

IBM Copy Services Manager



Release Notes November 2017

Version 6 Release 2

IBM Copy Services Manager



Release Notes November 2017

Version 6 Release 2

Note:

Before using this information and the product it supports, read the information in "Notices" on page 15.

Edition notice

This edition applies to Version 6, Release 2 , Modification 1 of IBM Copy Services Manager and to all subsequent releases and modifications until otherwise indicated in new editions.

© Copyright IBM Corporation 2005, 2017.

US Government Users Restricted Rights – Use, duplication or disclosure restricted by GSA ADP Schedule Contract with IBM Corp.

Contents

About this document	v
What's new	vii
Prerequisites	1
Getting support and information	3
Publications and related information	5
Known issues and workarounds	9
Notices	15
Privacy policy considerations	17
Trademarks	17

About this document

This document contains the release notes in support of IBM® Copy Services Manager Version 6, Release 2, Modification 1.

What's new

The following functions are introduced in IBM Copy Services Manager Version 6.2.1:

Version 6, Release 2, Modification 1

This table provides the current technical changes and enhancements to Copy Services Manager as of November 2017.

For more information on how to use these new features, see the IBM Copy Services Manager online product documentation (<http://www-01.ibm.com/support/knowledgecenter/SSESK4>).

Table 1. in Copy Services Manager Version 6.2.1 (November 2017)

Function or feature	Description
Usability enhancements to the Session Overview panel	<p>Several usability features are now added to the Copy Services Manager GUI on the Session Overview panel. This panel lists all the sessions that are configured on the Copy Services Manager server.</p> <p>The table on this panel has a number of customizable features, including filter, column reordering, and column sorting. These customizable features now persist even if you log out and back in, or refresh the page.</p> <p>You can also now hide and unhide columns in the table.</p>
Support for restore capabilities on SAN Volume Controller FlashCopy® sessions	<p>The restore command restores the point-in-time relationships from the target volumes to the source volumes of the FlashCopy session, and overwrites any data on the source volumes. You can now restore FlashCopy sessions in the opposite direction on SAN Volume Controller storage systems.</p>
Discovery of disconnected storage under FICON started by using a refresh command	<p>A storage system refresh operation initiates the discovery of FICON-attached devices. The refresh command starts the thread that detects if the storage system is connected through a FICON connection to z/OS instead of waiting for the periodic timer to start.</p>
Support for creating DS8000 system diagnostics from the GUI or CLI for use in resolving issues	<p>For a selected storage system with an HMC connection, you can now perform either a warm start or an on-demand dump to collect diagnostic information. A warm start collects microcode data that is useful in diagnosing problems and is designed for data integrity, data protection, and data capture. An on-demand dump is a nondisruptive action to collect diagnostic information.</p>

Table 1. in Copy Services Manager Version 6.2.1 (November 2017) (continued)

Function or feature	Description
Copy rate and clean rate parameters changed for storage systems that run IBM Spectrum Virtualize	<p>The copy rate is the rate that the storage system uses to perform the background copy of the FlashCopy role pair. You can adjust the copy rate by using the Copy Services Manager GUI.</p> <p>The clean rate controls the rate at which the cleaning process operates, and can be adjusted in the <code>rmserver.properties</code> file. Both of these rates increased to a maximum of 150 for newer systems at release 7.8.1 and higher. The default for both rates is 50.</p>
New Global Mirror Either Direction session type	Copy Services Manager Version 6.2.1 now offers a new Global Mirror Either Direction session type. This session offers a new four-volume solution that supports Global Mirror in both directions: H1 J1/H2 J2.
New ways to manage space	You can now employ new space-management methods in Copy Services Manager. These new methods include the Reflash After Recover option, and the Free Journal Space command for sessions that contain Global Mirror relationships.
New SNMP event and email notifications for any detected path failures	Path failures can degrade replication bandwidth or performance. Copy Services Manager now periodically queries for path status and reports it in the GUI. Additionally, an email notification is sent.
Support for scheduled tasks against Copy Services Manager sessions	<p>You can now create scheduled tasks against Copy Services Manager sessions by using the new Schedule Task wizard in the GUI.</p> <p>Actions can be performed on the tasks, including: modify, remove, enable, disable, and run.</p>
New scheduled task event and email notifications	An SNMP notification is also sent when scheduled tasks are complete, or encounter errors that result in failure.
You can now edit the server properties file from within the Copy Services Manager GUI	<p>Starting with Copy Services Manager 6.2.1, a panel is available under the Settings menu in the GUI where you can edit the server properties configuration.</p> <p>You can also make edits to the <code>rmserver.properties</code> file outside of the GUI.</p>

Table 1. in Copy Services Manager Version 6.2.1 (November 2017) (continued)

Function or feature	Description
<p>Ability to have Copy Services Manager automatically start replication at the Metro Mirror secondary after a HyperSwap occurs for multi-target session types (Metro Mirror - Metro Mirror and Metro Mirror - Global Mirror)</p>	<p>When HyperSwap is enabled on multi-target sessions with Metro Mirror relationships, by default a HyperSwap command or event results in all I/O being swapped to the Metro Mirror secondary. And then the Copy Services Manager session moves to a Target Available state.</p> <p>After the swap, no replication occurs, and a manual Start command must be issued for replication to run again.</p> <p>In Copy Services Manager 6.2.1, you can add the following property into the <code>rmsvr.properties</code> file: <code>csm.aut.restart.after.swap=true</code></p> <p>When this option is present, after a swap occurs, Copy Services Manager automatically restarts replication from the site that was swapped to, to the alternative site without user intervention.</p> <p>If HyperSwap is enabled on the role pair that is automatically started, as soon as all pairs in the role pair reach a Prepared state, the HyperSwap configuration is automatically loaded as well. This option helps to ensure that replication is started quickly after a HyperSwap command or event to provide continual disaster recovery and high availability needs.</p>
<p>Ability to convert the Copy Services Manager license file to a string key for DS8000 HMC enablement</p>	<p>If you only have a stand-alone Copy Services Manager (<code>csm-license.zip</code>) license file, then you need to convert that file to a string key to enable the DS8000 HMC.</p> <p>You can download a Copy Services Manager Install File for your operating system from IBM Fix Central (www.ibm.com/support/fixcentral), which is used to convert the zip file to a string key.</p>

Table 1. in Copy Services Manager Version 6.2.1 (November 2017) (continued)

Function or feature	Description
Installation documentation corrections and improvements	<p>The following installation procedures are now updated:</p> <ul style="list-style-type: none"> • Correction to the "Silent installation" section of the "Installing on distributed systems" instructions. • Changes to the postinstallation procedures for IBM Z: <ul style="list-style-type: none"> – The IWNRACF2 job – The IWNINSTL job • Parameter correction for the Started Task for HSIBAPI in "Preparing to use HyperSwap from z/OS." • New prerequisite information added to "Migrating on z/OS." • New details added to the upgrading procedures for both IBM Z and distributed systems in "Upgrading Copy Services Manager."
Updated graphic images in documentation	<p>Many of the graphics and icons in the Copy Services Manager GUI have a new look, as now also reflected within the documentation.</p>

Prerequisites

Prerequisites for Copy Services Manager include supported operating systems, browsers, and storage systems.

The Copy Services Manager prerequisites can be found at <http://www-01.ibm.com/support/docview.wss?uid=ssg1S1005402>.

Getting support and information

There are several resources available for obtaining additional information and support.

IBM System Storage® products website

IBM System Storage products: <http://www.ibm.com/servers/storage>

IBM Copy Services Manager Support Portal

Copy Services Manager Support Portal (https://www.ibm.com/support/home/product/10000480/IBM_Copy_Services_Manager)

Note: You might need to enter your IBM ID when you first enter this portal.

IBM Support representative

Contact your IBM support representative.

Publications and related information

Product guides, other IBM publications, and websites contain information that relates to IBM Copy Services Manager.

To view a PDF file, you need Adobe Reader. You can download it at no charge from the Adobe website (get.adobe.com/reader/).

Online documentation

The IBM Copy Services Manager online product documentation (<http://www-01.ibm.com/support/knowledgecenter/SSESK4>) contains all of the information that is required to install, configure, and manage IBM Copy Services Manager. The online documentation is updated between product releases to provide the most current documentation.

Publications

You can order or download individual publications that have an order number from the IBM Publications Center website (www.ibm.com/shop/publications/order/).

Table 2. IBM Copy Services Manager product publications

Title	Description	Order number
<i>IBM Copy Services Manager Installation and Configuration Guide</i>	This guide provides task-oriented information for anyone who installs and configures IBM Copy Services Manager.	V6.2.1 SC27-8543-06 V6.2.0 SC27-8543-05 V6.1.5 SC27-8543-04 V6.1.4 SC27-8543-03 V6.1.3 SC27-8543-02 V6.1.2 SC27-8543-01 V6.1.0 SC27-8543-00
<i>IBM Copy Services Manager User's Guide</i>	This guide provides task-oriented information for users of IBM Copy Services Manager. Users should be familiar with the following topics <ul style="list-style-type: none">• Copy Services concepts• General principles of IBM AIX®, Linux, Windows, and the IBM z®/OS operating systems• Simple Network Management Protocol (SNMP) concepts• Storage Area Network (SAN) concepts	V6.2.1 SC27-8542-07 V6.2.0 SC27-8542-06 V6.1.5 SC27-8542-05 V6.1.4 SC27-8542-04 V6.1.3 SC27-8542-03 V6.1.2 SC27-8542-02 V6.1.1 SC27-8542-01 V6.1.0 SC27-8542-00
<i>IBM Copy Services Manager Command-line Interface User's Guide</i>	This guide provides information for customizing and using the command-line interface for IBM Copy Services Manager. This guide provides information for customizing and using the command-line interface for IBM Copy Services Manager.	V6.2.1 SC27-8998-02 V6.2.0 SC27-8998-01 V6.1.5 SC27-8998-00

Table 2. IBM Copy Services Manager product publications (continued)

Title	Description	Order number
<i>IBM Copy Services Manager z/OS FlashCopy Manager User's Guide</i>	This guide provides task-oriented information for those who administer FlashCopy operations in a z/OS® environment.	V6.2.0 SC27-8032-02 V6.1.5 SC27-8032-01 V6.1.3 SC27-8032-00
<i>IBM Copy Services Manager Release Notes</i>	This document contains the release notes in support of IBM Copy Services Manager.	Search on IBM Copy Services Manager at IBM Fix Central (www.ibm.com/support/fixcentral) to locate and download the Release Notes® related to your product version.
<i>IBM Copy Services Manager for z Systems Program Directory and IBM Copy Services Manager Basic Edition for z Systems Program Directory</i>	<p>These program directories are intended for system programmers who are responsible for program installation and maintenance.</p> <p>They contain information about the material and procedures associated with the installation of IBM Copy Services Manager for z Systems® and IBM Copy Services Manager Basic Edition for z Systems.</p>	<p><i>IBM Copy Services Manager for z Systems Program Directory</i></p> <p>V6.2.1 GI13-4517-05 V6.2.0 GI13-4517-04 V6.1.4 GI13-4517-03 V6.1.3 GI13-4517-02 V6.1.1 GI13-4517-01 V6.1.0 GI13-4517-00</p> <p><i>IBM Copy Services Manager Basic Edition for z Systems Program Directory</i></p> <p>V6.2.1 GI13-4518-05 V6.2.0 GI13-4518-04 V6.1.4 GI13-4518-03 V6.1.3 GI13-4518-02 V6.1.1 GI13-4518-01 V6.1.0 GI13-4518-00</p>
<i>Program Directory for IBM Copy Services Manager FlashCopy Manager for IBM Copy Services Manager for z Systems</i>	This guide is intended for the system programmer or storage administrator of the IBM Copy Services Manager z/OS FlashCopy Manager utility.	V6.2.1 GI11-2904-04 V6.2.0 GI11-2904-03 V6.1.4 GI11-2904-02 V6.1.3 GI11-2904-01
<i>IBM DSCLI on z/OS Program Directory</i>	<p>This program directory is intended for system programmers who are responsible for program installation and maintenance.</p> <p>It contains information about the material and procedures associated with the installation of the IBM Copy Services Manager on the DS8000® HMC for access to the DS8000 CLI.</p>	V6.2.1 GI13-3563-02 V6.2.0 GI13-3563-01 V6.1.4 GI13-3563-00

Related websites

View the websites in the following table to get more information about IBM Copy Services Manager.

Table 3. IBM Copy Services Manager related websites

Title	Description
IBM website (ibm.com)®	Find more information about IBM products and services.

Table 3. IBM Copy Services Manager related websites (continued)

Title	Description
IBM Support Portal website(www.ibm.com/storage/support)	Find support-related information such as downloads, documentation, troubleshooting, and service requests and PMRs.
Copy Services Manager Support Portal (https://www.ibm.com/support/home/product/10000480/IBM_Copy_Services_Manager)	Find technical support information that is specific to IBM Copy Services Manager.
IBM Directory of Worldwide Contacts website(www.ibm.com/planetwide)	Find contact information for general inquiries, technical support, and hardware and software support by country.
IBM Redbooks® website(www.redbooks.ibm.com/)	Find technical information developed and published by IBM International Technical Support Organization (ITSO).
IBM System Storage Interoperation Center (SSIC) website (www.ibm.com/systems/support/storage/config/ssic)	Find information about supported host system models, operating systems, adapters, and switches.
IBM Fix Central (www.ibm.com/support/fixcentral)	Find fixes and updates for your system's software, hardware, and operating system.

Known issues and workarounds

The following information describes current known issues with IBM Copy Services Manager Version 6.2.1 and any associated workarounds.

Table 4. IBM Copy Services Manager Version 6.2.1 known issues and workarounds

Issue	Explanation and possible workaround
<p>When defined with the same consistency group name, all sessions that share the same DS8000 storage system have the same Master/Subordinate topology, even if there are sessions that do not span the same set of storage systems.</p>	<p>Copy Services Manager supports assigning the same consistency group name to multiple Global Mirror sessions. Master/Subordinate sessions for DS8000 are supported, but limited testing was completed for different combinations of Master/Subordinate configurations, due to environment limitations.</p> <p>Consult with IBM Support to ensure proper coverage of your required configuration.</p>
<p>When more than 256 Copy Services Manager sessions are assigned the same consistency group name, internal issues are encountered.</p>	<p>Limit the number of sessions with the same consistency group name to under 256. This issue will be addressed in a future release.</p>
<p>The Global Mirror options are not synced across sessions that share the same consistency group name. Therefore, when the Global Mirror Master is started, it uses the options that were defined for one of the sessions.</p>	<p>In Copy Services Manager, you can modify certain options for Global Mirror sessions, such as the consistency-group interval time. Ensure that all sessions that have the same consistency group name are also defined with the same Global Mirror options.</p>
<p>When the Global Mirror data for a session is exported, gaps might result with no data while the session was in a suspended state.</p>	<p>When a Global Mirror session that shares a consistency group name with other sessions is suspended, the suspended session is removed from the Master on the hardware while the other sessions are restarted and continue to form consistency groups. When a session is removed from the Master, Copy Services Manager stops collecting historical Global Mirror data for that session.</p> <p>This code limitation has no current workaround.</p>
<p>Copy Services Manager does not support the ability to change the Master of the Metro Global Mirror session from the H2 volumes to the H1 volumes without affecting the other Global Mirror sessions that share the consistency group name.</p>	<p>Copy Services Manager supports the ability to use the same consistency group name across a Metro Global Mirror session. However, when running H1>H2, if you issue either a Start H1>H3 to complete an Incremental Resync, or you issue a Suspend/Recover/Start H2H1H3 to switch the direction of the session, the Global Mirror session is terminated at site 2, which affects the other shared Global Mirror sessions.</p> <p>This is a code limitation with no current workaround.</p>

Table 4. IBM Copy Services Manager Version 6.2.1 known issues and workarounds (continued)

Issue	Explanation and possible workaround
<p>Copy Services Manager does not support local OS authentication.</p>	<p>When you migrate from a Tivoli® Storage Productivity Center for Replication installation that uses local OS authentication to a Copy Services Manager installation (see the <i>IBM Copy Services Manager Installation and Configuration Guide</i> for migration instructions), local OS users are displayed on the Administration page with an indication that they were not found in either the LDAP or Basic User Registries.</p> <p>Delete these local OS users, and then either create new basic users for local users, or configure LDAP to use LDAP users or groups for authentication.</p>
<p>There is a known DS8000 issue on certain microcode levels when a relationship is running in Global Copy and switched to a Metro Mirror mode. An error occurs indicating that the multi-target feature is not supported. This problem might be encountered on multi-target Metro Mirror - Global Mirror and multi-target Metro Mirror - Global Mirror with Practice session types.</p>	<p>Suspend the Metro Mirror pairs, and then restart to work around the issue.</p>
<p>After a Recover to Site 3 for a Metro Mirror - Global Mirror with Practice session that uses count-key data (CKD) volumes, when a Start H3->H1->H2 or Start H3->H2->H1 command is issued, the hardware might return an error code 0F74 with Sense Byte 9 set to 0A on the H1-H3 relationships. This situation leads to a full copy of the data from H3 to H1.</p>	<p>There is a known issue after recovering to site 3 for a Metro Mirror - Global Mirror with Practice session using CKD volumes. The Start H3->H1->H3 and Start H3->H2->H1 command attempt to establish failed over relationships from the H3 volume back to H1 to avoid a full copy, as H3 is the target of the FlashCopy relationship and not in the remote copy relationship between site 1 and site 3. Due to the error in setting up the failback to avoid a full copy, the H3 to H1 relationship performs a full copy of the data.</p>
<p>Copy Services Manager does not support migrating from one Copy Services Manager server to another on z/OS.</p>	<p>If you need to migrate Copy Services Manager from one server to another on z/OS, contact IBM Support.</p> <p>Also, see the section that is titled "Backing up and restoring product data" in Chapter 2 of the <i>IBM Copy Services Manager User's Guide</i> for a high availability approach.</p>

Table 4. IBM Copy Services Manager Version 6.2.1 known issues and workarounds (continued)

Issue	Explanation and possible workaround
<p>The Start H3H1H2/StartH3H2H1 command on a multi-target Metro Mirror - Global Mirror with Practice session receives a 0F52 hardware error.</p>	<p>During the Start H3H1H2/Start H3H2H1 command operation for a multi-target Metro Mirror - Global Mirror with Practice session, a failover is issued to the H1/H2 volume to later establish H3 to H1/H2. If there are no paths between H1/H2 and H3, you receive a 0F52 error.</p> <p>The workaround for this scenario is to ensure that there are paths from H1/H2 to H3 and H3 to H1/H2 before you issue the Start H3H1H2 or H3H2H1 command.</p>
<p>When you use Copy Services Manager on a DS8000 HMC, the key size for a certificate must be 2048.</p>	<p>On z/OS 2.1, you might encounter a problem due to the key size of a certificate not defaulting to 2048. You can resolve this issue by adding the SIZE(2048) parameter to the RACDCERT statement when you generate a self-signed certificate.</p> <p>For more information, see the topic that is titled "Configuring a secure communication between HyperSwap® and the client" in the Install Guide or online product documentation. "Publications and related information" on page 5 provides details on where to find this information.</p>
<p>When you upgrade from a previous version of Copy Services Manager to Version 6.2.0, you might encounter an error when you edit the port pairings CSV file in the GUI.</p>	<p>A new feature in Copy Services Manager 6.2.0 is the ability to add logical paths by editing a sample CSV file in the GUI. However, in previous versions of this file, one of the lines that is supposed to be a comment starts with a dollar (\$) sign instead of a number (#) sign. This situation returns an error.</p> <p>This issue is fixed in Version 6.2.0, but is retained for upgrades. Therefore, be aware that you might encounter this error if you upgrade from an older version of Copy Services Manager.</p>

Table 4. IBM Copy Services Manager Version 6.2.1 known issues and workarounds (continued)

Issue	Explanation and possible workaround
<p>There are limitations for DS8000 storage systems when you set a property in the <code>rmserver.properties</code> file on a multi-target session to support Remote Pair FlashCopy in a multi-target environment.</p>	<p>The only option that is currently supported by DS8000 for Remote Pair FlashCopy (Preserve Mirror) is Attempt to preserve Metro Mirror consistency but fail FlashCopy if Metro Mirror target consistency can't be preserved, or restricted mode in the DSCLI.</p> <p>You might receive the following error if you use the wrong option: IWNR1027E : The command Flash in session rpfc-mtc23-12xx has completed with one or more errors. error Jun 6, 2017 4:07:52 PM : csmuser : IWNR2114E : A hardware error occurred during the running of a command for the pair in session rpfc-mtc23-12xx for copy set DS8000:2107.LD581:VOL:1206 with source DS8000:2107.LD581:VOL:1206 and target DS8000:2107.LD581:VOL:1201 in role pair H1-T1. The hardware returned an error code of 0f89. Sense Byte 9: 10.</p>
<p>Unable to connect to older DS8000 storage systems after upgrade to Copy Services Manager 6.2.0</p>	<p>After you upgrade to Copy Services Manager 6.2.0, the Copy Services Manager server might be unable to connect to older DS8000 storage systems due to updated security protocols.</p> <p>Contact support if you encounter problems with connecting to the storage system after upgrade.</p>
<p>Discovery of disconnected storage under FICON during storage systems refresh</p>	<p>If a storage system disconnects from the FICON attachment under z/OS, its status, along with the parent connection is reported as Degraded and marked with the message: z/OS Device Path Connection Degraded.</p> <p>During normal operation, after the device reconnects, the status goes back to Connected for both the device and its connection. However, if a device is disconnected and then removed from the Copy Services Manager storage connection panel, the message is not removed from the parent. The parent continues to display z/OS Device Path Connection Degraded until Copy Services Manager is restarted.</p>

Table 4. IBM Copy Services Manager Version 6.2.1 known issues and workarounds (continued)

Issue	Explanation and possible workaround
<p>Removal of a Copy Services Manager user also results in the removal of any users that have the same name, but in a different case.</p>	<p>If you have multiple user IDs with the same spelling, but different case, you should not remove any of these user ID variations. Doing so causes all of the users to be removed from the Copy Services Manager access control list, and none of the users are then able to log in to the account.</p> <p>You can add the deleted user back if necessary with no errors. Remove the other users from the <code>basicRegistry.xml</code> file, and then they can be added again.</p>
<p>Migration from Tivoli Storage Productivity Center for Replication to Copy Services Manager on z/OS results in some features that fail to start if the <code>rmserver.properties</code> file is in ASCII and not EBCDIC.</p>	<p>Check your <code>rmserver.properties</code> file before you migrate from Tivoli Storage Productivity Center for Replication to Copy Services Manager. If the file is encoded in ASCII, change it to EBCDIC encoding before you proceed with the migration.</p> <p>For more information and detailed steps, see "Migrating on z/OS," in the installation procedures. See "Publications and related information" on page 5 for where to obtain the Install Guide or view the installation topics in the online help.</p>
<p>On a multi-target Metro Mirror - Global Mirror session with HyperSwap enabled, after the swap occurs, an 0FD2 error might appear on the original Global Mirror leg when you start replication from the new site.</p>	<p>The original Global Mirror leg is non-participating and does not affect replication. However, after you swap back, the leg might continue to show the error. If so, the error puts the session in a Target Available and Severe state, even though the swap was successful.</p> <p>To clear the error on the non-participating role pair, another start can be issued, even if the session is already in a Prepared state.</p>

Notices

This information was developed for products and services offered in the US. This material might be available from IBM in other languages. However, you may be required to own a copy of the product or product version in that language in order to access it.

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 document 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, MD-NC119
Armonk, NY 10504-1785
US*

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:

*Intellectual Property Licensing
Legal and Intellectual Property Law
IBM Japan Ltd.
19-21, Nihonbashi-Hakozakicho, Chuo-ku
Tokyo 103-8510, Japan*

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 jurisdictions 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 websites are provided for convenience only and do not in any manner serve as an endorsement of those

websites. The materials at those websites are not part of the materials for this IBM product and use of those websites is at your own risk.

IBM may use or distribute any of the information you provide 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:

*IBM Director of Licensing
IBM Corporation
North Castle Drive, MD-NC119
Armonk, NY 10504-1785
US*

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.

The performance data discussed herein is presented as derived under specific operating conditions. Actual results may vary.

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.

This information is for planning purposes only. The information herein is subject to change before the products described become available.

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 actual people or business enterprises 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. The sample programs are provided "AS IS", without warranty of any kind. IBM shall not be liable for any damages arising out of your use of the sample 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_.

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

Privacy policy considerations

IBM Software products, including software as a service solutions, (“Software Offerings”) may use cookies or other technologies to collect product usage information, to help improve the end user experience, to tailor interactions with the end user, or for other purposes. In many cases no personally identifiable information is collected by the Software Offerings. Some of our Software Offerings can help enable you to collect personally identifiable information. If this Software Offering uses cookies to collect personally identifiable information, specific information about this offering’s use of cookies is set forth below.

This Software Offering does not use cookies or other technologies to collect personally identifiable information.

If the configurations deployed for this Software Offering provide you as customer the ability to collect personally identifiable information from end users via cookies and other technologies, you should seek your own legal advice about any laws applicable to such data collection, including any requirements for notice and consent.

For more information about the use of various technologies, including cookies, for these purposes, see IBM’s Privacy Policy at <http://www.ibm.com/privacy> and IBM’s Online Privacy Statement at <http://www.ibm.com/privacy/details> in the section entitled “Cookies, Web Beacons and Other Technologies,” and the “IBM Software Products and Software-as-a-Service Privacy Statement” at <http://www.ibm.com/software/info/product-privacy>.

Trademarks

IBM, the IBM logo, and [ibm.com](http://www.ibm.com) are trademarks or registered trademarks of International Business Machines Corp., registered in many jurisdictions worldwide. Other product and service names might be trademarks of IBM or other companies. A current list of IBM trademarks is available on the Web at “Copyright and trademark information” at www.ibm.com/legal/copytrade.shtml.

Adobe is a registered trademark of Adobe Systems Incorporated in the United States, and/or other countries.

Java and all Java-based trademarks and logos are trademarks or registered trademarks of Oracle and/or its affiliates.

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.



Printed in USA