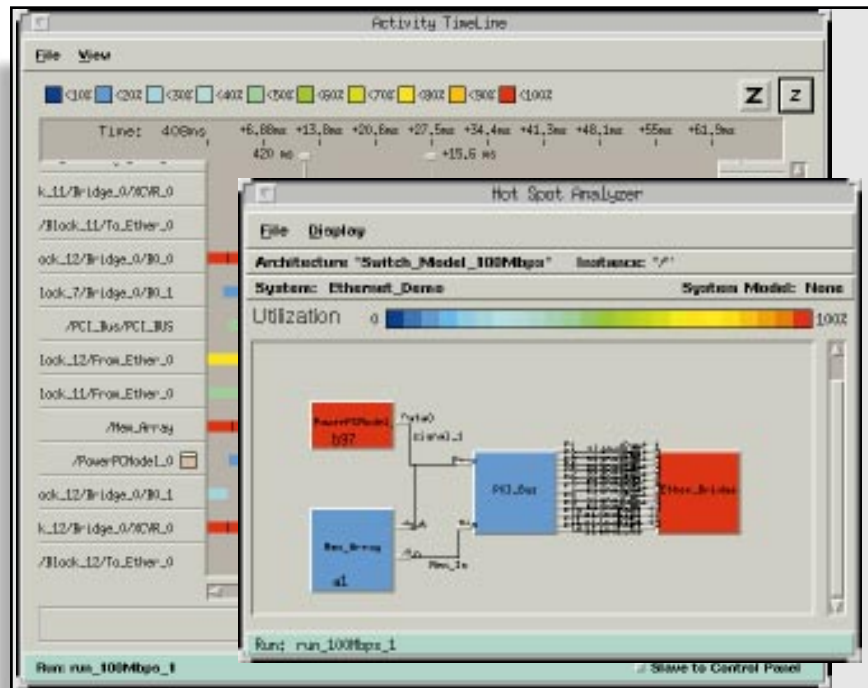




## Highlights

- Build and simulate architectural prototype of hardware and software system
- Fast architecture-level performance simulations allow architectural changes to be assessed quickly
- Analyze system performance characteristics such as data path latencies, component utilization and data throughput
- Modeling methodology promotes collaboration between hardware, software and system designers
- Parameterizable library of common processors, busses, and networking elements allows designers to quickly assemble a system model
- Accurately determine utilization of data processing, memory, and communication interconnects at the beginning of the design cycle
- Extensive support for multiple processor systems: easily allocate tasks over processing nodes
- Ensures design will meet performance goals
- Aids in minimizing design costs with fewer physical prototypes and reduced artwork



## Product Overview

eArchitect is an architectural prototyping tool that allows systems designers to concurrently analyze various hardware and software architectures of their eProducts at the beginning stages of their designs. Designers can quickly and easily construct and simulate performance models of their system so that they have a high level of confidence that the system will function correctly before investing significant time, money, and resources to the project. eArchitect provides a structured design methodology where hardware and software engineers can get involved with the system architect from the beginning of a project to minimize the risk of uncovering problems late when they are most expensive to fix. As systems become more complex with multiple processors, intricate data paths, and elaborate software, system designers face a difficult challenge of ensuring that their designs will meet overall performance objectives while minimizing design costs. eArchitect helps the designer to develop an architectural specification with confidence that the design will work right the first time.

## Determine Optimal eProduct Architecture

As design complexity rises and schedules shrink, it is becoming more critical that problems are found early in the design process. Today's system designers have a very complex job when it comes to choosing the optimal eProduct architecture given the vast array of hardware and software building blocks. Mistakes caught late in the process are very costly in terms of schedule, resources, and performance. eArchitect aids the designer in the early exploration and refinement of suitable system architectures. Using the building blocks from the eArchitect library, a designer can quickly build a high level model of a system, simulate it and analyze its performance. The designer can make necessary changes and iterate through simulation and analysis. eArchitect provides the



proper tools to streamline this iterative process allowing a system designer to perform architectural tradeoffs. This will reduce major surprises that may be found during implementation or in the field. Usage of eArchitect will result in fewer physical prototypes, reduced rework, and systems that match specifications. eArchitect will help the designer optimize the eProduct architecture for performance and cost.

### Involve Hardware and Software Engineers at the Start

Traditionally, the system designer develops the architectural requirements for a product and then hands them off to the hardware and software groups. Since the hardware and software designers are typically not involved in defining the requirements, design problems often are not uncovered until late in the design when they are the most costly to fix. eArchitect promotes early collaboration amongst system, hardware, and software designers during the requirements and architectural design stages so they can all agree and have confidence their design will work. It is essential that hardware and software be considered simultaneously from the beginning of the design to ensure the optimal hardware and software architectures will be chosen and risk associated with integration will be minimized. If designers simulate the hardware and software interaction from the very beginning, they should minimize their chances of uncovering integration problems late in the design.

### Simulate and Analyze Alternatives Quickly

eArchitect combines intuitive modeling concepts, fast performance model simulations, and data visualization tools to create an environment where system, hardware, and software engineers can evaluate design alternatives quickly. eArchitect utilizes un-interpreted, token-based modeling paradigm, to achieve extremely fast simulations and high-level model representation. eArchitect provides intuitive system modeling concepts such as

block diagrams to describe the hardware and software systems. Software functionality is described graphically or through a textual description. Hardware functionality is described by hierarchical block diagrams constructed from parameterizable library elements. The eArchitect library contains commonly used processors, bus models, memory devices and networking elements. The user can take the elements from the library and build representative models of the user system. Using these concepts allows engineers to easily create entirely new system architectures or modify performance characteristics such as data throughput and latency and immediately see the performance impact of a change.

### Typical Product Usage

The user begins a design process with eArchitect in much the same way the current "manual" process is initiated with successive refinement of block diagrams. eArchitect provides two integrated designs flows, for the hardware and software architectures. This allows each discipline to operate on familiar ground, but still collaborate and agree on a common system architecture.

The hardware architecture is created by instantiating and connecting elements from the eArchitect library. The user can adjust various characteristics of the elements once they have been placed into the block diagram. Customized devices and sections of the design may be stored as user library elements for later use.

An integral part of the architectural design is the Software model. The user begins describing the software as a block diagram representing communication between various software tasks. As more details about the software architecture are understood the user may refine a software task by adding additional detail either as a hierarchical block diagram, or textual description. Software utilization is modeled as instruction count estimates and cycle time budgets. The software designer is only required to estimate the number of CPU operations required to capture the performance of a particular algorithm.

eArchitect simulates the system very quickly since the simulation occurs at an

architectural level. The simulation provides utilization statistics about hardware devices and software tasks. Powerful analysis tools are provided to aid the user to understand the performance of the system. The user can now see how busy the processor. He can see what percentage of time each software task takes up on the processor. He can see the response time of critical interrupts. He can see how much traffic is on the bus. Is there a potential bottleneck on the bus? What conditions cause the bottleneck? Is there a block starved for Data? What is the performance of Custom Hardware in the System?

With the aid of the results from the Analysis phase, the user can make changes to the architecture. He can go to a faster or a slower and cheaper processor. He may offload functions to another processor or custom hardware. If there is a bottleneck on the bus, he can take corrective action. In conclusion, eArchitect provides the capability to determine, realistic hardware and software architecture early in the design cycle thus minimizing risk, and maximizing chances of a first pass design success.



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