Business application development and runtime environment
The COBOL2002 Family

An Advanced and Reliable Foundation for Further Progress

COBOL2002

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Dynamic Advancement and Proven Reliability -
The Dual Strengths of COBOL2002

Making optimum use of legacy assets while actively creating new values -- these dual objectives can be fully realized with COBOL2002. In today’s world of ever-evolving business systems, this capability makes the crucial difference. Hitachi’s COBOL2002 supports the specifications of the latest fourth International Standard for COBOL while inheriting Hitachi COBOL85 that has been used for many years. Valuable resources such as existing COBOL source code and the skills of trained COBOL developers can be fully applied.

Through features such as Java™ and XML interoperability, COBOL provides improved support for Web application development. Interoperability with the SOA platform Cosminexus and the Integrated systems management Job Management Partner 1 is also available. Hitachi’s advanced and reliable COBOL2002 meets the individual requirements of your business.
Supporting the specifications of the fourth International Standard for COBOL (the COBOL2002 standard)

COBOL2002 pioneered the support of specifications of the revised International Standard for COBOL published in 2002, and supports the new principal features of the COBOL2002 standard, including object orientation, conditional compilation, and user-defined data types, that help improve development efficiency.

Web technology support

Interoperability with the latest Web technology such as Java™ and XML is provided as a non-optional feature. This enables COBOL applications to seamlessly integrate with other tools and allows the development of Web applications using the highly reliable COBOL.

XML: eXtensible Markup Language

Versatile functionality for business applications

COBOL2002 has a number of features for business applications, such as numeric operations with decimal rounding error control, versatile string handling, and excellent runtime performance.

Efficient use of legacy COBOL assets

With COBOL2002, you can continue to make use of valuable assets, such as existing COBOL source code and the skills of COBOL developers. For example, COBOL applications can be used from a Java™ application such as a Servlet or JSP™.

Easy-to-use development tools create a productive environment

COBOL2002 provides powerful and efficient tools, including a COBOL editor supporting the latest language specifications and a free-form reference format, a test debugger with a new GUI that has become even easier to use, and a coverage tool that can be invoked with the start of the application to collect coverage information in a distributed environment such as Web servers.

Standards provide future compatibility

The International Standards Organization (ISO), American National Standards Institute (ANSI), and Japanese Industry Standards (JIS) define the COBOL language specifications, so the COBOL language specifications are not dependent on a specific vendor. Backwards compatibility is strictly kept in the newer standards so that existing COBOL applications can always be maintained with confidence.
Support for Web system environments

**Java™-COBOL interoperability**
A Java™ application running on the SOA platform Cosminexus can call a COBOL program as a JavaBeans™ or EJB™ instance. The business logic portion that is the core of the Web application can therefore be developed in COBOL.

**uCosminexus OpenTP1 interoperability**
COBOL2002 can run in the Distributed Transaction Manager uCosminexus OpenTP1 environment. This enables the development of large-scale distributed transaction processing systems in a Web environment. An application for running on uCosminexus OpenTP1 can be developed using COBOL, and existing online applications can easily be migrated to a Web environment.
COBOL2002 runs in a variety of system operation environments. Effectively use COBOL assets in an advanced web environment.

Data can be exchanged between COBOL applications on a Windows® server and client.

Support for client/server system environments

A COBOL application running on a Windows® server and a COBOL application running on a client can exchange data, which makes it possible to implement effective load distribution. By using a DBMS preprocessor or ODBC interface, the COBOL application on the client can perform remote access to a database on the server.

Batch processing operations are enabled.

Management of Batch processing operations

Using Integrated systems management Job Management Partner 1, COBOL2002 running on a UNIX® or Windows® machine can perform batch processing of COBOL applications. Functions such as batch job scheduling on a monthly or weekly basis and large-volume output of forms for efficient printer operation are supported. Out-of-paper errors, paper jams and other conditions are also easily managed.
Support for the fourth International Standard for COBOL (the COBOL2002 standard) leads to easier and faster program development.

- **Object orientation support**
  Object-oriented programming is supported, similar to C++ and Java™. The productivity of COBOL applications can be improved by using universal object-oriented methods such as inheritance, polymorphism, and encapsulation.

- **Common exception handling**
  In addition to the USE statement for conventional I/O error processing, various other processing routines for handling cases such as data exceptions and numeric size overflow can be specified. Various execution error handling routines that used to form a large part of COBOL applications can be separated from the logic part of the application itself, thereby improving logic readability.

- **Compiler directives (e.g. conditional compilation)**
  When compiling COBOL source code, special instructions can be given to the compiler to control its behavior and the interpretation of statements. This is convenient for managing all descriptions of platform-specific procedures or procedures customized for individual users in one source program.

- **User-defined data types**
  Data types can be declared. You can freely define and reference data types and easily code data items with the same structure.

- **User-defined functions**
  In addition to using the intrinsic functions provided by COBOL, you can also define your own functions as needed. Using such user-defined functions in formulas results in simple and highly readable applications.

- **Free-form reference format**
  In addition to the conventional fixed format, a free-form reference format without sequence number and indicator areas is also available. This enables coding in a free format without having to be aware of column positions.
Construct Web systems using existing COBOL assets.

**Java™-COBOL interoperability**

A Java™ application (Servlet or JSP™) running in the Cosminexus environment can call a COBOL program as a JavaBeans™ instance. A COBOL access Bean (JavaBeans™) for calling the COBOL application is created automatically by the COBOL2002 development environment product, which helps in streamlining development tasks. By using Java™ and COBOL in tandem, systems can be constructed quickly.

**XML data handling**

XML data can be processed as records in COBOL programs. Your COBOL programming know-how is sufficient to develop XML data processing applications. Depending on the application processing, the required range for XML data (arbitrary XML element) can be matched to COBOL records.
Tools and a compiler are provided for every step of the process, from panel and form design to testing and debugging. Smooth development is supported.

Web system construction support
Integration of COBOL applications with the latest Web technology is made easy by interoperability features for Java and XML. This lets you build sophisticated Web applications in a highly reliable environment.

Development manager
This is the front end for the COBOL development environment, where all tools come together. The manager lets you keep track of development resources, display dependency structures, and control automated compiling.

- **Panel definition**
  CUI panels can be defined easily using panel images. From the defined panels, it is then possible to generate the COBOL source code for WINDOW SECTION or SCREEN SECTION.

- **File and record definition**
  From the defined file and record specifications, the COBOL source code for FILE SECTION and WORKING-STORAGE SECTION is generated.

- **ODBC record definition**
  From information about tables created by database applications, the record definition can be created, and the resulting record definition can be used as the COPY library.

- **COBOL manuals**
  Documentation such as the Language Reference, User's Guide, and Operation Guide manuals can be accessed online. Efficient search features help speed up development work.

- **COBOL editor**
  Color highlighting of reserved terms and constants, automatic numbering, and syntax check, are just some of the features provided by the editor that is tailor-made for COBOL. Templates for all COBOL statements are supplied. Debugger and compiler errors are linked, to ensure efficient source editing.

- **Compiler**
  The compiler includes optimization features to get the most out of the hardware. Runtime performance is improved, enabling the development of high-performance applications. Test command templates can also be created easily.

- **Test debugger**
  Simulation (for main/sub programs, files, databases, DC, etc.) and other powerful stand-alone testing tools are provided. Batch execution enables efficient execution of high-volume test data.

- **Coverage**
  Test progress can be monitored quantitatively for easy schedule management and assessment of test adequacy.
Customize your development environment for even better results. Convenient optimization features are provided.

- **Easily transfer current transaction processing to the Web.**

**Java™-TP1/COBOL interoperability***

Mission-critical transaction processing (uCosminexus OpenTP1) can be transformed to the Web. A Java™ application running in the Cosminexus environment can access an existing COBOL application in the Distributed Transaction Manager uCosminexus OpenTP1 server environment. Changes to your server environment or to the COBOL application are not necessary. A TP1/COBOL access Bean (JavaBeans™) for calling the COBOL application is created automatically by the development environment product.

*Requires the separately available TP1/COBOL adaptor for Cosminexus.

Transactions synchronization is possible with 2-phase-commit.

- **Libraries-to-use libraries and utilities are provided for the Windows® environment.**

**Libraries and utilities for the Windows® environment**

- **COBOL communication library**
  A communication tool is provided using the TCP protocol. This makes it easy to create COBOL applications that perform data exchange with applications running the other machines.

- **Business library**
  Functions often used by business applications are provided as a library. This includes routines for image data processing and Japanese character conversion (Shift-JIS to JIS and vice versa).

**This utility provides features for file conversion (sequential to CSV/txt, ISAM to CSV, etc.) as well as file editing and updating.**

**Wide-ranging software interoperability**

**Various interoperability features facilitate development of COBOL applications for Windows®.**

- **OLE automation feature**
  COBOL application procedure statements can be used to control applications that support the COM interface (Microsoft® Office, etc.), enabling automation of tasks such as spreadsheet operations.

- **Database access**
  By using a DBMS preprocessor or ODBC interface, access to various databases such as HiRDB, Oracle, or Microsoft® SQL Server is available.

- **Spreadsheet software interoperability**
  Files, such as CSV format files, created by spreadsheet software such as Microsoft® Excel can be handled with the READ/WRITE statement for input and output.

- **Multi-thread support**
  COBOL2002 enables the creation of applications that support a multi-thread environment in which parallel processing places fewer demands on the hardware than in a multi-process approach. This facilitates integration of existing assets into a multi-thread environment.
COBOL2002 Program Products (for Windows®)

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Outline</th>
<th>Supported OS</th>
</tr>
</thead>
<tbody>
<tr>
<td>COBOL2002 Net Server Suite<em>4</em>5</td>
<td>Product suite (for PC servers) consisting of the following components: COBOL2002 compiler, development manager, COBOL editor, test debugger, coverage, ODBC record definition, file record definition, Java™-COBOL interoperability (development runtime environment), COBOL-SORT*2</td>
<td>Windows Server® 2008 (x64), Windows Server® 2003 x64 Editions, Windows® Vista® x64, Windows® XP Professional x64 Edition</td>
</tr>
<tr>
<td>COBOL2002 Net Client Suite*5</td>
<td>Product suite (for PC clients) consisting of the following components: COBOL2002 compiler, development manager, COBOL editor, test debugger, coverage, ODBC record definition, file record definition, Java™-COBOL interoperability (development runtime environment), COBOL2002 runtime library, COBOL ISAM, COBOL SORT*2</td>
<td>Windows Server® 2008 (x64), Windows Server® 2003 x64 Editions</td>
</tr>
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COBOL2002 Program Products (for 64 bit Windows®)

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<tr>
<th>Product Name</th>
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</thead>
<tbody>
<tr>
<td>COBOL2002 Net Developer (64)<em>1</em>6</td>
<td>Development environment product consisting of the following components: COBOL2002 compiler for 64 bit, development manager, COBOL editor, test debugger, coverage tool, ODBC record definition, COBOL2002 runtime library, COBOL ISAM, COBOL SORT*2</td>
<td>Windows Server® 2008 (x64), Windows Server® 2003 x64 Editions, Windows® Vista® x64, Windows® XP Professional x64 Edition</td>
</tr>
<tr>
<td>COBOL2002 Net Server Runtime (64)*7</td>
<td>Runtime environment product (for PC servers) consisting of the following components: COBOL2002 runtime library for 64 bit, Java™-COBOL interoperability (runtime environment), COBOL ISAM, COBOL SORT*2</td>
<td>Windows Server® 2008 (x64), Windows Server® 2003 x64 Editions</td>
</tr>
<tr>
<td>COBOL2002 Net Server Suite (64)<em>8</em>9</td>
<td>Product suite (for PC servers) consisting of the following components: COBOL2002 compiler for 64 bit, development manager, COBOL editor, test debugger, coverage, ODBC record definition, COBOL2002 runtime library, COBOL ISAM, COBOL SORT*2</td>
<td>Windows Server® 2008 (x64), Windows Server® 2003 x64 Editions</td>
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COBOL2002 Program Products (for UNIX®)

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<tbody>
<tr>
<td>COBOL2002 Net Server Suite*6</td>
<td>Development and runtime environment products consisting of the following components: COBOL2002 compiler and command-based test debugger, runtime library, Java™-COBOL interoperability (runtime environment), COBOL-ISAM and COBOL-SORT*2</td>
<td>AIX 5L, AIX V6.1, HP-UX 11i v2/v3 (IPF)*6, Linux®x86, Linux®x64, Solaris®(SPARC)</td>
</tr>
<tr>
<td>COBOL2002 Net Server Runtime*7</td>
<td>Runtime environment products consisting of the following components: COBOL2002 runtime library, Java™-COBOL interoperability (runtime environment), COBOL-ISAM, COBOL-SORT*2</td>
<td>AIX 5L, AIX V6.1, HP-UX 11i v2/v3 (IPF)*6, Linux®x86, Linux®x64, Solaris®(SPARC)</td>
</tr>
<tr>
<td>COBOL2002 Net Server Suite (64)*8</td>
<td>Development and runtime environment products consisting of the following components: COBOL2002 compiler for 64 bit and command-based test debugger, runtime library, Java™-COBOL interoperability (runtime environment), COBOL ISAM, COBOL SORT*2</td>
<td>HP-UX 11i v2/v3 (IPF), Linux®x64</td>
</tr>
<tr>
<td>COBOL2002 Net Server Runtime (64)*8</td>
<td>Runtime environment products consisting of the following components: COBOL2002 runtime library for 64 bit, Java™-COBOL interoperability (runtime environment), COBOL ISAM, COBOL SORT*2</td>
<td>HP-UX 11i v2/v3 (IPF), Linux®x64</td>
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COBOL2002 Family

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<tr>
<td>COBOL communication library</td>
<td>Provides TCP protocol communication features</td>
<td>Windows®</td>
</tr>
<tr>
<td>Business utility Version 3</td>
<td>Provides various file handling features for applications</td>
<td>Windows®</td>
</tr>
<tr>
<td>Business library</td>
<td>Comprises often used processing for business use</td>
<td>Windows®</td>
</tr>
<tr>
<td>TP1/COBOL adapter for Cosminexus Version 2</td>
<td>Provides Java™-TP1/COBOL interoperability (development environment)</td>
<td>Windows®</td>
</tr>
<tr>
<td>TP1/COBOL Extended Server Run Time System for Cosminexus Version 2</td>
<td>Provides Java™-TP1/COBOL interoperability (runtime environment)</td>
<td>Windows®</td>
</tr>
<tr>
<td>TP1/COBOL Expansion Run Time System for Cosminexus Version 2 (64)</td>
<td>Provides Java™-TP1/COBOL interoperability (runtime environment)</td>
<td>HP-UX 11i v2/v3 (IPF)</td>
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COBOL2002 Related Products

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<tr>
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<tbody>
<tr>
<td>Cosminexus</td>
<td>SOA Platform</td>
<td>Windows®, AIX 5L,AIX V6.1,HP-UX 11i v2/v3 (IPF)*7, Linux®x86, Linux®x64, Solaris®(SPARC)</td>
</tr>
<tr>
<td>uCosminexus OpenTP1</td>
<td>Distributed Transaction Management</td>
<td>Windows®, AIX 5L,AIX V6.1,HP-UX 11i v2/v3 (IPF)*7, Linux®x86, Linux®x64, Solaris®(SPARC)</td>
</tr>
<tr>
<td>Job Management Partner 1</td>
<td>Integrated systems management</td>
<td>Windows®, AIX 5L,AIX V6.1,HP-UX 11i v2/v3 (IPF), Linux®x86, Linux®x64, Solaris®(SPARC)</td>
</tr>
<tr>
<td>HIRDB</td>
<td>Scalable database</td>
<td>Windows®, AIX 5L,AIX V6.1,HP-UX 11i v2/v3 (IPF), Linux®x86, Linux®x64, Solaris®(SPARC)</td>
</tr>
<tr>
<td>uCosminexus EUR</td>
<td>Report Management System</td>
<td>Windows®, AIX 5L,AIX V6.1,HP-UX 11i v2/v3 (IPF), Linux®x86, Linux®x64, Solaris®(SPARC)</td>
</tr>
</tbody>
</table>

*1: To put applications into actual operation, COBOL2002 Net Client Suite or COBOL2002 Net Server Suite is required.
*2: COBOL ISAM and COBOL SORT provide ISAM and SORT functionality in a COBOL2002 environment.
*3: If multiple CPUs are installed, additional CPU licenses are required.
*4: This product can be used for development and actual operation.
*5: To put applications into actual operation, COBOL2002 Net Server Suite (64) is required.
*6: Java™-COBOL interoperability is not supported.
*7: COBOL2002 does not support Java™-COBOL interoperability.
COBOL2002 has been developed under a quality assurance system approved by ISO9001 and TickIT.

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The official name of Windows is Microsoft® Windows® Operating System.

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Hitachi participates in the COBOL Consortium of Japan to actively provide users with information.

COBOL2002 has been developed under a quality assurance system approved by ISO9001 and TickIT.

Information service

Information on Hitachi Open Middleware is available at the following website: http://www.hitachi.co.jp/soft-e/

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