

Windchill 9.0/9.1 System Administration

Course Code	TRN-2141-T
Course Length	3 Days

Overview

In this course, you will learn how to install and configure Windchill system components, including PDMLink and ProjectLink. You will learn how to perform routine Windchill system administration tasks including how to shut down and start Windchill services, conduct performance testing, and tune up Windchill components for performance. You will also learn how to manage a distributed system environment and plan and run basic backup and recovery procedures. Other topics include managing system performance with Oracle 10g, managing memory and CPU allocation, troubleshooting background queues, and monitoring firewall activity and security.

Note: Due to the subject matter of this class, simulated software is used for Windchill installation to provide an accurate, effective, and efficient training experience that could not otherwise be duplicated in a standard classroom environment.

At the end of each module, you will complete Pro/FICIENCY skills assessment questions. These questions are used to help reinforce your understanding of the course topics and form the basis for review of any topics, if necessary.

After completing the course, you will be prepared to complete basic Windchill PDMLink tasks and activities, as well as have a better understanding of the Windchill PDMLink system implementation at your company.

Prerequisites

- Familiarity with the Windchill PDMLink 9.0/9.1 or Windchill ProjectLink 9.0/9.1 user interface.
- Familiarity with the Windows command prompt and the ability to form and execute basic SQL statements.

Audience

This training course is intended for System Administrators and Application Developers.

Topics

- Identifying Windchill System Components
- Installing Windchill Components
- Performance Testing
- External File Storage
- Data Replication
- Workflow Performance Tuning
- Database Performance Tuning
- System Backup and Recovery
- Windchill Infrastructure Security
- Windchill 9.1 System Administration Enhancements

Agenda

Day 1

Module 1	Identifying Windchill System Components
Module 2	Installing Windchill Components
Module 3	Managing Windchill Services
Module 4	Performance Testing

Day 2

Module 5	External File Storage
Module 6	Data Replication
Module 7	Tuning Application Server
Module 8	Tuning Workflow Processes

Day 3

Module 9	Oracle Performance Tuning
Module 10	Windchill Backup and Recovery
Module 11	Windchill Infrastructure Security

Table Of Contents

Windchill 9.0/9.1 System Administration

Identifying Windchill System Components

Introduction.....	1-1
Objectives.....	1-1
Lecture Notes.....	1-2
Client Requirements.....	1-3
Windchill Architecture: Windchill Server.....	1-4
Windchill Architecture: Database.....	1-5
Windchill Architecture: LDAP Server.....	1-6
Windchill Architecture: Search Engine.....	1-7
Windchill Architecture: Mail Server.....	1-8
Three-Tier Architecture.....	1-9
Windchill System Components: The Client Tier.....	1-10
Windchill System Components: The Server Tier.....	1-11
Windchill System Components: The Database Tier.....	1-12
Role of the System Administrator.....	1-13
Windchill Technical Documents.....	1-14
Lab Exercises.....	1-16
Exercise 1: Reviewing Windchill Technical Documents.....	1-16
Summary.....	1-16

Installing Windchill Components

Introduction.....	2-1
Objectives.....	2-1
Lecture Notes.....	2-2
The PTC Solution Installer (PSI).....	2-3
Understanding Installation Types.....	2-4
Express Installation Assumptions.....	2-5
Advanced Installation Assumptions.....	2-6
Windchill Required Components.....	2-7
Installing on Multiple Machines.....	2-8
Required Ports for Windchill.....	2-9
Windchill Requirements for Oracle Database.....	2-10
Installing Oracle.....	2-11
Installing Windchill Solution.....	2-12
Selecting the Database Size.....	2-14

The Staging Area Options	2-15
Lab Exercises	2-16
Exercise 1: Installing Oracle.....	2-16
Exercise 2: Installing and Configuring Windchill Components.....	2-18
Exercise 3: Validating Windchill Installation	2-21
Exercise 4: Installing ProductView Adapters.....	2-23
Exercise 5: Configuring the Pro/ENGINEER Adapter	2-24
Summary	2-25
Managing Windchill Services	
Introduction.....	3-1
Objectives.....	3-1
Lecture Notes.....	3-2
System Administration Utilities	3-3
Windchill Configuration Properties Files.....	3-4
The site.xconf File	3-5
The JMX Clients	3-6
Using JConsole to Modify Property Values	3-7
Using JConsole to Start and Stop Windchill Servers.....	3-8
Using JConsole to Manage Log Files.....	3-9
The xconfmanager Utility.....	3-10
The xconfmanager: Options.....	3-11
The xconfmanager: Example.....	3-12
The xconfmanager: Validate Changes.....	3-13
The Windchill Command	3-14
The Windchill Shell.....	3-15
Identifying Major Windchill Services.....	3-16
Starting/Stopping Apache Web Server.....	3-17
Starting/Stopping Tomcat.....	3-18
Starting Aphelion.....	3-19
Stopping Aphelion.....	3-20
Starting/Stopping Oracle.....	3-21
Starting/Stopping Windchill.....	3-22
Automating Windchill Startup	3-23
Automating Windchill Shutdown.....	3-24
Lab Exercises	3-25
Exercise 1: Starting Windchill Services.....	3-25
Exercise 2: Stopping Windchill Services.....	3-27
Exercise 3: Managing Properties and Services using JConsole.....	3-28

Exercise 4: Executing Commands using the Windchill Shell	3-30
Exercise 5: Modifying Properties using the xconfmanager	3-31
Summary	3-31
Performance Testing	
Introduction.....	4-1
Objectives.....	4-1
Lecture Notes.....	4-2
Defining Performance.....	4-3
Surveying the Tuning Environment	4-4
Performance Tuning – Production Environment.....	4-5
Mixing Reality with Performance Tuning	4-6
Performance Tuning Methodology	4-7
Performance Tuning Goals.....	4-8
A Typical Business Day Workload Profile.....	4-9
Performance Testing.....	4-10
Measure of Performance	4-11
Defining User Roles and Profiles.....	4-12
Defining User Tasks and Frequency.....	4-13
Identifying Bottlenecks.....	4-14
Bottlenecks: Response Time versus User Load	4-15
Bottlenecks: Throughput versus User Load	4-16
Bottlenecks: Resources versus User Load	4-17
Monitoring Performance: Task Manager	4-18
Monitoring Performance: System Monitor.....	4-19
Monitoring Performance: UNIX Commands.....	4-20
Introducing the Apache JMeter.....	4-21
Building JMeter Test Plans	4-22
Elements of a Simple Test Plan.....	4-24
JMeter Graphical User Interface	4-25
Recording Samples.....	4-26
Lab Exercises	4-27
Exercise 1: Retrieving System Information using the Task Manager.....	4-27
Exercise 2: Gathering Server Statistics using the System Monitor.....	4-28
Exercise 3: Recording a JMeter Performance Testing Plan.....	4-30
Exercise 4: Measuring Windchill Performance using JMeter	4-33
Summary	4-35
External File Storage	
Introduction.....	5-1

Objectives.....	5-1
Lecture Notes.....	5-2
File Vaulting.....	5-3
File Storage Options.....	5-4
File Vaulting Architecture.....	5-5
File Vaulting Strategies.....	5-6
Planning External Storage.....	5-7
Planning Vaults.....	5-8
Vaulting Rules.....	5-9
Setting Up External Storage.....	5-10
Forcing Contents to Vault.....	5-11
The Central Cache Vault.....	5-12
Specifying File Threshold Value for Vaults.....	5-13
Vaults with Automatic Folder Creation.....	5-15
Maintaining Vaults.....	5-16
Converting from Multiple Vaults to a Single Vault.....	5-17
Changing the Location of Files in Vaults.....	5-18
Converting Existing Folders to Root Folders.....	5-19
Managing Revaulting.....	5-20
Other File Vaulting Properties.....	5-21
Lab Exercises.....	5-22
Exercise 1: Configuring File Vaults for External Storage.....	5-22
Exercise 2: Creating Vaulting Rules.....	5-24
Exercise 3: Testing File Vaulting.....	5-25
Summary.....	5-26
Data Replication	
Introduction.....	6-1
Objectives.....	6-1
Lecture Notes.....	6-2
Content Replication.....	6-3
Types of Replication Site.....	6-4
Replication Configuration - File Server Site.....	6-5
Replication Configuration - Full-Scale Site.....	6-6
Installing the File Server - Requirements.....	6-7
Enabling Remote File Server Support.....	6-8
Generating the Security Key.....	6-9
Using the File Server Manager Utility.....	6-10
Configuring the System for Data Replication.....	6-11

Registering the File Server.....	6-12
Configuring Replica Vaults.....	6-13
Creating Replication Rules.....	6-14
Creating Replication Schedules.....	6-15
Replication Properties.....	6-16
Background Queues for Replication.....	6-17
Replication and Visualization Service.....	6-18
Replication and Compression.....	6-19
Designating Cache Vault in Replica Sites.....	6-20
Content Cache Upload.....	6-21
Content Cache Download.....	6-22
Mirroring the Local Cache Vault.....	6-23
Setting the Preferred Content Cache Site.....	6-24
Resetting Replication.....	6-25
Predictive Replication.....	6-26
Predictive Replication Settings.....	6-27
Ad Hoc Replication.....	6-28
Parallel Replication.....	6-29
Lab Exercises.....	6-30
Exercise 1: Downloading File Server Files.....	6-30
Exercise 2: Installing the File Server.....	6-32
Exercise 3: Registering the File Server with the Master Server.....	6-34
Exercise 4: Configuring Replication Vaults.....	6-35
Exercise 5: Creating Replication Rules.....	6-37
Exercise 6: Creating Replication Schedules.....	6-38
Exercise 7: Setting a Preferred File Server.....	6-39
Summary.....	6-39
Tuning Application Server	
Introduction.....	7-1
Objectives.....	7-1
Lecture Notes.....	7-2
Windchill Server Tuning Objectives.....	7-3
Monolithic Windchill Configuration.....	7-4
Multi-Tiered Windchill Configuration.....	7-5
Windchill Background Queues.....	7-6
Queue Manager.....	7-7
Queue Entry States.....	7-8
Out-of-the-Box Background Queues.....	7-9

Background Queue Properties	7-10
Configuring a Single Method Server	7-11
Configuring a Background Method Server	7-12
Distributing Background Queues	7-13
Tuning Background Queues	7-14
Balancing System Memory	7-15
Tomcat Tuning - Managing Client Requests	7-16
Tomcat Heap Size	7-17
Method Server Heap Size	7-18
Setting Windchill Cache Sizes - wt.properties	7-19
Setting Windchill Cache Sizes - db.properties	7-21
Using Anti-Virus Software	7-23
Operating System Tuning - Windows	7-24
Process Priority Control	7-25
Server Cluster Configuration	7-26
Advantages of Server Load Balancing	7-27
Lab Exercises	7-28
Exercise 1: Increasing Windchill and Tomcat Heap Sizes	7-28
Exercise 2: Modifying Windchill Cache Sizes	7-30
Exercise 3: Configuring a Background Method Server	7-31
Summary	7-31
Tuning Workflow Processes	
Introduction	8-1
Objectives	8-1
Lecture Notes	8-2
Workflow Queues	8-3
Example of a Clog	8-4
Possible Solution to a Clog - Change Workflow Design	8-6
Possible Solution to a Clog - Use Distributed Queues	8-7
Configuring Queue Pooling	8-8
After Queue Pooling	8-9
Dedicated Workflow Queues	8-11
Configuring Dedicated Workflow Queues	8-12
Tagging Dedicated Workflow Queues	8-13
After Dedicated Queues	8-14
Setting Dedicated Queues per Workflow Process	8-16
Queue Manager	8-17
Lab Exercises	8-18

Exercise 1: Identifying and Troubleshooting Clogged Workflow Queues.....	8-18
Exercise 2: Implementing Workflow Queue Pooling.....	8-20
Exercise 3: Implementing Dedicated Workflow Queues.....	8-22
Summary.....	8-23
Oracle Performance Tuning	
Introduction.....	9-1
Objectives.....	9-1
Lecture Notes.....	9-2
Reviewing Instance and Database.....	9-3
Reviewing Background Processes.....	9-4
System Global Area (SGA).....	9-6
Reviewing the Shared Pool.....	9-7
Reviewing the Database Buffer Cache.....	9-8
Reviewing the Redo Log Buffer.....	9-9
Understanding Oracle Storage Hierarchy.....	9-10
Database Files.....	9-11
Oracle Enterprise Manager Database Control.....	9-12
Oracle Initialization Parameters.....	9-13
Control Files.....	9-14
Oracle Tablespaces.....	9-15
Oracle Datafiles.....	9-16
Redo Log Files.....	9-17
Online Redo Log Files.....	9-18
Automatic Shared Memory Management.....	9-19
Tuning Library Cache.....	9-21
Tuning Data Dictionary Cache.....	9-22
Resizing the Shared Pool.....	9-23
Tuning the Buffer Cache.....	9-24
Tuning Redo Log Buffer.....	9-25
Identifying Waits for Log Buffer Space.....	9-26
Identifying Waits for Log File Switching.....	9-27
Identifying Waits for Incomplete Checkpointing.....	9-28
Sizing the Redo Log Buffer.....	9-29
Approximating Initial Memory Sizes.....	9-30
Automatic Workload Repository.....	9-31
Oracle Advisory Framework.....	9-33
Automatic Database Diagnostic Monitor (ADDM).....	9-34
Memory Advisor.....	9-35

Segment Advisor	9-36
Undo Advisor	9-37
SQL Tuning Advisor	9-38
SQL Access Advisor	9-39
Oracle 10g Tuner for Windchill Solutions	9-40
Using Oracle 10g Tuner	9-41
Lab Exercises	9-42
Exercise 1: Reviewing Oracle File Structure	9-42
Exercise 2: Reviewing Instance Memory Parameters	9-44
Exercise 3: Generating Reports using the Automatic Workload Repository	9-45
Exercise 4: Using the Automatic Database Diagnostic Monitor (ADDM)	9-46
Exercise 5: Installing Oracle 10g Tuner	9-47
Summary	9-47
Windchill Backup and Recovery	
Introduction	10-1
Objectives	10-1
Lecture Notes	10-2
Overview	10-3
Windchill Data Stores	10-4
Windchill Backup – Example 1	10-5
Windchill Backup – Example 2	10-6
Windchill Backup – Example 3	10-7
Windchill Backup – Example 4	10-8
Cold Backup versus Hot Backup	10-9
Cold Backup	10-10
Oracle Cold Backup	10-11
Oracle Archive Log Mode	10-12
Oracle No Archive Log Mode	10-13
Oracle Backup using the Database Control	10-14
Oracle Backup Recommendations	10-15
Oracle Flash Recovery Area	10-16
Oracle Backup - Oracle Suggested Strategy	10-17
Hot Backups	10-18
Hot Backup - Back Up Static File Systems	10-19
Hot Backup - Disable Queues and Content Cache	10-20
Hot Backup - Oracle with RMAN	10-21
Hot Backup - Oracle without RMAN	10-22
Hot Backup - Fast InStream Indices (Optional)	10-23

Hot Backup - Aphelion.....	10-24
Hot Backup - Vaults.....	10-25
Hot Backup - Content Cache Vault.....	10-26
Hot Backup - Replica Vaults (Optional).....	10-27
Enabling Queues and Content Cache.....	10-28
Backup and Recovery Testing.....	10-29
Recovering Oracle.....	10-30
Rebuilding Replica Vaults.....	10-32
Recovering Fast InStream Indices.....	10-33
Recovering Aphelion.....	10-34
Aphelion Modification Logging (mod_logs).....	10-35
Updating Aphelion mod_logs Settings.....	10-36
Aphelion Backup and Recovery - Best Practices.....	10-37
Recovering File Vaults.....	10-38
Lab Exercises.....	10-39
Exercise 1: Switching Oracle to Archive Log Mode.....	10-39
Exercise 2: Implementing Oracle-Suggested Strategy for Backups.....	10-41
Exercise 3: Exporting Oracle Database.....	10-42
Exercise 4: Backing up Aphelion Data.....	10-43
Summary.....	10-43
Windchill Infrastructure Security	
Introduction.....	11-1
Objectives.....	11-1
Lecture Notes.....	11-2
Major Security Risks.....	11-3
Preventive Techniques.....	11-4
Three Tiers of Windchill.....	11-5
Terminologies.....	11-6
Restricting Access - Firewalls.....	11-7
Restricting Access - Reverse Proxy.....	11-8
Multi-Tier Security Architecture.....	11-9
Advantages of Multi-Tier Architecture.....	11-10
Disadvantages of Multi-Tier Architecture.....	11-11
User Authentication.....	11-12
HTTPS Client Authentication.....	11-13
Securing the Data Stream - Cryptography.....	11-14
Securing the Operating System.....	11-15
Securing Applications.....	11-16

Firewall Implementation – Option 1	11-17
Firewall Implementation – Option 2	11-18
Firewall Implementation – Option 3	11-19
Firewall Implementation – Option 4	11-20
Firewall Implementation – Option 5	11-21
Summary	11-21
Windchill 9.1 System Administration Enhancements	
Introduction	A-1
Objectives	A-1
Lecture Notes	A-2
Windchill 9.1 System Enhancements	A-3
Updating Windchill from Version 9.0 to 9.1	A-4
Monitoring System Health and Performance	A-5
Converting a Modeled Type to a Soft Type	A-6
The Modeled to Soft Type Tool	A-7
The ModeledToSoftType tool: Options	A-8
The ModeledToSoftType tool: Example	A-9
Windchill 9.1 Vaulting and Replication Enhancements	A-10
Remote External Vaulting	A-11
Remote CAD Workers	A-12
Server to Server Replication	A-13
Automatic Folder Creation for Remote Vault Folders	A-14
Unreferenced File Cleanup in Vaults	A-15
Local Replication for File Servers	A-16
Summary	A-16