



Portage de Windows Compact 7 et mise en œuvre de Qt sur architectures ARM multicoeurs

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60+ engineering team - experts in system integration on complex embedded devices

Engineering offices in France, Europe and USA

OUR EXPERTISE

Solutions for various operating systems – Android, Linux, QNX, Windows Embedded, Windows 8 using various architectures and platforms from our industrial partners

OUR MISSION

Secure OEMs embedded designs success from evaluation to shipment by providing OS Expertise combined with in-depth knowledge of ARM and x86 processors' architecture.



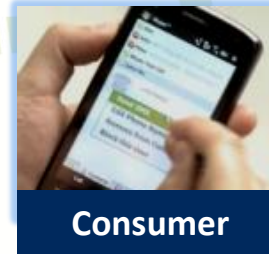
Automotive



Industrial and
Handheld Devices



Medical



Consumer



Home/Building
Automation



Reliable Expertise to Secure Full Turnkey Device Development



Firmware Expertise

- Edition/ Customization of reference BSPs for many SV architectures
- Custom drivers development
- OS optimization
- Embedded Device integration

Embedded Applications

- Multimedia
 - *DirectShow*
 - *OpenGL*
- Custom GUI
 - *Silverlight*
 - *.NET Compact Framework*
- Real-time
- Data management
- Geo-localization / Navigation
- Middleware / Comm. Stacks

Mobile Applications

- UI/UX Design and implementation for Mobile devices
- Natural UI / Kinect SDK
- Smartphone Middleware
- Windows Phone and Windows 8 expertise
- Silverlight, WPF, OpenGL
- Performance optimization
 - *Graphical rendering*
 - *UX effects*



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Windows Embedded Compact Introduction



- Windows Embedded Compact 7 integrates advanced technologies to rapidly build a wide range of innovative, small-footprint devices
- 32-bit, real-time, multitasking OS
 - Delivered as a granular set of components
 - Use Platform Builder tools to configure image
- Runs on x86, ARM, MIPS
- Reliable real time capabilities (256 Thread Priorities)
- Small Footprint (Kernel =~300K)
- Targeted for Low power devices
- Shared Source Code and Success Model



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- Multiple architectures:
 - X86
 - ARM (ARMv5, ARMv6 and ARMv7)
 - MIPS
- Multi-core support.
- Up to 3GB of addressable physical memory.
- Can run up to 32K processes (different memory spaces).
- No limit on the number of threads (activities) managed by the scheduler. The scheduler manages 256 levels of priority.

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Componentization



- Hundreds of components in the catalog.
- Automatic management of dependencies.
- Components can be easily selected using Platform Builder IDE.
- Support for custom components and replacement of standard components with custom versions.
- Componentization reduces system requirements.
- Componentization increases stability and security.

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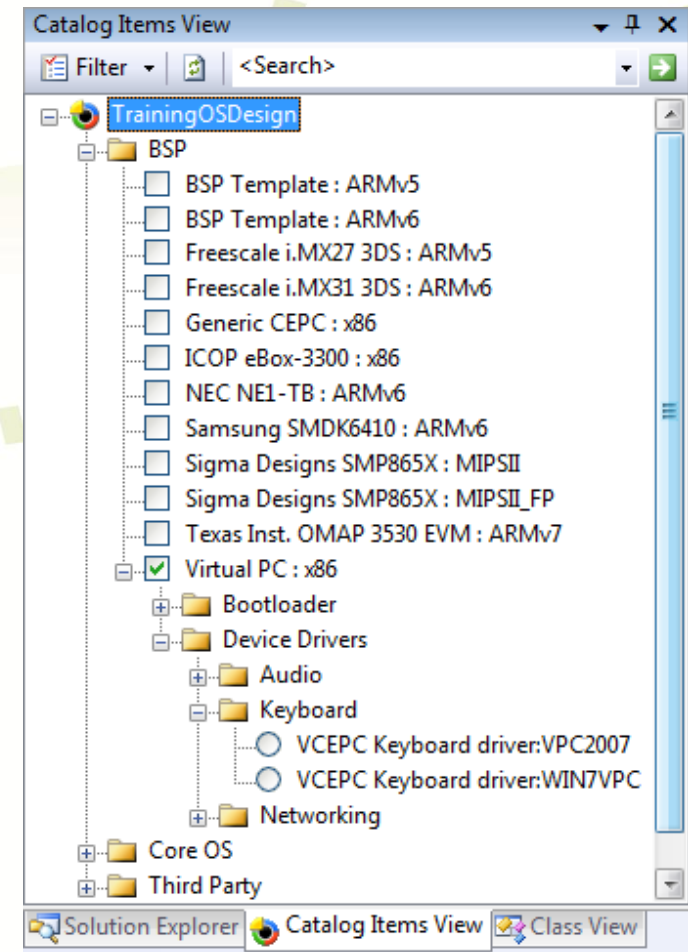
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The Catalog

- All the features of Windows Embedded Compact 7 are organized into components.
- A component is a set of related features that can be added to an OS Design.
- Components may depend on other components for their functions.
- The catalog provide an easy and extensible way to select components.



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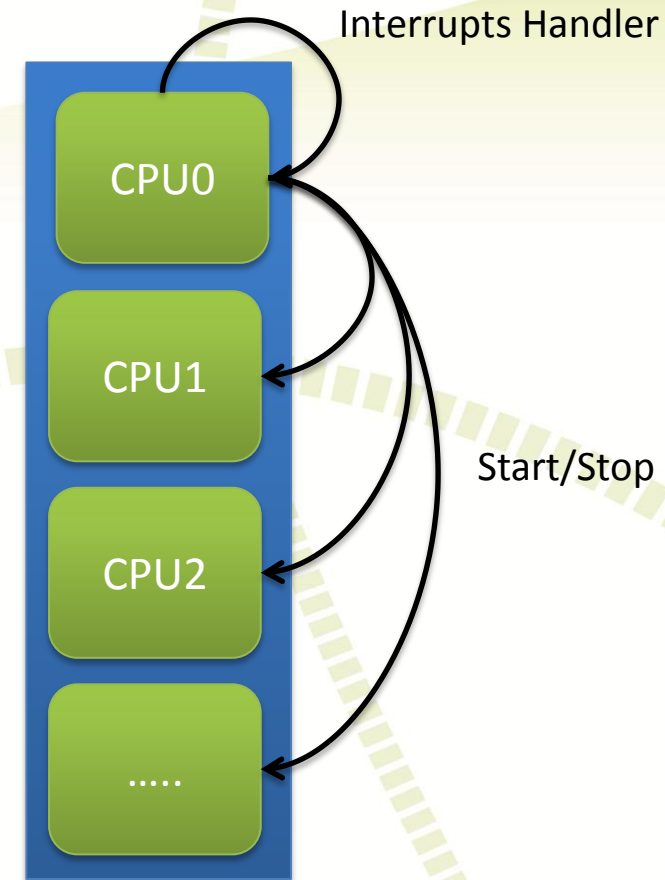
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WEC7 SMP Support Kernel

- Support from 1 to 250 cores
 - 1 Core is the default behavior
 - 2 to 250 Cores require kernel development
- Mandatory for multi-core
 - Interrupts handled by CPU0
- Kernel functions (OAL)
 - OEMIdleEx, OEMIpiHandler, OEMMpCpuPowerFunc, OEMMpPerCPUInit, OEMSendIPI, OEMMpStartAllCPUs, NKAcquireOalSpinLock, NKReleaseOalSpinLock, NKSendInterProcessorInterrupt



Target Architecture Examples

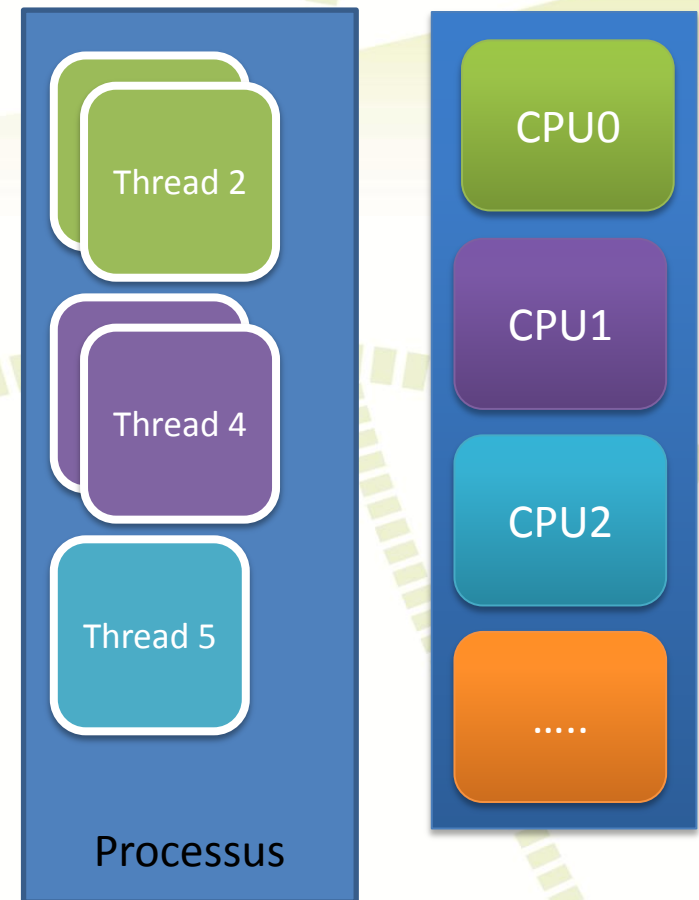


- Examples
 - Texas Instrument OMAP4
 - Freescale i.MX6
 - Xilinx Zynq
- In general
 - Support available in the reference BSP
 - Turn individual core ON/OFF
 - Change of the freq of each core
 - Cache and interrupt challenges already handled
- Specific
 - Zynq: FPGA « core »



WEC7 SMP Support Applications

- Processes and Thread affinity fixed using native APIs
 - GetCurrentProcessorNumber, CeGetIdleTimeEx, CeGetProcessAffinity, CeGetThreadAffinity, CeGetTotalProcessors, CeSetProcessAffinity, CeSetThreadAffinity, CePowerOffProcessor, CePowerOnProcessor
- Manual Load Balancing: using the listed APIs
- Automatic Load Balancing: no action required



Multi-Core/Multi-Threaded Approach

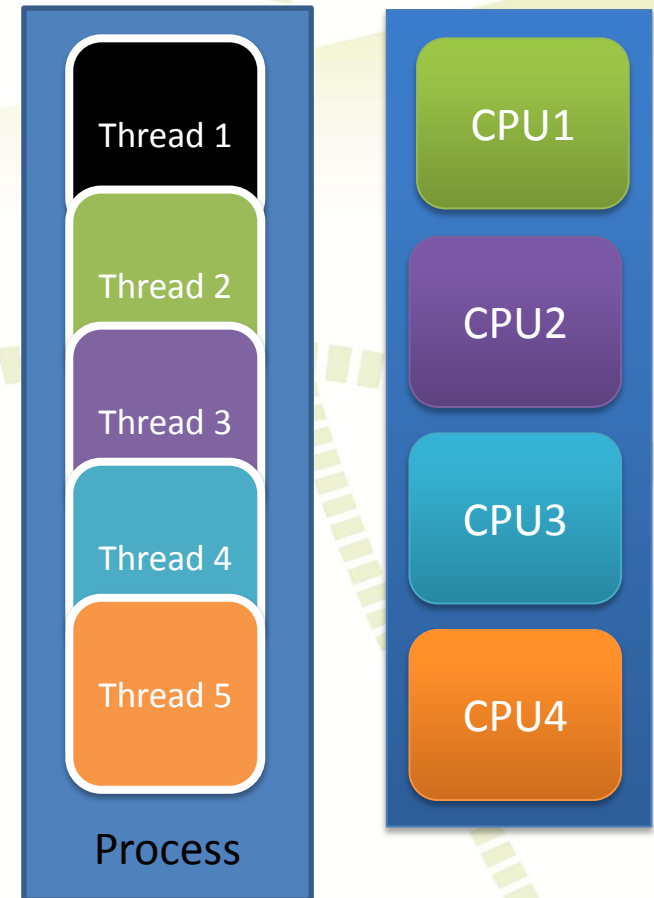
```
void multi_thread_pixel_fill()
{
    int      iThread;
    HANDLE   hThread[NUM_CORES];
    int      iThreadIndex[NUM_CORES];

    for ( iThread = 0; iThread < NUM_CORES; iThread ++ )
    {
        iThreadIndex[iThread] = iThread;
        hThread[iThread] = CreateThread(NULL, 0, pixel_fill_part,
            &iThreadIndex[iThread], CREATE_SUSPENDED, NULL);

        CeSetThreadAffinity(hThread[iThread], iThread);
    }

    for (iThread = 0; iThread < NUM_CORES; iThread++)
    {
        ResumeThread(hThread[iThread]);
    }

    for (iThread = 0; iThread < NUM_CORES; iThread++)
    {
        WaitForSingleObject(hThread[iThread], INFINITE);
        CloseHandle(hThread[iThread]);
        hThread[iThread] = INVALID_HANDLE_VALUE;
    }
}
```



Application Framework: Qt



- Cross-platform application and UI framework
 - QT4 / QT5
 - Limitation: not fully integrated
- Native development (C++)
 - Can leverage MultiCore!
- Features:
 - GUI
 - Other APIs: XML parsing, Database access, File handling, Internationalization support
 - Graphics hardware acceleration
 - Development tools

