eNewsletter

KAL - Large IP Cores:

Memory Controllers:

- SD/SDIO 2.0/3.0 Controller
- SDRAM Controller
- DDR/DDR2/DDR3 SDRAM Controller
- NAND Flash Controller
- Flash/EEPROM/SRAM Controller
- PCMCIA/CompactFlash Host Adapter
- PCMCIA/CompactFlash Slave Controller

CPU Cores:

- 32 bit - NEW
- 8 bit - 8051
- 8 bit- HC68HC11
- 8 bit - PIC Processor
- 8 bit – Z80
- 16 bit – D6800

Clock Synchronization:

- IEEE 1588 Slave
- IEEE 1588 Master
- IEEE 1588 Master/Salve
- IEEE 1588 PTP Stack
- IEEE 1588 L2/L3 Solution

Peripherals:

- HDLC/SDLC
- Smart Card Reader Unit
- EEPROM SPI Ctrl
- LCD Ctrl
- Floating Point Unit
- I2C Master/Slave
- SPI Master/Slave

New 32bit CPU for ASIC/FPGA (IP Core) by DCD

The D32PRO is a 32-bit, deeply embedded and royalty-free IP Core. This silicon proven solution, based on RISC architecture but mastered on DCD's experience dated since 1999, boosts performance to 1.48 / 2.67 DMIPS/MHz and 2.41 CoreMarks/MHz. The minimal usable D32PRO CPU starts from 10.6k/6.8k gates when optimized for area. Dynamic power is 7 microwatts/MHz with a 90 nm process (DCD's IP Cores are synthesizable and foundry independent). The D32PRO has been equipped with C compiler and integrated CPU configurator. This makes DCD's CPU fully configurable, both for ultra-low energy and for power-user projects.

The D32PRO is a deeply embedded, royalty-free 32-bit CPU. Drawing on its valuable experience - like **the world's fastest 8051** - Digital Core Design created completely new, RISC 32-bit CPU. This silicon proven CPU enables engineers to tailor it to their needs – ***The D32PRO is fully scalable, hence it can be easily adjusted to get the efficiency comparable to ARM Cortex M0-M3*** – explains Tomek Krzyzak, DCD's vice-president – ***but there's no problem to run the Core with maximal performance to get up to 1.48 / 2.67 DMIPS/MHz and 2.41 CoreMarks/MHz***.

All peripherals on board

The D32PRO has been equipped with Floating Point Coprocessor and great variety of available peripherals like e.g. USB, Ethernet, I2C, SPI, UART, CAN, LIN, RTC, HDLC, Smart Card etc. Other peripherals can be effortlessly added to the CPU by using standardized interfaces.

Variable pipeline – ultimate code density

The D32PRO is a universal & fully configurable solution, which effectively executes application codes with many jumps (e.g. switching decision tree) as well as homogeneous ones (e.g. arithmetic operations). This wouldn't be possible without

- **CAN bus**
- **LIN bus**
- **Programmable Peripheral Interface**
- **UART, UART with FIFO**
- **PWM**
- **Timer 8254**
- **Programmable Timer**
- **Interrupt Controller**
- **Ethernet Controller 10/100/1000 BaseT**
- **DMA Controller**
- **USB 1.0/2.0 Host/Salve**
- **On Chip Bus Analyzer**

PCI Bus Controllers and Peripherals:

- **PCI Express**
- **PCI-X Host Bridge Master/Target**
- **PCI Host Bridge Master/Target**
- **PCI-PCI Bridge**
- **PCI-ISA Bridge**
- **PCI Bus Arbiter**

Modulation:

- **ADPSM**

AHB/APB Peripherals:

- **AHB Bus Master/Slave**
- **APB Bus Master/Slave**
- **AHB/AXI DMA Controller**
- **AXI Bus Master/Slave**

MIPS CPU Interface:

- **MIPS - SysAD Bus Slave**
- **MIPS - SysAD Bus to PCI Host bridge**
- **MIPS - EC interface to SDRAM Controller**
- **MIPS - EC Interface to PCI Host Bridge**
- **MIPS - EC Interface Bus Slave**

Analog IP Cores:

- **Analog IP cores (ADC, DAC, PLL,) are available – Please contact us.**
- **We are expert in**

variable pipelining. Another innovation is brought in the command list, which is based on special instructions – derivatives to the higher level language like e.g. C. That approach enabled ultimate code density, which goes in hand with efficient and compact instructions set. Variable length instructions are based on 16 bits and can be executed conditionally. The D32PRO implements the best features of the embedded microcontrollers, where one of them enables efficient cooperation with the at-tached peripherals, thanks to dedicated bit instructions.

The D32PRO has been equipped with 13 general registers R0-R12 and most of them are being refreshed automatically after interruption. Thanks to it the CPU accelerates interrupts and context switching in real time systems. And if it's still not enough, the D32PRO has been equipped with one non-maskable and dozens of real-time reconfigurable interrupts: like its activity, priority level and number of automatically stacked registers.

Low energy for (not only) IoT

The D32PRO emphasizes low energy consumption, which is crucial in modern electronics. This is achieved thanks to special PMU (Power Management Unit), which dynamically controls the clock's frequency. Thanks to it an engineer can program energy-saving mode for the CPU, where all the peripherals will be working with nominal clock. Moreover, the CPU itself can be moved to STOP mode with the clock detached from it. Then it can return to normal mode by an interrupt from any peripheral. In order to save additional power, the CPU can easily switch off the peripherals which are unused at the current moment.

Debugger – Bootloader

The D32PRO, similarly to DCD's 8051 IP Cores, is delivered with a built-in hardware debugger. But this special solution has been tailored for 32-bit CPU, that's why it enables full control from Eclipse level (complete Eclipse debugging system with GCC => USB 2.0 cable => D32PRO). Moreover, in DCD's debugger only two pins have been used as optimal tradeoff between communication throughput and consumed resources, when in competitive solutions communication needs at least 5 pins (JTAG). Hardware bootloader unit enables firmware memory updates directly from external low cost Flash memory connected through the (Q)SPI interface. Moreover, the bootloader is equipped with hardware encryption mechanism which significantly protects firmware against reverse

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