

SQL*Net Version 2 on MVS

The cornerstone of client/server architecture is the network. Since MVS is a proven, durable, and high-performance mainframe server environment, the Oracle7 product set on this platform must include exceptional networking facilities.

SQL*Net Version 2 fills this role. Enhancements to the generic SQL*Net architecture allow Oracle7 servers to perform some of the functions of network bridges and routers for Oracle clients. In addition, the SQL*Net V2 implementation on MVS is more efficient and easier to tune than prior versions.

This article provides an overview of the generic SQL*Net V2 product, and then discusses how it is implemented on MVS and what advantages this new release will bring to the MVS product set.

Generic Architecture

The SQL*Net V2 architecture is based upon a facility called the Transparent Network Substrate, or TNS. TNS is responsible for routing and maintaining client connection requests to the proper destination server. Figure 1 shows TNS in perspective with other architectural elements of an Oracle7 server: TNS uses Oracle Protocol Adapters to communicate with network protocols, and it communicates with the database via the Multi-Threaded Server (MTS).

MTS is a multitasking software layer that allows users to share processes when using an Oracle7 server. With SQL*Net V1 and Oracle Version 6, the system administrator had to assign each client to his or her own process in the server system. Large numbers of concurrent clients would create large numbers of processes on the server, most of which were idle at any given time. By sharing processes between users, MTS reduces the number of processes created in the server system and reduces the amount of system resources needed to service large numbers of clients.

SQL*Net V2 offers other features that improve client/server performance. The communication protocol now used between Oracle clients and servers is full-duplex and completely asynchronous. Version 1 of the product was implemented as a set of remote procedure calls within the "two-task" interface, and was capable only of synchronous half-duplex communication. TNS includes aliasing facilities that allow clients to connect to a server

or group of servers via a simple, mnemonic name. And lastly, TNS includes a "multiprotocol interchange" facility that supports heterogeneous connections between a client and server involving multiple operating systems and network protocols.

SQL*Net for MVS Implementation

Although the MTS is an excellent facility for many Oracle7 platforms, it is not well suited to MVS. MTS was designed for an operating system that uses time-slicing to dispatch processes, whereas the MVS dispatcher is more sophisticated. Users can tune MVS dispatching algorithms for a wide variety of behaviors (including time-slicing), but it is not practical to ask MVS customers to totally reprogram their dispatching methodology in order to use Oracle7.

In any case, Oracle for MVS has always run under the Multi-Processing Monitor (MPM), which shares processes between users. Oracle's IBM development staff designed MPM to take advantage of MVS dispatching algorithms and provide console interface and process monitoring facilities needed on MVS.

Because of these MVS issues, the Oracle for IBM development staff implemented SQL*Net V2 without the Multi-Threaded Server. Fortunately, TNS can interface with Oracle7 via a SQL*Net V1-style adapter. This adapter allows Oracle7 implementations without MTS (a group that also includes many desktop operating systems) to take advantage of SQL*Net V2 facilities.

The SQL*Net V1-style adapter works extremely well on MVS. It runs entirely within the Oracle7 address space, allowing Oracle7 and TNS to communicate

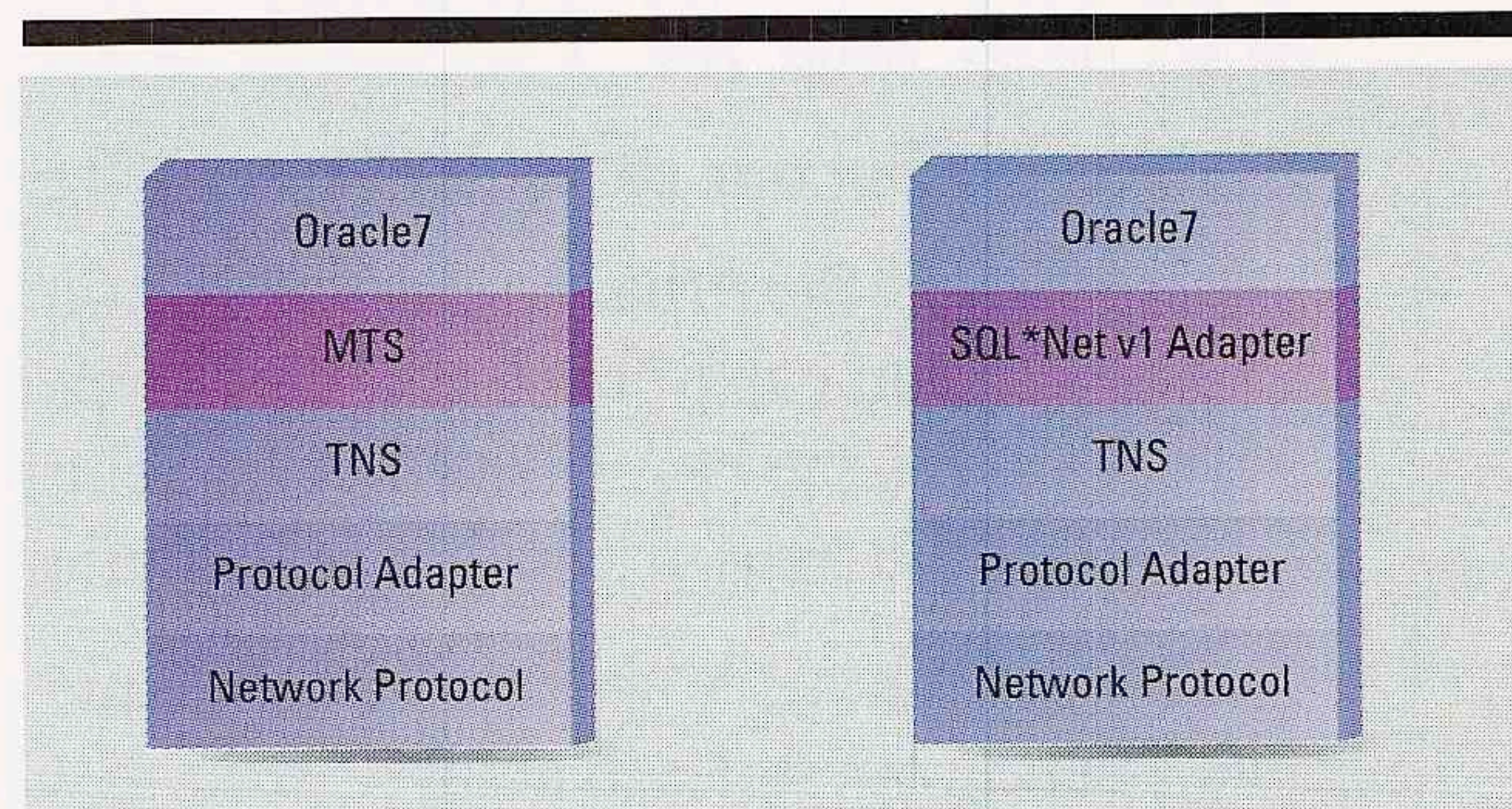


FIGURE 1 GENERIC SQL*NET V2 ARCHITECTURE WITH THE MULTI-THREADED SERVER (LEFT) AND WITHOUT (RIGHT)

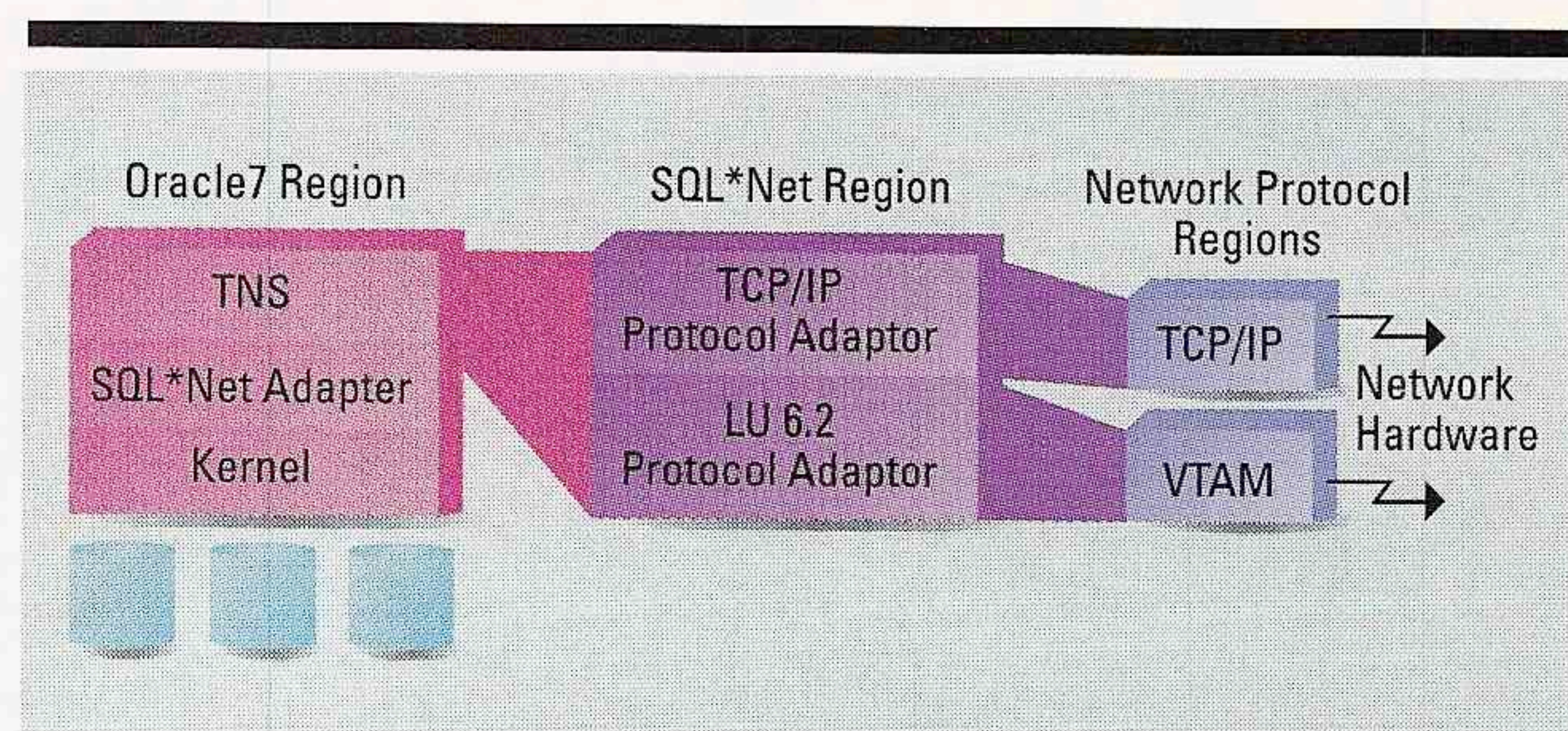


FIGURE 2 ADDRESS SPACE RELATIONSHIPS FOR SQL*NET V2 ON MVS. SHADED AREAS ARE LINKS VIA CROSS-MEMORY SERVICES (XMS)

directly without any network overhead or performance issues. The current SQL*Net for MVS implementation provides most of the features available with TNS:

- full-duplex asynchronous communications protocols
- aliasing facilities
- support for LU 6.2 and three different proprietary versions of TCP/IP

SQL*Net V2 for MVS does not currently support multiprotocol interchange, although there are plans to implement this valuable facility in a future release.

Separate Address Spaces

The most important distinction between SQL*Net Versions 1 and 2 on MVS is that the new version uses a different address space from the Oracle7 server. Figure 2 provides an overview of the relationship between the address spaces. By placing Oracle Protocol Adapters in a separate address space from the Oracle7 kernel, you realize a number of important benefits.

- *A single SQL*Net region can provide network services to multiple Oracle7 servers.* Users can add or drop server regions without altering the network configuration. For example, you can place new Oracle7 regions on an LU 6.2 network with fewer changes to the VTAM network definitions.

- *Network communication functions can run at a different priority than the Oracle7 kernel.* With SQL*Net V1, the network protocol drivers and kernel processes had to run at the same dispatching priority, occasionally causing problems. Network drivers must run at high priorities to achieve good network performance, yet kernel server processes running at high priority can "take over" the entire system. These functions are now dispatched separately, and you can tune them separately for optimal performance.

- *Oracle Protocol Adapters can run in supervisor state.* There are dedicated MVS subtasks running in the SQL*Net region for each network protocol, and these subtasks can take advantage of high-performance features such as the authorized path for LU 6.2. Supervisor state execution provides major performance benefits

for some communications protocols.

- *When you implement the multiprotocol interchange in the SQL*Net address space, it will support heterogeneous connections without affecting Oracle7 performance.* For example, if a client connects via LU 6.2 to a server on the TCP/IP network (see Figure 2), then the SQL*Net region will be able to transfer the network packets directly between the VTAM and TCP/IP networks without affecting the Oracle7 region.

The Future

MVS is an ideal environment for large database servers. MVS processor complexes provide unparalleled reliability, storage capacity, I/O performance, and networking capabilities. The Oracle for IBM development staff has engineered the Oracle7 product set to take advantage of the strengths of MVS, and to become the centerpiece of large, enterprise-wide client/server environments. With the advent of SQL*Net Version 2, the last element is in place to make Oracle7 for MVS a complete solution for large server environments. □

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