



Next-Generation Sequencing Solutions

Affordable, high-performance processing for DNA analysis

Key benefits

- Comes with two Dual-Core or Quad-Core Intel Xeon processors for high-performance analysis of DNA sequences.
- Uses straightforward direct-attached storage instead of complex network storage
- Can run Mac OS X, Windows, and Linux simultaneously, when equipped with optional workstation virtualization software
- Xserve RAID allows for up to 10.5TB of storage in a single enclosure

The right solution for next-generation sequencing

Apple products best suited for DNA sequencing include:

- Mac Pro workstation
- Xserve RAID storage
- Optional: workstation virtualization software from Parallels or VMware

A new generation of hardware and software is bringing dramatic reductions in the cost of DNA sequencing, combined with extraordinary improvements in throughput. While the plummeting costs are making sequencing available to a wider range of labs than ever before, smaller organizations are finding it difficult to manage the massive amounts of data generated by these new instruments. The typical approach of deploying compute clusters with network-attached storage is not practical without ongoing IT support. Fortunately, there's a better alternative: an Apple Mac Pro workstation with Xserve RAID for terabytes of easy-to-use direct-attached storage.

High-performance processing

The sequencers now coming to market can generate millions of image files every day. Robust processing power is needed for data analysis to keep pace with data production. In fact:

- Image analysis scales linearly with data size.
- Base calling scales linearly with data size.
- Assembly scales exponentially with complexity.

Does that mean you need a supercomputer to process all that data? Not at all. Given the increasingly powerful capabilities of today's workstations, four to eight processors are typically sufficient to analyze the data from one run before the next run begins.

Apple Mac Pro computers can be configured with two Dual-Core or Quad-Core Intel Xeon processors, giving you up to eight 3.0GHz processing cores in a single workstation. Unparalleled expansion capabilities include four storage bays, eight DIMM slots, two optical drives, and four PCI Express slots. High-performance graphics are provided by your choice of graphics cards—all of which let you connect multiple displays. With build-to-order options available for processors, graphics cards, memory, hard drives, optical drives, and other components, the Mac Pro offers more than 33 million possible configurations to meet your specific needs.

Ease of use

To handle all the data coming from next-generation sequencers, it's common for labs to deploy compute clusters with shared networked storage. Such a configuration requires trained network administrators, but many of the labs, research departments, and other groups now looking at acquiring their own sequencers don't have dedicated IT staffs. And individual biologists, lab technicians, and hospital personnel cannot be expected to perform IT-level tasks.

A Mac Pro workstation with direct-attached Xserve RAID devices offers much faster I/O performance than network-attached storage, and does not require intensive IT support. Of course, your users also get the renowned ease of use provided by Mac OS X, Apple's award-winning UNIX-based operating system. Even seasoned UNIX administrators will appreciate being able to perform tasks with the elegant Mac OS X graphical user interface. Or, if they prefer, they can use a traditional command-line interface.



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Large storage capacity

A single multiday run of a next-generation sequencer can easily generate a terabyte of data, and labs typically choose to keep each run's data online (or at least nearline) for at least a month.

Apple's Xserve RAID storage system holds up to 10.5TB of data in a single rack-optimized storage enclosure. Each 7200-rpm hard drive connects to a dedicated Ultra ATA drive channel to eliminate bottlenecks and maximize the Fibre Channel host connection. Apple's high-performance Ultra ATA-to-Fibre Channel systems architecture delivers superior performance and reliability at a much lower cost than using Fibre Channel hard drives. And Xserve RAID offers an outstanding gigabyte-per-dollar ratio for Fibre Channel storage.

Versatility

Mac computers come with the robust UNIX-based Mac OS X operating system already installed. Mac OS X offers a versatile platform for analytical applications, and can also potentially be used for instrument control. Mac OS X is ideal for multiplatform environments because of its built-in support for Windows networking and file sharing—and, of course, for UNIX and Internet standards such as NFS and TCP/IP.

Through the use of third-party products such as Parallels Desktop for Mac and VMware Fusion, a Mac can even run multiple operating systems simultaneously—which means that a single system can support Mac OS X, Windows, and Linux applications. (Note that the need for Linux can be eliminated in many cases by recompiling your tools to run directly on Mac OS X.) In this scenario, the highly secure Mac OS X also acts as a buffer between Windows viruses and your Windows applications.

Summary

An Apple Mac Pro workstation with Xserve RAID storage helps you get the highest productivity from today's next-generation DNA sequencers by providing a high-performance data analysis workstation. By eliminating the need for complex, labor-intensive network storage, this system allows a wider range of facilities to analyze data—and at an extremely affordable price.

For more information, please contact your local Apple Sales Representative, or call Apple Enterprise Sales at 877-412-7753.