Networked CAD Systems

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Computer-aided design (CAD) tools have become an essential part in the design flow of any complex electronic system. At the same time, the number of tools needed to implement complex systems is increasing and such tools are generally provided by several suppliers. Integration of CAD tools into unified frameworks prompts for an increasing effort in the creation of standard interfaces. The definition of standard formats for design descriptions such as VHDL and EDIF has been an important milestone in this direction. However, the user interfaces provided by different CAD vendors still lack in uniformity and compatibility.

Moreover design teams are often geographically dispersed, even though they may be working on different parts or facets of the same design. Design reuse of libraries, hard/soft macros, and embedded software may require access to resources that are also geographically dispersed. Fortunately, computer networks such as intranets and the internet provide pervasive reliable links among designers and design data, as well as an useful means of storing and classifying information. In addition, network browsers and helpers have simplified the access to remote and distributed information, by providing a uniform mechanism which is easy to learn.

The use of computer-aided design tools over intranets and the internet is raising a large interest because of research and business opportunities. Most corporations, where designs are performed at different sites, use intranets for data sharing and communication. Computationally demanding tasks can be performed on high-performance servers remotely connected to the designers by intranet links. Nevertheless, CAD tools are still developed and marketed to be used in specific locations, and the use of intranets to improve upon the design cycle is left to the needs and the ingenuity of the designers.

We expect to see distributed CAD environments for intranets on the market soon. Such environments will make transparent to the designer the location of tools, libraries and design data. This will increase designers' productivity by providing them with uniform access to resources as well as faster response time on computationally-expensive tasks because of load balancing across the network.

The next challenge is to develop distributed CAD environments over the internet. The world-wide web (WWW) provides a link to virtually all users of scientific computing and WWW browsers provide de facto standard user interfaces. Whereas the WWW has been mainly used until now for information retrieval, a large potential lays in its use for distributed information processing and in leveraging network programming tools.

CAD programs and environments on the WWW can be developed for scientific and/or commercial reasons. The WWW is an ideal means for dissemination of information. Thus, CAD tools developed in academia may be interfaced to the WWW for the purpose of supporting remote access and demonstrations, and providing world-wide exposure. Collaborative research programs at different institutions can use the WWW as a way of interfacing CAD tools. In this perspective, the WWW may play a role similar to the original role of ARPANET.

The commercial opportunities for distributed CAD services are promising as well. New tool usage paradigms may emerge. Designers could temporarily connect to a tool provider, perform a specific task and be billed on a usage-time basis. Design flows may incorporate the use of remotely-located tools, with different costs and objectives, and customizable according to the design goals. CAD vendors may offer free, or limited-cost, tool usage to advertise their products.
There are clearly many ways of envisioning the development of networked CAD systems on intranets and on the internet. Difficulties may arise due to several factors, including data consistency, network loads, limited bandwidth and response delays. Design of electronic products using the internet must address security problems related to design and technology data. Despite these difficulties, the rapid growth of network-based products and the potential payoffs of networked CAD make this field an exciting area of research.