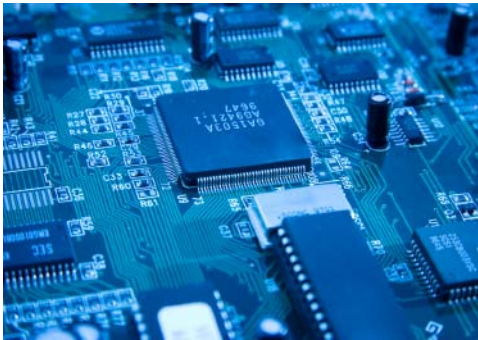


Platform™

Cadence Design Systems Improves Performance and Efficiency with a Global Server Farm while Providing Competitive Advantage



Building a state-of-the-art EDA design and verification environment for Cadence and its customers

Challenges

- Larger and more complex designs requiring more capacity for verification and regression testing
- Containing the costs of fast-growing IT environments

The Solution

- A Global Server Farm managed by Platform LSF virtualizing 8000 CPUs

Business Benefits

- Measured IT resource utilization of more than 90% during busy periods
- Average IT resource utilization of greater than 65% on a sustained basis 7x24
- Improved engineering productivity
- Ability to integrate the IT environments from acquired companies more quickly
- Improved accountability and management visibility
- Ability to resource critical projects more easily

Making Better Products Faster

In the \$1 trillion worldwide electronics market served by Cadence, time to market is everything. Electronics makers increasingly see demand driven by consumer oriented products and an explosion in next-generation multi-media communications devices. As a result, Cadence customers need technologies that enable them to make optimal use of growing silicon capacity while compressing design cycles and getting products to market more quickly.

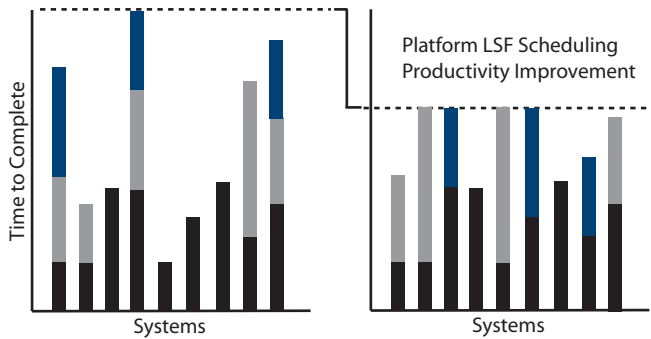
Cadence addresses this need with electronic design automation (EDA) technologies and engineering services to design, verify and prepare advanced semiconductors and systems for manufacturing. These products in turn form the foundation of the computing, communication and consumer devices that account for more than 90 percent of global semiconductor revenue.

Cadence offers a range of technologies addressing all aspects of the design lifecycle. The Cadence® Allegro® system interconnect design platform enables co-design of integrated circuits (ICs), IC packages and printed circuit boards (PCBs) while the Cadence Encounter® digital IC design platform allows detailed blueprints for designers to create IC layouts from high-level designs. The Cadence Incisive® functional verification platforms allows designers to manage their entire verification effort and simulate large, complex chip designs, helping to minimize product quality risks and ensure that a device can be manufactured.

The Challenge

To say that semiconductor design is a complex business would be an understatement. A designer today working on a system-on-chip (SoC) implementation with one million gates may have a new project following close behind with two million or more gates. One of the early tasks in the design process is the simulation of a digital functional specification. Doubling the number of gates roughly quadruples the complexity of the design verification task. Each time a flaw is fixed in the system, the verification engineer must go back and re-run all tests associated with that fix to be sure that additional errors have not crept into the design. The more complex the design, the more regression testing that is involved. Consequently, complex designs often require hundreds of such fixes. When multiple design teams are involved designing multiple projects concurrently, device verification and regression testing can translate into millions of simulation jobs, making device verification one of the most time-consuming and critical processes in bringing a new semiconductor to market. Techniques such as directed random testing can save engineering time by reducing the burden on the verification engineer however, owing to a greater volume of tests required to ensure coverage, they can also dramatically increase the amount of computer simulation required.

The speed and thoroughness with which design firms can run simulations and the facility to employ additional computing resources during critical path periods in the design lifecycle are essential to getting a quality design to manufacturing on schedule. Software systems that can manage the millions of simulations across clusters of high-performance commodity computers are key to meeting the challenges of device verification.



Reproduced from Cadence Publication, The Case for a Simulation Server Farm

As a world leader in the semiconductor industry, Cadence has acquired other successful technology firms, some of which used their own workload management systems—based on open source or in-house technologies—to manage verification activities. The use of multiple tools and approaches, however, was causing significant challenges and business inefficiencies. Because of a lack of standardization there was no mechanism to obtain a consolidated view of how global assets were being used, and no way for one group to easily borrow simulation capacity from another group in times of need. Significant time and expense was involved in adapting and maintaining Cadence processes to the nuances of multiple incompatible workload management systems.

The Solution

In 2005, Cadence standardized on Platform LSF as a single distributed resource management system as a part of the Global Server Farm Initiative. The Global Server Farm combines roughly 8,000 CPUs across multiple datacenters. While the design centers principally serve their local users communities, Cadence designers in fast-growing geographies like China and India can access compute capacity in San Jose, California using globally standardized approaches. The Global Server Farm has simplified the design environment, made it easier to share resources between groups, and has allowed Cadence to obtain better knowledge of how assets are used, thus helping to better manage IT spending. Because there is more visibility into asset utilization, investments can be channeled to support the most critical business needs, and compute capacity added to a grid can service multiple design teams supporting

"When we decided to build out a single Distributed Resource Manager across the company, Platform LSF was the obvious choice because it provides us with the support, scalability and advanced features essential to our business."

Steve MacQuiddy
Director, Server Farm Operations, Cadence

fluctuating demands for resources through the design lifecycle. Platform LSF has helped to simplify the deployment of internal technologies at Cadence. Using advanced scheduling features such as LSF fairshare, server farm assets can be allocated based on project teams, design efforts, applications, or by user or group to ensure that IT resources are used optimally. The use of Platform LSF has resulted in both lower IT costs and more efficient spending as well as a reduction in the time required to run complex device simulations and the capacity to take on more projects.

"The cornerstone of our Global Server Farm Initiative internally to Cadence is to have our engineering groups achieve better productivity and have access to increased compute capability at a lower cost. Increasing our engineering productivity and capability gives us the critical opportunity to drive more innovation, a key Cadence core value."

Robert J. Stear
Vice President, Operations, Cadence

Toward a More Effective Design Environment

If you're going to build the world's best technologies for design and functional verification—and help an entire industry learn how to use them effectively—it's essential that you have your own house in order. Grid computing and distributed resource management are staple technologies for EDA firms. Designing and verifying today's complex designs would simply not be possible without effective management of these distributed workloads.

Through the Global Server Farm Initiative, Cadence has not only introduced significant efficiencies into its own business but has also developed a showcase server environment that points the way toward greater effectiveness for its own customers.

"Since standardizing on Platform LSF as a single distributed workload manager for all of our global design centers, Cadence have been able to simplify its environment, improve management and capacity planning of IT resources, and ensure that IT assets are used optimally around the globe. This has resulted in a very significant efficiency enhancement for our resource teams globally."

Dan Salisbury
Corporate Vice-President, IT, Cadence

Using Platform LSF's advanced management features, administrators can control how the system responds during times of overload. For example, an administrator can set thresholds that would result in the suspension of low-priority jobs when a server or cluster reaches 90% utilization. These thresholds afford greater flexibility and can be implemented on a variety of indices for whole groups of related jobs or individual jobs. The intelligence in the scheduling system means that a larger, longer-running job might automatically get higher priority than a shorter running job which could be more easily suspended and re-started by LSF. This results in direct productivity gains for the business. With its "fire and forget" approach, LSF ensures that jobs will be completed using the optimal set of resources subject to site-wide policies. Engineers will not waste an overnight simulation window due to some unforeseen issue like a server being down. LSF automates job distribution and recovery and is able to "step around" failing or under-performing servers to guarantee that simulations are run in a timely manner.

As Cadence has realized benefits from its Global Server Farm investment, features have been developed in Cadence products to specifically take advantage of Platform LSF. As an example, Cadence NC-Sim, used for functional and timing simulations, supports parallel builds and has a feature known as license suspension. License suspension has the effect of adding extra servers in times of critical need. NC-Sim licenses that are in active use can be temporarily "borrowed" by a higher priority project

needing access to licenses and the lower priority simulations can be automatically suspended by Platform LSF. Once the higher priority simulations are completed, the suspended NC-Sim jobs associated with the lower priority job are automatically resumed, thereby ensuring that design teams are achieving the highest level of productivity from the server farm and that licenses are fully utilized. This is just one example of several productivity advantages realized when using Platform LSF with Cadence technologies.

Helping Cadence Customers Compete

Cadence has "set the bar high" with regard to the efficiency of its own internal operations. By taking advantage of the company's pioneering work in optimizing its Global Server Farm, new multi-threaded technologies, and direct integrations with Platform LSF, Cadence customers are able to run their IT environments more cost effectively as well. Cadence customers adopting these best practices not only benefit by improving their ability to share server farm resources but they can also enhance their own competitiveness by improving time to market for the new semiconductor designs that are the lifeblood of the hyper-competitive consumer electronics industry.

About Platform Computing

Platform Computing is the leading systems infrastructure software company that accelerates applications and delivers IT agility for increased business performance and reduced cost. Founded in 1992, Platform is a pioneer in HPC, Cluster and Grid Computing technologies. Platform has over 2,000 global customers and strategic relationships with Dell, HP, IBM, Intel, Microsoft, Red Hat and SAS, along with the industry's broadest support for third-party applications. For more information please visit www.platform.com.



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