

Comprehensive Intel® Atom™ Processor Training

Let MindShare Bring “Intel® Atom™ Processor” to Life for You

The Atom processor (codenamed Silverthorne and Diamondville) is Intel's newest embedded processor, targeting the embedded and ultra-mobile PC markets where low power is of utmost importance. Atom implements the IA-32 instruction set, which has a long and rich legacy. The Intel 8088 processor was used in the original IBM PC in the 1980s. As time has progressed, Intel has added new hardware and software features to each new generation. The 80386 processor is normally regarded as the baseline for the IA32 instruction set. However, as software compatibility with the original IBM PC and the 8088 is necessary, this class also covers the key aspects of the original IBM PC architecture (such as memory map). This class examines the evolution of the platform to assist in understanding the reasons for the architecture. The Front Side Bus (FSB) protocol interfaces to the remainder of the system board components via the chipset.

You Will Learn:

- How the Intel Atom processor works
- How the platform components function together and divide responsibilities
- Front Side Bus (FSB) architecture that will give you the understanding of how the processor communicates with the chipset
- Power management and thermal management features of the Atom processor
- Atom internal microarchitecture, including pipeline and caches
- Processor modes
- Instruction set and registers
- Vector features
- Interrupt handling
- Software compatibility and optimization
- Rational behind the architectural features

Course Length: 4 Days

Who Should Attend?

This course is hardware-oriented. It is however suitable for both hardware and firmware/software engineers. The course is ideal for system board-level design engineers who need a broad understanding of the processor or PC architecture. The course is suitable for engineers who need a broad understanding of IA32 architecture.

Course Outline:

Atom processor-based platform overview

- IA32 introduction and history
- Platform block diagram
- Responsibilities of each unit

Atom processor

- Addressing modes: real, big-real, protected, paging, SMM, 64-bit extensions
- Registers
- Memory accesses and the memory map
- Instruction set
- Segmentation
- Task switching
- Paging
- Hyperthreading
- Caches and TLB

- Execution pipeline
- Functionality not supported in Intel Atom compared with Penryn
- x86 legacy features
- Interrupts, PIC and APIC
- Software optimization
- VT overview (not in all models)

Front Side Bus (FSB) architecture

- Transactions and packets on the bus
- Signal groups
- Phases on the bus
- Locking transactions
- Cache snooping
- I/O transactions
- Address alignment
- Power management features

Platform overview

- Chipset overview
- PCI configuration setup, logical PCI bus 0
- DDR2-533, SPD and BIOS
- Boot-up sequence, BIOS responsibilities
- BIOS configuration
- ACPI overview

Power management

- Frequency changes
- Sleep states, traditional c states plus c4, c4e, c6
- Thermal monitoring
- L2 cache power down
- Platform power consumption data, showing where the power is being drained

Recommended Prerequisites: Basic understanding of computer architecture

Course Material:

MindShare Presentation: ***Hardcopy and Softcopy of Comprehensive Intel Atom Processor course materials***

Reference: MindShare's [***The Unabridged Pentium 4, IA32 Processor Genealogy***](#) textbook (1st Edition).

Author: Tom Shanley

Publisher: Addison Wesley

Available through the [MindShare Store](#) and major bookstore outlets.

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