Basic example

Date: August 11, 1997.

This tutorial shows you how to create an executable and run it on the CD-Emulator from the MS-DOS console, how to launch it directly from the CD-Emulator as if it were a gold boot disk, and (briefly) how to transfer it to a gold disk and run it.   This is just to get your feet wet; more information can be found in the "CD Emulator" user's guide, which comes with your CD-Emulator distribution, and also on the Technical Reference CD (do a multi-document search on "buildcd" and see what comes up). I assume that you've already set up your emulator correctly and that you have gone through the tutorial in the "Readme.doc" distributed with the CD-Emulator diskette.

I hope this helps, if you have any questions or comments, email me at Chia-Ming_Wang@interactive.sony.com. If you have any questions or comments about the emulator programs, please contact support@snsys.com. You can visit their Web Site at http:\\www.snsys.com, and thereby get access to their FTP site, which contains the latest and greatest materials. Finally, I'm *not* the CD guru around here. Email your tough questions to DevTech_Support@interactive.sony.com.

 If your CD-Emulator is already up and running, follow these steps to launch the example program "main.cpe":

Step 0. Launch the drivers for your development board.   Open up an MS-DOS console window.   If you have a DTL-H2000, run "dexbios". If you have a DTL-H2500, run "h25bios". Make sure the emulator hard drive is on, and activate the emulator driver "cdbios" by running the command "cdbios /a<address> /I<interrupt> /D<dma channel>", such as

cdbios /a398 /i5 /d7

  (For more information on launching "cdbios", read the tutorial in the "README.DOC" included in this distribution).

Step 1. Place your data files in the directory structure that will appear on the CD. In this tutorial, "text1.txt" and "\dir1\text2.txt" have already been placed in their proper positions. (By the way, pronounce "dir1" as "dir-one", not "dir-el".)
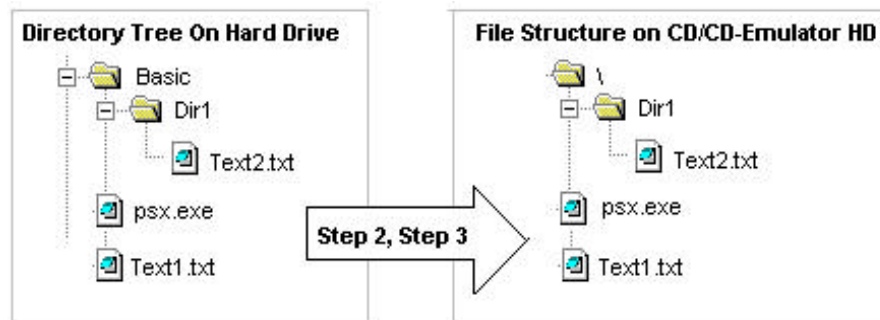
The figure on the left is the directory tree we currently have. In Steps 2 and 3, we will build the emulator's hard drive to correspond to the figure on the right.

Step 2. Build a ".cti" file. The "hello.cti" file has already been created for this tutorial using "CDGEN" and "CCS2CTI", although there are several ways to create a ".cti" file:

Method 1: By hand. Follow the formatting instructions in the CD Emulator User's Guide.
Method 2: By using CDGEN.   Follow the instructions in the "CD Generator User's Guide" to save the file as a ".ccs" file. Then use "ccs2cti" to convert the file to a ".CTI" file:

    ccs2cti hello.ccs

This command converts "hello.ccs" into "hello.cti".

Method 3: By using gencti. This is **still** a version 1.0beta. Read the "GenCTI Instructions" in the "Readme.doc" of this distribution. If you would like an update of this program, contact SN Systems at support@snsys.com.

Let's examine the "hello.cti" file more closely.

```
Disc CDROMXA_PSX

LeadIn XA
    Empty 1350
    PostGap 150
EndTrack

Track XA
    Pause 150
    Volume ISO9660
                                                    ①
        SystemArea C:\LICENSEA.DAT
      PrimaryVolume
②  ───────────►  SystemIdentifier PLAYSTATION
        VolumeIdentifier MY_VOLUME
        VolumeSetIdentifier MY_VOLUME_SET
        PublisherIdentifier MY_PUBLISHER         ③
        DataPreparerIdentifier MY_DATA_PREPARER
        ApplicationIdentifier PLAYSTATION
        LPath
        MPath
        Hierarchy

        Directory DIR1
          File TEXT2.TXT
④ {        XAFileAttributes Form1 Data
             Source DIR1\TEXT2.TXT
          EndFile
        EndDirectory


        File TEXT1.TXT
⑤ {       XAFileAttributes Form1 Data
            Source TEXT1.TXT
          EndFile

        File PSX.EXE
⑥ {       XAFileAttributes Form1 Data
            Source PSX.EXE
          EndFile

        EndHierarchy
      EndPrimaryVolume
    EndVolume
EndTrack

LeadOut XA
    Empty 150
EndTrack

EndDisc
```

❶ The LicenseA.Dat is the licensing file used to create gold disks for North American territories. If you are just using the CD Emulator for now, and *you don't have access to this file, you can delete this line.* You can find copies of the licensing files "licenseA.dat", "licenseJ.dat", and "licenseE.dat" on the Programmer Tools CD, in the directory "\Cdgen\LcnsFile". However, if you are going to create a gold disk, you should get the appropriate file for your territory anyways.

❷ The "PLAYSTATION" system identifier and appplication identifiers are required fields.

❸ These Identifiers aren't optional, but their values are.

❹ In this sample directory (sitting on your compuer) is a sub-directory called "dir1", and it contains the file "text2.txt". Hence, the "source" for this file is "DIR1\TEXT2.TXT". When the cd emulator image is built in Step 3 (below), the file will be placed in to the "Directory DIR1" as "File TEXT2.TXT". The above file declaration used a relative pathname -- it was assumed that the parent directory of "DIR1" is the current directory, but alternatively, you can specify the entire "source" path. For example, instead of "Source DIR1\TEXT2.TXT", you could use "Source C:\ps\cdemu\sample\DIR1\TEXT2.TXT", as in the following snippet:

```
Directory DIR1
      File TEXT2.TXT
        XAFileAttributes Form1 Data
        Source C:\ps\cdemu\sample\DIR1\TEXT2.TXT
      EndFile
    EndDirectory
```

❺ In this sample directory (sitting on your computer) is a lone file called "text1.txt". Hence the "source" for this file is "TEXT1.TXT", and it will be placed in the Root directory of the CD Emulator.

❻ In this sample directory (sitting on your computer) is a lone file called "psx.exe". This is the bootable executable version of the "main.cpe" file. You will learn how to boot off of the cdemulator in **Step 6 (option 2).**

Following the syntax in the "Cd Emulator" user's guide, you should be able to cut and paste from this file. However, be aware that these sample files are regular data only -- not CD-DA files or sub-header files (such as XA-audio), which require a different syntax. Refer to the examples in the Programmer Tools CD, in \psx\sample\scee\cd for examples of ".cti" files for these types of data files.

Step 3. Copy the directory structure to the emulator's hard drive. *With the cdbios active*, run buildcd to process the ".cti" file to copy your directory tree's data to the CD emulator's harddrive. Make sure you are in the correct directory. Assuming that the full path of this "basic" directory is "c:\ps\cdemu\sample\basic", change to the directory:

cd c:\ps\cdemu\sample\basic

Now run the "buildcd" command. In the following MS-DOS command, the emulator's hard drive is at SCSI ID "2", and data is written to partition "1":

buildcd -s2:1 hello.cti

(You should have already activate the cdbios in Step 0 of this tutorial). In practice, you would probably want to put this into a batch file, such as the included "build.bat".

Step 4. Verify that the files are on the emulator's hard drive. With the cdbios active, run cddisk. In the following MS-DOS command, the emulator's hard drive is at SCSI ID "2".

<div align="center">cddisk 2</div>

Within the cddisk program, set the active partition to "1". Choose "3" to "View Partition Contents", then press "1" (to see inside partition 1). You should see the directory listing of the contents of the emulator's hard drive. Press "Esc" to exit.

Step 5. Select the emulator. Type the following (assuming that snpatch is in c:\ps\pssn\bin; your directory tree may be different):

```
resetps 1
run c:\ps\pssn\bin\snpatch.cpe   (only if running on a DTL-H2000)
run c:\ps\pssn\bin\selemu.cpe     (you only need to do this command once for any given session of
                                  h25bios or dexbios)
```

Step 6 (option 1) .   **Launch the executable from the MS-DOS prompt**. *Assuming that you are in the correct directory*, type the following:

```
resetps 1
run c:\ps\pssn\bin\snpatch   (only if running on a DTL-H2000)
run main.cpe
```

By running your executable from the MS-DOS prompt, you can step through your code using SN's dbugpsx:

```
resetps 1
run c:\ps\pssn\bin\snpatch   (only if running on a DTL-H2000)
dbugpsx  main /e
```

You should see the following words on your television monitor, on a red background:

```
THE CURRENT BUFFER:  0
FROM FILE 1: CONTENTS OF TEXT1.TXT. HI THERE!

FROM FILE 2: GREETINGS FROM \DIR\TEXT2!
```

Step 6 (option 2). Launch the executable directly from the CD emulator. The file "psx.exe" is already included in this distribution, and *was included in the "hello.cti" file*.   **This is the method used when creating gold disks.**

```
Resetps 1
run c:\ps\pssn\bin\cdexec.cpe
```

You should see the following words on your television monitor, on a red background:

```
THE CURRENT BUFFER:  0
FROM FILE 1: CONTENTS OF TEXT1.TXT. HI THERE!
```

FROM FILE 2: GREETINGS FROM \DIR\TEXT2!

"psx.exe" was created from the "main.cpe" file using the "cpe2x" command by doing the following:

    cpe2x /cA main.cpe
    move main.cpe psx.exe

In the above example, the "/cA" option embeds information in the "psx.exe" file that the executable will run on American PlayStations. If we had used "/cE", the executable would be only suitable for European PlayStations.

To debug using this method, you will have to rely on "printf" statements in your code.   You can see the output using the TSR "mess1.com" and "testmess", included on your Programmer Tools CD.

    Resetps 1
    mess1.com   *Starts the printf handler*
    run c:\ps\pssn\bin\cdexec
    testmess   *Dumps out the printf's to your MS-DOS command prompt*

Summary of the basic steps for the emulator

Let's review what we've learned. You can launch the ".cpe" file from the MS-DOS prompt, which will allow you to debug the program using "dbugpsx". Alternatively, you can launch the ".exe" file directly from the cd-emulator, which is also the method for launching the program from your gold disk and the "black box" (DTL-H2010 or the DTL-H2510, which are CD drives for the DTL-H2000/DTL-H2500 development boards). The following summarizes the steps:

To launch the ".cpe" file:

Launch the drivers for the development board and the emulator.
Create the program and data.
Create a CTI file.
Create a CD-ROM image using *C:> buildcd *.cti -s2:1 (SCSI channel 2, partition 1)*
Activate the partition, and view the partition's content . *C:>cddisk 2 (SCSI channel 2)*
Tell the dev boards to choose the CD-ROM emulator   using *C:>run selemu*
Reset the hardware using *C:>resetps 1*
For DTL-H2000 only, run the bug-fix to the ROM using *C:> run c:\ps\pssn\bin\snpatch.cpe*
Execute the program using *C:>run *.cpe or C:>dbugpsx main /e*

To launch the ".exe" file:
Launch the drivers for the development board and the emulator.
Create the program and data.
Create the .exe file *using c:>cpe /cA *.cpe (for North America)*
Create a CTI file.
Create a CD-ROM image using *C:> buildcd *.cti -s2:1 (SCSI channel 2, partition 1)*
Activate the partition, and view the partition's content . *C:>cddisk 2 (SCSI channel 2)*
Tell the dev boards to choose the CD-ROM emulator using *C:>run selemu.*
Reset the hardware using *C:>resetps 1*

For DTL-H2000 only, run the bug-fix to the ROM using *C:> run c:\ps\pssn\bin\snpatch.cpe*
Execute the program using *C:>run c:\ps\pssn\bin\cdexec*

Building a CD

To build a CD, use the "CDGEN" program in conjunction with your burner. (Note that "CDGEN" is not produced by SN Systems.) You can also try using CutCD, which is included in the CD Emulator distribution diskette. The following is a basic summary of the steps required to burn a CD using CGEN, taken from the Technical Reference CD in the document FAQ\CD4.pdf as well as other sources (using the Adobe Acrobat multi-document search tool on "buildcd", and Coombe's talk on "My Gold Disk Doesn't Work", which appears in the downloading section of the Web Site, under "Files:Documentation Updates:DVConf97.zip".):

Step 1. Remove functions such as *pollhost*, *Pcinit*, *Pcopen*, *Pclseek*, *Pcread*, *Pcwrite*, *Pcclose* and *PSYQpause*.

Step 2. Make your program fit into two meg minus 64K used by the Rom kernel Remember, your development boards have 8 megabytes of RAM, but the PlayStation only has 2 megabytes. Generate and check your map file to be sure executables fit if you are unsure. Check your malloc() calls to be sure they succeed. Remove references to memory outside the 2Meg memory map. Your 2Meg memory map is between 0x80010000 (the 0x10000 is the 64K used by the kernel) and 0x801FFFFF. Use _ramsize and _stacksize(specify as static). Just because it compiles does not mean it will fit in 2 Meg. That is up to you.

Step 3. Perform a cpe2x /C[area] on the .cpe file.

Step 4. Add files to the CDGEN.

       a) Choose the correct file type for XA items.
- Use Mode 2 Form 1 for game data.
- Use Mode 2 Form 2 for XA files.
- Select both Form 1 and Form 2 for a combined Audio and Video file.
- Use the file type button to set it for each file.
- Standard file is Mode 2 Form 1.

Step 5. Using the **Additional Information** dialog button in the volume panel of CDGEN, set the **System Area File** to the path of your company's license.dat file. Example:

<div align="center">c:\cdgen\licenseA.dat</div>

Note: You do not need to actually have "licenseA.dat" appear in the root directory of your CD-ROM image. The information will be burned into the lead track (and hence become invisible).

Note: You can find the license files on the Programmer Tools CD in the directory "cdemu\LcsnFile".

Step 6. Using the **Master** dialog button in the **Layout** panel of CDGEN, set the License Area to:

- J if you have a Japanese debug station.
- A if you have an American debug station.
- E if you have an European debug station.

Step 7. Set the minutes to 74 minutes. However, you should use 71 minute media. A 74 minute media might work but is not supported. You must use the CD-R71PS for the mastering process for submissions to SONY.

Step 8. Press the record (REC) button.

Running the CD on your developer's CD-ROM

Now that you've burned the gold disk, you can run it on the CD-ROM drives of your development boards.

Step 0. Make sure your DTL-H2000 or DTL-H2500 is hooked up, and that the CD-ROM drives are hooked up to the boards. The DTL-H2010 CD drive is used by the DTL-H2000, and the DTL-H2510 CD drive is used by the DTL-H2500. Run dexbios (for DTL-H2000 boards) or h25bios (for DTL-H2500 boards) in your DOS console.

Step 1.. Place the CD (gold disk or commercial) into your DTL-H2010 or DTL-H2510 CD-ROM drives.

Step 2. Notify the boards that you will be using the CD-ROM drive rather than the CD-Emulator:

       run c:\ps\psyq\bin\selcd.cpe

This selects the CD mode.

Step 3. Type "resetps 1" for good measure.

Step 4. Type the following:

       run c:\ps\psyq\bin\cdexec

This should start the executable.

Step 5: If you're curious about the cdexec.cpe file, look at \psx\sample\module\cdexec, which contains the few lines of code that launch the executable.

In general, if you have difficulties running the gold disk, recheck your work (Step 2 of "Building the CD"). If it still doesn't work, then you should reference Dave Coombe's talk on "My Gold Disk Doesn't Work", which appears in the downloading section of the Web Site, under "Files:Documentation Updates:DVConf97.zip".