LOCK MANAGER: THEORY AND OPERATION

Function: To provide data integrity for a multi-user database when many applications are reading from and writing to the same set of files.

How It Works:

Start Lockmanager. Client applications automatically request a file lock from Lockmanager whenever they open a database. This request causes Lockmanager to establish a persistent connection for as long as the database is open. The connection is associated with a unique user identifier of not more than 15 characters. One identifier exists for each database 'task'.

Client application requests always begin the cycle. Most requests are for 'read locks', where the app opens a database file for reading. Any number of clients can have read locks for the same file, and no client can write to a read-locked file. All write requests are queued until the file is available.

When a client needs to write changes to the database, it first writes the changes to a LOG file. The client then sends a message to Lockmanager requesting permission to write to a file, along with the name of the LOG file it has written. The Lockmanager flags the Userid as being in the process of committing a transaction, then stores the name of the LOG file. If the connection is disrupted, the Lockmanager prepares for AutoRecovery by deleting all user info for that client, and it tells the next client in to perform a recovery based on the LOG file. If the transaction completes successfully, Lockmanager receives an 'end transaction' message from the client and unflags the client's Userid.

The LOG files are all stored on the server, using the first 8 chars of the Userid + .log. Each user's LOG file is therefore unique and cannot be shared. CAUTION: If a site has multiple users with ID's such as Tranportation1, Transportation2, etc., there could be a problem here.

TAF files have two purposes: 1) They insure that all users of a database use the same Lockmanager, and 2) they provide pointers to LOG files for outstanding transactions in the event of a simultaneous Lockmanager and application crash. Each database has only ONE TAF file, and all users must use it. When a client application starts up, it checks for the existence of a TAF file, and creates one if needed. If one already exists, it checks to see if the name and type match the expected. If not, there is a TAFSYNC error. Deleting the TAF file eliminates the error, but also removes the pointers to the LOG files, preventing autorecovery of the database!

How To Setup Lockmanager:

Lockmanager can use either of two protocols to communicate with clients, NetBIOS or TCP/IP. Both ends must be using the same protocol. SEE APPENDIX A for info on protocols. Lockmanager is started with the Eluise.bat file, by inserting a line after the one starting CPA, and before the line starting Eluise. The commands and switches are as follows:

Lmw [-mx[n]] [-a *name*]

The ' –mx' switch tells Lockmanager the protocol to use. Substitute 'b' for 'x' to use NetBIOS.. Substitute 'c' for 'x' if you wish to use TCP/IP instead of NetBIOS. Append an optional digit (n) to declare the LANA number you wish to use. (See Appendix A)The default name is 'lockmgr'. Substitute another name if you wish. If you need more than one lockmanager, set them up using different names, and access them by name from the client side.

How To Setup the Client:

Client-side setup is done by creating a file called 'rdm.ini' which is placed in the \elt\exe\server directory. This file would specify the name and type of the Lockmanager the client should connect to. This entire file is optional if you use the default settings. The following lines are only necessary if you wish to use other than the default settings.

[LOCKMGR]
name=myLockmgr (Default is 'lockmgr')
type=LMC_NETBIOS (Default)
<OR>
type=LMC_TCP
net_timeout=xx (Default is 30 seconds)
delname=1 (If client has problems logging in with same name from another workstation, or to prevent .TAF errors due to crashes)
LANA= x (Default is 000, view through ControlPanel-Network-Adaptors-NetBIOS-Properties. Use the Edit button to change the default. 000-255 are the valid numbers, but they can't conflict with numbers already shown in the Properties box as in use.

ERROR MESSAGE EXPLICATION

- **TAFSYNC –944 Errors**: The current lock manager name and type do not match those in an existing TAF file. Delete the *.TAF file to eliminate this error. CAUTION: Deleting TAF files can prevent recovery if the database has been corrupted! If you end a session and go to another workstation and use the same name or a session crashes and you can't get back online, try adding the 'delname' line to RDM.ini. Lockmgr usually retains the name of users after they've logged out. This causes the name to be deleted immediately when a session ends.

- **LMCERROR –925 Errors**: Application has lost contact with Lockmanager. Result of network problems, crashed applications, or an unexpectedly terminated lockmanager. Restart application, and if necessary, lockmanager. If Lockmanager didn't crash, it's possible the communication problem is being caused by an overloaded network. The client request will be timed out if not answered in 30 seconds. You may increase this setting with a line "net_timeout=xx" in the *rdm.ini* file. Also it's possible that the message buffer is too small.

- **DUPUSERID –921 Errors**: When you open a database in shared mode, Lockmanager adds your UserID to it's name table. Because this process is slow, the name is not automatically deleted when you close your database, so that re-connecting is faster. If you try to re-access the database from a different machine, you will get a '-921 DUPUSERID' error. To have the UserID automatically deleted on close, add the line
  delname=1 to your 'rdm.ini' file under [LOCKMGR].

- **NOLOCKMGR –920 Error**: Start Lockmanager, or check your network connection. If you can ping or browse the server, and Lockmanager is running, be sure that you've specified the correct name and protocol.

APPENDIX A: PROTOCOLS

NetBIOS

NetBIOS is the protocol used by all Microsoft networked computers to communicate with each other. This is the name you gave your computer when you set up networking in Control Panel, and can be up to 15 characters, plus a 16th added by the system.

TCP/IP

Transport Control Protocol/Internet Protocol is the protocol suite used by all computers on the Internet, and the majority of large-network computers. It uses individual unique 32 bit numerical addresses for every computer on the 'Net. These numbers are divided up into 4 'dotted quad' sections, which specify the host's address as well as the subnet and network it is on.

Additional setup concerns for TCP/IP:

Lockmanager, in default TCP/IP mode, will display its address in the caption bar as ' 1 . 2 . 3 . 4 foo.bar.net'. You may connect to it by changing the 'rdm.ini' file to read
name=1.2.3.4 , name=foo.bar.net, or just name=foo if you are on the same subnet bar.net. HOWEVER, EACH computer that uses this Lockmanager MUST use the same format!!!!!!!!!
Lockmanager can be forced to listen on only one LANA channel, instead of the 256 it normally listens on. If this has been done, make sure that you set all clients to use that LANA number as well (rdm.ini, [LOCKMGR], LANA=x). CAUTION: You cannot specify the LANA number for Windows 95 workstations, other than to have the default protocol assigned to 0.