

WebSphere. Lombardi Edition 7.2

Upgrade Guide



Table of Contents

Copyright notice	1
Upgrading to Lombardi 7.2.0	2
Upgrading databases in all environments	2
Backing up existing installations	3
Itemizing customizations	3
Backing up databases	4
Installing WebSphere Lombardi Edition 7.2.0	4
Upgrading existing databases	5
Applying customizations	6
Verifying the upgrade	7
Exporting and importing assets	7
Before you begin	7
Steps to follow	8
Exporting existing assets from your current version	8
Backing up existing installations	8
Itemizing customizations	9
Backing up databases	9
Installing WebSphere Lombardi Edition 7.2.0	9
Applying customizations	10
Importing existing assets into WebSphere Lombardi Edition 7.2.0	10
Verifying implementations	11
Notices and Trademarks	12
Notices	12
Trademarks and service marks	14

Copyright notice

Before using this information and the product it supports, be sure to read the general information under [Notices](#).

© **Copyright International Business Machines Corporation 2010. All Rights Reserved.**



IBM WebSphere Lombardi Edition 7.2.0 Licensed Materials - Property of IBM. U. S. Government Users Restricted Rights - Use, duplication, or disclosure restricted by GSA ADP Schedule Contract with IBM Corp.

Upgrading to Lombardi 7.2.0



If you are currently running Teamworks version 7.0.0 or 7.0.1, You must upgrade to Lombardi Edition version 7.1.0 before you upgrade to Lombardi version 7.2.0.

If you are running Lombardi Teamworks 7.1.0, you can upgrade to Lombardi version 7.2.0, as described in the following sections. For this upgrade operation, you have the following options:

Option	When to use	For more information
Upgrade data in all environments	<p>If you are currently running processes and want to retain all runtime data and instances, you need to upgrade the Lombardi databases in your Process Center and each runtime environment.</p>  <p>The Process Center and each runtime environment must be running the same version of the Lombardi software. Therefore, you should upgrade the Process Center and each runtime environment within a very short timeframe. Otherwise, you should contact Customer Support to develop an approach for your upgrade that will prevent version conflicts and other potential issues.</p>	Upgrading databases in all environments
Export all Lombardi assets from version 7.1.0 and import them into Lombardi 7.2.0	<p>If there is no need to retain runtime data and instances.</p>  <p>This option is not recommended for Lombardi upgrades in most situations. You should review the information in the referenced section to understand how toolkits and snapshot histories are affected and then contact Customer Support for assistance if you still believe you need to upgrade in this manner.</p>	Exporting and importing assets

Upgrading databases in all environments

The following table lists the tasks that you must complete to upgrade to IBM® WebSphere® Lombardi Edition 7.2.0 by upgrading existing Lombardi Teamworks or WebSphere Lombardi Edition 7.1.0 databases:

Task	For more information
1. Back up existing installations (Process Center and runtime environments).	Backing up existing installations
2. Itemize customizations for each installation.	Itemizing customizations
3. Back up databases (Process Center and runtime environments).	Backing up databases

Task	For more information
4. Install WebSphere Lombardi Edition 7.2.0 Process Center and runtime environments.	Installing WebSphere Lombardi Edition 7.2.0
5. Upgrade databases for Process Center and runtime environments.	Upgrading existing databases
6. Apply customizations to each new installation.	Applying customizations
7. Start WebSphere Lombardi Edition 7.2.0 servers and verify all data.	Verifying the upgrade

Backing up existing installations

Backups enable you to save files and settings to transfer to the new WebSphere Lombardi Edition 7.2.0 installations. Although the installation of WebSphere Lombardi Edition 7.2.0 does not modify existing installations, it is still prudent to create backups before you perform the upgrade.



Create a backup of the Process Center and each runtime environment installation.

The default installation directories are the following:

- For Teamworks 7.0.0 and 7.0.1:
 - Windows®: [System_drive]/Teamworks7, where [System_drive] is the drive where Teamworks is installed
 - UNIX®: [Home]/teamworks7, where [Home] is the user's home directory.
- For WebSphere Lombardi Edition 7.1.0 :
 - Windows: [System_drive]/IBM/Lombardi7, where [System_drive] is the drive where Lombardi is installed
 - UNIX: [Home]/lombardi7, where [Home] is the user's home directory.

Locate each installation directory and copy it to a backup directory.

Itemizing customizations

Before you perform the upgrade, make a list of any customizations you have made to your existing installations and ensure you have a backup copy of your customized files. For example, if you have changed configuration settings for the Process Center using the 100Custom.xml file, you need to have a copy of that file available. This enables you to easily apply your customized settings to the new installation.



If you have changed configuration settings by directly editing configuration files such as 99Local.xml and 00Static.xml, be sure you have backup copies of each altered file for each installation.



The installation of WebSphere Lombardi Edition 7.2.0 automatically installs WebSphere Application Server 7.0. For more information about embedded application server settings, see *WebSphere Application Server Version 7.0 Information Center*. For information on other changes that might affect customizations, see the *WebSphere Lombardi Edition 7.2.0 Release Notes*.

Backing up databases

Before you upgrade to WebSphere Lombardi Edition 7.2.0, create backup copies of your existing Teamworks or WebSphere Lombardi Edition databases. This enables you to revert to the pre-upgrade state of the databases at any time, if necessary.



You need to create a backup of the Process Center databases and as well as the databases in each runtime environment.

Most databases provide a backup wizard or other user assistance for creating database backups. Contact your database administrator for more information.

Installing WebSphere Lombardi Edition 7.2.0

Install Lombardi Process Center and any runtime environments that you require. You can install Lombardi immediately from the installer program, or you can create an Automated Installer package that you can modify and later install non-interactively. For installation instructions, refer to the appropriate guide for your server type, installation type, and operating system:

Server type	Interactive installation	Automated installation
Process Center	<i>Process Center Installation and Configuration Guide for Windows</i>	<i>Automated Process Center Installation and Configuration Guide for Windows</i>
	<i>Process Center Installation and Configuration Guide for UNIX</i>	<i>Automated Process Center Installation and Configuration Guide for UNIX</i>
Runtime environment	<i>Runtime Environment Installation and Configuration Guide for Windows</i>	<i>Automated Runtime Environment Installation and Configuration Guide for Windows</i>
	<i>Runtime Environment Installation and Configuration Guide for UNIX</i>	<i>Automated Runtime Environment Installation and Configuration Guide for UNIX</i>



Although needed to render reports when running previous versions on UNIX platforms, X-Windows Virtual Frame Buffer (Xvfb) is not necessary with WebSphere Lombardi Edition 7.2.0. If Xvfb is not needed for other purposes on your UNIX server, you can stop Xvfb. If Xvfb is required for other purposes, running it in the same screen as WebSphere Lombardi Edition causes Lombardi report rendering to fail. So, in this case, be sure to change the value of the \$DISPLAY environment variable on your UNIX host before starting Lombardi servers.

The following choices in the WebSphere Lombardi Edition 7.2.0 installation program are specific to upgrading:

- If you previously installed WebSphere Lombardi Edition 7.1.0 in the default installation directory, choose a different directory for installing WebSphere Lombardi Edition 7.2.0. Both 7.1.0 and 7.2.0 use the same default installation directory.
- Specify the parameters for the existing databases that you will be upgrading and using with WebSphere Lombardi Edition 7.2.0.
- Do *not* select the **Initialize new database?** option in the WebSphere Lombardi Edition Installer, and do not perform the steps to load initial data, as described in the Installation and Configuration guides. The upgrade utility described in [Upgrading existing databases](#) performs all the necessary database and system data initialization for WebSphere Lombardi Edition 7.2.0.

- Do *not* select **Startup IBM WebSphere Lombardi Edition**. The Lombardi Process Center and runtime environments must not be running when you upgrade the databases.

Upgrading existing databases

The upgrade utility modifies your existing database schemas and data for use with WebSphere Lombardi Edition 7.2.0. If you are upgrading from Teamworks 7.0.0 or 7.0.1, this includes converting encrypted passwords to work with the encryption algorithm used by WebSphere Lombardi Edition 7.2.0. Encrypted passwords may be stored in the database for users defined through the internal security provider, for secure Web service integrations, or for Microsoft® SharePoint integrations.


The upgrade utility also updates the following assets to WebSphere Lombardi Edition 7.2.0:

- Lombardi System Data toolkit
- Process Portal process app
- Quick Start process app.

The following table lists any steps you should take before performing the database upgrade.



Be sure to create backups of your existing databases before proceeding.

Current version of Teamworks or WebSphere Lombardi Edition	Filesystem where WebSphere Lombardi Edition 7.2.0 is to be installed	Steps to take
<ul style="list-style-type: none"> • Lombardi Teamworks. 7.0.0 or 7.0.1 • WebSphere Lombardi Edition 7.1.0 previously upgraded from Teamworks 7.0.0 or 7.0.1. 	Same filesystem as the existing Teamworks or WebSphere Lombardi Edition installation.	<p>In the [Lombardi_home]/upgrade directory, modify the upgrade.properties file to set the value of the previous.lombardi.install.dir property to be your current installation directory.</p>  <p>If this property is missing or invalid, the upgrade script is unable to upgrade encrypted passwords, but can still perform other upgrade processing.</p>
Lombardi Teamworks. 7.0.0 or 7.0.1.	Different filesystem from the existing Teamworks or WebSphere Lombardi Edition installation.	Copy utility.jar from [Teamworks_home]/process-center/lib or [Teamworks_home]/process-server/lib in the older installation to [some_dir]/process-center/lib on the filesystem of the new installation, and set previous.lombardi.install.dir to [some_dir].
WebSphere Lombardi Edition 7.1.0 previously upgraded from Teamworks 7.0.0 or 7.0.1.	Different filesystem from the existing Teamworks or WebSphere Lombardi Edition installation.	If [Lombardi_home_710]/AppServer/lib/ext/jcrypt.jar is present in your installation, copy it to [Lombardi_home_720]/AppServer/lib/ext.

To perform the database upgrade, navigate to the [Lombardi_home]/upgrade directory and run Upgrade.bat (Windows) or Upgrade.sh (UNIX). The script updates existing schemas and migrates data.

If you previously upgraded to WebSphere Lombardi Edition 7.1.0 from Teamworks 7.0.0 or 7.0.1, the script also converts encrypted passwords to work with WebSphere Lombardi Edition 7.2.0.

Because the script detects the state of both databases and applies only the necessary steps, it is always safe to run again. If a step fails, you can simply re-execute the upgrade script after you have addressed the problem that caused the failure.

While the upgrade utility updates the System Data toolkit to WebSphere Lombardi Edition version 7.2.0, it does not automatically update existing dependencies. Update the existing dependencies by opening Lombardi Authoring Environment and following the steps below for each process app and toolkit:

1. Under **Toolkits**, right-click **System Data** toolkit
2. Select **Change Version of dependency**.
3. Select the 7.2.0 snapshot from the Change Dependency snapshot list.

For more information, refer to *Managing and using toolkits* in *Lombardi Authoring Environment User Guide* or the online Help.

Applying customizations

Compare your customized files from the backups of your existing installations with the corresponding files in the new WebSphere Lombardi Edition 7.2.0 installations to ensure that all of your settings are correctly applied to the new installations. Ensure that you have applied customized settings for the following artifacts:

- Configuration files and settings



If you have customized the length of tracked fields in the Performance Data Warehouse database, be sure to update the value of the Performance Data Warehouse's `max-length-of-string-columns` property. For more information, see *Extending the maximum number of characters in tracked performance data* in *Lombardi Administration Guide*.

If you are currently running Teamworks 7.0.0 or 7.0.1, note that WebSphere Lombardi Edition 7.2.0 uses a different encryption algorithm. When you update configuration files, be sure to replace encrypted passwords created by your current version with passwords encrypted by 7.2.0. For more information on encrypting passwords, see *Encrypting passwords* in the Installation and Configuration Guides.

- Application server database connection pool settings and tuning parameters
- E-mail templates
- Logging configurations
- Customized files such as CSS files, CoachDesigner.xsl, images, HTML files, and JAR files by taking the following steps:
 - Include as managed assets the customized files in your current version that have not yet been added to process applications or toolkits.
 - If you customized CoachDesigner.xsl, upload it as a managed asset so that you can use in place of the default xsl file that is installed as part of the upgrade.



Starting in WebSphere Lombardi Edition 7.2.0, CoachDesigner.xml is a managed asset.

For more information, see *Editing process app settings* and *Editing Toolkit settings* in *Lombardi Authoring Environment User Guide* or the online help.

Verifying the upgrade

Start the WebSphere Lombardi Edition 7.2.0 servers in each environment as described in the *Installation and Configuration Guides*. You can use the Process Center Console and the Designer in Lombardi Authoring Environment to verify that all process applications, toolkits, and assets are available in the repository. You can check for errors and rectify any issues as described in *Validating processes* in *Lombardi Authoring Environment User Guide* and the online Help.

From the Process Center Console, verify that connected servers are showing up and that previously installed snapshots are accurately listed. You can use the Inspector in Lombardi Authoring Environment to check active instances.

Exporting and importing assets

This upgrade option is not recommended for upgrades to WebSphere® Lombardi Edition in most situations. Read [Before you begin](#) to understand how your existing assets are affected by export and import.

Before you begin

In the majority of cases, upgrading your databases in all environments ensures that you retain all the features and flexibility offered by Teamworks and WebSphere Lombardi Edition 7.1.0. If you export and then import existing assets, your assets are affected as follows:

- Imported toolkits are immutable.
- Snapshot histories for process applications and toolkits are lost.

Because imported toolkits are immutable, no one can change the items within them. And, no user can change the immutable quality of imported toolkits. However, the user who imports a toolkit does have administrative access to that toolkit and can grant the following access to other users and groups:

Read	Users with Read access can clone the imported toolkit or copy items from the toolkit to a different toolkit or process application.
Write	Users with Write access have all the capabilities included with Read access, plus they can import a new version of the toolkit and archive older versions of the toolkit. Write access also enables users to restore previously archived versions.
Admin	Users with Admin access have all the capabilities included with Write access, plus they can grant or remove administrative access to the toolkit.

When you export process applications and toolkits, you select a snapshot for the export procedure. In most cases, you select the most recent snapshot and perhaps one or more additional snapshots that represent important milestones. Because you export particular snapshots, you lose the history provided by any additional snapshots that you may have stored in the Lombardi Process Center repository.

With a database upgrade, your toolkits remain mutable and you retain the entire snapshot history for all process applications and toolkits. For these reasons, a database upgrade as outlined in [Upgrading databases in all environments](#) is appropriate in most situations.

Steps to follow

The following table lists the tasks that you must complete to upgrade to WebSphere Lombardi Edition 7.2.0 by exporting and importing existing assets:

Task	For more information
1. Export existing assets.	Exporting existing assets from your current version
2. Back up existing installations (Process Center and runtime environments).	Backing up existing installations
3. Itemize customizations for each installation.	Itemizing customizations
4. Back up existing databases.	Backing up databases
5. Install Lombardi 7.2.0 Process Center and runtime environments.	Installing WebSphere Lombardi Edition 7.2.0
6. Apply customizations to each new installation.	Applying customizations
7. Import existing assets into WebSphere Lombardi Edition 7.2.0 Process Center.	Importing existing assets into WebSphere Lombardi Edition 7.2.0
8. Verify implementations in Designer in Lombardi Authoring Environment.	Verifying implementations

Exporting existing assets from your current version

You can export assets using the Process Center Console. To access the Process Center Console either start Authoring Environment or open your Web browser to `http://[host_name]:[port]/ProcessCenter`. Process Center Server must be running.

1. Export existing process applications and toolkits as described in *Importing and exporting process applications from the Process Center Console* and *Importing and exporting toolkits from the Process Center Console* in *Authoring Environment User Guide* and the online Help.
2. When you are finished exporting all existing assets, exit Authoring Environment or close your browser window.
3. Stop the servers in the Process Center and each runtime environment as described in the *Installation and Configuration Guides*.

Backing up existing installations

Backups enable you to save files and settings to transfer to the new WebSphere Lombardi Edition 7.2.0 installations. Although the installation of 7.2.0 does not modify existing installations, it is still prudent to create backups before you perform the upgrade.



Create a backup of the Process Center and each runtime environment installation.

The default installation directories are the following:

- For Teamworks 7.0.0 and 7.0.1:
 - Windows®: `[System_drive]/Teamworks7`, where `[System_drive]` is the drive where Teamworks is installed
 - UNIX®: `[Home]/teamworks7`, where `[Home]` is the user's home directory.

- For WebSphere Lombardi Edition 7.1.0 :
 - Windows: [System_drive]/IBM/Lombardi7, where [System_drive] is the drive where Lombardi is installed
 - UNIX: [Home]/lombardi7, where [Home] is the user's home directory.

Locate each installation directory and copy it to a backup directory.

Itemizing customizations

Before you perform the upgrade, make a list of any customizations you have made to your existing installations and ensure you have a backup copy of your customized files. For example, if you have changed configuration settings for the Process Center using the 100Custom.xml file, you need to have a copy of that file available. This enables you to easily apply your customized settings to the new installation.



If you have changed configuration settings by directly editing configuration files such as 99Local.xml and 00Static.xml, be sure you have backup copies of each altered file for each installation.



The installation of WebSphere Lombardi Edition 7.2.0 automatically installs WebSphere Application Server 7.0. For more information about embedded application server settings, see *WebSphere Application Server Version 7.0 Information Center*. For information on other changes that might affect customizations, see the *WebSphere Lombardi Edition 7.2.0 Release Notes*.

Backing up databases

Before you upgrade to WebSphere Lombardi Edition 7.2.0, create backup copies of your existing Teamworks or WebSphere Lombardi Edition databases. This enables you to revert to the pre-upgrade state of the databases at any time, if necessary.



You need to create a backup of the Process Center databases and as well as the databases in each runtime environment.

Most databases provide a backup wizard or other user assistance for creating database backups. Contact your database administrator for more information.

Installing WebSphere Lombardi Edition 7.2.0

Install Lombardi Process Center and any runtime environments that you require. For instructions, see the *Installation and Configuration Guide* appropriate for the server type, installation type, and operating system.



Be sure to either select the option to **Initialize new databases?** in the Lombardi Installer or run the initialization script for each WebSphere Lombardi Edition installation as described in the *Loading initial data* in the Installation and Configuration Guides.



Although needed to render reports when running previous versions on UNIX platforms, X-Windows Virtual Frame Buffer (Xvfb) is not necessary with WebSphere Lombardi Edition 7.2.0. If Xvfb is not needed for other purposes on your UNIX server, you can stop Xvfb. If Xvfb is required for other purposes, running it in the same screen as WebSphere Lombardi Edition causes Lombardi report rendering to fail. So, in this case, be

sure to change the value of the \$DISPLAY environment variable on your UNIX host before starting Lombardi servers.

Applying customizations

Compare your customized files from the backups of your existing installations with the corresponding files in the new WebSphere Lombardi Edition 7.2.0 installations to ensure that all of your settings are correctly applied to the new installations. Ensure that you have applied customized settings for the following artifacts:

- Configuration files and settings



If you have customized the length of tracked fields in the Performance Data Warehouse database, be sure to update the value of the Performance Data Warehouse's `max-length-of-string-columns` property. For more information, see *Extending the maximum number of characters in tracked performance data* in *Lombardi Administration Guide*.

If you are currently running Teamworks 7.0.0 or 7.0.1, note that WebSphere Lombardi Edition 7.2.0 uses a different encryption algorithm. When you update configuration files, be sure to replace encrypted passwords created by your current version with passwords encrypted by 7.2.0. For more information on encrypting passwords, see *Encrypting passwords* in the Installation and Configuration Guides.

- Application server database connection pool settings and tuning parameters
- E-mail templates
- Logging configurations
- Customized files such as CSS files, CoachDesigner.xsl, images, HTML files, and JAR files by taking the following steps:
 - Include as managed assets the customized files in your current version that have not yet been added to process applications or toolkits.
 - If you customized CoachDesigner.xsl, upload it as a managed asset so that you can use in place of the default xsl file that is installed as part of the upgrade.



Starting in WebSphere Lombardi Edition 7.2.0, CoachDesigner.xsl is a managed asset.

For more information, see *Editing process app settings* and *Editing Toolkit settings* in *Lombardi Authoring Environment User Guide* or the online help.

Importing existing assets into WebSphere Lombardi Edition 7.2.0

Verify that the WebSphere Lombardi Edition 7.2.0 Process Center Server is running and then start the Process Center Console. To access the Process Center Console either start Lombardi Authoring Environment or open your Web browser to `http://[host_name]:[port]/ProcessCenter`.

1. Import the previously exported process applications and toolkits as described in *Importing and exporting process applications from the Process Center Console* and *Importing and exporting toolkits from the Process Center Console* in *Lombardi Authoring Environment User Guide* and the online Help.



If an imported process application or toolkit contains a password in its implementation (for example, a protected web service implementation), the password field is blank when imported into Lombardi 7.2.0.

2. If your imported assets include tracking groups or other data required by the Performance Data Warehouse, be sure the warehouse is running and then select **File > Send definitions to Performance Data Warehouse** from the main menu. Sending existing definitions enables authors to capture data needed to test reports (and other assets that require performance data) while developing those assets in Lombardi Authoring Environment.

Verifying implementations

After importing the assets, open them in the Designer in Lombardi Authoring Environment to check for validation errors. You can open each imported process application and toolkit and check for errors as described in *Validating processes in Lombardi Authoring Environment User Guide* and the online Help.

Notices and Trademarks

Notices

This information was developed for products and services offered in the U.S.A. IBM may not offer the products, services, or features discussed in this document in other countries. Consult your local IBM representative for information on the products and services currently available in your area. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-IBM product, program, or service.

IBM may have patents or pending patent applications covering subject matter described in this document. The furnishing of this documentation does not grant you any license to these patents. You can send license inquiries, in writing, to:

*IBM Director of Licensing
IBM Corporation
North Castle Drive
Armonk, NY 10504-1785
U.S.A.*

For license inquiries regarding double-byte character set (DBCS) information, contact the IBM Intellectual Property Department in your country or send inquiries, in writing, to:

*IBM World Trade Asia Corporation
Licensing
2-31 Roppongi 3-chome, Minato-ku
Tokyo 106-0032, Japan*

The following paragraph does not apply to the United Kingdom or any other country where such provisions are inconsistent with local law:

INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some states do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. IBM may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

Any references in this information to non-IBM Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this IBM product and use of those Web sites is at your own risk.

IBM may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Licensees of this program who wish to have information about it for the purpose of enabling: (i) the exchange of information between independently created programs and other programs (including this one) and (ii) the mutual use of the information which has been exchanged, should contact:

*Intellectual Property Dept. for WebSphere Software
IBM Corporation
3600 Steeles Ave. East
Markham, Ontario
Canada L3R 9Z7*

Such information may be available, subject to appropriate terms and conditions, including in some cases, payment of a fee.

The licensed program described in this document and all licensed material available for it are provided by IBM under terms of the IBM Customer Agreement, IBM International Program License Agreement or any equivalent agreement between us.

Any performance data contained herein was determined in a controlled environment. Therefore, the results obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurements may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

Information concerning non-IBM products was obtained from the suppliers of those products, their published announcements or other publicly available sources. IBM has not tested those products and cannot confirm the accuracy of performance, compatibility or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.

All statements regarding IBM's future direction or intent are subject to change or withdrawal without notice, and represent goals and objectives only.

This information contains examples of data and reports used in daily business operations. To illustrate them as completely as possible, the examples include the names of individuals, companies, brands, and products. All of these names are fictitious and any similarity to the names and addresses used by an actual business enterprise is entirely coincidental.

COPYRIGHT LICENSE:

This information contains sample application programs in source language, which illustrate programming techniques on various operating platforms. You may copy, modify, and distribute these sample programs in any form without payment to IBM, for the purposes of developing, using, marketing or distributing application programs conforming to the application programming interface for the operating platform for which the sample programs are written. These examples have not been thoroughly tested under all conditions. IBM, therefore, cannot guarantee or imply reliability, serviceability, or function of these programs.

Each copy or any portion of these sample programs or any derivative work, must include a copyright notice as follows:

```
© (your company name) (year). Portions of this code are derived from IBM Corp.  
Sample Programs.  
© Copyright IBM Corp. _enter the year or years_. All rights reserved.
```

If you are viewing this information softcopy, the photographs and color illustrations may not appear.

Trademarks and service marks

IBM, the IBM logo, and ibm.com are trademarks or registered trademarks of International Business Machines Corporation in the United States, other countries, or both. If these and other IBM trademarked terms are marked on their first occurrence in this information with a trademark symbol (® or ™), these symbols indicate U.S. registered or common law trademarks owned by IBM at the time this information was published. Such trademarks may also be registered or common law trademarks in other countries. A current list of IBM trademarks is available on the Web at “Copyright and trademark information” at <http://www.ibm.com/legal/copytrade.shtml>.

Linux is a registered trademark of Linus Torvalds in the United States, other countries, or both.

Microsoft and Windows are trademarks of Microsoft Corporation in the United States, other countries, or both.

UNIX is a registered trademark of The Open Group in the United States and other countries.

Java and all Java-based trademarks and logos are trademarks of Sun Microsystems, Inc. in the United States, other countries, or both.

Other company, product, or service names may be trademarks or service marks of others.