

Windchill System Maintenance and Monitoring Checklist

Technical Brief

Supported Releases and Products

Windchill® 10.0
Windchill PDMLink®
Windchill ProjectLink™
Pro/INTRALINK® 10.0
Arbortext® Content Manager™

Audience

This document is intended for managers, system administrators, solution architects, and business administrators. It assumes that the reader has the following knowledge and skills:

- Windchill System Administration utilities and procedures
- Oracle Database or SQL Server backup and recovery
- Java process monitoring
- System administration of the Windchill server component operating systems

Support Policy for Enterprise Deployment Resources

This document is a resource that PTC has created to assist customers with implementation and systems integration on specified system configurations. This document is not PTC product documentation and it may not be updated in the same way as PTC product documentation. Before using this document, verify that this document is applicable to the versions of PTC products that you are using. Because of the almost infinite variety of system configurations that customers can have, PTC cannot and does not warrant that this document will be entirely accurate for your particular configuration. Using the information in this document may require specific knowledge, skills, or expertise with PTC or third-party products. If incorrectly implemented, some of the information provided can have significant negative consequences.

Should you need consulting help with this document, you may be able to engage the PTC Global Services organization or a PTC services partner who can assist your company with its deployment of Windchill. If you require such assistance, contact your PTC sales representative or authorized reseller.

If you would like to provide feedback to PTC on this document or have a specific technical question about this document or about a PTC product, contact PTC Technical Support for assistance. Support for this document is provided in

English. PTC Technical Support will endeavor to reply within two business days to requests for support of this document.

Description

The following schedule and checklist provides recommended maintenance and monitoring tasks that should be performed by Windchill administrators for Pro/INTRALINK, Windchill PDMLink, Windchill ProjectLink and Arbortext Content Manager production systems.

Additional tasks can be added if other products are installed or if your system is complex or customized. The schedule can also be altered depending on the size or Service Level Agreement requirements for any given system.

Challenge

A Windchill deployment is a complex system with multiple components and data repositories. Proper maintenance of Windchill is an ongoing process consisting of many tasks that should be performed on a daily, weekly, or monthly basis. Failure to properly configure notification settings coupled with neglect of essential maintenance tasks and regular system monitoring can lead to system failures, data loss, and lost productivity.

Solution

The following checklist of Windchill maintenance and monitoring activities should be considered an essential guideline for Windchill administration. The frequencies listed for each activity are examples based on medium-sized deployments; these can vary if the system is larger or smaller. Descriptions of each activity and suggested methods, software, and tools that can be used to accomplish them are listed after the checklist.

Windchill System Maintenance and Monitoring Checklist

	Activity
	Configure notification settings
Daily/Frequently	1. Perform and verify scheduled system backups
	2. Monitor system availability
	3. Review database logs and notification emails for warnings and errors
	4. Monitor CPU and memory usage by Windchill processes
	5. Review and catalog PTC Technical Support Subscription emails
	6. Check database statistics
	7. Check Windchill queues
	8. Monitor network health
Weekly	9. Remove unreferenced files in vaults
	10. Monitor disk space usage
	11. Check performance using monitoring tools
	12. Perform database maintenance
	13. Defragment Windows disks
Monthly/Quarterly	14. Check performance using benchmarks
	15. Check for disconnected principals
	16. Remove leftover data
	17. Clone production to test server
	18. Run WinRU utility to check database health
	19. Evaluate settings using Windchill Configuration Assistant

Configure notification settings

An important step in any Windchill production deployment is to configure notification alerts for administrators within the various system components. This makes it much easier for the administrator to monitor the system both passively using email and remotely using an email client on any mobile device. Notifications are sent automatically whenever the Windchill system components are running, and when they shut down for any reason.

JMX-Administrator Notifications

The Java Virtual Machine components of Windchill are preprogrammed with both error-based notification alerts and performance-based threshold alerts. In order to have these alerts sent to administrator email accounts, populate the JMX-Administrators email list. This can be done using a command-line script:

1. Open a windchill shell and set the directory to `windchill/codebase`.
2. Execute the following command to populate the JMX-Administrators list with email addresses:

```
ant -f modifyMBeanConfig.xml setEmailList -
DemailAddresses="<comma-delimited list of email
addresses>"
```

Note: If the Windchill host system (localhost) is not configured as a mail server, you will need to configure the mail (smtp) server hostname in order for JMX notifications to be sent successfully. The JMX notifications use the value specified by the `wt.mail.mailhost` property in `codebase/wt.properties` by default.

See the [Windchill Specialized Administration Guide](#) for more information.

Database Notifications

Both the Oracle and Microsoft SQL Server have built-in notification mechanisms that should be configured by the database administrator.

Oracle

In Oracle 10g and later, this is configured within the Oracle Enterprise Manager utility using the following steps:

1. Log on as any "sysdba" level user.
2. Select **Setup > Notification Methods** to add the SMTP server:

ORACLE Enterprise Manager 10g Database Control

Setup Preferences Help Logout Database

Setup

- Administrators
- Notification Methods**
- Patching Setup
- Blackouts
- Management Pack Access

Notification Methods

Notification Methods allow you to globally define different mechanisms for sending notifications. These include e-mail, SNMP traps and running custom scripts. Once defined, these methods can then be used with Notification Rules for sending notifications to administrators as a result of alert occurrences. Each administrator has Notification Rules defined as a preference.

Mail Server

The information below is needed before Enterprise Manager can send e-mail notifications by means of Notification Rules. Revert Apply Test Mail Servers

Outgoing Mail (SMTP) Server
Specify one or more server names separated by a comma or space.

Identify Sender As

Sender's E-mail Address

3. Select **Preferences > General** to specify the email addresses to which notifications are sent.

ORACLE Enterprise Manager 10g Database Control

Setup Preferences Help Logout Database

Preferences

- General**
- Preferred Credentials
- Notification Rules Schedule

General

Revert Apply

Password

To change your password, specify and confirm a new password.

Administrator

Password

Confirm Password

E-mail Addresses

These addresses are used to send notifications to you. You can specify multiple addresses if you want to be notified in different ways, and the format to use for each address. Later on, you will need to define a Notification Schedule before any e-mail notifications can be sent to you.

Remove Test

Select All | Select None

Select E-mail Address	Message Format
<input checked="" type="checkbox"/> dba@mycompany.com	Long Format

Add Another Row

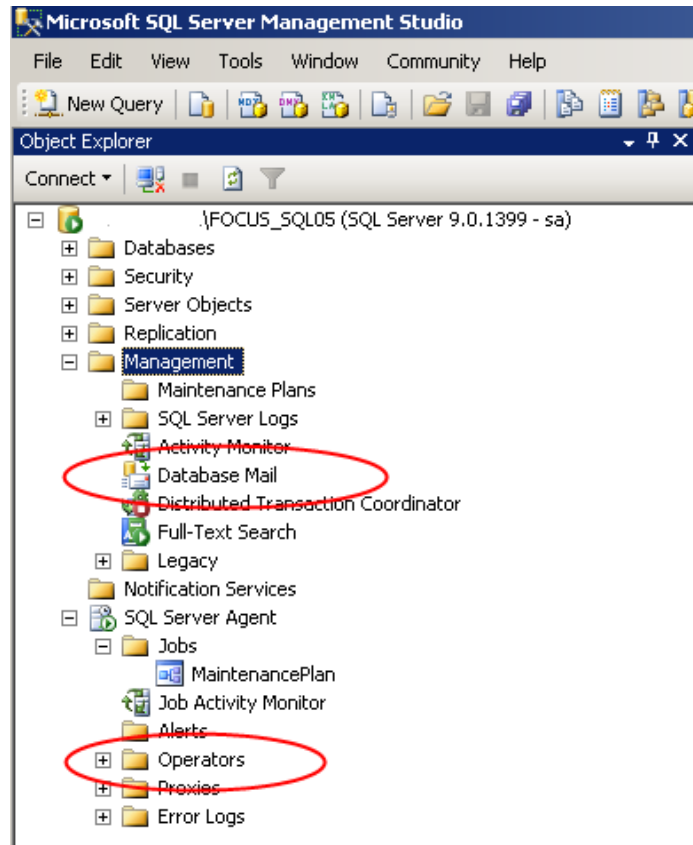
✓ TIP Refer to on-line help for message format sample.

Note: The notification rules and schedule can also be configured as needed from the **Preferences** page in the Oracle Enterprise Manager.

Microsoft SQL Server

The SQL Server Management Studio also has configurable alerts that notify the administrator of issues through email or pager. To use of this capability, you must first configure the **Database Mail** and **Operators** with the correct SMTP server and email addresses to be used for the administrators.

Right-click the links in the SSMS Object Explorer window to access the configuration tools:



Windchill Directory Server

The directory server can be configured to send notifications using the dsconfig utility. An example notification message would be:

```
458887 org.opens.server.DirectoryServerStarted The
Directory Server has started successfully
```

The following is an example showing Windows configuration. The Unix utility is similar, but located within the *<WindchillDS>/server/bin* directory.

1. Open a command window and execute the following:
`<WindchillDS>\server\bat\dsconfig.bat`
2. Accept the default local hostname.
3. Enter **1** to automatically trust the certificate.
4. Accept **4444** as the port.
5. For the Administrator user bind, enter: `cn=Manager`
6. Enter the password: `ldapadmin`

7. Enter 14 and then 1 to edit the Global Configuration.

```
D:\ptc\Windchill_9.1\WindchillDS\server\bat>dsconfig
>>>> Specify the Windchill Directory Server LDAP connection parameters
Directory server hostname or IP address [ATWOOD03L1]:
How do you want to trust the server certificate?
    1) Automatically trust
    2) Use a truststore
    3) Manually validate
Enter choice [3]: 1
Directory server administration port number [4444]:
Administrator user bind DN [cn=Directory Manager]: cn=Manager
Password for user 'cn=Manager':
>>>> Windchill Directory Server configuration console main menu
What do you want to configure?
    1) Access Control Handler          24) Monitor Provider
    2) Account Status Notification    25) Network Group
    3) Administration Connector       26) Network Group Criteria
    4) Alert Handler                  27) Network Group Request Filtering
                                       Policy
    5) Attribute Syntax               28) Network Group Resource Limits
    6) Backend                        29) Password Generator
    7) Certificate Mapper              30) Password Policy
    8) Connection Handler              31) Password Storage Scheme
    9) Crypto Manager                  32) Password Validator
   10) Debug Target                    33) Plugin
   11) Entry Cache                     34) Plugin Root
   12) Extended Operation Handler      35) Replication Domain
   13) Extension                       36) Replication Server
   14) Global Configuration            37) Root DN
   15) Group Implementation            38) Root DSE Backend
   16) Identity Mapper                 39) SASL Mechanism Handler
   17) Key Manager Provider            40) Synchronization Provider
   18) Local DB Index                  41) Trust Manager Provider
   19) Local DB ULU Index              42) Virtual Attribute
   20) Log Publisher                   43) Work Queue
   21) Log Retention Policy            44) Workflow
   22) Log Rotation Policy             45) Workflow Element
   23) Matching Rule
    q) quit
Enter choice: 14
>>>> Global Configuration management menu
What would you like to do?
    1) View and edit the Global Configuration
    b) back
    q) quit
```

8. Configure an SMTP server:
- Enter 14 for `smtp-server`, and
 - Enter 2 for **Add one or more values**.
 - Provide a value, for example `smtpserver.mycompany.com`.
 - Press **Enter** to continue and then enter `f` to finish.
 - Enter `b` to return to the main menu.
9. Add the new Alert Handler:
- From the main menu, enter 4.
 - Enter 2 to **Create a new Alert Handler**.
 - Enter 2 to select **SMTP Alert Handler**.
 - Enter a name, for example `admin_notify`
 - Enter 1 to select `true` and enable the handler, and then enter the following values:
 - Enter a value for the **"message-body"** property
Enter a value using the available wildcards, for example: `%%alert-id%% %%alert-type%% %%alert-message%% \n`

- **Enter a value for the "message-subject" property**
Enter a subject to filter for in your email, for example: WindchillDS Alert message
- **Enter a value for the "recipient-address" property**
Enter one or more email addresses for your administrator(s), for example: myadmins@mycompany.com
- **Enter a value for the "sender-address" property**
Enter an address that will correspond to your WindchillDS server, for example: WindchillDS@host.mycompany.com

f. Enter **f** to finish.

```

C:\WINNT\system32\cmd.exe - dsconfig
c> cancel
q> quit

Enter choice [c]: 1

>>>> Configuring the "message-body" property

Specifies the body that should be used for email messages generated by
this alert handler.

The token "%alert-type%" is dynamically replaced with the alert type
string. The token "%alert-id%" is dynamically replaced with the alert ID
value. The token "%alert-message%" is dynamically replaced with the
alert message. The token "\n" is replaced with an end-of-line marker.

Syntax:  STRING

Enter a value for the "message-body" property: %alert-id% %alert-type% %al
rt-message% \n

>>>> Configuring the "message-subject" property

Specifies the subject that should be used for email messages generated by
this alert handler.

The token "%alert-type%" is dynamically replaced with the alert type
string. The token "%alert-id%" is dynamically replaced with the alert ID
value. The token "%alert-message%" is dynamically replaced with the
alert message. The token "\n" is replaced with an end-of-line marker.

Syntax:  STRING

Enter a value for the "message-subject" property: WindchillDS alert message

>>>> Configuring the "recipient-address" property

Specifies an email address to which the messages should be sent.

Multiple values may be provided if there should be more than one
recipient.

Syntax:  STRING

Enter a value for the "recipient-address" property: atwood@ptc.com
Enter another value for the "recipient-address" property [continue]:

>>>> Configuring the "sender-address" property

Specifies the email address to use as the sender for messages generated by
this alert handler.

Syntax:  STRING

Enter a value for the "sender-address" property: opens@atwood031

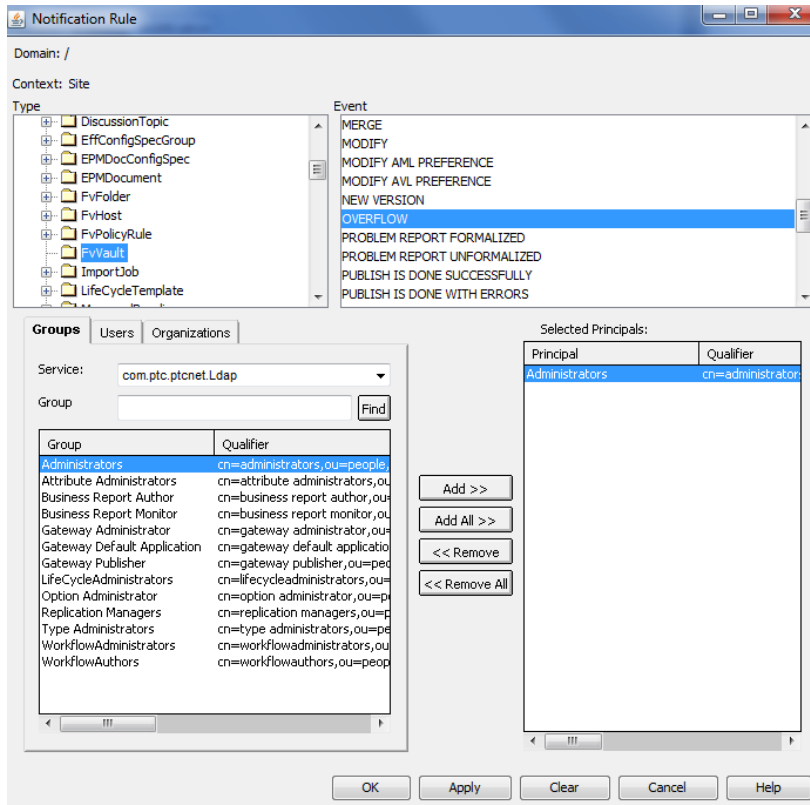
```

File Vault Notifications

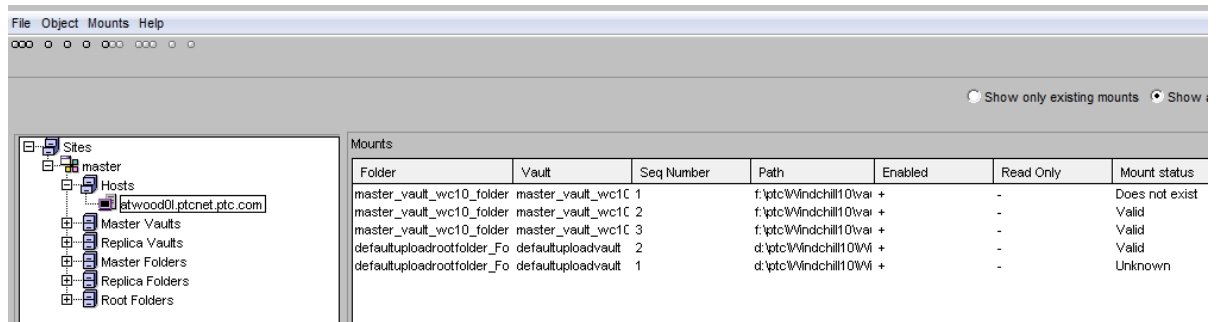
To monitor the status of file vaults, you can create an OVERFLOW event notification rule. To set this rule, perform the following steps:

1. Navigate to the Policy Administration utility by selecting **Site** > **Utilities** > **Policy Administration**.
2. Select a domain, and click **Update**.
3. In the window that opens, select the **Notification** tab and then click **Create**.
4. Under **Type**, select **FvVault**.
5. Under **Groups**, select **Administrators** and click **Add**.

This ensures that the administrator receives an email if a vault becomes Read Only. The following screenshot illustrates the selections to create the notification rule:



To manually check the status of file vaults, navigate to **Site** > **Utilities** > **File Server Administration**. Select **Vault Configuration** to check whether vaults are Enabled, Read Only, and Synchronized (replication only):



When a file vault status changes unexpectedly, you should run validation tests from within the utility. Analysis often requires further investigation at the operating system level for issues with disk space, directory permissions, and device mounts.

For more information on vaulting, see the [Windchill Enterprise Administration Guide](#) and the [Windchill Vaulting and Replication Planning - Technical Brief](#). For more information on notification rules, click **Help** from the **Notification Rule** window.

Daily/Frequent Activities

1. Perform and verify scheduled system backups (Daily)

Note: *This is the most critical administration activity. No system should be deployed and released to production until the required backup (and recovery) procedures are established and validated. The backup procedure should be scheduled and automated with notifications as much as possible. A complete backup strategy will likely utilize both full and incremental backups.*

The database server, all master and cache file vaults, and the directory server are primary backup targets. Other targets can include large replica vaults, text-based search indexes, the Windchill Business Reporting database, software configuration files, customization code, and installation directories (in particular the Windchill codebase). See the [Windchill Backup and Recovery Planning Technical Brief](#) and the [Windchill Backup and Recovery Execution Featuring NetApp Storage Solutions – Technical Brief](#) for more information.

Verify the scheduled backups on a regular basis. The verification procedure can vary from a simple check of the backup file sizes and notification alerts to performing a test recovery using the backup data on a test system.

2. Monitor system availability (Daily)

There are several methods available to monitor system availability. Configuration of email notifications built into the Windchill JVMs, database server, and directory server is the primary recommended approach for passive monitoring.

However, there are other "active" methods available to check availability as well. The default methods provided with the software for the basic components of Windchill are the following:

- **Server Status:** From **Site**  **> Utilities**, select **Server Status**.

The Server Status shows the current status of the Windchill JVMs, including the servlet engine (in Windchill 9.1), the Server Managers, and Method Servers. Red text fields indicate values that have exceeded their thresholds. This utility is cluster compatible, and can also be used to feed other higher level monitoring programs. If the web server or servlet engine becomes unavailable, check the availability further using other utilities as described later in this section.

Server Status

Current Active Users: [1](#) Server Managers: [6504@i3933-VM11*](#) (master) [System Configuration](#)
[Collector](#)
 Windchill Directory Server: [Available](#) File Servers: [Available](#) [Monitoring Tools](#)

Master Server Manager: [6504@i3933-VM11*](#) Uptime: 35 days, 10:20:53.297
 Deadlocked: No

	Recent	Baseline	Memory In Use	Available System Memory
Time In Garbage Collection	0%	0.003%	Heap 47.127%	Physical 2264.75MB (38.469%)
CPU Used by Process	0.105%	0.028%	Perm Gen 44.551%	Swap 4178.742MB (44.526%)

Method Server Data [BackgroundMethodServer.10232](#) [MethodServer.9652*](#)
 Uptime 3 days, 08:56:33.406 3 days, 09:03:12.235
 Deadlocked No No

Memory In Use		
Heap	11.535%	14.066%
Perm Gen	26.044%	45.063%

Other Statistics	Recent	Baseline	Recent	Baseline
Time In Garbage Collection	0%	0.14%	0%	0.197%
CPU Used by Process	0.054%	0.139%	0.571%	0.16%

Servlet Requests: General	Recent	Baseline	Recent	Baseline
Active Sessions			1	0.017
Completed Requests			16	1073
Average Response Time			0.229 sec	0.166 sec
Maximum Concurrency			3	5
Average Concurrency			0.044	0.001

Servlet Requests: Help Center	Recent	Baseline	Recent	Baseline
Completed Requests			0	0
Average Response Time			◆ sec	◆ sec
Maximum Concurrency			0	0
Average Concurrency			0	0

Method Contexts	Recent	Baseline	Recent	Baseline
Completed Contexts	61	153342	18	5456
Maximum Concurrency	2	27	3	5
Average Concurrency	0.005	0.023	0.055	0.002

Method Context Time	Recent	Baseline	Recent	Baseline
In JDBC Calls	63.047%	19.687%	67.279%	22.964%
In JDBC Connection Wait	0.477%	25.898%	0.015%	0.019%
In JNDI Calls	0%	0%	0%	0.113%

[Back to top](#)

Windchill Directory Server: [2768@i3933-VM11](#) Uptime: 38 days, 14:07:17.843
 Deadlocked: No
 JMX URL: service:jmx:rmi:///jndi/rmi://i3933-vm11.ptcnet.ptc.com:1689/org.opends.server.protocols.jmx.client-unknown

	Recent	Baseline	Memory In Use	Available System Memory
Time In Garbage Collection	0.151%	0.073%	Heap 5.461%	Physical 2265.961MB (38.489%)
CPU Used by Process	0.161%	0.038%	Perm Gen 48.628%	Swap 4179.902MB (44.538%)

[Back to top](#)

Site URL	Name	Status	Time of Last Ping	Availability	Average Response Time
http://i3933-vm11.ptcnet.ptc.com:10004/Windchill/servlet/WindchillGW	master	OK	2011-04-01 02:53:56.328 +0530	99.897%	0.761

[Back to top](#)

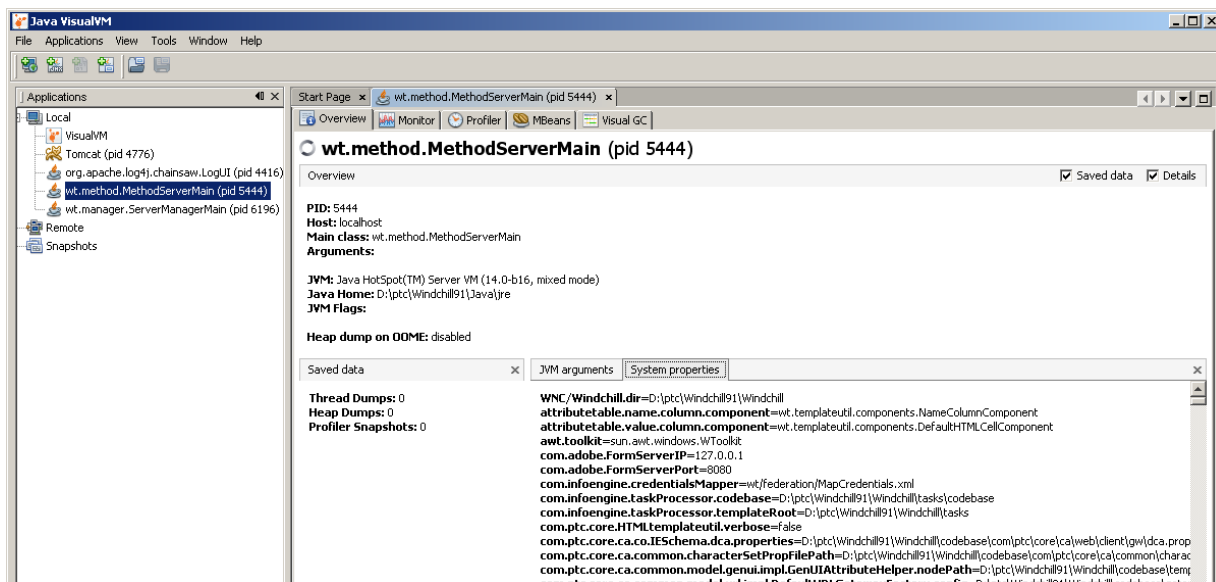
There are several enhancements for Windchill 10.0 to note:

- Many measured values now show as active links in the status page and can be graphed over time. The values are now persisted data in the database. This allows the administrator to investigate how any value has changed in the past rather than just seeing the current one.

- Both the **Directory Server** and **File Server** status are embedded into the page at the bottom.
- The **System Configuration Collector** link activates a tool to collect the configuration and log files and send them to Technical Support.
- The **Monitoring Tools** link opens the **System Health Monitoring Tools** page, which includes several useful reports for analyzing issues:
 - Performance Feedback Settings**
 - Log Levels**
 - Log File Viewer**
 - Persisted Log Events**
 - Method Context and Servlet Request Samples**
 - Top SQL Sample Intervals**
 - Java Process Information**

- **Pre 9.1 Windchill:** Use the **Basic Connectivity Test** page:
`http://<server><:port>/Windchill/wtcore/test.html`
- **Apache:** Use the basic Apache test page: `http://<server><:port>`
- **Servlet Engine (prior to Windchill 10.0):** Use the Tomcat test page provided with Info*Engine:
`http://<localhost>/<Windchill>/infoengine/jsp/examples/VerifyIE.jsp`
- **Directory Server:** Use LDAP Browser (Aphelion) or the Control Panel utility (Windchill Directory Server) as basic connectivity tools for troubleshooting. Other available tools include the Aphelion web tool (for Aphelion) and JMX clients such as JConsole for the Windchill Directory Server. For more information, see the [OpenDS wiki](#).
- **Database:** Manually check connections using Oracle SQLPlus or and SQL Server native client application. Many third-party administration tools have plugins for both Oracle and SQL Server as well.

For further monitoring options, administrators can use any JMX-compatible tool such as JConsole or VisualVM, both of which are included with Windchill 9.1 and later releases. VisualVM is a powerful tool that can be configured with plug-ins to enable MBeans and VisualGC for further diagnostics and troubleshooting.



You can also configure a third-party monitoring application such as [Nagios](#) to work with Windchill, or create a custom Server Status application using Windchill APIs.

It is important to configure automatic email/pager notification for failures wherever possible. However, a nonresponsive or hanging system component may not generate an error; therefore, some manual monitoring capability is always recommended to troubleshoot system availability.

3. Review automatic notification emails for error and warning messages or review Windchill database and application server logs (Daily)

The notification emails will usually inform administrators of errors automatically. These emails should be reviewed frequently.

PTC also recommends a proactive review of the database and application server logs in order to check for problems or trends that may not yet be causing a notification alert. This could be done less frequently depending on the amount of activity in the system and the number of errors that may be occurring during a given time period.

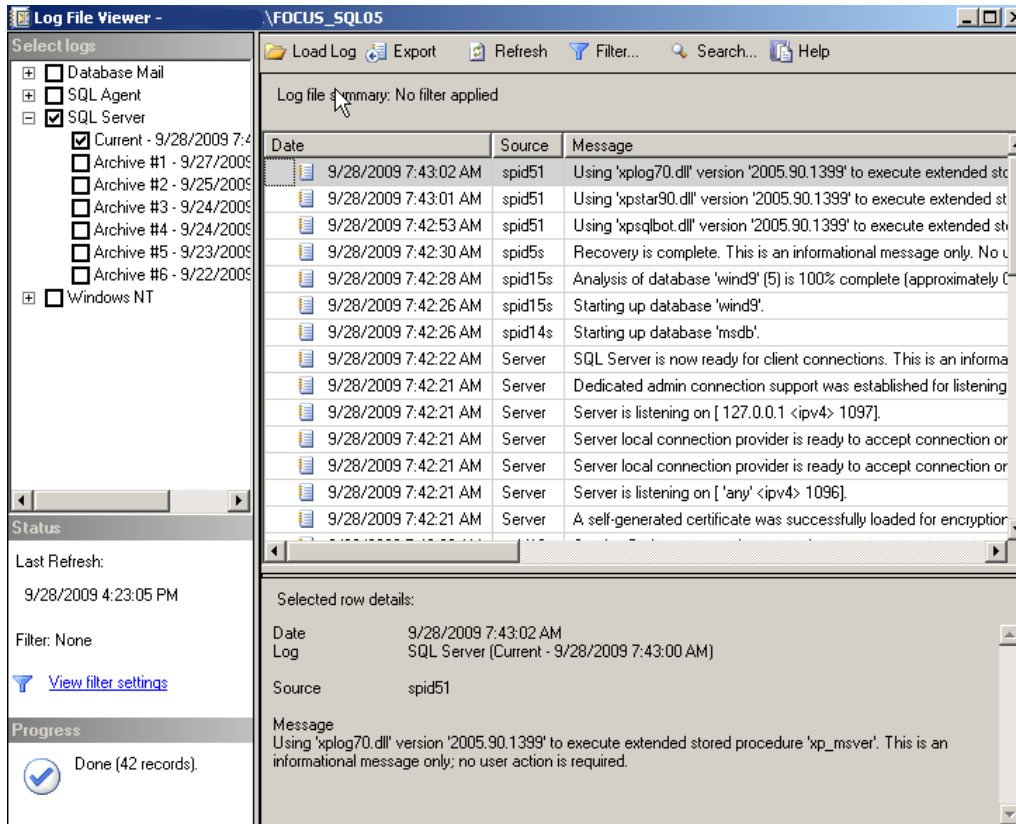
Database: Check the Oracle alert log (check for errors ORA-#####) or SQL Server Error log.

The Oracle Enterprise Manager (OEM) has an **Alerts** section on the **Home** page:

The screenshot shows the Alerts section of Oracle Enterprise Manager. At the top, there is a '▼ Alerts' header. Below it, a navigation bar shows 'Category All', a 'Go' button, and counts for 'Critical 0' and 'Warning 1'. A table below lists the alerts with columns for Severity, Category, Name, Message, and Alert Triggered. One warning alert is shown: 'Alert Log' with the name 'Generic Alert Log Error' and the message 'ORA-error stack (00600[17016]) logged in D:\ORACLE\PRODUCT110.2.0\ADMIN\WIND9\BDUMP>alert_wind9.log.' The alert was triggered on 'Sep 13, 2009 9:12:39 AM'.

Severity	Category	Name	Message	Alert Triggered
Warning	Alert Log	Generic Alert Log Error	ORA-error stack (00600[17016]) logged in D:\ORACLE\PRODUCT110.2.0\ADMIN\WIND9\BDUMP>alert_wind9.log.	Sep 13, 2009 9:12:39 AM

The SQL Server Management Studio (SSMS) has a Log File Viewer utility that can be used to filter and drill down into error messages:



Application Server: Windchill 10.0 includes a Log File Viewer that allows you to select a source directory and search log files or entries by name, error message, log entry, and more. This viewer is accessible by clicking the **Monitoring Tools** link on the **Server Status** page discussed in the previous step.

The logs can also be parsed by any full-function text editor such as TextPad (<http://www.textpad.com/>), or using a Log4j-compatible application such as Chainsaw (<http://logging.apache.org/chainsaw/index.html>).

Chainsaw can be used to filter through log files, but only if they are formatted in XML. By default, Windchill creates two logs for the MethodServer process, but neither is in XML format. In the following example, `<Windchill>/codebase/WEB-INF/log4jMethodServer.properties` is edited in order to reformat the `MethodServerLog4j-<pid>.log` file so that it can be parsed by Chainsaw. The new lines and comment characters in bold are shown below:

```
# Define methodServerLogFile appender
log4j.appender.methodServerLogFile=org.apache.log4j.DailyRollingFile
Appender
#log4j.appender.methodServerLogFile.File=${wt.logs.dir}/${wt.manager
.serviceName}Log4j-${wt.jvm.id}.log
```

```
log4j.appender.methodServerLogFile.File=${wt.logs.dir}/${wt.manager.
serviceName}Log4j-${wt.jvm.id}.xml
```

```
log4j.appender.methodServerLogFile.DatePattern='.'yyyy-MM-dd
```

```
log4j.appender.methodServerLogFile.layout=org.apache.log4j.xml.XMLLa
yout
```

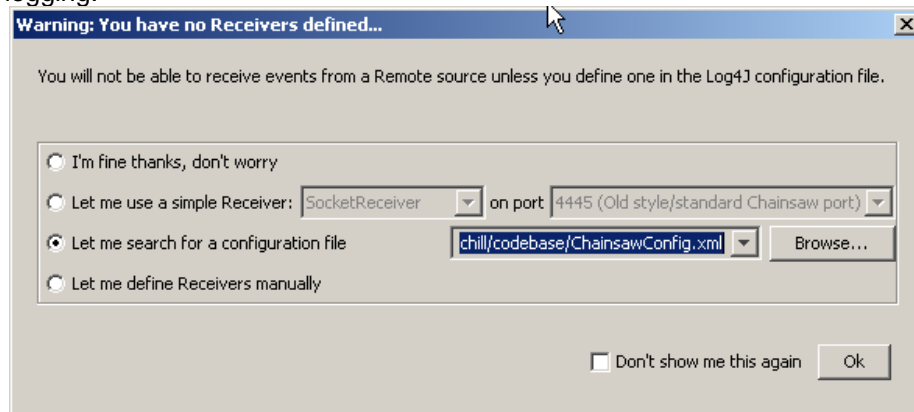
```
#log4j.appender.methodServerLogFile.layout=org.apache.log4j.PatternLayout
#log4j.appender.methodServerLogFile.layout.ConversionPattern=%d{ISO8601} %-5p [%t] %c - %m%n
```

You can also use a socket to connect Chainsaw to the currently running processes for real-time monitoring. This requires several steps:

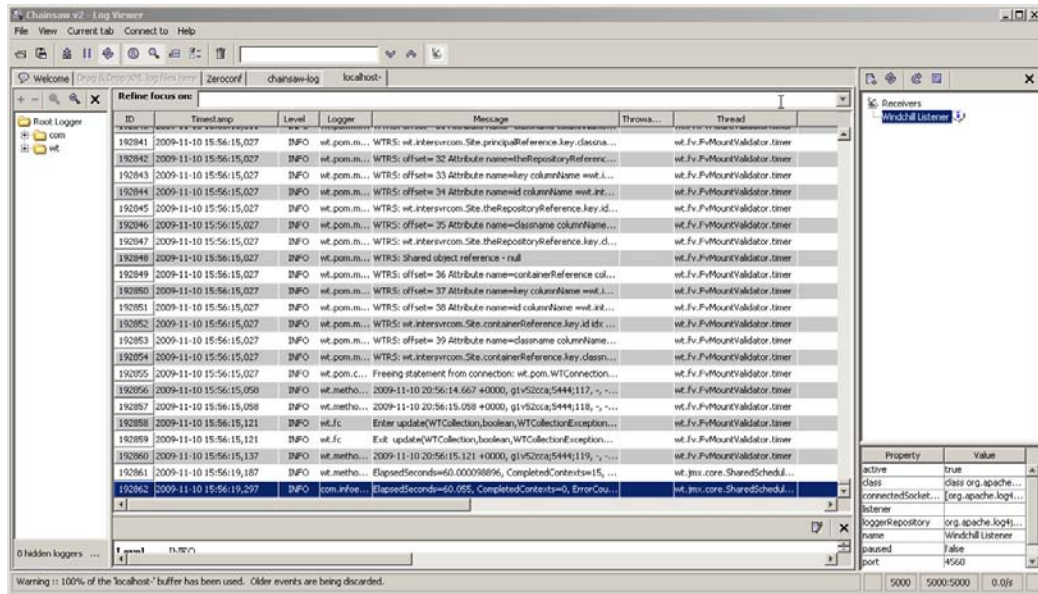
1. Edit `<Windchill>/codebase/WEB-INF/log4jMethodServer.properties` in a text editor:
 - a. Modify the `rootLogger` line to include the “socket” appender at default ERROR level:


```
log4j.rootLogger=ERROR, stdout, methodServerLogFile, socket
```
 - b. Enable the “socket appender” properties by removing the “#” comment character so they appear as shown:


```
log4j.appender.socket=org.apache.log4j.net.SocketAppender
log4j.appender.socket.port=4560
log4j.appender.socket.remoteHost=localhost
log4j.appender.socket.application=${wt.manager.serviceName}-${wt.jvm.id}
```
2. In the same directory, edit the other `log4j*.properties` files in a similar manner.
3. Start Chainsaw. A **Warning** message appears, in which you must specify `<Windchill>/codebase/ChainsawConfig.xml` to start a listener for Windchill logging:



A window appears confirming that Windchill information is being received:



PTC recommends that you rotate logs on a daily basis and preserve old logs in an archive so that repetitive or randomly occurring issues can be traced back to their initial occurrence. Automatic notification when errors occur is also recommended.

4. Monitor CPU and memory usage by Windchill processes (Daily)

Windchill-supported operating systems contain many available tools for monitoring memory and CPU usage. On UNIX or Linux, the “vmstat” command for both CPU and memory usage and the “top” command (or “topaz” on IBM) showing CPU usage are universally available.

vmstat:

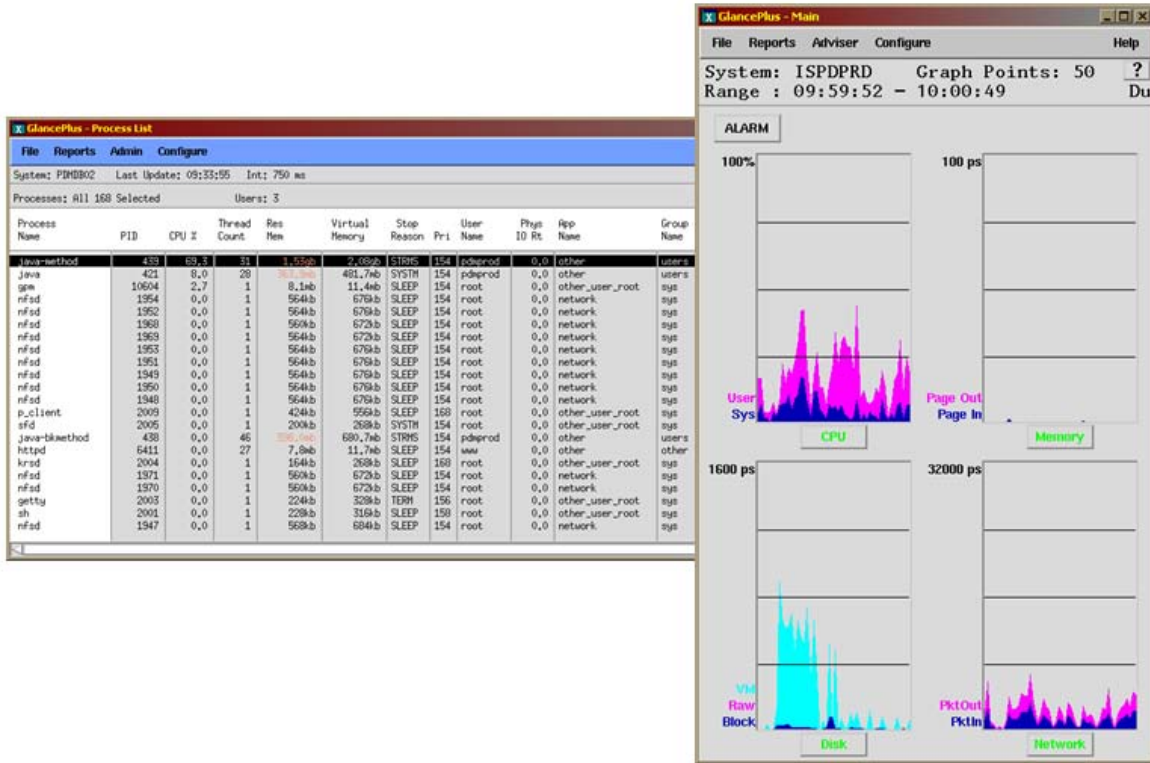
```
procs memory page disk faults cpu
r b w swap free re mf pi p fr de sr s0 s1 s2 s3 in sy cs us sy id
0 0 0 11456 4120 1 41 19 1 3 0 2 0 4 0 0 48 112 130 4 14 82
0 0 1 10132 4280 0 4 44 0 0 0 0 0 23 0 0 211 230 144 3 35 62
0 0 1 10132 4616 0 0 20 0 0 0 0 0 19 0 0 150 172 146 3 33 64
0 0 1 10132 5292 0 0 9 0 0 0 0 0 21 0 0 165 105 130 1 21 78
```

top:

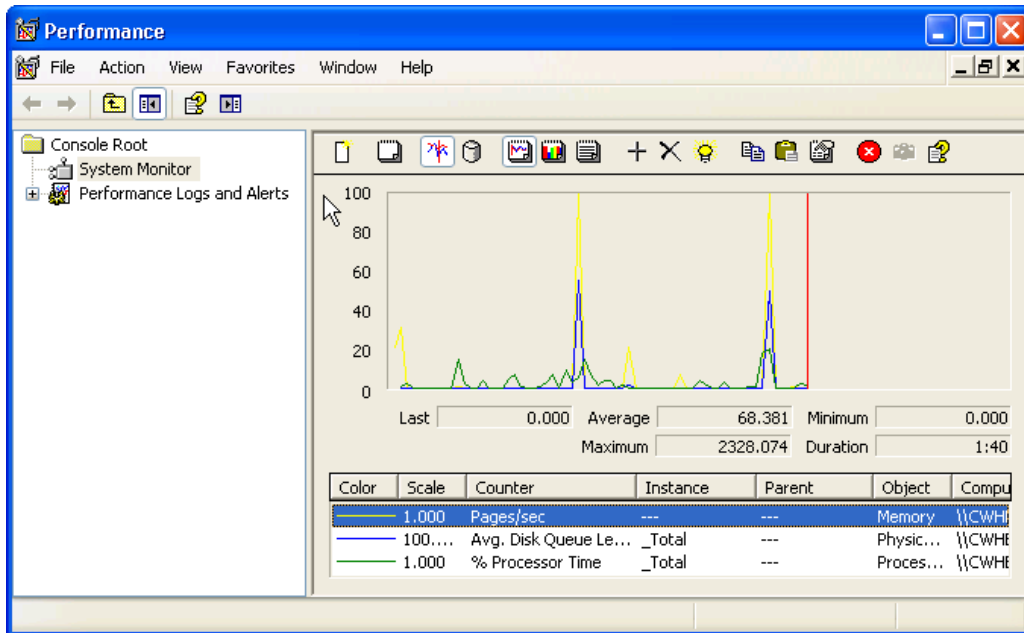
```
load averages: 0.01, 0.01, 0.01 10:22:20
82 processes: 81 sleeping, 1 on cpu
CPU states: 99.8% idle, 0.0% user, 0.1% kernel, 0.0% iowait, 0.0% swap
Memory: 16G real, 13G free, 940M swap in use, 20G swap free

  PID USERNAME LWP PRI NICE  SIZE  RES STATE   TIME   CPU COMMAND
 10203 root         1  59  0 4008K 1720K cpu/2   0:00  0.02% top
   758 root        31  59  0  210M 123M sleep   97:25  0.00% java
   107 root         10  59  0 6112K 4920K sleep   47:32  0.00% picld
 17847 root        19  59  0  299M  28M sleep   45:26  0.00% java
 11792 root         1  59  0  32M  29M sleep   32:56  0.00% Xvnc
   131 root        41  59  0 6984K 5648K sleep    7:06  0.00% nscd
   247 daemon     4  59  0  367M  311M sleep    6:17  0.00% nfsmapid
   761 root         1  59  0 8152K 2280K sleep    5:05  0.00% sendmail
 11797 root         5  59  0  13M 9544K sleep    3:42  0.00% dtwm
    9 root        15  59  0  11M 9632K sleep    3:26  0.00% svc.configd
   268 root         4  59  0 6280K 4072K sleep    1:52  0.00% inetd
    7 root        15  59  0  13M  10M sleep    1:42  0.00% svc.startd
   431 root        17  59  0  16M  10M sleep    1:40  0.00% fmd
   496 root         1  59  0  0K  0K sleep    1:39  0.00% snmpd
   265 root         1  59  0 1328K 944K sleep    1:37  0.00% utmpd
```


Glance is a monitoring and analysis tool available for HP-UX and Solaris systems:



Windows has the System Monitor (perfmon), which has configurable counters for various system attributes, and can import log files for analysis:



There are also many third-party software packages that can monitor CPU and memory for specific processes or the entire operating system.

If available in your chosen monitoring software, use thresholds to trigger notification of overloads and logging to show trends such as peak usage periods during each day. Recommendations for thresholds vary somewhat by operating system, architecture, software versions and performance tuning methodology. In general, CPU usage should average around 40-60% of capacity with peaks of 80% or less during normal operations, and physical memory usage should peak at less than 80% of total capacity.

When the system exceeds your target thresholds, investigate the possible causes and look for solutions. For example:

- Are there automated jobs running that could be rescheduled?
- Are there more active users than the system was originally sized for?
- Is the maximum size of the Java Heap large enough for the usual morning rush?
- Are users all trying to check in their work on Friday afternoon because they have not been checking it in more regularly during the week?

Regularly exceeding thresholds is usually an indicator that you need to increase the operating system resources available to the Windchill system or do a complete performance analysis. You can usually address singular or infrequent threshold events with software configuration changes, business process changes, software patches and updates, or changes in user behavior.

5. Review and catalog PTC Technical Support Subscriptions email updates from <http://www.ptc.com> (Daily)

Subscribe to Technical Support Subscriptions for all the PTC products you have installed at <http://www.ptc.com/appserver/cs/subscriptions/subscriptions.jsp>. Although there is a Daily/Weekly delivery option, the volume of alerts makes daily review more manageable. After reviewing the current issues, it is also useful to file emails with issues relevant to your deployment in an email program with indexed search capability. Storing emails in this manner allows you to create a searchable repository of the latest troubleshooting information.

The following is an example of the type of emails you will receive:

Dear ,

This is your PTC Technical Support Email subscription, which you are currently scheduled to receive daily at 8.00 AM (Eastern Standard Time). This email contains the following:

- Solutions (TANs/TPIs): [2](#)

- Solutions (TANs/TPIs) which have been updated since your last subscription email:

Number	Product	Description
TAN_146263	FlexPLM 9.0	When Updating a Sample Request, Switching from a Sample to Another Saves the Changes Applied to the First Sample, Even if the Update is Finally Cancel...
TAN_142710	Windchill ProjectLink 9.0 Windchill PDMLink 9.1 Windchill PDMLink 9.0 Pro/ENGINEER Wildfire 3.0	The PDMLink Collector Retrieves Extra Dependencies Not Explicitly Requested By The User And In Comparison To The Number Of Objects Collected With Pro/...

For detailed information regarding a particular issue, click the specific TAN or TPI link. PTC Technical Support can also provide additional guidance.

6. Check database statistics (Daily)

Both Oracle and SQL Server databases use schema statistics to help optimize SQL queries. The Windchill application produces a large number of SQL queries each day that are used to process user requests for information from database tables. Ensuring that your database is successfully updating the schema statistics is crucial to overall system performance.

In the Oracle Enterprise Manager, select the **Administration** tab, and select **Manage Optimizer Statistics** to check the job. The status should show “SUCCEEDED”:

ORACLE Enterprise Manager 10g
Database Control

Database Instance: wind9 > Manage Optimizer Statistics

Manage Optimizer Statistics

Database wind9

Optimizer Statistics are used by the query optimizer to choose the best execution plan for each SQL statement. Up-to-date optimizer statistics can greatly improve t

Oracle-Defined GATHER_STATS_JOB Job

The GATHER_STATS_JOB updates optimizer statistics for objects with stale or missing statistics. It is executed within the maintenance window on a regular basis.

Configuration Configure

Job Status	Enabled
Next Run	Sep 29, 2009 10:00:00 PM EDT
Window Group for Next Run	MAINTENANCE_WINDOW_GROUP
Previous Runs	18

☞ TIP SYS user or user with ALTER privileges on the Oracle-defined job can configure and view the Oracle-defined Job

Last Run

Time	Sep 28, 2009 10:05:44 PM EDT
Status	SUCCEEDED
Duration (mins)	5.71
Objects Analyzed	173

If the statistics job for Oracle fails, you can use the error message to further investigate through My Oracle Support (<https://support.oracle.com/CSP/ui/flash.html>) using your registered Oracle account.

SQL Server uses a different approach to maintain statistics. It will automatically update the statistics for any given table and its indexes based on the size of the table and the number of changes made. This ensures that no statistics become stale in most circumstances. However, if performance for a particular query is not optimal, you can also update the statistics manually by executing an “update statistics <tablename>...” statement for each table involved in the query.

7. Check Windchill queues for overall health and failed entries (Daily)

You can manually check queues by checking email or by navigating to **Site** > **Utilities** > **Queue Management**. Queues that are usually heavily used include Indexing, Visualization, and Workflow (Wf*) queues. JMX is pre-configured with failed entry execution notification and threshold-based notification for high queue loads and entries that are taking too long. You can see the TotalThreshold, WaitingReadyThreshold and EntryExecutionTimeThresholdSec values from a JMX client (such as JConsole) as shown in the following screenshot:

The screenshot shows the Java Monitoring & Management Console interface. The left pane displays a tree view of system components, with 'ActionItemOverdueQueue' selected under 'Queues'. The right pane shows the 'Attribute values' table for this component.

Name	Value
AveEntryExecTimeSeconds	0.0
EntryExecutionTimeThresholdSec	900
ExecutionThreadLoggerLevel	
ExecutionThreadLoggerName	wt.queue.ScheduleQueue.ActionItemOverdueQueue
LoggerLevel	
LoggerName	wt.queue.QueueWatcher
MaxEntryExecTimeSeconds	0.0
MinEntryExecTimeSeconds	0.0
MinMinutesBetweenNotifications	30
Name	ActionItemOverdueQueue
TotalEntries	0
TotalThreshold	500
WaitingReadyEntries	0
WaitingReadyThreshold	250

You can adjust the threshold values for each queue as needed. Additionally, you can do a more detailed investigation of failed entries using the Queue Analyzer tool (for instructions, see <http://<Windchill>/wt/tools/support/QueueAnalyzer.html>). For workflow queue issues, another useful tool is the Queue and Workflow Health Check Script (for instructions, see <http://<Windchill>/wt/tools/support/WorkflowHealthReport.html>).

8. Monitor network health (Daily)

Network sizing and health can greatly affect performance of the Windchill client-server interactions. Network latency and bandwidth values have theoretical limits set by the hardware configuration; however, during periods of heavy use, the effective values change. Response times are affected by increased congestion and packet loss.

In most circumstances, your IT department network administrators should monitor the network; however, for troubleshooting purposes, the Windchill administrators should have access to a status page or dashboard for the network used by the Windchill system. Alternatively, if the IT department generates regular network reports, request that the Windchill administrators be added to the recipients list.

It is very useful to have a “normal use” baseline of expected values (latency, bandwidth, utilization, packet loss) for comparison when monitoring the network. A detailed discussion of network tuning is beyond the scope of this document. However, some general guidelines include the following:

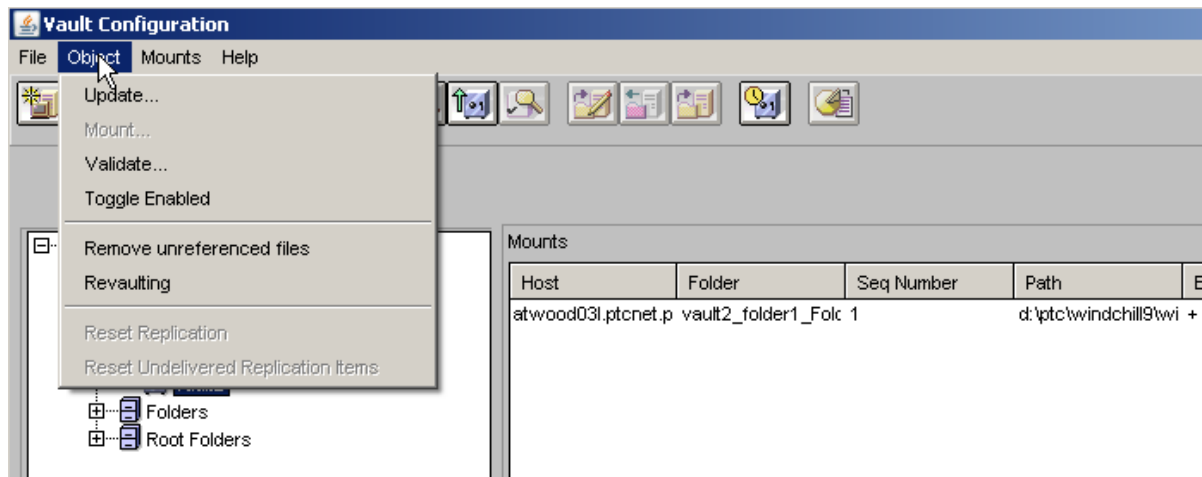
- Utilization (congestion) should be less than 50% on average, with peaks less than 80%.
- Packet loss should be less than 0.1% for a Local Area Network (LAN) and less than 0.2% for a Wide Area Network (WAN).

If more sophisticated tools are not available, the `ping <hostname>` command is also a useful troubleshooting tool for critical nodes.

Weekly Activities

9. Remove unreferenced files using the Vault Configuration utility (Weekly or Monthly)

Executing this option cleans up leftover content files referenced by objects that were deleted in Windchill. Regular execution of this command helps control disk space growth within file vaults on the master server. In Windchill 9.1 and later, this utility also supports file vaults on remote file servers.



10. Monitor disk space usage (Weekly or Monthly)

Maintain growth curves that can be used to identify deviations and also predict when additional storage devices or media will be needed. Vaulted content files usually take up the most space in a Windchill system. The Database data files usually do not grow rapidly, except if extensive auditing is configured or content is stored in BLOBS rather than external vaults. (Deviations in data file growth can help predict performance problems as well.) The LDAP Directory Server repository usually is very small by comparison and only requires an occasional check.

Monitor the following locations regularly:

- File vaults and replica vaults (weekly)
- Backup repository (monthly)
- Data server data file locations (monthly)

11. Check performance using monitoring tools (Weekly)

Note: For large installations, consider doing this activity on a daily basis instead of weekly.

There are monitoring tools available for the various server components:

- **Web server:** Apache can be set up for monitoring using the `mod_status` and `mod_info` modules. Microsoft IIS has similar built-in tools at the software and operating system level (System Monitor).

- Application and servlet engine:** Java processes can be monitored both historically and at a glance by navigating to **Site** > **Utilities** > **Server Status**. Other options include using JMX clients such as JConsole or VisualVM. The values to monitor are listed in the **Server Status** utility, and many have adjustable thresholds. For more information, see the [Windchill Specialized Administration Guide](#).
- Directory Server:** Windchill Directory Server performance can be monitored using a JMX client in Windchill 9.1. In Windchill 10.0, this ability is available from the Server Status utility.
 If you are still using the Aphelion Directory Server with an earlier release, Aphelion web tools offers a **Request Summary** page showing response times. To access this summary, select **LDE** > **PTCLdap** > **Manage** in the LDAP browser. On the page that displays, select **PTCLdap** > **Local Administration** > **Statistics** > **Request Statistics** > **Request Summary**.
- Database:** Use the Oracle Enterprise Manager ADDM reports or Microsoft SQL Server Database Engine Tuning Advisor to check performance levels.

In general, compare the metrics shown for each component against values that occur when the system is performing well.

12. Perform database maintenance (Weekly)

Database maintenance is critical to overall system performance. There are other tasks besides updating the schema statistics that often need to be performed. These tasks include rebuilding indexes, adding disk space, and so on.

Oracle Enterprise Manager has an **Advisor Central** page with maintenance recommendations:

ORACLE Enterprise Manager 10g Database Control

Database Instance: wind9 > Advisor Central

Advisor Central

Page R

Advisors

[ADDM](#) [Memory Advisor](#) [MTTR Advisor](#)
[Segment Advisor](#) [SQL Access Advisor](#) [SQL Tuning Advisor](#)
[Undo Management](#)

Advisor Tasks

Search

Select an advisory type and optionally enter a task name to filter the data that is displayed in your results set.

Advisory Type: All Types Task Name: Advisor Runs: Last Run Status: All Go

By default, the search returns all uppercase matches beginning with the string you entered. To run an exact or case-sensitive match, double quote the search string. You can use the wildcard symbol (%) in a dou

Results

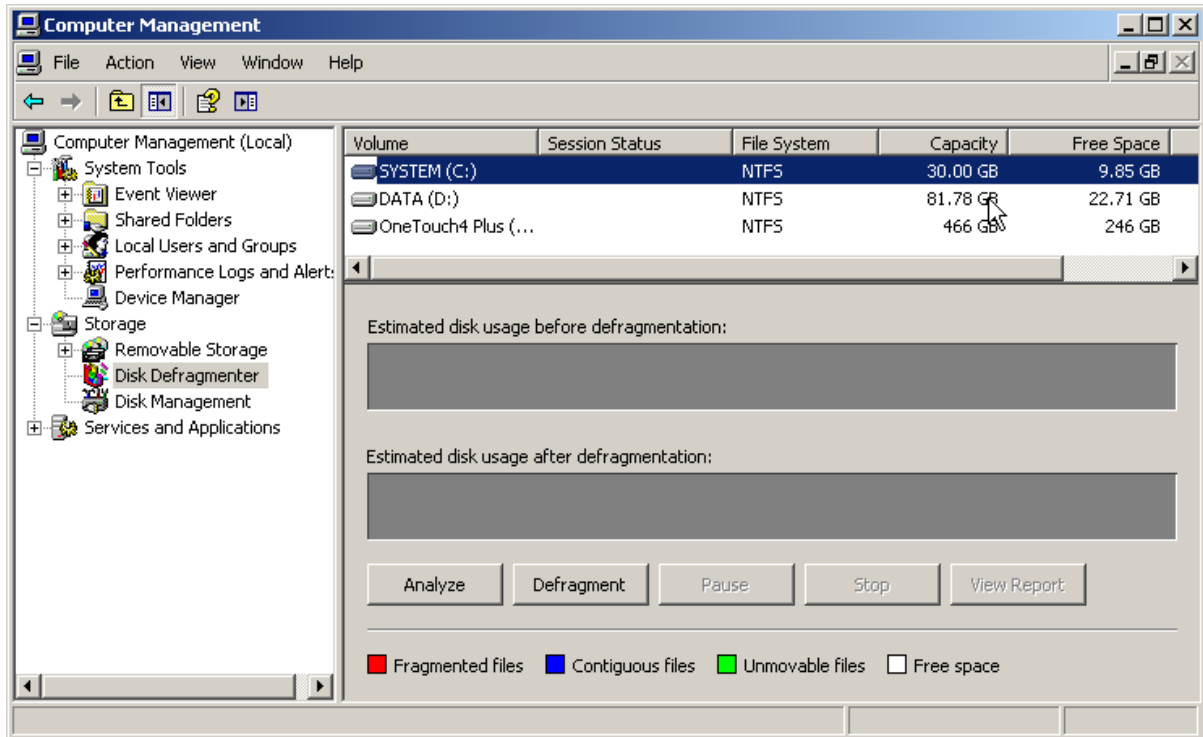
Select	Advisory Type	Name	Description	User	Status	Start Time
<input checked="" type="radio"/>	ADDM	ADDM:1834908724_1_3746	ADDM auto run: snapshots [3745, 3746], instance 1, database id 1834908724	SYS	COMPLETED	Jul 28, 2009 3:
<input type="radio"/>	Segment Advisor	SYS_AUTO_SPCADV_4022872009	Auto Space Advisor	SYS	COMPLETED	Jul 27, 2009 11:

Microsoft SQL Server Management Studio, discussed in a previous section, has some similar capabilities as part of the Maintenance Plan wizard.

13. Defragment Windows disks (Weekly or Monthly)

On Windows, fragmentation of disks affects disk I/O performance over time. Disks that are heavily utilized for read/write operations fragment more quickly. Even SAN disks will require occasional defragmentation when using Windows as the operating system.

Defragmentation of specific disks can be done manually during off-hours with the **Control Panel > Administrative Tools > Computer Management** utility:



You can also schedule defragmentation to occur during off-hours using the `defrag.exe` command inside the **Control Panel > Scheduled Tasks** utility.

There are also third-party defragmenting tools such as Diskeeper available (see <http://support.microsoft.com/kb/130539>). These tools are usually automated and have lower overhead and performance impact during execution than the original Windows utility.

Many storage vendors have their own methods of defragmenting as well. For example, NetApp storage systems have a “reallocation scan” that should be scheduled regularly.

Note: *UNIX and Linux systems usually do not require defragmenting. Use the `fsck` utility to manually check for fragmentation or other issues if disk performance is a problem.*

Monthly Activities

14. Check Windchill performance using benchmark tests (Monthly)

Daily monitoring of certain performance attributes like CPU usage and Java garbage collection contributes to performance assurance, but to truly measure performance and ensure user satisfaction you should regularly test the system against accepted performance benchmarks for response time. The goal is to keep performance of the benchmark operations within a reasonable margin as the database grows over time.

A manual test procedure is easiest to implement, but requires more manual effort to perform regularly over time. Create a repeatable, well-documented procedure that utilizes timed steps modeled after your company's most common operations. Graph both the response time results and the amount of data in the system for each month.

PTC has published a manual CAD benchmark test called the [Windchill Creo Data Management Performance Benchmark Test](#). This can be used as a comparison for your system, or as an example template for creating your own test procedure.


Automated tests can be created for benchmarking Windchill. The testing tool must be able to record and generate web-based client actions for basic functionality tests. Two software tools that have been used for automated testing at PTC and at customer sites are Apache JMeter (<http://jakarta.apache.org/jmeter/>) and Silk Performer (<http://www.borland.com/us/products/silk/silkperformer/>).

PTC Global Services consultants can help implement a JMeter-based load tool called the "Windchill Multiuser Load Generator for CAD and Non-CAD Operations." This tool can automatically generate loads on the system and measure response times for operations using your own data or the WorldCar assembly data from PTC.

PTC offers an automated tool based on J-Link that is documented in [Windchill Single User Performance Tester for Creo Data Management Operations](#). You can use this tool to benchmark operations with Creo CAD data.

15. Check for disconnected participants using Participant Administration (Monthly)

Disconnected Participants are user accounts with data that is not synchronized correctly between the LDAP Directory Server and Database server. The data in LDAP is not found in the location specified in the database. There is a tool for fixing or deleting these users.

Select **Site**  > **Utilities** > **Participant Administration**. From the **Actions** menu, select **Search Disconnected Participants** and enter your search criteria in the available fields.

Note: The selection criteria fields are not case-sensitive and you can include the asterisk (*) wild card character. You can also click **Search** without entering any values in the fields to display all available participants.

If a user, group, or organization is listed, you can reconnect or delete them. For more information on performing those tasks, see the Windchill Help Center.

16. Remove leftover data from deleted users using Personal Cabinet Administration (Monthly)

The Personal Cabinet Administration utility cleans up data leftover in personal workspaces when a user is deleted from Windchill. This task should be done monthly.

The utility has only one option after startup: if any cabinets are listed, delete them.



17. Clone production server for testing (Monthly or Quarterly)

Cloning (or rehosting) the production server to another machine is an activity that is optional in the sense that it does not directly affect the operations of production server. However, there are many benefits to having a production clone available, including the following:

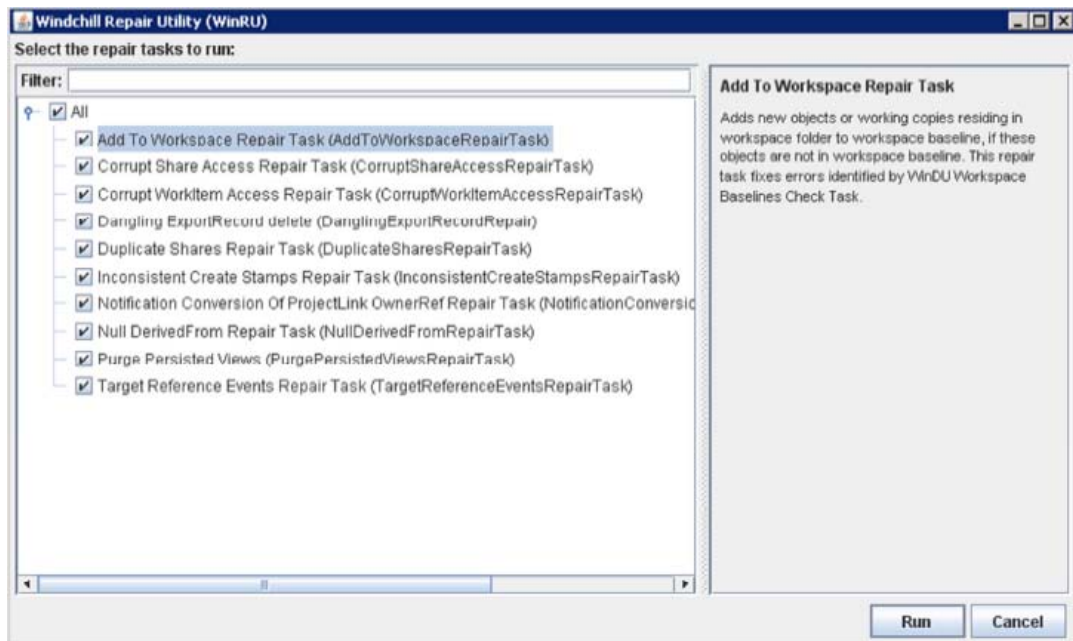
- Troubleshooting issues that reproduce using only production data
- Training new personnel on a test system closely resembling production
- Practicing backup and recovery scenarios
- Practicing and validation of disaster recovery to a new host
- Testing new settings and/or customizations
- Testing and practicing maintenance upgrades

See the [Windchill 10.0 Rehost Guide](#) for information that can assist in this task.

If the amount of data on the production server prohibits monthly cloning due to time or resource constraints, consider performing this task on a quarterly or as-needed basis instead.

18. Run the WinRU utility to check database health (Monthly or Quarterly)

There are various diagnostic tasks that check database integrity built into the Windchill Diagnostic Utility (WinRU).



For information about using this utility, see <http://www.ptc.com/support/windu.htm>.

19. Evaluate settings using Windchill Configuration Assistant (Monthly or Quarterly)

The Windchill Configuration Assistant is a utility that can optimize certain configuration properties based on the amount of system resources and the amount of data in the database. The size of the data caches defined in Windchill's Java Virtual Machine processes can be

checked against the size of the database tables periodically. Changes to the physical or virtual system (such as increased memory or CPU resources) should also be accompanied by adjustments to Windchill properties.

To execute the utility and see the options available, open a windchill shell and execute the following command:

```
ant -f WindchillConfigAssistant.xml -projecthelp
```

For more information, visit the Windchill Help Center.

Benefits

Regular maintenance and monitoring by the administrator will contribute greatly to the ongoing health, performance and availability of the Windchill system.

Performing regular maintenance also promotes faster troubleshooting if an error occurs.

Additional Information

[Windchill Specialized Administration Guide](#)

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

[Windchill Enterprise Administration Guide](#)

[Windchill 10.0 Rehost Guide](#)

[Windchill Vaulting and Replication Planning – Technical Brief](#)

[Windchill Backup and Recovery Execution Featuring NetApp Storage Solutions – Technical Brief](#)

[Windchill Backup and Recovery Planning – Technical Brief](#)

[Windchill Directory Server Administration Guide](#)

[Windchill Architecture Overview](#)

Monitoring and Management for the Java Platform:

<http://java.sun.com/j2se/1.5.0/docs/guide/management/index.html>

Nagios: <http://www.nagios.org>

Sun Solaris Performance Wiki:

http://www.solarisinternals.com/wiki/index.php/SolarisInternalsPerformance_FAQ

IBM AIX Performance Wiki:

<http://www.ibm.com/developerworks/wikis/display/WikiPtype/Performance+Monitoring+Tools>

Microsoft LDP Page with example LDAP queries:

<http://support.microsoft.com/default.aspx?scid=kb;en-us;255602#XSLTH3237121122120121120120>

Windchill System Maintenance and Monitoring Checklist

©2011 Parametric Technology Corporation (PTC). The information contained herein is provided for informational use and is subject to change without notice. The only warranties for PTC products and services are set forth in the express warranty statements accompanying such products and services and nothing herein should be construed as constituting an additional warranty. PTC shall not be liable for technical or editorial errors or omissions contained herein. For important Copyright, Trademark, Patent, Licensing and Data Collection Information see the About Box, or Copyright Notice, of your PTC software.