# OpenCOBOL 1.1
## [06FEB2009 Version]
# Build Guide
## For MinGW

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This document builds upon the instructions found in the
"**MinGW Open-Cobol Install**"
Documentation at http://sourceforge.net

## Contents

# Introduction

This document describes the process you will need to follow in order to build OpenCOBOL 1.1 using a Minimalist GNU for Windows (MinGW) environment.

OpenCOBOL was designed to run in a UNIX environment. This means that the compiler, run-time libraries and compiled object programs will expect to have certain UNIX services available.

The "Minimalist GNU For Windows" [MinGW] package is a very high-level UNIX emulation facility that provides the UNIX services OpenCOBOL and its compiled programs will require. It provides these services via a single DLL (**mingwm10.dll**[1]) which must be available on both the development systems upon which OpenCOBOL programs are compiled as well as the run-time systems upon which those compiled programs will be executed. The following statement was taken directly from the MinGW website:

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[1]    The number in the name of the DLL is a version number. It is quite possible that by the time you are actually using this document to create your own OpenCOBOL binaries, the version number of MinGW will have changed and you may have a DLL with a different number.

"The MinGW base runtime package has been placed in the public domain, and is not governed by copyright. This basically means that you can do what you like with the code."

The "base runtime package" is the aforementioned DLL!

The MinGW package <u>also</u> includes the GNU Compiler Collection (GCC), and GNU binutils packages; these will provide a free C compiler and development environment with which the various OpenCOBOL components can be built.

# Overview of the Process

The following is a brief overview of the general steps you will follow to create your own OpenCOBOL binaries and to package them for your use.

The version numbers shown reflect the versions of the software that have been successfully used to build OpenCOBOL.  If you are able to locate these versions using the instructions provided, you're guaranteed of success!  If not, get the latest version and cross your fingers!

1. **Install MinGW 5.1.6**

   This is a minimal Unix-emulation environment intended for use under Windows.

   MinGW has been placed in the public domain and is available free-of-charge and is freely distributable.

2. **Install MSYS 1.0.11**

   This is a Unix bash command shell environment for use under MinGW; it is needed to be able to run the various configuration, installation and verification scripts for OpenCOBOL and its co-requisite packages.

   Like MinGW, MSYS has been placed in the public domain and is available free-of-charge and is freely distributable.

   The version number (1.0.11) shown here is the last version with a Windows EXE installer.  Even though it is NOT the most-recent version, it is sufficient to the task of building OpenCOBOL and it's related components.

3. **Download and Build the GNU Multiple-Precision Arithmetic (GMP) Package 5.0.1**

   GMP is a free library for arbitrary precision arithmetic, operating on signed integers, rational numbers, and floating point numbers.  There is no practical limit to the precision except the ones implied by the available memory in the machine GMP runs on. GMP has a rich set of functions, and the functions have a regular interface.

   It is GMP that enables OpenCOBOL to perform the USAGE DISPLAY and USAGE COMPUTATIONAL-3 (packed decimal) arithmetic that we've all come to expect from any COBOL implementation.

This package is available free-of-charge and is licensed under the terms of the **GNU Lesser General Public License**.

4.  **Download and Build the Public Domain Curses (PDCurses) Package 3.4**

    This is a runtime packages utilized by OpenCOBOL in support of the SCREEN SECTION and extended-function ACCEPT and DISPLAY statements.

    This package is available free-of-charge and is licensed under the terms of the **GNU Lesser General Public License**.

5.  **Download and Build the Berkeley Database (BDB) Package 5.0.26**

    This is a runtime package that will be utilized by OpenCOBOL to support INDEXED files, the SORT statement and the MERGE statement.

    Although copyrighted to Oracle Corporation, BDB is made available free-of-charge and is redistributable under the terms set forth in its license.  The following statement, along with the BDB copyright at the bottom of this page[2], satisfies the terms of that license:

    Source code to BDB is available from the BDB website.  Source code to OpenCOBOL V1.1 is available from the OpenCOBOL website (**http://www.opencobol.org**).

    You will need to register with the Oracle website in order to download the software.

6.  **Download the OpenCOBOL Source**

    This is the full source code to the OpenCOBOL compiler and associated run-time library.

    The compiler is licensed under GNU General Public License.

    The run-time library is licensed under **GNU Lesser General Public License**.

7.  **Build OpenCOBOL**

    This is the process of actually building the OpenCOBOL compiler and runtime library.

8.  **Package it all Into an OpenCOBOL Folder**

    This is the process of preparing an "OpenCOBOL" folder that contains the binaries of OpenCOBOL and the co-requisite packages in a form that you may use and distribute with your OpenCOBOL apps.

# Install MinGW 5.1.6

1.  Go to "**sourceforge.net**" on the web.

2.  Search for "MinGW"; you should find something resembling "**MinGW - Minimalist GNU for Windows**" (files seem to change names on sourceforge periodically).  Click on it to bring up it's product page and then click it's "Download" button.

3.  Once downloaded, run it (it's a Windows ".exe").

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[2]   Copyright (c) 1990-2006 Oracle Corporation.  All rights reserved.

4. Accept the default installation directory (**C:\MinGW**).

5. When given the chance to choose the components to install, make sure "**MinGW Base Tools**" package is selected.  All other components are optional – install them if you'd like, but neither OpenCOBOL nor any of its co-requisite packages need them.

6. (optional) - Once the installation is complete, feel free to delete the "**MinGW.5.1.6.exe**" file that you downloaded.

7. Copy "C:\MinGW\libexec\gcc\mingw32\3.4.5\cc1.exe"[3] to "C:\MinGW\bin\cc1.exe". This will (ultimately) allow C:\MinGW\bin to be the ONLY directory you'll need to have in your PATH in order to compile OpenCOBOL programs!

8. Verify that **C:\MinGW\bin** contains a file named **mingwm10.dll[4].**

# Install MSYS 1.0.11

Having MinGW is a good start, but you need more than a few runtime service routines and UNIX command-line utilities – you need a full-blown UNIX "bash" shell environment too!  The various configuration and installation scripts used by the various OpenCOBOL components were all written assuming the user is running them within a UNIX "bash" shell[5], so you'll need one!

Of course, this isn't a problem!  You'll simply need to install the "MSYS" base system into your MinGW environment to have access to the UNIX shell you'll need.  Nothing that's part of MSYS is needed to compile or execute OpenCOBOL programs – MSYS is needed only so that you can build OpenCOBOL and its co-requisite packages.

1. Return to "**sourceforge.net**" and once again search for "**MinGW**"; you should again find that same "something resembling '**MinGW - Minimalist GNU for Windows**'" that you found earlier.  Click on it to bring up it's product page.

2. Click the "**View all Files**" button that appears next to the "Download" button.

3. A file list will appear.  Click each of the following (as you click an item, others will appear underneath it):

    - **MSYS**

    - **BaseSystem**

    - **msys-core**

    - **msys-1.0.11**

    - **MSYS-1.0.11.exe** (this is the MSYS installer for Windows)

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[3]    The "**3.4.5**" is the version number of the gcc package that is part of MinGW

[4]    The number in the name of the DLL is a version number.  It is quite possible that by the time you are actually using this document to create your own OpenCOBOL binaries, the version number of MinGW will have changed and you may have a DLL with a different number.

[5]    "bash" is one of the more popular command shell environments in the Linux world

4. Once downloaded, run the MSYS installer.  This IS an older version of MSYS, but it's adequate to build OpenCOBOL and it's A LOT EASIER to install than the newer versions are.

5. Click "Yes" and "Next" until you're asked for an installation directory.

6. Specify "**C:\MinGW\MSYS**" as the MSYS installation directory.

7. Once actual installation is complete, a command window should pop up asking for permission to run a post-install process - respond "y".

8. Next, use Windows Explorer to ensure that a directory named "**C:\MinGW\MSYS\etc**" exists and verify there's a file named "**fstab**" in it (no extension); If it exists, use Windows Explorer to "Open" the file with "Notepad" and make sure its contents are a single line:

   | |
   |---|
   | **c:/mingw /mingw** |

   If there is no such file, or the contents are not "**c:/mingw /mingw**", create one with that single line as its contents (remember there's no extension after "fstab")[6].

9. An icon "**MSYS**" should have been created on your desktop - double-click it.

10. The window started by the "MSYS" icon resembles a Windows console, but is actually an MSYS "bash" shell; Use the window's "Properties" command as you would do with a normal window to change the window size to 190 columns by 60 rows - make sure the buffer size has a "height" of at least 600; you'll also want to change the font to something that enables that window to fit on your screen (I use "Lucida Console" with a "size" of "10").

11. If you are running Windows Vista or Windows 7, close the bash window and restart it again, this time giving it Administrator authority via "**Run As Administrator**".

# Download and Build the GNU Multiple-Precision Arithmetic package (GMP) 5.0.1

From this point forward, you will no longer be simply running a Windows executable to install pre-compiled software.  From now on, you'll be using the GNU Compiler Collection that was installed along with MinGW to actually compile the C source code of the remaining software packages.  Fortunately, this isn't nearly as difficult as you might think because the authors of all those packages constructed special "configure" and "install" bash shell scripts that will use the Unix "make" command (installed as part of MSYS) to actually run the C compiler.

To acquire and build GMP:

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[6]    The "fstab" file defines a UNIX mount-point named "mingw" via which commands and shell scripts can reference the "**C:\MinGW**" directory.  In UNIX, the "/" character is used to delimit layers in directory paths rather than the "\" character Windows uses.  UNIX also prefers lower-case names for files and directories.

1. Go to the "**gmplib.org**" website, home of the GNU Multiple Precision arithmetic library routines [GMP].

2. Find the website's "download" area and download a file named "**gmp-5.0.1-tar.gz**".

3. Once downloaded, use Windows Explorer to copy it into your **C:\MinGW\MSYS** folder.

4. Uncompress and expand the file by issuing the following commands from your "bash" window:

   ```
   cd /mingw/MSYS 7
   tar xzf gmp-*.tar.gz 8,9
   rm gmp-*.tar.gz 9,10
   ```

5. Build GMP using these commands:

   ```
   cd gmp*
   ./configure --prefix=/mingw --enable-shared --disable-static
   make
   make install
   make check
   ```

   Expect LOTS of output from the last four commands; the "--enable-shared" and "--disable-static" options are CRITICAL because they will cause a DLL to be created for the GMP library.  The last command is supposed to verify that GMP installed properly.  Prior to version 5.0.1 it had failed EVERY SINGLE TIME for me and GMP still worked perfectly. Go figure!  As of 5.0.1, however, all tests now PASS.

6. When all this is done, execute the following command to ensure that a DLL was generated for GMP:

   ```
   ls /mingw/bin/*.dll
   ```

   You should see that a "**/mingw/bin/libgmp-10.dll**[11]" exists.

---

[7]   Remember – when entering commands in the bash window, use "/", not "\".

[8]   Compressed "tarballs" (.tar.gz files) are the UNIX equivalent to ".zip" files, and you use the "tar" command to create them as well as to uncompress and expand them

[9]   The "*" will ask the bash shell to "fill in the middle part" of the filename automatically - neat, huh?

[10]  The "rm" command deletes files; we no longer need the "tarball"

[11]  As we've seen already with the MinGW DLL, the "10" shown here is actually a version number.  You may find that it's different, depending on the version of GMP you acquired.

# Download and Build the Public Domain Curses (PDCurses) Package 3.4

Acquire and build PDCurses as follows.  NOTE: I do NOT recommend using the "PDCurses" package available for download from the "MinGW" product page on sourceforge – follow these instructions instead:

1.  Go to the "**pdcurses.sourceforge.net**" website, home of the public-domain CURSES package [PDCurses].

2.  Find the website's "download" area and download a file named "**PDCurses-3.4.tar.gz**".

3.  Once downloaded, use Windows Explorer to copy it into your **C:\MinGW\MSYS** folder

4.  Uncompress and expand the file by issuing the following commands from your "bash" window:

```
cd /mingw/MSYS
tar xzf PDC*.tar.gz
rm PDC*.tar.gz
```

5.  Build PDCurses using these commands:

```
cd PDC*/win32
make -f gccwin32.mak DLL=Y [DEBUG=Y]¹²
```

6.  When this is done, execute the following command to ensure that a DLL was generated for PDCurses (if not, you must have forgotten the DLL=Y switch):

```
ls *.dll
```

You should see that a "**pdcurses.dll**" exists.

7.  There is no "make install" available for PDCurses, so you'll have to deploy the PDCurses components yourself:

```
cp pdcurses.dll /mingw/bin/.
cp pdcurses.a /mingw/lib/libpdcurses.a
cd ..
cp *.h /mingw/include/.
cp curses.h /mingw/include/pdcurses.h ¹³
```

---

¹² The optional DEBUG=Y switch can be provided to generate debugging code internal to the PDCurses package.  I needed it once to diagnose a problem with screen I/O and it really helped!  WARNING : using DEBUG=Y will <u>really</u> slow the PDCurses package down – I don't recommend it for normal use

¹³ The OpenCOBOL 'configure' script and the 'cobc' command (OpenCOBOL compiler) expects 'curses.h' to be named 'pdcurses.h'

# Download and Build the Berkeley Database (BDB) Package 5.0.26

Acquire and build BDB as follows:

1.  Go to the "www.oracle.com/technology/products/berkeley-db/db/index.html" website, home of the BDB package.

2.  Find the website's "download" area and download a file named "**Berkeley DB 5.0.26.NC.tar.gz**" (the "NC" indicates this is the "without encryption" version)

3.  Once downloaded, use Windows Explorer to copy it into your **C:\MinGW\MSYS** folder

4.  Uncompress and expand the file by issuing the following commands from your "bash" window:

    ```
    cd /mingw/MSYS
    tar xzf db*.tar.gz
    rm db*.tar.gz
    ```

5.  Install BDB using these commands:

    ```
    cd db*/build_unix
    ../dist/configure --enable-mingw --prefix=/mingw --enable-compat185 LIBCSO_LIBS=-lwsock32
    make
    make install
    ```

6.  When this is done, execute the following command to ensure that a DLL was generated for BDB:

    ```
    ls /mingw/bin/*.dll
    ```

    You should see that a "**libdb-5.0.dll**" exists.

# Download the OpenCOBOL Source

And now we're ready to install OpenCOBOL:

1.  Go to the "**opencobol.org**" website, home of the OpenCOBOL project.

2.  Find the website's "download" area and download the 1.1 pre-release version of OpenCOBOL.  At the time of publication of this document, the publically-available tarball for OpenCOBOL 1.1 is the 06FEB2009 version.

3.  Once downloaded, use Windows Explorer to copy it into your **C:\MinGW\MSYS** folder

4.  Uncompress and expand the file by issuing the following commands from your "bash" window:

```
cd /mingw/MSYS
tar xzf open*.tar.gz
rm open*.tar.gz
```

# Apply Patches to the OpenCOBOL Source (Optional)

During the project that created the OpenCOBOL Programmer's Guide, I discovered several problems. Upon inspection of the compiler and/or runtime library C code, I was able to develop fixes for these problems. The OpenCOBOL 06FEB2009 tarball will have the problems corrected by the following fixes. I recommend that you edit the OpenCOBOL source code as documented below before proceeding.

I have confirmed that subsequent tarballs (not yet publically available) have these (or similar) corrections already made.

1. I found that neither the SCREEN SECTION nor the extended-format DISPLAY statement were able to support the use of colors on the screen. Upon inspection, I found that the "**screenio.c**" component of the run-time library was not properly initializing the color-pair array used by PDCurses, therefore causing white-on-black to be the color always used, regardless of what you specified in your OpenCOBOL programs.

   The change I made was to the "**cob_screen_init()**" routine in the "**screenio.c**" module, found in the **C:\MinGW\MSYS\open-cobol-1.1\libcob** folder.

   If this problem is corrected in your version, you should find code similar to what is shown here. If not, correct your copy of screenio.c using any text editor to include the code shown in **red**.

```
static void COB_NOINLINE
cob_screen_init (void)
{
   char   *s;
#ifdef HAVE_LIBPDCURSES
   short i;
#endif
   if (!cob_screen_initialized) {
      s = getenv ("COB_SCREEN_EXCEPTIONS");
      if (s) {
         if (*s == 'Y' || *s == 'y') {
            cob_extended_status = 1;
            s = getenv ("COB_SCREEN_ESC");
            if (s) {
               if (*s == 'Y' || *s == 'y') {
                  cob_use_esc = 1;
               }
            }
         }
      }
      fflush (stdout);
      fflush (stderr);
      if (!initscr ()) {
         cob_runtime_error ("Failed to initialize curses");
         cob_stop_run (1);
      }
      cbreak ();
      keypad (stdscr, 1);
      nl ();
      noecho ();
      if (has_colors ()) {
         start_color ();
         pair_content ((short)0, &fore_color, &back_color);
         if (COLOR_PAIRS) {
            cob_has_color = 1;
         }
#ifdef HAVE_LIBPDCURSES
         for (i = 1; i < (size_t)COLOR_PAIRS; i++) {
            init_pair ((short)i, (short)0, (short)0);
         }
#endif
      }
      attrset (A_NORMAL);
      getmaxyx (stdscr, cob_max_y, cob_max_x);
      cob_screen_initialized = 1;
   }
}
```

2.  A problem exists with both the **NUMVAL** and **NUMVAL-C** intrinsic functions where they both refuse to acknowledge the existence of a "CR" or "DB" symbol in a string being processed.  To fix this bug, you'll have to apply a fix to the **intrinsic.c** module (found in the **C:\MinGW\MSYS\open-cobol-1.1\libcob** folder).

    In both the "**cob_intr_numval**" and "**cob_intr_numval_c**" function definitions in **intrinsic.c** you'll see a section of code like the following (part of the character-by-character scan of the string being converted):

```
for (i = 0; i < srcfield->size; ++i) {
   if (i < (srcfield->size - 2)) {
      if (strcasecmp ((char *)&srcfield->data[i], "CR") == 0
          || strcasecmp ((char *)&srcfield->data[i], "DB") == 0) {
         sign = 1;
         break;
      }
   }
```

To fix the problem, change each of those two code snippets to the following:

```
for (i = 0; i < srcfield->size; ++i) {
   if (i < (srcfield->size - 1)) {
      if (strcasecmp ((char *)&srcfield->data[i], "CR") == 0
          || strcasecmp ((char *)&srcfield->data[i], "DB") == 0) {
         sign = 1;
         break;
      }
   }
```

3. The ACCEPT … FROM DAY-OF-WEEK statement is non-functional on MinGW versions of OpenCOBOL.  To fix this, find the "**cob_accept_day_of_week**" function in the **common.c** module (found in the **C:\MinGW\MSYS\open-cobol-1.1\libcob** folder):

```
void
cob_accept_day_of_week (cob_field *f)
{
   time_t  t;
   char    s[4];
   t = time (NULL);
#if defined(_MSC_VER)
   sprintf(s, "%d", localtime(&t)->tm_wday + 1);
#else
   strftime (s, 2, "%u", localtime (&t));
#endif
   cob_memcpy (f, (ucharptr)s, 1);
}
```

and make the changes shown in **red**:

```
void
cob_accept_day_of_week (cob_field *f)
{
   time_t  t;
   char     s[4];
   t = time (NULL);
   s[0] = (char)(localtime(&t)->tm_wday);
   if(s[0] == 0) s[0] = 7;
   s[0] += '0';
   cob_memcpy (f, (ucharptr)s, 1);
}
```

4. When a statement such as this:

   **ACCEPT INPUT-FIELD FROM CONSOLE**

   Is executed in a program that contains no SCREEN SECTION, or in which no data item defined in the SCREEN SECTION has yet been ACCEPTed or DISPLAYed, the field receiving the ACCEPTed value may be corrupted by having a trailing ASCII carriage-return character (X'0D') appended to its value. This will occur only in situations where the data read from the console is shorter in length than the length of the receiving field (INPUT-FIELD in the example).

   To correct this, find the "**cob_accept**" function in the **termio.c** module (found in the **C:\MinGW\MSYS\open-cobol-1.1\libcob** folder):

```c
void
cob_accept (cob_field *f)
{
/* RXW
  size_t    size;
*/
  cob_field_attr  attr;
  cob_field   temp;

  if (cob_screen_initialized) {
     cob_field_accept (f, NULL, NULL, NULL, NULL, NULL, 0);
     return;
  }
  temp.data = term_buff;
  temp.attr = &attr;
  COB_ATTR_INIT (COB_TYPE_ALPHANUMERIC, 0, 0, 0, NULL);
  /* read a line */
  if (fgets ((char *)term_buff, COB_MEDIUM_BUFF, stdin) == NULL) {
     temp.size = 1;
     term_buff[0] = ' ';
     term_buff[1] = 0;
  } else {
     temp.size = strlen ((char *)term_buff) - 1;
  }
  if (COB_FIELD_TYPE(f) == COB_TYPE_NUMERIC_DISPLAY) {
     if (temp.size > f->size) {
        temp.size = f->size;
     }
  }
  cob_move (&temp, f);
/* RXW
  if (isatty (fileno (stdin))) {
     temp.size = strlen ((char *)term_buff) - 1;
     cob_move (&temp, f);
  } else {
     size = strlen ((char *)term_buff) - 1;
     if (size > f->size) {
        size = f->size;
     }
     memcpy (f->data, term_buff, size);
     memset (f->data + size, ' ', f->size - size);
  }
*/
}
```

And make the correction shown in **red**:

```
void
cob_accept (cob_field *f)
{
/* RXW
  size_t    size;
*/
  cob_field_attr  attr;
  cob_field   temp;

  if (cob_screen_initialized) {
     cob_field_accept (f, NULL, NULL, NULL, NULL, NULL, 0);
     return;
  }
  temp.data = term_buff;
  temp.attr = &attr;
  COB_ATTR_INIT (COB_TYPE_ALPHANUMERIC, 0, 0, 0, NULL);
  /* read a line */
  if (fgets ((char *)term_buff, COB_MEDIUM_BUFF, stdin) == NULL) {
     temp.size = 1;
     term_buff[0] = ' ';
     term_buff[1] = 0;
  } else {
     temp.size = strlen ((char *)term_buff) - 1;
     if ( term_buff[temp.size] ==  '\n' ) {
        temp.size--;
     }
  }
  if (COB_FIELD_TYPE(f) == COB_TYPE_NUMERIC_DISPLAY) {
     if (temp.size > f->size) {
        temp.size = f->size;
     }
  }
  cob_move (&temp, f);
/* RXW
  if (isatty (fileno (stdin))) {
     temp.size = strlen ((char *)term_buff) - 1;
     cob_move (&temp, f);
  } else {
     size = strlen ((char *)term_buff) - 1;
     if (size > f->size) {
        size = f->size;
     }
     memcpy (f->data, term_buff, size);
     memset (f->data + size, ' ', f->size - size);
  }
*/
}
```

# Build OpenCOBOL

Build OpenCOBOL using these commands:

```
cd /mingw/MSYS/open*
./configure --prefix=/mingw
make
make install
```

# Packaging it all Into an OpenCOBOL Folder

You now have everything you need to build your own "OpenCOBOL" folder suitable for program compilation and execution.  At a minimum, you'll need to follow these steps (these steps assume that the directory "C:\OpenCOBOL" does not yet exist):

```
mkdir C:\OpenCOBOL
copy C:\MinGW\bin                         C:\OpenCOBOL
copy C:\MinGW\share\open-cobol\config     C:\OpenCOBOL\config
copy C:\MinGW\share\open-cobol\copy       C:\OpenCOBOL\Copy
copy C:\MinGW\lib                         C:\OpenCOBOL\lib
copy C:\MinGW\include                     C:\OpenCOBOL\include
```

Use the "**Configuring OpenCOBOL**" instructions presented at the beginning of this document to establish this folder as your OpenCOBOL "production" environment.

# Using Your OpenCOBOL Folder

Follow these simple steps to allow the OpenCOBOL folder you just created to be usable.  Make the following <u>mandatory</u> ENVIRONMENT variable changes to the "User Variables" for your userid:[14]

   a.  Add a new environment variable named **COB_CONFIG_DIR** and set it's value to **C:\OpenCOBOL\config**

   b.  Modify the PATH variable to add **C:\OpenCOBOL\bin** to the folder list (if there isn't a userid-local PATH variable yet, create one with **C:\OpenCOBOL\bin** as its value)

   c.  Add a new environment variable named **COB_COPY_DIR** and set its value to **C:\OpenCOBOL\Copy**.

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[14]  On a Windows XP computer, start **Control Panel**, double-click **System**, select the **Advanced** tab and click the **Environment Variables** button.

On a Windows Vista or Windows 7 system, start **Control Panel**, double-click **System** (if using Classic View) or click **System and Maintenance** (if Using Control Panel Home view)  then **Advanced System Settings.**  From the **System Properties** window, click the **Advanced** tab and then press the **Environment Variables** button.

Believe it or not, that's it!  You're done.

There is an additional environment variable change you might want to make in the future as you become more familiar with OpenCOBOL – the establishment of the **COB_LIBRARY_PATH** variable.

This variable (as well as the others discussed above) are documented in the **OpenCOBOL Programmers Guide** (look them up in the index).

# Sharing Your OpenCOBOL Folder With Others

Sharing the OpenCOBOL environment you have created with others is pretty simple…simply follow these steps:

1. Give the complete OpenCOBOL folder and its contents to whomever you wish to share with.  Have them copy it to the root of their "C:" drive (therefore becoming their C:\OpenCOBOL folder).

2. Have them perform the same ENVIRONMENT variable changes as were documented in the "Using Your OpenCOBOL Folder" section.

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Public License instead of this License.  But first, please read
<http://www.gnu.org/philosophy/why-not-lgp
```

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```
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                        Version 3, 29 June 2007

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   The "Minimal Corresponding Source" for a Combined Work means the
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object code and/or source code for the Application, including any data
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   If you modify a copy of the Library, and, in your modifications, a
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       Library.  A suitable mechanism is one that (a) uses at run time
       a copy of the Library already present on the user's computer

system, and (b) will operate properly with a modified version
of the Library that is interface-compatible with the Linked
Version.

e) Provide Installation Information, but only if you would otherwise
be required to provide such information under section 6 of the
GNU GPL, and only to the extent that such information is
necessary to install and execute a modified version of the
Combined Work produced by recombining or relinking the
Application with a modified version of the Linked Version. (If
you use option 4d0, the Installation Information must accompany
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