Hardware Management Console Readme

Version 9 Release 1 Maintenance 920 (V9 R1 M920) README

Updated: 12 September 2018

Contents

The information in this Readme contains the fix list and other package information about the Hardware Management Console.

Terminology

x86 - This term is used to reference the legacy HMC that runs on x86/Intel/AMD hardware for both the 7042 Machine Type appliances and the Virtual HMC that can run on the Intel hypervisors (KVM, VMWare, Xen).

ppc64 or ppc64le - describes the Linux code that is compiled to run on Power-based servers or LPARS (Logical Partitions)

DNS - Domain Name Server

GUI - Graphical user interface

vHMC - Virtual HMC. The HMC appliance that runs in supported VM Hypervisors

Installation Notes

Note 1: HMC V9R1 is the last supported release for the 7042 appliance models.

Note 2: During the installation, the screen can pause or go blank. Press the space bar or scroll-lock to activate the display again.

PTF MH01759 HMC V9 R1.920.0 Service Pack - for 7042 Machine Types or vHMC for x86 hypervisors (5765-HMW)

This package is a service pack image that can be used to update your HMC from HMC V9 R1.910.0 to the HMC V9 R1.920.0. You can also reference this package by PTF MH01759 and APAR MB04146. This image can be installed on top of HMC Version 9 Release 1.910.0 Recovery installation PTF MH01733 with or without additional PTFs installed.

- Service packs are cumulative and will include all the interim fixes for the PTFs released up to and including the last service pack(s) for this HMC version. Please read the individual Readme files for each PTF to see the list of interim fixes.

- HMC V9R1 is the last supported release for the 7042 appliance models. The vHMC for x86 hypervisors will continue to be supported for V9 HMC.

Package information				
Package name	**Size**	**Checksum (sha1sum)**	**APAR#**	**PTF#**
HMC_Update_V9R1M920_SP0_x86.iso	3436152832	303772caa336fee2007c52a609ef29babd707086	MB04146	MH01759
Splash Panel information (or lshmc -V output)				
"version= Version: 9 Release: 1 Service Pack: 920 HMC Build level 1807241531 MH01759 - HMC V9R1 M920 [x86_64] ","base_version=V9R1 "				

PTF MH01760 HMC V9 R1.920.0 Service Pack - for 7063 Machine Types or vHMC for PowerVM (5765-HMB)

This package represents a service pack image that can be used to update your HMC from HMC V9 R1.910.0 to the HMC V9 R1.920.0 . You can also reference this package PTF MH01760 and APAR MB04147. This image can be installed on top of HMC Version 9 Release 1 910.0 Recovery installation PTF MH01735 with or without additional PTFs installed.

Note: Service packs are cumulative and will include all the interim fixes for the PTFs released up to and including the last service pack(s) for this HMC version. Please read the individual Readme files for each PTF to see the list of fixes.

Package information				
Package name	**Size**	**Checksum (sha1sum)**	**APAR#**	**PTF#**
HMC_Update_V9R1M920_SP0_ppc.iso	3459534848	b3e80653f386d6b1e0ab8f32e66c5e6570c302d9	MB04147	MH01760
Splash Panel information (or lshmc -V output)				
"version= Version: 9 Release: 1 Service Pack: 920 HMC Build level 1807241531 MH01760 - HMC V9R1 M920 [ppc64le] "," base_version=V9R1 "				

Enhancements and new function

New Functions

- Enable support for the E950 system, MTM: 9040-MR9
- HMC GUI Enhancements
    - Support for export topology diagram with large data.

    - Addition of Virtual Networks menu option in Virtual IO Server for add/remove of a client Virtual Ethernet adapter or an internal network to a Virtual IO Server
    - Added option to remove adapter in the managed system Virtual Network Adapter view.
    - Support for sync virtual switch.
    - Segregated views for physical volume, logical volume, and shared storage pool under Partition Virtual Storage.
    - Option to specify client slot ID while attaching virtual SCSI and virtual optical device configuration to partition.
    - While deploying a partition template, VSCSI configuration will have an option to specify client slot ID in Edit Connections.
    - Capture of Partition and System template will have progressive messages of failure or success of the operation.
    - Support for regular expression based search in dashboard. [i.e. a searches resource that ends with "a", a* searches resource starts with "a", ???? searches any resources with 4 letter, ??a? searches resource that has four letter with 3rd letter as "a" etc.
    - Support for modifying "Advanced settings" options like boot mode etc. while using activation with "Current configuration".
    - Last Activated profile will be available as a new column in the Partitions tabular view.
    - Partition Virtual Storage will have option to run cfgdev.
    - Partition Virtual Storage will have option to remove existing path or add a new path to the storage attached through Modify connection.

- Enhancement to configure multiple base DN's (distinguished names) in HMC LDAP configuration
- Ability to disable password based authentication for users created locally on the HMC
- Added ILMT / BigFix agent support to the vHMC, so that customers can certify that they have the correct number of licenses during audit. Specifically, the BigFix agent will be available in vHMC images, and not the hardware appliance images.
- User configurable maximum certificate expiration limit for HMC.
    - Enhance Certificate Management to support configurable certificate age limit.
    - Configured HMC Certificate to show root CA certificate details.
- HMC Management Enhancements
- Support for ethernet failover using GUI and CLI
    - Data replication configuration through command line
    - Enable/Disable DNS from command line.
- Support for VIOS installation using USB.
- HMC Command line enhancement to list possible and suggested target side Virtual IO mappings for "Remote Restart" operation

List of fixes

General fixes

- Fixed an issue where a user could not see the translated message in all locales while viewing "All System Plans" page .
- Fixed an issue with invalid certificate, which prevents HMC start-up. User can recover the HMC by executing **runsig -s 513** as the hscpe user.
- Fixed an issue that prevented the HMC from discovering the adapter capabilities of DCBX capable Juniper EX4200 switch during the HMC boot.
- Fixed an issue where the Change Password scheduled operation would cause SRC E3D46FFF to be reported.
- Fixed an issue where LPAR OS version details not shown correctly until manual refresh is performed.

- Fixed an issue where HMC UI partition table view processor usage column is rounding off to integer value. If the value is '0', then it shows blank.
- Added create system plan task launcher from action menu of Managed system.
- Fixed a performance issue where "Export PCM data" was taking more than a minute with a large number of LPARs.
- Fixed an issue where using the server/VIOSs/partition "click-card" (*i* icon) to turn off an attention indicator can cause unintended modifications to other properties. The unintended modifications may include deletion of in use virtual adapters resulting in an impact to running partitions/VIOS.
- Fixed an issue with 7063-CR1 where the HMC may fail to boot to the log on panel with “error 1901” and all network adapters disabled when one or more adapters are plugged into a dcbx capable switch that has dcbx enabled.

Security fixes

- Addressed Kerberos vulnerabilities: CVE-2017-11368 and CVE-2017-7562.
- Addressed OpenSSL vulnerabilities: CVE-2017-3737 and CVE-2017-3736.
- Addressed NTP vulnerabilities: CVE-2017-6464 and CVE-2017-6463.
- Addressed OpenSSH vulnerabilities: CVE-2017-15906.

Command line changes

- The **lsrrstartlpar** command has been enhanced to display virtual I/O information for a partition remote restart operation.
- USB support has been added to the **installios** command.
- The **chdatarep** and **lsdatarep** commands have been added to provide data replication function via the command line.
- The **runilmtscan** command has been added to run an IBM License Metric Tool (ILMT) scan on an HMC virtual appliance to collect hardware and software inventory data and upload the scan results to the ILMT server. The **lsilmtscan** command has been added to list scan status details.
- A new option has been added to the **chhmcusr** command to prevent a local user from logging into the HMC using a password. The **lshmcusr** command has been enhanced to display this new option.
- The **chhmcldap** and **lshmcldap** commands have been enhanced to support multiple base DNs for LDAP search.
- The **chhmc** and **lshmc** commands have been enhanced to support network bonding.
- A new option has been added to the **chhmc** command to enable or disable DNS on the HMC. The **lshmc** command has been enhanced to display this new option.
- A new option has been added to the **chhmc** command to allow for custom DHCP ranges.

Known issues and Limitations

- If the local console browser hangs, click the X button to close the browser and the login page will be presented to the user.
- Following data types are not supported in data replication:
    - Outbound Connectivity Data
    - Customer Information Data
- In Performance and Capacity Monitoring dashboard, Processed and Aggregated metrics for Energy monitoring data does not contain thermal information, it is included in Raw metrics.
- HMC does not support modification of Kerberos username from GUI.
- CEC Icon in GUI dashboard for E950 system is not unique.
- In Network Settings panel, DHCP ranges in address ranges table have duplicate entries.

- If a failure occurs while creating the Network Bridge from the GUI, virtual switch information is not cleared from GUI. Refresh the panel to recover from failure.
- User will notice Internal Error while modifying the VLAN list information when the virtual NIC does not have any active backing device.
- User will not be able to view the virtual NIC backing devices if the VIOS RMC state is inactive.
- HMC does not support simultaneous modify operations like changing failover priority and removing backing device in a single operation.
- User will not be able to add and delete additional vlan ids as part of single POST operation through REST interface.
- When cloud connector is running on the HMC, Users might observe an increase in /var/ disk space when observed with 'df -h' though the 'du' doesn't show so much of data being actually present in the /var/ partition. In such case, users need to stop and start the cloud connector to avoid the E212E134 SRCs being generated.
- In Power Management panel for P9 system, operation labels are different as compared to labels shown in ASMi.
- HMC does not support modification of IP address for the sl0 interface.
- HMC does not support launching of VTerm console for multiple logical partitions at same time.
- Customer shall see the garbage characters in some menu items of dashboard when non-UTF-8 flavor is selected for HMC locale and UTF-8 locale is selected for browser (eg. Japanese). Configuring same language settings on both HMC and browser is recommended.
- Event manager for 'call home' with this release HMC cannot register with an older release HMC.
- HMC dashboard might display incorrect RMC status when NTP is enabled. To workaround the issue, user can refresh the page to see the correct RMC status.
- Security restrictions:
    - **In NIST mode**:
        - RMC code on partition does not support two HMC connections with mixed configuration i.e. one HMC running in NIST mode and other one in non-NIST mode. Both the HMCs must be in the same mode.
    - **In non-NIST mode**:
        - Following ciphers are not supported although the available cipher list shows them.

          TLS_RSA_FIPS_WITH_3DES_EDE_CBC_SHA

          Note this function is fully supported for all other Power systems assuming that the appropriate HMC, firmware and PowerVM levels installed.
    - The GUI does not support disconnected sessions like the previous Classic GUI did. In the GUI a session logoff is a logoff and a session disconnect is also a logoff. This means that the user cannot reconnect to a GUI session to resume a task(s) from where it left off. Every login via the GUI creates a new session. For more details on long running tasks, please refer to the link below:
      http://www.ibm.com/support/knowledgecenter/POWER9/p9eh6/p9eh6_loginmode.htm
    - In some rare situations, especially with a Firefox browser, the user may be redirected to a second login page after login credentials have been validated. Providing the login credentials again will fail. If this issue occurs, close and relaunch the browser.

      If the login page locally shows "Console internal error" and "The requested resource is not available", the framework is still initializing. Wait a minute and restart the desktop on the local console using <ctrl><alt><backspace>
    - Enabling or disabling service processor redundancy is only permitted when both primary and secondary service processors are at standby with service processor in position A as primary. The workaround is to set up service processor failover with the following command:
      chsyscfg –m <server name> **-r sys –i "sp_failover_enabled=1"**
    - Launch of the ASMI menu is not supported using the Safari browser.
    - In case HMC UI pops up a dialog stating "*failed to load widgetset...*", please click OK and wait for the content to be loaded or refresh the view after sometime.

- User will not be able to print Won character (E 13 L1) with Korean keyboard; Greek (KBD212) - not able to print "Acute and Diaeresis Accent" (key C-10-L3), and "Syllable Hyphen" (key B-10-L3).
- HMC Keyboard layout change, incorrectly displays Belgium keyboard as KBID442 and should be KBID120. They keyboard configuration correctly assigns the appropriate keyboard value KBID120 for Belgium, this is just a display name error.
- User will be activate LPAR with current configuration when the resource role does not contain the LPAR.
- Host Ethernet adapters data table is shown even after unchecking the “use captured info” selection box while viewing the Logical Partition template.
- While configuring SRIOV logical port advanced settings in Edit Partition Template, ‘allow specified VLAN IDs’ field data will be lost if user navigate view other configuration and terminate the panel with cancel button.
- User will not be able to view the VIOS license when VIOS installed using manual console method in Deploy System Template and Create Virtual I/O Server Wizards.

Web browser requirements

Learn about the requirements your web browser must meet to monitor and control the HMC.

To access HMC through a remote browser in a Windows 7 environment, you must have a minimum/default of 1600x900 screen resolution.

HMC web browser support requires HTML 2.0, JavaScript 1.0, Java™ Virtual Machine (JVM), Java Runtime Environment (JRE) Version 8 U151, and cookie support in browsers that will connect to the HMC. Contact your support personnel to assist you in determining if your browser is configured with a Java Virtual Machine. The web browser must use HTTP 1.1. If you are using a proxy server, HTTP 1.1 must be enabled for the proxy connections. Additionally, pop-ups must be enabled for all HMCs addressed in the browser if running with pop-ups disabled.

The following browsers have been tested:

Google Chrome

This HMC version supports Google Chrome Version 66.0.3359.181 (Official Build) (64-bit).

Safari

This HMC version supports Safari 11.1

Microsoft Internet Explorer

This HMC version supports supports Internet Explorer 11.0.9600

- If your browser is configured to use an Internet proxy, then local Internet addresses are included in the exception list. Consult your network administrator for more information. If you still need to use the proxy to get to the Hardware Management Console, enable Use HTTP 1.1 through proxy connections under the advanced tab in your Internet Options window.

- It is recommended to have:

    - Browser security setting in internet zone. If you are running security mode in "Local intranet" mode, make sure you do not have any setting to detect intranet network; disable Compatibility view.
    - Browser zoom setting to 100%.

Mozilla Firefox

This HMC version supports Mozilla Firefox Version 52 Extended Support Release (ESR) and Mozilla Firefox Version 60 Extended Support Release (ESR). Ensure that the JavaScript options to raise or lower windows and to move or resize existing windows are enabled. To enable these options, click the Content tab in the browser's Options dialog, click Advanced next to the Enable JavaScript option, and then select the Raise or lower windows option and the Move or resize existing windows options. Use these options to easily switch between HMC tasks. For more information about the latest Mozilla Firefox ESR levels, see Security Advisories for Firefox ESR.

Clearing the Browser Cache

In Microsoft Internet Explorer

1. Open the Browser
2. Select **Tools**
3. Select **Internet Options**
4. Under Browser History, select **Delete**
5. Check "**Temporary Internet files and websites files**" and "**Cookies and website data**"
6. Click on **Delete**

In Mozilla Firefox

1. In the top-right corner of the browser window click the **menu**button
   Choose **History**, and then **Clear Recent History.**
   In time range to clear, select "**Everything**"
   In the Details section, select "**Cookies**" and "**Cache**"
   Click on "**Clear now**"
2. In the top-right corner of the browser window click the menu button
   Choose **Options > Advanced > Network >**
   In "**Offline Web Content and User Data**" section click on "**Clear Now**"

In Google Chrome

1. In the top-right corner of the browser window, click the **Chrome menu**
   Choose **History**.
   Click the button **Clear browsing data**. A dialog will appear.
   From the drop-down menu, select "t**he beginning of time**."
   Check the boxes "**Cookies, site, and plug-in data**" and "**Cache**"
   Click the button **Clear browsing data**.
2. Open the following URL with the Chrome browser: **chrome://appcache-internals/**
   If there is an entry related to the target hmc, click the corresponding "**Remove**" link

Other web browser considerations

Session cookies need to be enabled in order for ASMI to work when connected to HMC remotely. The ASM proxy code saves session information and uses it.

Internet Explorer

1. Click **Tools > Internet Options.**
2. Click the Privacy tab and select **Advanced**.
3. Determine whether **Always allow session cookies** is checked.
4. If not checked, select **Override automatic cookie handling** and **Always allow session cookies**.

5. For the First-party Cookies and Third-party Cookies, choose block, prompt, or accept. Prompt is preferred, in which case you are prompted every time a site tries to write cookies. Some sites need to be allowed to write cookies.

Mozilla Firefox

1. Click **Tools > Options**.
2. Click the **Cookies** Tab.
3. Select **Allow sites to set cookies.**
   If you want to allow only specific sites, select Exceptions, and add the HMC to allow access.

Installation

Installation instructions for HMC Version 9 upgrades and corrective service can be found at these locations:

Upgrading or restoring HMC Version 9

Updating, upgrading, and migrating your HMC machine code

Instructions and images for upgrading via a remote network install can be found here:

HMC V9 network installation images and installation instructions

Virtual HMC Installation for x86 hypervisors

Installation Images

Download of the Power Hardware Management Virtual Appliance (vHMC) install images are available at the Entitled Systems Support site (ESS): http://www-304.ibm.com/servers/eserver/ess/OpenServlet.wss . You must be entitled to Product ID 5765-HMW or 5765-HMV in order to download 5765-HMW from the ESS site.

Upgrade of 5765-HMV to 5765-HMW is supported.

Fixes, mandatory fixes and service packs for the vHMC are common to the Power Hardware management console (HMC) and will be available at IBM Fix Central.

The splash panel information (lshmc -V output) for the vHMC will be the same as for the HMC recovery DVD that is documented in the above description section.

Installation guidance for installing the vHMC into your hypervisor is found in the IBM Knowledge Center. Installation procedures may vary depending on the operating system you use and the hypervisor you use.

A feature of the vHMC is the activation engine which allows you to preconfigure the HMC Console by passing configuration information to the HMC at the first boot of the HMC, when using these images. Please look at the on-line Knowledge Center documentation on using the Activation Engine feature.

Notes for the Virtual Appliance for x86 hypervisors

- The supported hypervisors for x86 are
  - VMWARE ESXi 6.0 or higher
  - KVM on Red Hat RHEL7 or higher
  - Xen 4.2 or higher on SLES 12
- There are now two images for the VMWare ESXi Server, one is for ESXi 6.0 and the other for ESXi 6.5. This is due to differences in the encoding of the OVA images. SHA1 for ESXi 6.0 , SHA256 for ESXi 6.5
- The processor on the systems hosting vHMC for x86 must have either Intel VT-x or AMD-V Hardware Virtualization enabled.

Installation methods for vHMC on x86 hypervisors
http://www.ibm.com/support/knowledgecenter/POWER8/p8hai/p8hai_installvhmc.htm

After the upgrade, install the mandatory fix using the instructions at Installation methods for HMC Version 8 fixes

Virtual HMC for PowerVM LPARS

Installation Images

Download of the Power Hardware Management Virtual Appliance (vHMC) install images are available at the Entitled Systems Support site (ESS): http://www-304.ibm.com/servers/eserver/ess/OpenServlet.wss . You must be entitled to Product ID 5765-HMA or 5765-HMB in order to download 5765-HMB from the ESS site.

Upgrade of 5765-HMA to 5765-HMB is supported.

Fixes, mandatory fixes and service packs for the vHMC are common to the Power Hardware management console (HMC) and are available at IBM Fix Central.

The splash panel information (lshmc -V output) for the vHMC will be the same as for the HMC recovery DVD that is documented in the above description section for the 7063 Machine type.

Installation guidance for installing the vHMC into your hypervisor are found in the Online Knowledge Center. Installation procedures may vary depending on the operating system you use and the hypervisor you use.

Notes for the Virtual Appliance for PowerVM :

- On Power9 servers, the HMC Virtual Appliance for PowerVM must run in Power8 compatibility mode, for this release.
- The HMC Virtual Appliance for PowerVM does not provide graphics adapter support for adapters assign to the partition. Use a supported web browser to point to the HMC for UI support.
- DLPAR operations such as memory and processor moves for HMCs running in an LPAR are not supported.
- Inactive partition migration and Simplified Remote Restart operations are supported.
- The virtual appliance for PowerVM requires a Power8 or Power9 server that is enabled for little endian support. Minimum System Firmware 860 recommended for Power8 servers.
- vHMC for PowerVM cannot manage the server it is hosted on.

Installation of vHMC for LPARs:
http://www.ibm.com/support/knowledgecenter/POWER8/p8hai/p8hai_vhmc_pvm.htm

General Virtual HMC notes

- Virtual HMC Appliance can be deployed in your existing POWER virtualized infrastructure. Virtual HMC Appliance supports install into PowerVM LPARs.
- Call home of serviceable events with a failing MTMS of the HMC itself is disabled. Those serviceable events should be manually reported to IBM software support.
- To see if you are running on a virtual HMC use the lshmc -v command. If it displays a UVMID field, then you are running in a virtual machine.

    Example:

        lshmc -v

        "vpd=*FC ????????
        *VC 20.0
        *N2 Thu Sep 14 15:02:44 UTC 2017
        *FC ????????
        *DS Hardware Management Console
        *TM Vc87-f0a
        *SE 7f61457
        *MN IBM
        *PN N/A
        *SZ 8371892224
        *OS Embedded Operating Systems
        *NA 127.0.0.1
        *FC ????????
        *DS Platform Firmware
        *RM V8R8.7.0.0
        ***UVMID c87f:0a7f:603a:1457**
        "

- When deploying a virtual HMC, if the mac address is not specified, it will be generated by the hypervisor. Network configuration on the HMC relies on the value of MAC addresses. If you re-deploy a new virtual HMC and want to restore critical console data previously taken on a virtual HMC, ensure sure you are using the same MAC addresses.
- When using Activation Engine to setup NTP configuration, you must specify the NTP version value.
- We recommend upgrading to the new image that uses 500GB by following the steps below:
    - From the current HMC version (e.g. HMC V8.860.0), upgrade to HMC V9 R1 M910
    - When the upgrade is complete the HMC is now at a new version but still has a 160GB disk.
    - Perform a Critical Console Data backup, excluding network information and store the backup to a remote location.
    - Deploy the new HMC V9 R1 M910 image which uses a 500GB disk.
    - After the HMC boots up with the 500GB disk, restore the Critical Console data.

National Language Support (Supported languages)

Languages	Locales
English	en_US,en_AU,en_BE,en_BE@preeuro,en_CA,en_GB,en_GB@euro,en_HK,en_IE,en_IE@preeuro,en_IN,en_NZ,en_PH,en_PK,en_S
Catalan	ca_ES, ca_ES@preeuro
German	de_DE, de_DE@preeuro, de_CH, de_AT, de_AT@preeuro, de_LU, de_LU@preeuro
French	fr_FR, fr_FR.UTF-8, fr_CH, fr_CA, fr_BE, fr_BE@preeuro, fr_LU, fr_LU@preeuro
Italian	it_IT, it_IT@preeuro, it_CH

Spanish	es_ES, es_ES@preeuro, es_AR, es_BO, es_CL, es_CO, es_CR, es_DO, es_EC,es_SV, es_GT, es_HN, es_MX, es_NI, es_PA, es_P
Brazilian Portuguese	pt_BR
Portugal Portuguese	pt_PT, pt_PT@preeuro
Polish	pl_PL, pl_PL.UTF-8, pl_PL@euro,pl_PL@preeuro
Japanese	Ja_JP
Simplified Chinese	zh_CN, zh_SG
Traditional Chinese	zh_TW, zh_HK
Korean	ko_KR
Hungarian	hu_HU, hu_HU.UTF-8,hu_HU@euro,hu_HU@preeuro
Dutch	nl_NL, nl_NL@preeuro, nl_BE, nl_BE@preeuro
Russian	ru_RU
Czech	cs_CZ, cs_CZ.UTF-8,cs_CZ@euro,cs_CZ@preeuro
Slovakian	sk_SK, sk_SK.UTF-8,sk_SK@euro,sk_SK@preeuro

Copyright and Trademark Information

Notices

This information was developed for products and services offered in the US.

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 and client examples cited are presented for illustrative purposes only. Actual performance results may vary depending on specific configurations and operating conditions.

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.

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

All IBM prices shown are IBM's suggested retail prices, are current and are subject to change without notice. Dealer prices may vary.

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 in softcopy, the photographs and color illustrations may not appear.

Trademarks

IBM, the IBM logo, and 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.

Intel, Intel logo, Intel Inside, Intel Inside logo, Intel Centrino, Intel Centrino logo, Celeron, Intel Xeon, Intel SpeedStep, Itanium, and Pentium are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries.

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

Microsoft is a trademarks of Microsoft Corporation in the United States, other countries, or both.

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