

# COST SAVINGS ON ELECTRONIC MAIL THROUGH CONSOLIDATION

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## INTRODUCTION

The rapid growth of the Internet and corporate intranets and extranets call for new messaging scaling requirements while supporting a broad range of user types. At the same time, controlled maintenance costs of such a system are of primary importance to companies wishing to remain competitive. Oracle9iAS Email (OES) is a cost-effective messaging system designed and built to support very large corporate and internet service provider customers. OES is a highly scalable, open standards-based solution for providing electronic mail and directory services. OES's architecture increases the number of concurrent users on the same machine, thereby reducing the deployment cost per user. This superior scalability translates to minimum hardware, simple deployment and low cost of administration. OES's scalable performance, support for industry standards, and use of Oracle Server technology, all contribute to an economical, scalable messaging system as illustrated by the rollout of OES in Oracle Corporation's Data Center.

## MESSAGING AT ORACLE

Oracle Corporation is the world's second-largest independent software company. Founded in 1977, Oracle is now a global corporation with over 55,000 employees in over 100 countries worldwide. Email at Oracle is serious business. Oracle, as a company, simply cannot operate without email. All employees have email accounts, with over 29,000 named email accounts in the United States alone. Every employee uses email to accomplish tasks from obtaining business approvals to distributing documents to sending technical information to closing business deals. Email is part of workflow as well, such as tracking expense approvals, and notifying the right people when a software problem record is updated. Because email is such a vital part of Oracle's business, the messaging system must always be available -- 24 hours a day, 7 days a week, 52 weeks of the year. As a fast-moving company that relies heavily on electronic messaging to do business, Oracle requires a system that:

- Handles the messaging needs of its employees
- Grows with an ever-increasing number of employees
- Supports those employees in widely disparate physical locations
- Handles mobile users
- Sends and receives messages in a timely manner
- Is reliable, and
- Is cost-effective.

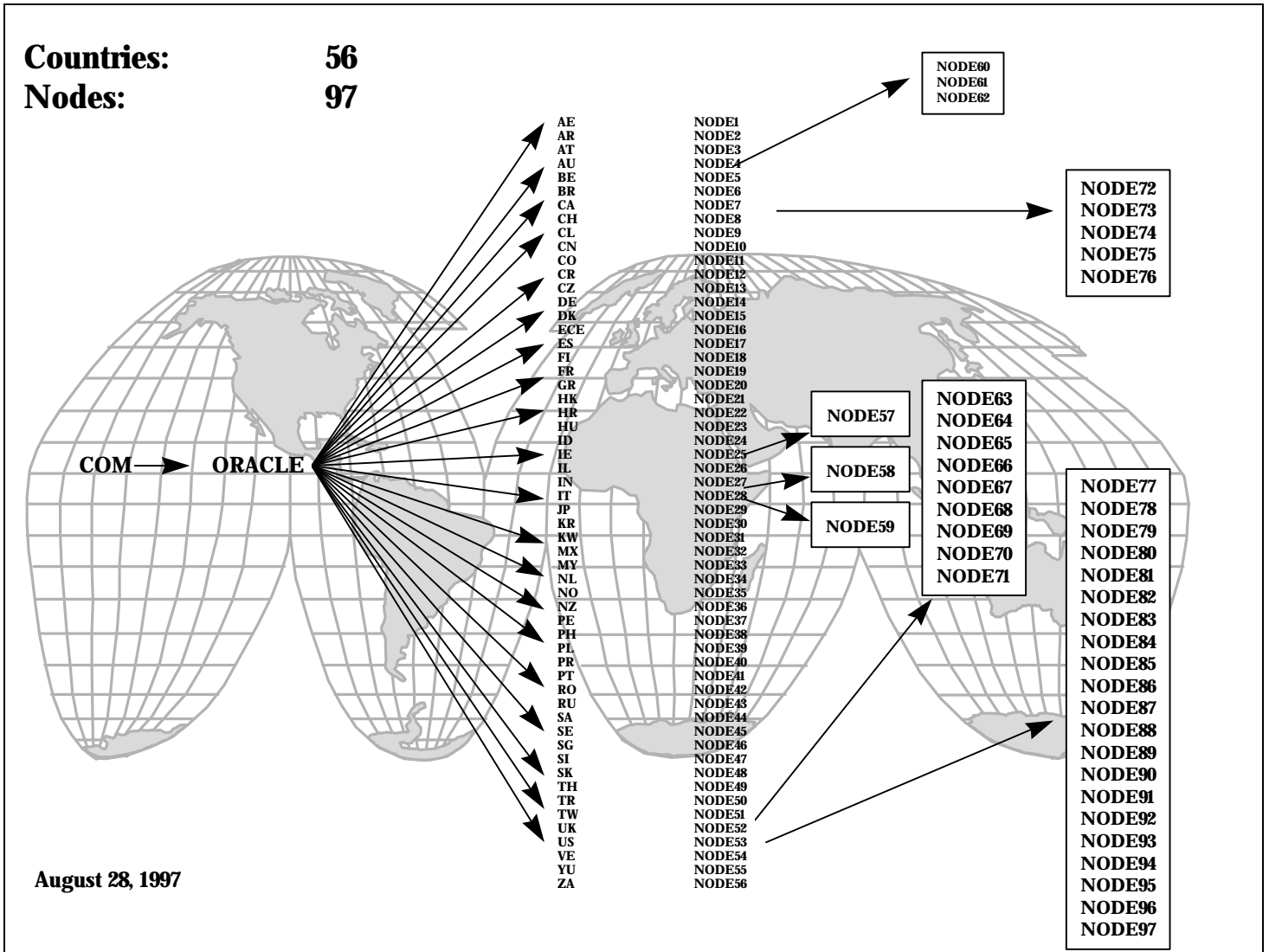
## BEFORE CONSOLIDATION

In 1997, the messaging system for 33,000 Oracle employees worldwide consisted of:

- 97 servers
- 120 message stores
- Proprietary email clients, and
- 50 data centers, about 1 per country

Oracle's messaging system at that time actually consisted of many smaller systems. Not all servers ran same versions of application software, not all servers were on the same platform (hardware or operating system), and the servers themselves were geographically scattered. There were 120 message stores worldwide. The system required 60 administrators because

there were multiple systems all over the world. Furthermore, the Oracle system did not consist of a single domain (e.g. oracle.com), but subdomains of oracle.com based on country (e.g. us.oracle.com).



*Historical Oracle messaging domain tree and nodes*

Not only was the existing system inefficient to administer, the scattered servers and messaging stores did not make the most of available technology, affecting performance. Many servers performed the same job for the various subsystems. A larger server that was possibly underutilized in one subsystem could not be used to share part of a smaller struggling server's load in a different subsystem. All of these factors contributed to the high cost of maintaining Oracle's existing messaging system.

### THE GOAL: COST REDUCTION

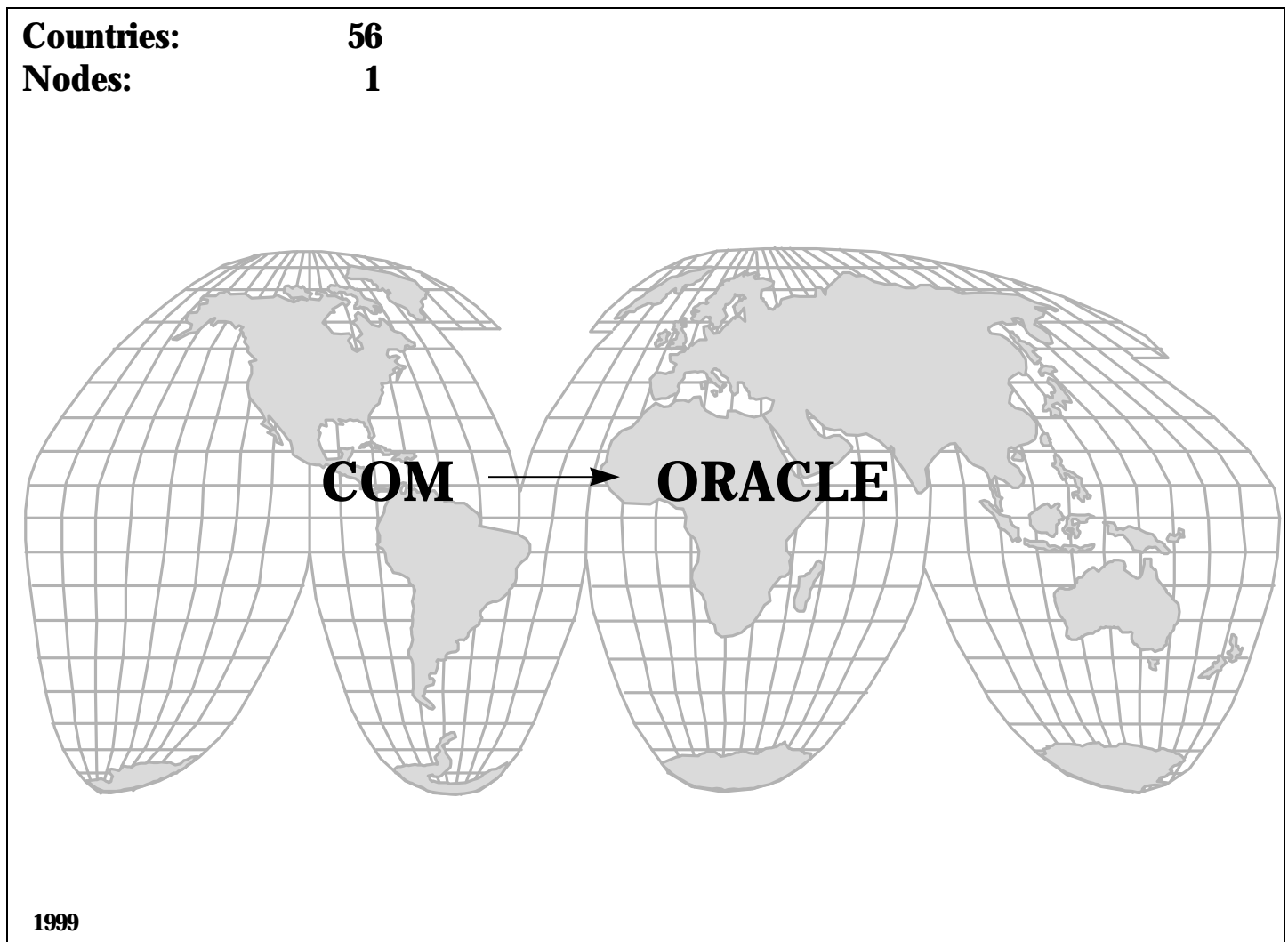
Oracle's overall goal was to reduce the cost of maintaining the messaging system while still meeting the messaging needs of a company expected to, and did, grow to 55,000 employees by mid-2000. Reliability, scalability, and performance were also essential, given the importance of messaging in Oracle's business. A company the size of Oracle, being serious about email, demanded that the redesigned company messaging system:

- Reduce the number of servers and databases needed for messaging system

- Implement a company-wide system rather than individual systems per country
- Work with standard messaging clients
- Improve performance and scalability to address the needs of a constantly increasing number of employees
- Provide reliability and fault tolerance.

## **SOLUTION: CONSOLIDATION**

Oracle's IT department decided that the best way to meet the first two goals was consolidation of the various subsystems into one company-wide messaging system.



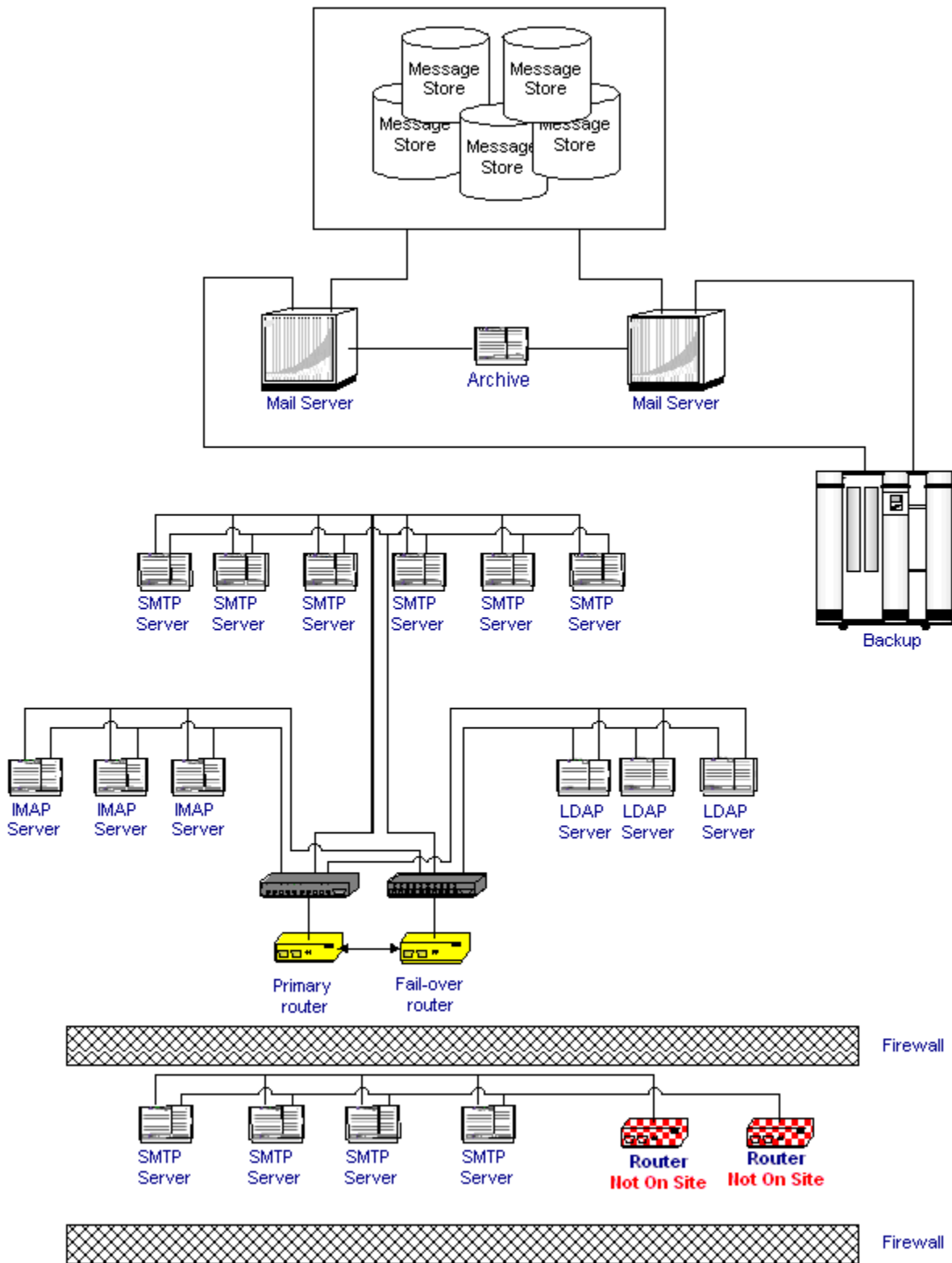
*Goal of Oracle messaging consolidation: single instance, single domain*

But reducing the amount of hardware was only part of the solution to Oracle's messaging needs. To be able to run a company-wide, enterprise messaging system on a minimum number of servers required software designed for that environment. Oracle's IT department researched the available software that would be able to support tens of thousands of users globally on a single instance. The Oracle Data Center decided that the best solution would be to install an OES middle tier with Oracle9i databases as message stores, and have all employees use an Internet Message Access Protocol version 4 (IMAP4) Internet browser as an email client. The heart of Oracle's new messaging system would be OES working with

Oracle 9i databases, which satisfied the new system's requirement of allowing the use of standard email clients to enhancing the performance of the new system. OES allows customers to easily access messages using any IMAP4- or Post Office Protocol version 3 (POP3)-compliant client. The Oracle messaging system would then be transformed into a three-tiered architecture. Finally, to provide fault tolerance, the messaging servers containing the data would be high availability clusters with hot backups in a different geographic location.

### **SOLUTION SYSTEM**

- 1 high availability cluster with 2 nodes
- 5 database instances
- 3 global LDAP directories with failover
- 10 (6 incoming, 4 outgoing) SMTP servers with failover
- 3 IMAP servers



*Architecture of new Oracle single instance messaging system.*

## **BENEFITS REALIZED**

The new globalized messaging system has many advantages for Oracle. The benefits of the final solution, all of which contribute to the end goal of cost savings, include:

- Reduced hardware requirements
- Better administrative control
- Choice of industry standard email clients
- Ease of use for employees
- Better performance, scaling
- Fault tolerance

## **LESS HARDWARE**

The reduction of the number of machines in the company messaging system means less money has to be invested in hardware, and the money budgeted for hardware can be used more judiciously to purchase more powerful machines where needed in the system. The consolidated system is also more efficient because it makes the most of all components. Supporting a larger user population on fewer pieces of hardware on a global system is possible because the servers are used around the clock. Not all users access the servers at the same time because not all employees are in the same time zone. The more efficient allocation of resources by using fewer pieces of hardware to support an increased number of users means more performance at a lesser price.

## **EASIER ADMINISTRATION AND MONITORING**

With Oracle's new system, all users company-wide use the same messaging system. Administration of the new messaging system is required for only five message stores on two machines (a single cluster) at one physical location. Administration is only required for a single release of software on a single technology stack, easing the task considerably. Any necessary changes to the system can be made much more quickly and reliably because of the consolidation of the system. Administrators can simultaneously manage any of the system's component hosts, such as message stores and IMAP servers, from any point on the network using an intuitive, Java-based Administration Tool. The Administration Tool is available on multiple platforms, including Windows 95, Windows NT, and UNIX-based environments.

A consolidated messaging system is also easier to monitor. With fewer queues and fewer components, a smaller group of people can keep watch over the system and dedicate themselves to correcting issues that are placing the service in jeopardy before those issues cause the service to fail.

## **INDUSTRY-STANDARD CLIENTS SUPPORT**

Oracle employees have many roles. Thousands of employees who use UNIX machines prefer particular email clients. The Oracle sales force lives on laptops and prefer different email clients. Some employees telecommute and access their email using one client at work and another at home. The Oracle Data Center requires support for an industry-standard email interface that allows employees to use the client most appropriate to their jobs at different times. Use of industry standard email clients also avoid incurring additional costs to build and maintain custom clients to access messages.

The Oracle Data Center chose IMAP4 clients because IMAP4 affords Oracle many things that the company requires. All messages can be controlled and administered in a central place. The mobility of the employees makes it easier to keep the messages in a central place to avoid synchronization problems. Employees who telecommute see the same inbox on their work systems as they do on their home systems. Furthermore, OES's support for industry standards allows employees the

flexibility to change messaging clients. For example, users on the road can access their messages as long as they have access to an IMAP4 client without need for proprietary software, thereby preventing the possible loss of business opportunities.

## **GLOBAL LDAP DIRECTORY**

Another benefit of Oracle's new consolidated messaging system is a global lightweight directory access protocol (LDAP) directory service. OES works with any directory that is compliant with the LDAP standard. This means that any LDAP-based client can access information in the directory, and directory information can be easily synchronized with any other LDAP-compliant directory.

For directory services, the Oracle Data Center uses the LDAP-compliant Oracle Internet Directory (OiD) product. OiD is an LDAP v3 compliant, multi-process, multi-threaded directory server built on Oracle 9i. OiD supports a multi-master replication configuration that is used in the Oracle Data Center. The three OiD nodes in the data center each contain employee information for all the employees in the company. The employee data is replicated on all nodes. Being a multi-master replication network, the directory data can be updated on any node. Changes on one node are pushed to others by the OiD replication server.

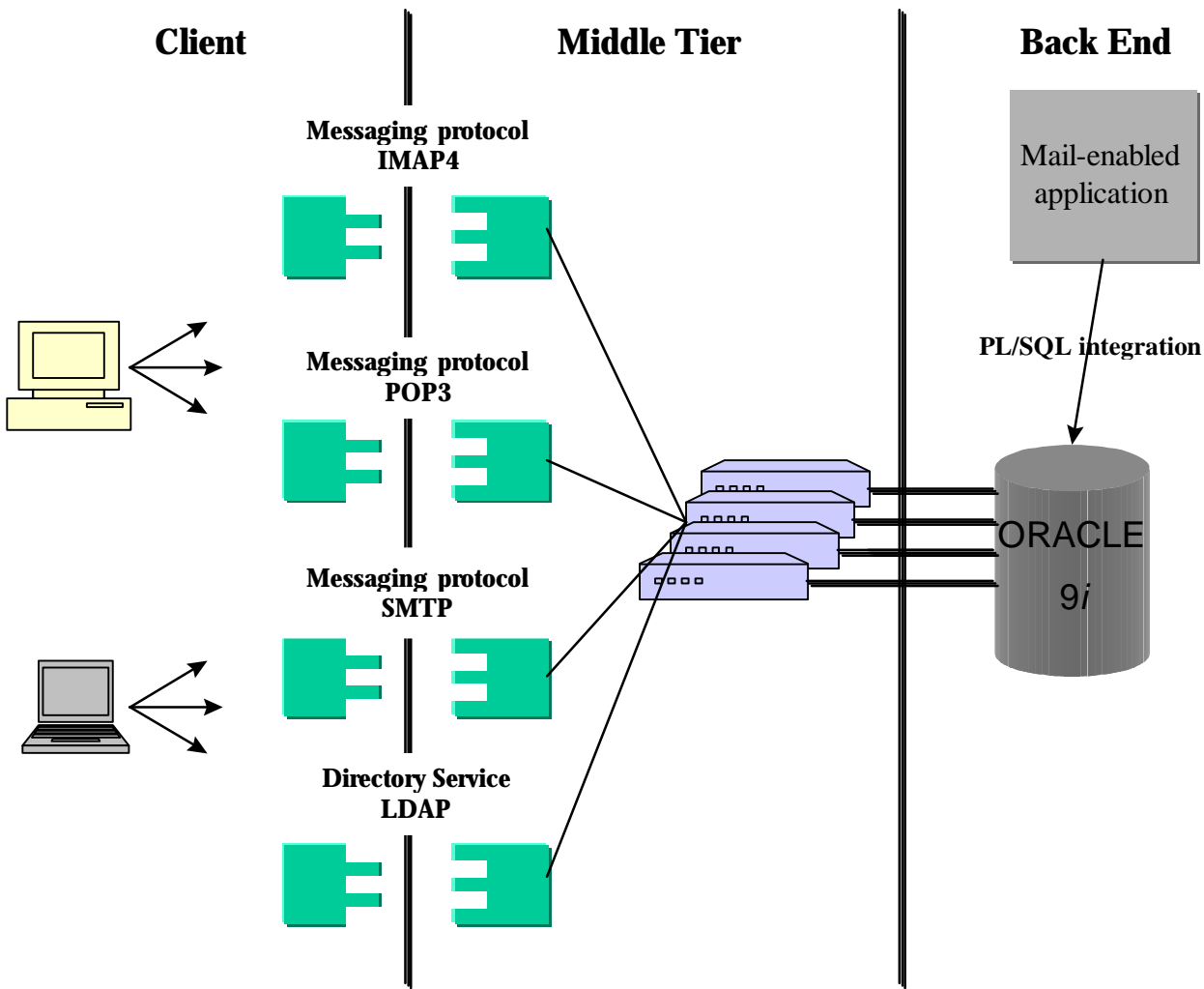
A single OiD directory for all of Oracle makes it easier for employees to look each other up. Users no longer need to look up employees by country, but just by name in a single worldwide directory. Furthermore, the use of OiD by OES in email address checking saves time by allowing users to correct mis-addressed emails immediately rather than finding out about the error when a bounced message is received.

## **NATIONAL LANGUAGE SUPPORT**

Both OES and OiD provide support for multiple languages. Because OES provides multibyte support, eastern European and Asian languages are supported. This meant that Oracle employees in over 100 countries around the world can use standards-based clients to access email in their native languages.

## **BETTER PERFORMANCE AND SCALING**

OES's scalability and performance are achieved through multithreading, load balancing, and database connection sharing to reduce resource requirements and increase the number of IMAP4 or POP3 clients that can be concurrently serviced. OES partitions the messaging workload into two distinct tiers. The middle tier acts as a protocol negotiator, allowing the translation of LDAP, IMAP4, POP3 and SMTP protocols into direct database queries. Each middle tier server multiplexes the internet protocol requests over a relatively small number of database connections. This middle tier of protocol listeners work independently of each other so servers can be added one at a time as growth dictates, providing linear scalability. No data resides on this tier, so the demands for nearly zero down time can be relaxed as surviving servers fill in for a failed node. Not requiring the five nines "99.999%" uptime for the individual middle tier servers reduces this tier's cost of ownership. A protocol tier existing apart from the data repository reduces costs because smaller "commodity-level" hardware can be utilized for 'data-less' tiers. More expensive hardware with high availability components can then be dedicated to the tier holding the data.



OES stores all configuration, directory, and message content on an Oracle 9i database server. OES takes advantage of Oracle 9i's multithreading, parallel processing, high availability support, and high performance so thousands of users can run with rapid response times.

### FAULT-TOLERANT

Fault tolerance is a major requirement for Oracle's new messaging system. Because so much of Oracle's business is done through messaging, constant access to emails in the consolidated system is crucial. OES works with Oracle 9i's Oracle Parallel Server to provide a highly available messaging system to a company whose business relies heavily on email. With Oracle's new message stores in five Oracle9i instances running on two high availability (HA) clusters, node failure on the back end does not preclude data access because all data can be accessed from any node. Data integrity is maintained because committed work on a failed node is recovered automatically without administrator intervention and without data loss.

In the middle tier, failure of a single node can be easily load balanced across surviving machines on this tier because OES does not store data there. Oracle's new messaging system uses multiple servers, labeled the IMAP servers in the single instance architecture diagram, running OES in the middle tier, which are load-balanced. A failure of any of these machines

simply means that users are redistributed among the surviving machines without loss of service. Similarly, OiD has a failover system.

## **CONCLUSION: PERFORMANCE UP, PRICE DOWN**

Electronic messaging is an inherent part of companies doing business on the Internet today. Providing the messaging needs of these companies' employees while delivering the performance and reliability required is a challenge. Keeping the costs of such a vital system down requires software that can make the most of a smaller amount of hardware. Oracle achieved this by using OES, along with OiD and the Oracle 9i database server in a powerful, fault-tolerant messaging system to serve the company worldwide. The overall cost savings of consolidating Oracle's messaging system from a widely dispersed network of many servers to a centralized system of two high availability clusters using OES are roughly \$11 million per year. Along with the dollar savings, Oracle also has a system that is easier to administer, support for standard clients to meet the needs of a mobile employee base, and a fault tolerant system that can grow with the needs of the company. By using OES, Oracle9i and OiD in a consolidated messaging system, Oracle saves millions of dollars in IT costs while providing employees with a performant, flexible, reliable messaging system for doing business on the Internet.