As designs become increasingly complex, the ideal workstation for VLSI design should offer users three key features: software applications to handle the specialized circuit design and mask making tasks of VLSI design; computing power to run those applications efficiently; and, ease-of-use, solutions that let the designer concentrate on design, not on computer programming.

Software Experts

Software experts, applications which are optimized for specific IC design tasks, are the central feature of the IC design system. Since the development of integrated circuits includes both logical and physical design, a workstation should have tools for schematic entry, verification, and test, as well as physical layout.

The traditional focus of IC design systems, transforming the logical design into the physical design, should offer new methodologies to accommodate the increasing size and complexity of IC's. Symbolic layout and silicon compilation techniques are options for shorter design cycles, guaranteed correct-the-first-time design, and easily updated design rule or process technology changes.

Layout analysis includes several varieties. Mask verification, as an interactive process, checking each polygon for design rule violations as it is entered or checking a group of geometries as it is completed, is critical in the design process. In addition, batch layout verification capability should be available to verify a completed chip, individual cell, or group of cells.

Finally, the ability to generate files of fractured mask level data, the final step before manufacturing, is available to the user on the workstation today.

Computer Power

The hardware which supports these design applications must offer very high performance. VLSI design requires fast graphics performance for rapid creation, manipulation, and modification of layout and schematics. Specialized graphics hardware, optimized for displaying geometric layout structures, can dramatically improve performance. Design rule checking and, in the case of symbolic layout, circuit compaction, are compute intensive applications which benefit from dedicated hardware accelerators designed to achieve supercomputer performance at the CAE workstation level.

To handle the heavy processing needs of IC design, workstations should be configured with multiple processors. These processors can perform tasks such as generating the graphic display, editing mask data, and layout verification. Separate processors can be dedicated to handle each of these functions.

Ease of Use

If a design workstation is to be used, it must be easy to use and understand. A friendly user interface in terms of a concise, intuitive command language; a versatile, graphical system interface; and, the ability to customize the system to the user's way of working are all minimal requirements for an effective workstation. The system interface should give the user the flexibility to run processes concurrently. Background tasks, such as running an electrical rules check or simulating a portion of the circuit, can be run while editing another portion is done. The system also gives users flexibility to develop their own procedures and programs. A program development environment that coheres to standards should be available to users.

Finally, the workstation should allow users to tailor their system environment to match the organization of their project or engineering resources. Networking and distributed data management permit the rapid exchange of data between designers and maximizes peripheral resource usage.