



CAPRION PHARMACEUTICALS

KEY HIGHLIGHTS

Company

Caprion Pharmaceuticals

Industry/Market

Life Sciences – Drug Discovery

Applications/Solutions

- High performance compute farm, data warehouse, and Laboratory Information Management System built on latest technology from Sun and its allies

Products/Services

- Sun Fire™ 6800, 4800, and 3800 servers
- Sun Fire 280R servers
- Sun Blade™ 100 workstations with smart card readers
- Sun Ray™ digital appliances with smart card readers
- Sun StorEdge™ T3 disk arrays (5 TB)
- Sun StorEdge L700 tape library
- Solaris™ 8 Operating Environment
- Sun Grid Engine software
- Sun Forte™ development tools
- Sun Management Center
- IPlanet™ ECXpert software
- Oracle 8i database and workflow software
- Veritas backup, file system, and volume manager software
- Micromass mass spectrometers and support software
- CGI systems integration services

Key Business Challenges

- Build compute farm capable of addressing the biggest issues in life sciences today
- Process hundreds of terabytes of data per year
- Identify tens of millions of proteins, and determine their inter-relationships plus their roles in disease
- Establish close relationships with suppliers of complementary technologies and technological expertise

Key Business Solutions

- One of the world's largest protein analysis compute farms developed and in production
- Foundations laid to handle years worth of explosive data growth
- Caprion positioned at the head of the proteomics industry

“We were extremely fortunate that the company with the highest performance technology today is the same company that has the ability, willingness, and scalability to help us feel comfortable about tomorrow – Sun Microsystems.”

Paul Kearney

*Director of Bioinformatics
Caprion Pharmaceuticals*

Caprion Pharmaceuticals has built one of the world's largest protein analysis compute farms using technology from Sun Microsystems, Inc. and its best-of-breed allies. Sun Professional Services architected a highly efficient solution that is based on Sun's latest technological foundations – the UltraSPARC® III microprocessor and the Solaris™ 8 Operating Environment.

Sun Fire™ servers managed by Sun Grid Engine software provide the computing horsepower needed for today's bioinformatics breakthroughs, the flexibility to efficiently address problems big and small, and the scalability to keep pace with genomics data's explosive growth. Sun Ray™ appliances support a flexible Laboratory Information Management System environment. Sun Blade™ workstations and Forte™ development tools produce applications that run without modification anywhere in the system. Sun StorEdge™ T3 disk arrays managed by a Sun Fire server host an Oracle data warehouse that supports queries on up to five terabytes of online data.

Sun brought top performance platforms to the Caprion relationship and much more. In keeping with its partnering-oriented business model, Sun leveraged its relationships with best-of-breed suppliers of complementary tools and services, and orchestrated a complete solution.

Oracle provided its industry-leading database and consulting expertise, Veritas its storage management tools, and CGI its systems integration skills. Sun also brought the IT expertise so necessary today as a complement to Caprion's bioinformatics expertise, the willingness to invest in understanding Caprion's goals, and the partnering attitude that helped create a world class solution to the biggest problems faced in life science research.

“Science in the Large”

Caprion Pharmaceuticals is a Montreal based biotechnology company that applies proteomics – the study of the nature and function of proteins – to discover and develop pharmaceutical products that enhance the quality of life. Caprion uses its CellCarta platform to help major biopharmaceutical companies accelerate their drug discovery efforts and as the basis for development of Caprion's own diagnostic and therapeutic products.



CellCarta is used for identifying proteins in different tissues and determining their roles in various diseases through comparison of normal and diseased tissues.

The nature of drug discovery research has changed dramatically in the last ten years with the advent of "industrial-scale biology." In the past most biological research was performed by individuals in small laboratories using relatively simple computer systems and tools.

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*Lloyd M. Segal
President and Chief Executive Officer
Caprion Pharmaceuticals*

Today's important biological breakthroughs, however, require vast compute power and massive storage capacity. The human genome must be searched hundreds of times per minute. Hundreds of terabytes of data must be processed in a year's time. Proteomic discoveries require the hurdling of challenges that are every bit as much computational as they are scientific. This convergence of biological and computer sciences has been dubbed "Science in the Large" by Caprion's director of bioinformatics, Paul Kearney.

"We viewed the establishment of a massive protein identification compute farm as an absolute necessity of the business we're in," said Kearney. "Life science is becoming a digital science, but we're experts in biology, not computers. At Caprion we need enormous compute capacity to identify a volume of millions of proteins per year and to identify their roles in diseases, which calls for millions squared comparisons. Our new computational facility had to be able to handle not just those awesome requirements of today, but vastly increased needs in the years ahead. Devising an architecture capable of dealing with those data volumes calls for an understanding of computer technology that is far beyond that of scientists like us. That's why we needed to cement a partnership with a company

that could do a lot more than provide a state of the art computing platform. Our partner had to have people who would take the time to understand our challenges, our strategy, and the impact of bioinformatics changes on our future computing requirements. Our partner also had to have technology scalable enough to keep pace with those changes. We were extremely fortunate that the company with the highest performance technology today is the same company that has the ability, willingness, and scalability to help us feel comfortable about tomorrow - Sun Microsystems."

High Performance Computing Benchmark Finalizes Decision for Sun

Caprion conducted a thorough evaluation of approaches and vendors when it selected its new computer system in early 2001. They rejected platforms based on Windows NT and Linux as lacking the robustness, reliability and scalability required. Caprion also rejected commercial UNIX® platforms that lacked a clear roadmap for the future. After winnowing the list to Sun and one competitor, Caprion made its final decision by running its own production software applications on each of them in a high-performance computing benchmark. "We were inclined toward Sun from the outset because the Solaris™ Operating Environment has a widespread reputation as being the top UNIX® in the world, because it spans such a spectrum of totally compatible platform choices, and because of Sun's record for predictable reliability," said Kearney. "Our decision became crystal clear when Sun won the performance benchmark hands down."

"Yet another virtue of Sun is the set of relationships Sun has established with best-of-breed leaders in the computing space," Kearney continued. "Sun introduced us to Oracle, who proved to be the ideal supplier of our data base and consulting expertise in development of our data warehouse. Sun also works closely with Micromass, the supplier of our mass spectrometer systems and their support software. By tuning and optimizing for Sun, Micromass made sure we received an integrated solution. Finally, Sun enjoys a strong relationship with CGI, our choice to perform integration of the complete system."

Sun, Oracle, and CGI Team to Meet All Caprion's Goals

Once all key vendor decisions were made, Caprion launched the implementation of all its major subsystems – the compute farm itself, a Laboratory Information Management System (LIMS) for tracking the progress of samples in accordance with FDA requirements, an R&D laboratory subsystem, the data warehouse, and a closely related data mining subsystem. Sun, Oracle, and CGI formed a close alliance that worked hand in hand with Caprion to bring the system into being.

For the compute farm, Caprion engaged the assistance of Sun Professional Systems, who began by sizing the system and developing a configuration that met present and future needs most cost-effectively. This subsystem consists of Sun Fire 4800, 3800, and 280R servers, all linked and managed using Sun Grid Engine software. Sun Grid Engine software affords Caprion the flexibility of devoting any or all of the compute farm's resources to a single large task, and/or deploying its resources to a number of smaller tasks.

"Sun Professional Services did a superb job," reported Kearney. "They did a lot more than put a great solution in place. They innovated by asking us what the future holds, determining what kinds of problems we'll be facing in the years ahead, and anticipating those problems by putting the right bases in place today for the solutions we'll need in the future. We certainly don't have the expertise to know everything we ought to be worried about in the years ahead, and so it was really exciting to have Sun Professional Services come in and tell us. They invested resources in our project in our project to the point of flying in Sun Grid Engine experts to get to know our system administration people and share experiences with the product. Sun Professional Services' contributions are absolutely key to our future success."

Sun Educational Services also played an important role by instructing Caprion's system administrators on all system hardware and software, with a special emphasis on Sun Grid Engine software and Veritas backup, file system, and volume manager software. "They did an excellent job," reported Kearney.

LIMS with New Levels of Dynamicism

The LIMS subsystem uses Sun Ray digital appliances and smart card technology to provide convenient access for users wherever they might be within Caprion's facilities. The devices are distributed throughout laboratories and conferences rooms so that wherever a researcher might be, all that is necessary to resume a session is to insert a smart card into the handiest Sun Ray appliance. "The Sun Ray approach introduces a new level of dynamicism for LIMS users," noted Kearney. "They aren't confined to a single desktop, nor do they have to lug a laptop around with them."

The R&D laboratory is populated by Sun Blade 100 workstations, all of which are also equipped to read smart cards. There Caprion's software experts develop and test new cutting edge software, using Forte™ development tools, before installing it on the production compute farm. "We wanted our developers to be able to write software on workstations and then run it on large servers without modification – a very strong point of the Solaris Operating Environment," said Kearney. "That's a key quality of the Sun product line to us."

The data warehouse, developed with expert assistance from Oracle Consulting and CGI, is optimized for making queries that call for extensive data searches and analysis, such as identifying correlations between certain disease types and an abundance of particular proteins. The data mining subsystem is the user interface into the data warehouse. The data warehouse configuration was also developed with the help of Sun Professional Services. The system is protected under the SunSpectrum Platinumsm service plan.



“With the amount of data we must manage in this business, intelligent data storage is essential,” said Kearney. “Our storage system architects did a great job of trading off the ready availability of online data and the cost-effectiveness of tape storage, helping us reduce the total cost of ownership.”

“When we entered into production, the system has been everything we hoped and expected it would be,” reported Kearney. “The reliability has been excellent and performance is so good it’s almost scary! Those Sun Fire servers are incredibly efficient. Frankly, going into this project, we expected we’d need a much larger compute farm to accomplish our goals. We’re extremely pleased, and we’re already engaged with Sun on planning the next steps – doubling the number of processors in the system, for one.”

Caprion’s CEO Sees Sun Relationship as Key to Success

Caprion’s president and chief executive officer, Lloyd M. Segal, views Sun’s and Oracle’s contributions as important differentiators that position Caprion at the head of the proteomics industry. “Their names alone give instant credibility to what we’re doing, but there’s a lot more to it than that,” he explained. “Other computer suppliers

will just come in and deliver racks of equipment, but Sun took a unique approach. They started by asking for an understanding of our goals and our strategies for achieving them. Then they devised a solution that meets today’s problems today and is architected to scale in lock step with the enormous growth we’ll see in the future. Sun seems to enjoy a challenge, and isn’t afraid to share in the risk of tackling challenges as a problem solver, not just an equipment supplier. Sun takes an entrepreneurial approach to business, just like we do. That’s why Sun makes such a great partner for us.”

“Our people are as good as you can get at understanding individual proteins, but that’s not enough for addressing today’s large scientific questions,” Segal added in closing. “We need efficient access to information about hundreds of thousands of proteins, which takes orders of magnitude more compute power than a PC can deliver. Sun provides the hardware and software capacity to analyze and visualize these enormous data volumes, and the scalability to continue doing so as these volumes explode in the years ahead. Sun is taking us where we need to go.”

For information about life science initiatives at Sun, please contact us at “informatics@sun.com”.

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