

## High-performance solutions: Linda on Compaq platforms

### Parallel program development for Memory Channel clusters, networks

Scientific Computing Associates, Inc., a pioneer in distributed computing, and Compaq provide powerful frameworks for building distributed and parallel systems to meet the high-performance needs of the technical computing market. SCA's Linda™ coordination language is a powerful fulcrum for competitive advantage in many industries for users of Compaq high-performance Alpha™ TruCluster™ systems and networks with UNIX® software.



*Compaq AlphaServer 4100  
systems in a TruCluster  
configuration*

#### Linda Highlights:

Linda is a set of powerful extensions to C, C++, and Fortran that enables rapid development and deployment of parallel applications. Based on a virtual shared memory programming model and simple language-level commands that enable process creation, synchronization, and communication, Linda is easy to use, even for users who are new to parallel computing.

#### The Linda model

Linda provides developers with a small set of operations that augment the capabilities of traditional computation languages such as C, C++, and Fortran. Developers of parallel or distributed applications use

#### The Compaq Advantage

Compaq delivers the widest range of systems with leading price/performance to meet your most demanding needs for developing and running technical applications. Today, Compaq offers you the industry's highest-performance UNIX and Windows NT™ workstations and servers as well as storage, networking, operating environments, and the best support services to handle your most complex tasks. Compaq systems range from single-processor Professional Workstations to AlphaServer™ SMP configurations containing up to 14 processors, including the new, record-setting Alpha 21264.

**Linda (continued)**

the operations to build and manipulate data structures in a virtual shared memory (VSM) that is accessible by all processes participating in a given run of an application. The processes choreograph their execution and exchange information through alterations and updates to the shared data structures.

Because the concept of manipulation of data structures is well understood and because processes interact only indirectly, the Linda model is conceptually both readily accessible and extremely flexible. As a result, parallel codes can often be deployed more rapidly and with less code modification than with more time-consuming, low-level conversion approaches. The virtual shared memory data model also accommodates techniques for dynamic load balancing, even among dissimilar processors.

As Linda language extensions are implemented through pre-compile and pre-link processing, automatic code optimization and extensive error reporting functions are possible during compile and link phases. Linda uses an effective graphical debugging tool that is fully compatible with standard UNIX debuggers such as DBX and GDB.

**Linda portability**

Linda virtual shared memory systems target homogeneous and heterogeneous networks of Compaq Alpha and other UNIX workstations, as well as Compaq AlphaServer clusters using Memory Channel technology and other distributed-memory UNIX multiprocessor systems. Linda

provides transparent data conversion between architectures and facilities for node selection, directory mapping, and program startup.

Most Linda programs written for one machine run without change on others, making possible single-source parallel coding for all UNIX architectures. Linda can also take advantage of underlying architectures of shared-memory and distributed-memory parallel systems through custom runtime systems with targeted sources.

**Compaq (continued)**

**Why choose Compaq?**

- The Alpha architecture, developed by Compaq, leads the overall HPTC market in revenue, while Compaq AlphaServer systems are moving rapidly toward revenue leadership among HPTC midrange servers.

- Compaq systems support the industry's widest choice of operating systems — Windows NT, Digital UNIX, and OpenVMS™ — with interoperability and connectivity programs to build seamless, heterogeneous computing environments.

- Compaq VLM64 very large memory technology dramatically boosts database performance on AlphaServer systems.

- Compaq high-performance, affordable uniprocessor and multiprocessor Professional Workstation systems feature Alpha and Intel CPUs and high-resolution PowerStorm graphics for superior speed and 2-D/3-D imaging in CAE and visual computing.

- Compaq StorageWorks™ products, with high-speed I/O interconnects (HiPPI, FibreChannel™, UltraSCSI), offer the industry's best selection of high-performance, high-reliability magnetic and optical storage media.

- Compaq system interconnect technologies, including ServerNet and Memory Channel, build powerful, clustered AlphaServer and ProLiant systems with more than 100 Alpha and Intel processors to solve problems of any size or complexity.

- Compaq GIGAswitch™, MultiSwitch™, and EtherWORKS networking solutions deliver the highest-performance enterprise connectivity, integrating switched Ethernet, Fast Ethernet, FDDI, and ATM.

- Compaq systems have the best price/performance, best reliability, and the lowest cost of ownership of all competing systems, as determined by industry analyst studies.

- Compaq has one of the industry's largest networks of business, technology, software, and channels partners, dedicated to delivering the highest-quality customer solutions available.

- Compaq Services, the world's largest and most respected computing service organization, and CustomSystems™ deliver, install, and support both off-the-shelf and special solutions around the world.



AlphaServer 1200

**Best price/performance.  
Industry's largest service organization.  
Innovative tools for fastest time-to solution.**

**Think Compaq and Linda.**

For more information, see  
[www.digital.com/info/hpc](http://www.digital.com/info/hpc)  
or  
[www.sca.com](http://www.sca.com)

Compaq believes the information in this publication is accurate as of its publication date; such information is subject to change without notice. Compaq is not responsible for any inadvertent errors. Compaq conducts its business in a manner that conserves the environment and protects the safety and health of its employees, customers, and the community.

Compaq, the Compaq logo, Digital, Alpha, AlphaServer, PowerStorm, StorageWorks, FibreChannel, GIGAswitch, and MultiSwitch are registered in the U.S. Patent and Trademark Office. Linda is a trademark of Scientific Computing Associates, Inc. UNIX is a registered trademark of the Open Group, Inc. Intel is a registered trademark of Intel Corporation. Windows NT is a trademark of Microsoft Corporation. Memory Channel is a trademark of Encore Computer Corporation.

Printed in the U.S.A. EC-F9582-02 Copyright © Compaq Computer Corporation. All rights reserved.