**EightyOne Emulator Development Environment**

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# Introduction

These instructions describe how to install the development environment necessary to build the EightyOne emulator on a Windows PC. They have been written specifically for emulator version 1.2 and above, which uses alternate folder locations that allows the source to be compiled on Windows XP or later. Previous versions of the emulator source will not compile directly using these instructions, although they could with suitable modification to the locations referenced within the project settings.

The following software is required to build the EightyOne emulator:

* Borland C++ Builder 5
* EightyOne source code distribution:
* Emulator source code (by Michael D Wynne)
* Components:
  + Animation-Timer (by Lucian Wischik)
  + Office Button 97 [2.16] (by Jonathan Hosking)
  + Theme Manager [1.10.1] (by Mike Lischke)
  + ComPort Library [2.64] (by Dejan Crnila)
  + DirectDraw [DirectX SDK June 2007] (by Microsoft)
* Component patches:
  + Office Button 97
  + ComPort Library

The components are included in the source code distribution for convenience and also to archive a copy of them in case the originals vanish from the Internet. The appendix section of this document details where the components can be downloaded from.

Component patches are included where modification is required to the standard component source code. Rather than document numerous changes within a file, a pre-modified version of the file is included which can simple be copied over the standard file.

After installation, the following folder structure will have been created:

* C:\EightyOne\Components\
* C:\EightyOne\Source\

The *Components* subfolder contains a number of third party components used by the emulator.   
The *Source* subfolder contains the code for the actual Emulator.  
All project settings use relative paths, which should in theory allow an alternate root folder to be used instead of *C:\EightyOne\* if desired.

# Development Environment Installation

## Copy the EightyOne Source Code Distribution

* Download the latest EightyOne source code distribution from:  
  <https://sourceforge.net/projects/eightyone-sinclair-emulator>
* Create folder *C:\EightyOne\*
* Expand the downloaded zipped file into *C:\EightyOne\*

## Download Borland C++ Builder 5 Enterprise Edition

* Download 7-Zip from:  
  <http://www.7-zip.org>
* Download Borland C++ Builder 5.x from:  
  <https://winworldpc.com/product/borland-c-builder/5x>
* The downloaded file should be *Borland CPP Builder 5.7z*
* Run 7-Zip and extract the contents of *Borland CPP Builder 5.7z* to a temporary folder
* Burn *builder5.iso* image to a DVD

## Install Borland C++ Builder 5 Enterprise Edition

* Insert Borland C++ Builder 5 DVD
* When prompted to AutoPlay, click **Run INSTALL.EXE**
* If prompted by User Account Control, click **Yes**
* From the menu screen, click **C++ Builder**
* At the Welcome screen, click **Next**
* At the Password Dialog screen, enter the following details then click **Next**  
  Serial number: *123-456-7890*  
  Authorization key: *f1xb-23x0*
* At the Software License Agreement screen, click **Yes**
* At the Information screen, click **Next**
* At the Setup Type screen, select *Typical* and click **Next**
* If a Registry Setting Conflict dialog appears click **No**
* At the Choose Office Component Configuration screen, select *Office 2000* and click **Next**
* At the Select File Associations screen, leave *.cpp* unticked and click **Next**
* At the External Installation Options screen, tick only *Install Interbase Client* and click **Next**
* At the Remote Dataset License Agreement screen, click **Agree**
* At the Select Component Directories screen, change the base folder so that the destination folders are as follows:  
  *C:\Borland\CBuilder5\  
  C:\Borland\Borland Shared\  
  C:\Borland\Borland Shared\BDE\  
  C:\Borland\Database Desktop\*
* Click **Next**
* At the Select Program Folder screen, accept the default name and click **Next**
* At the Start Copying Files screen, click **Install**
* Files will be installed
* At the InterBase Client Setup screen, click **Next**
* At the Important Installation Information screen, click **Next**
* At the Software License Agreement screen, click **Yes**
* At the InterBase Component Selection screen, accept the default options and click **Install**
* Files will be installed
* At the InterBase Client Setup Complete screen, untick *Yes! Show me the README file* and click **Finish**
* At the View Read Me screen, untick *View Readme* and click **Next**
* At the Setup Complete, select *Yes, I want to restart my computer now* and click **Finish**
* The PC will start rebooting
* Remove the CD
* Create a shortcut on the desktop to *C:\Borland\CBuilder5\Bin\bcb.exe* with name *Borland C++ Builder 5*
* Using the desktop shortcut, run Borland C++ Builder 5
* If prompted whether to change the Just-In-Time Debugger, tick *Don’t ask me this again* and click **No**
* From the Tools menu, select Editor Options, and set the Editor SpeedSetting option to *Visual Studio emulation* and click **OK**
* Close Borland C++ Builder 5

## Install Animation-Timer

* Extract *C:\EightyOne\Installation Files\Animation-Timer\animtimer5.zip* to  
  *C:\EightyOne\Temp\Animation-Timer\*
* Run *C:\EightyOne\Temp\Animation-Timer\setup.exe*
* Click **Yes** when prompted that the program is from an unknown publisher
* Click **Browse** for the Destination Directory and select folder  
  *C:\EightyOne\Components\Animation-Timer*
* Click **Yes** to create the folder
* Click **OK**
* Ensure the BCB5 Directory is specified as *C:\Borland\CBuilder5*
* Click **Next**
* Click **Install**
* Click **Close**
* Close the readme file that opens
* If the Program Compatibility Assistant dialog appears, select *This program installed correctly*
* Delete folder  
  *C:\EightyOne\Temp\*

## Install Office Button 97 [2.16]

* Extract *C:\EightyOne\Installation Files\Office Button 97\offbtn97.zip* to  
  *C:\EightyOne\Components\Office Button 97\*
* Copy the contents of  
  *C:\EightyOne\Installation Files\Office Button 97 Patch\*and paste (overwriting existing files) to  
  *C:\EightyOne\Components\Office Button 97\OffBtn97\*
* Using the desktop shortcut, run Borland C++ Builder 5
* From the File menu, select Open Project
* Browse to *C:\EightyOne\Components\Office Button 97\OffBtn97\32-Bit\*
* Select *OfficeButton97.bpk* and click **Open**
* Click **Install**
* Click **OK**
* Close the Package window
* Click **No** when prompted to save changes
* Close C++ Builder 5 and select **No** when prompted to save project changes

## Install Theme Manager [1.10.1]

* Using Windows Explorer, browse to *C:\Borland\CBuilder5\Projects\* and create a subfolder named *Intermed*
* Extract, selecting to copy without encryption when prompted,  
  *C:\EightyOne\Installation Files\Theme Manager\TMSourceOnly.zip*to  
  *C:\EightyOne\Components\Theme Manager\*
* Using the desktop shortcut, run Borland C++ Builder 5
* From the File menu, select Open Project
* Browse to *C:\EightyOne\Components\Theme Manager\TMSourceOnly\CBuilder\*
* Select *ThemeManagerC5.bpk* and click **Open**
* Click **Compile**
* Click **OK**
* Close the Package window
* Click **No** when prompted to save changes
* From the File menu, select Open Project
* Browse to *C:\EightyOne\Components\Theme Manager\TMSourceOnly\CBuilder\*
* Select *ThemeManagerC5D.bpk* and click **Open**
* Click **Install**
* Click **OK**
* Close the Package window
* Click **No** when prompted to save changes
* Close C++ Builder 5 and select **No** when prompted to save the project

## Install ComPort Library [2.64]

* Extract *C:\EightyOne\Installation Files\ComPort Library\CPort264.zip* to  
  *C:\EightyOne\Temp\ComPort Library\*
* Extract *C:\EightyOne\Temp\ComPort Library\Sources.zip* to  
  *C:\EightyOne\Components\ComPort Library\*
* Using the desktop shortcut, run Borland C++ Builder 5
* From the File menu, select Open Project
* Browse to *C:\EightyOne\Components\ComPort Library\*
* Select *CPortLibCB5.bpk* and click **Open**
* Click **Compile**
* Click **OK**
* Close the Package window
* Click **No** when prompted to save changes
* From the File menu, select Open Project
* Browse to *C:\EightyOne\Components\ComPort Library\*
* Select *DsgnCPortCB5.bpk* and click **Open**
* Click **Install**
* Click **OK**
* Close the Package window
* Click **No** when prompted to save changes
* Close C++ Builder 5 and select **No** when prompted to save the project
* Using Windows Explorer, copy  
  *C:\EightyOne\Installation Files\ComPort Library Patch\CPort.hpp*  
  to  
  *C:\EightyOne\Components\ComPort Library\*
* Delete folder  
  *C:\EightyOne\Temp\*

## Install DirectDraw [DirectX SDK June 2007]

* Using Windows Explorer, copy  
  *C:\EightyOne\Installation Files\DirectDraw\ddraw.lib*   
  to  
  *C:\EightyOne\Components\DirectDraw\*

# Source Code Compilation

The EightyOne emulator consists of three projects:

* zlib.bpr
* libdsk.bpr
* EightyOne.bpr

Each can be built separately (in which case zlib.bpr and libdsk.bpr must be compiled prior to EightyOne.bpr) or a project group file can be used to build all three (in which case the build order will automatically be handled). All projects compile without build warnings.

## Compile All Projects

To compile all projects using the project group file:

* Using Windows Explorer, browse to *C:\EightyOne\Source\* and right click on *EightyOne.bpg*, select *Send to* and select *Desktop (create shortcut)*
* Double click the EightyOne.bpg shortcut on the desktop to launch Borland C++ Builder 5
* From the Project menu, select Build All Projects

## Compile Project: EightyOne

Once zlib.bpr and libdsk.bpr have been compiled, it is not necessary to recompile these each time changes are made solely to the emulator. Instead only the EightyOne.bpr project needs to be recompiled, which can be done as follows:

* Using Windows Explorer, browse to *C:\EightyOne\Source\* and right click on *EightyOne.bpr*, select *Send to* and select *Desktop (create shortcut)*
* Double click EightyOne.bpr shortcut on the desktop to run C++ Builder 5
* From the Project menu, select Build EightyOne

## Suppressing DVD Drive Errors

When compiling the EightyOne.bpr project, a ‘No Disk’ error may appear with message ‘There is no disk in the drive’. Borland C++ Builder 5 is for some reason attempting to access the DVD it was originally installed from. The error can be ignored by clicking **Continue**. Alternatively, the error message can be suppressed as follows:

* From the start button, type regedit.exe into the search/run box and press Enter
* Click **Yes** if the User Account Control dialog pops up
* Browse to *HKEY\_LOCAL\_MACHINE\SYSTEM\CurrentControlSet\Control\Windows*
* Double click on entry *ErrorMode*
* Set the value to 2 and click **OK**
* Close the registry editor window
* Log off and back on

# Creating New Emulator Releases

## Relative Paths

When new projects, components or libraries are introduced, these should be referenced using relative paths within the project settings. This allows the source to be compiled in a folder other than the recommended folder of *C:\EightyOne\*.

## Warnings

Ensure all code compiles in both debug and release mode without warnings using the current warning level settings. The strictness of warning conditions for each project may be increased but should not be lowered.

## Increment Revision Number

The EightyOne emulator uses a release numbering scheme consisting of a version number and a revision number. The version will always be 1 unless the emulator code is significantly restructured / rewritten. The revision number will increment for every release that is made public. It is not necessary to increment the revision number for non-published development versions, but these should not be made public.

Prior to building the project, the revision number must be updated in two places as follows:

* Open EightyOne.bpr in C++ Builder 5
* Open source file zx81cofig.h
* Edit the #define MINORVERSION and increment the revision number
* Save the file
* From the Project menu, select Options
* Select the Version Info tab
* Ensure *Include version information in project* is checked
* Increment the *Minor version* number
* Click **OK**
* From the File menu, select Save All

## Select Release Build

Prior to building the project, ensure that a *release* build is selected as follows:

* Open EightyOne.bpr in C++ Builder 5
* From the Project menu, select Options
* Select the Compiler tab
* Click **Release**
* Click **OK**
* From the File menu, select Save All

## Update Revision History File

Copy and edit the *Revision history.txt* file from the latest published release and add an entry at the top of the file detailing the changes introduced in the new revision, following the format established for previous releases.

## Remove Intermediate Build Artefacts

When creating the source distribution, the following types of files should be omitted:

* \*.exe
* \*.lib
* \*.tds
* \*.obj
* \*.~\*

# Appendices

## Component Download Sites

The source code distribution contains copies of all components required by the emulator and so these do not need to be downloaded separately. However, to allow the entire source distribution to be reproduced this section documents where the components can downloaded from.

### Download Animation-Timer (by Lucian Wischik)

* Download Animation-Timer for BCB5 from:  
  <http://www.wischik.com/lu/programmer/>
* The downloaded file should be *animtimer5.zip*

### Download Office Button 97 [2.16] (by Jonathan Hosking)

* Download TOffice97 Button 2.16 for CB4 from:  
  <http://www.snehovapohotovost.cz/authorsmore.php?id=1744>
* The downloaded file should be *offbtn97.zip*

### Download Theme Manager [1.10.1] (by Mike Lischke)

* Download Theme Manager 1.10.1 source code from:  
  <http://www.soft-gems.net/index.php/controls/windows-xp-theme-manager/>
* The downloaded file should be *TMSourceOnly.zip*

### Download ComPort Library [2.64] (by Dejan Crnila)

* Download ComPort Library 2.64 from:  
  <http://sourceforge.net/projects/comport/files/comport/>
* The downloaded file should be *CPort264.zip*

### Download DirectDraw [DirectX SDK June 2007] (by Microsoft)

The DirectDraw library file from the DirectX Software Development Kit 2007 is required by the emulator. The SDK is over 450MB in size, yet the single library file required is only 1KB. To avoid the need to download the entire SDK, the library file has been extracted and included in the emulator source distribution. The process of extracting the library file is as follows:

* Download the DirectX Software Development Kit (June 2007) from:  
  <http://www.microsoft.com/en-us/download/details.aspx?id=1324>
* The downloaded file should be *dxsdk\_jun2007.exe*
* Save the zip file to *C:\EightyOne\Temp\DirectX\*
* Run *C:\EightyOne\Temp\DirectX SDK June 2007\dxsdk\_jun2007.exe*
* At the license screen, click **Yes**
* Files are extracted and then the window vanishes for several seconds
* When the WinZip dialog appears, untick *When done unzipping open Setup.exe* and select to unzip to *C:\EightyOne\Temp\DirectX\* and click **Unzip**
* Files are unzipped
* Click **OK**
* Close the WinZip dialog
* Open a command prompt and type  
  *\Borland\CBuilder5\bin\coff2omf.exe  
   ″\EightyOne\Temp\DirectX\Lib\x86\ddraw.lib″  
   ″\EightyOne\Installation Files\DirectDraw\ddraw.lib″*
* Close the command prompt window
* Delete folder  
  *C:\EightyOne\Temp\*

## Component Patch Details

### Office Button 97

A button toggle feature has been added to the component, which involves changes throughout the OffBtn.pas file. It is simpler to copy a pre-modified file than document the numerous changes required throughout the file.

The component does not come with a project package file and so the patch folder includes a suitable file.

### ComPort Library

The compilation of the component will automatically generate file CPort.hpp. When project EightyOne.bpr is compiled, errors will be detected in CPort.hpp which can be resolved as follows:

* Delete lines 685-689:  
  *#pragma option push -w-inl  
  /\* Exception.CreateRes \*/ inline \_\_fastcall EComPort(int Ident)/\* overload \*/  
   : Sysutils::Exception(  
   Ident) { }  
  #pragma option pop*
* Delete lines 698-702:  
  *#pragma option push -w-inl  
  /\* Exception.CreateResHelp \*/ inline \_\_fastcall EComPort(int Ident, int  
   AHelpContext)/\* overload \*/  
   : Sysutils::Exception(Ident, AHelpContext) { }  
  #pragma option pop*

The patch folder contains a version of CPort.hpp with these fixes already implemented.