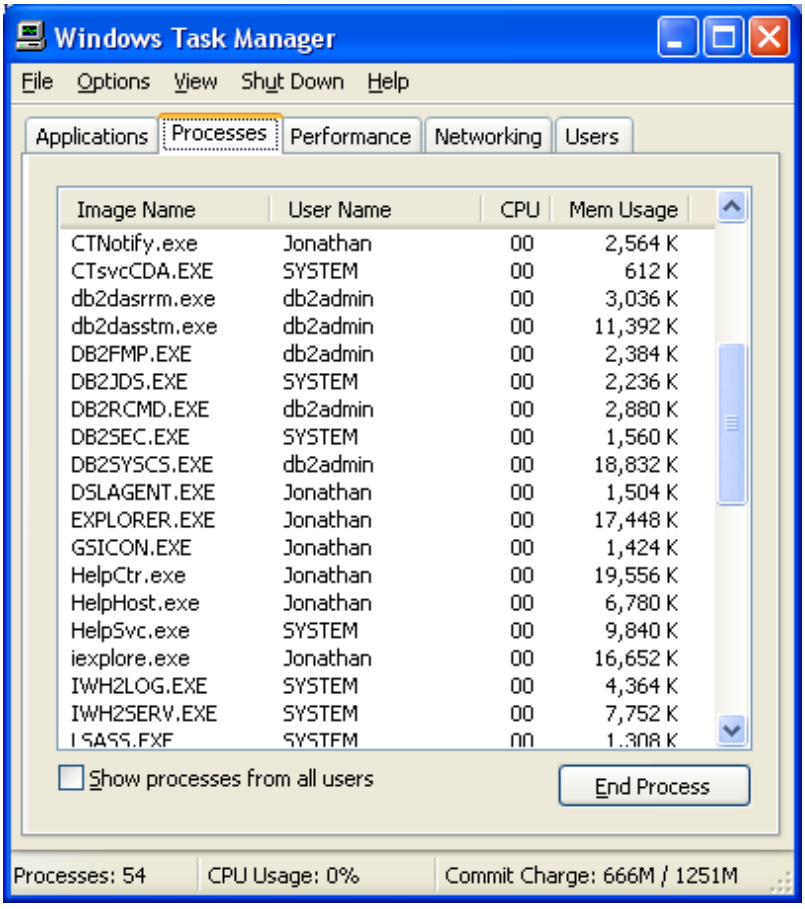
DB2 UDB Installation: DBM and Database

Introduction

This section examines the initial actions we must take when installing and customizing the DB2 UDB database manager and a database. Most of the tasks can be accomplished by using wizards. You can also use system and CLP commands. In the next few pages, we will consider:

- Installation and customisation
- Creating an instance
- Customizing an instance
- Installation documentation

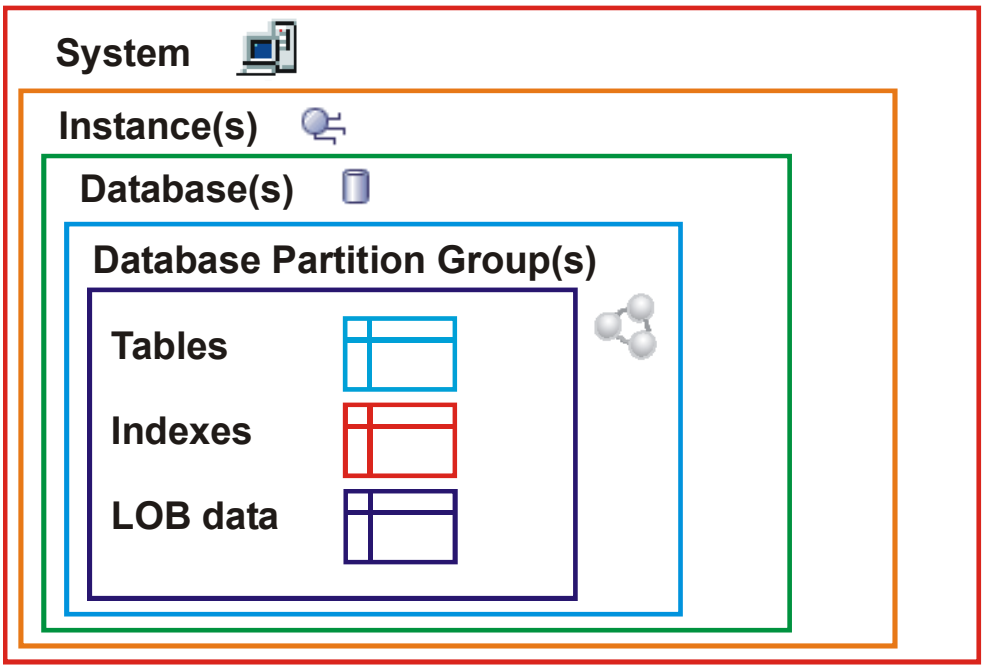
DB2 processes



Each running DB2 system has several processes (threads in Windows) which perform various tasks such as logging, buffer pool processing, security, and deadlock detection.

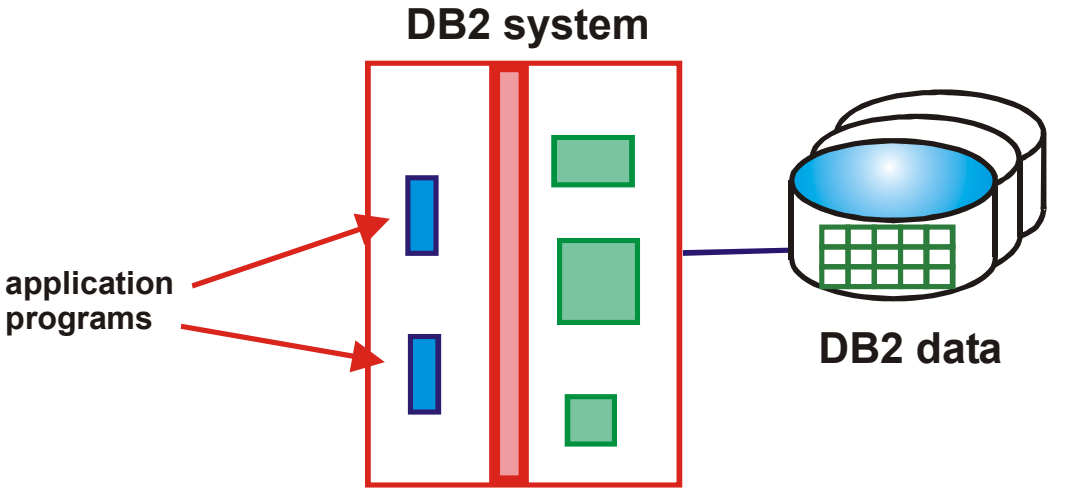
DB2 UDB contains:

- One DBM (Database Manager)
- One or more Databases



DB2 object hierarchy DSA-10

DB2 places a firewall between its internal processes and the requesting client programs. This means that the client programs cannot corrupt the data as they cannot write directly to any internal memory buffers.

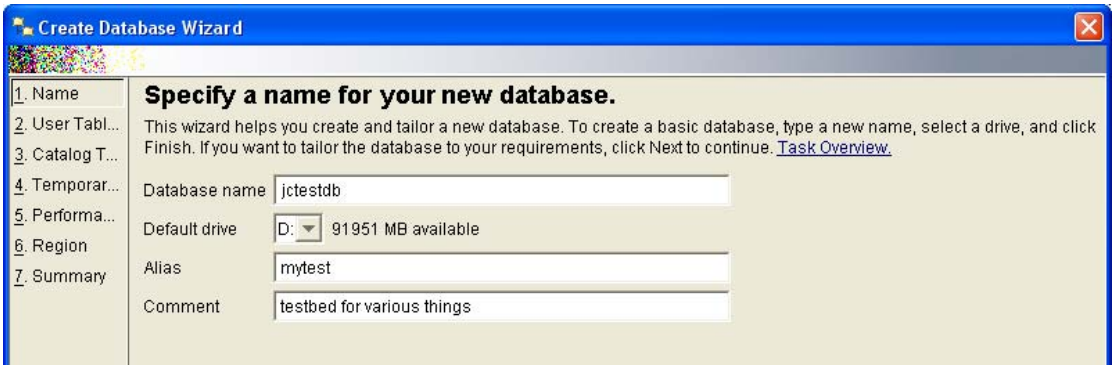


DB2 processes isolated by firewall DSB-10

Creating a database (via wizard)

Each database has the following characteristics:

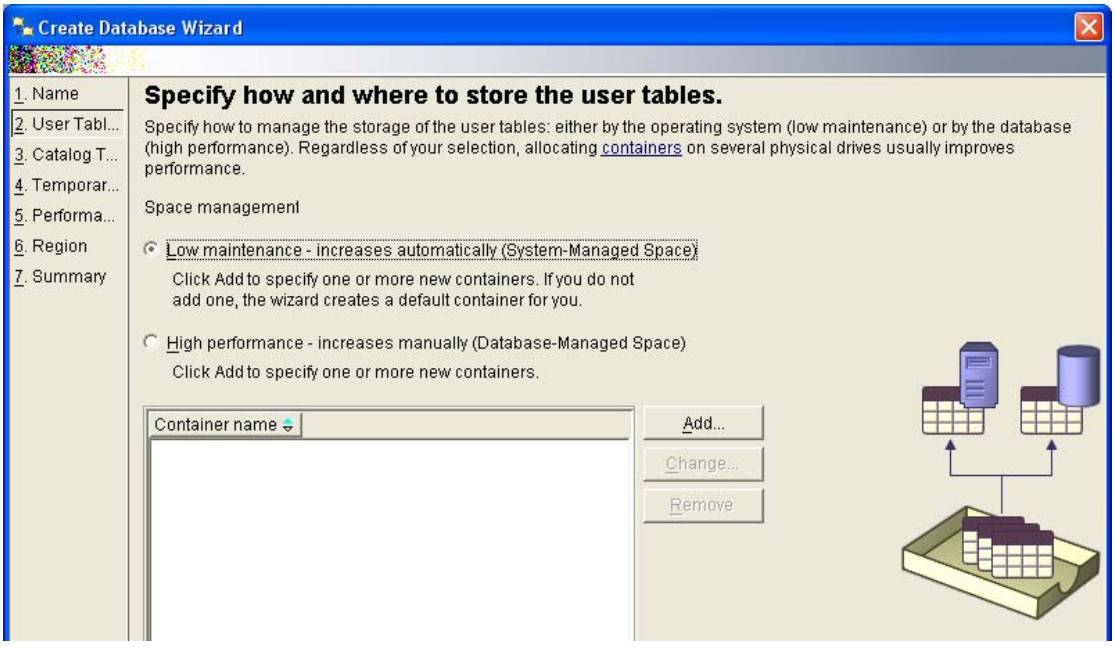
- Unit of start/stop for operations
- Can be backed up/restored
- Holds one or more tables and indexes
- Has its own set of catalog tables (SYSCAT.xxx)



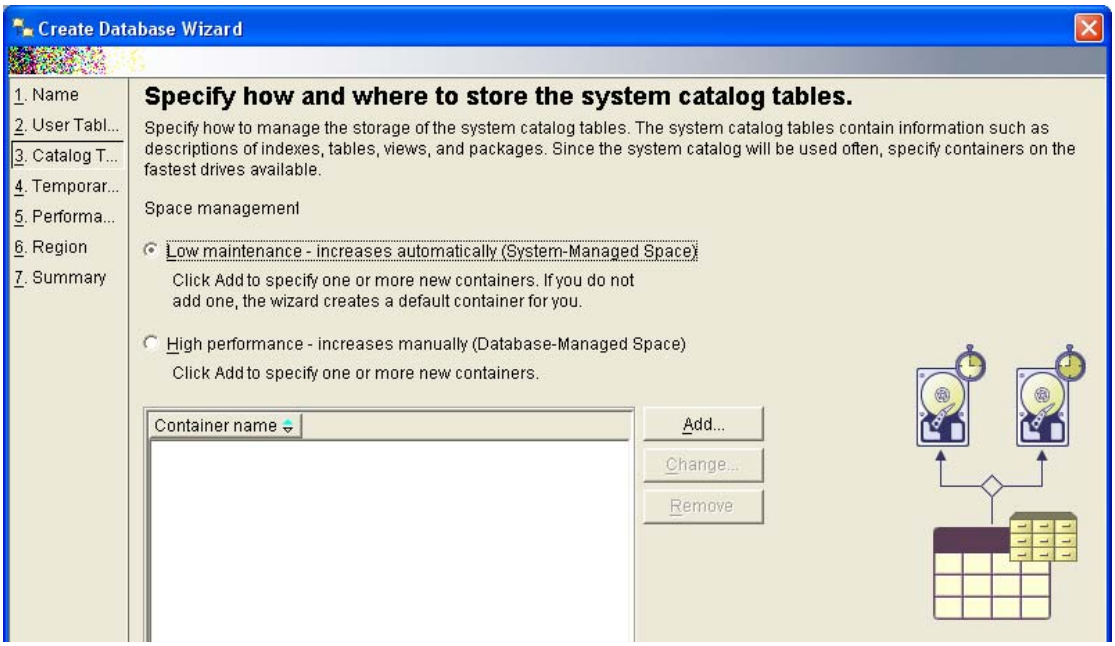
The user data tables can be managed either by the operating system (System-Managed Space) or by the database (Database-Managed Space).

The trade off is:

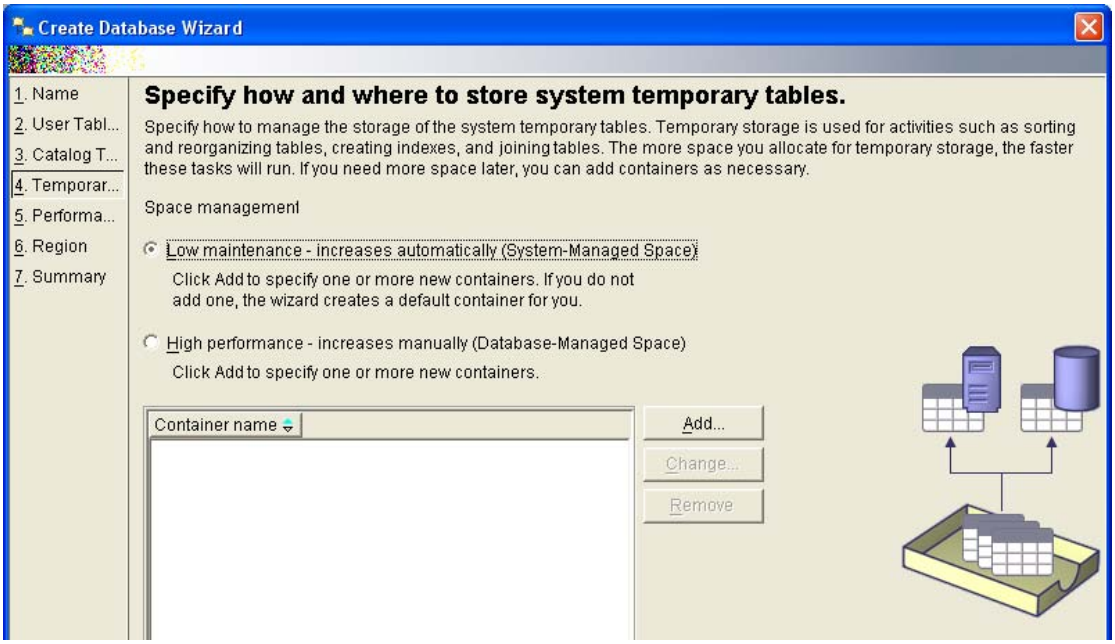
low maintenance vs high performance.



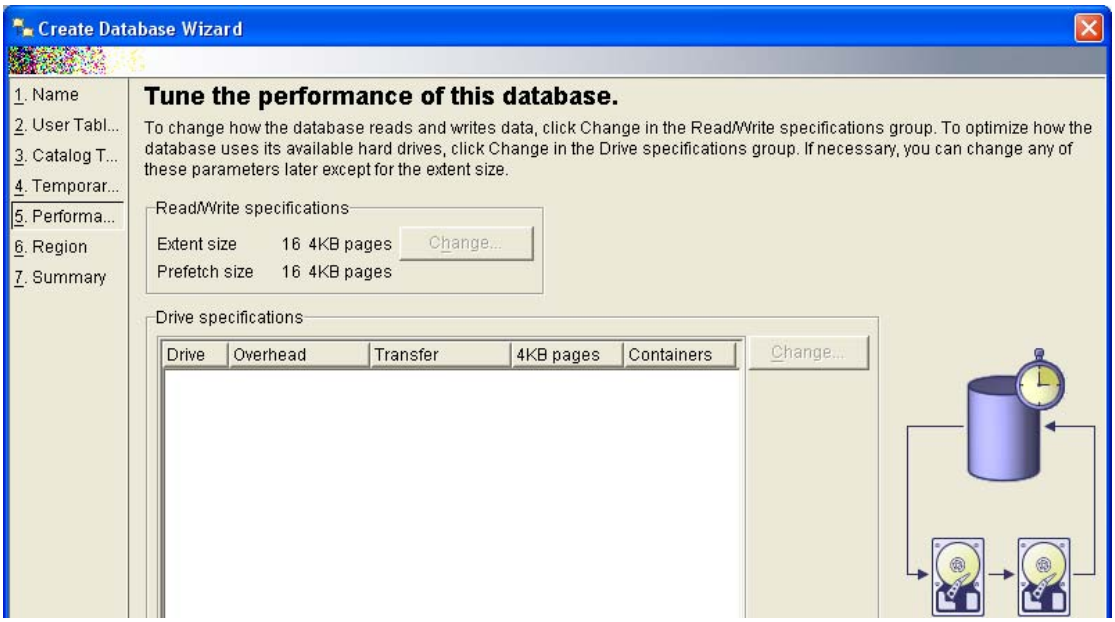
Each database has its own set of catalog tables (SYSCAT.*). These are used to manage the tables, indexes, etc. You must specify where they will reside:



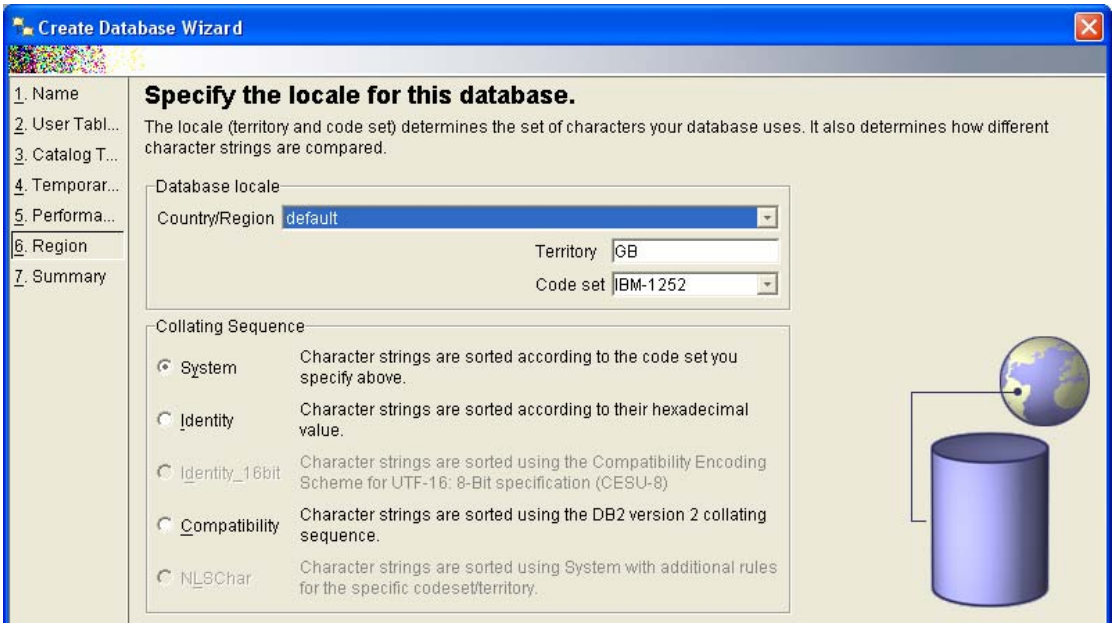
DB2 uses temporary tables during SQL execution. Again, you must specify where they will go:



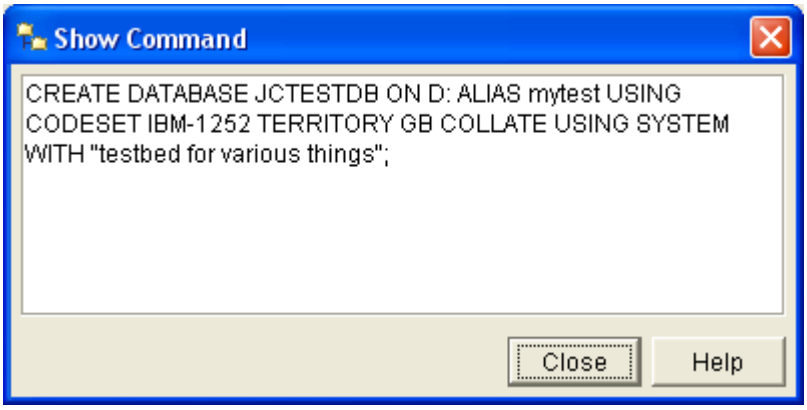
The performance of DB2 is affected substantially by time spent doing I/O operations. You can control the amount of data which is transferred during I/Os:

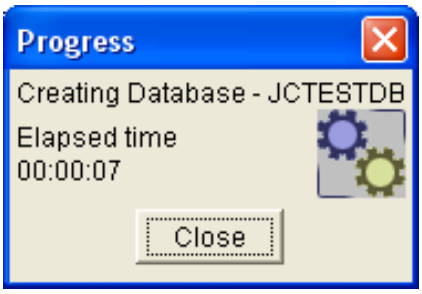


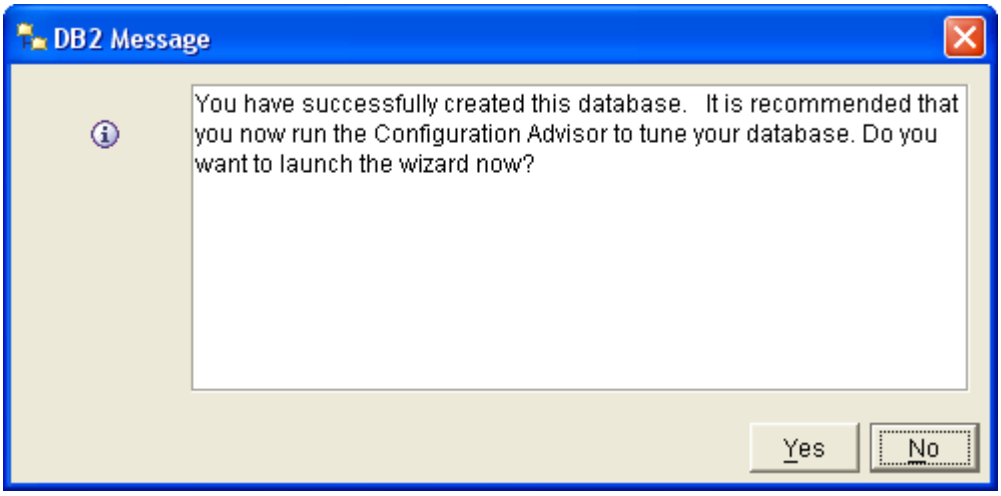
Here, DB2 prompts you for details of the collating sequence.



After the initial details have been supplied, DB2 executes code which creates the database:

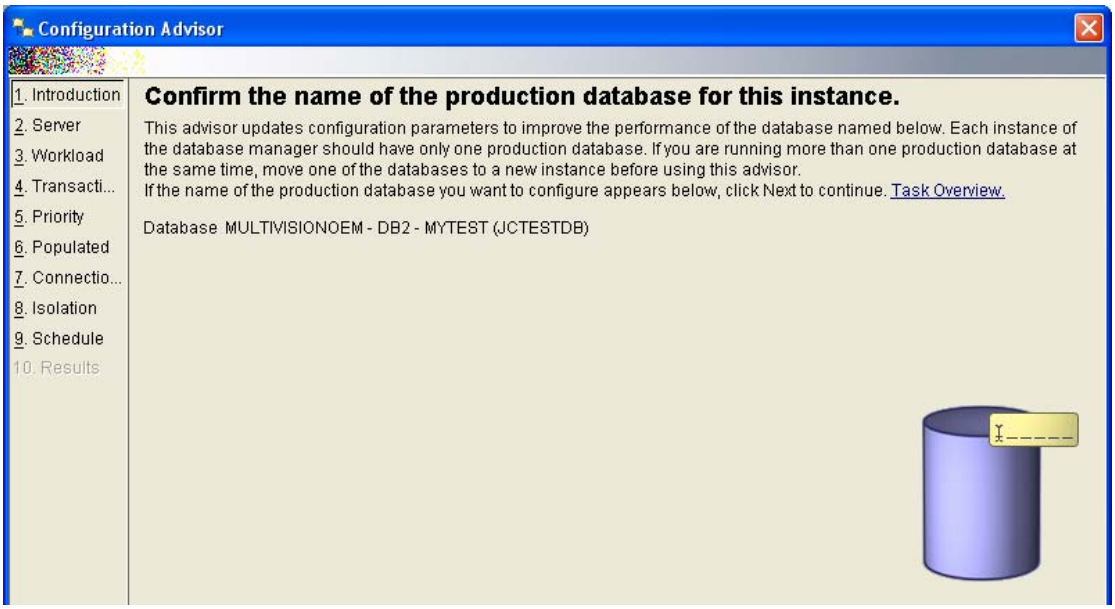




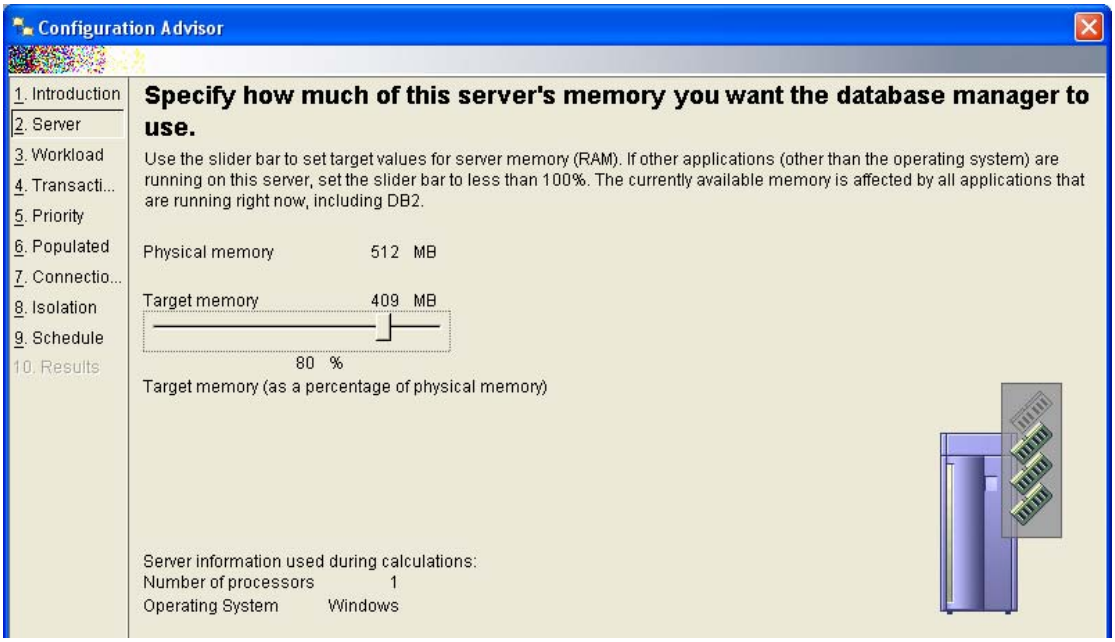


Customizing an instance

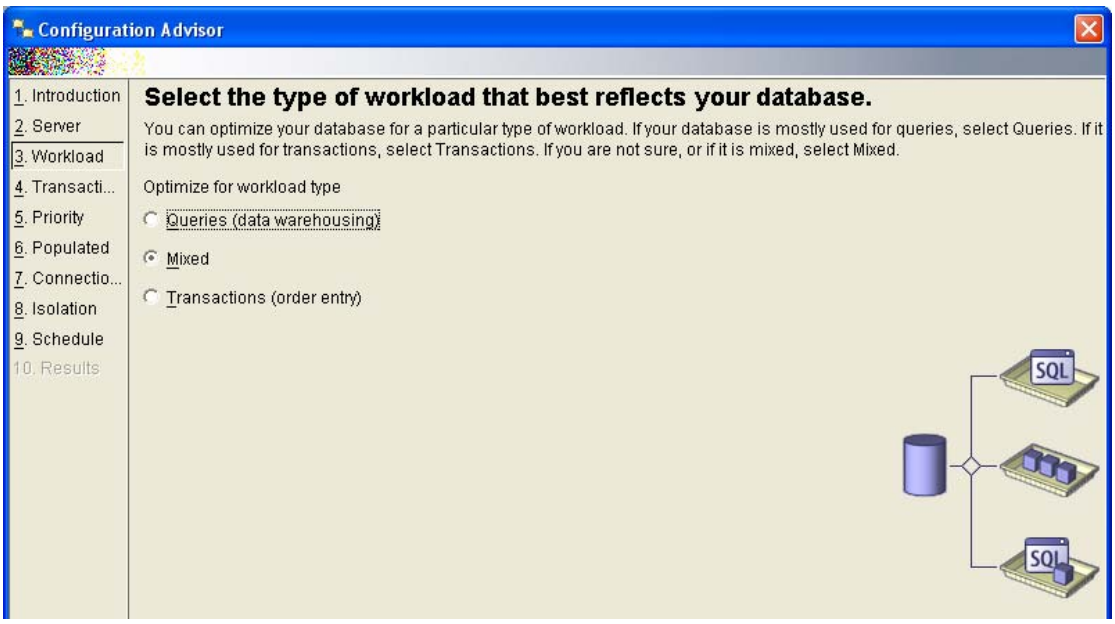
The configuration advisor now prompts you for further details about the anticipated usage of this database.



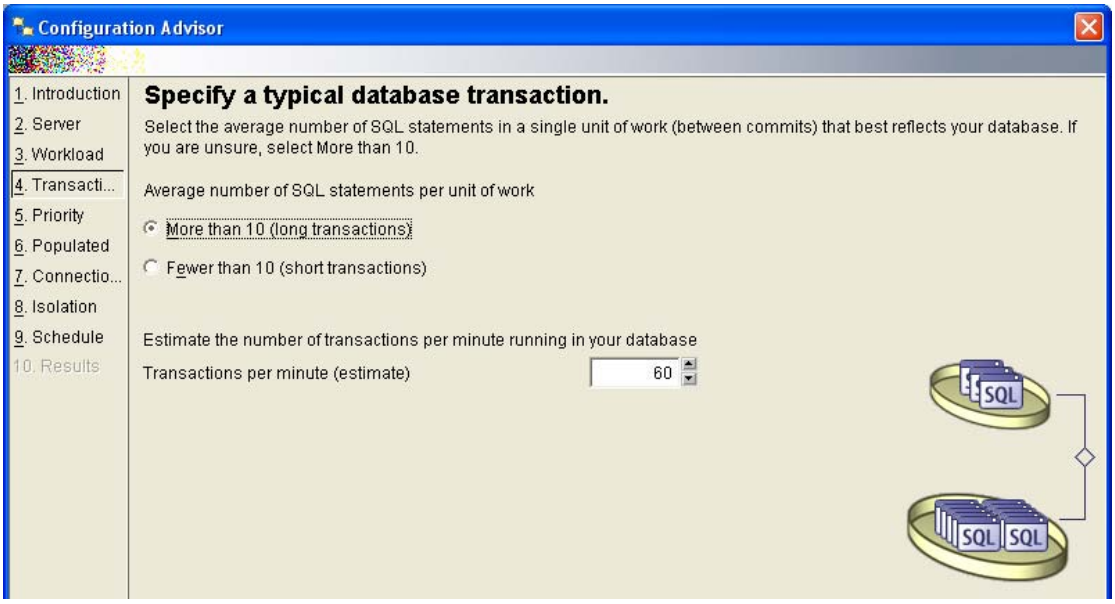
If the server is not dedicated to DB2 work, remember to leave some memory for other tasks.



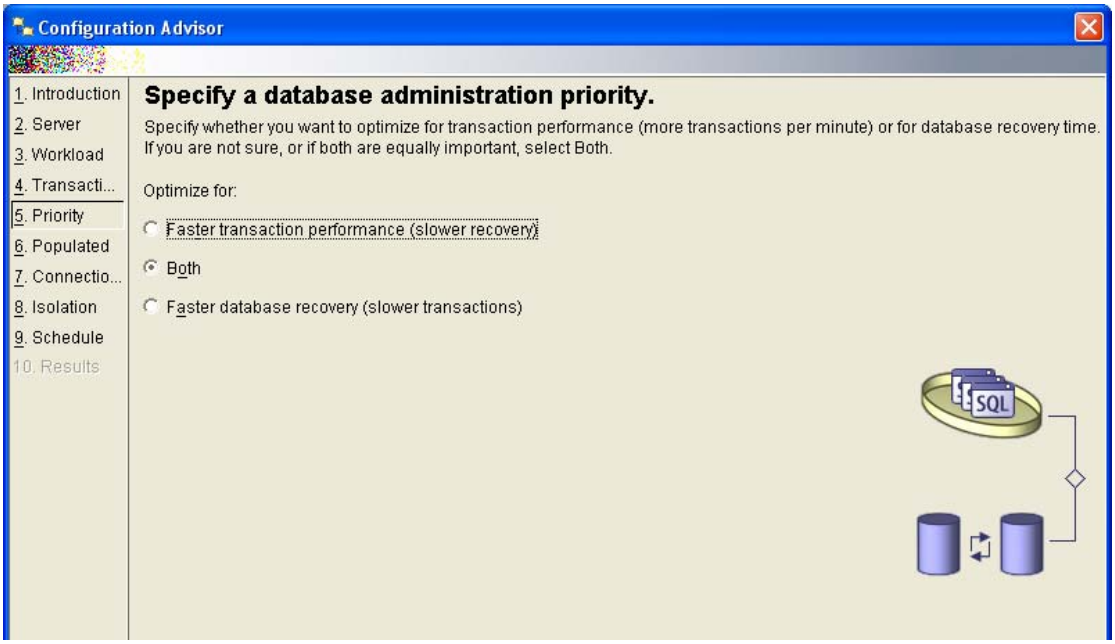
The next screens prompt you for details of the expected workload:



Many UNIX and Windows DB2 systems run packages. Try to find out from the package suppliers how many SQL statements there are in a typical transaction. The information will be used to optimise DB2 performance.

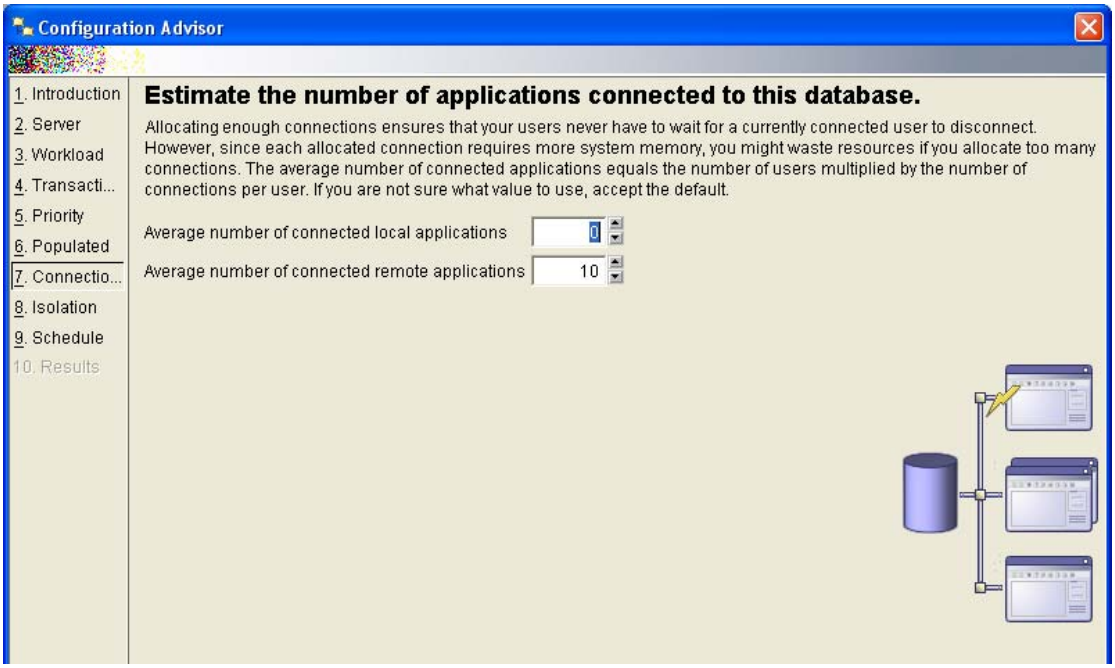


This screen supplies priority preferences.

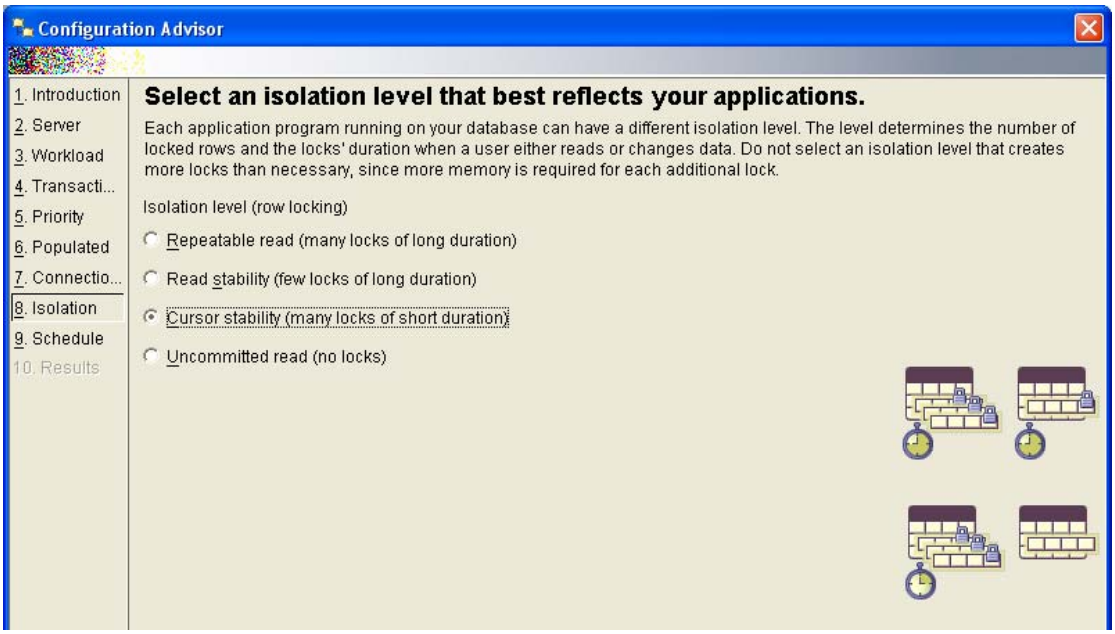


If the database contains data, the catalog tables will hold accurate information which will help DB2 to determine which indexes (if any) would be used when accessing data. Each time the database changes substantially in size, you should run this advisor to refresh the statistics.

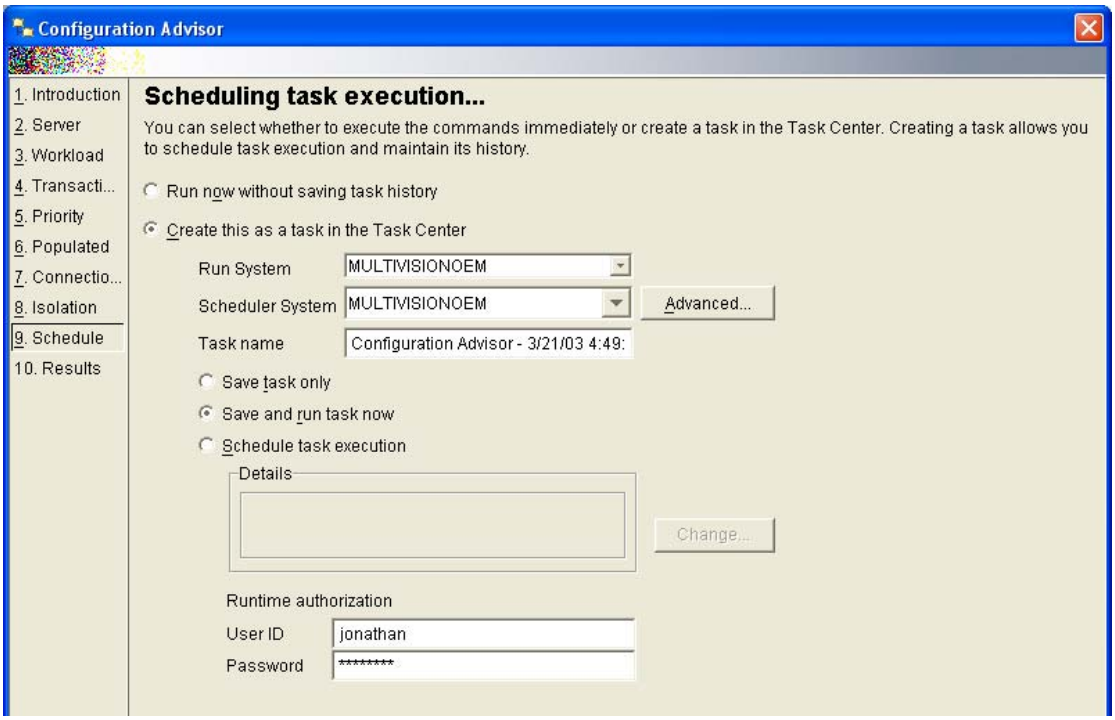
In formation supplied on this screen enables DB2 to plan its memory usage.

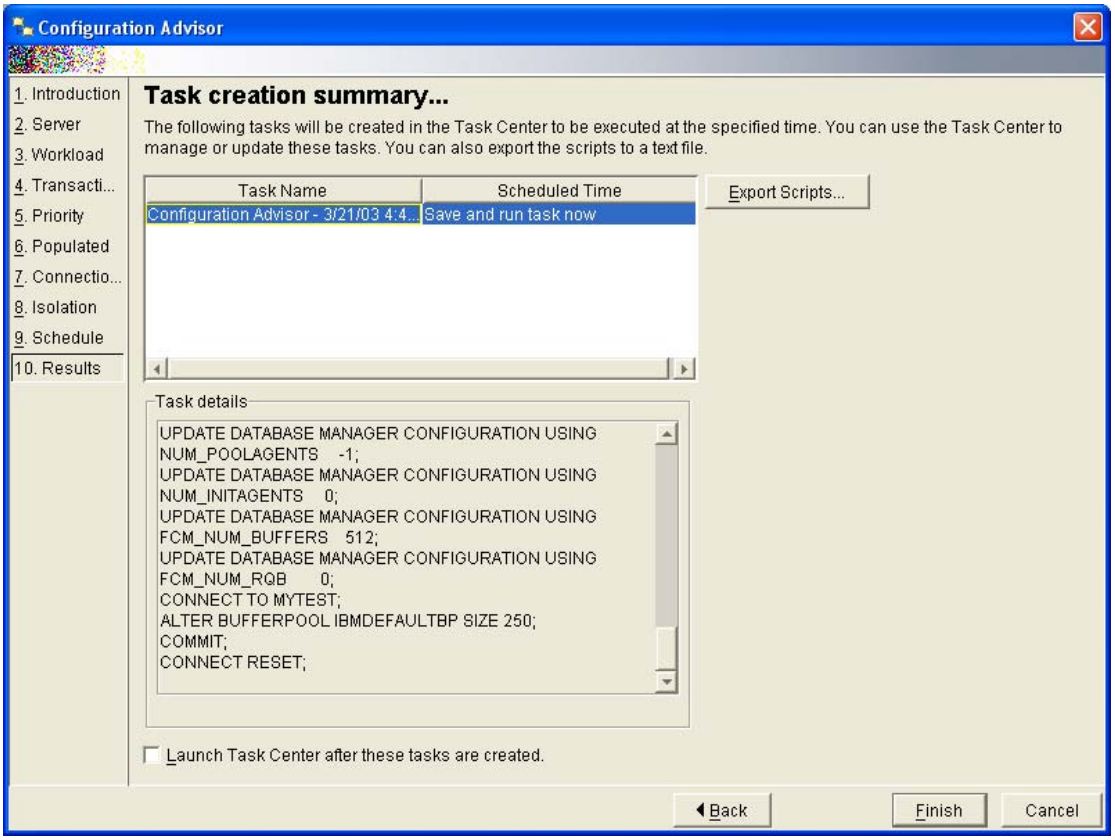


As DB2 access rows in the tables, it locks them. This screen establishes a default for the database. We will examine locking in more detail in a later section.



The information supplied so far has enabled DB2 to construct various commands. These screens prompt you for execution details and then display the results.

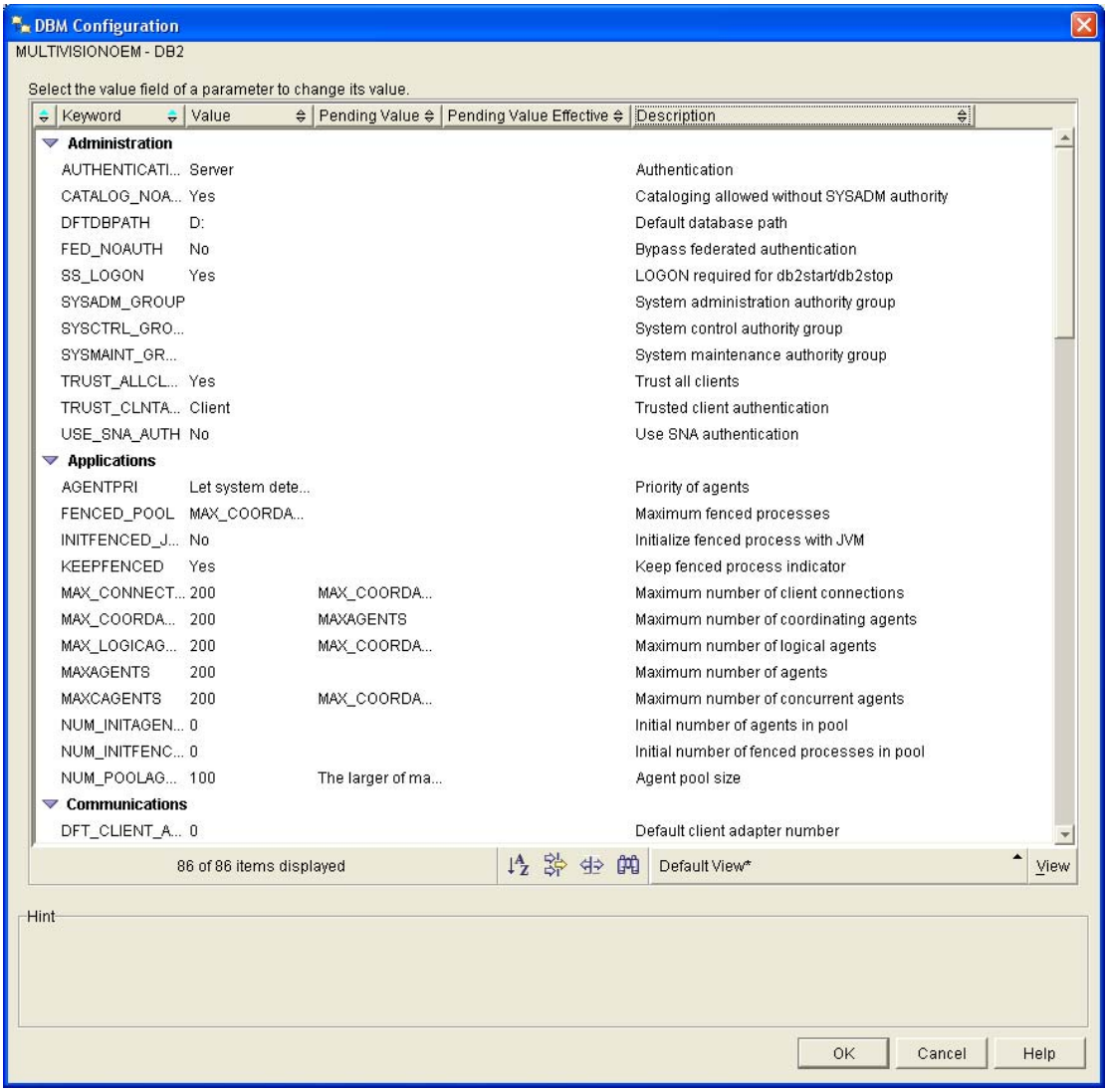


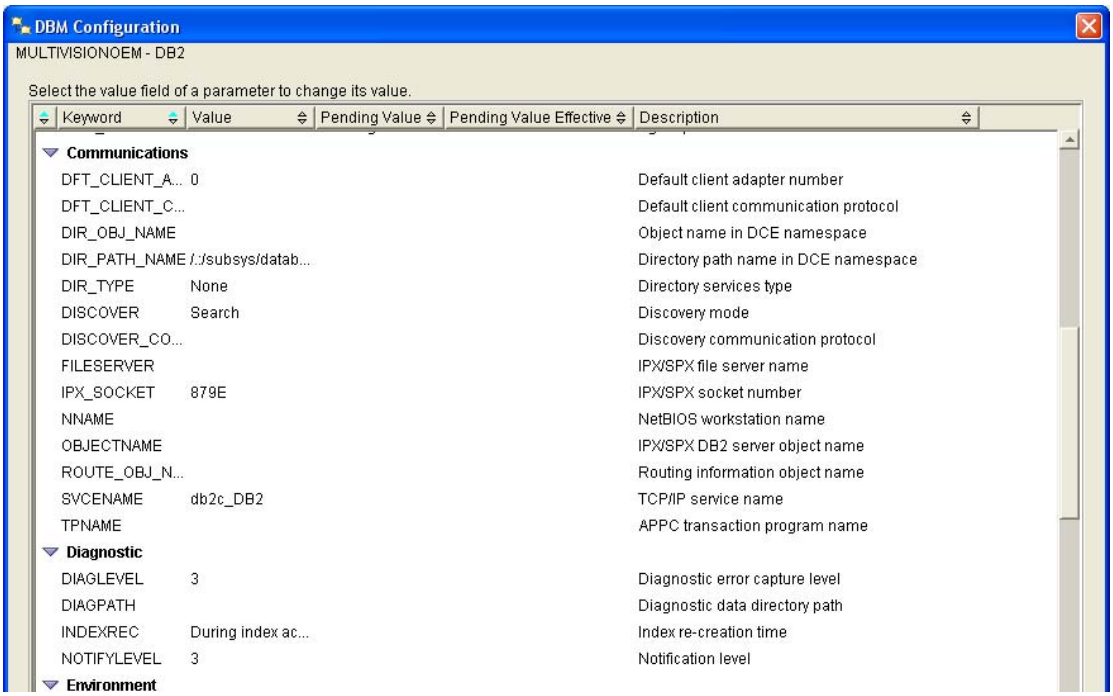


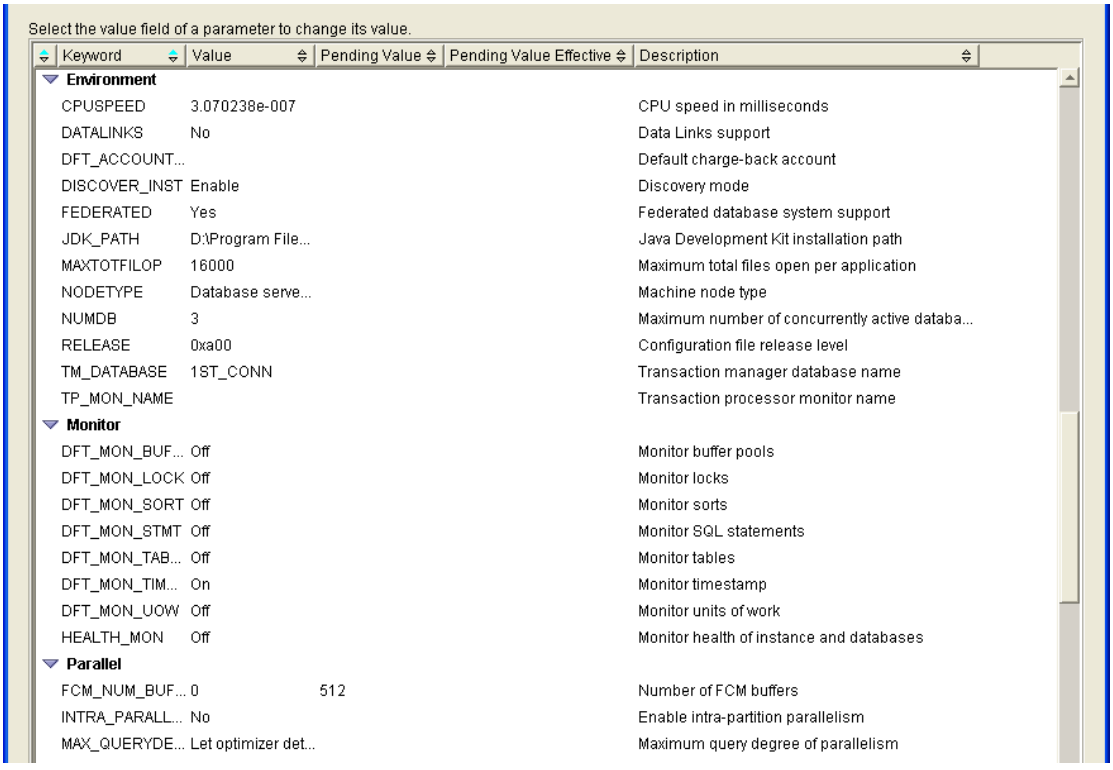
Database Manager Configuration parameters

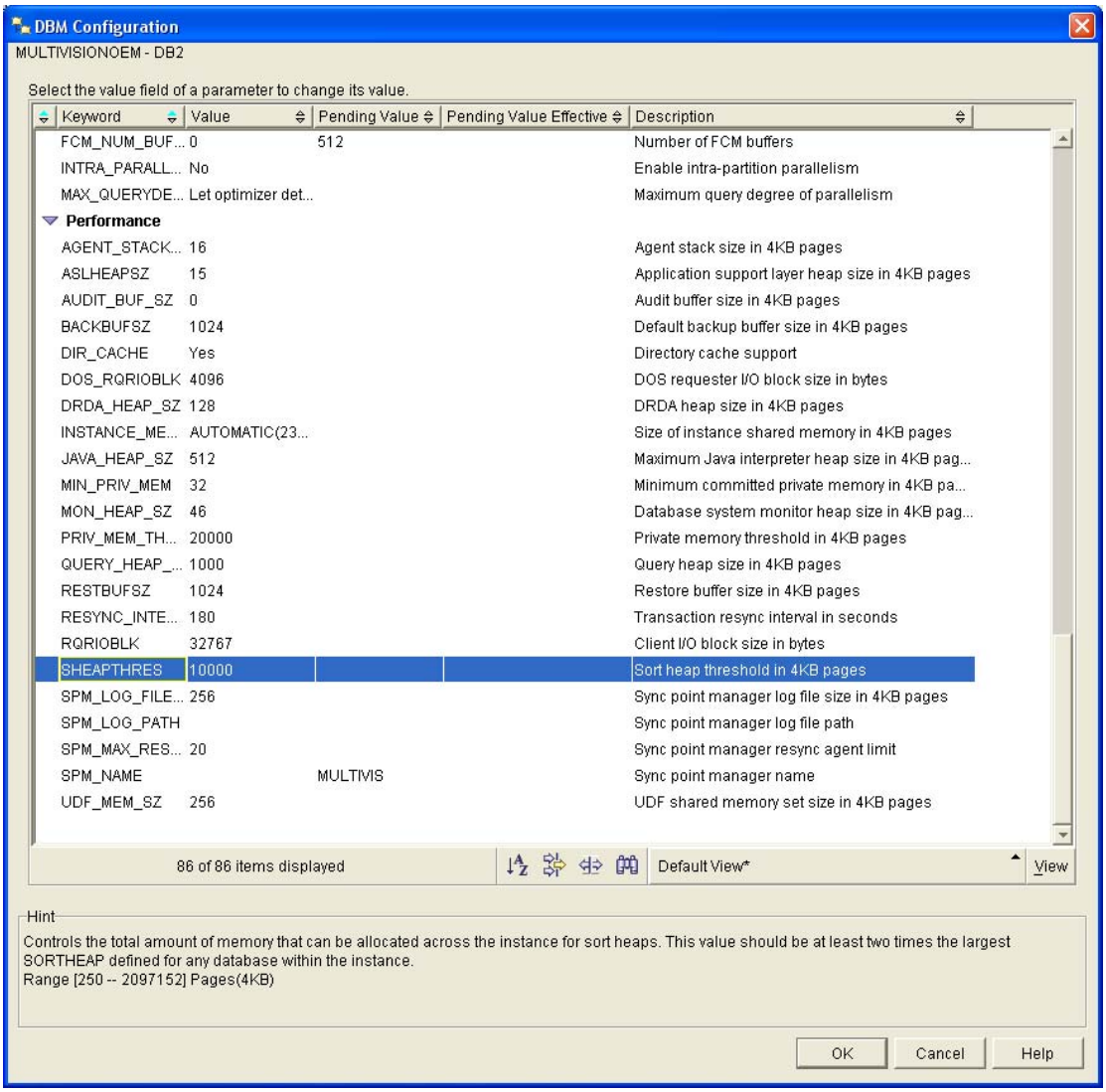
Once the database manager has been created, we can review the configuration parameters. As you highlight each parameter, a hint relating to its usage appears in the bottom of the window. If needed, we can change most of the parameters.

The DBM parameters are grouped into several functional sections.




DBM Configuration
MULTIVISIONOEM - DB2
Select the value field of a parameter to change its value.
Keyword
Value
Pending Value
Pending Value Effective
Description
Communications
DFT_CLIENT_A... 0 Default client adapter number
DFT_CLIENT_C... Default client communication protocol
DIR_OBJ_NAME Object name in DCE namespace
DIR_PATH_NAME /.:/subsys/datab... Directory path name in DCE namespace
DIR_TYPE None Directory services type
DISCOVER Search Discovery mode
DISCOVER_CO... Discovery communication protocol
FILESERVER IPX/SPX file server name
IPX_SOCKET 879E IPX/SPX socket number
NNAME NetBIOS workstation name
OBJECTNAME IPX/SPX DB2 server object name
ROUTE_OBJ_N... Routing information object name
SVCENAME db2c_DB2 TCP/IP service name
TPNAME APPC transaction program name
Diagnostic
DIAGLEVEL 3 Diagnostic error capture level
DIAGPATH Diagnostic data directory path
INDEXREC During index ac... Index re-creation time
NOTIFYLEVEL 3 Notification level
Environment

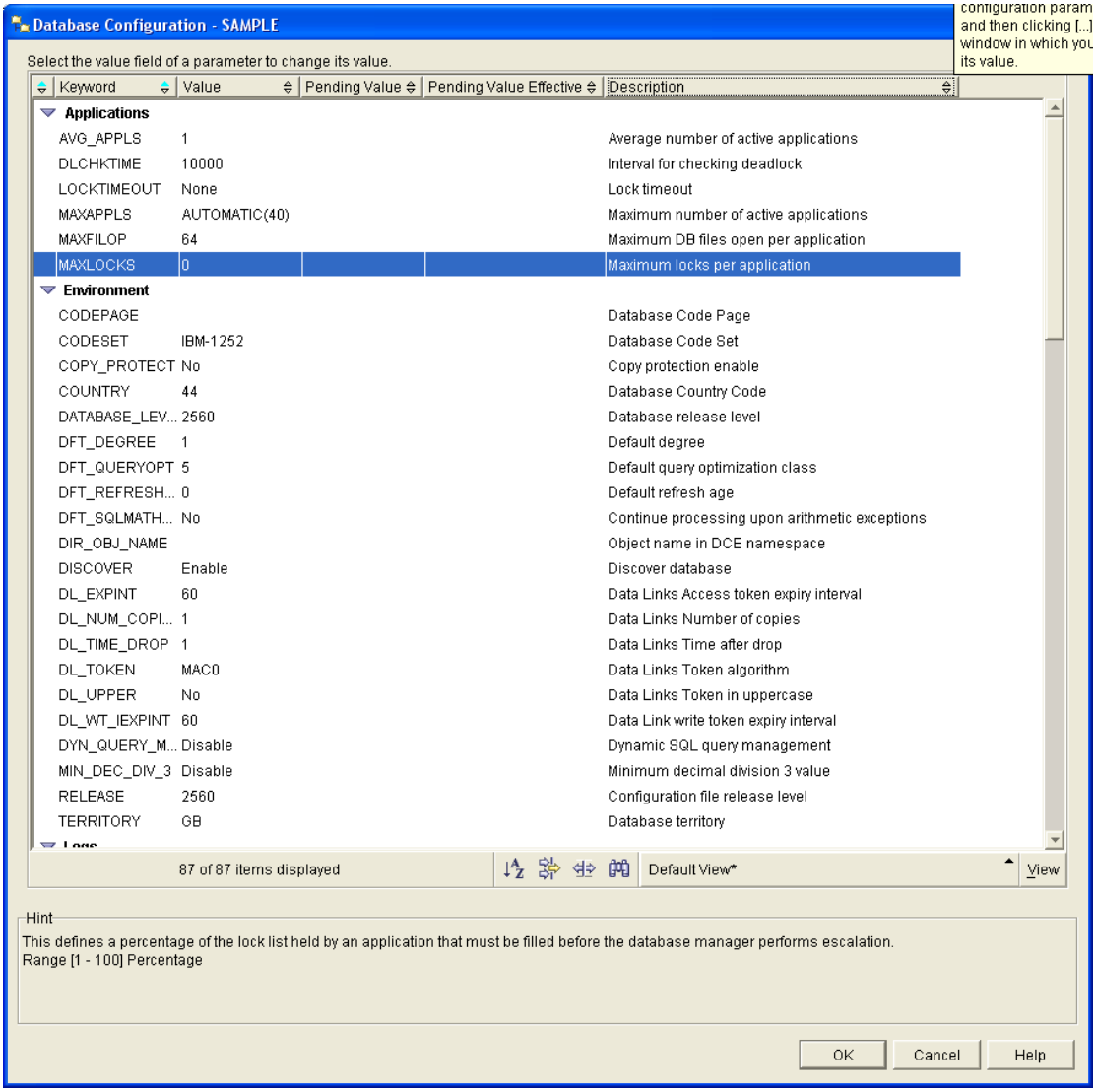

Select the value field of a parameter to change its value.
Keyword
Value
Pending Value
Pending Value Effective
Description
Environment
CPUSPEED 3.070238e-007 CPU speed in milliseconds
DATALINKS No Data Links support
DFT_ACCOUNT... Default charge-back account
DISCOVER_INST Enable Discovery mode
FEDERATED Yes Federated database system support
JDK_PATH D:\Program File... Java Development Kit installation path
MAXTOTFILOP 16000 Maximum total files open per application
NODETYPE Database serve... Machine node type
NUMDB 3 Maximum number of concurrently active databa...
RELEASE 0xa00 Configuration file release level
TM_DATABASE 1ST_CONN Transaction manager database name
TP_MON_NAME Transaction processor monitor name
Monitor
DFT_MON_BUF... Off Monitor buffer pools
DFT_MON_LOCK Off Monitor locks
DFT_MON_SORT Off Monitor sorts
DFT_MON_STMT Off Monitor SQL statements
DFT_MON_TAB... Off Monitor tables
DFT_MON_TIM... On Monitor timestamp
DFT_MON_UOW Off Monitor units of work
HEALTH_MON Off Monitor health of instance and databases
Parallel
FCM_NUM_BUF... 0 512 Number of FCM buffers
INTRA_PARALL... No Enable intra-partition parallelism
MAX_QUERYDE... Let optimizer det... Maximum query degree of parallelism

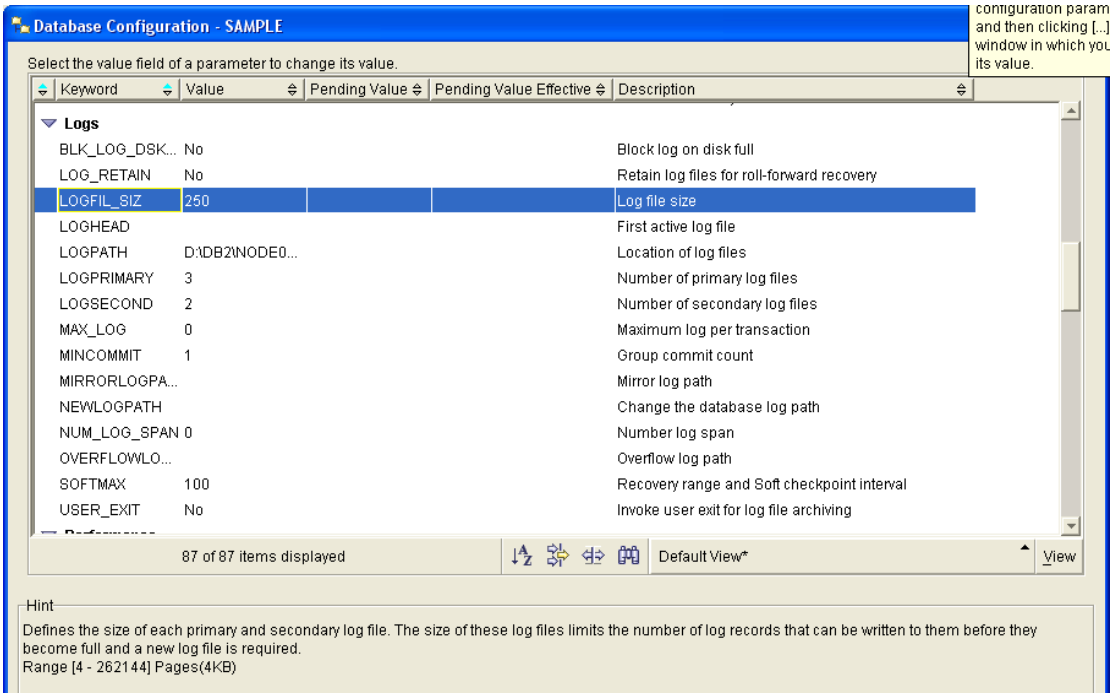

DBM Configuration
MULTIVISIONOEM - DB2
Select the value field of a parameter to change its value.
Keyword
Value
Pending Value
Pending Value Effective
Description
FCM_NUM_BUF... 0 512 Number of FCM buffers
INTRA_PARALL... No Enable intra-partition parallelism
MAX_QUERYDE... Let optimizer det... Maximum query degree of parallelism
Performance
AGENT_STACK... 16 Agent stack size in 4KB pages
ASLHEAPSZ 15 Application support layer heap size in 4KB pages
AUDIT_BUF_SZ 0 Audit buffer size in 4KB pages
BACKBUFSZ 1024 Default backup buffer size in 4KB pages
DIR_CACHE Yes Directory cache support
DOS_RQRIOBLK 4096 DOS requester I/O block size in bytes
DRDA_HEAP_SZ 128 DRDA heap size in 4KB pages
INSTANCE_ME... AUTOMATIC(23... Size of instance shared memory in 4KB pages
JAVA_HEAP_SZ 512 Maximum Java interpreter heap size in 4KB pag...
MIN_PRIV_MEM 32 Minimum committed private memory in 4KB pa...
MON_HEAP_SZ 46 Database system monitor heap size in 4KB pag...
PRIV_MEM_TH... 20000 Private memory threshold in 4KB pages
QUERY_HEAP_... 1000 Query heap size in 4KB pages
RESTBUFSZ 1024 Restore buffer size in 4KB pages
RESYNC_INTE... 180 Transaction resync interval in seconds
RQRIOBLK 32767 Client I/O block size in bytes
SHEAPTHRES 10000 Sort heap threshold in 4KB pages
SPM_LOG_FILE... 256 Sync point manager log file size in 4KB pages
SPM_LOG_PATH Sync point manager log file path
SPM_MAX_RES... 20 Sync point manager resync agent limit
SPM_NAME MULTIVIS Sync point manager name
UDF_MEM_SZ 256 UDF shared memory set size in 4KB pages
86 of 86 items displayed
Default View*
View
Hint
Controls the total amount of memory that can be allocated across the instance for sort heaps. This value should be at least two times the largest SORTHEAP defined for any database within the instance.
Range [250 -- 2097152] Pages(4KB)
OK
Cancel
Help

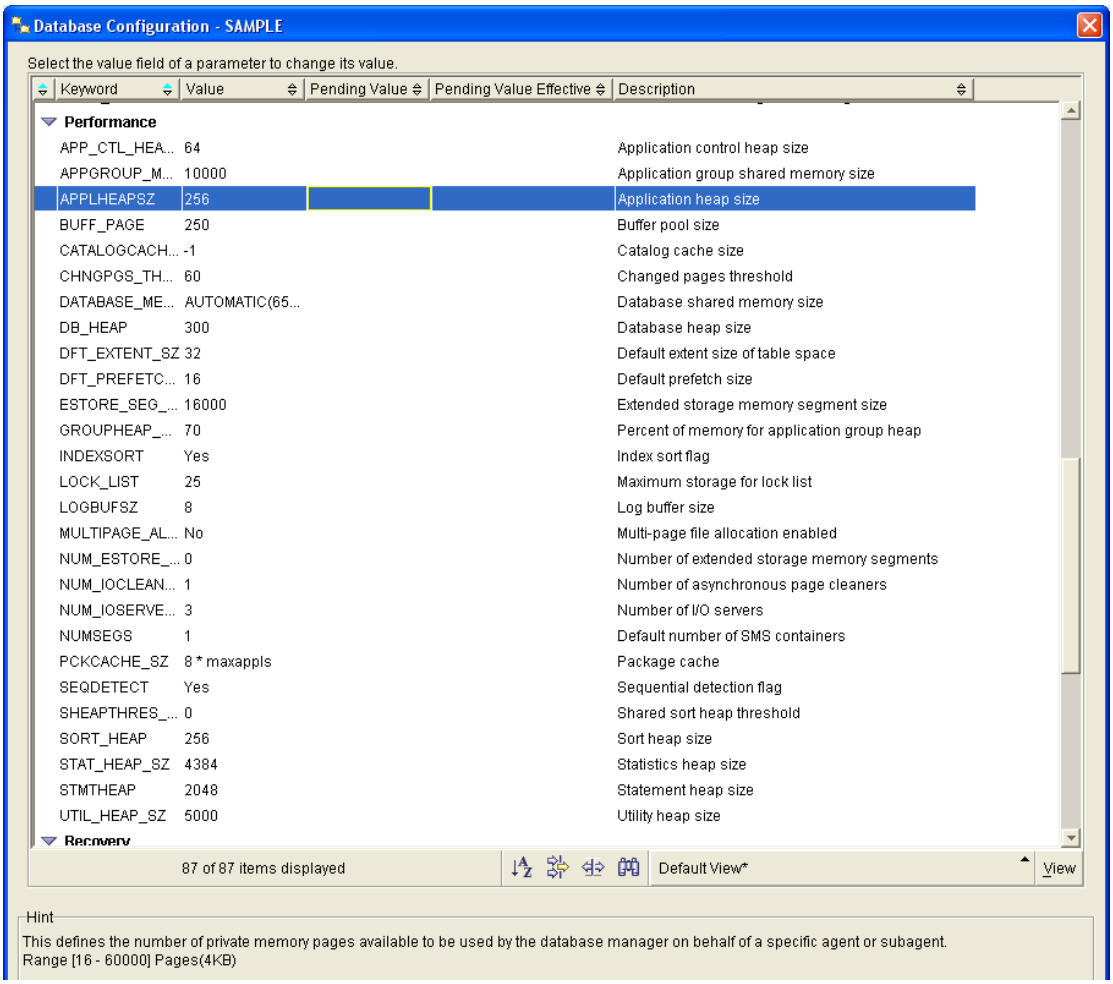
Database Configuration parameters

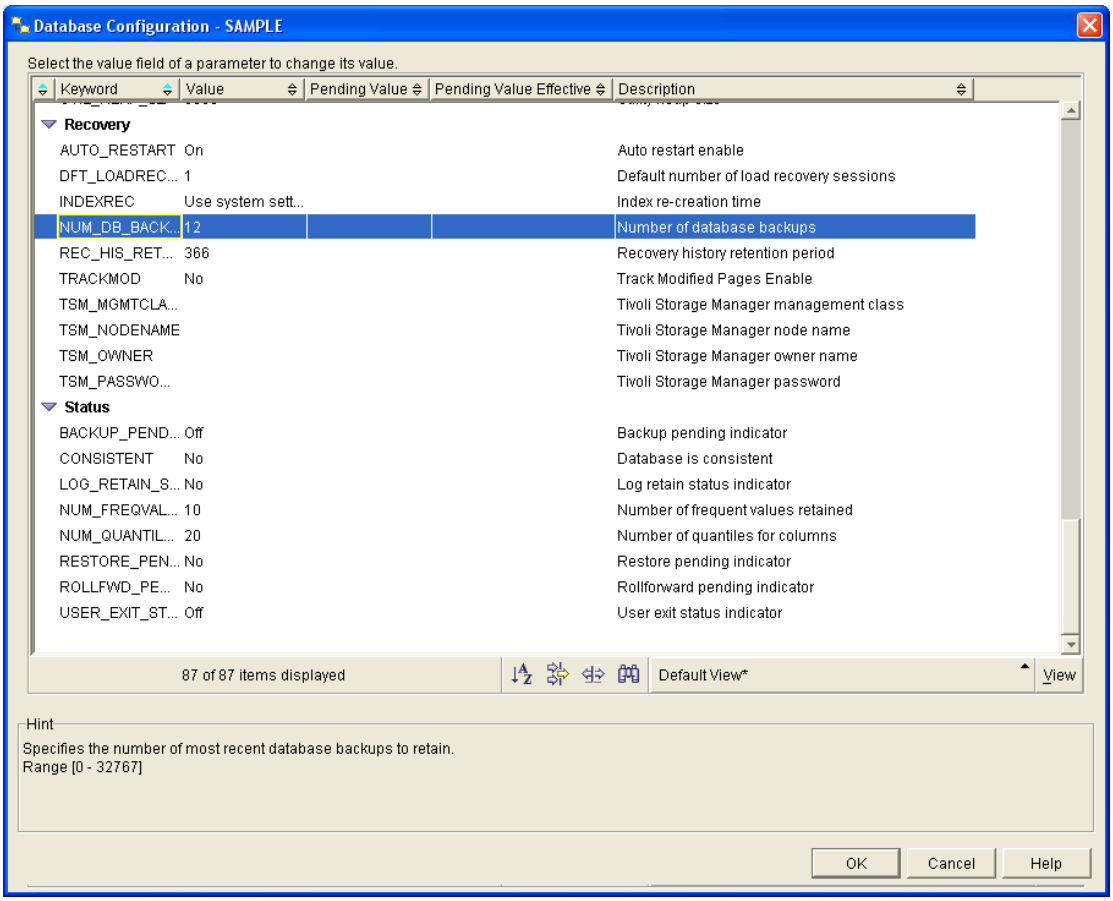
We can also view the configuration parameters for an individual database.

You should highlight each parameter in turn so that you can view its hint.




Database Configuration - SAMPLE
configuration param
and then clicking [...]
window in which you
its value.
Select the value field of a parameter to change its value.
Keyword
Value
Pending Value
Pending Value Effective
Description
Logs
BLK_LOG_DSK... No Block log on disk full
LOG_RETAIN No Retain log files for roll-forward recovery
LOGFIL_SIZ 250 Log file size
LOGHEAD First active log file
LOGPATH D:\DB2\NODE0... Location of log files
LOGPRIMARY 3 Number of primary log files
LOGSECOND 2 Number of secondary log files
MAX_LOG 0 Maximum log per transaction
MINCOMMIT 1 Group commit count
MIRRORLOGPA... Mirror log path
NEWLOGPATH Change the database log path
NUM_LOG_SPAN 0 Number log span
OVERFLOWLO... Overflow log path
SOFTMAX 100 Recovery range and Soft checkpoint interval
USER_EXIT No Invoke user exit for log file archiving
87 of 87 items displayed
Default View*
View
Hint
Defines the size of each primary and secondary log file. The size of these log files limits the number of log records that can be written to them before they become full and a new log file is required.
Range [4 - 262144] Pages(4KB)


Database Configuration - SAMPLE
Select the value field of a parameter to change its value.
Keyword
Value
Pending Value
Pending Value Effective
Description
Performance
APP_CTL_HEA... 64 Application control heap size
APPGROUP_M... 10000 Application group shared memory size
APPLHEAPSZ 256 Application heap size
BUFF_PAGE 250 Buffer pool size
CATALOGCACH... -1 Catalog cache size
CHNGPGS_TH... 60 Changed pages threshold
DATABASE_ME... AUTOMATIC(65... Database shared memory size
DB_HEAP 300 Database heap size
DFT_EXTENT_SZ 32 Default extent size of table space
DFT_PREFETC... 16 Default prefetch size
ESTORE_SEG_... 16000 Extended storage memory segment size
GROUPHEAP_... 70 Percent of memory for application group heap
INDEXSORT Yes Index sort flag
LOCK_LIST 25 Maximum storage for lock list
LOGBUFSZ 8 Log buffer size
MULTIPAGE_AL... No Multi-page file allocation enabled
NUM_ESTORE_... 0 Number of extended storage memory segments
NUM_IOCLEAN... 1 Number of asynchronous page cleaners
NUM_IOSERVE... 3 Number of I/O servers
NUMSEGS 1 Default number of SMS containers
PCKCACHE_SZ 8 * maxappls Package cache
SEQDETECT Yes Sequential detection flag
SHEAPTHRES_... 0 Shared sort heap threshold
SORT_HEAP 256 Sort heap size
STAT_HEAP_SZ 4384 Statistics heap size
STMTHEAP 2048 Statement heap size
UTIL_HEAP_SZ 5000 Utility heap size
Recovery
87 of 87 items displayed
Default View*
View
Hint
This defines the number of private memory pages available to be used by the database manager on behalf of a specific agent or subagent.
Range [16 - 60000] Pages(4KB)


Database Configuration - SAMPLE
Select the value field of a parameter to change its value.
Keyword
Value
Pending Value
Pending Value Effective
Description
Recovery
AUTO_RESTART On Auto restart enable
DFT_LOADREC... 1 Default number of load recovery sessions
INDEXREC Use system sett... Index re-creation time
NUM_DB_BACK... 12 Number of database backups
REC_HIS_RET... 366 Recovery history retention period
TRACKMOD No Track Modified Pages Enable
TSM_MGMTCLA... Tivoli Storage Manager management class
TSM_NODENAME Tivoli Storage Manager node name
TSM_OWNER Tivoli Storage Manager owner name
TSM_PASSWO... Tivoli Storage Manager password
Status
BACKUP_PEND... Off Backup pending indicator
CONSISTENT No Database is consistent
LOG_RETAIN_S... No Log retain status indicator
NUM_FREQVAL... 10 Number of frequent values retained
NUM_QUANTIL... 20 Number of quantiles for columns
RESTORE_PEN... No Restore pending indicator
ROLLFWD_PE... No Rollforward pending indicator
USER_EXIT_ST... Off User exit status indicator
87 of 87 items displayed
Default View*
View
Hint
Specifies the number of most recent database backups to retain.
Range [0 - 32767]
OK
Cancel
Help

Environment variables on UNIX systems

You should define all DB2-specific registry variables in the DB2 profile registry. Otherwise, you won't be able to carry out remote administration of those variables.

You must set the system environment variable DB2INSTANCE.

The scripts **db2profile** (for Korn shell) and **db2cshrc** (for Bourne shell or C shell) are provided as examples to help you set up the database environment. They can be found in insthome/sqllib, where insthome is the home directory of the instance owner.

These scripts include statements to:

- Update a user's path with the following directories:
  insthome/sqllib/bin
  insthome/sqllib/adm
  insthome/sqllib/misc
- Set DB2INSTANCE to the default local instance_name for execution.

All DB2-supported variables must be set in the DB2 profile registry except for PATH and DB2INSTANCE.

To change the environment variable for the current session, issue commands similar to the following:

For Korn shell:
```
DB2INSTANCE=inst1
export DB2INSTANCE
```

For Bourne shell:
```
export DB2INSTANCE=<inst1>
```

For C shell:
```
setenv DB2INSTANCE <inst1>
```

The DB2 **Instance Level Profile Registry** file is located at:
INSTHOME/sqllib/profile.env

Access permissions and ownership of this file should be:

-rw-rw-r-- <db2inst1> <db2iadm1> profile.env

where <db2inst1> is the instance owner, and <db2iadm1> is the instance owner's group.

The INSTHOME is the home path of the instance owner.

The DB2 **Global Level Profile Registry** is located at:
/var/db2/<version_id>/default.env for AIX, Solaris, and Linux operating
/var/opt/db2/<version_id>/default.env for HP-UX

Access permissions and ownership of this file should be:

-rw-rw-r-- <Instance_Owner> <Instance_Owner_Group> default.env

If you want to modify global registry variables, you must be logged on as **root**.

The DB2 Instance Node Level Profile Registry is located under:
INSTHOME/sqllib/nodes/<node_number>.env

The access permissions and ownership of the directory and this file should be:

drwxrwsr-w <Instance_Owner> <Instance_Owner_Group> nodes

-rw-rw-r-- <Instance_Owner> <Instance_Owner_Group> <node_number>.env

The INSTHOME is the home path of the instance owner.

The DB2 **Instance Profile Registry** is located at:
/var/db2/<version_id>/profiles.reg for AIX, Solaris, and Linux
/var/opt/db2/<version_id>/profiles.reg for HP-UX

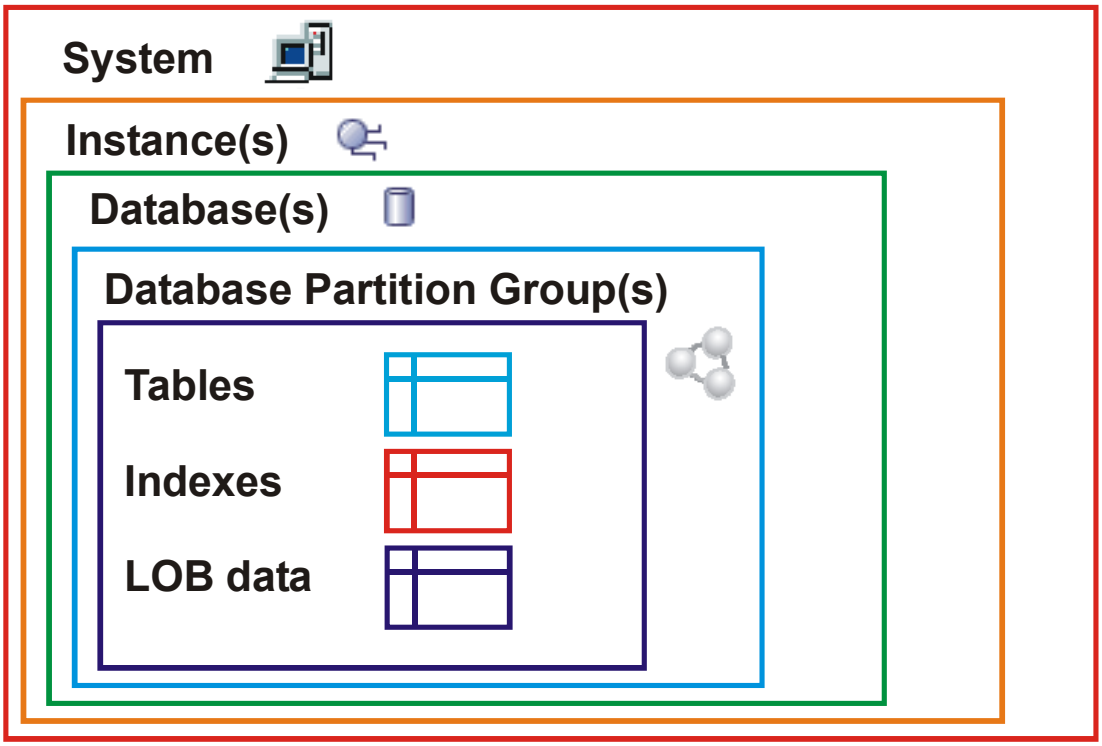
The access permissions and ownership of this file should be:

-rw-r--r-- root system profiles.reg

System Commands

db2icrt	Create an instance
db2idrop	Drop an instance
db2ilist	List the instances
db2iupdt	Update instances
db2sampl	Create a sample database
db2set	Display, set, or remove variables in the DB2 profile registry
db2setup	Install DB2
db2start	Start DB2
db2stop	Stop DB2

Details of all these commands are in the online documentation.



DB2 object hierarchy

DSA-10

CLP commands:

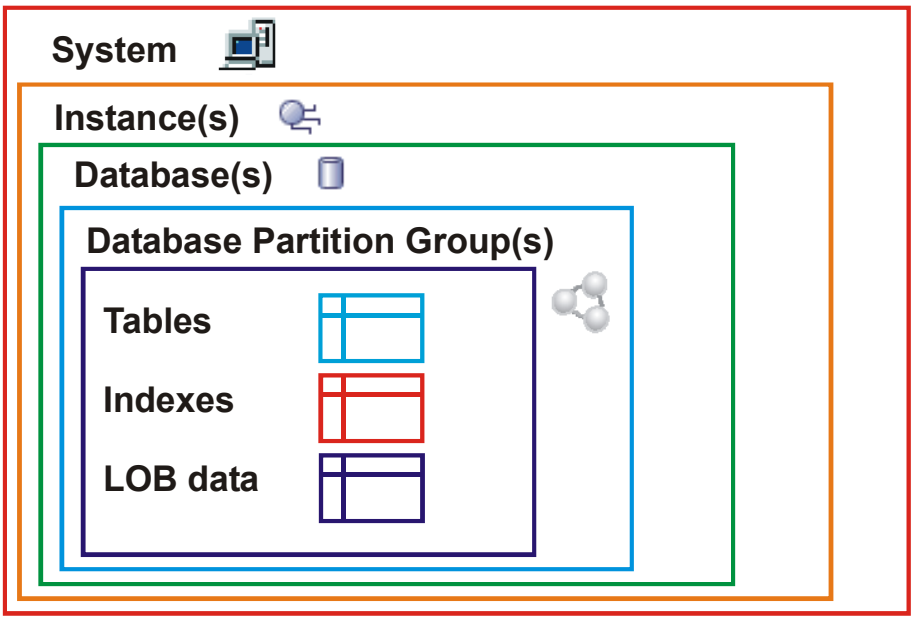
START DATABASE MANAGER
STOP DATABASE MANAGER
GET DATABASE MANAGER CONFIGURATION
RESET DATABASE MANAGER CONFIGURATION
UPDATE DATABASE MANAGER CONFIGURATION

ACTIVATE DATABASE
DEACTIVATE DATABASE

ATTACH
DETACH

GET ALERT CONFIGURATION
RESET ALERT CONFIGURATION
UPDATE ALERT CONFIGURATION

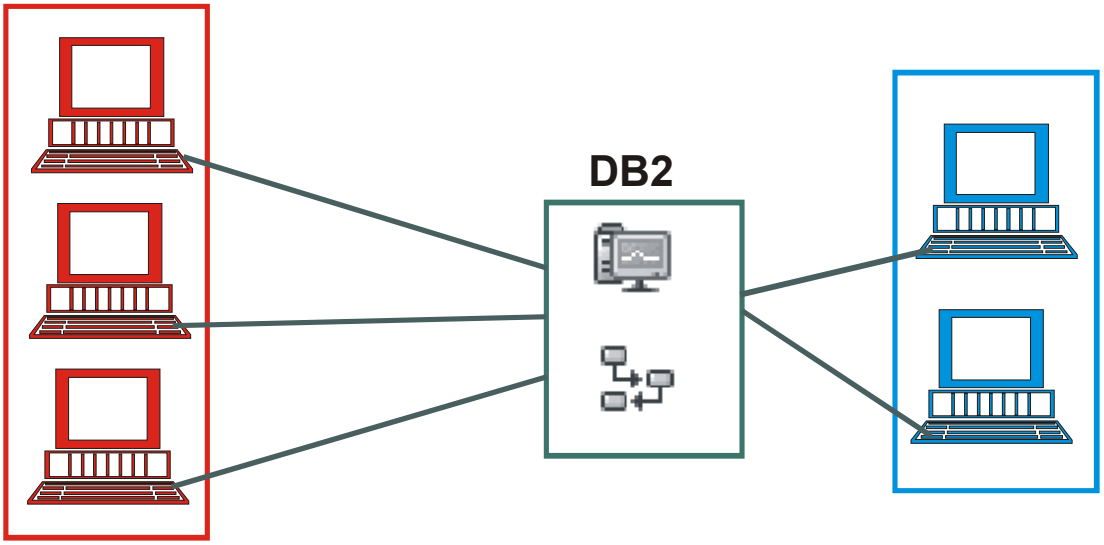
AUTOCONFIGURE
DROP DATABASE
GET INSTANCE
LIST COMMAND OPTIONS
MIGRATE DATABASE
TERMINATE
UPDATE COMMAND OPTIONS



DB2 object hierarchy

DSA-10

Contact groups



Contacts and Contact Groups

DSA-110

GET CONTACT GROUP
GET CONTACT GROUPS
GET CONTACTS
UPDATE CONTACT
UPDATE CONTACT GROUP