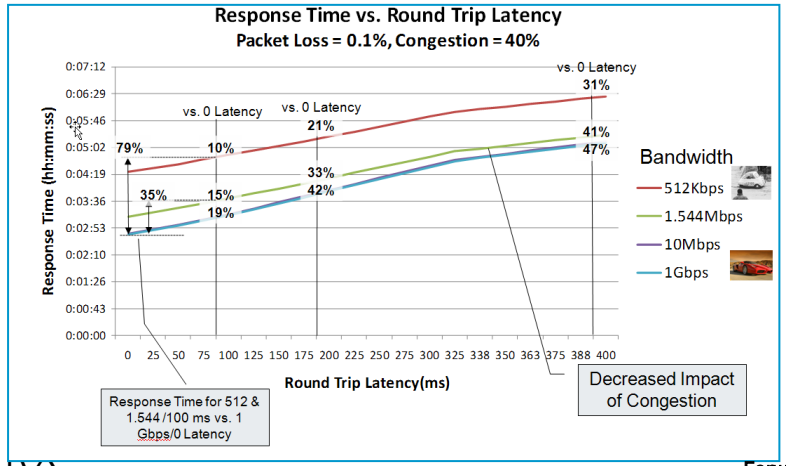
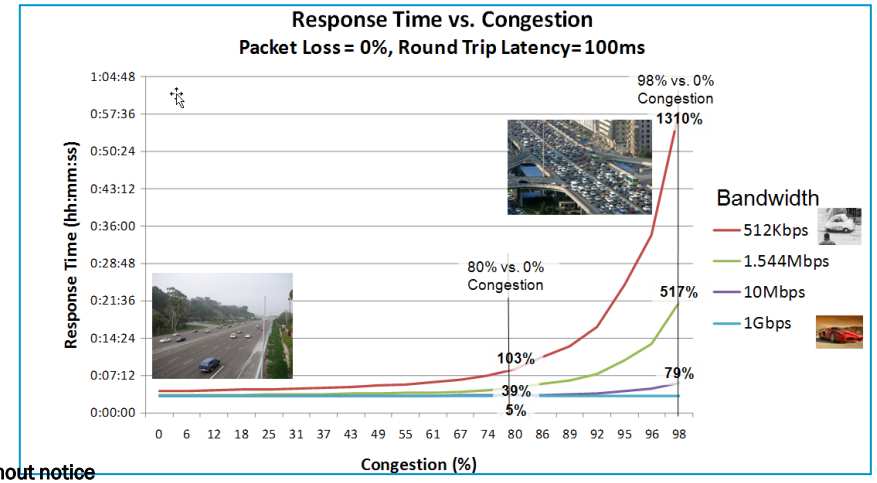
PERFORMANCE ON THE WAN

IMPACT OF WAN ON CAD USER PERFORMANCE

- 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
  - Bandwidth between the client and server
  - Latency between the client and server
  - Network Utilization (Congestion) between the client and server

<u>The more CAD users at a site the larger the bandwidth requirements for the site</u>





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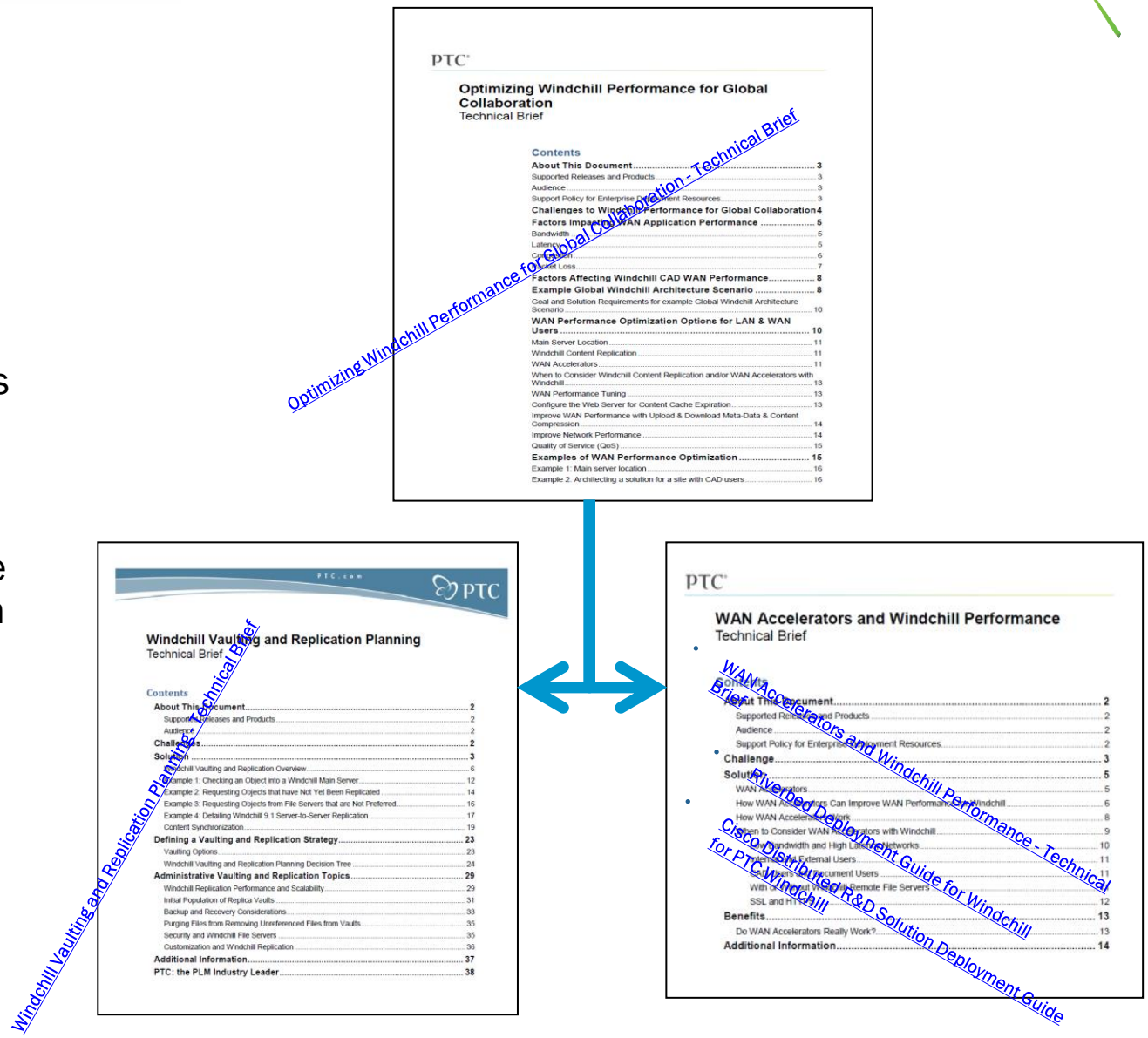
REMOTE USER PERFORMANCE OPTIMIZING OPTIONS

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 Windchill File Servers at remote sites to improve content download and upload performance



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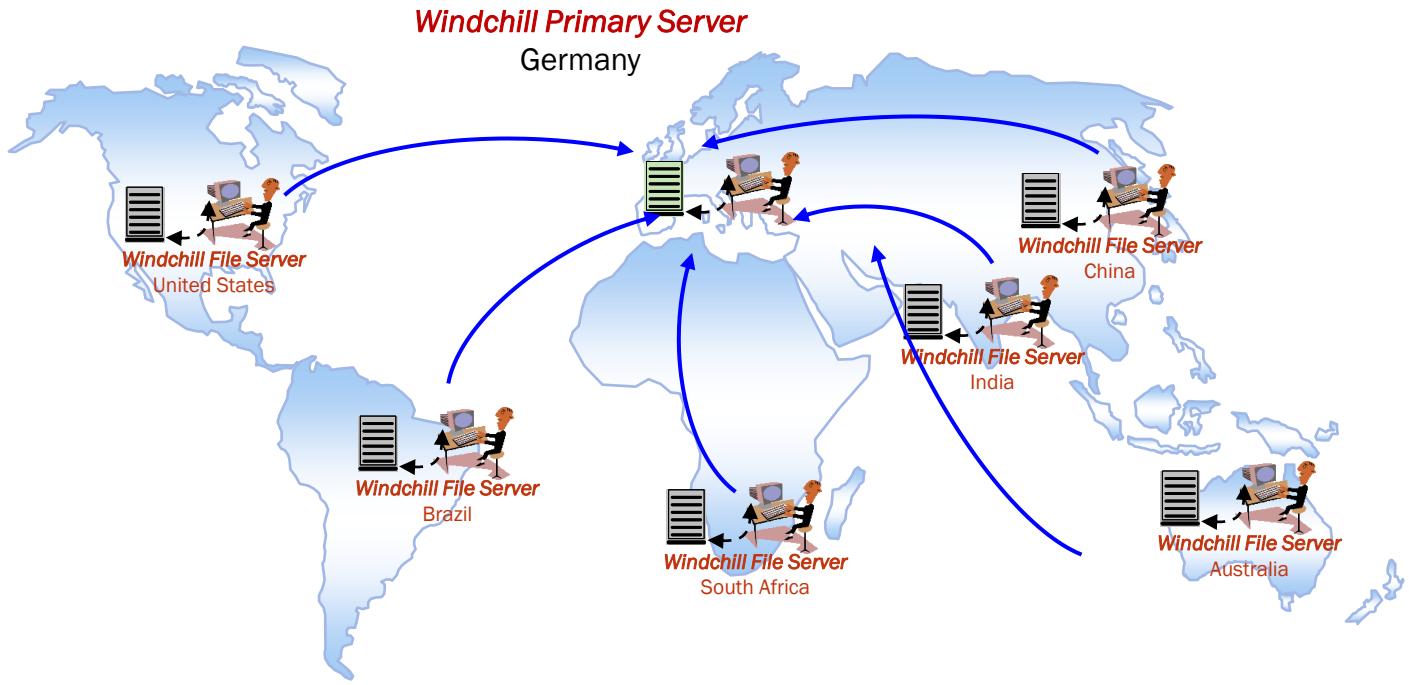
WINDCHILL VAULTING AND REPLICATION

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

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WAN ACCELERATORS BENEFITS AND CONSIDERATIONS

- WAN accelerators can
  - Substantially improve application performance for remote users accessing Windchill over the WAN
  - Reduce the time to replicate content to Windchill File Servers
  - Reduce bandwidth consumption and increase the quality of service

- However, the degree to which WAN accelerators can benefit a Windchill deployment depends on
  - The current quality (bandwidth and latency) and usage (congestion) of your WANs
  - How many users are accessing 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 Windchill Remote File Servers

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WHEN TO CONSIDER WAN ACCELERATORS WITH WINDCHILL

- 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 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 Windchill Remote File Servers to provide optimal performance for remote CAD users , i.e. WAN accelerators as a complementary device but not as a substitute for 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 Windchill Remote File Server can be deployed with HTTP or HTTPs

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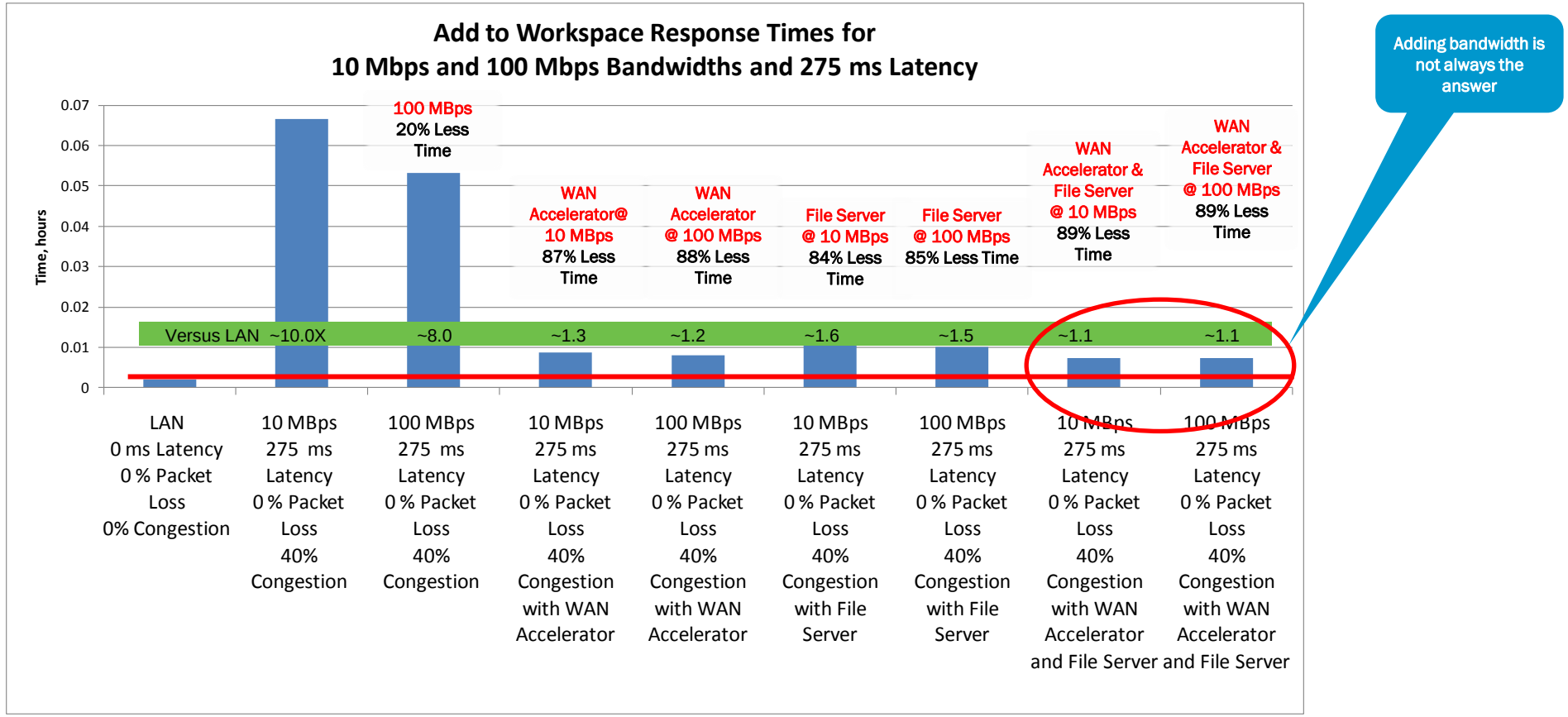
IMPACT OF OPTIMIZATION APPROACHES ON WINDCHILL PERFORMANCE



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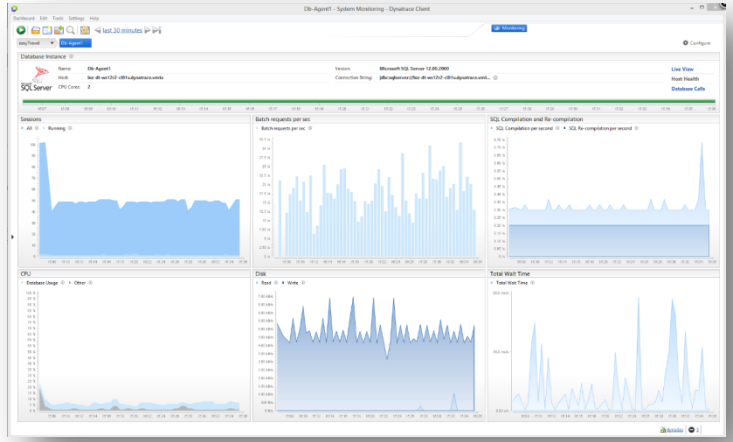
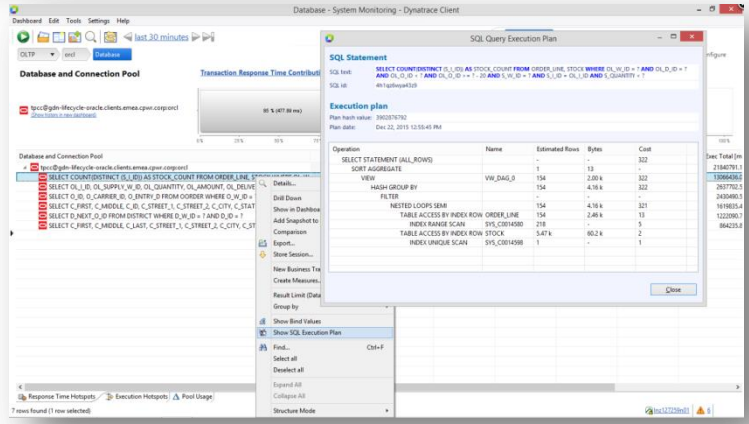
MONITORING & TROUBLESHOOTING

PTC SYSTEM MONITOR 5.0

- Windchill Monitoring Improvements
  - Optimized sensors
  - New Infrastructure monitoring dashboard
  - Email Plugin improvements
  - Critical Install and System Profile fixes
- New Database Monitoring
- New Supported Products
  - Servigistics SPO 6.2
  - InService 6.3



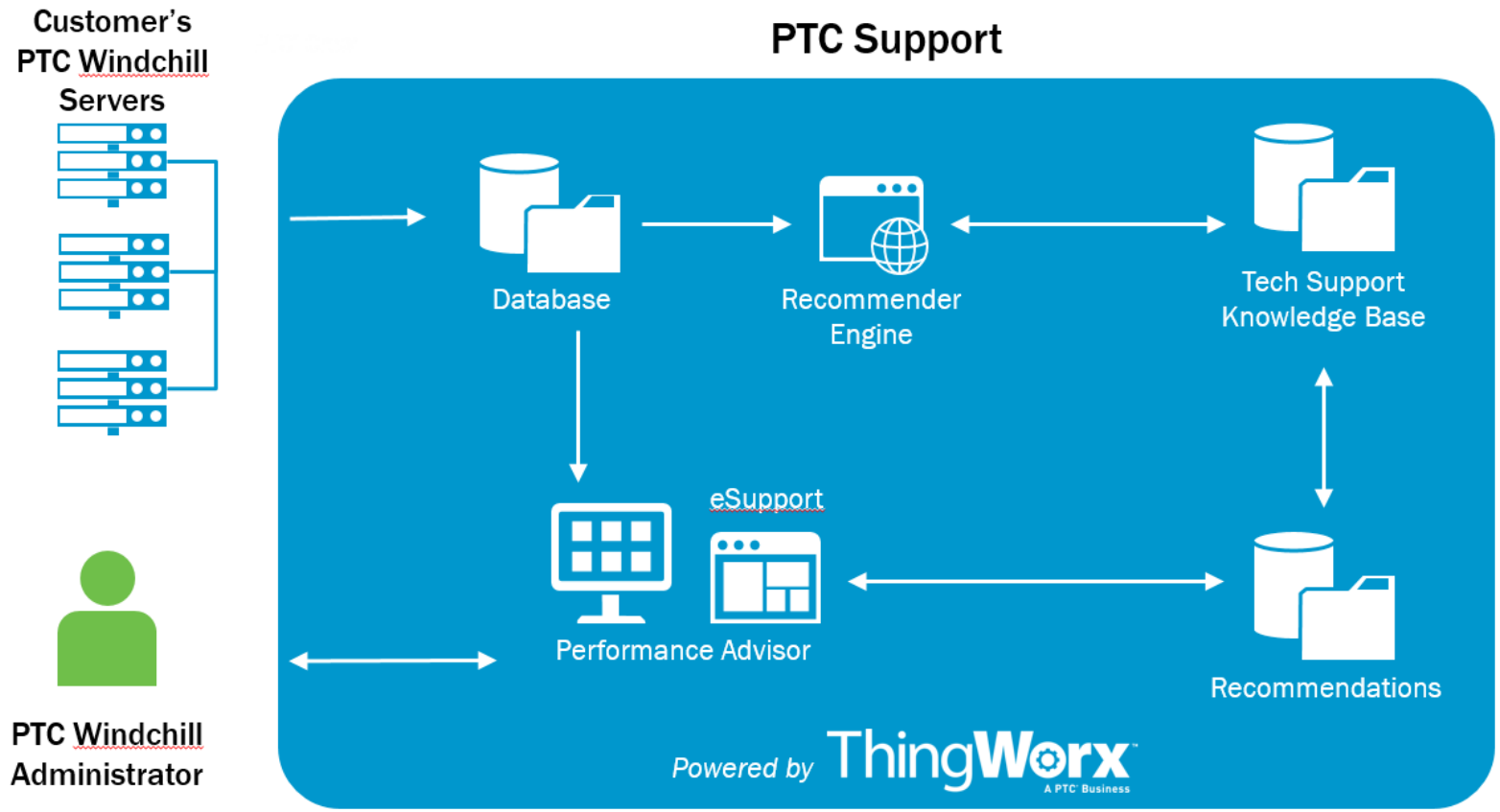


July 2016	Windchill 10.0 +	Java 8	Built on dT 6.3

SMART, CONNECTED PTC WINDCHILL DELIVERS…

CAPABILITIES

- Using IoT to better service and support PTC software
- Proactive Support – detecting issues before they become “issues”
- Configurable dashboards to help monitor systems configuration, usage and peer comparisons
- License and usage monitoring tools
- Private & Secure environment



BENEFITS

- Increased end-user productivity
- Decrease IT cost of managing PTC Applications
- Reduced incident rates

SUMMARY

Benefits of Performance Advisor

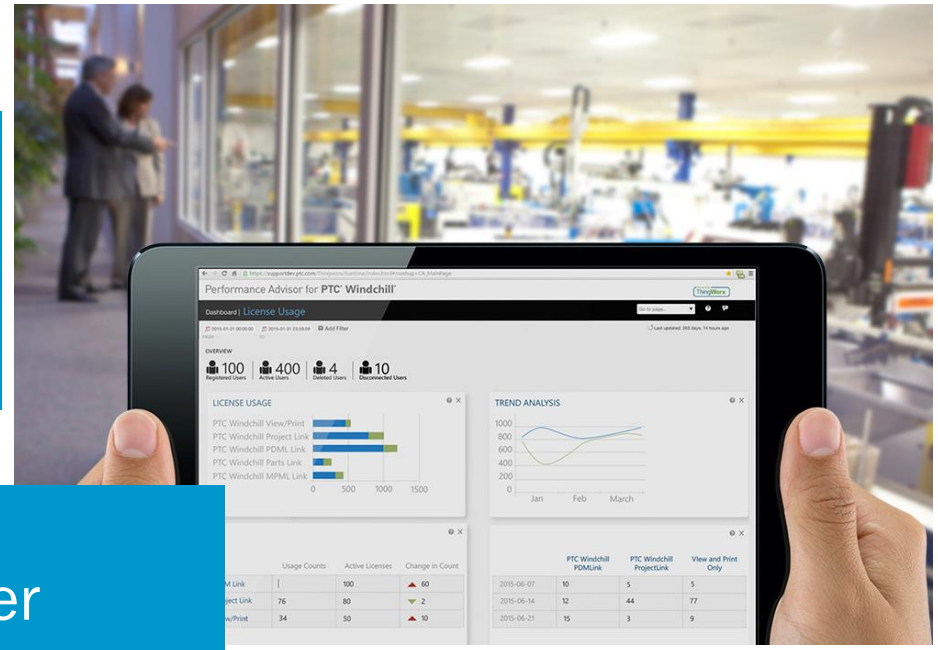
Optimize System	Maximize Productivity	Control Costs	Reduce Risk
	oard access to etter manage your rise systems	Optimize IT Resources to change from “firefighting” to business process improvemer	
Increased admin & support efficiency to deliver timely resolutio	Decrease incident rates	Track license utilizat	
Proactively avoid end-user performance issu		vestment protection rough increased time	Compare system configuration and informat peers
Insight into system growth	performance metrics for “corrective-action” before impacting productivity	n-budget performance through an optimized support strategy	Formal c process opt-in wi trusted

Proactive insights and recommendations

Protect your investment

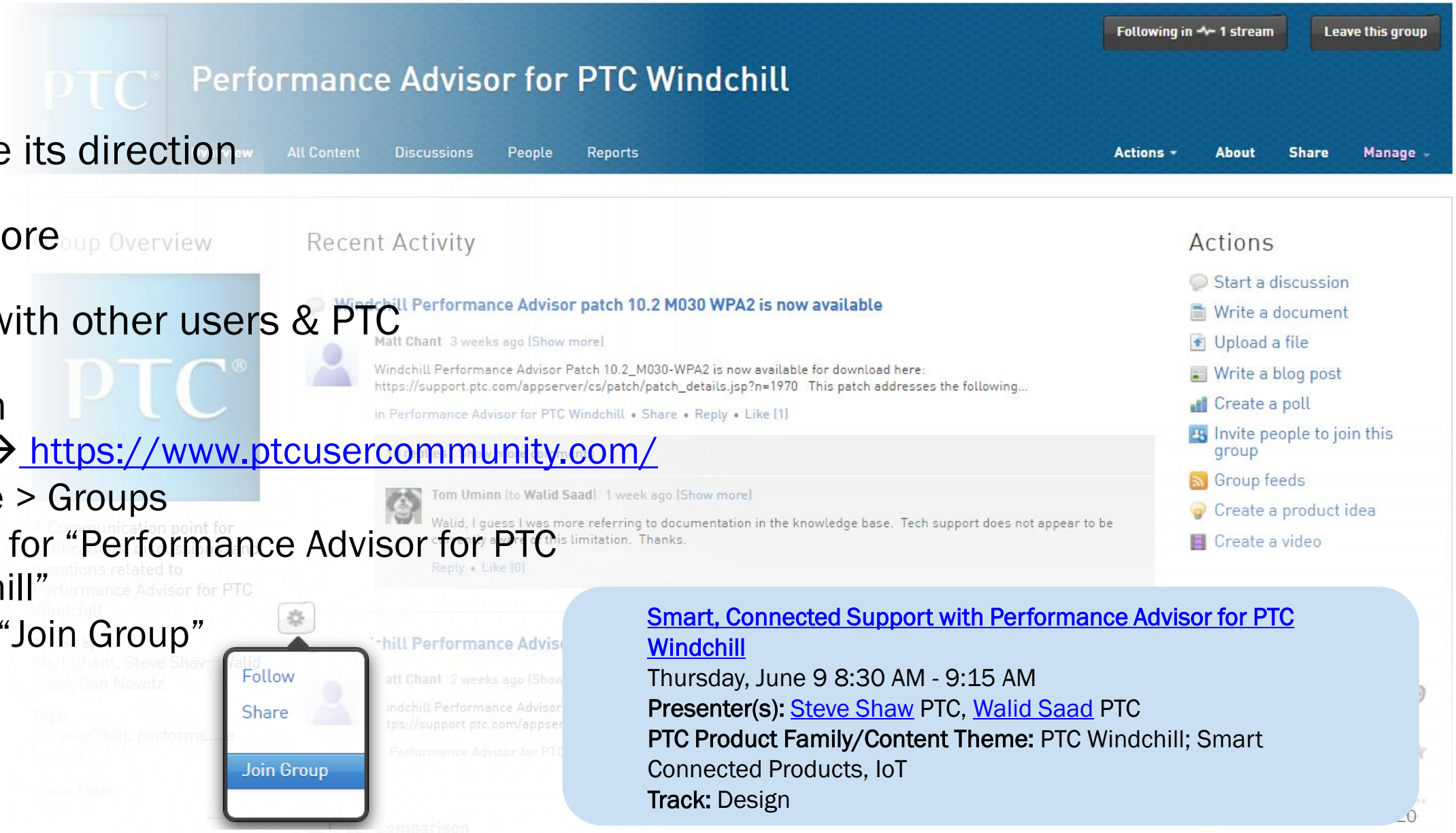
Increase productivity

Peer Comparisons



JOIN THE CONVERSATION

- Help shape its direction
- Find out more
- Converse with other users & PTC
- How to join
  - Go to → https://www.ptcusercommunity.com/
  - Browse > Groups
  - Search for “Performance Advisor for PTC Windchill”
  - Select “Join Group”



[Smart, Connected Support with Performance Advisor for PTC Windchill]
Thursday, June 9 8:30 AM - 9:15 AM
Presenter(s): Steve Shaw PTC, Walid Saad PTC
PTC Product Family/Content Theme: PTC Windchill; Smart Connected Products, IoT
Track: Design

SUMMARY

- 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
- **See last section in this presentation titled "Performance Optimization Essentials" for details**

- WAN conditions play a critical role in performance. See section – **"Performance on the WAN"**
- 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 & Performance Advisor for PTC Windchill are a value add for customers

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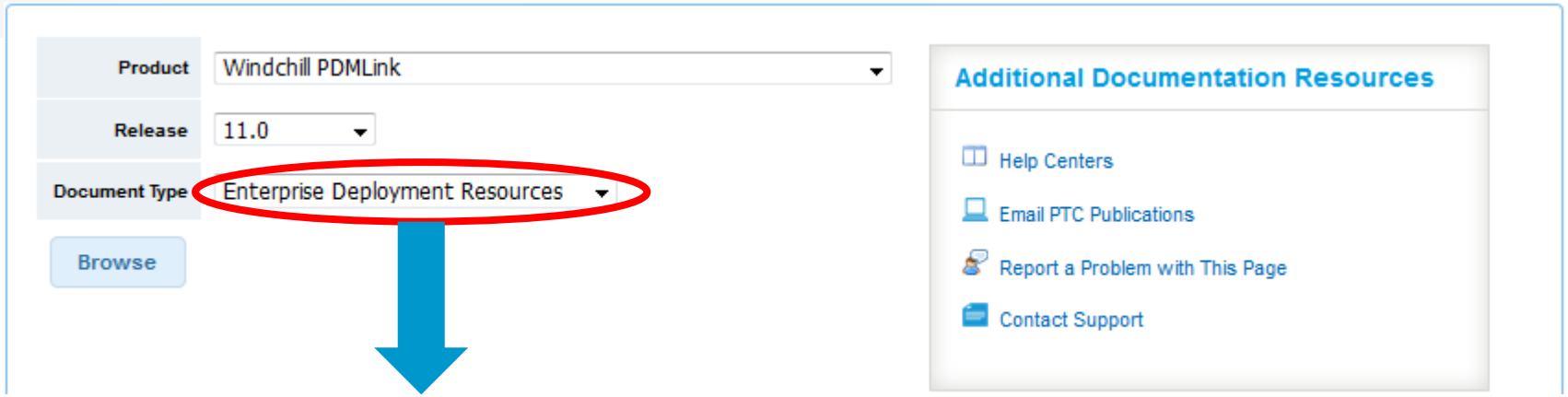
IMPORTANT DOCUMENTS AND TOOLS

EDC DOCUMENTS AND TOOLS



Windchill PDMLink - 11.0

Enterprise Deployment Resources

PTC Windchill CATIA V5 Data Management Performance Benchmark Test – Data Sheet - English
Published: 28-Dec-2015
Use this spreadsheet, as described in the PTC Windchill CATIA V5 Data Management Performance Benchmark Test – Instructions document.
Edit

PTC Windchill CATIA V5 Data Management Performance Benchmark Test – Preliminary Dataset - English
Published: 28-Dec-2015
This ZIP file contains the preliminary dataset to use to warm up your system before running the actual performance benchmark test. Use this dataset as described in the Windchill CATIA V5 Data Management Performance Benchmark Test – Instructions document.
Edit

PTC Windchill CATIA V5 Data Management Performance Benchmark Test – World Car Dataset - English
Published: 28-Dec-2015
This ZIP file contains the World Car dataset to use when executing the actual performance benchmark test. Use the dataset when executing the actual performance benchmark test as described in the Windchill CATIA V5 Data Management Performance Benchmark Test – Instructions document.
Edit

PTC Windchill Rehost Utility Guide - English
Published: 09-Oct-2015
The guide describes how to install and use the PTC Windchill Rehost Utility R 3.0 to accomplish the activities in the rename, rehost, clone, and move scenarios.
Edit

PTC Windchill Web Browser Comparison 11.x - English
Published: 28-Apr-2016
This document discusses the role of a web browser in the Windchill application and its impact on end-user productivity and system adoption. Comparative performance and feature information for the web browsers supported by Windchill 11.x are discussed to help companies choose the right web browsers for their organization.
Edit

PTC Windchill Workgroup Manager for CATIA V5 Data Management Performance Benchmark Test - Instructions - English
Published: 28-Dec-2015
This document provides information that you can use to conduct a performance benchmark test for Windchill Workgroup Manager for CATIA V5 data management operations that interact with Windchill.
Edit

WAN Accelerators and Windchill Performance - Technical Brief - English
Published: 28-Dec-2015
The information in this document can be used with Windchill 10.0, 10.1, 10.2, and 11.0. This document provides an overview of how WAN Accelerators work, when they should be considered with Windchill, and how WAN accelerators can complement Windchill Remote File Servers.
Edit

Windchill 11x Client Requirements - Technical Brief - English
Published: 06-Apr-2016
This document provides the minimum and recommended client requirements for CAD and non-CAD users of Windchill PDMLink, Windchill ProjectLink, and Pro/INTRALINK 11x 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

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WINDCHILL RESOURCE PAGES ON WWW.PTC.COM

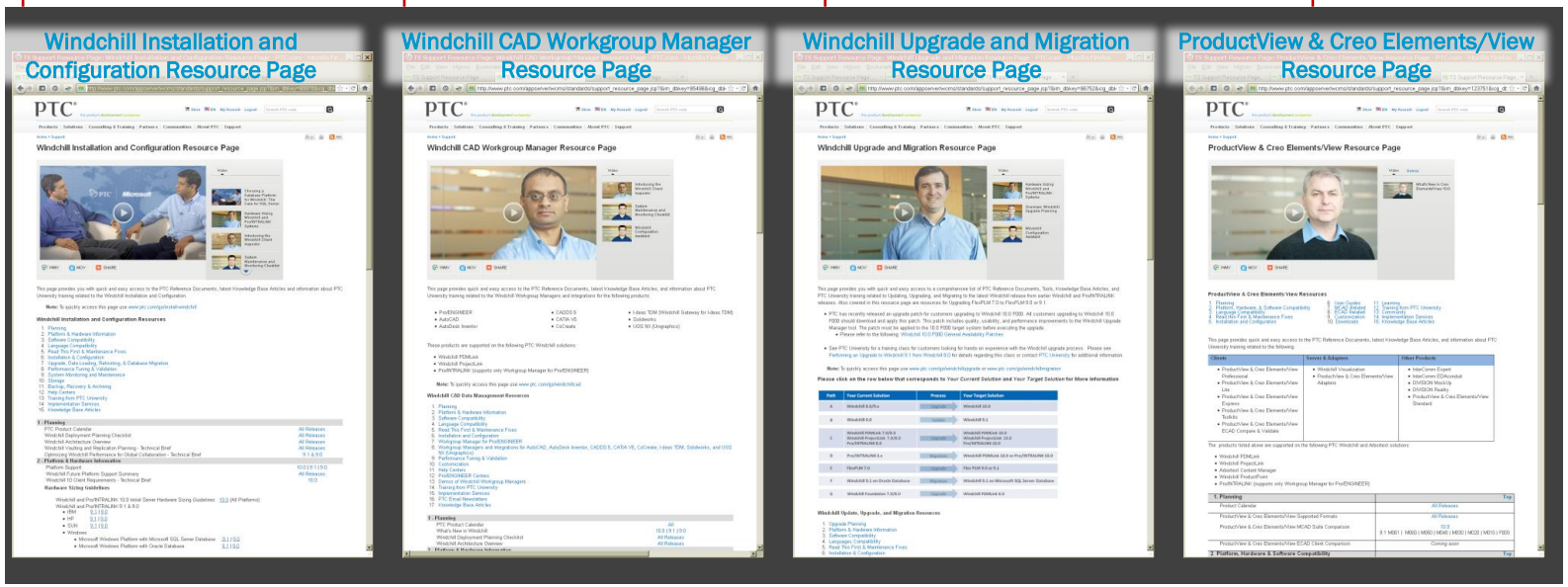
Quick access to comprehensive collection of Windchill Product Documentation and Enterprise Deployment Resources

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



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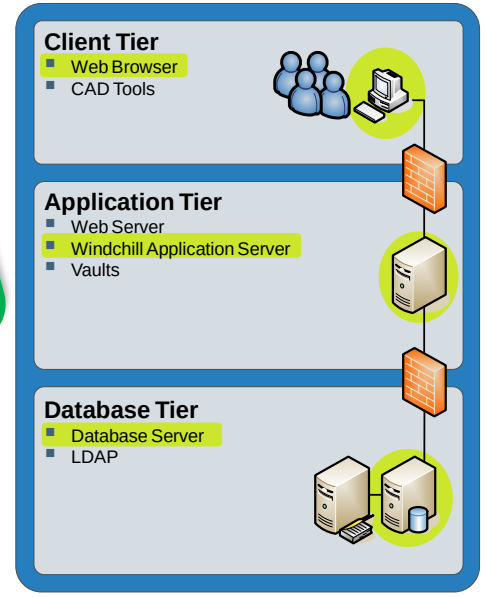
WINDCHILL SERVER HARDWARE SIZING GUIDELINES

- The objective of 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 Windchill PDMLink, Windchill ProjectLink, or Pro/INTRALINK installation for up to 2500 weighted active CAD and non-CAD users
  - Are available for each of the supported Windchill platforms and databases

Updated
(WC 11.X sizing for SQL Server coming soon!!)



For More Information please refer to

- Windchill and Pro/INTRALINK 11.x Server Hardware Sizing Guidelines - Microsoft Windows Platform with Oracle Database
- Windchill and Pro/INTRALINK 11.x Server Hardware Sizing Guidelines - Linux Platform with Oracle Database

For the Windchill 11 release, PTC has performed sizing exercises on Windows and Linux platforms. These tests showed that there is no difference in server size between 10.X and 11.0. For customers that are on IBM AIX, HP-UX and Solaris it is recommended that you use the corresponding 10.X sizing guides to size your servers for Windchill 11. This assumes that you will be using the latest processors to run Windchill 11.X on these platforms

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**

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WINDCHILL SERVER HARDWARE SIZING GUIDELINES

The Windchill Sizing Calculator, new for Windchill 11.x, allows you to size the system more precisely by entering up to 20 defined user roles. By breaking down the sizing estimate for users and their anticipated workloads into their respective global geographies, you can perform more "what if" calculations to quickly create a number of different sizing estimates in your environment.

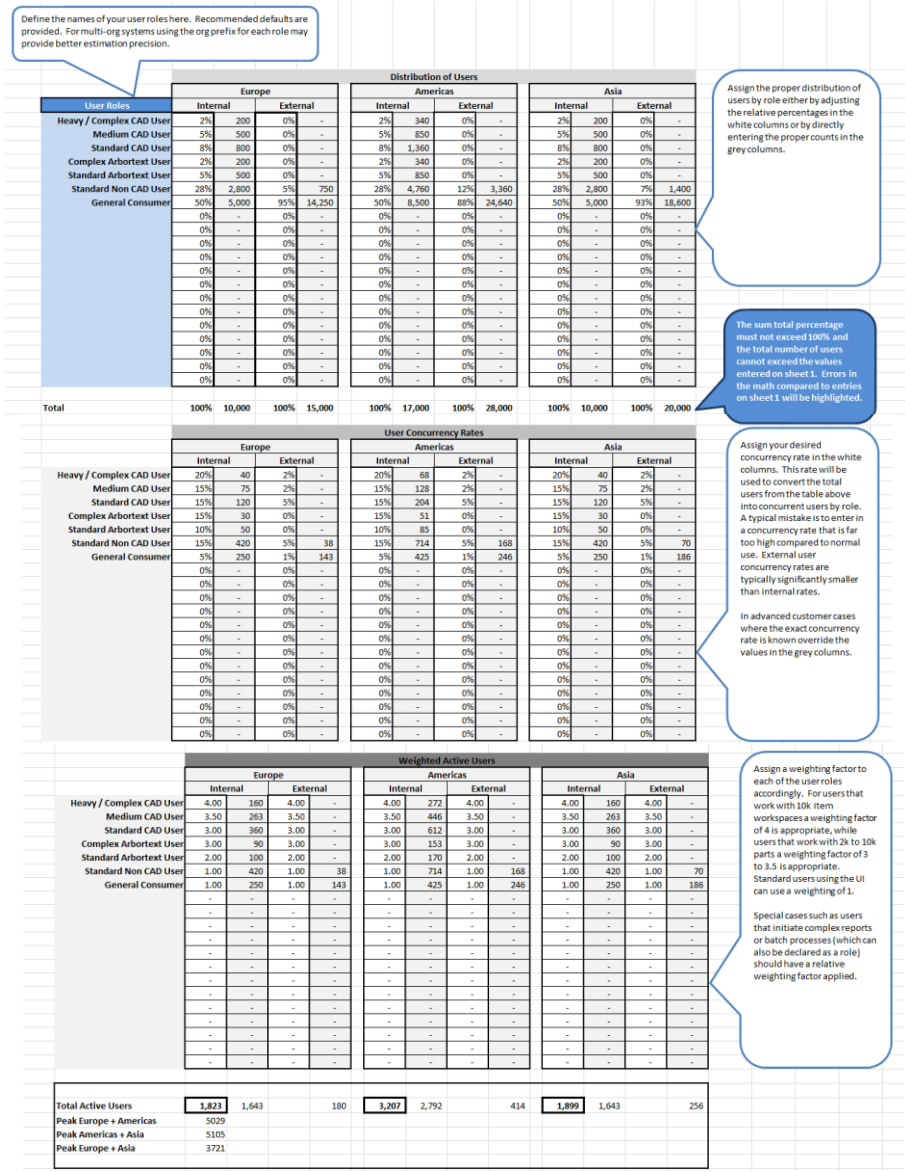
Approximate Named Users

	Europe	Americas	Asia
Internal	10000	17000	10000
External	15000	28000	20000
Total	25000	45000	30000
Grand Total	100000		

Enter the relative distribution of named users internally and externally by region. All external users should be considered suppliers and partners. Direct employees that work externally typically should be considered an internal user for sizing

Peak Europe + Americas	5029
Peak Americas + Asia	5105
Peak Europe + Asia	3721

After verifying and adjusting all of the appropriate values on the Sizing Estimate tab the highlighted value here is the recommended minimum weighted active user value to be used in conjuction with the PTC Hardware Sizing Guide for the OS of your choice.



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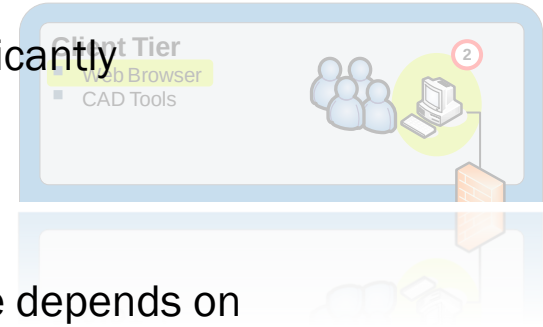
WINDCHILL 11.X CLIENT REQUIREMENTS

- System response time is a crucial factor influencing the productivity of Windchill users and the adoption of the system
- Windchill client performance and scalability significantly influenced by
  - Client hardware
  - System configuration
- System response time of 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 11x Client Requirements - Technical Brief

Non-CAD User System Requirements		
	Minimum	**Recommended**
Operating System	Windows 7(32 bit[1])	• Windows 8.1- 64 bit[1] • Windows 10- 64 bit[1] • Macintosh OS X 10.10.x[2]
RAM	2 GB	4 GB
CPU	2 GHz	2.5 GHz or higher
Web Browser	Microsoft Internet Explorer 11.0 Oracle Java (JRE) plugin version 8, update 60 or higher	• Mozilla Firefox ESR 38. or higher • Microsoft Internet Explorer 11.0 • Google Chrome 41 or higher • Apple Safari 8.0 or higher
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 7 - 32bit[1,2]	• Windows 8.1- 64 bit[1,2] • Windows 10- 64 bit[1,2,3]
RAM	4 GB[4]	8 GB or higher
CPU	2 GHz[7]	Quad 3 GHz or higher
Web Browser		
Standalone	• Microsoft Internet Explorer 11.0 - Oracle Java (JRE) plugin version 8, update 60 or higher	• Mozilla Firefox ESR 38 or higher for Windchill 11.X • Microsoft Internet Explorer 11 for Windchill 11.x • Google Chrome 41
Embedded	• Microsoft Internet Explorer 11.0 - Oracle Java (JRE) plugin version 8, update 60 or higher • Mozilla & based browser (embedded with Creo Parametric 2.0)[5]	• Microsoft Internet Explorer 11.x • Chromium based browser for Creo 3.0[6,7] • Chromium based browser for Windchill Workgroup Manager [6,7]
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	• Microsoft Internet Explorer 11: **500 rows** • Mozilla Firefox 38.0.x: **3000 rows** • Mozilla based browser (embedded with Creo Parametric 2.0)[5]: **2000 rows**	• Microsoft Internet Explorer 11: **2000 rows** • Chromium based browser[6,7]: **2000 rows**

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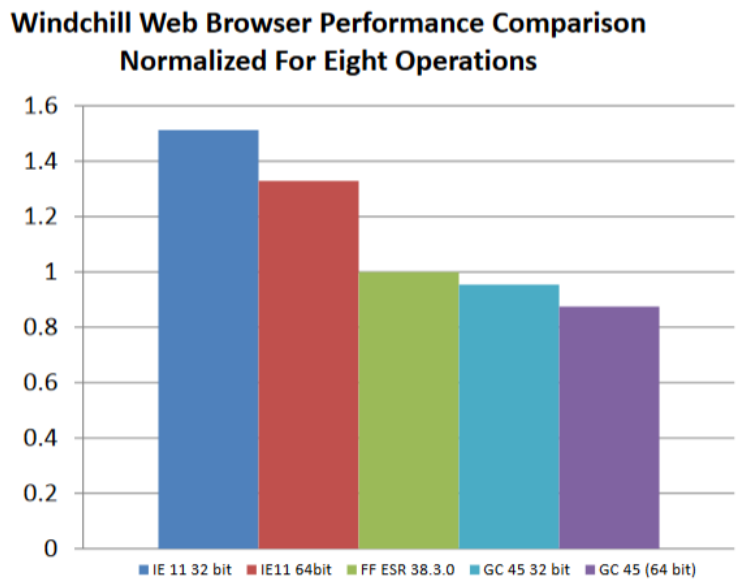
CHOOSING THE BEST WEB BROWSER FOR YOUR WINDCHILL USERS

- Which browser is best for your company?
  - Provides comparative performance data for the supported web browsers for Windchill
  - Windchill 11.X Web Browser Support
    - Windchill 11.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

Updated

For More Information please refer to

- PTC Windchill Web Browser Comparison 11.x



	Microsoft Internet Explorer	Mozilla		Google-Chromium		Safari
	IE 11	Firefox ESR 38.x	Embedded Mozilla[1]	Chrome latest	Embedded Chromium[2]	Safari 8.0.x
Windchill 11.x Web Browser Support[3]						
Stand Alone Browser	Yes	Yes	No	Yes	No	Yes
Workgroup Manager Browser (Embedded)	Yes	No	Yes	No	Yes	No
Performance						
Refer to Corresponding Section Below						

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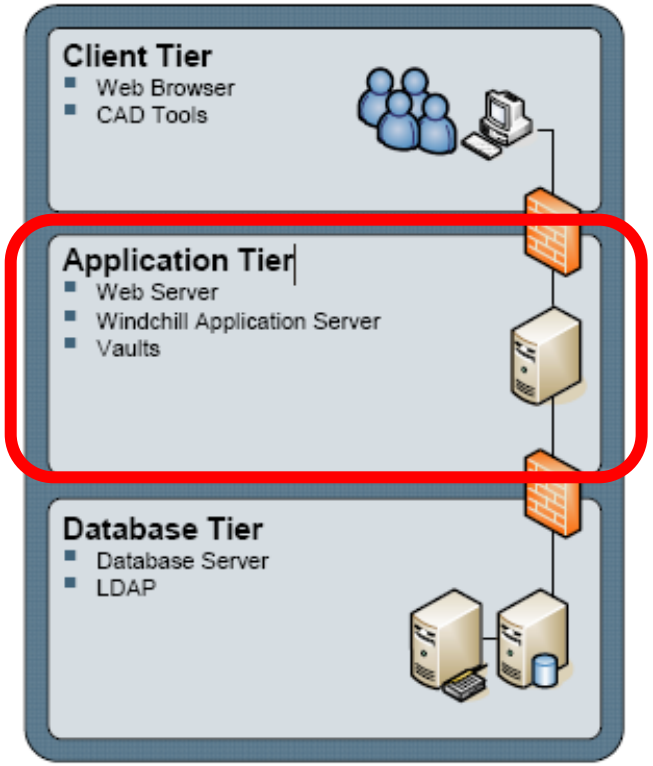
WINDCHILL CONFIGURATION ASSISTANT (WCA)

Execute Solution Deployment Installation, Configuration, and Tuning

- Challenge
  - Optimally configuring 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 Windchill runs and calculates recommended values for 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 Windchill Configuration Assistant Run
    - Manual Windchill Configuration Assistant Runs

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



For More Information please refer to

- Windchill Administration - Configuring Your Windchill Environment

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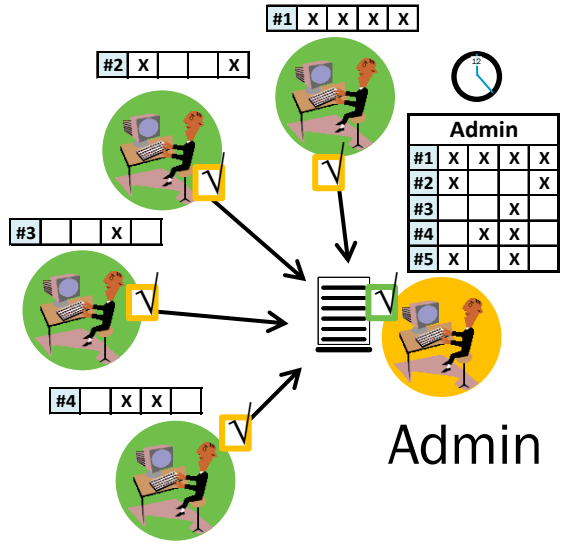
WINDCHILL CLIENT INSPECTOR (WCI)

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 Creo and 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



Client Property Settings (config.pro):

Property	Value	Location	Release or Environment	
dm_network_threads	6	config.pro		ds (concurrent ne default of 3 can decre network saturation. al information.
dm_http_compression_level	3			unregistered, Pro/ENGINEER restarted or setting to take effect. 136108 for issues with this property in certain bui TPI 141292 for additional information.
dm_cache_size	0	config.pro	ldfire 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 the cache at the set limit. This setting can contribute to pe (both in the background cleanup jobs but also during retriev regeneration but deleted from cache will need to be downlo
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.

Updated

For More Information please refer to

- Windchill Client Inspector 11.x Deployment and Administration Guide
- Windchill Client Inspector (WCI) Software available from PTC Software Downloads page under Windchill 11.0,10.2,10.1,10.0 and 9.1

WINDCHILL SINGLE USER PERFORMANCE TESTER FOR CREO DATA MANAGEMENT OPERATIONS (SPT)

Automates single user performance tests of basic 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 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 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

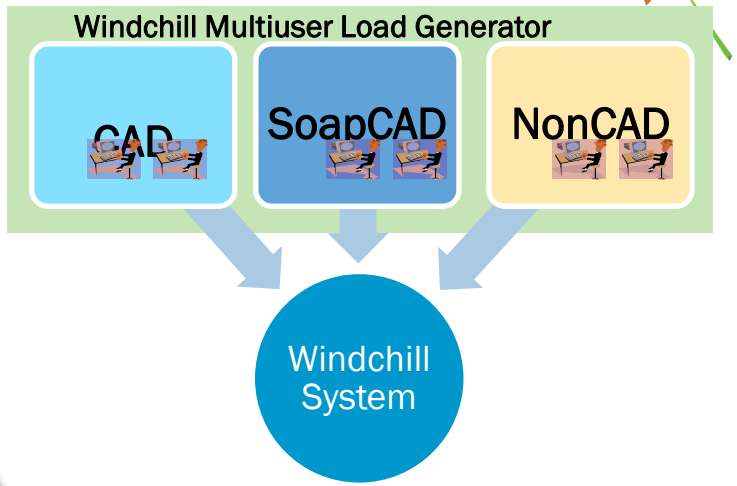
Updated for Windchill 11

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

Forward looking information, subject to change without notice

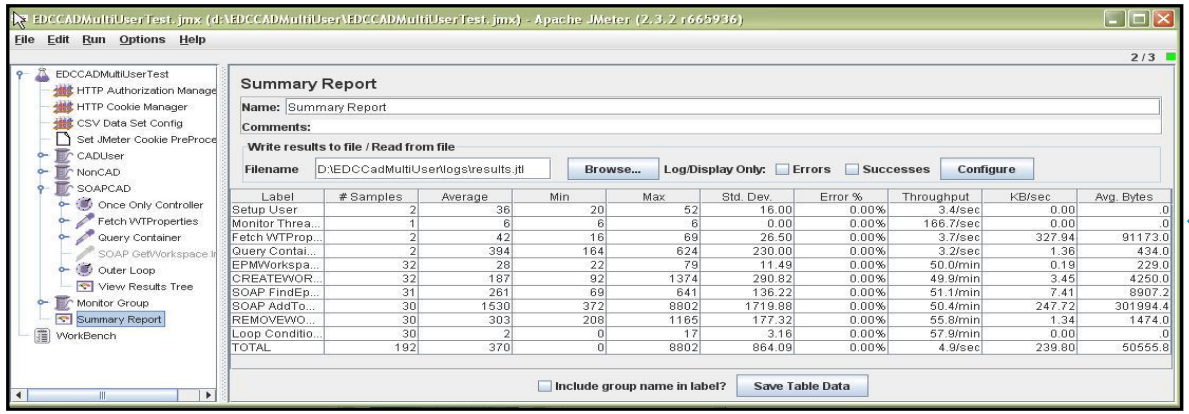
WINDCHILL MULTIUSER LOAD GENERATOR FOR CAD AND NON-CAD OPERATIONS (WMLG)

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 11



Summary report with response time measurements

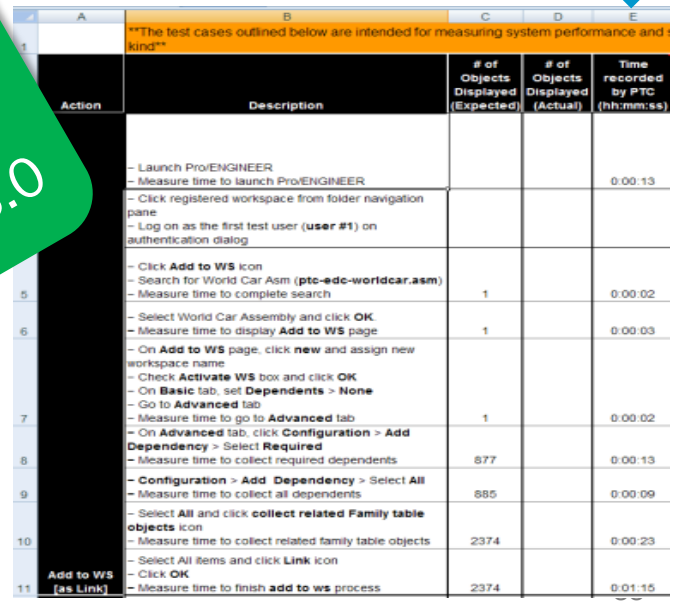
Forward looking information, subject to change without notice

WINDCHILL CREO DATA MANAGEMENT PERFORMANCE BENCHMARK TEST

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

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

Time recorded by PTC (hh:mm:ss)



Action	Description	# of Objects Displayed (Expected)	# of Objects Displayed (Actual)	Time recorded by PTC (hh:mm:ss)
	"The test cases outlined below are intended for measuring system performance and kind"			
	- Launch Pro/ENGINEER - Measure time to launch Pro/ENGINEER			0:00:13
	- Click registered workspace from folder navigation pane - Log on as the first test user (**user #1**) on authentication dialog			
	- Click **Add to WS** icon - Search for World Car Asm (**ptc-edc-worldcar.asm**) - Measure time to complete search	1		0:00:02
	- Select World Car Assembly and click **OK** - Measure time to display **Add to WS** page	1		0:00:03
	- 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		0:00:02
	- On **Advanced** tab, click **Configuration** > **Add Dependency** > Select **Required** - Measure time to collect required dependents	877		0:00:13
	- **Configuration** > **Add Dependency** > Select **All** - Measure time to collect all dependents	885		0:00:09
	- Select **All** and click **collect related Family table objects** icon - Measure time to collect related family table objects	2374		0:00:23
Add to WS [as Link]	- Select All items and click **Link** icon - Click **OK** - Measure time to finish **add to ws** process	2374		0:01:15

Updated with data for Windchill 11, Creo 2 & Creo 3.0

For More Information please refer to

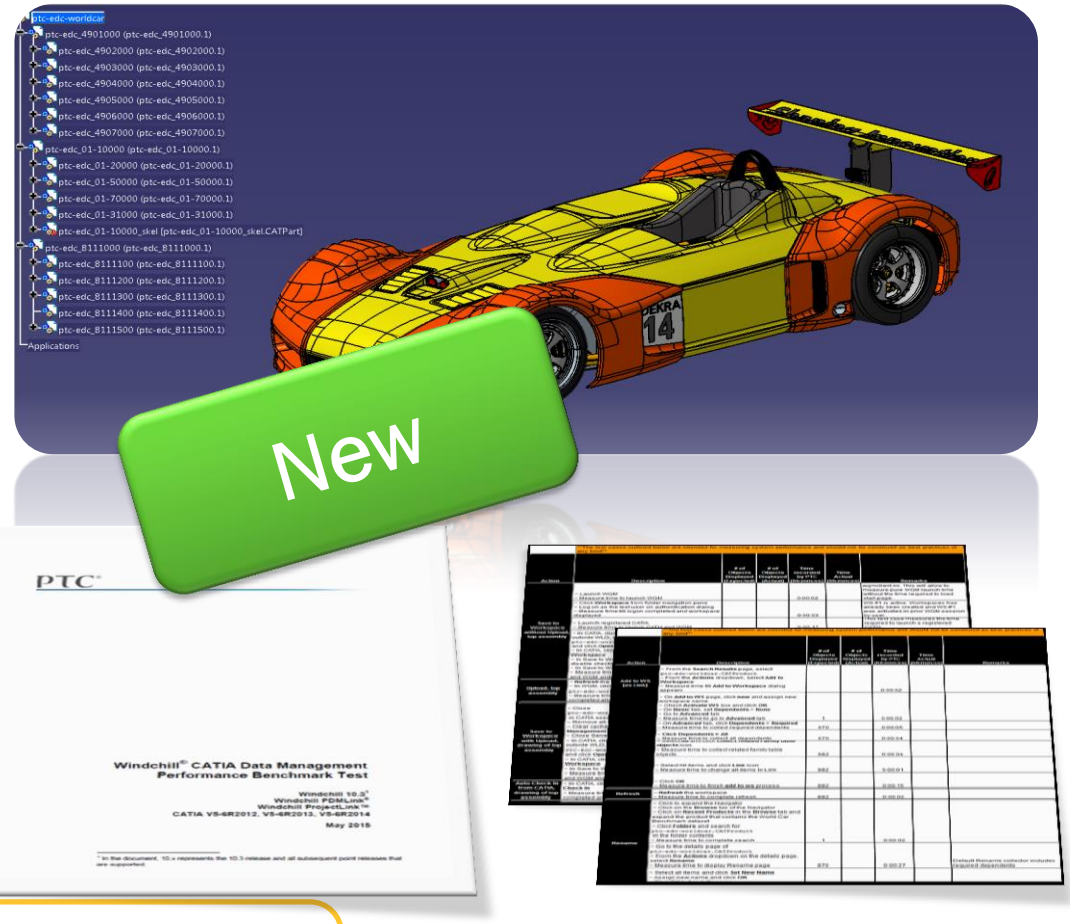
- Windchill Creo Data Management Performance Benchmark Test - Instructions
- Windchill Creo Data Management Performance Benchmark Test - Data Sheet
- Windchill Creo Data Management Performance Benchmark Test – Preliminary Dataset (82 KB)
- Windchill Creo Data Management Performance Benchmark Test – World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

Forward looking information, subject to change without notice

WINDCHILL CATIA V5 WGM PERFORMANCE BENCHMARK TEST

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

- Benefits
  - Enables customers and PTC to measure and assess user performance for a particular implementation of Windchill
  - In executing the test, customers can determine with reasonable accuracy whether their system is performing within expected limits



For More Information please refer to

- PTC Windchill CATIA V5 Data Management Performance Benchmark Test – Data Sheet
- PTC Windchill CATIA V5 Data Management Performance Benchmark Test – Preliminary Dataset
- PTC Windchill CATIA V5 Data Management Performance Benchmark Test – World Car Dataset

Forward looking information, subject to change without notice

WINDCHILL NON-CAD PERFORMANCE BENCHMARK TEST

- 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

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

Being updated for Windchill 11

Time recorded by PTC (hh:mm:ss)

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
SQLSERVER version: SQLSERVER 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 navigitor in Search in Selected folder *"PTC_EDC_PART*"* and click search – Measure time to complete search	100	2	

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WINDCHILL 11 – CAD DATA MANAGEMENT BEST PRACTICES & PERFORMANCE IMPROVEMENTS

PERFORMANCE – FEATURED OBJECTS

What are featured objects?

- Featured Objects is a view designed to restrict the number of objects displayed in the workspace. The goal is to select the objects likely to be the most interesting to you
  - Remove “clutter” of dependencies in WS.
  - Improves UI refresh times, since less items displayed

- Windchill automatically sets the following as featured:
  - Rule 1—Include objects initially selected for Add to Workspace or Check Out actions
  - Rule 2—Include all checked-out objects
  - Rule 3—Include all objects modified locally or in the server-side workspace
  - Rule 4—Include drawings included for selected items
  - Rule 5- Objects opened in the CAD tool (in embedded browser only)

- Users can choose to only see featured objects by default using the server-side preference: Workspace Display = Featured Items

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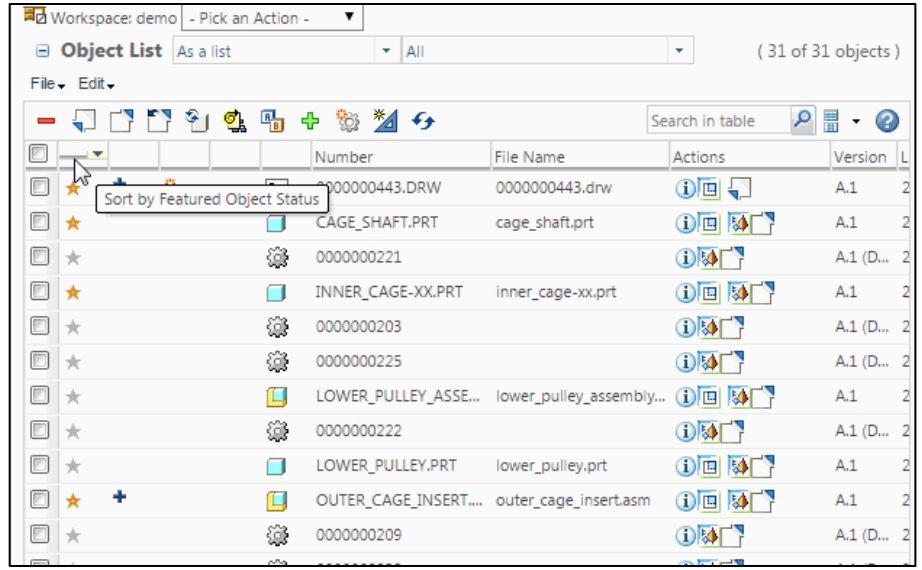
FEATURED OBJECTS

Improve working with large workspaces

- Challenge
  - Large workspace listings can be a drag on performance
  - Much of what is in a workspace is scenery information required by CAD
  - Gaining users focus on the important information in the users workspace
  - Existing Featured object filter limiting in its rules based approach
  - UX testing showed may users didn't even know this feature exists

- Capabilities
  - New Featured Object Status column displays which items are "featured"
    - Identify featured items with starred icon
    - Sort on column
  - New Manual rule
    - In addition to existing hardcoded rule
    - Users can manually add items of interest to their featured object list



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SCALABILITY – LARGE WORKSPACES

More and more customers are working in WSs with 5000 – 60,000 objects

ISSUE: Although some improvements in 10.2, single object actions in large workspaces are still taking longer than single object actions in small workspaces

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PERFORMANCE TESTING BASELINE – SINGLE OBJECT ACTION

Creo 3.0 with 10.2 M030	100	1000	5000	10000	20000
	Ave Time (sec)	Ave Time (sec)	Ave Time (sec)	Ave Time (sec)	Ave Time (sec)
Open from CS	8	9	19	33	53
Check out & Modify	2	4	11	21	41
Custom Check-in	8	11	26	45	85
Auto Check-in	4	8	19	35	71
Check out single object	3	6	17	33	63
Undo checkout	3	3	12	19	35
Remove from WS	3	5	15	27	53

Note that times significantly increase as number of objects in WS increases

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PERFORMANCE TESTING ANALYSIS

Why are times increasing with workspace size?

Analysis showed a lot of time was taken checking for and updating non-iteration based changes made outside of the workspace:

- State
- Master attributes (in table displays only, not in CAD tool parameters/attributes)
- Location
- Share Status (e.g. checked out to a project)
- General Status (e.g. checked out by other user)
- Out of Date Status (e.g. iteration is no longer latest)
- Name
- Number
- File Name
- Organization

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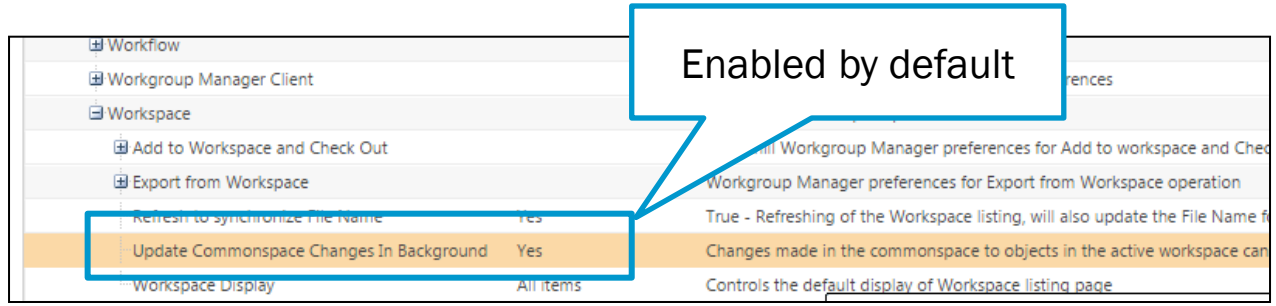
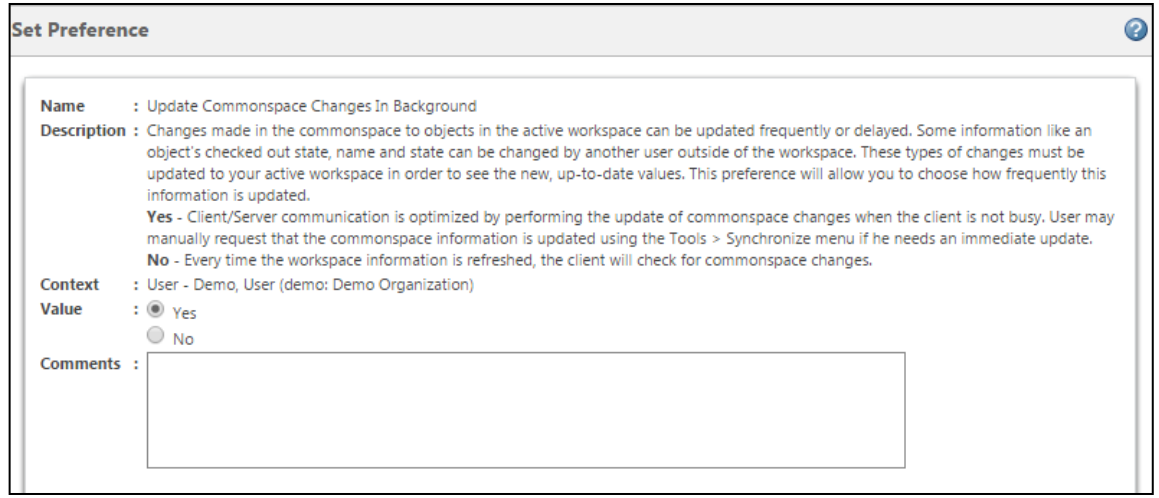
NEW PERFORMANCE RELATED PREFERENCE

- New user preference
  - Workspace > Update Commonspace Changes In Background
- How it works
  - When the client is updating this information in the background, other PDM actions will need to wait until this update is finished.
- The user should be given a message in the UWGM message area or the Creo message area indicating that the client is busy:
  - (info icon) Started workspace refresh.
  - (info icon) Workspace refresh succeeded.
- If the user tries to close the client (either Creo or WWGM) while the update of the CS information is in progress, then s/he should receive the standard pop-up message that the client cannot close because it is busy with a PDM action.





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PERFORMANCE TESTING RESULTS WITH NEW PREFERENCE

Comparing 11.0 and 10.2 M030 using Creo 3.0	100 in WS		1000 in WS		5000 in WS		10000 in WS		20000 in WS	
	Diff	% Diff	Diff	% Diff	Diff	% Diff	Diff	% Diff	Diff	% Diff
Open from CS	-1	-13%	-1	-11%	-4	-21%	-13	-39%	-18	-34%
Check out & Modify	-1	-50%	-2	-50%	-5	-45%	-9	-43%	-18	-44%
Custom Check-in	-1	-13%	-2	-18%	-8	-31%	-15	-33%	-30	-35%
Auto Check-in	-1	-25%	-3	-38%	-7	-37%	-14	-40%	-29	-41%
Check out single object	-1.5	-50%	-3	-50%	-11	-65%	-21	-64%	-39	-62%
Undo checkout	-1	-33%	0	0%	-5	-42%	-7	-37%	-12	-34%
Remove from WS	-1	-33%	-1	-20%	-5	-33%	-1	-4%	-19	-36%

* Difference in seconds

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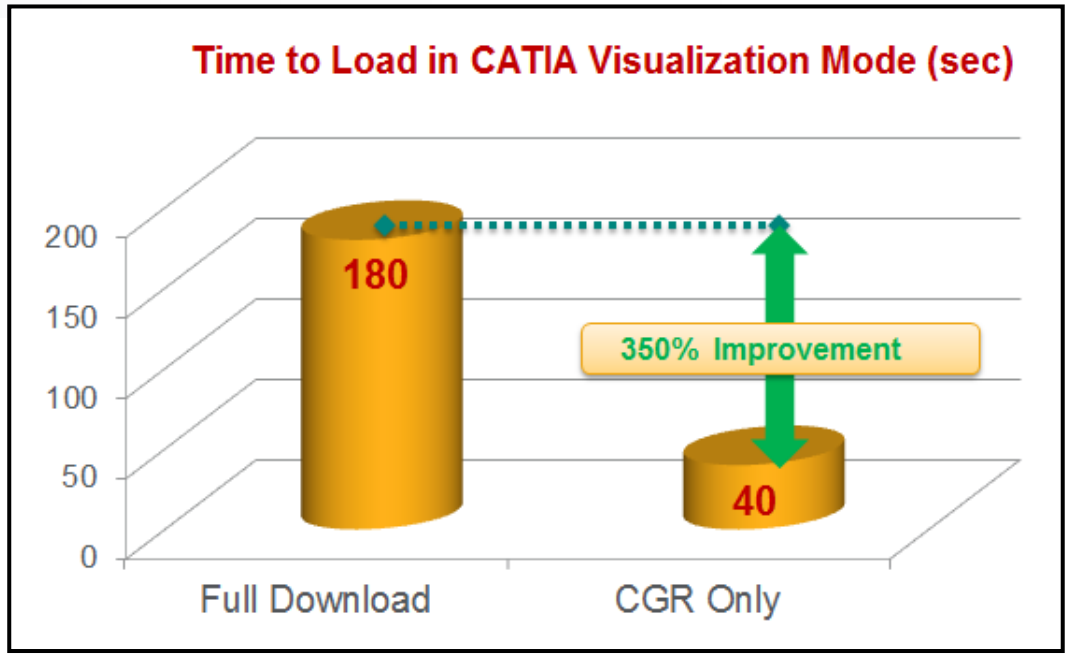
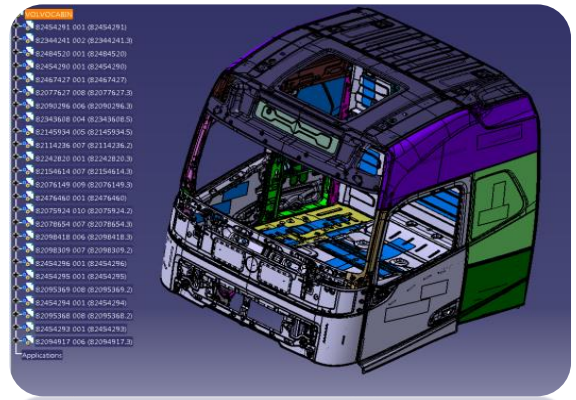
DOWNLOAD OPTIONS FOR LARGE ASSEMBLY MANAGEMENT

CAPABILITIES

- Provide 3 options for loading CATIA assemblies from the server
  - **Full :** all contents (CATParts, CGRs) as well as CATProducts are downloaded
  - **CGR :** only CGR files along with CATProducts when loading assembly from server
  - **ASYNC :** only CGR files along with CATProducts when loading assembly from server. When loading is complete, CATParts are download.





Dataset Characteristics:

- Size on disk: **1.49 Gb**
- 197 Unique Assemblies
- 358 Unique Components

Sub-ass'y (CGR > design mode)

- 29 Unique Components: **66.2 Mb**

BENEFITS

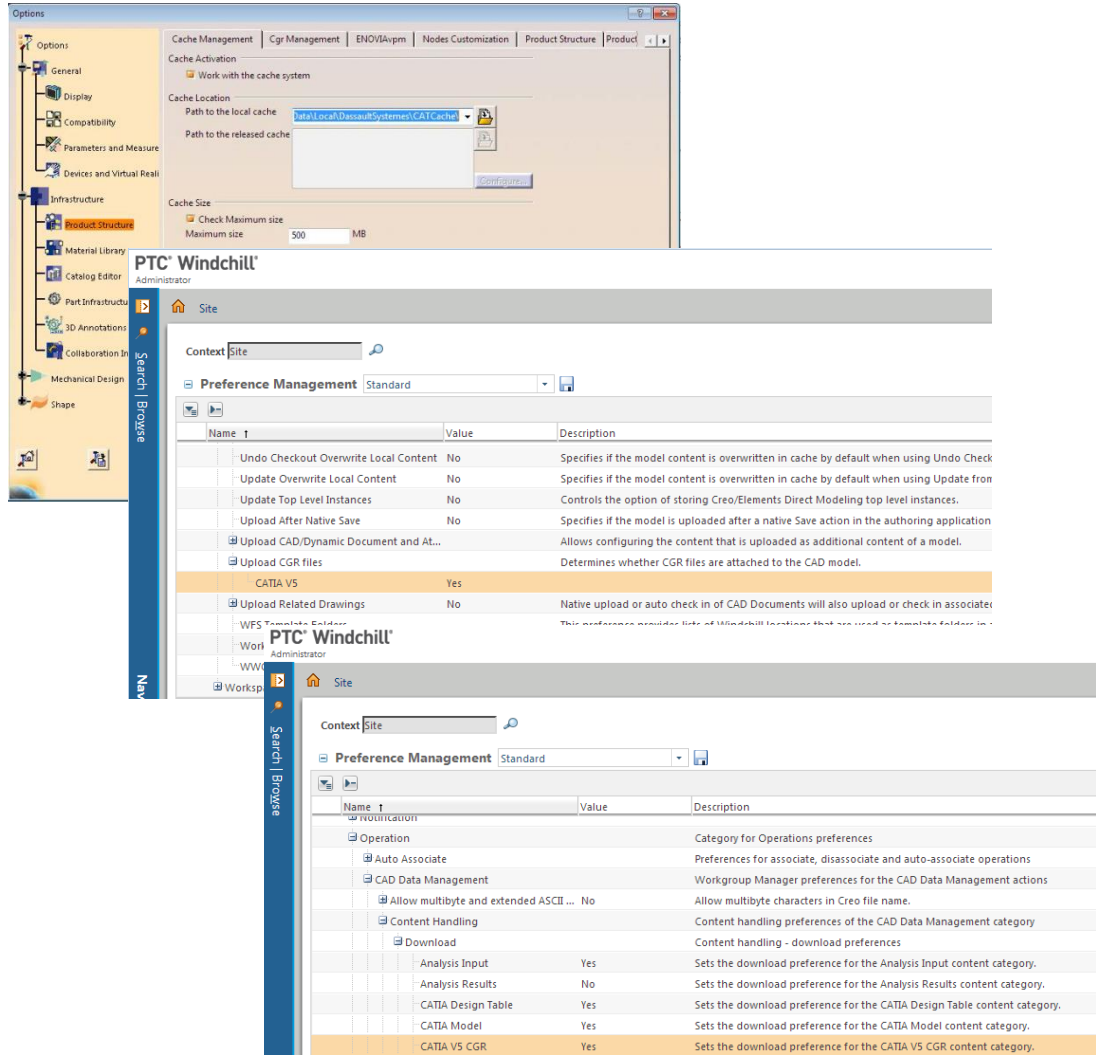
- Improves initial loading performance of large CATIA assemblies
- Reduces the network overhead
- With ASYNC mode, no extra downtime is required when parts are requested as structure mode

KNOWN CONFIGURATION SETTINGS FOR BETTER PERFORMANCE

- Set environment variable CATNoStartDocument=1.
  - This will allow to measure pure CATIA launch time without the time required to create a new CATProduct in CATIA session.

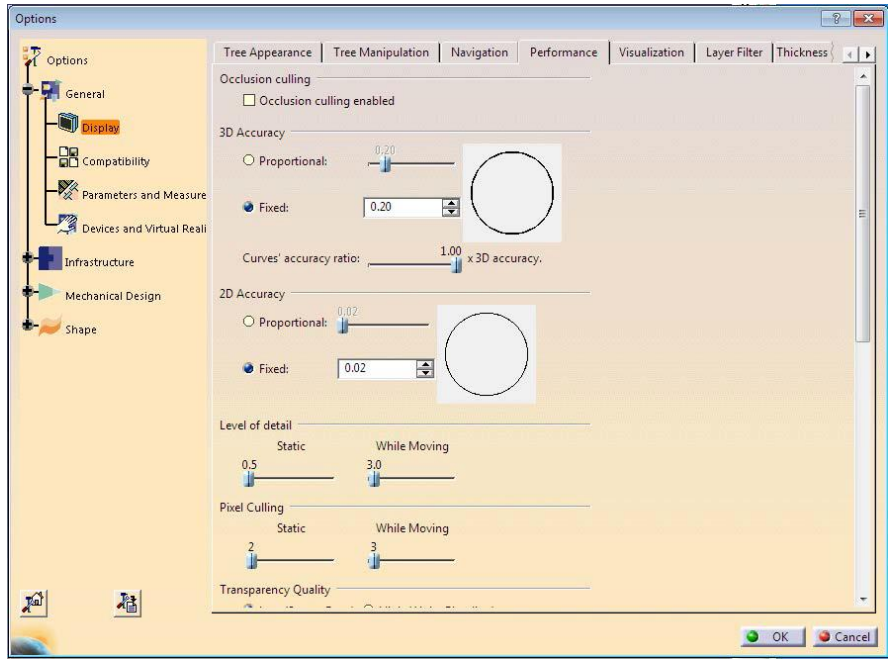
- Set home.page.url=about:blank in wgmclient.ini.
  - This will allow to measure pure Workgroup Manager launch time without the time required to load start page.

- Enable work with CGR for registered CATIA.
  - This will speed up open in CATIA for assemblies stored in Windchill. To do this:
    - Activate work with the cache system in CATIA
    - Enable CGR upload/download on Windchill site for CATIA



KNOWN CONFIGURATION SETTINGS FOR BETTER PERFORMANCE

- Use default 3D Accuracy settings in CATIA.
  - Usage of non-default values can trigger CATIA to re-create CGR on open/save (native CATIA behavior if accuracy settings stored in previously saved CGR files does not match with current CATIA settings) and, as result, significant performance degradation on various actions
- Set the following PTC Windchill Workgroup Manager for CATIA V5 settings



Preference Name	Property Value	Comments
force.update.metadata.on.open	No	faster open from Windchill, slower switch to design mode
update.metadata.on.load	No	faster open from Windchill, faster switch to product mode, slower switch to design mode
wwgm.download.method.upon.open	CGR	faster open from the commonspace, any action than requires loaded CATPart will go with delay

PERFORMANCE OPTIMIZATION ESSENTIALS

PERFORMANCE OPTIMIZATION ESSENTIALS

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

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CONFIGURING FOR PERFORMANCE – DATABASE (ORACLE)

- **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** – (**applies to 11g only**)

- There is a list of recommended indexes which should be applied. See article CS98135
  - Applies to all Windchill 10.X releases
  - Oracle
  - Microsoft SQL Server

- Most missing indexes are now out-of-the-box in Windchill 11

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CONFIGURING FOR PERFORMANCE – DATABASE (SQL SERVER)

Refer to TS Article - SQL Server performance and scalability knowledge hub for Windchill 10 & 11

Performance issues on SQL Server 2014 with Windchill - CS225042

- The problems appear to occur in Databases set with a compatibility level of 120 (SQL Server 2014)
- This is due to Microsoft issue documented at https://support.microsoft.com/en-us/kb/3044519

Title	SQL Server performance and scalability knowledge hub for Windchill 10 & 11
Description	• SQL Server performance and scalability knowledge hub for Windchill • Are there best practices for SQL Server performance?
Applies To	• Windchill PDMLink 10.0 to 11.0 • Windchill ProjectLink 10.0 to 11.0 • Pro/INTRALINK 8.x + 10.0 to 11.0 • Windchill PDM Essentials 10.0 to 11.0 • Arbortext Content Manager 10.0 to 11.0 • Microsoft SQL Server 2008 R2 to 2014
Cause	

Resolution	**Update SQL Server**
	• Keeping SQL Server database current for Windchill performance and stability
	• SQL Server 2008 R2 CPU stays at 100% after multiple restarts of Windchill 10.2
	Indexes
	• List of recommended database indexes to improve performance in Windchill 10
	• How to identify duplicate indexes in SQL Server for Windchill
	• SQL Server index byte limitation for Windchill databases
	Configuration
	• SQL Server memory settings for Windchill performance and stability
	• SQL Server tempdb recommendations for performance in Windchill
	• Recommendation for the "max degree of parallelism" configuration option in SQL Server for Windchill
	• Recommended "compatibility_level" value in SQL Server for Windchill
	Troubleshooting
	• Where to find SQL Server diagnostic script for Windchill
	• Windchill 10.X system performance troubleshooting
	• How to use SQL Server Profiler for troubleshooting Windchill performance
	• How to identify the source of a problematic SQLs and blocking database sessions in Windchill
	• Huge tempdb.ldf file is generated in SQL Server
	Oracle to SQL Server Migration
	• How to improve performance of an Oracle to SQL Server migration
	Maintenance
	• How to update statistics for entire Windchill database in SQL Server
	• How to shrink a table in MS SQL Server
	• Fragmentation:
	  ○ How to reduce database fragmentation in SQL Server
	  ○ MS SQL Index Fragmentation Detection Script for Integrity databases
	  ○ Unable to perform updates in Windchill 10.1 with SQL Server
	Functionality
	• Windchill PDMLink is showing gaps in sequence numbers on MS SQL Server 2012

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CONFIGURING FOR PERFORMANCE – WINDCHILL SERVER

- **Use the Windchill Configuration Assistant** - see chapter 1 of the Administrator Configuration Guide

- **Apply settings described in articles**
  - Windchill 10.x Initial Performance Tuning - **applies to WC 11**
    - 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
    - Oracle 11g recommendations don't apply to 12c. Go with defaults in 12c
  - How to enable Oracle CPU limit per call for Windchill – **applies to all releases of Windchill including WC 11**
    - 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

- **Windchill 10.2 performance issue with Windows 2012 Server on VMware ESXi 6.0 -** https://support.ptc.com/appserver/cs/view/solution.jsp?n=CS229255

WINDCHILL PROPERTIES – CRITICAL CONSIDERATIONS

- Don't allocate more memory to Method Servers than the machine has RAM
  - (wt.method.maxHeap x (wt.manager.monitor.start.MethodServer + 1 for the BGMS)) + wt.manager.maxHeap + 1G (for JVM perm space not part of the heap) + **Extra*** < 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**

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WINDCHILL PROPERTIES – CRITICAL CONSIDERATIONS CON'T

- wt.properties
  - The two MOST important caches in Windchill for Performance
    - **wt.cache.size.WTPrincipalCache & wt.cache.size.StandardUfidSrvService$RemoteObjectIdCache**
    - See articles CS71489 & CS97931 for sizing instructions
  - Type caches are the third most common cache related performance issue. See https://support.ptc.com/appserver/cs/view/solution.jsp?n=CS177841

- 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)

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CONFIGURING FOR PERFORMANCE - CLIENT

- Article CS130553 - Step by Step Process to use Windchill Client Inspector to inspect relevant Pro/ENGINEER, Creo Elements/Pro, Creo Parametric or Windchill Workgroup Manager Windchill settings on client machines
- Article CS24192 - Pro/ENGINEER Wildfire or Creo Interaction with PDMLink - Recommended Initial Performance Server Settings
- Article CS23960 - Pro/ENGINEER Wildfire and Creo Interaction with PDMLink - Recommended Initial Performance Client Settings
- Article CS140968 - Windchill Workgroup Manager Interaction with 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 & DRM 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 Windchill Interaction

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CONFIGURING FOR PERFORMANCE - CLIENT - CONT.

Network

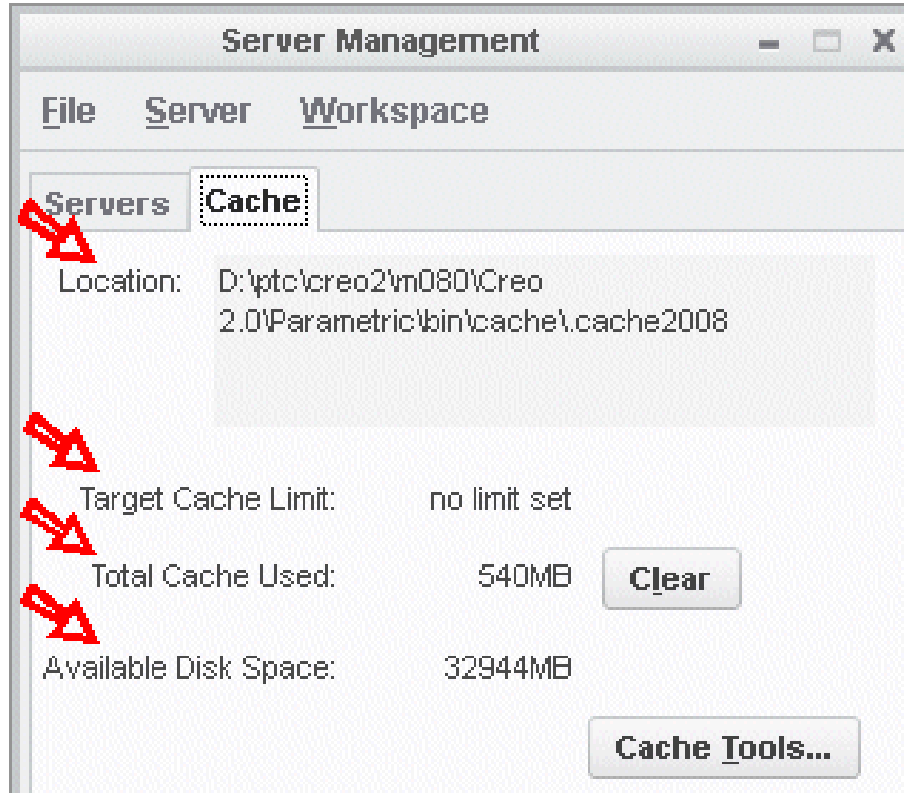
- Wired vs. Wireless
  - Wired typically faster
  - Wired more fault tolerant
  - Wired has less overhead
- Update NIC drivers
- Bandwidth limited by slowest link anywhere along the path between the client and server
- Optimize and prioritize for highest network bandwidth infrastructure allows
  - Gbit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

Forward looking information, subject to change without notice

CONFIGURING FOR PERFORMANCE - CLIENT - CONT.

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***
    - ***PTC_WFS_ROOT***
    - ***PTC_WGM_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

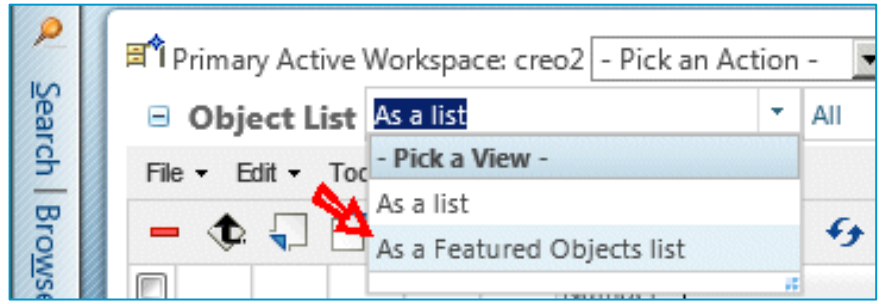


Forward looking information, subject to change without notice

CONFIGURING FOR PERFORMANCE - CLIENT - CONT.

Best Practices

- Selecting Top Level Object Versus Multi-Selecting All the Objects of the Assembly/Drawing when performing actions
- Perform actions from File & 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



Forward looking information, subject to change without notice

CONFIGURING FOR PERFORMANCE - CLIENT - CONT.

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

Forward looking information, subject to change without notice

DIAGNOSING POOR CLIENT PERFORMANCE RELATING TO DISK I/O ISSUES WITH IOMETER

- 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, detail 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

Forward looking information, subject to change without notice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