ACORN RISC

TOMORROW'S TECHNOLOGY FOR STANDARD PCs

SpringBoard

Acorn
The choice of experience.

Acorn SpringBoard

Add an Acorn SpringBoard to your PC and experience a new level of computing performance. Whilst maintaining all the functionality of your PC, SpringBoard provides a whole new computer; a fully-expandable 32-bit Reduced Instruction Set Computer (RISC) with up to 4 Mbytes of memory and a performance of over 4 million instructions per second (MIPS[1]).

RISC Technology

Many computer manufacturers are researching RISC technology for their new generations of computers, but Acorn Computers Limited has already brought its system to the market.

In traditional processors, a large number of instructions are built into the processor, to enable it to carry out all the tasks it might be asked to perform.

RISC technology greatly reduces the number of processor instructions and simplifies them, so that they can be executed much more quickly. This gives such an enormous speed advantage over conventional processors that there is little penalty for replicating seldom-used, complex instructions with a number of simple RISC instructions.

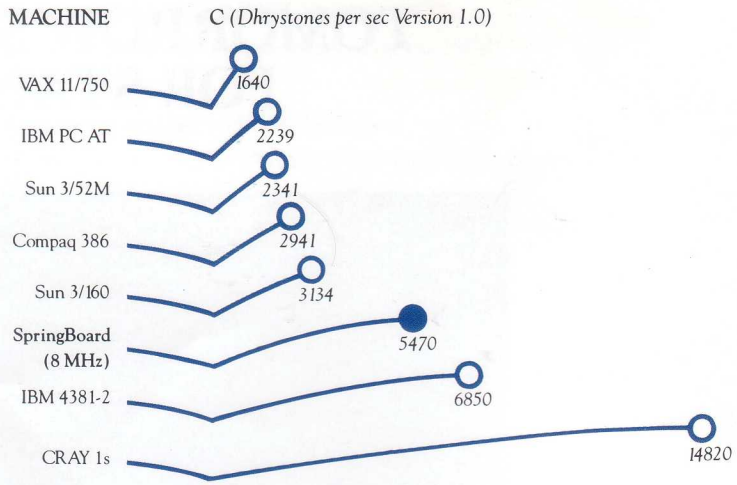
Acorn has produced the world's first commercially-available RISC processor, the Acorn RISC Machine (ARM), the latest version of which provides SpringBoard with its central processing unit.

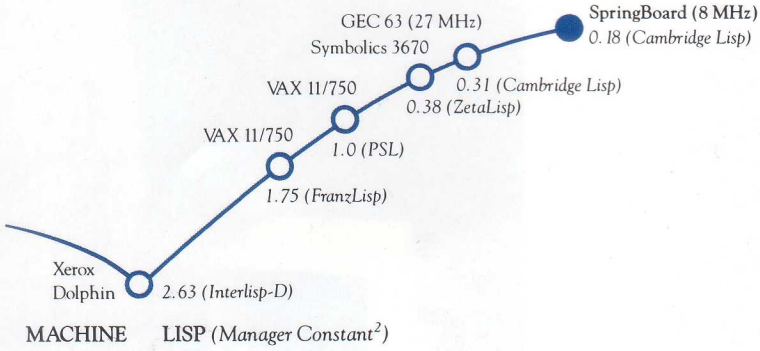
Performance

SpringBoard's performance as a RISC machine is still further enhanced by pipelining and hard-wired instruction decoding on the chip. Pipelining is a technique borrowed from mainframe computers, which enables all parts of the processor to operate continuously. While one instruction is being executed, its successor is being decoded and a third is being fetched from memory.

Traditionally, microcode in the processor is used to decode instructions. On the ARM processor this microcode is dispensed with completely and all instruction decoding is hard-wired on the chip. This dedicated hardware logic enables the processor to execute instructions far more quickly than microcoded processors. Compared to traditional processor clock rates, RISC clock rates give a substantial improvement in performance.

These advanced design features give SpringBoard a staggering performance by any standards. Just compare these benchmarks:





A System Nucleus

SpringBoard has been designed from the start to form the nucleus of an integrated hardware and software system. Its high-speed bus is capable of data transfer rates of up to 30 Mbytes/sec. A peripheral module (*podule*) interface provides the link between SpringBoard and add-on cards supplied by Acorn (e.g. a floating point card) or by Acorn third-party developers.

The SpringBoard system provides the building blocks for you to tailor your own system from the start and upgrade it as your needs increase. The open architecture of the system allows you to produce podules to meet specific requirements.

Languages

A range of high-level languages is available for SpringBoard including the ARM C Compiler, ARM Fortran, ARM Lisp, ARM Prolog, ARM Basic and ARM Pascal.

Conformity to industry standards by the ARM C Compiler and Fortran facilitates the fast porting of many applications written in these two widely-used languages.

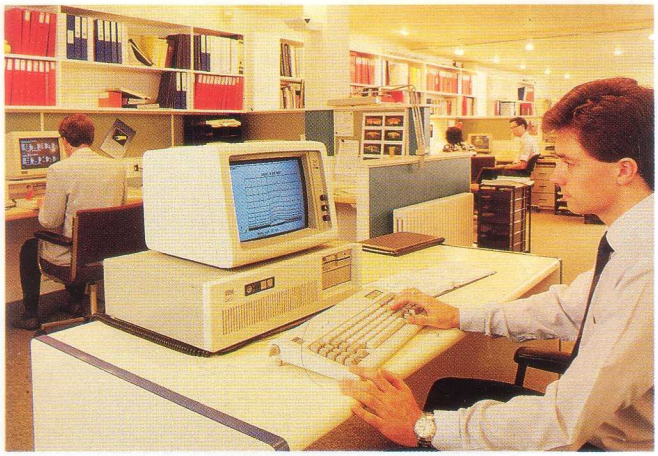
[1] *MIPS rating based on a straight comparison with DEC VAX 11/750.*

[2] *The 'Manager Constant' is an attempt to produce a single number that gives a clear indication of comparative performance. It is calculated as (ListOnlyCddr+Tak+Gtak +MyReverse)/4, all figures being first normalised to VAX 11/750: PSL.*

Versatility

More than just a co-processor, SpringBoard is a complete computer in its own right. The potential is enormous when you consider that up to four SpringBoards can be used in one PC, with each board processing information simultaneously yet independently of each other and of the PC.

In addition, SpringBoard can be used in three distinct ways:



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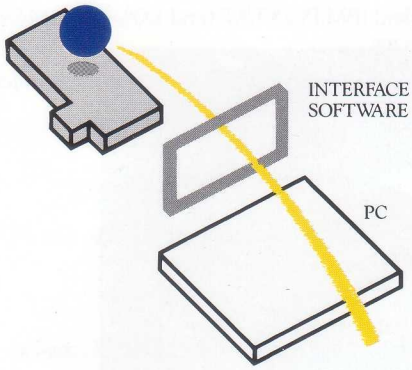

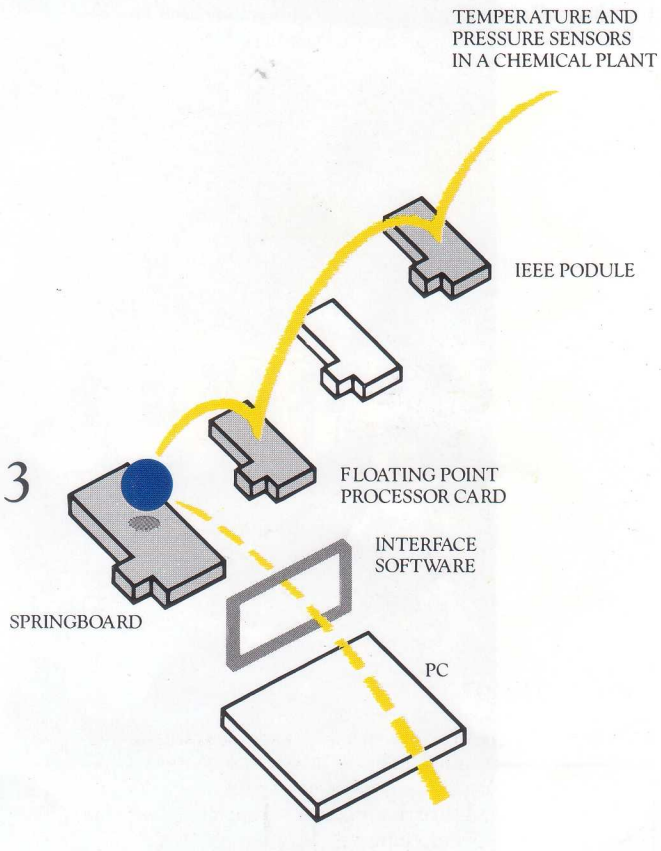

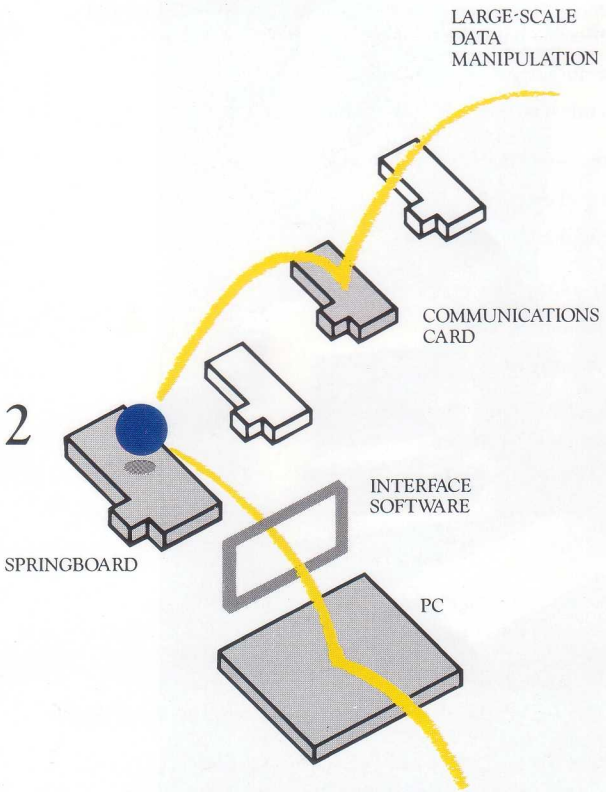

1
Master Processing

You can take advantage of SpringBoard's speed and memory capacity to run a large application program, using the PC as a terminal talking directly to SpringBoard, as you would to a mainframe computer.

2
Split Processing

You are using an MS-DOS application on your PC. Whenever the program needs extra processing power – for example, for large-scale data manipulation operations – it refers these operations automatically to SpringBoard, which can process them some twenty times faster than the PC. You are totally unaware of SpringBoard's presence and Acorn's interface software enables your PC to communicate fluently with the SpringBoard, without your intervention.

3
Independent Processing

You are using your PC for word-processing, while all the time SpringBoard is collecting and processing data from hundreds of temperature and pressure sensors in a chemical plant. The data is fed to SpringBoard automatically via a communications card, which connects to SpringBoard's high-speed bus. Whenever you require a status report, you can suspend your word-processing session and access the program running on SpringBoard with a few simple commands.

Hardware

SpringBoard occupies a single 8-bit slot in your PC. The interface between the PC and SpringBoard is provided by a software module running in the PC host and this software enables SpringBoard to be driven by an MS-DOS application or by the user directly.

SpringBoard makes use of the ARM chip-set to produce a powerful card with the minimum of components.

Software

The SpringBoard package includes the software needed to drive SpringBoard (the Interface Software) plus a range of other software and utilities including the ARM Assembler, the multi-file editor TWIN and Linker. These utilities enable the software developer to make full use of SpringBoard's features.

The Interface Software enables the user to develop ARM-based programs that will run directly on SpringBoard and programs to run in the host PC which will communicate with a program running on SpringBoard.

It also lets you re-compile DOS applications, with the minimum of translation, so that they can run on SpringBoard. To facilitate this, the Interface Software supports DOS interrupt calls.

It additionally provides a wide range of machine operating system calls to allow you to exploit SpringBoard's power.

Technical Specification

Hardware

Processor – ARM 32-bit RISC processor.

Memory – 1Mbyte or 4Mbyte mounted on four SIPs.

Clock – 8 MHz.

Expansion – 8/32-bit high-speed interface.

PC Interface – Standard IBM PC/XT/AT (and 100% compatibles) expansion slot connector.

Architecture – Single board computer able to operate independently of the host PC.

System Software

Operating System – Runs under host operating systems, MS-DOS Version 2.X, 3.X and 4.1.

Interface – Provides:

Direct communication with SpringBoard, with host PC used as terminal.

Independent operation of SpringBoard and host PC.

Bi-directional communications between host applications and SpringBoard applications.

A powerful range of system calls.

Host hardware interrupt and I/O functions.

Executive – 64Kbyte EPROM. Provides:

Caching of executable programs.

Low-level debugging facilities.

Utilities – Consisting of:

Multi-file editor, TWIN.

ARM Assembler.

Linker.

Machine-code Debugger.

General Development Tools.

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Acorn would like to thank CHAM Limited, London, Napp Laboratories, Cambridge and the East Anglian Regional Health Authority for their assistance with the photography in this brochure.

Design: by Design Newmarket Photography: David Wilkinson, Cambridge