**DAΦNE TECHNICAL NOTE**

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# General structure of the DAΦNE control system

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The LISA control system is now almost completed. During its development many new ideas have been tested and integrated and an original and powerful structure for a control system has been developed. We propose to extend this general structure to the DAΦNE project.

The innovative aspects of our control system can be easily summarized:

- The use of high speed data buses allows very fast message delivery (KHz instead of tens of Hertz).
- The centralized control of the communication system makes the structure very simple and efficient (see Fig. 1). Interrupt mechanisms can be replaced by a much faster polling process, making debugging and upgrading of the system very easy. A single, continuously updated central memory constitutes the prototype of the system database.
- Using many simple and cheap CPU's, each performing a simple task, instead of a single central unit allows to get rid of the intricacies of a complicated multitasking system.
- Implementing an open architecture, where communications between internal processors and the rest of the world are simple and efficient increases enormously the computing power and the flexibility of the system.

- Using personal computers as workstations gives access to an enormous quantity of high level software, where new powerful tools become available day by day.

A centralized system is more simple to handle and also more reliable, since attention has to be placed on the continuous functioning of only a small number of units, which can be easily replaced in case of malfunctions. This is contrary to what is generally claimed about the reliability of a distributed system, but let us point out that there is a conceptual difference between an accelerator control system and a system which has to meet military standards. A network which has to be able to continue functioning, even partially, in case of intentional damage is very different from a control system which only exists in a few buildings for an experimental physics setup, and reliability considerations can change dramatically.

For the peripheral CPU software the usual solution of a multitasking system is nowadays strongly under objection. A multitasking system for a peripheral CPU which only has to look at a few memory locations every now and then looks very much like trying to kill a fly with a cannon. The opposite point of view is represented by the famous statement "One task, one processor". This is an optimal way to look at things, although, as with every beautiful theoretical construction, it sometimes suffers from implementation problems, namely having to buy a new CPU to perform some really trivial task like checking if a single temperature sensor has drifted too far from specs. Compromises always happen, but they do not touch the intrinsic soundness of the principle. The situation is somewhat similar to the period when structured programming techniques were being introduced, and people kept trying to write a FORTRAN program without using the GO TO statement, which was strongly forbidden. It was almost impossible, but the underlying idea helped to develop a new and much more readable programming style.

We believe that this kind of structure will make a control system much more powerful, reliable and easy to handle than the standard network solution.

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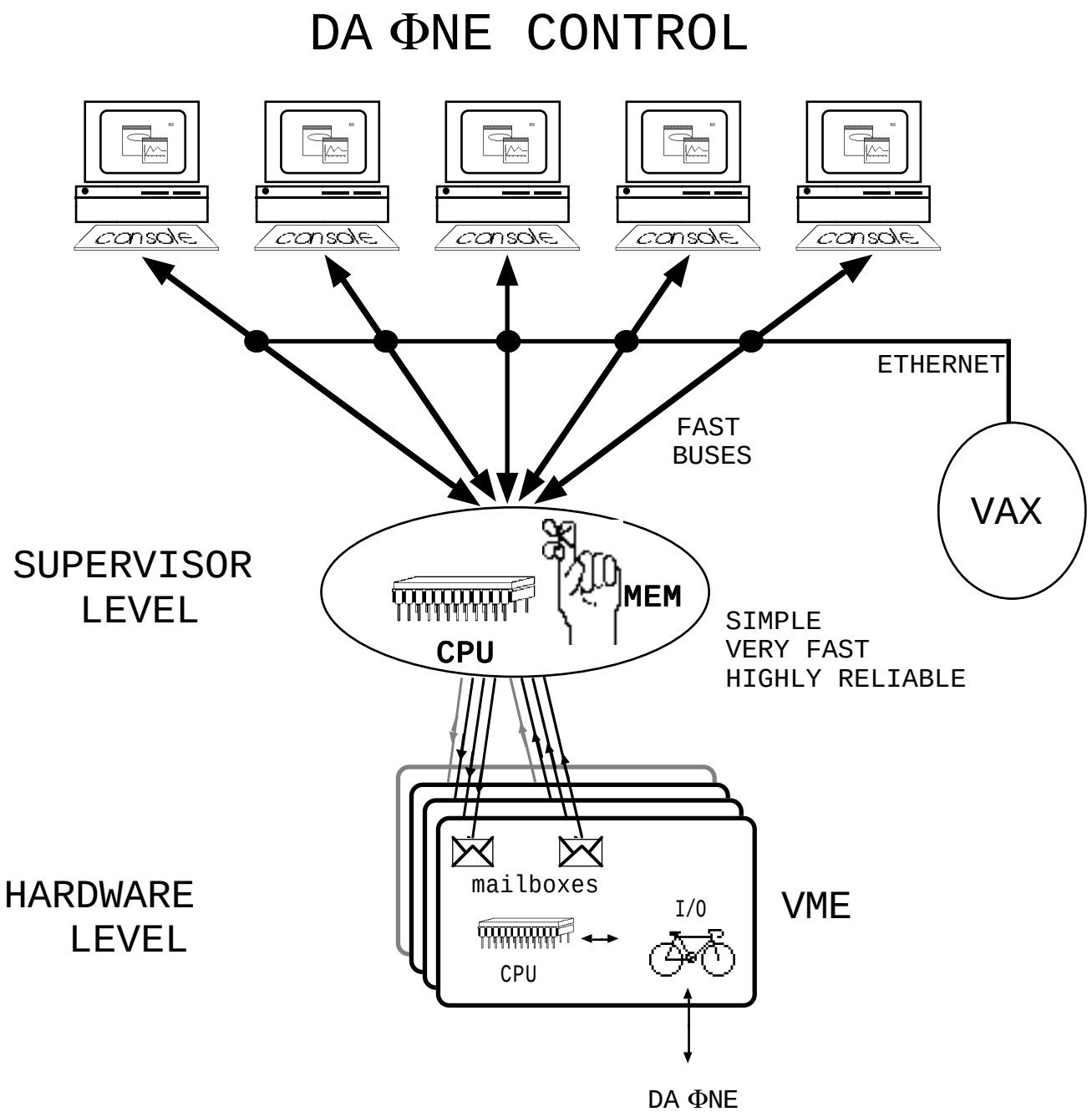


**Fig. 1**: DAΦNE Control Sistem structure