Chipsets

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Introduction

The motherboard of the first PC systems (up to 286 systems) was composed of several (up to some tens) of components.

Thanks to the great advances in semiconductor technology, starting from the mid '80s it was possible to integrate all these components on a few chips.

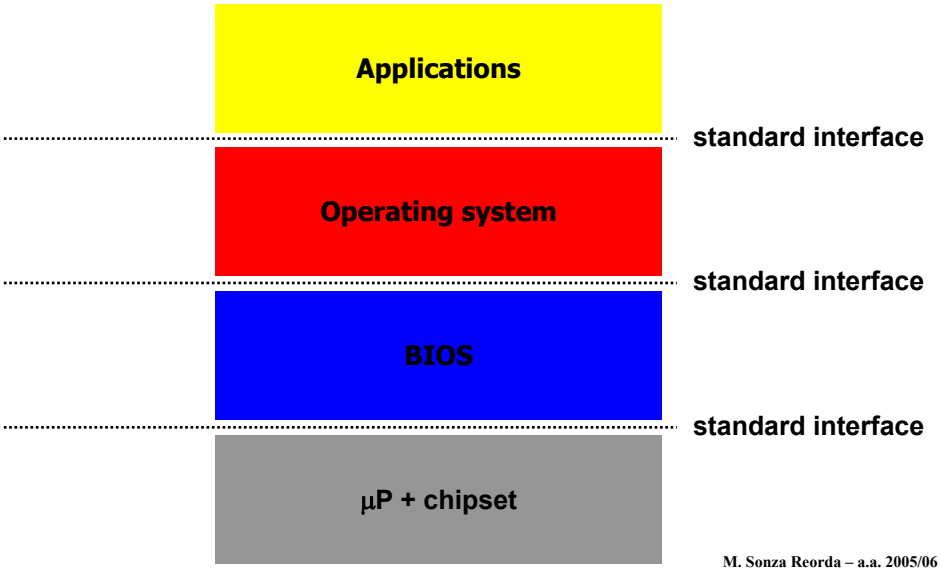
The set of chips developed to ease the design of a motherboard with a given processor is known as *chipset*.

Chipset SW compatibility

Chipsets are not compatible one with the other (in terms of supported functions, architecture, and signals), but the resulting motherboard must always be able to run the software developed for previous boards.

This is possible because for every chipset a proper low-level layer of the OS (e.g., the BIOS) is developed.

HW/SW layers



Chipset characteristics

Normally, a chipset is specifically designed for a given processor.

However, some non-Intel processors can integrate with Intel chipsets, since they exactly replace the Intel processor.

Chipset functions

They include

- **Cache support**
- **Memory support**
- **Timing and flow control**
- **Peripheral and I/O bus control**
- **Power management support.**

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Chipsets normally includes all the logic to manage external caches.
Chipset design defines the amount of *cachable memory*, which also depends on the size of the tag RAM.

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Chipsets differ in terms of amount and type of supported memory.

Chipse

It is up to the chipset to
- Generate the correct control signals for accessing the memory
- Possibly perform buffering of data from/to the processor
- Detect the amount and type of existing memory, and generate suitable signals to manage it (e.g., requesting wait states).

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Chipse

Chipsets normally include:
- A DMA controller
- Bridges, to connect with other busses (e.g., PCI/EISA)
- A couple of interrupt controllers
- Interface to USB
- Interface to AGP.

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Chipse

Most recent chipsets support a group of features aimed at reducing the amount of power used by the PC during idle periods.
Power management works through a number of settings that dictate when to shut down various parts of the computer (e.g., the video, or the hard disk) when it becomes idle.

They include

- Cache support
- Memory support
- Timing and flow control
- Peripheral and I/O bus control
- Power management support.

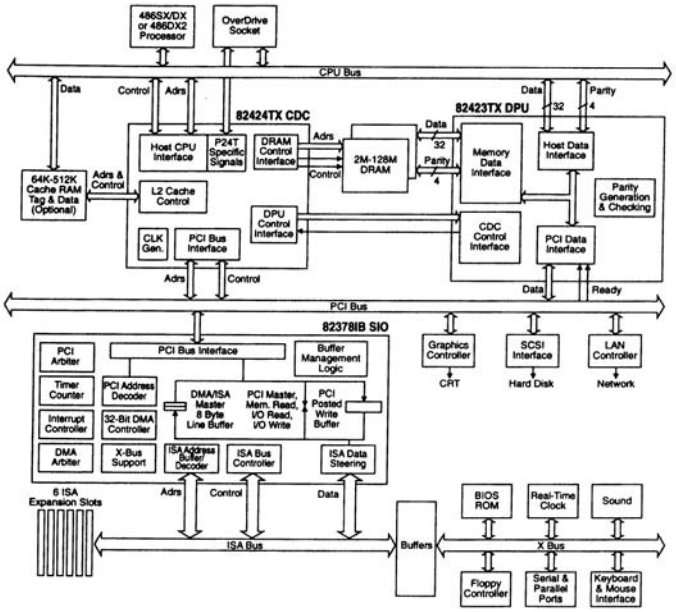
The Saturn chipset

It was developed by Intel for 486 CPUs.

It is composed of 3 chips:

- 82424TX: Cache/DRAM Controller (CDC)
- 82423TX: Data Path Unit (DPU)
- 82378IB: System I/O (SIO).

A PC based on the Saturn chipset



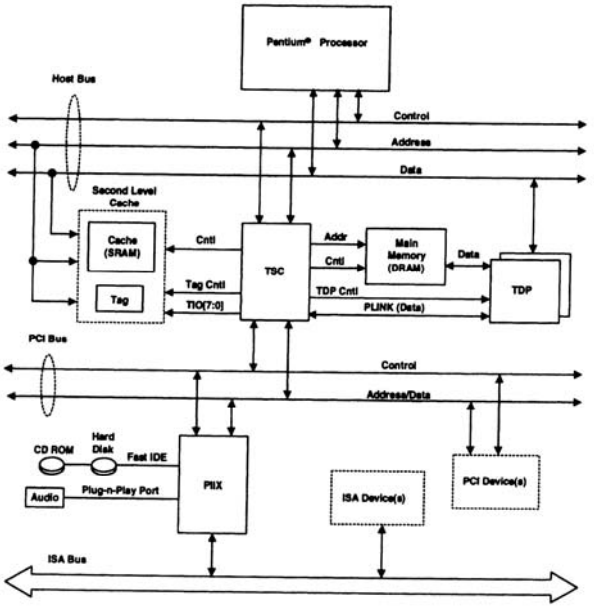
The Triton chipset

It was the second chipset released (1995) by Intel for the PCI Pentium systems, after the unsuccessful Mercury chipset.

The Triton chipset is composed of

- **S82437FX: Triton System Controller (TSC)**
- **S82438FX: Triton Data Paths (TDP)**
- **S82371FB: PCI ISA IDE Xcelerator (PIIX).**

A PC based on the Triton chipset



Triton chipset evolution

Data	430FX	430HX	430VX	430TX
System Controller	82437FX	82439HX	82437VX	82439TX
Data Path Unit	82438FX	in 82439HX	82438VX	in 82439TX
Maximum memory	128 Mb	512 Mb	128 Mb	256 Mb
Max. L2 cache	512 Kb	512 Kb	512 Kb	512 Kb
Cacheable area	64 Mb	512 Mb	64 Mb	64 Mb
USB support	no	yes	yes	yes
SDRAM support	no	no	yes	yes
Ultra DMA/33	no	no	no	yes
IDE Xcelerator	PIIX (82371FB)	PIIX3 (82371SB)	PIIX3 (82371SB)	PIIX4 (82371AB)
PCI specification	2.0	2.1	2.1	2.1