



# IBM Open Class Library Transition Guide

**Note!**

Before using this information and the product it supports, be sure to read the information in "Notices" on page 73.

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## Chapter 1. IBM Open Class Library Transition

The IBM<sup>®</sup> Open Class<sup>®</sup> (IOC) Library is a library of C++ classes provided with the IBM C++ compiler products on the following platforms.

Table 1. IBM Open Class Library platforms

Platform	Product Name
AIX <sup>®</sup>	IBM C Set ++ <sup>®</sup> for AIX, Version 3 — NS
	IBM C and C++ Compilers for OS/2 <sup>®</sup> , AIX and for Windows NT <sup>®</sup> , Version 3.6 — NS
	IBM VisualAge <sup>®</sup> C++ Professional for AIX, Version 4.0
	IBM VisualAge C++ Professional for AIX, Version 5.0
AS/400 <sup>®</sup> and iSeries <sup>™</sup>	IBM VisualAge for C++ for AS/400, Version 3 Release 6 — NS
	IBM VisualAge for C++ for AS/400, Version 3 Release 7 — NS
	IBM VisualAge C++ for AS/400, Version 4 Release 3
	IBM VisualAge C++ for AS/400, Version 4 Release 4
	IBM ILE C++ for AS/400, Version 4 Release 3
	IBM ILE C++ for AS/400, Version 4 Release 4
	IBM WebSphere <sup>®</sup> Development Studio for iSeries, Version 5 Release 1 — ILE C++ Compiler
OS/390 <sup>®</sup> and z/OS <sup>™</sup>	IBM C/C++ for MVS/ESA <sup>™</sup> Version 3 Release 2
	IBM OS/390 C/C++ Version 1 Release 1 — NS
	IBM OS/390 C/C++ Version 1 Release 2 — NS
	IBM OS/390 C/C++ Version 1 Release 3 — NS
	IBM OS/390 C/C++ Version 2 Release 4 — NS
	IBM OS/390 C/C++ Version 2 Release 5 — NS
	IBM OS/390 C/C++ Version 2 Release 6
	IBM OS/390 C/C++ Version 2 Release 7
	IBM OS/390 C/C++ Version 2 Release 8
	IBM OS/390 C/C++ Version 2 Release 9
	IBM OS/390 C/C++ Version 2 Release 10
	IBM z/OS C/C++ Version 1 Release 1
	IBM z/OS C/C++ Version 1 Release 2
OS/2	IBM VisualAge for C++ for OS/2, Version 3.0 — NS
	C and C++ Compilers for OS/2, AIX and for Windows NT, Version 3.6 — NS
	IBM VisualAge C++ Professional for OS/2 and for Windows NT, Version 4.0 — NS

Table 1. IBM Open Class Library platforms (continued)

Platform	Product Name
Windows®	IBM VisualAge for C++ for Windows, Version 3.5 — NS
	C and C++ Compilers for OS/2, AIX and for Windows NT, Version 3.6 — NS
	IBM VisualAge C++ Professional for OS/2 and for Windows NT, Version 4.0 — NS
NS: This product is no longer marketed or supported by IBM.	

IBM announced in its documentation for IBM z/OS C/C++ Version 1 Release 2 and IBM WebSphere Development Studio for iSeries, Version 5 Release 1 that the IBM Open Class Library was provided to ease porting from AIX, but was not intended for use in new development since support would be withdrawn in a future release.

IBM will standardize on the Standard C++ Library, including the Standard Template Library (STL) and other features of the ISO C++ 1998 Standard, and will remove support for the IBM Open Class Library in future releases of the C++ compiler products on the z/OS, AIX and iSeries platforms. This change in IBM's direction is being communicated to customers.

Application owners and customers whose applications depend on the IBM Open Class Library need to be aware of IBM's direction so that they can migrate away from using the library. This document explains the various options available to application owners and users to make this transition as simple as possible.

In general, where an overlap in functions exists between the IBM Open Class Library and the Standard C++ Library (including the Standard Template Library), the following is recommended:

- Use the Standard Template Library (STL) containers, iterators, and algorithms instead of the IOC collection classes.
- Use the Standard C++ exception template classes instead of the IOC exception classes.
- Use the Standard C++ string template classes instead of the IOC string classes.

However, there are many classes in the IBM Open Class Library for which there is no equivalent in the Standard C++ Library. This document identifies some of the options available to application owners to deal with this situation. The decision as to which option is best will depend on the version of the IBM Open Class Library you use and the extent to which you use classes for which there is no equivalent replacement in the Standard C++ Library.

Although the USL I/O Stream Library and the complex Math class are not being removed at this time, it is recommended that you migrate to the C++ Standard iostream and complex classes. This is especially important if you are migrating other IOC streaming classes to Standard C++ Library streaming classes, since you cannot combine USL and Standard C++ Library streams in one application.

Since the IBM C++ compilers for OS/2 and Windows are already out of service, this document focuses on migration strategies for AIX, z/OS and iSeries platforms. This means that Windows and OS/2 specific User Interface and 2D Graphics classes are not covered in this document, and AIX specific User Interface and 2D

Graphics classes are only briefly discussed. Instead, this document focuses on the non-GUI classes (also known as *Core Classes*).

## Determining Whether Your Application Uses the IBM Open Class Library

If you are uncertain as to whether or not your application uses the IBM Open Class Library, then you can use the tables below to identify the names of the IOC libraries, data sets, and service programs in the different IBM C++ compiler products. Check your makefiles, build scripts, and application load maps to determine if your application loads any one of these libraries.

Table 2. IBM Open Class Library on AIX: Library, data set, and service program names

Product Name	IBM Open Class Library Name	
	Dynamic Library	Static Library
IBM C Set ++ for AIX, Version 3	libbmcl.a	libbmcls.a
	libbmui.a	libbmuis.a
IBM C and C++ Compilers for OS/2, AIX and for Windows NT, V3.6	libcxxbase.a	libcxxbasens.a
	libcxxtestfw.a	libcxxtestfwns.a
	libcxxfstrm.a	libcxxfstrmns.a
	libcxxgraph2d.a	libcxxgraph2dns.a
	libcxxui.a	libcxxuins.a
IBM VisualAge C++ Professional for AIX, Version 4.0	libvacbase.a	libvacbasens.a
	libvactestfw.a	libvactestfwns.a
	libvacfstrm.a	libvacfstrmns.a
	libvacgraph2d.a	libvacgraph2dns.a
IBM VisualAge C++ Professional for AIX, Version 5.0	libvacui.a	libvacuins.a
	libioc.a (import library)	libiocns.a (static non-GUI library)
	libvacbase5.a	
	libvactestfw5.a	
	libvacfstrm5.a	libiocclns.a (static collection library)
	libvaccl5.a	
libvacui5.a		
libvacgraph2d5.a	libiocuins.a (static UI and 2D library)	

Table 3. IBM Open Class Library on iSeries and AS/400: Library, data set, and service program names

Product Name	IBM Open Class Library Name	
	Dynamic Library	Static Library
IBM VisualAge for C++ for AS/400, Version 3 Release 6	QYPPCCL and QYPPASL	
IBM VisualAge for C++ for AS/400, Version 3 Release 7	QYPPC370 (service program)	
IBM VisualAge C++ for AS/400, Version 4 Release 3	QYPPC370 (service program)	

Table 3. IBM Open Class Library on iSeries and AS/400: Library, data set, and service program names (continued)

Product Name	IBM Open Class Library Name	
	Dynamic Library	Static Library
IBM VisualAge C++ for AS/400, Version 4 Release 4	QYPPOC370 (service program)	
IBM ILE C++ for AS/400, Version 4 Release 3	QYPPOC370 (service program)	
IBM ILE C++ for AS/400, Version 4 Release 4	QYPPOC370 (service program)	
IBM iSeries WebSphere Development Studio, Version 5 Release 1 — ILE C++ Compiler	QYPPOC510 (service program)	

Table 4. IBM Open Class Library on z/OS and OS/390: Library, data set, and service program names

Product Name	IBM Open Class Library Name	
	Dynamic Library	Static Library
IBM C/C++ for MVS/ESA Version 3 Release 2	CBC.SCLBSID members APPSUPP and COLLECT	CBC.SCLBCPP
IBM OS/390 C/C++ Version 1 Release 1	CBC.SCLBSID members APPSUPP and COLLECT	CBC.SCLBCPP
IBM OS/390 C/C++ Version 1 Release 2	CBC.SCLBSID members APPSUPP and COLLECT	CBC.SCLBCPP
IBM OS/390 C/C++ Version 1 Release 3	CBC.SCLBSID (binder input definition side-deck) containing member ASCCOLL	CBC.SCLBCPP
IBM OS/390 C/C++ Version 2 Release 4	CBC.SCLBSID (binder input definition side-deck) containing member ASCCOLL	CBC.SCLBCPP
IBM OS/390 C/C++ Version 2 Release 5	CBC.SCLBSID (binder input definition side-deck) containing member ASCCOLL	CBC.SCLBCPP
IBM OS/390 C/C++ Version 2 Release 6	CBC.SCLBSID (binder input definition side-deck) containing member ASCCOLL	CBC.SCLBCPP
IBM OS/390 C/C++ Version 2 Release 7	CBC.SCLBSID (binder input definition side-deck) containing member ASCCOLL	CBC.SCLBCPP
IBM OS/390 C/C++ Version 2 Release 8	CBC.SCLBSID (binder input definition side-deck) containing member ASCCOLL	CBC.SCLBCPP



Table 4. IBM Open Class Library on z/OS and OS/390: Library, data set, and service program names (continued)

Product Name	IBM Open Class Library Name	
	Dynamic Library	Static Library
IBM OS/390 C/C++ Version 2 Release 9	CBC.SCLBSID (binder input definition side-deck) containing member ASCCOLL	CBC.SCLBCPP
IBM OS/390 C/C++ Version 2 Release 10	CBC.SCLBSID (binder input definition side-deck) containing member ASCCOLL	CBC.SCLBCPP
IBM z/OS C/C++ Version 1 Release 1	CBC.SCLBSID (binder input definition side-deck) containing member ASCCOLL	CBC.SCLBCPP
IBM z/OS C/C++ Version 1 Release 2	CBC.SCLBSID (binder input definition side-deck) containing members IOC and COLL for Version 5 IOC and member ASCCOLL for Version 3 IOC	CBC.SCLBCPP2 for Version 5 IOC and CBC.SCLBCPP for Version 3 IOC

Table 5. IBM Open Class Library on OS/2: Library, data set, and service program names

Product Name	IBM Open Class Library Name	
	Dynamic Library	Static Library
IBM VisualAge for C++ for OS/2, Version 3.0	CPPOOB3.DLL	CPPOOC3.LIB
	CPPOOD3.DLL	
	CPPOOM3.DLL	
	CPPOOR3U.DLL	
	CPPOOU3.DLL	
IBM C and C++ Compilers for OS/2, AIX and for Windows NT, V3.6	CPPOBI36.DLL	CPPOBS36.LIB
	CPPODI36.DLL	CPPODS36.LIB
	CPPOFI36.DLL	CPPOFS36.LIB
	CPPOGI36.DLL	CPPOGS36.LIB
	CPPOKI36.DLL	CPPOKS36.LIB
	CPPOMI36.DLL	CPPOMS36.LIB
	CPPORR36.DLL	
	CPPOUI36.DLL	CPPOUS36.LIB
	CPPFGI36.DLL	CPPFGS36.LIB

Table 5. IBM Open Class Library on OS/2: Library, data set, and service program names (continued)

Product Name	IBM Open Class Library Name	
	Dynamic Library	Static Library
IBM VisualAge C++ Professional for OS/2 and for Windows NT, Version 4.0	CPPOBI40.DLL	CPPOBS40.LIB
	CPPODI40.DLL	CPPODS40.LIB
	CPPOFI40.DLL	CPPOFS40.LIB
	CPPOGI40.DLL	CPPOGS40.LIB
	CPPOKI40.DLL	CPPOKS40.LIB
	CPPOMI40.DLL	CPPOMS40.LIB
	CPPORR40.DLL	
	CPPOUI40.DLL	CPPOUS40.LIB
	CPPFGI40.DLL	CPPFGS40.LIB

Table 6. IBM Open Class Library on Windows: Library, data set, and service program names

Product Name	IBM Open Class Library Name	
	Dynamic Library	Static Library
IBM VisualAge for C++ for Windows, Version 3.5	CPPWOB3I.DLL	CPPWOC3.LIB
	CPPWOD3I.DLL	
	CPPWOF3I.DLL	
	CPPWOM3I.DLL	
	CPPWOR3U.DLL	
	CPPWOT3.DLL	
	CPPWOU3I.DLL	
IBM C and C++ Compilers for OS/2, AIX and for Windows NT, V3.6	CPPOBI36.DLL	CPPOBS36.LIB
	CPPODI36.DLL	CPPODS36.LIB
	CPPOFI36.DLL	CPPOFS36.LIB
	CPPOGI36.DLL	CPPOGS36.LIB
	CPPOKI36.DLL	CPPOKS36.LIB
	CPPOMI36.DLL	CPPOMS36.LIB
	CPPORR36.DLL	
	CPPOQI36.DLL	
	CPPOUI36.DLL	CPPOUS36.LIB
	CPPFGI36.DLL	CPPFGS36.LIB

Table 6. IBM Open Class Library on Windows: Library, data set, and service program names (continued)

Product Name	IBM Open Class Library Name	
	Dynamic Library	Static Library
IBM VisualAge C++ Professional for OS/2 and for Windows NT, Version 4.0	CPPOBI40.DLL	CPPOBS40.LIB
	CPPODI40.DLL	CPPODS40.LIB
	CPPOFI40.DLL	CPPOFS40.LIB
	CPPOGI40.DLL	CPPOGS40.LIB
	CPPOKI40.DLL	CPPOKS40.LIB
	CPPOMI40.DLL	CPPOMS40.LIB
	CPPORR40.DLL	
	CPPOQI40.DLL	
	CPPOUI40.DLL	CPPOUS40.LIB
	CPPFGI40.DLL	CPPFGS40.LIB

## IOC Header Files

You can also determine whether your application uses IOC by checking whether your source and header files contain any `#include` directives specifying any of the IOC header file names. IOC header files names have the pattern of `i*.h` or `i*.hpp`, and are listed below. In addition, Table 7 contains USL I/O Streaming and complex Math class header names.

Table 7. IBM Open Class Header Names

Category of Classes	IOC Header Names	
Application Control — see “Application Control Classes” on page 25 for migration suggestions	<ul style="list-style-type: none"> <li>• iccsid.hpp</li> <li>• icntptr.hpp</li> <li>• iconditn.hpp</li> <li>• icritsec.hpp</li> <li>• idllmod.hpp</li> <li>• ievtdata.hpp</li> <li>• iextproc.hpp</li> <li>• iintrst.hpp</li> <li>• ilanglvl.hpp</li> <li>• imrefcnt.hpp</li> <li>• ingapp.hpp</li> <li>• ingthrd.hpp</li> <li>• inotadr.hpp</li> <li>• inotifev.hpp</li> </ul>	<ul style="list-style-type: none"> <li>• inotify.hpp</li> <li>• iobservr.hpp</li> <li>• iobslst.hpp</li> <li>• iperfset.hpp</li> <li>• iperthr.hpp</li> <li>• iprcenv.hpp</li> <li>• iprimlck.hpp</li> <li>• ireslib.hpp</li> <li>• ireslock.hpp</li> <li>• istdntfy.hpp</li> <li>• isynchr.hpp</li> <li>• itimer.hpp</li> <li>• iverision.hpp</li> </ul>
Streaming — see “Streaming Classes” on page 30 for migration suggestions	<ul style="list-style-type: none"> <li>• idatstrm.hpp</li> <li>• imstrmbl.hpp</li> <li>• istrmcf.hpp</li> </ul>	<ul style="list-style-type: none"> <li>• istrmexc.hpp</li> <li>• istrmio.hpp</li> <li>• istrmmod.hpp</li> </ul>

Table 7. IBM Open Class Header Names (continued)

Category of Classes	IOC Header Names	
File System — see “File System Classes” on page 31 for migration suggestions	<ul style="list-style-type: none"> <li>• icmpdnam.hpp</li> <li>• iexcfile.hpp</li> <li>• ififostr.hpp</li> <li>• ifileitr.hpp</li> <li>• ifilestr.hpp</li> </ul>	<ul style="list-style-type: none"> <li>• ifilesys.hpp</li> <li>• ipathnam.hpp</li> <li>• itmstamp.hpp</li> <li>• ityperep.hpp</li> </ul>
Text and Internationalization — see “Text and Internationalization Classes” on page 32 for migration suggestions	<ul style="list-style-type: none"> <li>• i0string.hpp</li> <li>• ibuffer.hpp</li> <li>• icodecvt.hpp</li> <li>• icolitr.hpp</li> <li>• idate.hpp</li> <li>• idbcsbuf.hpp</li> <li>• ilocale.hpp</li> <li>• imtabrl.hpp</li> <li>• inumfrmt.hpp</li> <li>• istparse.hpp</li> <li>• istrenum.hpp</li> <li>• istrgen.hpp</li> <li>• istring.hpp</li> <li>• istrtest.hpp</li> <li>• istyles.hpp</li> <li>• istylset.hpp</li> </ul>	<ul style="list-style-type: none"> <li>• itext.hpp</li> <li>• itime.hpp</li> <li>• itrancod.hpp</li> <li>• itxtbdry.hpp</li> <li>• itxtcoll.hpp</li> <li>• itxtiter.hpp</li> <li>• itxtplmt.hpp</li> <li>• itxtstyl.hpp</li> <li>• iucmpbty.hpp</li> <li>• iueasia.hpp</li> <li>• iueeuro.hpp</li> <li>• iugnrl.hpp</li> <li>• iumeast.hpp</li> <li>• iunicode.hpp</li> <li>• iusasia.hpp</li> <li>• iusyms.hpp</li> </ul>
Error Handling, Tracing, and Testing — see “Error Handling, Tracing, and Testing Classes” on page 36 for migration suggestions	<ul style="list-style-type: none"> <li>• iargdict.hpp</li> <li>• icmptest.hpp</li> <li>• iexc.h</li> <li>• iexcbase.hpp</li> <li>• igenexc.hpp</li> <li>• imsgtext.hpp</li> <li>• issttest.hpp</li> </ul>	<ul style="list-style-type: none"> <li>• istrmtst.hpp</li> <li>• itest.hpp</li> <li>• itestcol.hpp</li> <li>• itestmul.hpp</li> <li>• ithrdexc.hpp</li> <li>• itimetst.hpp</li> <li>• itrace.hpp</li> </ul>

Table 7. IBM Open Class Header Names (continued)

Category of Classes	IOC Header Names
Collection — see “Collection Classes” on page 38 for migration suggestions	<ul style="list-style-type: none"> <li>• iabag.h</li> <li>• iacllct.h</li> <li>• iadqu.h</li> <li>• iaeqkey.h</li> <li>• iaeqsrt.h</li> <li>• iaeqsrt.h</li> <li>• iaequal.h</li> <li>• iaes.h</li> <li>• ia hp.h</li> <li>• iakb.h</li> <li>• iakey.h</li> <li>• iaks.h</li> <li>• iaksb.h</li> <li>• iaksrt.h</li> <li>• iakss.h</li> <li>• iamap.h</li> <li>• iamwt.h</li> <li>• iaorder.h</li> <li>• iappl.h</li> <li>• iapqu.h</li> <li>• iaqu.h</li> <li>• iarel.h</li> <li>• iarstrct.h</li> <li>• iasb.h</li> <li>• iaseq.h</li> <li>• iaset.h</li> <li>• iasm.h</li> <li>• iasqntl.h</li> <li>• iasr.h</li> <li>• iasrt.h</li> <li>• iass.h</li> <li>• iastk.h</li> <li>• iastr.h</li> <li>• iatname.hpp</li> <li>• iatree.h</li> <li>• iattribt.hpp</li> <li>• ibag.h</li> <li>• ibagavl.h</li> <li>• ibagbst.h</li> <li>• ibagdil.h</li> <li>• ibaghsh.h</li> <li>• ibaglst.h</li> <li>• ibagtab.h</li> <li>• ibcllct.h</li> <li>• ibhandle.hpp</li> <li>• ibtree.h</li> <li>• idqu.h</li> <li>• idqudil.h</li> <li>• idqulst.h</li> <li>• idqutab.h</li> <li>• ies.h</li> <li>• iesdil.h</li> <li>• ieslst.h</li> <li>• iestab.h</li> <li>• ihp.h</li> <li>• ihpdil.h</li> <li>• ihplst.h</li> <li>• ihptab.h</li> <li>• iiatree.h</li> <li>• iimwt.h</li> <li>• ikb.h</li> <li>• ikbdil.h</li> <li>• ikbhsh.h</li> <li>• ikblst.h</li> <li>• ikbtab.h</li> <li>• iks.h</li> <li>• iksavl.h</li> <li>• iksb.h</li> <li>• iksbdil.h</li> <li>• iksblst.h</li> <li>• iksbst.h</li> <li>• iksbstab.h</li> <li>• iksdil.h</li> <li>• ikshsh.h</li> <li>• ikslst.h</li> <li>• ikss.h</li> <li>• ikssavl.h</li> <li>• ikssbst.h</li> <li>• ikssdil.h</li> <li>• iksslst.h</li> <li>• iksstab.h</li> <li>• ikstab.h</li> <li>• imap.h</li> <li>• imapavl.h</li> <li>• imapbst.h</li> <li>• imapedil.h</li> <li>• imaphsh.h</li> </ul>

Table 7. IBM Open Class Header Names (continued)

Category of Classes	IOC Header Names
Collection — see “Collection Classes” on page 38 for migration suggestions	<ul style="list-style-type: none"> <li>• imaplst.h</li> <li>• imaptab.h</li> <li>• imwt.h</li> <li>• ipqu.h</li> <li>• ipqudil.h</li> <li>• ipqulst.h</li> <li>• ipqutab.h</li> <li>• iptr.h</li> <li>• iqu.h</li> <li>• iqudil.h</li> <li>• iqulst.h</li> <li>• iqutab.h</li> <li>• irbag.h</li> <li>• irdeque.h</li> <li>• irel.h</li> <li>• ireldil.h</li> <li>• irelhsh.h</li> <li>• irellst.h</li> <li>• ireltab.h</li> <li>• ireqseq.h</li> <li>• irheap.h</li> <li>• irkeybag.h</li> <li>• irkeyset.h</li> <li>• irksbag.h</li> <li>• irksset.h</li> <li>• irmap.h</li> <li>• irprioqu.h</li> <li>• irqueue.h</li> <li>• irrel.h</li> <li>• irseq.h</li> <li>• irset.h</li> <li>• irsrtbag.h</li> <li>• irsrtmap.h</li> <li>• irsrtrel.h</li> <li>• irsrtset.h</li> <li>• irstack.h</li> <li>• isb.h</li> <li>• isbavl.h</li> <li>• isbbst.h</li> <li>• isbdil.h</li> <li>• isblst.h</li> <li>• isbtav.h</li> <li>• iseq.h</li> <li>• iseqdil.h</li> <li>• iseqlst.h</li> <li>• iseqtab.h</li> <li>• iset.h</li> <li>• isetavl.h</li> <li>• isetbst.h</li> <li>• isetdil.h</li> <li>• isethsh.h</li> <li>• isetlst.h</li> <li>• isettab.h</li> <li>• ism.h</li> <li>• ismavl.h</li> <li>• ismbst.h</li> <li>• ismdil.h</li> <li>• ismlst.h</li> <li>• ismtab.h</li> <li>• isr.h</li> <li>• isrdil.h</li> <li>• isrtab.h</li> <li>• iss.h</li> <li>• issavl.h</li> <li>• issbst.h</li> <li>• issdil.h</li> <li>• isslst.h</li> <li>• isstab.h</li> <li>• istdcnr.hpp</li> <li>• istdkcncr.hpp</li> <li>• istk.h</li> <li>• istkdil.h</li> <li>• istklst.h</li> <li>• istktab.h</li> <li>• itree.h</li> <li>• istdops.h</li> </ul>
Math — see “Math Classes” on page 69 for migration suggestions	<ul style="list-style-type: none"> <li>• complex.h</li> <li>• idecimal.hpp</li> <li>• ilonglng.hpp</li> <li>• ipoint.hpp</li> <li>• iptarray.hpp</li> <li>• irect.hpp</li> </ul>
USL I/O Streaming — see “USL I/O Stream Classes” on page 71 for migration suggestions	<ul style="list-style-type: none"> <li>• fstream.h</li> <li>• iostream.h</li> <li>• stdiostream.h</li> <li>• strstream.h</li> </ul>

Table 7. IBM Open Class Header Names (continued)


Category of Classes	IOC Header Names	
 <p>Interface — see “User Interface Classes” on page 72 for migration suggestions</p>	<ul style="list-style-type: none"> <li>• i2dghand.hpp</li> <li>• i3statbx.hpp</li> <li>• iaccel.hpp</li> <li>• iaccelky.hpp</li> <li>• iaccltb.hpp</li> <li>• ialgnatt.hpp</li> <li>• ianimbut.hpp</li> <li>• iapp.hpp</li> <li>• iarglist.hpp</li> <li>• ibcolor.hpp</li> <li>• ibidiset.hpp</li> <li>• ibitflag.hpp</li> <li>• bmpctl.hpp</li> <li>• ibtnnhdr.hpp</li> <li>• ibundles.hpp</li> <li>• ibutton.hpp</li> <li>• icanvas.hpp</li> <li>• icheckbx.hpp</li> <li>• iclipbrd.hpp</li> <li>• icliphdr.hpp</li> <li>• icmd.hpp</li> <li>• icmdevt.hpp</li> <li>• icmdhdr.hpp</li> <li>• icnrclst.hpp</li> <li>• icnrcl.hpp</li> <li>• icnrctl.hpp</li> <li>• icnrdiv.hpp</li> <li>• icnrdivd.hpp</li> <li>• icnreevt.hpp</li> <li>• icnrehdr.hpp</li> <li>• icnrevt.hpp</li> <li>• icnrhdr.hpp</li> <li>• icnrmhdr.hpp</li> <li>• icnrnhdr.hpp</li> <li>• icnrobj.hpp</li> <li>• icnrolst.hpp</li> <li>• icollvwi.hpp</li> <li>• icolor.hpp</li> <li>• icombobs.hpp</li> <li>• icombobx.hpp</li> <li>• icombonh.hpp</li> <li>• icombovw.hpp</li> <li>• icontrol.hpp</li> </ul>	<ul style="list-style-type: none"> <li>• icoordsy.hpp</li> <li>• icsliden.hpp</li> <li>• icslider.hpp</li> <li>• ictlevt.hpp</li> <li>• icustbev.hpp</li> <li>• icustbhd.hpp</li> <li>• icustbut.hpp</li> <li>• idievt.hpp</li> <li>• idrawcv.hpp</li> <li>• iedithdr.hpp</li> <li>• ientryfd.hpp</li> <li>• ientrynh.hpp</li> <li>• ievent.hpp</li> <li>• iexbase.hpp</li> <li>• iexcept.hpp</li> <li>• ifiledlg.hpp</li> <li>• ifilehdr.hpp</li> <li>• iflyhhdr.hpp</li> <li>• iflytext.hpp</li> <li>• ifocshdr.hpp</li> <li>• ifontdlg.hpp</li> <li>• ifonthdr.hpp</li> <li>• iframe.hpp</li> <li>• iframevt.hpp</li> <li>• iframext.hpp</li> <li>• iframhdr.hpp</li> <li>• iframnhd.hpp</li> <li>• igrafatt.hpp</li> <li>• igraphbt.hpp</li> <li>• igroupbx.hpp</li> <li>• ihandle.hpp</li> <li>• ihandler.hpp</li> <li>• ihelp.hpp</li> <li>• ihelpevt.hpp</li> <li>• ihelphdr.hpp</li> <li>• iiconctl.hpp</li> <li>• iinfoa.hpp</li> <li>• iinhratt.hpp</li> <li>• ikey.hpp</li> <li>• ikeyevt.hpp</li> <li>• ikeyhdr.hpp</li> <li>• ilbdielt.hpp</li> </ul>

Table 7. IBM Open Class Header Names (continued)

Category of Classes	IOC Header Names
<p> Interface — see “User Interface Classes” on page 72 for migration suggestions</p>	<ul style="list-style-type: none"> <li>• ilbdihdr.hpp</li> <li>• iletbas.hpp</li> <li>• iletbnh.hpp</li> <li>• iletbox.hpp</li> <li>• iletcvw.hpp</li> <li>• imcelcv.hpp</li> <li>• imenu.hpp</li> <li>• imenubar.hpp</li> <li>• imenuvt.hpp</li> <li>• imenuhdr.hpp</li> <li>• imenunhd.hpp</li> <li>• imle.hpp</li> <li>• imlenhdr.hpp</li> <li>• imndievt.hpp</li> <li>• imndihdr.hpp</li> <li>• imnitem.hpp</li> <li>• imousevt.hpp</li> <li>• imoushdr.hpp</li> <li>• imphdr.hpp</li> <li>• imsgbox.hpp</li> <li>• imsgwin.hpp</li> <li>• inbdievt.hpp</li> <li>• inotebk.hpp</li> <li>• inotebnh.hpp</li> <li>• iobjwin.hpp</li> <li>• ioutlbox.hpp</li> <li>• ipageevt.hpp</li> <li>• ipagehdr.hpp</li> <li>• ipainevt.hpp</li> <li>• ipainhdr.hpp</li> <li>• ipaints.hpp</li> <li>• ipopmenu.hpp</li> <li>• iprofile.hpp</li> <li>• ipushbut.hpp</li> <li>• iradiobt.hpp</li> <li>• irecohdr.hpp</li> <li>• isclnhdr.hpp</li> <li>• iscrlevt.hpp</li> <li>• iscrlhdr.hpp</li> <li>• iscroll.hpp</li> <li>• iselhdr.hpp</li> <li>• isetbnhd.hpp</li> <li>• isetbut.hpp</li> <li>• isetcv.hpp</li> <li>• isizeevt.hpp</li> <li>• isizehdr.hpp</li> <li>• isldahdr.hpp</li> <li>• islhdr.hpp</li> <li>• islidenh.hpp</li> <li>• islider.hpp</li> <li>• islidhdr.hpp</li> <li>• ispbtnnh.hpp</li> <li>• ispbttnh.hpp</li> <li>• ispinbas.hpp</li> <li>• ispinhdr.hpp</li> <li>• ispinnum.hpp</li> <li>• ispintxt.hpp</li> <li>• isplitcv.hpp</li> <li>• istattxt.hpp</li> <li>• isubmenu.hpp</li> <li>• iswp.hpp</li> <li>• isysmenu.hpp</li> <li>• itabctl.hpp</li> <li>• itabnh.hpp</li> <li>• itabpage.hpp</li> <li>• itbar.hpp</li> <li>• itbarbut.hpp</li> <li>• itbarcnr.hpp</li> <li>• itbarfrm.hpp</li> <li>• itextcnh.hpp</li> <li>• itextctl.hpp</li> <li>• itextevt.hpp</li> <li>• itexthdr.hpp</li> <li>• ithread.hpp</li> <li>• ititle.hpp</li> <li>• ititlenh.hpp</li> <li>• ivport.hpp</li> <li>• iwindow.hpp</li> <li>• iwinnhdr.hpp</li> </ul>



Table 7. IBM Open Class Header Names (continued)

Category of Classes	IOC Header Names	
 Graphics — see “2D Graphics Classes” on page 72 for migration suggestions	<ul style="list-style-type: none"> <li>• i2dghand.hpp</li> <li>• ibcolor.hpp</li> <li>• ibcurve.hpp</li> <li>• ibundles.hpp</li> <li>• icolmap.hpp</li> <li>• iexgrprt.hpp</li> <li>• ifont.hpp</li> <li>• igarea2d.hpp</li> <li>• igbase2d.hpp</li> <li>• igcurv2d.hpp</li> <li>• igimage.hpp</li> <li>• igline2d.hpp</li> </ul>	<ul style="list-style-type: none"> <li>• igloop2d.hpp</li> <li>• igrafatt.hpp</li> <li>• igraftxt.hpp</li> <li>• igrph2d.hpp</li> <li>• igrezept.hpp</li> <li>• igrport.hpp</li> <li>• iimage.hpp</li> <li>• imatrix.hpp</li> <li>• imngpres.hpp</li> <li>• ipaints.hpp</li> <li>• ipt2darr.hpp</li> <li>• irawarr.hpp</li> </ul>

## Determining the IOC Version Used by Your Application

Once you have confirmed that you use the IBM Open Class Libraries, you need to determine which version you use. Over the years, enhancements have been made to the library. New versions of the library were distributed when there were significant changes in function, class composition, or hierarchy. By knowing which version you use, you will be able to determine which classes you need to worry about from a migration point of view. For example, if you are using Version 3 of the IBM Open Class Library, then you do not need to worry about finding migration solutions for the Text and Internationalization, File System or Test Framework categories of classes since they were added in Version 5 of the IBM Open Class Library.

Use Table 8 below to identify the version of IOC in each of the IBM C++ compiler products.

Table 8. IBM Open Class Library Versions

Platform	Product Name	IOC Version
AIX	IBM C Set ++ for AIX, Version 3	3
	IBM C and C++ Compilers for OS/2, AIX and for Windows NT, Version 3.6	4
	IBM VisualAge C++ Professional for AIX, Version 4.0	4
	IBM VisualAge C++ Professional for AIX, Version 5.0	5

Table 8. IBM Open Class Library Versions (continued)

Platform	Product Name	IOC Version
AS/400 and iSeries	IBM VisualAge for C++ for AS/400, Version 3 Release 6	3
	IBM VisualAge for C++ for AS/400, Version 3 Release 7	3
	IBM VisualAge C++ for AS/400, Version 4 Release 3	3
	IBM VisualAge C++ for AS/400, Version 4 Release 4	3
	IBM ILE C++ for AS/400, Version 4 Release 3	3
	IBM ILE C++ for AS/400, Version 4 Release 4	3
	IBM WebSphere Development Studio for iSeries, Version 5 Release 1 - ILE C++ Compiler	5
OS/390 and z/OS	IBM C/C++ for MVS/ESA Version 3 Release 2	3
	IBM OS/390 C/C++ Version 1 Release 1	3
	IBM OS/390 C/C++ Version 1 Release 2	3
	IBM OS/390 C/C++ Version 1 Release 3	3
	IBM OS/390 C/C++ Version 2 Release 4	3
	IBM OS/390 C/C++ Version 2 Release 5	3
	IBM OS/390 C/C++ Version 2 Release 6	3
	IBM OS/390 C/C++ Version 2 Release 7	3
	IBM OS/390 C/C++ Version 2 Release 8	3
	IBM OS/390 C/C++ Version 2 Release 9	3
	IBM OS/390 C/C++ Version 2 Release 10	3
	IBM z/OS C/C++ Version 1 Release 1	3
	IBM z/OS C/C++ Version 1 Release 2	5

Table 8. IBM Open Class Library Versions (continued)

Platform	Product Name	IOC Version
OS/2	IBM VisualAge for C++ for OS/2, Version 3.0	3
	IBM C and C++ Compilers for OS/2, AIX and for Windows NT, Version 3.6	4
	IBM VisualAge C++ Professional for OS/2 and for Windows NT, Version 4.0	4
Windows	IBM VisualAge for C++ for Windows, Version 3.5	3
	IBM C and C++ Compilers for OS/2, AIX and for Windows NT, Version 3.6	4
	IBM VisualAge C++ Professional for OS/2 and for Windows NT, Version 4.0	4

Use Table 9 and Table 10 on page 16 below to determine the category of classes supported in the different versions of the IBM Open Class Library. The functions provided in each version were cumulative in nature. This means that Version 4 contains all Version 3 functions plus some enhancements, and Version 5 contains all Version 4 functions plus some enhancements.

Table 9. Classes included in the IBM Open Class Library Version 3.








Categories of Classes	Description
Application Support (on some platforms this category is known as Data Types and Exceptions)	Classes that provide support for the application, threads, profiles and resources used by the application. Classes that model basic data types, such as strings, points and rectangles and classes to manipulate string, date and time information. Classes that let you handle and trace exceptions.
Collection	Classes that provide a set of commonly used abstract data types, including sets, maps, sequences, trees, stacks, and queues, used to build collections.
User Interface	<p>   Window classes that encapsulate the basic graphical building blocks used to construct application windows. Event and event handler classes that encapsulate the user's interaction with application windows. Setting and style classes to manipulate the appearance or behavior of window classes. Direct manipulate classes support the "drag-and-drop" mechanism.</p> <p>  Multimedia classes support the creation of applications that integrate text and graphics with a combination of audio, motion video, images, and animation.</p> <p>  Dynamic Data Exchange (DDE) classes to provide client and server communication between two applications.</p>

Table 9. Classes included in the IBM Open Class Library Version 3. (continued)












Categories of Classes	Description
Graphics	 Classes that provide support for creation, manipulation, and rendering of graphic objects.
Complex Mathematics	Classes that provide a set of facilities to manipulate complex numbers and perform standard mathematical operations on them.
I/O Streams	Classes that provide a set of facilities to deal with many varieties of input and output.

Table 10. Classes included in the IBM Open Class Library Versions 4 and 5.

Categories of Classes	Description
Application Control (this category replaced Application Support or Data Types and Exceptions category)	Classes that provide support for multithreaded execution environments — process classes that create and manipulate external processes, thread classes that create and manipulate threads, notification classes that notify interested objects of changes in other objects and reference counting classes that manage thread-safe access to objects used by different processes simultaneously. Other classes in this category interact with and control the application and its modules, libraries, resources, environments, profiles, and timers. Classes that let you handle and trace exceptions.
Collection	Classes that provide a set of commonly used abstract data types, including sets, maps, sequences, trees, stacks and queues, used to build collections.
Text and Internationalization	Text classes that provides support for Unicode classes to create and manipulate the stylistic and semantic properties of characters, character sets, and scripts. Internationalization classes provide support to create and manipulate international text, compare language sensitive strings, convert between character sets, and access portable and host-specific resources via locale mechanisms. Classes that provide support for date and time classes to store and manipulate date and time information. (Similar to the date and time support provided in the Application Support category in Version 3).
File System	Classes that provide portable abstractions that allow you to manipulate physical file system entities such as volumes, directories, and files.
Object Persistent Streaming	Classes that provide a set of streaming classes that support streaming data in C++ objects in and out of persistent storage.
Error Handling, Tracing, and Testing	Classes that provide support for building robust and well-behaved applications including exception classes that detect and convey information about unusual circumstances in applications, tracing classes for tracing code, and test classes for running unit tests for your application.

Table 10. Classes included in the IBM Open Class Library Versions 4 and 5. (continued)

Categories of Classes	Description
User Interface	<p>   Window classes that encapsulate the basic graphical building blocks used to construct application windows. Event and event handler classes that encapsulate the user's interaction with application windows. Setting and style classes to manipulate the appearance or behavior of window classes. Direct manipulation classes support the "drag-and-drop" mechanism.</p> <p>  Multimedia classes support the creation of applications that integrate text and graphics with a combination of audio, motion video, images, and animation.</p> <p>  Dynamic Data Exchange (DDE) classes to provide client and server communication between two applications.</p>
2D Graphics	<p>   Classes that provide support for platform-independent creation, manipulation, and rendering of 2D graphic objects.</p>
Math	Classes that provide a set of facilities to manipulate complex numbers and perform standard mathematical operations on them. Provides classes to manipulate binary coded decimal numbers.
USL I/O Stream	Classes that provide a set of facilities to deal with many varieties of input and output.

## Migration Options

Application owners and customers whose applications depend on the IBM Open Class Library need to develop an action plan that enables them to transition away from using the library.

For new development, do not use the IBM Open Class Library. Use other libraries, such as the Standard C++ Library (including the Standard Template Library), which is provided with the latest version of the IBM C++ compiler products. Other publicly available C++ libraries are described in "Other C++ Libraries" on page 18.

For existing applications, the following options are available.

1. Obtain a broader license from IBM for the IBM Open Class Library source code. The source code provided with the compiler product is licensed to you with restrictions. IBM can provide you with a license for the IBM Open Class Library which will grant you additional rights.  
Refer to [www.ibm.com/software/ad/vacpp/support/ioclicense.html](http://www.ibm.com/software/ad/vacpp/support/ioclicense.html) for further information about this option.  
Once you have the license, you can either continue to use and maintain the IBM Open Class Library, or integrate the required classes into your own code.
2. Replace IOC classes with equivalent classes available publicly. The Standard C++ Library, which includes the Standard Template Library (STL), is provided with the latest version of the IBM C++ compiler products. The Standard C++ Library contains classes that duplicate functions provided by IOC and may be an option to migrate to. For example, you can:

- Replace the IBM Open Class collection classes with the Standard Template Library (STL) containers, iterators and algorithms.
- Replace the IBM Open Class exception classes with the Standard C++ exception template classes.
- Replace the IBM Open Class string classes with the Standard C++ string template classes.

Other publicly available C++ libraries are described in “Other C++ Libraries”.

3. Write your own classes that mimic IOC functionality. Some IOC classes are based on classic algorithms and data structures that have been well studied and documented. You may be able to code your own equivalent classes with a little research.



Although the USL I/O Stream Library and the complex Math class are not being removed at this time, it is recommended that you migrate to the Standard C++ iostream and complex classes. This is especially important if you are migrating other IOC streaming classes to Standard C++ Library streaming classes, since you cannot combine USL and Standard C++ Library streams in one application.

## Other C++ Libraries

Some publicly available C++ libraries, which can be used to replace withdrawn IOC classes, are listed below. This list of possible replacement libraries is not exhaustive, but can be used as an example and starting point when you are considering your own migration needs.

**Note:** IBM does not endorse or support the products and companies listed below.

Links to external web sites are provided only for convenience, and do not in any manner serve as an endorsement of these products or companies.

- The International Components for Unicode (ICU) is a C and C++ library that provides robust and full-featured Unicode support on a wide variety of platforms and they can be used in place of some of the IOC Text and Internationalization classes. Refer to IBM’s Open Source Projects web site at <http://oss.software.ibm.com/icu/> for more information.
- The Rogue Wave SourcePro C++ libraries appear to have equivalent function to some parts of the IBM Open Class Library. Support exists for string processing classes, collection classes, extensible virtual stream classes and a streaming mechanism, a framework for internationalizing C++ applications, thread creation, control and synchronization, execution tracing, and other functionality. Rogue Wave SourcePro C++ libraries are available from <http://www.roguewave.com>
- STLport is a multiplatform Standard C++ Library implementation. It is free, open-source product, featuring advanced techniques and optimizations for maximum efficiency, exception safety and thread safety, and important extensions, such as hash tables, singly-linked list, and rope. For more information, see <http://www.stlport.org> and <http://www.ibm.com/software/ad/c390/cmvsstlp.htm>.
-  GTK+ is a multiplatform, open source GUI Toolkit for creating graphical user interfaces primarily designed for the X Window System. More information is available at <http://www.gtk.org>
-  The IOC User Interface class library builds on the Motif toolkit and widget library. You should now build your own interfaces between your

application and Motif toolkits and widgets. More information about Motif can be found at <http://www.opengroup.org> and <http://www.motifzone.net>.

## **Example: Replacing IOC Classes with Standard C++ Library Classes**

The following is an example of replacing withdrawn IOC classes with equivalent classes available in the Standard C++ Library. It is taken from the `planets.cpp` sample. Originally this sample used the IOC Collection class `ISortedSet`, as shown in Figure 1 on page 20. It was updated to use the equivalent STL Collection class `std::set`, as shown in Figure 2 on page 22.

This migration option does not involve just changing the name `ISortedSet` to `std::set`; other changes need to be made in the code to accommodate the changes. For example, the STL class uses an iterator to navigate through the set elements, whereas the IOC class uses a cursor. Some of the classes that you migrate to may not have an exact equivalent of the class that you currently use. If there is not such an equivalent, then you will need to write some additional code. Also note that, if the functionality that you use exists, it may have a different member name.

```

FILE: planets.cpp
//
// All known planets are handled in a sorted set.
// This example creates several sorted sets of planets.
// The sort order is based on each planets distance from
// the sun.
//

#include <iostream.h>
#include <iss.h> // Use the Sorted Set Default Variant:
#include "planet.h" // Get Class Planet

int main()
{
    ISortedSet <Planet>
    allPlanets, heavyPlanets, brightPlanets;

    // A cursor to cursor through allPlanets:
    ISortedSet <Planet>::Cursor aPCursor (allPlanets);
    SayPlanetName showPlanet;

    allPlanets.add (Planet("Earth", 149.60f, 1.0000f, 99.9f));
    allPlanets.add (Planet("Jupiter", 778.3f, 317.818f, -2.4f));
    allPlanets.add (Planet("Mars", 227.9f, 0.1078f, -1.9f));
    allPlanets.add (Planet("Mercury", 57.91f, 0.0558f, -0.2f));
    allPlanets.add (Planet("Neptune", 4498.f, 17.216f, +7.6f));
    allPlanets.add (Planet("Pluto", 5910.f, 0.18f,+14.7f));
    allPlanets.add (Planet("Saturn", 1428.f, 95.112f, +0.8f));
    allPlanets.add (Planet("Uranus", 2872.f, 14.517f, +5.8f));
    allPlanets.add (Planet("Venus", 108.21f, 0.8148f, -4.1f));

    forICursor (aPCursor)
    {
        if (allPlanets.elementAt (aPCursor).isHeavy ())
            heavyPlanets.add (allPlanets.elementAt (aPCursor));

        if (allPlanets.elementAt (aPCursor).isBright ())
            brightPlanets.add (allPlanets.elementAt (aPCursor));
    }

    cout << endl << endl << "All Planets: " << endl;
    allPlanets.allElementsDo (showPlanet);

    cout << endl << endl << "Heavy Planets: " << endl;
    heavyPlanets.allElementsDo (showPlanet);

    cout << endl << endl << "Bright Planets: " << endl;
    brightPlanets.allElementsDo (showPlanet);

    cout << endl << endl
    << "Bright-or-Heavy Planets: " << endl;
    brightPlanets.unionWith (heavyPlanets);
    brightPlanets.allElementsDo (showPlanet);

    cout << endl << endl
    << "Did you notice that all these Sets are sorted"
    << " in the same order"
    << endl
    << " (distance of planet from sun) ? " << endl;

    return 0;
}

```

Figure 1. The original version of the planets.cpp sample used the IBM Open Class Library and USL I/O Stream Library. (Part 1 of 2)



```

FILE: planet.h
#include <iostream.h>
#include <iappl.h>

class Planet {
private:
    char* pname;
    float dist;
    float mass;
    float bright;

public:
    // Let's use the compiler generated default for
    // the copy constructor

    Planet(char* aname, float adist, float amass, float abright) :
        pname(aname), dist(adist), mass(amass), bright(abright) {}

    // For any Set we need to provide element equality.
    IBoolean operator== (Planet const& aPlanet) const
        { return pname == aPlanet.pname; }

    // For a Sorted Set we need to provide element comparison.
    IBoolean operator< (Planet const& aPlanet) const
        { return dist < aPlanet.dist; }

    char* name() { return pname; }

    IBoolean isHeavy() { return (mass > 1.0); }
    IBoolean isBright() { return (bright < 0.0); }
};

class SayPlanetName : public IApplicator<Planet> {
public:
    virtual IBoolean applyTo(Planet& p)
        { cout << " " << p.name() << " "; return True;}
};

```

*Figure 1. The original version of the planets.cpp sample used the IBM Open Class Library and USL I/O Stream Library. (Part 2 of 2)*

```

FILE: planets.cpp

//
// All known planets are handled in a sorted set.
// This example creates several sorted sets of planets.
// The sort order is based on each planet's distance from
// the sun.
//

#include "planet.h"

int main() {

    // use Standard Template Library
    std::set<Planet> allPlanets, heavyPlanets, brightPlanets;

    allPlanets.insert(Planet("Earth", 149.60f, 1.0000f, 99.9f));
    allPlanets.insert(Planet("Jupiter", 778.3f, 317.818f, -2.4f));
    allPlanets.insert(Planet("Mars", 227.9f, 0.1078f, -1.9f));
    allPlanets.insert(Planet("Mercury", 57.91f, 0.0558f, -0.2f));
    allPlanets.insert(Planet("Neptune", 4498.f, 17.216f, +7.6f));
    allPlanets.insert(Planet("Pluto", 5910.f, 0.18f, +14.7f));
    allPlanets.insert(Planet("Saturn", 1428.f, 95.112f, +0.8f));
    allPlanets.insert(Planet("Uranus", 2872.f, 14.517f, +5.8f));
    allPlanets.insert(Planet("Venus", 108.21f, 0.8148f, -4.1f));

    typedef std::set<Planet>::iterator PIter;
    for (PIter aPIter = allPlanets.begin();
         aPIter != allPlanets.end(); ++aPIter)
    {
        if ((*aPIter).isHeavy()) heavyPlanets.insert(Planet(*aPIter));
        if ((*aPIter).isBright()) brightPlanets.insert(Planet(*aPIter));
    }

    std::ostream_iterator<Planet, char> oIter(std::cout, " ");

    std::cout << "\nAll Planets: " << std::endl;
    std::copy( allPlanets.begin(), allPlanets.end(), oIter );

    std::cout << "\n\nHeavy Planets: " << std::endl;
    std::copy( heavyPlanets.begin(), heavyPlanets.end(), oIter );

    std::cout << "\n\nBright Planets: " << std::endl;
    std::copy( brightPlanets.begin(), brightPlanets.end(), oIter );

    std::cout << "\n\nBright-or-Heavy Planets: " << std::endl;
    brightPlanets.insert(heavyPlanets.begin(), heavyPlanets.end());
    std::copy( brightPlanets.begin(), brightPlanets.end(), oIter );

    std::cout << "\n\nDid you notice that all these Sets are sorted"
               << " in the same order\n"
               << " (distance of planet from sun) ? " << std::endl;
}

```

Figure 2. The modified version of the planets.cpp sample uses STL's set container and Standard C++ iostream Library. (Part 1 of 2)

```

FILE: planet.h

#include <string>
#include <algorithm>
#include <set>
#include <iterator>
#include <iostream>

class Planet
{
private:
    std::string pname;
    float dist;
    float mass;
    float bright;

public:
    // Let's use the compiler generated defaults for
    // the copy constructor and the copy-assignment
    // operator.

    Planet(char * aname, float adist, float amass, float abright):
        pname(aname), dist(adist), mass(amass), bright(abright) {}

    // For a set, we need to provide element comparison.
    bool operator<(Planet const & aPlanet) const
    {
        if (dist < aPlanet.dist) return true;
        else if (aPlanet.dist < dist) return false;

        if (pname < aPlanet.pname) return true;
        else if (aPlanet.pname < pname) return false;

        if (mass < aPlanet.mass) return true;
        else if (aPlanet.mass < mass) return false;

        if (dist < aPlanet.bright) return true;
        else return false;
    }

    std::string name() const { return pname; }

    bool isHeavy() const { return (mass > 1.0f); }
    bool isBright() const { return (bright < 0.0f); }
};

std::ostream & operator<<(std::ostream &os, Planet const & p )
{
    os << p.name();
    return os;
}

```

*Figure 2. The modified version of the planets.cpp sample uses STL's set container and Standard C++ iostream Library. (Part 2 of 2)*



---

## Chapter 2. Class-based Guide to Migrating the IBM Open Class Library

This section lists all of the categories of classes and tries to recommend a migration suggestion for each class in that category. More information about migration options is provided in section “Migration Options” on page 17. The **Notes** column in the tables below identifies in which version of the IOC library the class was introduced and identifies any inheritances. If no version number is specified, the class was introduced before Version 3 of IOC. A *simple class* does not inherit from other classes and therefore may be easier to separate from the rest of the IOC library and incorporate into an application’s source code.

If you are looking for the migration suggestion for a particular class, and you do not know which category it belongs to, you can look in the “Index” on page 79 to find out on what page it is described.

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### Application Control Classes

This category of classes replaced Application Support (also known as Data Types and Exceptions) category in Version 3.

These classes provide support for multithreaded execution environments. This includes process classes that create and manipulate external processes, thread classes that create and manipulate threads, notification classes that notify interested objects of changes in other objects and reference counting classes that manage thread-safe access to objects used by different processes simultaneously. Other classes in this category interact with and control the application and its modules, libraries, resources, environments, profiles, and timers.

Most of these classes were added in Version 3 of the IBM Open Class Library. However, substantial work was done in Version 4 to support thread safety and to separate the GUI-based threads from the non-GUI-based threads.

Table 11. IBM Open Class Library Application Control classes

Class Name	Header File	Notes
<b>To migrate the following classes, you can either obtain a broader license from IBM and integrate the entire library or a particular class into your application, or write your own classes mimicking IOC functionality.</b>		
IApplication	iapp.hpp	Available in IOC Version 3 and redesigned in IOC Version 4 to support UI-based applications only. The non-UI application support provided by this class was moved to the new class INonGUIApplication. Derived from INonGUIApplication
IAttribute	iattribt.hpp	Added in IOC Version 4. Simple class.
IAttributeName	iatname.hpp	Added in IOC Version 4. Simple class.
IBase	ibase.hpp	Deprecated in IOC Version 4.

Table 11. IBM Open Class Library Application Control classes (continued)

Class Name	Header File	Notes
ICodeSet	icodeset.hpp	Added in IOC Version 5. Simple class.
ICondition	iconditn.hpp	Added in IOC Version 4. Simple class.
ICountedPointerTo	icntptr.hpp	Added in IOC Version 4. Simple class.
ICritSec	icritsec.hpp	Added in IOC Version 3. Derived from IBase.
ICrossThreadNotificationLoop	iobsrvr.hpp	Added in IOC Version 4. Simple class.
ICurrentApplication	iapp.hpp	Available in IOC Version 3 and redesigned in IOC Version 4 to support UI-based applications only. The non-UI application support provided by this class was moved to the new class ICurrentNonGUIApplication. Derived from IApplication.
ICurrentNonGUIApplication	ingapp.hpp	Added in IOC Version 4. Derived from INonGUIApplication.
ICurrentNonGUIThread	ingthrd.hpp	Added in IOC Version 4. Derived from INonGUIThread.
ICurrentThread	ithread.hpp	Available in IOC Version 3 and redesigned in IOC Version 4 to support UI-based threads only. The non-UI thread support provided by this class was moved to the new class ICurrentNonGUIThread. Derived from INonGUIThread and IThread.
IDLLModule	idllmod.hpp	Added in IOC Version 4. Simple class.
IDynamicLinkLibrary	ireslib.hpp	Derived from IResourceLibrary. Not supported on iSeries and z/OS.
IEnumHandle	ibhandle.hpp	Added in IOC Version 5 for iSeries and IOC Version 3 for all other platforms.
IEnvironment	iprcenv.hpp	Added in IOC Version 4. Simple class.
IEventData	ievtdata.hpp	Simple class.
IExternalProcess	iextproc.hpp	Added in IOC Version 4. Simple class.
IHandle	ibhandle.hpp	Added in IOC Version 5 for iSeries and IOC Version 3 for all other platforms.
IInterest	iintrst.hpp	Added in IOC Version 4. Simple class.

Table 11. IBM Open Class Library Application Control classes (continued)

Class Name	Header File	Notes
IModuleHandle	ibhandle.hpp	Added in IOC Version 5 for iSeries and z/OS and IOC Version 3 for all other platforms.
IMRefCounted	imrefcnt.hpp	Added in IOC Version 4. Simple class.
INonGUIApplication	ingapp.hpp	Added in IOC Version 4.
INonGUIThread	ingthrd.hpp	Added in IOC Version 4.
INonGUIThread::Cursor	ingthrd.hpp	Added in IOC Version 4.
INotificationEvent	inotifev.hpp	Added in IOC Version 3. Simple class.
INotificationEventFor	inotifev.hpp	Added in IOC Version 4. Derived from INotificationEvent
INotifier	inotify.hpp	Added in IOC Version 3. Simple class.
INotifierAddress	inotadr.hpp	Added in IOC Version 4. Simple class.
IObserver	iobsrvr.hpp	Added in IOC Version 3. Simple class.
IObserverConnectionTo	iobsrvr.hpp	Added in IOC Version 4. Derived from IObserver.
IObserverForConnectionTo	iobsrvr.hpp	Added in IOC Version 4. Derived from IObserver.
IObserverList	iobslist.hpp	Added in IOC Version 3. Simple class.
IPerformanceSettings	iperfset.hpp	Added in IOC Version 4. Simple class. Mostly used for capturing information on UI settings.
IPrimalLock	iprimlck.hpp	Added in IOC Version 4. Simple class.
IPrivateCondition	iconditn.hpp	Added in IOC Version 4. Derived from ICondition.
IPrivateResource	ireslock.hpp	Added in IOC Version 5 for iSeries and IOC Version 3 for all other platforms. Derived from IResource.
IPrivateSemaphoreHandle	ibhandle.hpp	Added in IOC Version 5 for iSeries and IOC Version 3 for all other platforms. Simple class.
IProcedureAddress	iprocadr.hpp	Added in IOC Version 3. Simple class. Not supported on z/OS.
IProcessId	ibhandle.hpp	Added in IOC Version 5 for iSeries and IOC Version 3 for all other platforms. Simple class.
IProfile	iprofile.hpp	Simple class. Not supported on iSeries or z/OS.
IProfile::Cursor	iprofile.hpp	Added in IOC Version 3. Simple class.
IProfileHandle	ihandle.hpp	Added in IOC Version 3. Simple class.

Table 11. IBM Open Class Library Application Control classes (continued)

Class Name	Header File	Notes
IRefCounted	irefcnt.hpp	Deprecated in IOC Version 4 and replaced with the thread-safe IRefCounted class. Simple class.
IReference	irefcnt.hpp	Deprecated in IOC Version 4. Simple class.
IResource	ireslock.hpp	Added in IOC Version 5 for iSeries and IOC Version 3 for all other platforms. Simple class.
IResourceId	ireslib.hpp	Added in IOC Version 3. Simple class. Not supported on z/OS and iSeries.
IResourceLibrary	ireslib.hpp	Added in IOC Version 3. Simple class. Not supported on z/OS and iSeries.
IResourceLock	ireslock.hpp	Added in IOC Version 5 for iSeries and IOC Version 3 for all other platforms. Simple class.
ISharedCondition	iconditn.hpp	Added in IOC Version 4. Derived from ICondition.
ISharedResource	ireslock.hpp	Added in IOC Version 5 for iSeries and IOC Version 3 for all other platforms. Derived from IResource.
ISharedSemaphoreHandle	ibhandle.hpp	Added in IOC Version 5 for iSeries and IOC Version 3 for all other platforms. Simple class.
IStandardNotifier	istdntfy.hpp	Added in IOC Version 3. Derived from INotifier.
ISynchronized	isynchr.hpp	Added in IOC Version 4. Simple template class.
IThread	ithread.hpp	Available in IOC Version 3 and redesigned in IOC Version 4 to support UI-based threads only. The non-UI thread support provided by this class was moved to the new class INonGUIThread. Derived from INonGUIThread.
IThreadFn	ingthrd.hpp	Added in IOC Version 5 for iSeries and IOC Version 3 for all other platforms. Derived from IRefCounted.
IThreadHandle	ibhandle.hpp	Added in IOC Version 4.
IThreadId	ibhandle.hpp	Added in IOC Version 5 for iSeries and IOC Version 3 for all other platforms.
IThreadLocalBase	iperthr.hpp	Added in IOC Version 4. Simple class.
IThreadLocalStorage	iperthr.hpp	Added in IOC Version 4. Derived from IThreadLocalBase



Table 11. IBM Open Class Library Application Control classes (continued)

Class Name	Header File	Notes
IThreadMemberFn	ingthrd.hpp	Added in IOC Version 5 for iSeries and IOC Version 3 for all other platforms. Derived from IThreadFn.
ITimer	itimer.hpp	Simple class. Not supported on z/OS and iSeries
ITimer::Cursor	itimer.hpp	Added in IOC Version 3. Simple class. Not supported on z/OS and iSeries
ITimerFn	itimer.hpp	Added in IOC Version 3. Derived from IMRefCounted. Not supported on z/OS and iSeries
ITimerMemberFn	itimer.hpp	Added in IOC Version 3. Derived from ITimerFn. Not supported on z/OS and iSeries
ITimerMemberFn0	itimer.hpp	Added in IOC Version 3. Derived from ITimerFn. Not supported on z/OS and iSeries
IVBase	ivbase.hpp	Deprecated in IOC Version 4.
IVersion	iversion.hpp	Added in IOC Version 4. Data class that represents the version of IOC in use. Should not be critical to applications.
<b>To migrate the following classes, you can either obtain a broader license from IBM and integrate the entire library or a particular class into your application, or specialize the Standard C++ exception template class.</b>		
IConditionInvalid	ithrdexc.hpp	Added in IOC Version 4. Derived from IException.
IWaitAbandoned	ithrdexc.hpp	Added in IOC Version 4. Derived from IException.
<b>The following Application Control classes cannot be migrated.</b>		
IStdDeque	istdcnr.hpp	Added in IOC Version 5. Documented as a class for internal use only and is not supported.
IStdEqualitySequence	istdcnr.hpp	Added in IOC Version 5. Documented as a class for internal use only and is not supported.
IStdKeySet	istdkcnr.hpp	Added in IOC Version 5. Documented as a class for internal use only and is not supported.
IStdKeySortedSet	istdkcnr.hpp	Added in IOC Version 5. Documented as a class for internal use only and is not supported.
IStdKeySortedSetAsTable	istdkcnr.hpp	Added in IOC Version 5. Documented as a class for internal use only and is not supported.
IStdKeySortedSetOnSortedTabularSequence	istdkcnr.hpp	Added in IOC Version 5. Documented as a class for internal use only and is not supported.

Table 11. IBM Open Class Library Application Control classes (continued)

Class Name	Header File	Notes
IStdQueue	istdcnr.hpp	Added in IOC Version 5. Documented as a class for internal use only and is not supported.
IStdSequence	istdcnr.hpp	Added in IOC Version 5. Documented as a class for internal use only and is not supported.
IStdSet	istdcnr.hpp	Added in IOC Version 5. Documented as a class for internal use only and is not supported.
IStdSortedSet	istdcnr.hpp	Added in IOC Version 5. Documented as a class for internal use only and is not supported.
IStdStack	istdcnr.hpp	Added in IOC Version 5. Documented as a class for internal use only and is not supported.

## Streaming Classes

These classes provide support for persistent storage mechanisms for IOC components, including the streaming classes that support streaming data in C++ objects in and out of persistent storage.

These classes were added in Version 4 of the IBM Open Class Library.

Table 12. IBM Open Class Library Streaming Classes

Class Name	Header File	Notes
<b>To migrate the following classes, you can either obtain a broader license from IBM and integrate the entire library or a particular class into your application, or write your own classes mimicking IOC functionality.</b>		
IDataStream	idatstrm.hpp	Added in IOC Version 4. Simple class.
IMStreamable	imstrmbl.hpp	Added in IOC Version 4. Simple class.
IStreamContextFrame	istrmcf.hpp	Added in IOC Version 4. Simple class.
IStreamInFrame	imstrmbl.hpp	Added in IOC Version 4. Simple class.
IStreamIO	istrmio.hpp	Added in IOC Version 4. Simple class.
IStreamModule	istrmmod.hpp	Added in IOC Version 4. Simple class.
IStreamOutFrame	imstrmbl.hpp	Added in IOC Version 4. Simple class.
<b>To migrate the following classes, you can either obtain a broader license from IBM and integrate the entire library or a particular class into your application, or specialize the Standard C++ exception template class.</b>		
IAddressAlreadyInContext	istrmexc.hpp	Added in IOC Version 4. Derived from IException.

Table 12. IBM Open Class Library Streaming Classes (continued)

Class Name	Header File	Notes
IEndOfStream	istrmexc.hpp	Added in IOC Version 4. Derived from IException.
IInvalidContextNumber	istrmexc.hpp	Added in IOC Version 4. Derived from IException.
IInvalidDataOnStream	istrmexc.hpp	Added in IOC Version 4. Derived from IException.
IUnknownTypeOnStream	istrmexc.hpp	Added in IOC Version 4. Derived from IException.

## File System Classes

These classes provide portable abstractions that allow you to manipulate physical file system entities such as volumes, directories, and files.

These classes were added in Version 4 of the IBM Open Class Library.

Table 13. IBM Open Class Library File System Classes

Class Name	Header File	Notes
<b>To migrate the following classes, you can either obtain a broader license from IBM and integrate the entire library or a particular class into your application, or write your own classes mimicking IOC functionality.</b>		
ICompoundName	icmpdnam.hpp	Added in IOC Version 4. Simple class.
ICompoundNameParser	icmpdnam.hpp	Added in IOC Version 4.
IDirectory	ifilesys.hpp	Added in IOC Version 4. Derived from IFileSystemEntity and IStreamable.
IDirectoryIterator	ifileitr.hpp	Added in IOC Version 4. Simple class.
IFile	ifilesys.hpp	Added in IOC Version 4. Derived from IFileSystemEntity and IStreamable.
IFileOperation	ifilesys.hpp	Added in IOC Version 4.
IFileSystemCopier	ifilesys.hpp	Added in IOC Version 4. Derived from IFileOperation.
IFileSystemEntity	ifilesys.hpp	Added in IOC Version 4. Derived from IStreamable.
IFileSystemMover	ifilesys.hpp	Added in IOC Version 4. Derived from IFileOperation.
IPathName	ipathnam.hpp	Added in IOC Version 4. Derived from ICompoundName and IStreamable.
IRootDirectoryIterator	ifileitr.hpp	Added in IOC Version 4. Simple class.
ITimeStamp	itmstamp.hpp	Simple class.
ITypeRepresentation	ityperrep.hpp	Added in IOC Version 4. Simple class.

Table 13. IBM Open Class Library File System Classes (continued)

Class Name	Header File	Notes
IUnixPathNameParser	ipathnam.hpp	Added in IOC Version 4. Derived from ICompoundNameParser.
IVolume	ifilesys.hpp	Added in IOC Version 4. Derived from IDirectory, IFileSystemEntity and IStreamable.
IVolumeIterator	ifileitr.hpp	Added in IOC Version 4. Simple class.
IWin32PathNameParser	ipathnam.hpp	Added in IOC Version 4. Derived from ICompoundNameParser.
<b>To migrate the following classes, you can either obtain a broader license from IBM and integrate the entire library or a particular class into your application, or specialize the Standard C++ exception template class.</b>		
IEntityInUse	iexcfile.hpp	Added in IOC Version 4. Derived from IAccessError and IException.
IEntityInvalid	iexcfile.hpp	Added in IOC Version 4. Derived from IInvalidParameter and IException.
IEntityTypeMismatch	iexcfile.hpp	Added in IOC Version 4. Derived from IInvalidParameter and IException.
IFileOperationCancelled	iexcfile.hpp	Added in IOC Version 4. Derived from IException.
IVolumeOffline	iexcfile.hpp	Added in IOC Version 4. Derived from IDeviceError and IException.
<b>To migrate the following classes, you can either obtain a broader license from IBM and integrate the entire library or a particular class into your application, or use Standard C++ iostream class.</b>		
IFileIOStream	ifilestr.hpp	Added in IOC Version 4. Derived from iostream (USL I/O Stream).

## Text and Internationalization Classes

These classes provide support for Unicode text strings and easily localizable components. This category includes the following groups of classes:

- Unicode support classes inquire about the stylistic and semantic properties of characters, character sets, and scripts (writing systems). These classes also store and manipulate Unicode text styles and were added in IOC Version 4.
- Internationalization classes create international applications and manipulate international text. This includes language-sensitive comparison of text strings, conversion between character sets, and a locale mechanism for access to portable and host-specific resources. Some of these classes existed in Version 3 of the library and others were added in Version 4.
- Date and time classes provide you with data types to store and manipulate date and time information. These classes were available in IOC Version 3.

The International Components for Unicode (ICU) is a C and C++ library that provides robust and full-featured Unicode support on a wide variety of platforms. The library provides: calendar support, character set conversions, language-sensitive collation, date and time formatting, over 170 locales, resource

bundles, message formatting, normalization, number and currency formatting, time zones, transliteration, word, line and sentence breaks. The functionality of many of these IOC classes can be found within ICU. See <http://oss.software.ibm.com/icu/> for more details on ICU.

Table 14. IBM Open Class Library Text and Internationalization Classes

Class Name	Header File	Notes
<b>To migrate the following class, use Standard C++ <code>std::codecvt_base</code> class.</b>		
<code>codecvt_base</code>	<code>icodecvt.hpp</code>	Added in IOC Version 4. Simple class.
<b>To migrate the following classes, obtain a broader license from IBM and integrate either the entire library or the specific class into your code, write your own code mimicking the functionality, or use the basic string functions available via the <code>cstring</code> or <code>string.h</code> header provided with the compiler.</b>		
<code>I0String</code>	<code>i0string.hpp</code>	Added in IOC Version 2. Derives from <code>IString</code> .
<code>IString</code>	<code>istring.hpp</code>	Added in IOC Version 2. Simple class.
<b>To migrate the following classes, obtain a broader license from IBM and integrate either the entire library or the specific class into your code, write your own code mimicking the functionality, or use equivalent classes in ICU.</b>		
<code>IBitwiseCollation</code>	<code>itxtcoll.hpp</code>	Added in IOC Version 4. Derived from <code>ICollation</code> .
<code>ICharacterPropertyIterator</code>	<code>iunicode.hpp</code>	Added in IOC Version 4. Simple class.
<code>ICharacterReference</code>	<code>itxtiter.hpp</code>	Added in IOC Version 4. Simple class.
<code>ICharacterSetIterator</code>	<code>itrancod.hpp</code>	Added in IOC Version 4. Simple class.
<code>ICharacterStyle</code>	<code>itxtstyl.hpp</code>	Added in IOC Version 4. Derived from <code>ITextStyle</code> .
<code>ICollation</code>	<code>itxtcoll.hpp</code>	Added in IOC Version 4. Simple class.
<code>ICollationIterator</code>	<code>icolitr.hpp</code>	Added in IOC Version 4. Simple class.
<code>IConstTextIterator</code>	<code>itxtiter.hpp</code>	Added in IOC Version 4. Simple class.
<code>IFastTextIterator</code>	<code>itxtiter.hpp</code>	Added in IOC Version 4. Simple class.
<code>ILineBreakConverter</code>	<code>itrancod.hpp</code>	Added in IOC Version 4. Simple class.
<code>ILocaleKey</code>	<code>ilocale.hpp</code>	Added in IOC Version 4. Derived from <code>IMStreamable</code> .
<code>ILocaleKeyIterator</code>	<code>ilocale.hpp</code>	Added in IOC Version 4. Simple class.
<code>IMTabRuler</code>	<code>imtabrl.hpp</code>	Added in IOC Version 4. Simple class.
<code>IParagraphEndIndentStyle</code>	<code>istyles.hpp</code>	Added in IOC Version 4. Derived from <code>IParagraphStyle</code> .
<code>IParagraphFirstIndentStyle</code>	<code>istyles.hpp</code>	Added in IOC Version 4. Derived from <code>IParagraphStyle</code> .

Table 14. IBM Open Class Library Text and Internationalization Classes (continued)

Class Name	Header File	Notes
IParagraphJustificationStyle	istyles.hpp	Added in IOC Version 4. Derived from IParagraphStyle.
IParagraphSpreadStyle	istyles.hpp	Added in IOC Version 4. Derived from IParagraphStyle.
IParagraphStartIndentStyle	istyles.hpp	Added in IOC Version 4. Derived from IParagraphStyle.
IParagraphStyle	itxtstyl.hpp	Added in IOC Version 4. Derived from ITextStyle.
IReverseTextIterator	itxtiter.hpp	Added in IOC Version 4. Simple class.
IStandardTabRuler	imtabrl.hpp	Added in IOC Version 4. Derived from IMTabRuler.
ITabRulerStyle	istyles.hpp	Added in IOC Version 4. Derived from IParagraphStyle.
ITabStop	imtabrl.hpp	Added in IOC Version 4. Simple class.
IText	itext.hpp	Added in IOC Version 4. Simple class.
ITextBitmapStyle	istyles.hpp	Added in IOC Version 4. Derived from ICharacterStyle.
ITextBoldfaceStyle	istyles.hpp	Added in IOC Version 4. Derived from ICharacterStyle.
ITextBoundary	itxtbdry.hpp	Added in IOC Version 4. Simple class.
ITextColorStyle	istyles.hpp	Added in IOC Version 4. Derived from ICharacterStyle.
ITextFixedPitchStyle	istyles.hpp	Added in IOC Version 4. Derived from ICharacterStyle.
ITextItalicStyle	istyles.hpp	Added in IOC Version 4. Derived from ICharacterStyle.
ITextIterator	itxtiter.hpp	Added in IOC Version 4. Simple class.
ITextOutlineStyle	istyles.hpp	Added in IOC Version 4. Derived from ICharacterStyle.
ITextPlacement	itxtplmt.hpp	Added in IOC Version 4. Simple class.
ITextPointSizeStyle	istyles.hpp	Added in IOC Version 4. Derived from ICharacterStyle.
ITextStorage	itxtstor.hpp	Added in IOC Version 4. Derived from IMRefCounted and IMStreamable.
ITextStrikethroughStyle	istyles.hpp	Added in IOC Version 4. Derived from ICharacterStyle.
ITextStyle	itxtstyl.hpp	Added in IOC Version 4. Simple class.
ITextStyleRunIterator	istylset.hpp	Added in IOC Version 4. Simple class.

Table 14. IBM Open Class Library Text and Internationalization Classes (continued)

Class Name	Header File	Notes
ITextStyleSet	istylset.hpp	Added in IOC Version 4. Derived from IMRefCounted and IStreamable.
ITextSuperSubscriptStyle	istyles.hpp	Added in IOC Version 4. Derived from ICharacterStyle.
ITextTypefaceStyle	istyles.hpp	Added in IOC Version 4. Derived from ICharacterStyle.
ITextUnderlineStyle	istyles.hpp	Added in IOC Version 4. Derived from ICharacterStyle.
ITextUneditableStyle	istyles.hpp	Added in IOC Version 4. Derived from ICharacterStyle.
ITranscoder	itrancod.hpp	Added in IOC Version 4. Simple class.
IUnicode	iunicode.hpp	Added in IOC Version 4. Simple class.
<b>To migrate the following classes, obtain a broader license from IBM and integrate either the entire library or the specific class into your code.</b>		
IBuffer	ibuffer.hpp	Added in IOC Version 2. Derived from IMRefCounted.
IDBCSBuffer	idbcsbuf.hpp	Added in IOC Version 2. Derived from IBuffer.
<b>To migrate the following classes, obtain a broader license from IBM and integrate either the entire library or the specific class into your code, or write your own code mimicking the functionality.</b>		
IDate	idate.hpp	Added in IOC Version 2. Simple class
IStringEnum	istrenum.hpp	Added in IOC Version 2. Simple class.
IStringGenerator	istrngen.hpp	Added in IOC Version 5 for AS/400 and z/OS and IOC Version 3 for all other platforms. Simple class.
IStringGeneratorasString	istrngen.hpp	Added in IOC Version 5 for AS/400 and z/OS and IOC Version 3 for all other platforms. Derived from IStringGeneratorFn.
IStringGeneratorFn	istrngen.hpp	Added in IOC Version 5 for AS/400 and z/OS and IOC Version 3 for all other platforms. Derived from IMRefCounted.
IStringGeneratorMemberFn	istrngen.hpp	Added in IOC Version 5 for AS/400 and z/OS and IOC Version 3 for all other platforms. Derived from IStringGeneratorFn.
IStringGeneratorRefMemberFn	istrngen.hpp	Added in IOC Version 5 for AS/400 and z/OS and IOC Version 3 for all other platforms. Derived from IStringGeneratorFn.

Table 14. IBM Open Class Library Text and Internationalization Classes (continued)

Class Name	Header File	Notes
IStringParser	istparse.hpp	Added in IOC Version 2. Simple class.
IStringParser::SkipWords	istparse.hpp	Added in IOC Version 2. Simple class.
IStringTest	istrtest.hpp	Added in IOC Version 2. Simple class.
IStringTestMemberFn	istrtest.hpp	Added in IOC Version 2. Derived from IStringTest.
<b>To migrate the following classes, obtain a broader license from IBM and integrate either the entire library or the specific class into your code, write your own code mimicking the functionality, or use the basic time functions available via the <code>ctime</code> or <code>time.h</code> header provided with the compiler.</b>		
ITime	itime.hpp	Added in IOC Version 2. Simple class.

## Error Handling, Tracing, and Testing Classes

These classes provide support for building robust and well-behaved applications. They include:

- exception classes to detect and convey information about unusual circumstances in applications
- tracing classes for your tracing code
- test classes to help you create and run unit tests for your application

Most of these classes were added prior to Version 3 of the IBM Open Class Library.

Table 15. IBM Open Class Library Error Handling and Tracing Classes

Class Name	Header File	Notes
<b>To migrate the following classes, you can either obtain a broader license from IBM and integrate the entire library or a particular class into your application, or specialize the Standard C++ exception template class.</b>		
IAccessError	iexbase.hpp	Added in IOC Version 2. Derived from IException.
IAlreadyExists	igenexc.hpp	Added in IOC Version 4. Derived from IException.
IAssertionFailure	iexbase.hpp	Added in IOC Version 2. Derived from IException.
ICannotProceed	igenexc.hpp	Added in IOC Version 4. Derived from IException.
IDeviceError	iexbase.hpp	Added in IOC Version 2. Derived from IException.
IException	iexbase.hpp	Added in IOC Version 2. Simple class.
IMustBeEmpty	igenexc.hpp	Added in IOC Version 4. Derived from IException.
IObjectNotFound	igenexc.hpp	Added in IOC Version 4. Derived from IException.



Table 15. IBM Open Class Library Error Handling and Tracing Classes (continued)

Class Name	Header File	Notes
IOutOfMemory	iexcbase.hpp	Added in IOC Version 2. Derived from IException.
IOutOfSystemResource	iexcbase.hpp	Added in IOC Version 2. Derived from IException.
IOutOfWindowResource	iexcbase.hpp	Added in IOC Version 3. Not supported on z/OS or iSeries. Derived from IResourceExhausted.
IResourceExhausted	iexcbase.hpp	Added in IOC Version 2. Derived from IException.
IInvalidName	igenexc.hpp	Added in IOC Version 4. Derived from IException.
IInvalidParameter	iexcbase.hpp	Added in IOC Version 2. Derived from IException.
IInvalidRequest	iexcbase.hpp	Added in IOC Version 2. Derived from IException.
<b>To migrate the following classes, you can either obtain a broader license from IBM and integrate the entire library or a particular class into your application, or write your own classes mimicking IOC functionality.</b>		
IArgumentDictionary	iargdict.hpp	Added in IOC Version 4. Simple class.
IBaseErrorInfo	iexcbase.hpp	Added in IOC Version 2. Simple class.
ICLibErrorInfo	iexcbase.hpp	Added in IOC Version 2. Derived from IBaseErrorInfo.
IComparisonTestOf	icmptest.hpp	Added in IOC Version 4. Derived from ITest.
IException::TraceFn	iexcbase.hpp	Added in IOC Version 2. Simple class.
IExceptionLocation	iexcbase.hpp	Added in IOC Version 2. Simple class.
IGUIErrorInfo	iexcept.hpp	Added in IOC Version 3. Not supported on z/OS or iSeries. Derived from IBaseErrorInfo.
IMessageText	imgstext.hpp	Added in IOC Version 2. Simple class.
ISimpleClock	ismpclck.hpp	Added in IOC Version 4. Simple class.
IStartStopTimingTest	issttest.hpp	Added in IOC Version 4. Derived from ITimingTest.
IStreamTestOf	istrmtst.hpp	Added in IOC Version 4. Derived from ITest.
ISystemErrorInfo	iexcbase.hpp	Added in IOC Version 2. Derived from IBaseErrorInfo.
ITest	itest.hpp	Added in IOC Version 4. Simple class.
ITestCollection	itestcol.hpp	Added in IOC Version 4. Derived from ITest.

Table 15. IBM Open Class Library Error Handling and Tracing Classes (continued)

Class Name	Header File	Notes
ITestMultiplexer	itestmul.hpp	Added in IOC Version 4. Derived from ITest.
ITieredTextBuffer	ittxtbuf.hpp	Added in IOC Version 4. Simple class.
ITimingTest	itimetst.hpp	Added in IOC Version 4. Derived from ITest.
ITimingTestStopwatch	issttest.hpp	Added in IOC Version 4. Simple class.
ITrace	itrace.hpp	Added in IOC Version 2. Used for debugging purposes.
IXLibErrorInfo	iexcept.hpp	Added in IOC Version 3. Not supported on z/OS or iSeries. Derived from IBaseErrorInfo.

## Collection Classes

These classes provide a set of commonly used abstract data types including sets, maps, sequences, trees, stacks, and queues.

Most of the representations of IBM Open Class Collections are duplicated in the Standard Template Library (STL) set of containers, iterators, and algorithms. You should consider using the equivalent STL class. Note that there may not be an exact correspondence of functionality between IOC and STL collections classes.

Most of the IOC Collection classes have been available since the first version of the library was made available. The IV<xxxx> classes were added in Version 3 of the class library in order to support the Visual Builder tool that was shipped with the compiler. They provide the same function as the other variants with the addition of notification support to inform observers of change events to the collection.

## Collection Characteristics and STL Containers

The standard containers come in two different varieties: sequence containers and associative containers.

Four different properties differentiate flat collections from each other. The following table describes how these characteristics compare to the STL containers.

Table 16. STL Containers

Collection classes	STL Containers	
	Sequence Containers	Associative Containers
The collection is ordered.	Sequence containers store their elements by the order you have inserted them. You must use an algorithm to sort the elements in these containers.	Associative containers do not store their elements by the order you have inserted them. These containers sort their elements automatically.

Table 16. STL Containers (continued)

Collection classes	STL Containers	
	Sequence Containers	Associative Containers
The collection is sequential.	You generally insert, access, or remove an element in these containers by referring to a specific location.	You generally access elements in these containers by referring to the key of the element instead of referring to a position in the container.
The collection allows an element to appear more than once.	Sequence containers allow you to have multiple occurrences of an element.	The multi- prefix indicates whether the associative container accepts multiple occurrences of a key.
Keys are defined for elements in the collection.	This does not apply to sequence containers.	Associative containers use keys.

The following table lists the main IOC Collection Classes, and an appropriate STL container or algorithm substitute:

Table 17. IOC Collection Classes Migration Suggestions

IOC Collection Class	ANSI STL Container
IKeySet	map
IKeyBag	multimap
IMap	map
IRelation	multimap
ISet	set
IBag	multiset
IKeySortedSet	map
IKeySortedBag	multimap
IPriorityQueue	priority_queue
ISortedMap	map
ISortedRelation	multimap
ISortedSet	set
ISortedBag	multiset
IEqualitySequence	vector, list
ISequence	list, deque
IStack	stack
IDeque	deque
IQueue	queue
IHeap	Choose any container, then apply the following algorithms: <ul style="list-style-type: none"> <li>• make_heap()</li> <li>• pop_heap()</li> <li>• push_heap()</li> <li>• sort_heap()</li> </ul>

The following table lists all IOC Collection classes and provides migration suggestions and other helpful information. The classes are listed alphabetically by migration suggestion. To determine the suggestion for a given class, first use Table 17 on page 39 to determine the appropriate migration suggestion for that group of classes, and then use Table 18 to confirm that the given class belongs to the specified migration group.

Table 18. IBM Open Class Library Collection Classes

Class Name	Header File	Notes
<b>To migrate the following classes, you can either obtain a broader license from IBM and integrate the entire library or a particular class into your application, or write your own classes mimicking IOC functionality.</b>		
IACollection	iacllct.h	Derived from IACollectionBase.
IACollectionBase	ibcllct.h	Derived from IMetaCollection.
IACollectionStreamer	iastr.h	Added in IOC Version 5 for iSeries and IOC Version 3 for all other platforms. Simple class.
IAEqualityCollection	iaequal.h	Derived from IACollection.
IAEqualityKeyCollection	iaekey.h	Derived from IAEqualityCollection.
IAEqualityKeySortedCollection	iaeqsrt.h	Derived from IAEqualityCollection.
IAEqualitySequence	iaes.h	Derived from IAEqualityCollection.
IAEqualitySortedCollection	iaeqsrt.h	Derived from IAEqualityCollection.
IAKeyCollection	iakey.h	Derived from IACollection.
IAKeySortedCollection	iaksrt.h	Derived from IAKeyCollection.
IAMultiwayTree	iamwt.h	Derived from IATree.
IAOrderedCollection	iaorder.h	Derived from IACollection.
IARestrictedAccessCollection	iarstrct.h	Derived from IACollectionBase.
IASequentialCollection	iasqntl.h	Derived from IAOrderedCollection.
IATree	iatree.h	Derived from IATreeBase.
IATreeBase	ibtree.h	Derived from IMetaTree.
IApplicator	iappl.h	Simple class.
IAutoElemPointer	iptr.h	Derived from IAutoPointer.
IAutoPointer	iptr.h	Simple class.
ICollectionGuard	iacllct.h	Added in IOC Version 5 for iSeries and IOC Version 3 for all other platforms. Simple class.
IConstantApplicator	iappl.h	Simple class.
ICursor	ibcllct.h	Simple class.
IElemPointer	iptr.h	Simple class.
IGMultiwayTree	imwt.h	Derived from IAMultiwayTree.
IGTree	itree.h	Derived from IGMultiwayTree.
IInternalApplicator	iappl.h	Simple class.
IMgPtr	icompat.h	Simple class.
IMngElemPointer	iptr.h	Derived from IMngPointer.
IMngPointer	iptr.h	Simple class.
IMultiwayTree	imwt.h	Derived from IGMultiwayTree.

Table 18. IBM Open Class Library Collection Classes (continued)

Class Name	Header File	Notes
IOrderedCursor	iaorder.h	Derived from IElementCursor.
IPartCollection	icompat.h	Derived from IACollectionBase.
IPartOrderedCollection	icompat.h	Derived from IACollection.
IPtr	icompat.h	Simple class.
IRestrictedAccessCollectionGuard	iarstrct.h	Added in IOC Version 4. Simple class.
IStreamablePointer	iptr.h	Added in IOC Version 4. Simple class.
ITreeCollectionGuard	iatree.h	Simple class.
ITreeCursor	ibtree.h	Simple class.
IVGMultiwayTree	imwt.h	Derived from IGMultiwayTree.
IVMultiwayTree	imwt.h	Derived from IVGMultiwayTree.
<b>To migrate the following classes, use the Standard Template Library's bag support.</b>		
IABag	iabag.h	Derived from IAEqualityCollection.
IBag	ibag.h	Derived from IGBag.
IBagAsAvlTree	ibagavl.h	Derived from IGBagAs<xxxx>.
IBagAsBstTree	ibagbst.h	Derived from IGBagAs<xxxx>.
IBagAsDilTable	ibagdill.h	Derived from IGBagAs<xxxx>.
IBagAsHshTable	ibaghsh.h	Derived from IGBagAs<xxxx>.
IBagAsList	ibaglst.h	Derived from IGBagAs<xxxx>.
IBagAsTable	ibagtab.h	Derived from IGBagAs<xxxx>.
IBagOnBSTKeySortedSet	icompat.h	Derived from IGBagAs<xxxx>.
IBagOnHashKeySet	icompat.h	Derived from IGBagAs<xxxx>.
IBagOnSortedDilutedSequence	icompat.h	Derived from IGBagAs<xxxx>.
IBagOnSortedLinkedSequence	icompat.h	Derived from IGBagAs<xxxx>.
IBagOnSortedTabularSequence	icompat.h	Derived from IGBagAs<xxxx>.
IGBag	ibag.h	Derived from IABag.
IGBagAsAvlTree	ibagavl.h	Derived from IABag.
IGBagAsBstTree	ibagbst.h	Derived from IABag.
IGBagAsDilTable	ibagdil.h	Derived from IABag.
IGBagAsHshTable	ibaghsh.h	Derived from IABag.
IGBagAsList	ibaglst.h	Derived from IABag.
IGBagAsTable	ibagtab.h	Derived from IABag.
IGBagOnBSTKeySortedSet	icompat.h	Derived from IABag.
IGBagOnHashKeySet	icompat.h	Derived from IABag.
IGBagOnSortedDilutedSequence	icompat.h	Derived from IABag.
IGBagOnSortedLinkedSequence	icompat.h	Derived from IABag.
IGBagOnSortedTabularSequence	icompat.h	Derived from IABag.
IRBag	irbag.h	Derived from IABag.
<b>To migrate the following classes, use the Standard Template Library's deque or list support.</b>		

Table 18. IBM Open Class Library Collection Classes (continued)

Class Name	Header File	Notes
IADeque	iadqu.h	Derived from IARestrictedAccessCollection.
IASequence	iaseq.h	Derived from IASequentialCollection.
IDeque	idqu.h	Derived from IGDeque.
IDequeAsDilTable	idqudil.h	Derived from IGDequeAs<xxxx>.
IDequeAsList	idqulst.h	Derived from IGDequeAs<xxxx>.
IDequeAsTable	idqutab.h	Derived from IGDequeAs<xxxx>.
IDequeOnDilutedSequence	icompat.h	Derived from IGDequeAs<xxxx>.
IDequeOnTabularSequence	icompat.h	Derived from IGDequeAs<xxxx>.
IDilutedSequence	icompat.h	Derived from IGSequenceAs<xxxx>.
IGDeque	idqu.h	Derived from IADeque.
IGDequeAsDilTable	idqudil.h	Derived from IADeque.
IGDequeAsList	idqulst.h	Derived from IADeque.
IGDequeAsTable	idqutab.h	Derived from IADeque.
IGDequeOnDilutedSequence	icompat.h	Derived from IADeque.
IGDequeOnTabularSequence	icompat.h	Derived from IADeque.
IGDilutedSequence	icompat.h	Derived from IASequence.
IGLinkedSequence	icompat.h	Derived from IASequence.
IGSequence	iseq.h	Derived from IASequence.
IGSequenceAsDilTable	iseqdil.h	Derived from IASequence.
IGSequenceAsList	iseqlst.h	Derived from IASequence.
IGSequenceAsTable	iseqtab.h	Derived from IASequence.
IGTabularSequence	icompat.h	Derived from IASequence.
ILinkedSequence	icompat.h	Derived from IGSequenceAs<xxxx>.
IRDeque	irdqu.h	Derived from IADeque.
IRSequence	irseq.h	Derived from IASequence.
ISequence	iseq.h	Derived from IGSequence.
ISequenceAsDilTable	iseqdil.h	Derived from IGSequenceAs<xxxx>.
ISequenceAsList	iseqlst.h	Derived from IGSequenceAs<xxxx>.
ISequenceAsTable	iseqtab.h	Derived from IGSequenceAs<xxxx>.
ITabularSequence	icompat.h	Derived from IGSequenceAs<xxxx>.
<b>To migrate the following classes, use the Standard Template Library's make_heap (), pop_heap (), push_heap (), sort_heap () algorithm support.</b>		
IAHeap	iahp.h	Derived from IACollection.
IGHeap	ihp.h	Simple class.
IGHeapAsDilTable	ihpdil.h	Simple class.

Table 18. IBM Open Class Library Collection Classes (continued)

Class Name	Header File	Notes
IGHeapAsList	ihplst.h	Simple class.
IGHeapAsTable	ihptab.h	Simple class.
IGHeapOnDilutedSequeuce	icompat.h	Simple class.
IGHeapOnTabularSequence	icompat.h	Simple class.
IHeap	ihp.h	Derived from IGHeap.
IHeapAsDilTable	ihpdil.h	Derived from IGHeapAs<xxxx>.
IHeapAsList	ihplst.h	Derived from IGHeapAs<xxxx>.
IHeapAsTable	ihptab.h	Derived from IGHeapAs<xxxx>.
IHeapOnDilutedSequeuce	icompat.h	Derived from IGHeapAs<xxxx>.
IHeapOnTabularSequence	icompat.h	Derived from IGHeapAs<xxxx>.
IRHeap	irheap.h	Simple class.
<b>To migrate the following classes, use the Standard Template Library's multimap support.</b>		
IAKeyBag	iakb.h	Derived from IAKeyCollection.
IAKeySortedBag	iaksb.h	Derived from IAKeySortedCollection.
IARelation	iarel.h	Derived from IAEqualityKeyCollection.
IGHashKeyBag	icompat.h	Derived from IAKeyBag.
IGKeyBag	ikb.h	Derived from IAKeyBag.
IGKeyBagAsDilTable	ikbdil.h	Derived from IAKeyBag.
IGKeyBagAsHshTable	ikbhsh.h	Derived from IAKeyBag.
IGKeyBagAsList	ikblst.h	Derived from IAKeyBag.
IGKeyBagAsTable	ikbtab.h	Derived from IAKeyBag.
IGKeySortedBag	iksb.h	Derived from IAKeySortedBag.
IGKeySortedBagAsDilTable	iksbdil.h	Derived from IAKeySortedBag.
IGKeySortedBagAsList	iksblst.h	Derived from IAKeySortedBag.
IGKeySortedBagAsTable	iksbtab.h	Derived from IAKeySortedBag.
IGKeySortedBag OnSortedDilutedSequence	icompat.h	Derived from IAKeySortedBag.
IGKeySortedBag OnSortedTabularSequence	icompat.h	Derived from IAKeySortedBag.
IGRelation	irel.h	Derived from IARelation.
IGRelationAsDilTable	ireldil.h	Derived from IARelation.
IGRelationAsHshTable	irelhsh.h	Derived from IARelation.
IGRelationAsList	irellst.h	Derived from IARelation.
IGRelationAsTable	ireltab.h	Derived from IARelation.
IHashKeyBag	icompat.h	Derived from IAKeyBagAs<xxxx>.
IKeyBag	ikb.h	Derived from IGKeyBag.
IKeyBagAsDilTable	ikbdil.h	Derived from IAKeyBagAs<xxxx>.
IKeyBagAsHshTable	ikbhsh.h	Derived from IAKeyBagAs<xxxx>.

Table 18. IBM Open Class Library Collection Classes (continued)

Class Name	Header File	Notes
IKeyBagAsList	ikblst.h	Derived from IAKeyBagAs<xxxx>.
IKeyBagAsTable	ikbtab.h	Derived from IAKeyBagAs<xxxx>.
IKeySortedBag	iksb.h	Derived from IKeySortedBag.
IKeySortedBagAsDilTable	iksbdil.h	Derived from IKeySortedBagAs<xxxx>.
IKeySortedBagAsList	iksblst.h	Derived from IKeySortedBagAs<xxxx>.
IKeySortedBagAsTable	iksbtab.h	Derived from IKeySortedBagAs<xxxx>.
IKeySortedBagOnSortedDilutedSequence	icompat.h	Derived from IKeySortedBagAs<xxxx>.
IKeySortedBagOnSortedTabularSequence	icompat.h	Derived from IKeySortedBagAs<xxxx>.
IRKeyBag	irkeybab.h	Derived from IAKeyBag.
IRKeySortedBag	irksbag.h	Derived from IAKeySortedBag.
IRRelation	irrel.h	Derived from IARelation.
IRelation	irel.h	Derived from IGRelation.
IRelationAsDilTable	ireldil.h	Derived from IGRelationAs<xxxx>.
IRelationAsHshTable	irelhsh.h	Derived from IGRelationAs<xxxx>.
IRelationAsList	irellst.h	Derived from IGRelationAs<xxxx>.
IRelationAsTable	ireltab.h	Derived from IGRelationAs<xxxx>.
<b>To migrate the following classes, use the Standard Template Library's map support.</b>		
IAKeySet	iaks.h	Derived from IAKeyCollection.
IAKeySortedSet	iakss.h	Derived from IAKeySortedCollection.
IAMap	iamap.h	Derived from IAEqualityKeyCollection.
IASortedMap	iasm.h	Derived from IAEqualityKeySortedCollection.
IASortedRelation	iasr.h	Derived from IAEqualityKeySortedCollection.
IAvIKeySortedSet	icompat.h	Derived from IKeySortedSetAs<xxxx>.
IBSTKeySortedSet	icompat.h	Derived from IKeySortedSetAs<xxxx>.
IGAvIKeySortedSet	icompat.h	Derived from IAKeySortedSet.
IGBSTKeySortedSet	icompat.h	Derived from IAKeySortedSet.
IGHashSet	icompat.h	Derived from IAKeySet.
IGKeySet	iks.h	Derived from IAKeySet.
IGKeySetAsAvlTree	iksavl.h	Derived from IAKeySet.
IGKeySetAsBstTree	iksbst.h	Derived from IAKeySet.
IGKeySetAsDilTable	iksdil.h	Derived from IAKeySet.



Table 18. IBM Open Class Library Collection Classes (continued)

Class Name	Header File	Notes
IGKeySetAsHshTable	ikshsh.h	Derived from IAKeySet.
IGKeySetAsList	ikslst.h	Derived from IAKeySet.
IGKeySetAsTable	ikstab.h	Derived from IAKeySet.
IGKeySetOnBSTKeySortedSet	icompat.h	Derived from IAKeySet.
IGKeySetOnSortedDilutedSequence	icompat.h	Derived from IAKeySet.
IGKeySetOnSortedLinkedSequence	icompat.h	Derived from IAKeySet.
IGKeySetOnSortedTabularSequence	icompat.h	Derived from IAKeySet.
IKeySetOnSortedTabularSequence	icompat.h	Derived from IGKeySetAs<xxxx>.
IGKeySortedSet	ikss.h	Derived from IAKeySortedSet.
IGKeySortedSetAsAvlTree	ikssavl.h	Derived from IAKeySortedSet.
IGKeySortedSetAsBstTree	ikssbst.h	Derived from IAKeySortedSet.
IGKeySortedSetAsDilTable	ikssdil.h	Derived from IAKeySortedSet.
IGKeySortedSetAsList	iksslst.h	Derived from IAKeySortedSet.
IGKeySortedSetAsTable	iksstab.h	Derived from IAKeySortedSet.
IGKeySortedSet OnSortedDilutedSequence	icompat.h	Derived from IAKeySortedSet.
IGKeySortedSet OnSortedLinkedSequence	icompat.h	Derived from IAKeySortedSet.
IGKeySortedSet OnSortedTabularSequence	icompat.h	Derived from IAKeySortedSet.
IKeySortedSet OnSortedTabularSequence	icompat.h	Derived from IGKeySortedSetAs<xxxx>.
IGMap	imap.h	Derived from IAMap.
IGMapAsAvlTree	imapavl.h	Derived from IAMap.
IGMapAsBstTree	imapbst.h	Derived from IAMap.
IGMapAsDilTable	imapdil.h	Derived from IAMap.
IGMapAsHshTable	imaphsh.h	Derived from IAMap.
IGMapAsList	imaplst.h	Derived from IGMapAs<xxxx>.
IGMapAsTable	imaptab.h	Derived from IGMapAs<xxxx>.
IGMapOnBSTKeySortedSet	icompat.h	Derived from IAMap.
IGMapOnHashKeySet	icompat.h	Derived from IGMap.
IGMapOnSortedDilutedSequence	icompat.h	Derived from IAMap.
IGMapOnSortedLinkedSequence	icompat.h	Derived from IGMapAs<xxxx>.
IGMapOnSortedTabularSequence	icompat.h	Derived from IGMapAs<xxxx>.
IGSortedMap	ism.h	Derived from IASortedMap.
IGSortedMapAsAvlTree	ismavl.h	Derived from IASortedMap.
IGSortedMapAsBstTree	ismbst.h	Derived from IASortedMap.
IGSortedMapAsDilTable	ismdil.h	Derived from IASortedMap.

Table 18. IBM Open Class Library Collection Classes (continued)

Class Name	Header File	Notes
IGSortedMapAsList	ismlst.h	Derived from IASortedMap.
IGSortedMapAsTable	ismtab.h	Derived from IASortedMap.
IGSortedMapOnBSTKeySortedSet	icompat.h	Derived from IASortedMap.
IGSortedMap OnSortedDilutedSequence	icompat.h	Derived from IASortedMap.
IGSortedMap OnSortedLinkedSequence	icompat.h	Derived from IASortedMap.
IGSortedMap OnSortedTabularSequence	icompat.h	Derived from IASortedMap.
IGSortedRelation	isr.h	Derived from IASortedRelation.
IGSortedRelationAsDilTable	isrdil.h	Derived from IASortedRelation.
IGSortedRelationAsTable	isrtab.h	Derived from IASortedRelation.
IGSortedRelation OnSortedDilutedSequence	icompat.h	Derived from IASortedRelation.
IGSortedRelation OnSortedTabularSequence	icompat.h	Derived from IASortedRelation.
ISortedRelation OnSortedTabularSequence	icompat.h	Derived from IGSortedRelationAs<xxxx>.
IHashSet	icompat.h	Derived from IGKeySetAs<xxxx>.
IKeySet	iks.h	Derived from IGKeySet.
IKeySetAsAvlTree	iksavl.h	Derived from IGKeySetAs<xxxx>.
IKeySetAsBstTree	iksbst.h	Derived from IGKeySetAs<xxxx>.
IKeySetAsDilTable	iksdil.h	Derived from IGKeySetAs<xxxx>.
IKeySetAsHshTable	ikshsh.h	Derived from IGKeySetAs<xxxx>.
IKeySetAsList	ikslst.h	Derived from IGKeySetAs<xxxx>.
IKeySetAsTable	ikstab.h	Derived from IGKeySetAs<xxxx>.
IKeySetOnBSTKeySortedSet	icompat.h	Derived from IGKeySetAs<xxxx>.
IKeySetOnSortedDilutedSequence	icompat.h	Derived from IGKeySetAs<xxxx>.
IKeySetOnSortedLinkedSequence	icompat.h	Derived from IGKeySetAs<xxxx>.
IKeySortedSet	ikss.h	Derived from IGKeySortedSet.
IKeySortedSetAsAvlTree	ikssavl.h	Derived from IGKeySortedSetAs<xxxx>.
IKeySortedSetAsBstTree	ikssbst.h	Derived from IGKeySortedSetAs<xxxx>.
IKeySortedSetAsDilTable	ikssdil.h	Derived from IGKeySortedSetAs<xxxx>.
IKeySortedSetAsList	iksslst.h	Derived from IGKeySortedSetAs<xxxx>.

Table 18. IBM Open Class Library Collection Classes (continued)

Class Name	Header File	Notes
IKeySortedSetAsTable	iksstab.h	Derived from IKeySortedSetAs<xxxx>.
IKeySortedSet OnSortedDilutedSequence	icompat.h	Derived from IKeySortedSetAs<xxxx>.
IKeySortedSet OnSortedLinkedSequence	icompat.h	Derived from IKeySortedSetAs<xxxx>.
IMap	imap.h	Derived from IMapAs<xxxx>.
IMapAsAvlTree	imapavl.h	Derived from IMapAs<xxxx>.
IMapAsBstTree	imapbst.h	Derived from IMapAs<xxxx>.
IMapAsDilTable	imapdil.h	Derived from IMapAs<xxxx>.
IMapAsHshTable	imaphsh.h	Derived from IMapAs<xxxx>.
IMapAsList	imaplst.h	Derived from IMapAs<xxxx>.
IMapAsTable	imaptab.h	Derived from IMapAs<xxxx>.
IMapOnBSTKeySortedSet	icompat.h	Derived from IMapOnBSTKeySortedSetAs<xxxx>.
IMapOnHashKeySet	icompat.h	Derived from IMapOnHashKeySetAs<xxxx>.
IMapOnSortedDilutedSequence	icompat.h	Derived from IMapOnSortedDilutedSequenceAs<xxxx>.
IMapOnSortedLinkedSequence	icompat.h	Derived from IMapOnSortedLinkedSequenceAs<xxxx>.
IMapOnSortedTabularSequence	icompat.h	Derived from IMapOnSortedTabularSequenceAs<xxxx>.
IRKeySet	irkeyset.h	Derived from IRKeySet.
IRKeySortedSet	irksset.h	Derived from IRKeySortedSet.
IRMap	irmap.h	Derived from IRMapAs<xxxx>.
IRSortedMap	irsrtmap.h	Derived from IRSortedMap.
IRSortedRelation	irsrtrel.h	Derived from IRSortedRelation.
ISortedMap	ism.h	Derived from ISortedMap.
ISortedMapAsAvlTree	ismavl.h	Derived from ISortedMapAs<xxxx>.
ISortedMapAsBstTree	ismbst.h	Derived from ISortedMapAs<xxxx>.
ISortedMapAsDilTable	ismdil.h	Derived from ISortedMapAs<xxxx>.
ISortedMapAsList	ismlst.h	Derived from ISortedMapAs<xxxx>.
ISortedMapAsTable	ismtab.h	Derived from ISortedMapAs<xxxx>.
ISortedMapOnBSTKeySortedSet	icompat.h	Derived from ISortedMapOnBSTKeySortedSetAs<xxxx>.
ISortedMap OnSortedDilutedSequence	icompat.h	Derived from ISortedMapOnSortedDilutedSequenceAs<xxxx>.
ISortedMap OnSortedLinkedSequence	icompat.h	Derived from ISortedMapOnSortedLinkedSequenceAs<xxxx>.

Table 18. IBM Open Class Library Collection Classes (continued)

Class Name	Header File	Notes
ISortedMap OnSortedTabularSequence	icompat.h	Derived from IGSortedMapAs<xxxx>.
ISortedRelation	isr.h	Derived from IGSortedRelation.
ISortedRelationAsDilTable	isrdil.h	Derived from IGSortedRelationAs<xxxx>.
ISortedRelationAsTable	isrtab.h	Derived from IGSortedRelationAs<xxxx>.
ISortedRelation OnSortedDilutedSequence	icompat.h	Derived from IGSortedRelationAs<xxxx>.
<b>To migrate the following classes, use the Standard Template Library's priority_queue support.</b>		
IAPriorityQueue	iapqu.h	Derived from IARestrictedAccessCollection.
IGPriorityQueue	ipqu.h	Derived from IAPriorityQueue.
IGPriorityQueueAsDilTable	ipqudil.h	Derived from IAPriorityQueue.
IGPriorityQueueAsList	ipqulst.h	Derived from IAPriorityQueue.
IGPriorityQueueAsTable	ipqutab.h	Derived from IGPriorityQueue.
IGPriorityQueue OnSortedDilutedSequence	icompat.h	Derived from IAPriorityQueue.
IGPriorityQueue OnSortedTabularSequence	icompat.h	Derived from IGPriorityQueueAs<xxxx>.
IPriorityQueue	ipqu.h	Derived from IGPriorityQueueAs<xxxx>.
IPriorityQueueAsDilTable	ipqudil.h	Derived from IGPriorityQueueAs<xxxx>.
IPriorityQueueAsList	ipqulst.h	Derived from IAPriorityQueueAs<xxxx>.
IPriorityQueueAsTable	ipqutab.h	Derived from IAPriorityQueueAs<xxxx>.
IPriorityQueue OnSortedDilutedSequence	icompat.h	Derived from IAPriorityQueue.
IPriorityQueue OnSortedTabularSequence	icompat.h	Derived from IAPriorityQueueAs<xxxx>.
IRPriorityQueue	irprioqu.h	Derived from IAPriorityQueueAs<xxxx>.
<b>To migrate the following classes, use the Standard Template Library's queue or list support.</b>		
IAQueue	iaqu.h	Derived from IARestrictedAccessCollection.
IGQueue	iqu.h	Derived from IAQueue.
IGQueueAsDilTable	iqudil.h	Derived from IAQueue.

Table 18. IBM Open Class Library Collection Classes (continued)

Class Name	Header File	Notes
IGQueueAsList	iqulst.h	Derived from IAQueue.
IGQueueAsTable	iqustab.h	Derived from IAQueue.
IGQueueOnDilutedSequence	icompat.h	Derived from IAQueue.
IGQueueOnTabularSequence	icompat.h	Derived from IAQueue.
IQueue	iqu.h	Derived from IGQueue.
IQueueAsDilTable	iqudil.h	Derived from IGQueueAs<xxxx>.
IQueueAsList	iqulst.h	Derived from IGQueueAs<xxxx>.
IQueueAsTable	iqustab.h	Derived from IGQueueAs<xxxx>.
IQueueOnDilutedSequence	icompat.h	Derived from IGQueueAs<xxxx>.
IQueueOnTabularSequence	icompat.h	Derived from IGQueueAs<xxxx>.
IRQueue	irqueue.h	Derived from IAQueue.
<b>To migrate the following classes, use the Standard Template Library's set support.</b>		
IASet	iaset.h	Derived from IAEqualityCollection.
IASortedSet	iass.h	Derived from IAEqualitySortedCollection.
IGSet	iset.h	Derived from IASet.
IGSetAsAvlTree	isetavl.h	Derived from IASet.
IGSetAsBstTree	isetbst.h	Derived from IASet.
IGSetAsDilTable	isetdil.h	Derived from IASet.
IGSetAsHshTable	isethsh.h	Derived from IASet.
IGSetAsList	isetlst.h	Derived from IASet.
IGSetAsTable	isettab.h	Derived from IASet.
IGSetOnBSTKeySortedSet	icompat.h	Derived from IASet.
IGSetOnHashKeySet	icompat.h	Derived from IASet.
IGSetOnSortedDilutedSequence	icompat.h	Derived from IASet.
IGSetOnSortedLinkedSequence	icompat.h	Derived from IASet.
IGSetOnSortedTabularSequence	icompat.h	Derived from IGSetAs<xxxx>.
IGSetOnSortedTabularSequence	icompat.h	Derived from IASet.
IGSortedSet	iss.h	Derived from IASortedSet.
IGSortedSetAsAvlTree	issavl.h	Derived from IASortedSet.
IGSortedSetAsBstTree	issbst.h	Derived from IASortedSet.
IGSortedSetAsDilTable	issdil.h	Derived from IASortedSet.
IGSortedSetAsList	isslst.h	Derived from IASortedSet.
IGSortedSetAsTable	isstab.h	Derived from IASortedSet.
IGSortedSetOnBSTKeySortedSet	icompat.h	Derived from IASortedSet.
IGSortedSetOnSortedDilutedSequence	icompat.h	Derived from IASortedSet.
IGSortedSetOnSortedLinkedSequence	icompat.h	Derived from IASortedSet.

Table 18. IBM Open Class Library Collection Classes (continued)

Class Name	Header File	Notes
IGSortedSet OnSortedTabularSequence	icompat.h	Derived from IASortedSet.
IRSet	irset.h	Derived from IASet.
IRSortedSet	irsrtset.h	Derived from IASortedSet.
ISet	iset.h	Derived from IGSet.
ISetAsAvlTree	isetavl.h	Derived from IGSetAs<xxxx>.
ISetAsBstTree	isetbst.h	Derived from IGSetAs<xxxx>.
ISetAsDilTable	isetdil.h	Derived from IGSetAs<xxxx>.
ISetAsHshTable	isethsh.h	Derived from IGSetAs<xxxx>.
ISetAsList	isetlst.h	Derived from IGSetAs<xxxx>.
ISetAsTable	isettab.h	Derived from IGSetAs<xxxx>.
ISetOnBSTKeySortedSet	icompat.h	Derived from IGSetAs<xxxx>.
ISetOnHashSet	icompat.h	Derived from IGSetAs<xxxx>.
ISetOnSortedDilutedSequence	icompat.h	Derived from IGSetAs<xxxx>.
ISetOnSortedLinkedSequence	icompat.h	Derived from IGSetAs<xxxx>.
ISortedSet	iss.h	Derived from IGSortedSet.
ISortedSetAsAvlTree	issavl.h	Derived from IGSortedSetAs<xxxx>.
ISortedSetAsBstTree	issbst.h	Derived from IGSortedSetAs<xxxx>.
ISortedSetAsDilTable	issdil.h	Derived from IGSortedSetAs<xxxx>.
ISortedSetAsList	isslst.h	Derived from IGSortedSetAs<xxxx>.
ISortedSetAsTable	isstab.h	Derived from IGSortedSetAs<xxxx>.
ISortedSetOnBSTKeySortedSet	icompat.h	Derived from IGSortedSetAs<xxxx>.
ISortedSet OnSortedDilutedSequence	icompat.h	Derived from IGSortedSetAs<xxxx>.
ISortedSet OnSortedLinkedSequence	icompat.h	Derived from IGSortedSetAs<xxxx>.
ISortedSet OnSortedTabularSequence	icompat.h	Derived from IGSortedSetAs<xxxx>.
<b>To migrate the following classes, use the Standard Template Library's multiset support.</b>		
IASortedBag	iasb.h	Derived from IAEqualitySortedCollection.
IASortedCollection	iasrt.h	Derived from IAOrderedCollection.
IGSortedBag	isb.h	Derived from IASortedBag.
IGSortedBagAsAvlTree	isbavl.h	Derived from IASortedBag.

Table 18. IBM Open Class Library Collection Classes (continued)

Class Name	Header File	Notes
IGSortedBagAsBstTree	isbbst.h	Derived from IASortedBag.
IGSortedBagAsDilTable	isbdil.h	Derived from IASortedBag.
IGSortedBagAsList	isblst.h	Derived from IASortedBag.
IGSortedBagAsTable	isbtab.h	Derived from IASortedBag.
IGSortedBagOnBSTKeySortedSet	icompat.h	Derived from IASortedBag.
IGSortedBag OnSortedDilutedSequence	icompat.h	Derived from IASortedBag.
IGSortedBag OnSortedLinkedSequence	icomapt.h	Derived from IASortedBag.
IGSortedBag OnSortedTabularSequence	icompat.h	Derived from IASortedBag.
IRSortedBag	irsrtbag.h	Derived from IASortedBag.
ISortedBag	isb.h	Derived from IGSortedBag.
ISortedBagAsAvlTree	isbavl.h	Derived from IGSortedBagAs<xxxx>.
ISortedBagAsBstTree	isbbst.h	Derived from IGSortedBagAs<xxxx>.
ISortedBagAsDilTable	isbdil.h	Derived from IGSortedBagAs<xxxx>.
ISortedBagAsList	isblst.h	Derived from IGSortedBagAs<xxxx>.
ISortedBagAsTable	isbtab.h	Derived from IGSortedBagAs<xxxx>.
ISortedBagOnBSTKeySortedSet	icompat.h	Derived from IGSortedBagAs<xxxx>.
ISortedBag OnSortedDilutedSequence	icompat.h	Derived from IGSortedBagAs<xxxx>.
ISortedBag OnSortedLinkedSequence	icompat.h	Derived from IGSortedBagAs<xxxx>.
ISortedBag OnSortedTabularSequence	icompat.h	Derived from IGSortedBagAs<xxxx>.
<b>To migrate the following classes, use the Standard Template Library's stack or list support.</b>		
IASStack	iastk.h	Derived from IARestrictedAccessCollection.
IGStack	istk.h	Derived from IASStack.
IGStackAsDilTable	istkdil.h	Derived from IASStack.
IGStackAsList	istklst.h	Derived from IASStack.
IGStackAsTable	istktab.h	Derived from IASStack.
IGStackOnDilutedSequence	icompat.h	Derived from IASStack.

Table 18. IBM Open Class Library Collection Classes (continued)

Class Name	Header File	Notes
IGStackOnTabularSequence	icompat.h	Derived from IASStack.
IGStackOnTabularSequence	icompat.h	Derived from IGStackAs<xxxx>.
IRStack	irstack.h	Derived from IASStack.
IStack	istk.h	Derived from IGStack.
IStackAsDilTable	istkdil.h	Derived from IGStackAs<xxxx>.
IStackAsList	istklst.h	Derived from IGStackAs<xxxx>.
IStackAsTable	istktab.h	Derived from IGStackAs<xxxx>.
IStackOnDilutedSequence	icompat.h	Derived from IGStackAs<xxxx>.
<b>To migrate the following classes, use the Standard Template Library's iterator support.</b>		
IElementCursor	iaclct.h	Derived from ICursor.
IElementTreeCursor	iatree.h	Derived from ITreeCursor.
IGBagAsAvlTreeCursor	ibagavl.h	Derived from IElementCursor.
IGBagAsDilTableCursor	ibagdil.h	Derived from IElementCursor.
IGBagAsHshTableCursor	ibaghsh.h	Derived from IElementCursor.
IGBagAsListCursor	ibaglst.h	Derived from IElementCursor.
IGBagAsTableCursor	ibagtab.h	Derived from IElementCursor.
IGBagCursor	ibag.h	Derived from IElementCursor.
IGDequeAsDilTableCursor	idqudil.h	Derived from IOrderedCursor.
IGDequeAsListCursor	idqulst.h	Derived from IOrderedCursor.
IGDequeAsTableCursor	idqutab.h	Derived from IOrderedCursor.
IGDequeCursor	idqu.h	Derived from IOrderedCursor.
IGEqualitySequence AsDilTableCursor	iesdil.h	Derived from IOrderedCursor.
IGEqualitySequenceAsListCursor	ieslst.h	Derived from IOrderedCursor.
IGEqualitySequenceAsTableCursor	iestab.h	Derived from IOrderedCursor.
IGEqualitySequenceCursor	ies.h	Derived from IOrderedCursor.
IGHeapAsDilTableCursor	ihpdil.h	Derived from IElementCursor.
IGHeapAsListCursor	ihplst.h	Derived from IElementCursor.
IGHeapAsTableCursor	ihptab.h	Derived from IElementCursor.
IGHeapCursor	ihp.h	Derived from IElementCursor.
IGKeyBagAsDilTableCursor	ikbdil.h	Derived from IElementCursor.
IGKeyBagAsHshTableCursor	ikbhsh.h	Derived from IElementCursor.
IGKeyBagAsListCursor	ikblst.h	Derived from IElementCursor.
IGKeyBagAsTableCursor	ikbtab.h	Derived from IElementCursor.
IGKeyBagCursor	ikb.h	Derived from IElementCursor.
IGKeySetAsAvlTreeCursor	iksavl.h	Derived from IElementCursor.
IGKeySetAsBstTreeCursor	iksbst.h	Derived from IElementCursor.
IGKeySetAsDilTableCursor	iksdil.h	Derived from IElementCursor.
IGKeySetAsHshTableCursor	ikshsh.h	Derived from IElementCursor.



Table 18. IBM Open Class Library Collection Classes (continued)

Class Name	Header File	Notes
IGKeySetAsListCursor	ikslst.h	Derived from IElementCursor.
IGKeySetAsTableCursor	ikstab.h	Derived from IElementCursor.
IGKeySetCursor	iks.h	Derived from IElementCursor.
IGKeySortedBagAsDilTableCursor	iksbdil.h	Derived from IOrderedCursor.
IGKeySortedBagAsListCursor	iksblst.h	Derived from IOrderedCursor.
IGKeySortedBagAsTableCursor	iksbtab.h	Derived from IOrderedCursor.
IGKeySortedBagCursor	iksb.h	Derived from IOrderedCursor.
IGKeySortedSetAsAvlTreeCursor	ikssavl.h	Derived from IOrderedCursor.
IGKeySortedSetAsBstTreeCursor	iksbst.h	Derived from IOrderedCursor.
IGKeySortedSetAsDilTableCursor	ikssdil.h	Derived from IOrderedCursor.
IGKeySortedSetAsListCursor	iksslst.h	Derived from IOrderedCursor.
IGKeySortedSetAsTableCursor	iksstab.h	Derived from IOrderedCursor.
IGKeySortedSetCursor	ikss.h	Derived from IOrderedCursor.
IGMapAsAvlTreeCursor	imapavl.h	Derived from IElementCursor.
IGMapAsBstTreeCursor	imapbst.h	Derived from IElementCursor.
IGMapAsDilTableCursor	imapdil.h	Derived from IElementCursor.
IGMapAsHshTableCursor	imaphsh.h	Derived from IElementCursor.
IGMapAsListCursor	imaplst.h	Derived from IElementCursor.
IGMapAsTableCursor	imaptab.h	Derived from IElementCursor.
IGMapCursor	imap.h	Derived from IElementCursor.
IGMultiwayTreeCursor	imwt.h	Derived from IElementCursor.
IGPriorityQueueAsDilTableCursor	ipqudil.h	Derived from IOrderedCursor.
IGPriorityQueueAsListCursor	ipqulst.h	Derived from IOrderedCursor.
IGPriorityQueueAsTableCursor	ipqutab.h	Derived from IOrderedCursor.
IGPriorityQueueCursor	ipqu.h	Derived from IOrderedCursor.
IGQueueAsDilTableCursor	iqudil.h	Derived from IOrderedCursor.
IGQueueAsListCursor	iqulst.h	Derived from IOrderedCursor.
IGQueueAsTableCursor	iqustab.h	Derived from IOrderedCursor.
IGQueueCursor	iqu.h	Derived from IOrderedCursor.
IGRelationAsDilTableCursor	ireldil.h	Derived from IElementCursor.
IGRelationAsHshTableCursor	irelhsh.h	Derived from IElementCursor.
IGRelationAsListCursor	irellst.h	Derived from IElementCursor.
IGRelationAsTableCursor	ireltab.h	Derived from IElementCursor.
IGRelationCursor	irel.h	Derived from IElementCursor.
IGSequenceAsDilTableCursor	iseqdil.h	Derived from IOrderedCursor.
IGSequenceAsListCursor	iseqlst.h	Derived from IOrderedCursor.
IGSequenceAsTableCursor	iseqtab.h	Derived from IOrderedCursor.
IGSequenceCursor	iseq.h	Derived from IOrderedCursor.
IGSetAsAvlTreeCursor	isetavl.h	Derived from IElementCursor.
IGSetAsBstTreeCursor	isetbst.h	Derived from IElementCursor.

Table 18. IBM Open Class Library Collection Classes (continued)

Class Name	Header File	Notes
IGSetAsDilTableCursor	isetdil.h	Derived from IElementCursor.
IGSetAsHshTableCursor	isethsh.h	Derived from IElementCursor.
IGSetAsListCursor	isetlst.h	Derived from IElementCursor.
IGSetAsTableCursor	isettab.h	Derived from IElementCursor.
IGSetCursor	iset.h	Derived from IElementCursor.
IGSortedBagAsAvlTreeCursor	isbavl.h	Derived from IOrderedCursor.
IGSortedBagAsBstTreeCursor	isbbst.h	Derived from IOrderedCursor.
IGSortedBagAsDilTableCursor	isbdil.h	Derived from IOrderedCursor.
IGSortedBagAsListCursor	isblst.h	Derived from IOrderedCursor.
IGSortedBagAsTableCursor	isbtab.h	Derived from IOrderedCursor.
IGSortedBagCursor	isb.h	Derived from IOrderedCursor.
IGSortedMapAsAvlTreeCursor	ismavl.h	Derived from IOrderedCursor.
IGSortedMapAsBstTreeCursor	ismbst.h	Derived from IOrderedCursor.
IGSortedMapAsDilTableCursor	ismdil.h	Derived from IOrderedCursor.
IGSortedMapAsListCursor	ismlst.h	Derived from IOrderedCursor.
IGSortedMapAsTableCursor	ismtab.h	Derived from IOrderedCursor.
IGSortedMapCursor	ism.h	Derived from IOrderedCursor.
IGSortedRelationAsDilTableCursor	isrdil.h	Derived from IOrderedCursor.
IGSortedRelationAsTableCursor	isrtab.h	Derived from IOrderedCursor.
IGSortedRelationCursor	isr.h	Derived from IOrderedCursor.
IGSortedSetAsAvlTreeCursor	issavl.h	Derived from IOrderedCursor.
IGSortedSetAsBstTreeCursor	issbst.h	Derived from IOrderedCursor.
IGSortedSetAsDilTableCursor	issdil.h	Derived from IOrderedCursor.
IGSortedSetAsListCursor	isslst.h	Derived from IOrderedCursor.
IGSortedSetAsTableCursor	isstab.h	Derived from IOrderedCursor.
IGSortedSetCursor	iss.h	Derived from IOrderedCursor.
IGStackAsDilTableCursor	istk.h	Derived from IOrderedCursor.
IGStackAsListCursor	istkdil.h	Derived from IOrderedCursor.
IGStackAsTableCursor	istklst.h	Derived from IOrderedCursor.
IGStackCursor	istktab.h	Derived from IOrderedCursor.
<b>To migrate the following classes, use the Standard Template Library's vector or list support.</b>		
IEqualitySequence	ies.h	Derived from IGEqualitySequence.
IEqualitySequenceAsList	ieslst.h	Derived from IGEqualitySequenceAs<xxxx>.
IGEqualitySequenceAsList	ieslst.h	Derived from IAEqualitySequence.
IREqualitySequence	ires.h	Derived from IAEqualitySequence.
<b>To migrate the following classes, use the Standard Template Library's list support.</b>		
ITree	itree.h	Derived from IGTREE.
<b>To migrate the following classes, use the Standard Template Library's bag support and extend it with notification support.</b>		

Table 18. IBM Open Class Library Collection Classes (continued)

Class Name	Header File	Notes
IVBag	ibag.h	Derived from IVGBag.
IVBagAsAvlTree	ibagavl.h	Derived from IVGBagAs<xxxx>.
IVBagAsBstTree	ibagbst.h	Derived from IVGBagAs<xxxx>.
IVBagAsDilTable	ibagdil.h	Derived from IVGBagAs<xxxx>.
IVBagAsHshTable	ibaghsh.h	Derived from IVGBagAs<xxxx>.
IVBagAsList	ibaglst.h	Derived from IVGBagAs<xxxx>.
IVBagAsTable	ibagtab.h	Derived from IVGBagAs<xxxx>.
IVBagOnBSTKeySortedSet	icompat.h	Derived from IVGBagAs<xxxx>.
IVBagOnHashKeySet	icompat.h	Derived from IVGBagAs<xxxx>.
IVBagOnSortedDilutedSequence	icompat.h	Derived from IVGBagAs<xxxx>.
IVBagOnSortedLinkedSequence	icompat.h	Derived from IVGBagAs<xxxx>.
IVBagOnSortedTabularSequence	icompat.h	Derived from IVGBagAs<xxxx>.
IVGBag	ibag.h	Derived from IGBag.
IVGBagAsAvlTree	ibagavl.h	Derived from IGBagAs<xxxx>.
IVGBagAsBstTree	ibagbst.h	Derived from IGBagAs<xxxx>.
IVGBagAsDilTable	ibagdil.h	Derived from IGBagAs<xxxx>.
IVGBagAsHshTable	ibaghsh.h	Derived from IGBagAs<xxxx>.
IVGBagAsList	ibaglst.h	Derived from IGBagAs<xxxx>.
IVGBagAsTable	ibagtab.h	Derived from IGBagAs<xxxx>.
IVGBagOnBSTKeySortedSet	icompat.h	Derived from IGBagAs<xxxx>.
IVGBagOnHashKeySet	icompat.h	Derived from IGBagAs<xxxx>.
IVGBagOnSortedDilutedSequence	icompat.h	Derived from IGBagAs<xxxx>.
IVGBagOnSortedLinkedSequence	icompat.h	Derived from IGBagAs<xxxx>.
IVGBagOnSortedTabularSequence	icompat.h	Derived from IGBagAs<xxxx>.
<b>To migrate the following classes, use the Standard Template Library's deque or list support and extend it with notification support.</b>		
IVDeque	idqu.h	Derived from IVGDeque.
IVDequeAsDilTable	idqudil.h	Derived from IVGDequeAs<xxxx>.
IVDequeAsList	idqulst.h	Derived from IVGDequeAs<xxxx>.
IVDequeAsTable	idqutab.h	Derived from IVGDequeAs<xxxx>.
IVDequeOnDilutedSequence	icompat.h	Derived from IVGDequeAs<xxxx>.
IVDequeOnTabularSequence	icompat.h	Derived from IVGDequeAs<xxxx>.
IVDilutedSequence	icompat.h	Derived from IVGSequenceAs<xxxx>.
IVGDeque	idqu.h	Derived from IGDeque.
IVGDequeAsDilTable	idqudil.h	Derived from IGDequeAs<xxxx>.
IVGDequeAsList	idqulst.h	Derived from IGDequeAs<xxxx>.
IVGDequeAsTable	idqutab.h	Derived from IGDequeAs<xxxx>.
IVGDequeOnDilutedSequence	icompat.h	Derived from IGDequeAs<xxxx>.
IVGDequeOnTabularSequence	icompat.h	Derived from IGDequeAs<xxxx>.

Table 18. IBM Open Class Library Collection Classes (continued)

Class Name	Header File	Notes
IVGDilutedSequence	icompat.h	Derived from IGSequenceAs<xxxx>.
IVGLinkedSequence	icompat.h	Derived from IGSequenceAs<xxxx>.
IVGSequence	iseq.h	Derived from IGSequence.
IVGSequenceAsDilTable	iseqdil.h	Derived from IGSequenceAs<xxxx>.
IVGSequenceAsList	iseqlst.h	Derived from IGSequenceAs<xxxx>.
IVGSequenceAsTable	iseqtab.h	Derived from IGSequenceAs<xxxx>.
IVGTabularSequence	icompat.h	Derived from IGSequenceAs<xxxx>.
IVLinkedSequence	icompat.h	Derived from IVGSequenceAs<xxxx>.
IVSequence	iseq.h	Derived from IVGSequence.
IVSequenceAsDilTable	iseqdil.h	Derived from IVGSequenceAs<xxxx>.
IVSequenceAsList	iseqlst.h	Derived from IVGSequenceAs<xxxx>.
IVSequenceAsTable	iseqtab.h	Derived from IVGSequenceAs<xxxx>.
IVTabularSequence	icompat.h	Derived from IVGSequenceAs<xxxx>.
<b>To migrate the following classes, use the Standard Template Library's vector or list support and extend it with notification support.</b>		
IVEqualitySequence	ies.h	Derived from IVGEqualitySequence.
IVEqualitySequenceAsDilTable	iesdil.h	Derived from IVGEqualitySequenceAs<xxxx>.
IVEqualitySequenceAsList	ieslst.h	Derived from IVGEqualitySequenceAs<xxxx>.
IVEqualitySequenceAsTable	iestab.h	Derived from IVGEqualitySequenceAs<xxxx>.
IVEqualitySequence OnDilutedSequeue	icompat.h	Derived from IVGEqualitySequenceAs<xxxx>.
IVEqualitySequence OnTabularSequeue	icompat.h	Derived from IVGEqualitySequenceAs<xxxx>.
IVGEqualitySequence	ies.h	Derived from IGEqualitySequence.
IVGEqualitySequenceAsDilTable	iesdil.h	Derived from IGEqualitySequenceAs<xxxx>.
IVGEqualitySequenceAsList	ieslst.h	Derived from IGEqualitySequenceAs<xxxx>.
IVGEqualitySequenceAsTable	iestab.h	Derived from IGEqualitySequenceAs<xxxx>.

Table 18. IBM Open Class Library Collection Classes (continued)

Class Name	Header File	Notes
IVGEqualitySequence OnDilutedSequeue	icompat.h	Derived from IGEQualitySequenceAs<xxxx>.
IVGEqualitySequence OnTabularSequeue	icompat.h	Derived from IGEQualitySequenceAs<xxxx>.
<b>To migrate the following classes, use the Standard Template Library's make_heap (), pop_heap (), push_heap (), sort_heap () algorithm support and extend it with notification support.</b>		
IVGHeap	ihp.h	Derived from IGHeap.
IVGHeapAsDilTable	ihpdil.h	Derived from IGHeapAs<xxxx>.
IVGHeapAsList	ihplst.h	Derived from IGHeapAs<xxxx>.
IVGHeapAsTable	ihptab.h	Derived from IGHeapAs<xxxx>.
IVGHeapOnDilutedSequence	icompat.h	Derived from IGHeapAs<xxxx>.
IVGHeapOnTabularSequence	icompat.h	Derived from IGHeapAs<xxxx>.
IVHeap	ihp.h	Derived from IVGHeap.
IVHeapAsDilTable	ihpdil.h	Derived from IVGHeapAs<xxxx>.
IVHeapAsList	ihplst.h	Derived from IVGHeapAs<xxxx>.
IVHeapAsTable	ihptab.h	Derived from IVGHeapAs<xxxx>.
IVHeapOnDilutedSequence	icompat.h	Derived from IVGHeapAs<xxxx>.
IVHeapOnTabularSequence	icompat.h	Derived from IVGHeapAs<xxxx>.
<b>To migrate the following classes, use the Standard Template Library's multimap support and extend it with notification support.</b>		
IVGHashKeyBag	icompat.h	Derived from IGKeyBagAs<xxxx>.
IVGKeyBag	ikb.h	Derived from IGKeyBag.
IVGKeyBagAsDilTable	ikbdil.h	Derived from IGKeyBagAs<xxxx>.
IVGKeyBagAsHshTable	ikbhsh.h	Derived from IGKeyBagAs<xxxx>.
IVGKeyBagAsList	ikblst.h	Derived from IGKeyBagAs<xxxx>.
IVGKeyBagAsTable	ikbtab.h	Derived from IGKeyBagAs<xxxx>.
IVGKeySortedBag	iksb.h	Derived from IGKeySortedBag.
IVGKeySortedBagAsDilTable	iksbdil.h	Derived from IGKeySortedBagAs<xxxx>.
IVGKeySortedBagAsList	iksblst.h	Derived from IGKeySortedBagAs<xxxx>.
IVGKeySortedBagAsTable	iksbtab.h	Derived from IGKeySortedBagAs<xxxx>.
IVGKeySortedBag OnSortedDilutedSequence	icompat.h	Derived from IGKeySortedBagAs<xxxx>.
IVGKeySortedBag OnSortedTabularSequence	icompat.h	Derived from IGKeySortedBagAs<xxxx>.
IVGRelation	irel.h	Derived from IGRRelation.
IVGRelationAsDilTable	ireldil.h	Derived from IGRRelationAs<xxxx>.

Table 18. IBM Open Class Library Collection Classes (continued)

Class Name	Header File	Notes
IVGRelationAsHshTable	irelhsh.h	Derived from IGRRelationAs<xxxx>.
IVGRelationAsList	irellst.h	Derived from IGRRelationAs<xxxx>.
IVGRelationAsTable	ireltab.h	Derived from IGRRelationAs<xxxx>.
IVHashKeyBag	icompat.h	Derived from IVGKeyBagAs<xxxx>.
IVKeyBag	ikb.h	Derived from IVGKeyBag.
IVKeyBagAsDilTable	ikbdil.h	Derived from IVGKeyBagAs<xxxx>.
IVKeyBagAsHshTable	ikbhsh.h	Derived from IVGKeyBagAs<xxxx>.
IVKeyBagAsList	ikblst.h	Derived from IVGKeyBagAs<xxxx>.
IVKeyBagAsTable	ikbtab.h	Derived from IVGKeyBagAs<xxxx>.
IVKeySortedBag	iksb.h	Derived from IVGKeySortedBag.
IVKeySortedBagAsDilTable	iksbdil.h	Derived from IVGKeySortedBagAs<xxxx>.
IVKeySortedBagAsList	iksblst.h	Derived from IVGKeySortedBagAs<xxxx>.
IVKeySortedBagAsTable	iksbtab.h	Derived from IVGKeySortedBagAs<xxxx>.
IVKeySortedBag OnSortedDilutedSequence	icompat.h	Derived from IVGKeySortedBagAs<xxxx>.
IVKeySortedBag OnSortedTabularSequence	icompat.h	Derived from IVGKeySortedBagAs<xxxx>.
IVRelation	irel.h	Derived from IVGRelation.
IVRelationAsDilTable	ireldil.h	Derived from IVGRelationAs<xxxx>.
IVRelationAsHshTable	irelhsh.h	Derived from IVGRelationAs<xxxx>.
IVRelationAsList	irellst.h	Derived from IVGRelationAs<xxxx>.
IVRelationAsTable	ireltab.h	Derived from IVGRelationAs<xxxx>.
<b>To migrate the following classes, use the Standard Template Library's map support and extend it with notification support.</b>		
IVAvlKeySortedSet	icompat.h	Derived from IVGKeySortedSetAs<xxxx>.
IVBSTKeySortedSet	icompat.h	Derived from IVGKeySortedSetAs<xxxx>.
IVGAvlKeySortedSet	icompat.h	Derived from IGKeySortedSetAs<xxxx>.
IVGBSTKeySortedSet	icompat.h	Derived from IGKeySortedSetAs<xxxx>.

Table 18. IBM Open Class Library Collection Classes (continued)

Class Name	Header File	Notes
IVGHashSet	icompat.h	Derived from IGKeySetAs<xxxx>.
IVGKeySet	iks.h	Derived from IGKeySet.
IVGKeySetAsAvlTree	iksavl.h	Derived from IGKeySetAs<xxxx>.
IVGKeySetAsBstTree	iksbst.h	Derived from IGKeySetAs<xxxx>.
IVGKeySetAsDilTable	iksdil.h	Derived from IGKeySetAs<xxxx>.
IVGKeySetAsHshTable	ikshsh.h	Derived from IGKeySetAs<xxxx>.
IVGKeySetAsList	ikslst.h	Derived from IGKeySetAs<xxxx>.
IVGKeySetAsTable	ikstab.h	Derived from IGKeySetAs<xxxx>.
IVGKeySetOnBSTKeySortedSet	icompat.h	Derived from IGKeySetAs<xxxx>.
IVGKeySet OnSortedDilutedSequence	icompat.h	Derived from IGKeySetAs<xxxx>.
IVGKeySet OnSortedLinkedSequence	icompat.h	Derived from IGKeySetAs<xxxx>.
IVGKeySet OnSortedTabularSequence	icompat.h	Derived from IGKeySetAs<xxxx>.
IVGKeySortedSet	ikss.h	Derived from IGKeySortedSet.
IVGKeySortedSetAsAvlTree	ikssavl.h	Derived from IGKeySortedSetAs<xxxx>.
IVGKeySortedSetAsBstTree	ikssbst.h	Derived from IGKeySortedSetAs<xxxx>.
IVGKeySortedSetAsDilTable	ikssdil.h	Derived from IGKeySortedSetAs<xxxx>.
IVGKeySortedSetAsList	iksslst.h	Derived from IGKeySortedSetAs<xxxx>.
IVGKeySortedSetAsTable	iksstab.h	Derived from IGKeySortedSetAs<xxxx>.
IVGKeySortedSet OnSortedDilutedSequence	icompat.h	Derived from IGKeySortedSetAs<xxxx>.
IVGKeySortedSet OnSortedLinkedSequence	icompat.h	Derived from IGKeySortedSetAs<xxxx>.
IVGKeySortedSet OnSortedTabularSequence	icompat.h	Derived from IGKeySortedSetAs<xxxx>.
IVGMap	imap.h	Derived from IMap.
IVGMapAsAvlTree	imapavl.h	Derived from IMapAs<xxxx>.
IVGMapAsBstTree	imapbst.h	Derived from IMapAs<xxxx>.
IVGMapAsDilTable	imapdil.h	Derived from IMapAs<xxxx>.
IVGMapAsHshTable	imaphsh.h	Derived from IMapAs<xxxx>.
IVGMapAsList	imaplst.h	Derived from IMapAs<xxxx>.
IVGMapAsTable	imaptab.h	Derived from IMapAs<xxxx>.

Table 18. IBM Open Class Library Collection Classes (continued)

Class Name	Header File	Notes
IVGMapOnBSTKeySortedSet	icompat.h	Derived from IMapAs<xxxx>.
IVGMapOnHashSet	icompat.h	Derived from IMapAs<xxxx>.
IVGMapOnSortedDilutedSequence	icompat.h	Derived from IMapAs<xxxx>.
IVGMapOnSortedLinkedSequence	icompat.h	Derived from IMapAs<xxxx>.
IVGMapOnSortedTabularSequence	icompat.h	Derived from IMapAs<xxxx>.
IVGSortedMap	ism.h	Derived from ISortedMap.
IVGSortedMapAsAvlTree	ismavl.h	Derived from ISortedMapAs<xxxx>.
IVGSortedMapAsBstTree	ismbst.h	Derived from ISortedMapAs<xxxx>.
IVGSortedMapAsDilTable	ismdil.h	Derived from ISortedMapAs<xxxx>.
IVGSortedMapAsList	ismlst.h	Derived from ISortedMapAs<xxxx>.
IVGSortedMapAsTable	ismtab.h	Derived from ISortedMapAs<xxxx>.
IVGSortedMapOnBSTKeySortedSet	icompat.h	Derived from ISortedMapAs<xxxx>.
IVGSortedMapOnSortedDilutedSequence	icompat.h	Derived from ISortedMapAs<xxxx>.
IVGSortedMapOnSortedLinkedSequence	icompat.h	Derived from ISortedMapAs<xxxx>.
IVGSortedMapOnSortedTabularSequence	icompat.h	Derived from ISortedMapAs<xxxx>.
IVGSortedRelation	isr.h	Derived from ISortedRelation.
IVGSortedRelationAsDilTable	isrdil.h	Derived from ISortedRelationAs<xxxx>.
IVGSortedRelationAsTable	isrtab.h	Derived from ISortedRelationAs<xxxx>.
IVGSortedRelationOnSortedDilutedSequence	icompat.h	Derived from ISortedRelationAs<xxxx>.
IVGSortedRelationOnSortedTabularSequence	icompat.h	Derived from ISortedRelationAs<xxxx>.
IVHashSet	icompat.h	Derived from IVGKeySetAs<xxxx>.
IVKeySet	iks.h	Derived from IVGKeySet.
IVKeySetAsAvlTree	iksavl.h	Derived from IVGKeySetAs<xxxx>.
IVKeySetAsBstTree	iksbst.h	Derived from IVGKeySetAs<xxxx>.
IVKeySetAsDilTable	iksdil.h	Derived from IVGKeySetAs<xxxx>.
IVKeySetAsHshTable	ikshsh.h	Derived from IVGKeySetAs<xxxx>.
IVKeySetAsList	ikslst.h	Derived from IVGKeySetAs<xxxx>.



Table 18. IBM Open Class Library Collection Classes (continued)

Class Name	Header File	Notes
IVKeySetAsTable	ikstab.h	Derived from IVGKeySetAs<xxxx>.
IVKeySetOnBSTKeySortedSet	icompat.h	Derived from IVGKeySetAs<xxxx>.
IVKeySetOnSortedDilutedSequence	icompat.h	Derived from IVGKeySetAs<xxxx>.
IVKeySetOnSortedLinkedSequence	icompat.h	Derived from IVGKeySetAs<xxxx>.
IVKeySetOnSortedTabularSequence	icompat.h	Derived from IVGKeySetAs<xxxx>.
IVKeySortedSet	ikss.h	Derived from IVGKeySortedSet.
IVKeySortedSetAsAvlTree	ikssavl.h	Derived from IVGKeySortedSetAs<xxxx>.
IVKeySortedSetAsBstTree	ikssbst.h	Derived from IVGKeySortedSetAs<xxxx>.
IVKeySortedSetAsDilTable	ikssdil.h	Derived from IVGKeySortedSetAs<xxxx>.
IVKeySortedSetAsList	iksslst.h	Derived from IVGKeySortedSetAs<xxxx>.
IVKeySortedSetAsTable	iksstab.h	Derived from IVGKeySortedSetAs<xxxx>.
IVKeySortedSetOnSortedDilutedSequence	icompat.h	Derived from IVGKeySortedSetAs<xxxx>.
IVKeySortedSetOnSortedLinkedSequence	icompat.h	Derived from IVGKeySortedSetAs<xxxx>.
IVKeySortedSetOnSortedTabularSequence	icompat.h	Derived from IVGKeySortedSetAs<xxxx>.
IVMap	imap.h	Derived from IVGMap.
IVMapAsAvlTree	imapavl.h	Derived from IVGMapAs<xxxx>.
IVMapAsBstTree	imapbst.h	Derived from IVGMapAs<xxxx>.
IVMapAsDilTable	imapdil.h	Derived from IVGMapAs<xxxx>.
IVMapAsHshTable	imaphsh.h	Derived from IVGMapAs<xxxx>.
IVMapAsList	imaplst.h	Derived from IVGMapAs<xxxx>.
IVMapAsTable	imaptab.h	Derived from IVGMapAs<xxxx>.
IVMapOnBSTKeySortedSet	icompat.h	Derived from IVGMapAs<xxxx>.
IVMapOnHashSet	icompat.h	Derived from IVGMapAs<xxxx>.
IVMapOnSortedDilutedSequence	icompat.h	Derived from IVGMapAs<xxxx>.
IVMapOnSortedLinkedSequence	icompat.h	Derived from IVGMapAs<xxxx>.
IVMapOnSortedTabularSequence	icompat.h	Derived from IVGMapAs<xxxx>.
IVSortedMapAsAvlTree	ismavl.h	Derived from IVGSortedMapAs<xxxx>.
IVSortedMapAsBstTree	ismbst.h	Derived from IVGSortedMapAs<xxxx>.
IVSortedMapAsDilTable	ismdil.h	Derived from IVGSortedMapAs<xxxx>.

Table 18. IBM Open Class Library Collection Classes (continued)

Class Name	Header File	Notes
IVSortedMapAsList	ismlst.h	Derived from IVGSortedMapAs<xxxx>.
IVSortedMapAsTable	ismtab.h	Derived from IVGSortedMapAs<xxxx>.
IVSortedMapOnBSTKeySortedSet	icompat.h	Derived from IVGSortedMapAs<xxxx>.
IVSortedMapOnSortedDilutedSequence	icompat.h	Derived from IVGSortedMapAs<xxxx>.
IVSortedMapOnSortedLinkedSequence	icompat.h	Derived from IVGSortedMapAs<xxxx>.
IVSortedMapOnSortedTabularSequence	icompat.h	Derived from IVGSortedMapAs<xxxx>.
IVSortedRelation	isr.h	Derived from IVGSortedRelation.
IVSortedRelationAsDilTable	isrdil.h	Derived from IVGSortedRelationAs<xxxx>.
IVSortedRelationAsTable	isrtab.h	Derived from IVGSortedRelationAs<xxxx>.
IVSortedRelationOnSortedDilutedSequence	icompat.h	Derived from IVGSortedRelationAs<xxxx>.
IVSortedRelationOnSortedTabularSequence	icompat.h	Derived from IVGSortedRelationAs<xxxx>.
<b>To migrate the following classes, use the Standard Template Library's priority_queue support and extend it with notification support.</b>		
IVGPriorityQueue	ipqu.h	Derived from IGPriorityQueue.
IVGPriorityQueueAsDilTable	ipqudil.h	Derived from IGPriorityQueueAs<xxxx>.
IVGPriorityQueueAsList	ipqulst.h	Derived from IGPriorityQueueAs<xxxx>.
IVGPriorityQueueAsTable	ipqutab.h	Derived from IGPriorityQueueAs<xxxx>.
IVGPriorityQueueOnSortedDilutedSequence	icompat.h	Derived from IGPriorityQueueAs<xxxx>.
IVGPriorityQueueOnSortedTabularSequence	icompat.h	Derived from IGPriorityQueueAs<xxxx>.
IVPriorityQueue	ipqu.h	Derived from IVGPriorityQueue.
IVPriorityQueueAsDilTable	ipqudil.h	Derived from IVGPriorityQueueAs<xxxx>.
IVPriorityQueueAsList	ipqulst.h	Derived from IVGPriorityQueueAs<xxxx>.
IVPriorityQueueAsTable	ipqutab.h	Derived from IVGPriorityQueueAs<xxxx>.

Table 18. IBM Open Class Library Collection Classes (continued)

Class Name	Header File	Notes
IVPriorityQueue OnSortedDilutedSequence	icompat.h	Derived from IVGPriorityQueueAs<xxxx>.
IVPriorityQueue OnSortedTabularSequence	icompat.h	Derived from IVGPriorityQueueAs<xxxx>.
<b>To migrate the following classes, use the Standard Template Library's queue or list support and extend it with notification support.</b>		
IVGQueue	iqu.h	Derived from IGQueue.
IVGQueueAsDilTable	iqudil.h	Derived from IGQueueAs<xxxx>.
IVGQueueAsList	iqulst.h	Derived from IGQueueAs<xxxx>.
IVGQueueAsTable	iqustab.h	Derived from IGQueueAs<xxxx>.
IVGQueue OnSortedDilutedSequence	icompat.h	Derived from IGQueueAs<xxxx>.
IVGQueue OnSortedTabularSequence	icompat.h	Derived from IGQueueAs<xxxx>.
IVQueue	iqu.h	Derived from IVGQueue.
IVQueueAsDilTable	iqudil.h	Derived from IVGQueueAs<xxxx>.
IVQueueAsList	iqulst.h	Derived from IVGQueueAs<xxxx>.
IVQueueAsTable	iqustab.h	Derived from IVGQueueAs<xxxx>.
IVQueueOnSortedDilutedSequence	icompat.h	Derived from IVGQueueAs<xxxx>.
IVQueueOnSortedTabularSequence	icompat.h	Derived from IVGQueueAs<xxxx>.
<b>To migrate the following classes, use the Standard Template Library's set support and extend it with notification support.</b>		
IVGSet	iset.h	Derived from IGSet.
IVGSetAsAvlTree	isetavl.h	Derived from IGSetAs<xxxx>.
IVGSetAsBstTree	isetbst.h	Derived from IGSetAs<xxxx>.
IVGSetAsDilTable	isetdil.h	Derived from IGSetAs<xxxx>.
IVGSetAsHshTable	isethsh.h	Derived from IGSetAs<xxxx>.
IVGSetAsList	isetlst.h	Derived from IGSetAs<xxxx>.
IVGSetAsTable	isettab.h	Derived from IGSetAs<xxxx>.
IVGSetOnBSTKeySortedSet	icompat.h	Derived from IGSetAs<xxxx>.
IVGSetOnHashKeySet	icompat.h	Derived from IGSetAs<xxxx>.
IVGSetOnSortedDilutedSequence	icompat.h	Derived from IGSetAs<xxxx>.
IVGSetOnSortedLinkedSequence	icompat.h	Derived from IGSetAs<xxxx>.
IVGSetOnSortedTabularSequence	icompat.h	Derived from IGSetAs<xxxx>.
IVGSortedSet	iss.h	Derived from IGSortedSet.
IVGSortedSetAsAvlTree	issavl.h	Derived from IGSortedSetAs<xxxx>.
IVGSortedSetAsBstTree	issbst.h	Derived from IGSortedSetAs<xxxx>.

Table 18. IBM Open Class Library Collection Classes (continued)

Class Name	Header File	Notes
IVGSortedSetAsDilTable	issdil.h	Derived from IVGSortedSetAs<xxxx>.
IVGSortedSetAsList	isslst.h	Derived from IVGSortedSetAs<xxxx>.
IVGSortedSetAsTable	isstab.h	Derived from IVGSortedSetAs<xxxx>.
IVGSortedSetOnBSTKeySortedSet	icompat.h	Derived from IVGSortedSetAs<xxxx>.
IVGSortedSetOnSortedDilutedSequence	icompat.h	Derived from IVGSortedSetAs<xxxx>.
IVGSortedSetOnSortedLinkedSequence	icompat.h	Derived from IVGSortedSetAs<xxxx>.
IVGSortedSetOnSortedTabularSequence	icompat.h	Derived from IVGSortedSetAs<xxxx>.
IVSet	iset.h	Derived from IVGSet.
IVSetAsAvlTree	isetavl.h	Derived from IVGSetAs<xxxx>.
IVSetAsBstTree	isetbst.h	Derived from IVGSetAs<xxxx>.
IVSetAsDilTable	isetdil.h	Derived from IVGSetAs<xxxx>.
IVSetAsHshTable	isethsh.h	Derived from IVGSetAs<xxxx>.
IVSetAsList	isetlst.h	Derived from IVGSetAs<xxxx>.
IVSetAsTable	isettab.h	Derived from IVGSetAs<xxxx>.
IVSetOnBSTKeySortedSet	icompat.h	Derived from IVGSetAs<xxxx>.
IVSetOnHashKeySet	icompat.h	Derived from IVGSetAs<xxxx>.
IVSetOnSortedDilutedSequence	icompat.h	Derived from IVGSetAs<xxxx>.
IVSetOnSortedLinkedSequence	icompat.h	Derived from IVGSetAs<xxxx>.
IVSetOnSortedTabularSequence	icompat.h	Derived from IVGSetAs<xxxx>.
IVSortedSet	iss.h	Derived from IVGSortedSet.
IVSortedSetAsAvlTree	issavl.h	Derived from IVGSortedSetAs<xxxx>.
IVSortedSetAsBstTree	issbst.h	Derived from IVGSortedSetAs<xxxx>.
IVSortedSetAsDilTable	issdil.h	Derived from IVGSortedSetAs<xxxx>.
IVSortedSetAsList	isslst.h	Derived from IVGSortedSetAs<xxxx>.
IVSortedSetAsTable	isstab.h	Derived from IVGSortedSetAs<xxxx>.
IVSortedSetOnBSTKeySortedSet	icompat.h	Derived from IVGSortedSetAs<xxxx>.
IVSortedSetOnSortedDilutedSequence	icompat.h	Derived from IVGSortedSetAs<xxxx>.

Table 18. IBM Open Class Library Collection Classes (continued)

Class Name	Header File	Notes
IVSortedSet OnSortedLinkedSequence	icompat.h	Derived from IVGSortedSetAs<xxxx>.
IVSortedSet OnSortedTabularSequence	icompat.h	Derived from IVGSortedSetAs<xxxx>.
<b>To migrate the following classes, use the Standard Template Library's multiset support and extend it with notification support.</b>		
IVGSortedBag	isb.h	Derived from IGSortedBag.
IVGSortedBagAsAvlTree	isbavl.h	Derived from IGSortedBagAs<xxxx>.
IVGSortedBagAsBstTree	isbbst.h	Derived from IGSortedBagAs<xxxx>.
IVGSortedBagAsDilTable	isbdil.h	Derived from IGSortedBagAs<xxxx>.
IVGSortedBagAsList	isblst.h	Derived from IGSortedBagAs<xxxx>.
IVGSortedBagAsTable	isbtab.h	Derived from IGSortedBagAs<xxxx>.
IVGSortedBagOnBSTKeySortedSet	icompat.h	Derived from IGSortedBagAs<xxxx>.
IVGSortedBag OnSortedDilutedSequence	icompat.h	Derived from IGSortedBagAs<xxxx>.
IVGSortedBag OnSortedLinkedSequence	icompat.h	Derived from IGSortedBagAs<xxxx>.
IVGSortedBag OnSortedTabularSequence	icompat.h	Derived from IGSortedBagAs<xxxx>.
IVSortedBag	isb.h	Derived from IVGSortedBag.
IVSortedBagAsAvlTree	isbavl.h	Derived from IVGSortedBagAs<xxxx>.
IVSortedBagAsBstTree	isbbst.h	Derived from IVGSortedBagAs<xxxx>.
IVSortedBagAsDilTable	isbdil.h	Derived from IVGSortedBagAs<xxxx>.
IVSortedBagAsList	isblst.h	Derived from IVGSortedBagAs<xxxx>.
IVSortedBagAsTable	isbtab.h	Derived from IVGSortedBagAs<xxxx>.
IVSortedBagOnBSTKeySortedSet	icompat.h	Derived from IVGSortedBagAs<xxxx>.
IVSortedBag OnSortedDilutedSequence	icompat.h	Derived from IVGSortedBagAs<xxxx>.

Table 18. IBM Open Class Library Collection Classes (continued)

Class Name	Header File	Notes
IVSortedBag OnSortedLinkedSequence	icompat.h	Derived from IVGSortedBagAs<xxxx>.
IVSortedBag OnSortedTabularSequence	icompat.h	Derived from IVGSortedBagAs<xxxx>.
IVSortedMap	ism.h	Derived from IVGSortedMap.
<b>To migrate the following classes, use the Standard Template Library's stack or list support and extend it with notification support.</b>		
IVGStack	istk.h	Derived from IGSortedStack.
IVGStackAsDilTable	istkdil.h	Derived from IGSortedStackAs<xxxx>.
IVGStackAsList	istklst.h	Derived from IGSortedStackAs<xxxx>.
IVGStackAsTable	istktab.h	Derived from IGSortedStackAs<xxxx>.
IVGStackOnDilutedSequence	icompat.h	Derived from IGSortedStackAs<xxxx>.
IVGStackOnTabularSequence	icompat.h	Derived from IGSortedStackAs<xxxx>.
IVStack	istk.h	Derived from IVGSortedStack.
IVStackAsDilTable	istkdil.h	Derived from IVGSortedStackAs<xxxx>.
IVStackAsList	istklst.h	Derived from IVGSortedStackAs<xxxx>.
IVStackAsTable	istktab.h	Derived from IVGSortedStackAs<xxxx>.
IVStackOnDilutedSequence	icompat.h	Derived from IVGSortedStackAs<xxxx>.
IVStackOnTabularSequence	icompat.h	Derived from IVGSortedStackAs<xxxx>.

## Collection Exception Classes

These exception classes are raised by the IOC Collection classes. Most of these classes have been available since Version 1 of the IOC library.

Table 19. IBM Open Class Library Collection Exception Classes

Class Name	Header File	Notes
<b>To migrate the following classes, you can either obtain a broader license from IBM and integrate the entire library or a particular class into your application, or specialize the Standard C++ exception template class.</b>		
IChildAlreadyExistsException	iexc.h	Derived from IPreconditionViolation and IException.
ICollectionLockException	iexc.h	Derived from IException.
ICollectionLockTimeoutException	iexc.h	Derived from IException.

Table 19. IBM Open Class Library Collection Exception Classes (continued)

Class Name	Header File	Notes
ICollectionResourceException	iexc.h	Derived from IException.
ICollectionUnlockException	iexc.h	Derived from IException.
ICursorInvalidException	iexc.h	Derived from IPreconditionViolation and IException.
ICyclicAttachException	iexc.h	Derived from IPreconditionViolation and IException.
IEmptyException	iexc.h	Derived from IPreconditionViolation and IException.
IFullException	iexc.h	Derived from IPreconditionViolation and IException.
IIdenticalCollectionException	iexc.h	Derived from IPreconditionViolation and IException.
IInvalidReplacementException	iexc.h	Derived from IPreconditionViolation and IException.
IKeyAlreadyExistsException	iexc.h	Derived from IPreconditionViolation and IException.
INotBoundedException	iexc.h	Derived from IPreconditionViolation and IException.
INotContainsKeyException	iexc.h	Derived from IPreconditionViolation and IException.
IOutOfCollectionMemory	iexc.h	Derived from IPreconditionViolation and IException.
IPositionInvalidException	iexc.h	Derived from IPreconditionViolation and IException.
IPreconditionViolation	iexc.h	Derived from IException.
IRootAlreadyExistsException	iexc.h	Derived from IPreconditionViolation and IException.
IStreamerInvalidException	iexc.h	Added in IOC Version 3. Derived from IException.
IStreamErrorException	iexc.h	Added in IOC Version 5. Derived from IException.

## Collection Operations Classes

These classes provide standard operations that work with the IOC Collection classes.

Table 20. IBM Open Class Library Collection Operations Classes

Class Name	Header File	Notes
<b>To migrate the following classes, you can either obtain a broader license from IBM and integrate the entire library or a particular class into your application, or write your own classes mimicking IOC functionality.</b>		
IAMultiwayTreeOps	iimwt.h	Simple class.
IATreeOps	iiatree.h	Simple class.
ICOps	istdops.h	Derived from IStdOps and IStdMemOps.
IECOps	istdops.h	Derived from IEOps, IStdOps, and IStdMemOps.
IEHOps	istdops.h	Derived from IEOps, IStdOps, and IStdMemOps.
IEKCKeyOps	istdops.h	Derived from IStdCmpOps.
IEKCOps	istdops.h	Derived from IEOps, IStdOps, and IStdMemOps.
IEKEHKeyOps	istdops.h	Derived from IStdEqOps.
IEKEHOps	istdops.h	Derived from IEOps, IStdOps, and IStdMemOps.
IEOps	istdops.h	Derived from IStdOps and IStdMemOps.
IKCKKeyOps	istdops.h	Derived from IStdCmpOps.
IKCOps	istdops.h	Derived from IStdOps and IStdMemOps.
IKEHKeyOps	istdops.h	Derived from IStdEqOps.
IKEHOps	istdops.h	Derived from IStdOps and IStdMemOps.
IMultiwayTreeOps	iimwt.h	Derived from IAMultiwayTreeOps.
IStdAsOps	istdops.h	Simple class.
IStdCmpOps	istdops.h	Simple class.
IStdEqOps	istdops.h	Simple class.
IStdHshOps	istdops.h	Simple class.
IStdKeyOps	istdops.h	Simple class.
IStdMemOps	istdops.h	Simple class.
IStdOps	istdops.h	Derived from IStdMemOps.
IWCOps	istdops.h	Derived from IWStdOps and IWStdMemOps.
IWEHOps	istdops.h	Derived from IWEOps, IWStdOps, and IWStdMemOps.
IWEKCKeyOps	istdops.h	Derived from IWStdCmpKeyOps.
IWEKCOps	istdops.h	Derived from IWEOps, IWStdOps, and IWStdMemOps.
IWEKEHKeyOps	istdops.h	Derived from IWStdEqKeyOps.
IWEKEHOps	istdops.h	Derived from IWEOps, IWStdOps, and IWStdMemOps.



Table 20. IBM Open Class Library Collection Operations Classes (continued)

Class Name	Header File	Notes
IWEOps	istdops.h	Derived from IWStdOps and IWStdMemOps.
IWKCKeysOps	istdops.h	Derived from IWStdCmpKeyOps.
IWKCOps	istdops.h	Derived from IWStdOps and IWStdMemOps.
IWKEHKeyOps	istdops.h	Derived from IWStdEqKeyOps.
IWKEHOps	istdops.h	Derived from IWStdOps and IWStdMemOps.
IWStdAsOps	istdops.h	Simple class.
IWStdCmpKeyOps	istdops.h	Simple class.
IWStdCmpOps	istdops.h	Simple class.
IWStdEqKeyOps	istdops.h	Simple class.
IWStdEqOps	istdops.h	Simple class.
IWStdHshKeyOps	istdops.h	Simple class.
IWStdHshOps	istdops.h	Simple class.
IWStdKeyOps	istdops.h	Simple class.
IWStdMemOps	istdops.h	Simple class.
IWStdOps	istdops.h	Derived from IWStdMemOps.

## Math Classes

These classes manipulate complex and binary coded decimal numbers. Although the complex Math Library is not being removed at this time, it is recommended that you migrate to the Standard C++ complex Library.

**Note:** The source for complex Math classes is not included with the IOC source provided with the compiler.

Table 21. IBM Open Class Library Math Classes

Class Name	Header File	Notes
<b>To migrate the following class, use Standard C++ complex class.</b>		
complex	complex.h	Simple class.
<b>To migrate the following class, you can either obtain a broader license from IBM and integrate the entire library or a particular class into your application, or specialize the Standard C++ exception template class.</b>		
IDecimalDataError	iexcbase.hpp	Added in IOC Version 2. Derived from IException
<b>To migrate the following classes, you can either obtain a broader license from IBM and integrate the entire library or a particular class into your application, or write your own classes mimicking IOC functionality.</b>		
IBinaryCodedDecimal	idecimal.hpp	Added in IOC Version 5 for iSeries and IOC Version 3 for all other platforms. Simple class.
IBinaryFormat	inumfrmt.hpp	Added in IOC Version 5. Simple class.

Table 21. IBM Open Class Library Math Classes (continued)

Class Name	Header File	Notes
IDecimal	idecimal.hpp	Added in IOC Version 5. Only supported in z/OS. Replaces decimal class from IOC Version 3 on OS/390.
IDecimalBase	idecimal.hpp	Added in IOC Version 5. Only supported in z/OS. Replaces decimalBase class from IOC Version 3 on OS/390.
IDecimalFormat	inumfrmt.hpp	Added in IOC Version 5. Simple class.
IDecimalProxy	idecimal.hpp	Added in IOC Version 5. Only supported in z/OS. Replaces decimalProxy class from IOC Version 3 on OS/390.
IDecimalResult	idecimal.hpp	Added in IOC Version 5. Only supported in z/OS. Replaces decimalResult class from IOC Version 3 on OS/390.
IDecimalUtil	idecimal.hpp	Added in IOC Version 5 for iSeries and IOC Version 3 for all other platforms. Simple class.
IHexadecimalFormat	inumfrmt.hpp	Added in IOC Version 5. Simple class
ILongLong	ilonglng.hpp	Added in IOC Version 4. Simple class.
IPair	ipoint.hpp	Added in IOC Version 5 for iSeries and z/OS and IOC Version 2 for all other platforms. Simple class.
IPoint	ipoint.hpp	Added in IOC Version 5 for iSeries and z/OS and IOC Version 2 for all other platforms. Derived from IPair.
IPointArray	iptarray.hpp	Added in IOC Version 5 for iSeries and z/OS and IOC Version 2 for all other platforms. Simple class.
IRange	ipoint.hpp	Added in IOC Version 5 for iSeries and z/OS and IOC Version 2 for all other platforms. Derived from IPair.
IRectangle	ipoint.hpp	Added in IOC Version 5 for iSeries and z/OS and IOC Version 2 for all other platforms. Derived from IPair.
ISize	ipoint.hpp	Added in IOC Version 5 for iSeries and z/OS and IOC Version 2 for all other platforms. Derived from IPair.

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## USL I/O Stream Classes

This library includes the UNIX<sup>®</sup> Systems Laboratories (USL) streaming classes for input and output capabilities for C++. Most of the functionality here is duplicated in Standard C++ iostream Library. To migrate, use the ISO-compliant stream classes provided in the Standard C++ iostream Library. Although the USL I/O Stream Library is not being removed at this time, it is recommended that you migrate to the Standard C++ iostream Library.

**Note:** The source for these classes is not included with the IOC source provided with the compiler.

Table 22. USL I/O Stream Classes




Class Name	Header File	Notes
<b>To migrate the following classes, use the Standard Template Library's iostream support.</b>		
filebuf	fstream.h	Derived from streambuf.
fstream	fstream.h	Derived from fstreambase and ios.
ifstream	fstream.h	Derived from fstreambase and ios.
ios	iostream.h	Simple class.
iostream	iostream.h	Derived from istream and ios.
iostream_withassign	iostream.h	Derived from iostream.
istream	iostream.h	Derived from ios.
istream_withassign	iostream.h	Derived from istream.
istrstream	strstream.h	Derived from strstreambase and ios.
ofstream	fstream.h	Derived from fstreambase and ios.
ostream	iostream.h	Derived from ios.
ostream_withassign	iostream.h	Derived from ostream.
ostrstream	strstream.h	Derived from strstreambase and ios.
stdiobuf	stdiostream.h	Derived from streambuf.
stdiostream	stdiostream.h	Derived from ios.
streambuf	iostream.h	Simple class.
strstream	strstream.h	Derived from strstreambase and ios.
strstreambuf	strstream.h	Derived from streambuf.

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## User Interface and 2D Graphics

IBM Open Class Library's User Interface and 2D Graphics classes were provided only on OS/2, Windows and AIX platforms. Since IOC on OS/2 and Windows platforms is no longer marketed or supported by IBM, only IOC on the AIX platform is discussed in this section. Multimedia classes, Dynamic Data Exchange (DDE) classes, and Direct Manipulation classes were provide only on the OS/2 and Windows platforms, so they are not included in this section.




## User Interface Classes

   User Interface classes provide support for user interface elements used by the applications you develop. These classes were provided on AIX, Windows and OS/2 platforms.

AIX uses the Common Desktop Environment (CDE) which is based on X11R5 and OSF/Motif 1.2. The IOC User Interface classes build on the Motif toolkit and widget library. For new development, you should now build your own interfaces between your application and Motif toolkits and widgets. Additional information about Motif can be found at <http://www.opengroup.org/motif/>. Additional information about Open Motif can be found at <http://www.motifzone.net/>.

To migrate UI classes, you either need to integrate all of the UI classes you're using into your application, or replace them entirely. Many of the UI classes are interconnected, so you can't easily keep some of the classes while replacing others with those you write yourself.

## 2D Graphics Classes

   2D Graphics classes provide support for the 2D graphic elements used by the applications you develop. The classes were provided only on AIX, Windows and OS/2 platforms.

On the AIX platform, all 2D Graphics classes were introduced in Version 4 of IBM Open Class Library.

To migrate 2D Graphics classes, you either need to integrate all of the 2D Graphics classes you're using into your application, or replace them entirely. Many of the 2D Graphics classes are interconnected, so you can't easily keep some of the classes while replacing others with those you write yourself.

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## Industry Standards

The following standards are supported:

- The C++ language is consistent with the International Standard for Information Systems-Programming Language C++ (ISO/IEC 14882:1998).





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- Musser, David R. and Atul Saini, *STL Tutorial and Reference Guide: C++ Programming with the Standard Template Library*, Reading, MA: Addison-Wesley, 1996.

For more information about the Standard Template Library, the Standard C Library and the Standard C++ Library, see *Standard C++ Library Reference*. This publication is provided in PDF format with your C++ compiler product, or can be downloaded from the IBM web site at <http://www.ibm.com>.



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