

IBM WebSphere Everyplace Micro Environment
Runtime for Windows Mobile 5.0 CDC 1.1/
Foundation 1.1/Personal Profile 1.1



WebSphere® software



Installation Guide

Version 6.1



Note: Before using this information and the product it supports, read the general information in the Notices section of this guide.

First Edition (March 2006)

This edition applies to version 6.1 of the IBM WebSphere Everyplace Micro Environment for Windows Mobile 5.0 CDC 1.1/Foundation 1.1/ Personal Profile 1.1 and to all subsequent releases and modifications until otherwise indicated in new editions.

© Copyright International Business Machines Corporation 2006. All rights reserved.

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

Contents

Preface	v
Who should read this guide	v
What this guide contains	v
Contacting software support.....	.vi
Conventions used in this guidevi
Introducing WebSphere Everyplace Micro Environment 6.1	1
System requirements	1
Package contents	1
Deploying J9 to Windows Mobile 5.0	3
Running a demo application	5
J9 VM and J9 JCL files	7
Files required on a target	7
Optional files on a target	8
Development tools.....	10
J9 command options	11
Common options	11
Advanced options	15
J9 V2.3 GC command line options.....	18
Notices	21
Trademarks	23
Notices for Excluded Components	23

Preface

IBM® WebSphere® Everyplace® Micro Environment (WEME) is a Java™ 2 Micro Edition (J2ME™) certified "Java Powered" runtime environment that provides the foundation for the deployment of applications to a variety of mobile devices. This release optimizes the WEME runtime environment for Windows Mobile™ 5.0 operating systems.

This guide explains how to deploy this WEME release to Windows Mobile 5.0 platforms.

Who should read this guide

This guide is intended for application programmers developing embedded applications for this product.

Readers should be familiar with the following:

- Windows Mobile 5.0: ActiveSync® and File Explorer
- Java related concepts, terminology, and programming fundamentals

What this guide contains

This book contains the following sections:

- **Introducing Websphere Everyplace Micro Environment 6.1** — Introduces WEME and the J9 Virtual Machine (VM). It also describes the release package contents and system requirements necessary for a successful product installation.
- **Deploying J9 to Windows Mobile 5.0** — Describes how to deploy to Windows Mobile 5.0 target systems.
- **Running a demo application** — Describes how to run a demo application.
- **J9 runtime files** — Provides a list of files in the J9 runtime and describes what they are used for.
- **J9 command options** — Provides a list of J9 command line options.

Contacting software support

Before contacting IBM Software Support with a problem, refer to the IBM WEME Software Support site at the following Web site:

<http://www.ibm.com/software/wireless/weme/support.html>

On this Web site, you can search for technical notes, white papers and other content related to the IBM WEME. For additional help, contact software support by using the methods described in the *IBM Software Support Guide* at the following Web site:

<http://techsupport.services.ibm.com/guides/handbook.html>

The guide provides the following information:

- Registration and eligibility requirements for receiving support
- Telephone numbers, depending on the country in which you are located

Conventions used in this guide

The following typeface conventions are used in this guide:

Bold	Lowercase commands or mixed case commands that are difficult to distinguish from surrounding text, keywords, parameters, options, names of Java classes, and objects are in bold.
<i>Italic</i>	Variables, titles of publications, and special words or phrases that are emphasized are in italic.
Monospace	Code examples, command lines, screen output, file and directory names that are difficult to distinguish from surrounding text, system messages, text that the user must type, and values for arguments or command options are in monospace.

Introducing WebSphere Everyplace Micro Environment 6.1

IBM WebSphere Everyplace Micro Environment (WEME) 6.1 provides the underlying platform for the deployment of e-business applications to small mobile devices.

The J9 VM is the core of WEME. It is the IBM implementation of the Java Virtual Machine (JVM) Specification, Version 1.4. For more on this Java VM Specification, see the following Web site:
<http://java.sun.com/docs/books/vmspec/>

The J9 runtime environment consists of the J9 VM and Java Class Libraries (JCL). It is J2ME compliant and contains Connected Device Configuration (CDC) 1.1, Foundation 1.1 and Personal Profile 1.1 based technologies. The WEME product is supported on a variety of operating systems and hardware architectures. This document covers WEME 6.1 for Windows Mobile 5.0. For information on other platforms contact your IBM Sales Representative.

System requirements

This section lists the minimum product levels you should have installed.

Host system requirements:

- x86-architecture based system running Windows XP service pack 2
- ActiveSync 4.0

Target system requirements:

PDA device running Windows Mobile 5.0

Package contents

This release of WEME is available from the IBM Workplace Client Technology, Micro Edition Web site at: <http://www.ibm.com/software/wireless/weme/>

This package includes the following files:

Runtime files

- \bin
Includes J9 programs and shared libraries

Note: These files are listed and described in the **J9 VM and the J9 JCL files** section of this document.

Classes and resources

- \lib
Includes charconv.zip
- \lib\jclFoundation11
Includes classes.zip and locale.zip.
- \lib\jclFoundation11\ext
Includes j9jce.jar and j9jsse.jar
- \lib\jclFoundation11\opt-ext
Includes j9jceprov.jar
- \lib\jclFoundation11\ppro11
Includes ppro-ui.jar and ppro-extras.jar
- \lib\security
Includes cacerts, java.policy and java.security
- \examples
Includes GolfScoreTrackerApp.jar and GolfScoreTrackerApp.lnk. These files are needed to launch the GolfScoreTrackerApp example.
- \doc
Includes this platform installation guide

Java source

- \lib
Includes charconv-src.zip
- \lib\jclFoundation11\source
Includes source.zip and local-src.zip
- \lib\jclFoundation11\ppro11\source
Includes ppro11-src.zip and ppro-ui-src.zip
- \licenses
Includes licenses, notices and associated files

Deploying J9 to Windows Mobile 5.0

Use the following steps to deploy this WEME Runtime for Windows Mobile 5.0 CDC 1.1/Foundation 1.1/Personal Profile 1.1 on your target device.

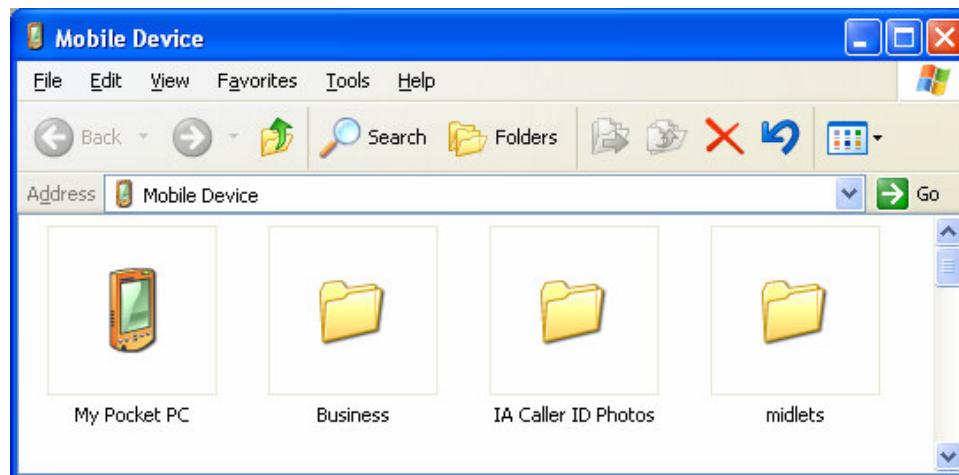
1. Download the product Installer to the Host PC from the following Web site:
<http://www.ibm.com/software/wireless/weme/>.

Product installer for Windows Mobile 5.0 CDC 1.1/FOUNDATION 1.1/PPRO 1.1: ibm-weme-wm50-arm-ppro11-6.1.0- YYYYMMDD-#####-##.exe

Note: For Linux x86 host platforms, download the corresponding .bin file.

2. Use the **Extraction Wizard** to extract the files. Extract the files to the default location indicated.

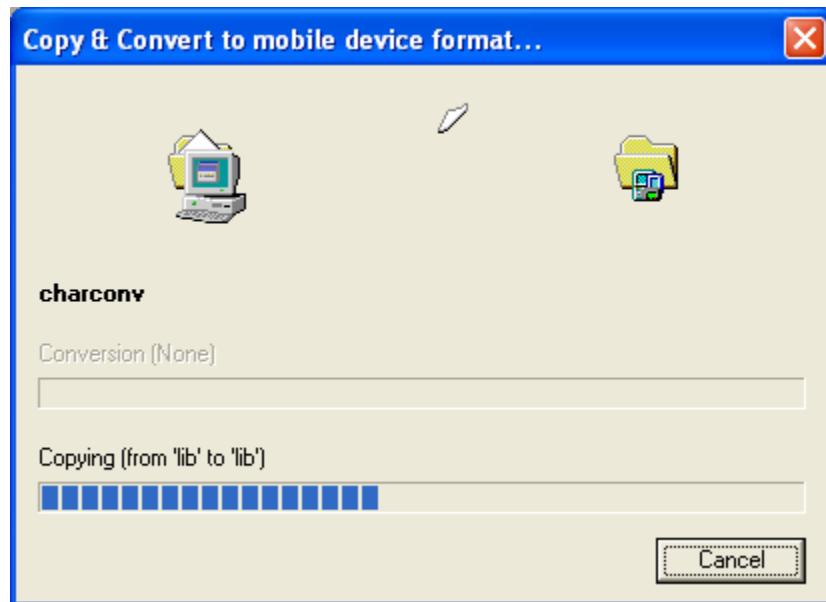
3. Select the Explore icon  in **ActiveSync** to open a **File Explorer** window for your mobile device.



4. Use **File Explorer** to go to the `root` folder on your mobile device and create a new folder named `J9`.
5. Open the `J9` folder and create a `PPRO11` folder.

6. Copy the previously unzipped `bin`, `lib` and `examples` directories to the `PPRO11` folder.

Note: These directories can be copied to any location you choose on the target file system; however, the `\bin` and `\lib` directories must remain intact. The base J9 executable and its shared objects must remain in the `\bin` directory.



Running a demo application

A demo application is included with this product. The LNK and JAR files needed to run this application are located in the following directory:

```
%JAVAHOME%\examples\GolfScoreTrackerApp.lnk  
%JAVAHOME%\examples\GolfScoreTrackerApp.jar
```

Note: %JAVAHOME% is the location of the J9 VM installation.

You can run this demo from the \examples directory on the PDA target file system.

1. In **File Explorer**, go to the %JAVAHOME%\examples folder and tap the GolfScoreTrackerApp.lnk file. An application window then appears.

J9 VM and J9 JCL files

The J9 VM and the J9 JCL come with a variety of programs and shared libraries. Not all of them are required at runtime in the target. The related files are located in the %JAVAHOME%\bin directory. Before loading the runtime files onto the target, you can remove some files from the runtime image to minimize its size. This section organizes these files into three categories:

- Files required on a target
- Optional files on a target
- Development tools

Files required on a target

This section specifies the absolute minimum set of files that must be available on a running target.

iveppro11.dll	Natives for the Personal Profile (PPro) 1.1 UI classes.
j9vmall23.dll	All Core DLL files combined into one DLL file for platforms with a limited number of open shared libraries, like the Pocket PC. It includes:
iverel23.dll	Specifies JXE support, including the relocator and JXE files class loader natives.
j9bvc23.dll	Enables the byte code verifier required when J9 is started with the (default) – verify option. Use – noverify when removing this file.
j9dyn23.dll	Specifies the dynamic class loader for class files loaded from directories, JAR files or JXE files.
j9gc23.dll	Specifies the Garbage Collector.
j9hookable23.dll	Specifies the link library for hookable components, such as the garbage collector event handling, Just in Time (JIT) compiler, Ahead of Time (AOT) runtime, the debugger, Java Virtual Machine Profiler Interface (JVMP), MicroAnalyzer, SmartLinker profiler, and verbose output.
j9prt23.dll	Specifies the J9 port library, containing target operating system dependent

		code.
j9thr23.dll		Defines support for implementing Java threads in either native OS threads or green threads.
j9vm23.dll		Specifies the J9 VM, including implementations of the Java byte codes.
j9zlib23.dll		Specifies the zlib data compression library ((C) 1995–2002 Jean-loup Gailly and Mark Adler). This file is required when using compressed JAR files.
jclfoun11_23.dll	Natives for the JCL. The JCL natives are provided in one file specific to the JCL (Foundation 1.1) used.	

Note: At least one of the following listed launcher programs is required.

j9.exe	The J9 VM program.
j9w.exe	J9 VM program. Opens J9 VM without a console.

Optional files on a target

This section specifies files that are needed only when you want to enable related J9 options or features.

j9dbg23.dll	Defines support for debugging the target. This is required when J9 is started with the -debug option. This file requires either j9dbgi23.dll or j9rdbi23.dll.
j9fdm23.dll	Specifies the Freely Distributable LIBM (fdlolibm), which is a C math library for machines that support IEEE 754 floating-point arithmetic. It provides the natives required by the <code>java.lang.StrictMath</code> class and is only required if this class is used. Note: only double precision is supported.
j9gcchk23.dll	Concurrent GC Reliability, Availability, Serviceability (RAS) checks. To reproduce GC problems activate with: -Xrunj9gcchk23[:options]
	To see options run: -Xrunj9gcchk23:help.

j9jar2jxe23.dll	Provides C-calling API for creating JXE files on-the-fly.
-----------------	---

j9jit23.dll	Just-in-time (JIT) compiler. JIT is enabled if this file is found. JIT is enabled with the -Xjit option and disabled with either the -Xint or the -Xnojit option.
j9jitzd23.dll	Problem Determination Library for JIT.
j9jpi23.dll	Used for: regex, limitfile, limit and exclude option processing, JIT log files, option printing, verbose options and internal data structure checking.
j9prf23.dll	Specifies JVMPI, which is required when J9 is started with the -jvmpi option.
j9rdbi23.dll	Defines support for micro analysis (profiling) of the target. This is required when J9 is started with the -analyze option.
j9vrb23.dll	Specifies access to the remote debug server, which is required when J9 is started with the following options: -debug:options -Xrdbginfo:host:port
jnichk.dll	Specifies verbose output, which is required if J9 is started with the -verbose option.
	Provides additional checking on JNI functions.
	Enabled with the following option: -Xrunjnichk [:verbose, help, profile[=<file>]]
	Note: This capability is useful when developing, but typically removed at runtime.
slprof.dll	Supports SmartLinker profiling of the target. Required by the class: <code>com.ibm.ive.slprofiler.runtime.TargetProfiling</code> in <code>profile.jar</code> .
java.properties	Requires j9jpi23.dll Contains all externalized text messages, such as help text and error messages for the default language (English). If this file is missing, numeric error codes are printed.

Development tools

This section describes development tool files that are required only while creating J9 applications on a development machine. These files are not required on the target at runtime.

`j9dbgserv` Starts the Debug Info Server. On a resource limited target debug information is stored external to the target in the debug info server. The VM communicates with the debug info server, transparent to the tooling.

Start the debug info server with:

```
j9dbgserv -port:<port> -symfiles:<symfile path>.
```

`jar2jxe` Converts JAR files to JXE files.

J9 command options

This section discusses both common and advanced J9 v2.3 command line options.

Note: The Pocket PC platform requires that you use fully qualified path names. Relative path names will not work.

Common options

This section contains common J9 v2.3 command line options.

Syntax:

```
j9 -jcl:ppro11 [options...] -classpath [options] classname [arguments...]  
j9 -jcl:ppro11 [options] -jxe:jxe_file [arguments...]
```

- | | |
|------------------------|--|
| -? or -help | Displays help for J9 standard command options. |
| -classpath path | Either -classpath <i>path</i> or -cp <i>path</i> can be used to set a class path for this invocation of J9. The final value of -classpath is determined as follows: |
| -cp path | <ul style="list-style-type: none">• If the -classpath option is set, its value is used.• If the -classpath option is not set, and the CLASSPATH environment variable is set, its value is used.• If neither of the preceding are set, the current directory (.) is used. |

If the class path includes:

- Multiple class path entries, separate them with a semicolon “;”
- A JAR, ZIP or JXE file, add the full name of the file to the class path
- CLASS files, specify the top-level directory of the CLASS file tree

Example: `-classpath \myclasses;\myjars\foo.jar`
CAUTION: The J9 class libraries and the J9 VM are not compatible with other vendors' class libraries. Because it is possible to have more than one runtime environment installed on your host computer, make sure that you do not mismatch

these libraries when specifying the class path. In particular, if your CLASSPATH environment variable is set, ensure that other vendor's libraries are not on it.

Note: java and javax class packages must be on **-Xbootclasspath**, not **-classpath**.

-jxe:jxe_file

Reads the specified JXE file, searching for the classes in this file. All classes found in the JXE file are placed at the end of the boot path. For example: `-jxe:hello.jxe`

Note: When using the **-jxe:** option, do not specify the startup class.

Specify the **-jxe:** option as the last option on the command line.

Note: It is recommended that you use **-classpath** (where applicable) or **-Xbootclasspath** if the JXE file contains boot classes. See the **-Xbootclasspath** option for details.

-Dprop=value

Sets the value of a system property.

Example: `-Dmy.property=some.value`

Sets the value of `my.property` to `some.value`. If no value is given, **-Dprop** sets the value to null.

To set values for multiple system properties, repeat the option statement, using a space to separate statements.

Example: `j9 -Dprop1=val1 -Dprop2=val2 -Dprop3=val3`

Note: Spacing is important in this option's syntax. There is no space between the initial **-D**, its property argument, the equal sign, or the *value* argument.

Example: `-Dname=John_Smith`

Note: If *value* contains spaces, enclose the option in double quotes. Example: `"-Dmy.property=value with space"`

-debug:options

Enables debug, Java Debug Wire Protocol (JDWP) standard options.

-jcl:config[:extralib1 : extralib2] When necessary, this command option is used to specify which JCL shared library will provide JNI natives for the class library Java code. For example, if both Foundation 1.1 and PPro 1.1 class libraries are available, to use the PPro 1.1 class libraries you must specify `-jcl:ppro11`.

Note: This option is not required when using the Foundation class library because Foundation 1.1, `-jcl:foun11` is the default.

With J9 2.3 the **-jcl** command line option is extended with the *extralib* parameters. The *extralib* parameters are used to specify directories off of the *core* library. Anything in the specified directory is added to the bootstrap classpath.

For example: `-jcl:foun11:ppro11`

Loads the JCL Foundation 1.1 library as normal and also includes `jclFoundation11/ppro11/*` on the bootstrap classpath.

A new system property set by the VM, `com.ibm.util.extralibs.properties` contains the value of the extra parameters, in this case: `com.ibm.util.extralibs.properties="ppro11"`.

If the **-jcl** option is used without indicating a **-Xbootclasspath: path**, the value for *path* is assumed to be `$JAVAHOME/lib/jclLibraryName/classes.zip`. However, if the class libraries are stored in a non-default location, you must include the **-Xbootclasspath: path** to direct the VM to the `classes.zip` file. See the **-Xbootclasspath** option for details.

Note: If the **-Xbootclasspath** and the **-jcl** VM options are mismatched, the VM generates an `Incompatible class library` error.

-verbose[:class, gc, stack, sizes]

Enables verbose output. Parameters are as follows:

- **class** displays each fully-qualified class name as it is loaded (that is, enable verbose class loading). This is the default value.
- **gc** displays garbage collection information.
- **stack** displays stack information.
- **sizes** displays default VM sizes.

-verify	Enables class file (byte code) verification. Note: The -verify option is true by default. To disable byte code verification, specify -noverify .
-version	Each VM build is identified by a version string of the form: YYYYMMDD_#####_flags Example: <u>20051103_03795_1EdFGq</u> The first 8 digits indicate the date the VM was built on. The next 5 digits indicate the build ID.
	The flags indicate the configuration: 1st letter: l: little endian b: big endian L: 64-bit little endian B: 64-bit big endian 2nd letter: E: emulated FPU H: hardware FPU 3rd letter: s: static linkage d: dynamic linkage 4th letter: C: CLDC F: Foundation S: J2SE 5th letter: M: Desktop GC m: Tiny GC G: Embedded 6th letter: i: no JIT a: AOT only r: large JIT q: small JIT V: Micro JIT R: large JIT + MicroJIT Q: small JIT + MicroJIT A: AOT + MicroJIT
-X	Prints help for non-standard (advanced) options.

Advanced options

The following advanced J9 v2.3 command line options are non-standard and subject to change without notice.

-Xbootclasspath:*path*

Sets the bootstrap class path to *path*.

For example:

```
-jcl:ppro11 -Xbootclasspath:%JAVAHOME%\lib\  
jclFoundation11\classes.zip
```

Note: When using this command line option, the **-jcl:LibraryName** option must be used, as shown in the above example, to indicate which class library natives the application should use.

-Xbootclasspath/p:*path*

Prepends the classes in *path* to the bootstrap class path. This option is useful for applying temporary fixes and/or adding to the bootstrap class path.

-Xbootclasspath/a:*path*

Appends the classes in *path* to the bootstrap class path. This option is useful for applying temporary fixes to application classes and/or adding to the bootstrap classpath.

-Xdbg:*options*

Enables standard Java Debug Wire Protocol (JDWP) debug options.

-Xdbginfo:*symbol_file_path*

Enables the debug info server.

-Xrdbginfo:*host:port*

Enables the remote debug info server.

-Xrunjdwp:*options*

Enables standard JDWP debug options.
Note: Starts a JDWP server.

-Xfuture

Turns on strict class-file format checks. These checks enforce closer conformance to the class-file format specification.

-Xss*x*

Sets the maximum Java thread stack size to *x*.

-Xmso*x*

Sets the operating system thread stack size to *x*.

-Xint

Run interpreted only.

-Xjit[:count=x, code=x]

With no parameters, **-Xjit** enables the JIT. Useful parameters are:

count=x, where *x* is the upper limit of the number of times a method is invoked before it is compiled. **Example:** `-Xjit:count=0`, forces the JIT to compile everything on first execution.

code=x, where *x* sets the size of the JIT code cache, in kilobytes. **Example:** `-Xjit:code=1024`, sets the size of the JIT code cache to 1MB. The code cache will grow dynamically if required.

-Xoptionsfile=filename
StartupClass [arguments..]

J9 VM Version 2.3 on all platforms supports an option file for the purpose of reducing the length of the command line.

Example: %JAVAHOME%\bin\j9 -Xoptionsfile=vm.options com.ibm.myapps.MyApp1

- An option file is a text file with one option per line.
- Lines starting with # are ignored and can be used for comments.
- The \ character can be used as a continuation so that a single option can span multiple lines.
- The following command line options must be converted into their J9 internal form when used in the options file:

Command line option	J9 internal form
<code>-analyze</code>	<code>-Xanalyze:NULL</code>
<code>-analyze:</code>	<code>-Xanalyze:</code>
<code>-classpath path</code>	<code>-Djava.class.path=path</code>
<code>-dbginfo:</code>	<code>-Xdbginfo:</code>
<code>-debug:</code>	<code>-Xdbg:</code>
<code>-jcl:config</code>	<code>-Xjcl:jclconfig_23</code>
<code>-noverify</code>	<code>-Xverify:none</code>
<code>-rdbginfo:</code>	<code>-Xrdbginfo:</code>
<code>-verify</code>	<code>-Xverify</code>
<code>-verify:</code>	<code>-Xverify:</code>
<code>-Xrunjdwp:</code>	<code>-Xdbg:</code>

- The following options must be entered on the command

line (they are ignored when listed in the options file):

-jar
-jxe
-jxe:
-jxespace:
-Xoptionsfile=

Note: Embedded options files are not supported.

- Undocumented options are ignored when listed in the options file. To be used, they must be added to the command line.
- All other options, such as **-D**, **-Xint**, **-Xmx** etc. are the same on the command line and in the options file.

Environment variables are not supported in the options file. For example the following works on the command line but not in the options file : `-Dmy.property=some.value`

- Options listed in the option file override options on the command line regardless of their position.

Example: `vm.options` file:

```
-Xint
-Xanalyze:st=true,ia=192.168.1.100,ms=100000
-Djava.security.manager
-Djava.security.policy=my.policy
#-Djava.class.path=my.jar
```

-XrunJDI[:options]

Loads helper libraries, such as those used with JVMPPI.

J9 V2.3 GC command line options

The Garbage Collector for IBM WEME Runtime for Windows Mobile 5.0 CDC 1.1/Foundation 1.1/PPro 1.1 provides global GC with compaction. The following related command line options are provided:

Option parameter key

<i>x</i>	integer value in bytes, or append with 'k' or 'M' for large values
<i>percentage</i>	integer value in the range of 0--100 (inclusive)
<i>age</i>	integer value in the range of 1--14 (inclusive)
<i>time</i>	integer value (in milliseconds)
-Xmx <i>x</i>	Sets memory object heap memory size to <i>x</i> . Xmx >= NewSpace size plus OldSpace size Scavenger enabled: minimum size 1536 bytes on 32-bit architectures, 6072 bytes on 64-bit architectures Scavenger disabled: minimum size 512 bytes on 32-bit architectures, 2048 bytes on 64-bit architectures
-Xms <i>x</i>	Sets the initial memory size to <i>x</i> . scavenger enabled: minimum size 4 kilobytes on 32-bit architectures, 8 kilobytes on 64-bit architectures Xms >= Xmn + Xmo scavenger disabled: minimum size 4 kilobytes on 32-bit architectures, 8 kilobytes on 64-bit architectures Xms >= Xmos
-Xmos <i>x</i>	Sets the initial OldSpace size to <i>x</i> . Note: Minimum size 512 bytes on 32-bit architectures, 2048 bytes on 64-bit architectures
-Xmox <i>x</i>	Sets the maximum OldSpace size to <i>x</i> .
-Xmo <i>x</i>	Sets the initial and maximum OldSpace size to <i>x</i> . Note: Attempts to set -Xmo and -Xmos , or -Xmo and -Xmox are rejected

-Xmcax

Sets the RAM class segment increment to *x*.

RAM class segments contain the portion of the Java classes that needs to be modified at runtime, such as the pointers to the class loader, super classes, implemented interfaces, statics, first instance and so forth. There is at least one RAM class segment per Class Loader. If more space for the RAM classes is needed, the J9 VM allocates a new segment in the same size.

-Xmcox

Sets the ROM class segment increment to *x*.

The code of Java classes loaded from class files is stored in special ROM classes segment types called Dynamically Loaded Classes, whose size is determined by this parameter. There is at least one ROM class segment per class loader. If more space for the dynamically loaded classes is needed, the J9 VM allocates a new segment in the size determined by the class loader.

Note: This option does not apply to classes loaded from a JXE file. The "rom.classes" entry in the JXE file is mapped directly to a ROM class segment.

-Xmoix

Sets the **OldSpace** increment to *x*. This value is used to expand the **OldSpace**. A value of 0 means no expansion is allowed. If **-Xmoi** is not specified, there are no restrictions on the expansion size of **OldSpace**.

Notices

This information was developed for products and services offered in the U.S.A. IBM might 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 might have patents or pending patent applications covering subject matter in this document. The furnishing of this document does not give 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 (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, 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 information. IBM may make improvements and/or changes in the product(s) and/or the program(s) described in this information 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:

IBM Corporation
Department LZKS
11400 Burnet Road
Austin, TX 78758
U.S.A.

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 measurement 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.

COPYRIGHT LICENSE:

This information contains sample application programs in source language, which illustrates programming techniques on various operating platforms.

These examples have not been thoroughly tested under all conditions.

No warranty

SUBJECT TO ANY STATUTORY WARRANTIES WHICH CAN NOT BE EXCLUDED, IBM MAKES NO WARRANTIES OR CONDITIONS EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION, THE WARRANTY OF NON-INFRINGEMENT AND THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, REGARDING THE PROGRAM OR TECHNICAL SUPPORT, IF ANY. IBM MAKES NO WARRANTY REGARDING THE CAPABILITY OF THE PROGRAM TO CORRECTLY PROCESS, PROVIDE AND/OR RECEIVE DATE DATA WITHIN AND BETWEEN THE 20TH AND 21ST CENTURIES.

The exclusion also applies to any of IBM's subcontractors, suppliers, or program developers (collectively called "Suppliers").

Limitation of Liability

NEITHER IBM NOR ITS SUPPLIERS WILL BE LIABLE FOR ANY DIRECT OR INDIRECT DAMAGES, INCLUDING WITHOUT LIMITATION, LOST PROFITS, LOST SAVINGS, OR ANY INCIDENTAL, SPECIAL, OR OTHER ECONOMIC CONSEQUENTIAL DAMAGES, EVEN IF IBM IS INFORMED OF THEIR POSSIBILITY. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE EXCLUSION OR LIMITATION MAY NOT APPLY TO YOU.

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.

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

The following terms are trademarks or registered trademarks of International Business Machines Corporation in the United States, other countries, or both:

IBM
IBM logo
Everyplace
WebSphere

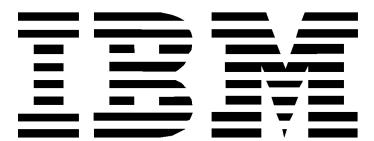
Java and all Java-based trademarks and logos are trademarks or registered trademarks of Sun Microsystems, Inc. in the United States and other countries. The Java Powered logo is used under license from Sun Microsystems, Inc.

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

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

Notices for Excluded Components

These notices are provided in the `notices.txt` file, located in the `\licenses` directory.



®