

THE ORACLE INTERNET PLATFORM ON LINUX

INTRODUCTION

Linux is the fastest growing operating system in the industry today. It is a free OS developed by the Internet community and because of its performance and stability, it is the OS of choice to run low-cost servers. Oracle has responded to the demand for commercial applications from Linux users and developers by implementing key components of its Internet Platform on Linux. The presentation describes our experience porting Oracle8i, Application Server, and WebDB on Linux. We will address a broad range of issues including technical questions, business benefits, and Oracle's strategy on Linux: What prominent Linux features are used by Oracle? What new features of Oracle8i are available on Linux? What tools and programs are available to develop applications for Oracle on Linux? What kind of support can one expect for this product? What are the business advantages of adopting the Linux platform? What is Oracle's strategic direction on Linux? The goal is to provide a fair evaluation of Linux as a commercial enterprise-level operating system for deploying Oracle products.

WHY LINUX?

By offering stability, functionality and value that rivals any OS in the industry, Linux has quickly become the most talked about platform for e-business. Millions of users worldwide have chosen Linux for applications from web and email servers to departmental and enterprise applications. According to research by International Data Corporation (IDC), Linux server shipments grew by 212% in 1998 – making it the fastest growing server OS. In the past year, Linux market share in server operating systems skyrocketed to 17.2 percent. This large market share and explosive growth puts Linux on the road to becoming the dominant operating system in the 21st century.

Among its many strengths, Linux is best known as the FREE operating system. Linux is Open Source software, which means that its license permits unlimited redistribution on CD-ROM or over the Internet. The cost benefit of free software is obvious. Anybody in the world can download Linux from the Internet and use it free of charge as a replacement to Microsoft Windows or any of the various flavors of UNIX. Also, several vendors offer easy-to-install Linux distributions on CD-ROM.

A unique benefit of open source software is that improvements to the product are instigated and implemented by the users themselves. Thanks to years of source code fine-tuning by an extensive and enthusiastic community of volunteer developers, Linux has achieved enterprise-class reliability, ease of administration, and outstanding performance.

Linux's elegant design and robust implementation make it the natural choice for application developers who want the advantages of UNIX at a low overall cost. Linux is designed to maximize the performance of commodity PC hardware, and to facilitate day-to-day system administration. In combination with its simplified, non-restrictive licensing, these benefits make Linux's cost of ownership much lower than those of the typical UNIX or Windows NT deployment.

Linux can be configured to run on 386 or better Intel-based systems, as well as on Compaq Alpha, Sun Sparc, PowerPC, and other architectures. Linux deployments are common in educational institutions, ISPs, and a rapidly increasing number of e-businesses. Linux is also rapidly expanding into corporate IS departments.

IS LINUX READY FOR THE ENTERPRISE?

In a Datapro survey, Linux was rated the best overall in customer satisfaction among all operating systems. Linux scored the highest ranking in cost of ownership, Internet readiness, Java support, flexibility, availability, interoperability, and ease of management. This overwhelming endorsement by the IT community, combined with Linux's growth rate of 212% in 1998, serve as strong evidence that Linux is an enterprise-quality OS.

Perhaps the most common concern for customers running their database or any application on Linux is the support question: Who will provide support for the product if something goes wrong? Concern about lack of support on Linux is somewhat ironic, because Linux has the most prolific and extensive support structure of any OS in the form of on-line peer support. There are literally thousands of Linux enthusiasts that find great pleasure in troubleshooting and fixing bugs. There have been frequent reports of bug fixes on Linux being available much faster than on any commercial OS. InfoWorld magazine recently recognized this informal, unpaid, but competent support channel with its Best Technical Support Award.

In addition to the Internet community, most major vendors that sell Linux on CD also offer packaged support. These companies have support professionals on staff that are available to help customers implement their Linux solutions. Linux distributions and commercial support contracts are available from a choice of vendors, including Red Hat, Caldera, S.u.S.E., TurboLinux, and many others.

Oracle8i is supported on Linux as on any other OS, with Oracle Worldwide Support taking full responsibility for the Oracle product, in accordance with the support contract.

INTERNET PLATFORM ON LINUX

Oracle has committed to an aggressive schedule for Oracle products on Linux. Our goal is to have the entire stack of Oracle products available on Linux at the earliest possible time. The following is a roadmap of our product availability schedule on Linux.

SERVER PRODUCTS:

- **Oracle 8**

Oracle 8.0.5.1	Released
Oracle 8.0.6.1	Q1CY00
- **Oracle 8i**

Oracle 8.1.5	Released
Oracle 8.1.6	Q1CY00
- **Oracle Directory**

OD 2.0.6	Q1CY00
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- **Oracle Application Server (OAS)**

OAS 4.0.7	Released
OAS 4.0.8.1	Q1CY00

DEVELOPMENT TOOLS:

- **Oracle WebDB**

WebDB 2.0	Released
WebDB 2.1	Released
- **Oracle Developer**

Developer 6i	Q2CY00
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APPLICATIONS:

- **Oracle Applications**
Release 11i Q2CY00
- **Oracle Internet Messaging**
IM 5.0 Q1CY00
- **Oracle iStore**
iStore 3.1.1.5 Q1CY00
iPayment 3.1.1 Q1CY00

DATAWAREHOUSING:

- **Oracle Discoverer**
Discoverer Server 3.3 Q2CY00

MANAGEMENT TOOLS:

- **Enterprise Manager (EM)**
EM Intelligent Agent Released

ISV APPLICATIONS:

In addition to Oracle's own family of Enterprise Resource Planning (ERP) and Customer Relationship Management (CRM) applications, there is a sizable developer community creating applications for Oracle on Linux. Third party applications running on Oracle come from a diverse community, ranging from individual developers to large ISVs. Through the Oracle Technology Network, developers have access to technical resources and a community of fellow developers. The Oracle Partner Program benefits application developers by providing co-marketing opportunities with Oracle and other partners. These programs and resources enable close integration of third party and Oracle products to help create sophisticated and robust applications on Linux.

OPERATING SYSTEM (OS) FEATURES

The performance and stability of the Oracle server depends on the availability of various features within the OS kernel. Oracle currently exploits several features within the Linux kernel:

- Shared Memory for SGA
- Symmetric Multi Processing (SMP) support for scalability
- Interprocess communication and concurrency control
- Threads support
- File I/O
- Signal Handling

Several server features are currently being added to the Linux kernel. Our presentation will describe upcoming enhancements to the operating system and characterize their impact on system performance. OS features currently being tested are:

- Raw I/O

- Asynchronous I/O
- List I/O
- 64-bit file I/O
- Large memory support (> 2GB)
- Post-Wait Driver
- High speed interconnect for multiprocessor systems.

Features desired in the Linux kernel include:

- Preemption Control
- NUMA support

DEPLOYING ORACLE ON LINUX

INSTALLATION ISSUES

Oracle Universal Installer (OUI) requires JRE 1.1.6 v5 for installing Oracle 8i. JRE is not distributed on the media along with the Oracle 8i distribution. The JRE package has to be downloaded from <http://www.blackdown.org> and installed in `/usr/local/jre`. If there is not enough disk space in `/usr` partition, JRE can be installed in any location and a symbolic link has to be created from `/usr/local/jre` to the location where it was installed. JRE is also required for the use of tools like Database Creation Assistant (dbassist), Net Assistant (netasst), Net Configuration Assistant (netca), Net Easy Config (netec) etc.

JDBC drivers and SQLJ require JDK 1.1.6v5 (JDK), which also has to be downloaded from <http://www.blackdown.org>.

OUI runs on fvwm and KDE environments. It also runs on GNOME environment but requires an upgrade as mentioned below. On RedHat 6.0, there is a bug in the Enlightenment package used with the GNOME environment that causes OUI to fail. An upgrade for Enlightenment package (enlightenment-0.15.5-37.i386.rpm) is available from the RedHat errata site at <http://www.redhat.com/corp/support/errata/rh60-errata-general.html>.

The Oracle Intelligent Agent executables (dbsnmp, oemevent and oratclsh) are not distributed on the media. Their build depends on TCL package, release 7.5, which can be downloaded from ftp://ftp.scriptics.com/pub/tcl/tcl7_5.

BACKUP & RECOVERY

Oracle RMAN (Recovery Manager) is the backup and recovery tool that is built into Oracle 8i. RMAN runs in command line mode or GUI mode. In GUI mode it is integrator with the Backup Manager applet that is built-in to Oracle Enterprise Manager. RMAN interfaces the 8i database with tape devices through industry standard SBT APIs. We are currently working with Legato and several other backup and recovery software vendors to provide integration with RMAN and Oracle8i on Linux.

Currently Oracle8i can be backed up to and recovered from a file system. File system back ups and restores can then be performed using several third party Linux tape backup and recovery tools.

HIGH AVAILABILITY ON LINUX

ORACLE PARALLEL SERVER (OPS)

Oracle Parallel Server is Oracle's high end multi-node high availability, high performance solution for enterprise computing. Oracle Parallel Server is currently being tested in a two instance configuration on Linux. The multi-node version will be

available on Linux shortly thereafter. Currently there are technology limitations with the Linux Operating System that is preventing OPS from running on Linux with all its functionality. The missing components are a high-speed interconnect and Raw I/O with shared disk access. Oracle is working with the Linux community and partners to bridge the gap and these features will soon be available in the Linux kernel.

ORACLE FAIL SAFE

Oracle Fail Safe is Oracle's two node fail over solution for small and medium sized businesses that require high availability and reliability without the overhead of expensive hardware. It is currently available only for Windows NT. It uses Microsoft's WolfPack clustering technology for two-node Windows NT servers. We are currently exploring a viable clustering solution on Linux to make Oracle Fail Safe available on Linux.

ORACLE STANDBY DATABASE

Oracle Standby Database is part of Oracle's high availability and backup/recovery solution for node failure. It uses Database and Operating System level file replication to transport the production database's redo archiving log files to a remote node running a standby database. This is the easiest to setup and lowest cost high availability solution for running Oracle on Linux. Additional automation provided in the database allows using scripting and automation tools to achieve file replication.

SUMMARY

The Oracle Internet platform on Linux provides the performance and scalability needed to support the world's most popular web sites, and is designed for efficient application development, superior content management, and successful application deployment on the Internet. Everything companies need to transform data into a powerful application- and content-driven Web environment and keep it available and efficient is included with Oracle8i. When teamed together, the Oracle8i database and the Linux operating system create a powerful and robust platform for developing and deploying a variety of applications.

Free trial versions of Oracle products on Linux are available for download from the Oracle Technology Network at <http://technet.oracle.com/>. Oracle8i on Linux is available for purchase from the Oracle Store at <http://www.oracle.com/>.