Migrating to Windows® Embedded Compact 7 Embedded Applications

Windows® Embedded Compact 7, the newest version of Windows Embedded Compact offering, provides a number of new features that make it an appealing choice when creating an end product. No matter what the project is, it is always beneficial to leverage the hard work you've already done. Combining the power and features of Compact 7 with the OMAP™ 3 processor and the AM37x Sitara™ ARM® microprocessors (MPUs) offerings from Texas Instruments (TI) means that you can build powerful devices leveraging the ARM Cortex™-A8 cores. This paper highlights the tasks, challenges, and benefits when porting an existing board support package (BSP) from Windows Embedded CE 6 (CE 6)to Windows Embedded Compact 7 (Compact 7).

CPU Support

In Compact 7, there have been some changes in the processors supported. Aside from SH4 support being dropped, there were drastic changes in ARM support. Previously CE 6 only supported ARMv4I. That support has now been dropped but replaced with support for ARMv5, ARMv6, and ARMv7. This means that the compilers and the kernel have been updated to support the features of the more powerful processors, including the Cortex-A series.

With regard to porting, this means that if you are working with an ARM processor, you will need to update your BSP's catalog to state that it supports one of these new processor architectures. If you don't do this it will not be visible in Platform Builder.

The new compilers may also cause you to have additional porting work. It is important that you build and test all of your code using the new compilers to ensure that there are no new issues exposed by them.

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In addition to supporting these new architectures, Compact 7 also has support for symmetric multiple processing . To enable this support, you simply need to enable it in the properties of the OSDesign, or set the environment variable IMGMPENABLE=1.

Of course adding multiprocessor support to your project is not something to be taken lightly. It will require that you do extensive testing. When more than one core is involved, bugs, such as race conditions, can be exposed that you never would have caught or seen on a single core device. In addition, there is also a new lock type introduced to deal with locking across multiple cores called a Spinlock.

In addition, there is no longer a limitation of 512MB of RAM in Compact 7; it can now address up 3GB. A side-effect of this is that that the location of things in memory is randomized. This benefits you by adding security from attacks that rely on data and binaries always being at the same location in memory. If you intend to make use of the extended memory capabilities of Compact 7, you should look at the implementation in the CEPC BSP.

If you do not intend to take advantage of the new functionality, you don't need to change anything. The architecture is designed to be backwards compatible with CE 6.

Device Emulator

In CE 6 the ARM device emulator allows you to do testing without having a hardware platform. This emulator is no longer available in Compact 7. However, there is now a BSP available for use in VirtualPC. This can act as a replacement for device emulator; you should be aware though, this is an X86 platform, not ARM. This may affect your testing in some cases.

Remote Tools

The remote tools available with Compact 7 are greatly improved from previous versions. The main reason behind this is the addition of the Remote Tools Framework. Many of the remote tools you have used in the past have been rewritten to fit it. This includes the addition of the Timeline Viewer.

This brings multiple tools together so you can track activity in a more useful way. The Timeline viewer currently supports Remote Kernel Tracker, Remote Performance Monitor, and the Remote Power Monitor.

In addition, you can create your own remote tools as well. When you create a remote tools project, you will create two executables, one device side, and one desktop side. Once your project is finished, it is package into a single file that can easily be added to the Platform Builder environment. Additional tools such as the Remote Leak Detector and Remote resource consumer can also be useful when testing and trying to track down issues.

Networking and User Interface

There have been performance improvements made in the networking stack for COMPACT 7, but this requires you to move your network drivers to NDIS 6. NDIS 6 on Compact 7 provides similar capabilities of NDIS 6 on desktop PCs with improved data packaging, simplified reset handling and multiprocessor scaling of received data handling.

For connected media devices, support for DLNA is a nice addition. Other improvements such as updating the IE Jscript engine to IE8, and support for Adobe Flash 10.1 can also lead to better experiences when using connected devices.

Another significant change is the Graphics, Windowing and Events GWE has been moved to user mode. This prevents any UI-related components from running in kernel mode. In addition many changes were made to make the UI more appealing such as adding alpha blending support to the compositor, and supporting transparent windows.

Multi-touch Support

There have been some changes made to the architecture of the touch driver. Part of these changes includes support for multi-touch devices.

In CE 6, the touch driver was one a few that were known as “native drivers”. This simply means that they did not follow the same model the other stream drivers on the device. Instead of working with device manager, these drivers were load directly by GWES.

In Compact 7, this driver is now implemented a stream driver. This is accomplished by a proxy driver that the operating system provides. This proxy driver is loaded by GWES as a native driver.

Windows Embedded Silverlight Tools

Silverlight for Windows Embedded support has significantly improved in Compact 7. The engine was upgraded to support XAML code produced by Expression Blend 3. In addition Microsoft added the *Windows Embedded Silverlight Tools*. These tools make it very easy to create a Silverlight for Windows Embedded subproject.

By selecting Create Platform Builder Subproject you can point the wizard to you Expression Blend 3 project and it will import it. Once the subproject is created, it’s also easy to manage events and maintain your project.

Additional Changes

You will be relieved to know that there should be minimal to no source code changes required when moving from CE 6 with Compact 7. However, some things have moved in the build tree. You will likely need to make adjustments to your SOURCES files to compensate for this.

It may also be good to know that the NOMIPS16CODE flag has been replaced by the NOIMPLICITIMPORT flag. However, the NOMIPS16CODE flag still works for backwards compatibility.

Something else to be aware of is that there has been a change in the order of processing of configuration files. In Compact 7, OSDesign configuration files will override settings in the platform configuration files. This functionality was reversed in CE 6.

If you have a battery driver in your design, you may need to update your driver as there were some changes in the MDD for battery drivers.

While BLCommon is still supported, a new framework called CEBOOT has been introduced. You may wish to consider transitioning to it at some point, or if you are starting a new project.
If you have been developing managed projects outside of platform builder, you can now keep them as subprojects within Platform Builder.

This objective of this article is to help prepare you for porting to Compact 7. The good news is it's not that hard. This article highlights a few things that may cause you trouble, as well as some of the new features available to you that make the migration worthwhile. You also should be able to see the value of the TI's OMAP 3 processors and Sitara ARM MPUs when building devices with Compact 7. Pairing TI offerings with Compact 7 software ensures that you will have a powerful, flexible device, no matter what your target market is.

About the Author

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