DB2 Data Management Software

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Chapter 2: Getting Started with DB2 UDB

IBM DB2 Universal Database V8.1

Database Administration Certification Preparation Course

Maintained by Clara Liu

IBM Software Group

Objectives

- In this section, we will cover:
  - DB2 UDB Family Products
  - DB2 UDB V8 Installation
  - DB2 UDB Instances
  - DB2 UDB Environment
  - DB2 UDB Tools

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DB2 UDB Tools

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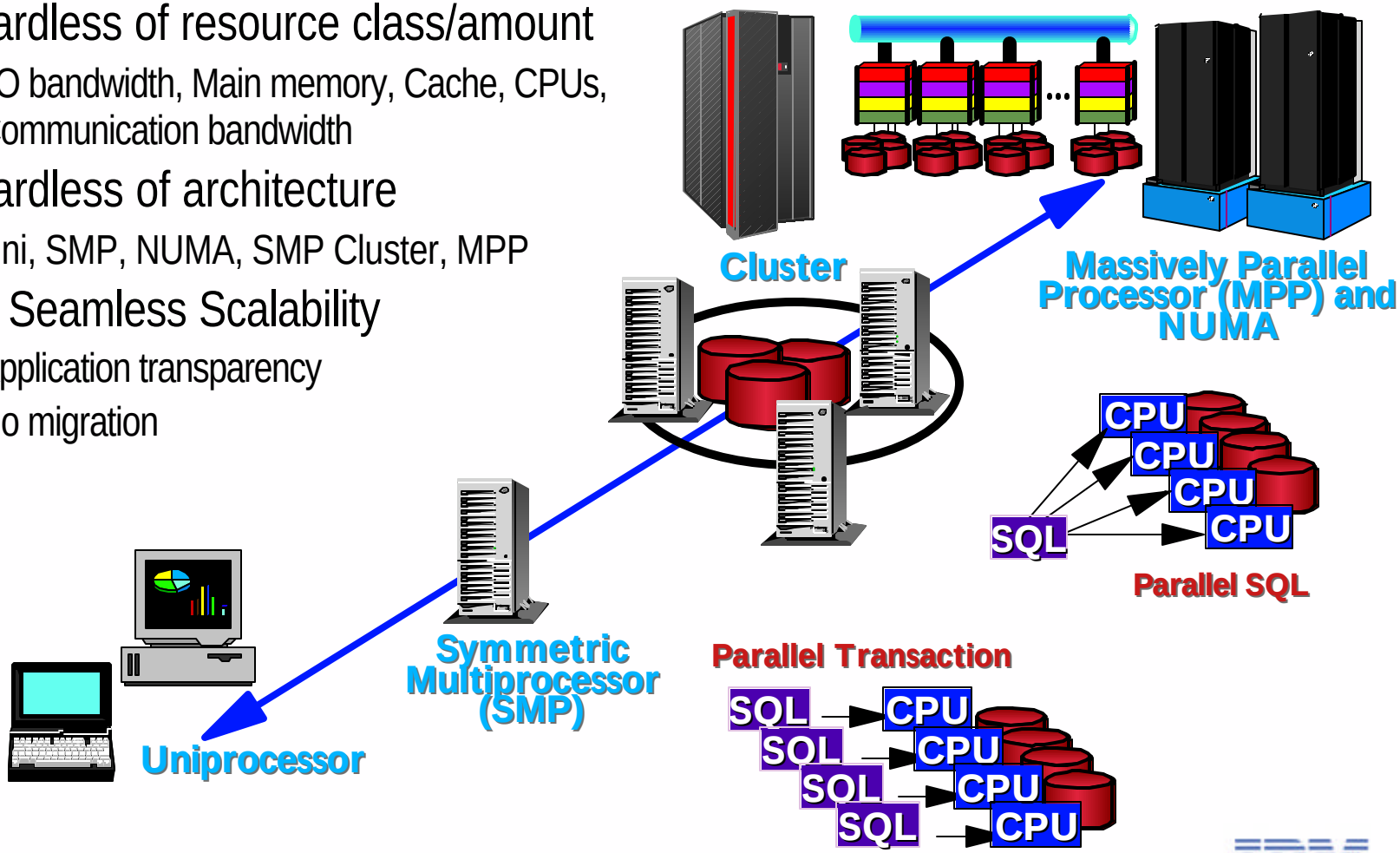
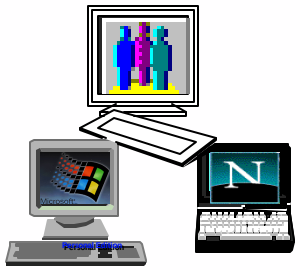
Theme: Fully Exploit All Resources

- Full exploitation of ALL available resources
  - Within a single query
  - Across separate queries
- Regardless of resource class/amount
  - I/O bandwidth, Main memory, Cache, CPUs, Communication bandwidth
- Regardless of architecture
  - Uni, SMP, NUMA, SMP Cluster, MPP
- With Seamless Scalability
  - Application transparency
  - No migration



DB2 Family Platform Support

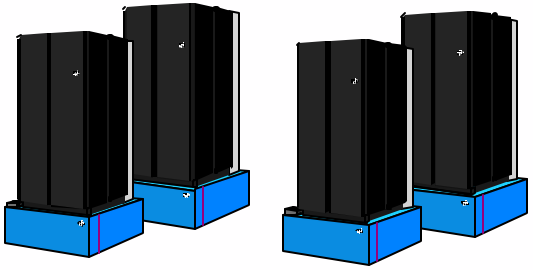


Personal

- Windows
- Linux

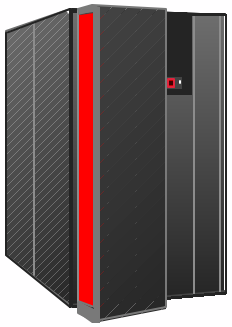
Workgroup

- AIX
- HP-UX
- Solaris
- Windows
- Linux



Enterprise Server Edition

- AIX
- HP-UX
- Solaris
- Windows
- Linux



Hosts

- DB2 iSeries
- DB2 zSeries
- DB2 VM/VSE

DB2 Connect

- AIX
- Solaris
- HP-UX
- Windows
- Linux

Everyplace

- Pocket PC
- Linux
- PalmOS
- QNX Neutrino
- Symbian EPOC

DB2 Universal Database

- DB2 Everyplace
  - Small footprint database engine on handheld devices (~ 150 KB)
  - A synchronization server to replicate data in both directions
  - Application development tool to build handheld apps with drag-and-drop ease
- DB2 Personal Edition (PE)
  - A fully functional database for workstations
  - Also a DB2 Satellite Client (can be remotely managed)
  - Possible to access remote DB2 servers as a client
  - Cannot act as database server for remote clients
  - Spatial Extender (single user)
  - Audio, Image, and Video Extenders
- DB2 Workgroup Server Edition (WSE)
  - Per User Licensing
  - Net Search Extender (5 user limit)
  - Spatial Extender (5 user limit)
  - Ideal for low user departmental machines using up to 4 CPUs

DB2 Universal Database

- DB2 Workgroup Server Unlimited Edition (WSUE)
  - Per Processor Licensing
  - Ideal for high user or web use
  - Up to 4 CPUs
  - Audio, Image, and Video Extenders
  - Net Search and Spatial Extenders are optional
- DB2 UDB Enterprise Edition (ESE)
  - Per Processor Licensing
  - Ideal for enterprise environments
    - CRM, ERP, SCM, Data Warehouses
  - Includes Host Database Connectivity (DB2 Connect)
  - Informix Integration
  - Audio, Image, and Video Extenders
  - Options Available:
    - Database Partitioning Feature (DPF)
    - Net Search Extender, Spatial Extender, Data Links Manager
    - Warehouse Manager
    - Intelligent Miner Scoring,Intelligent Miner Modeling,Intelligent Miner Visualization

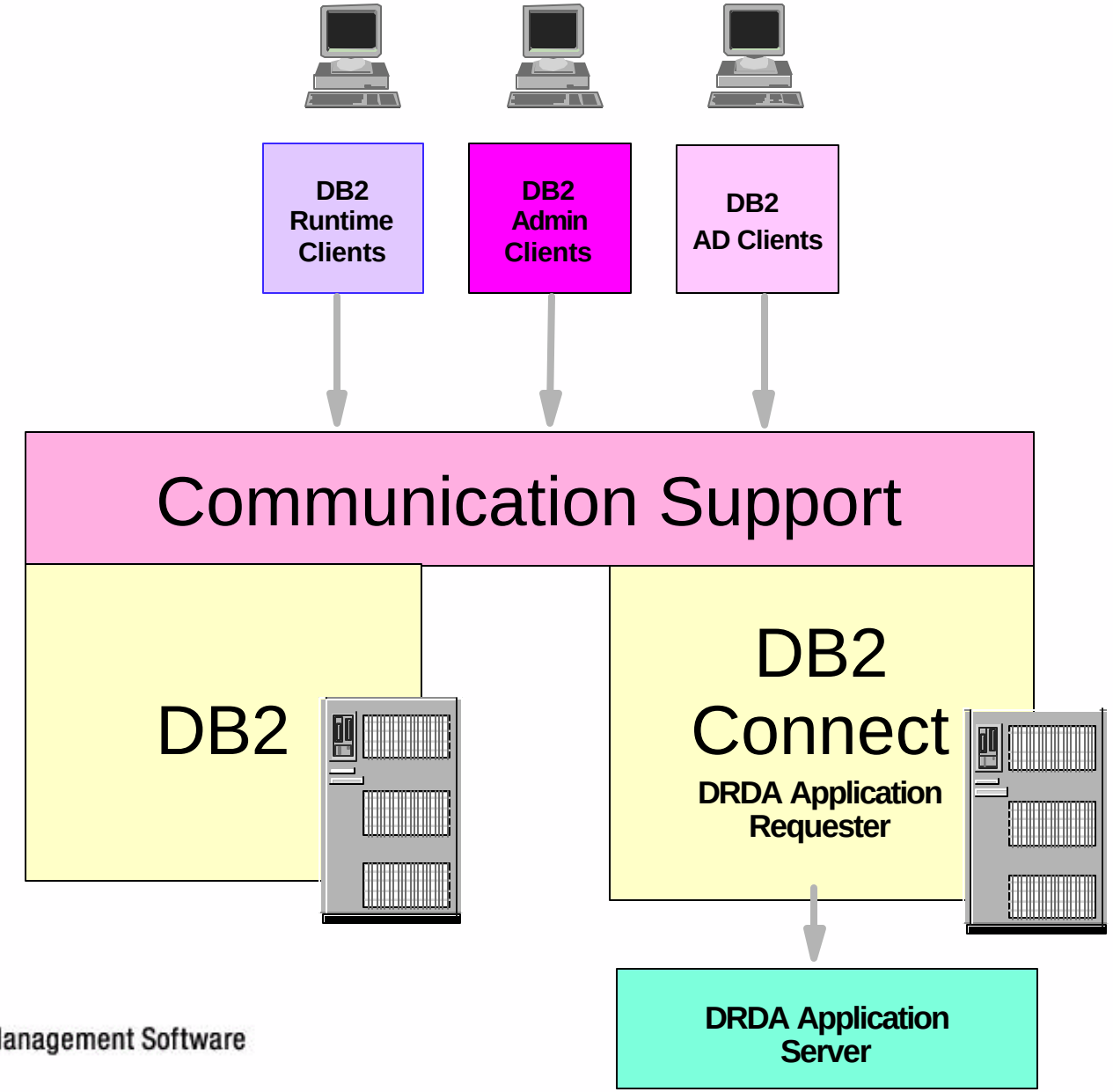
DB2 Host Databases

- DB2 for iSeries
  - http://www-1.ibm.com/servers/eserver/iseries/db2/
- DB2 for zSeries
  - http://www-3.ibm.com/software/data/db2/os390/
- DB2 for VSE & VM
  - http://www-3.ibm.com/software/data/db2/vse-vm/

DB2 Clients

- Runtime Client
  - Runtime code to access DB2 servers
- Administration Client
  - Includes runtime client
  - Provides tools to administer DB2 servers
- Application Development Client
  - Includes runtime client
  - Provides tools and libraries to develop applications that access DB2 servers

Overview of DB2 Componets



DB2 Connect

- DB2 Connect Personal Edition
  - Provides PC-based desktops transparent access to DB2 host databases or DRDA-compliant database server (single user)
  - Package also includes AD client, Administration client, and Runtime client
  - Platforms: Linux, Windows NT/98/2000/ME
- DB2 Connect Enterprise Edition
  - Act like a gateway that allows LAN-based systems and their desktop applications to access DB2 host databases or DRDA-compliant database server (multi users)
  - Includes web-enabling functions such that Internet or intranet users can also pass through the gateway to access the host database.
  - Package also includes AD client, Adminstration client, and Runtime client
  - Platforms: Windows NT/2000, AIX, HP-UX, Solaris, Linux, Linux/390

DB2 Developer's Edition

- DB2 Personal Developer's Edition
  - A single user database engine
  - Enables a developer to design and build single user desktop applications
  - Package includes:
    - DB2 Personal Edition
    - DB2 Connect Personal Edition
    - Application Development Client
    - DB2 Net Search Extender, Spatial Extender, AIV Extenders
  - Platforms: Linux, Windows NT/2000/XP
- DB2 Universal Developer's Edition
  - Offers a low cost package for a single application developer to design, build, and prototype applications for deployment on any of the DB2 client or server platforms
  - Package includes all client and server DB2 editions: DB2 Connect, DB2 Extenders, Warehouse Manager, and Intelligent Miner
  - Software in this package cannot be used for production systems
  - Platforms: AIX, HP-UX, Linux, Solaris, Windows NT/2000/XP

Data Warehouse and OLAP concepts

- DB2 Warehouse Manager
  - Performs SQL-based extract, transform, and load (ETL) capabilities to move and transform data
  - Provides distributed agents to transfer data directly between sources and targets, and a metadata management solution
- DB2 OLAP Server
  - Delivers analytic applications for fast, intuitive multidimensional analysis, allowing users to ask questions in an intuitive business language
  - Processes multidimensional requests that calculate, consolidate, and retrieve information from a multidimensional database, a relational database, or both.
  - Offers exhaustive, machine-driven, algorithm-based, data mining to discover unexpected values

Other DB2 Products

- Relational Connect
  - Part of IBM Information Integrator
  - Allows access to non-DB2 data sources, e.g. Oracle, Sybase, MS SQL Server, ODBC data sources
  - Supports advanced SQL and data type support
  - Advanced optimization and global catalog
  - Distributed queries including distributed join
  - Pass-through option
- DB2 Extenders
  - DB2 AIV Extenders
    - Audio, Image and Video data searching with traditional business data
  - DB2 Spatial Extender
    - Gathering and analyzing spatial data and traditional business data
  - DB2 Net Search Extender
    - High speed full-text searching with a large number of concurrent users
  - DB2 XML Extender
    - Leveraging the power of XML in e-business applications

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DB2 UDB Family Products

DB2 UDB V8 Installation

DB2 UDB Instances

DB2 UDB Tools

DB2 UDB Environment

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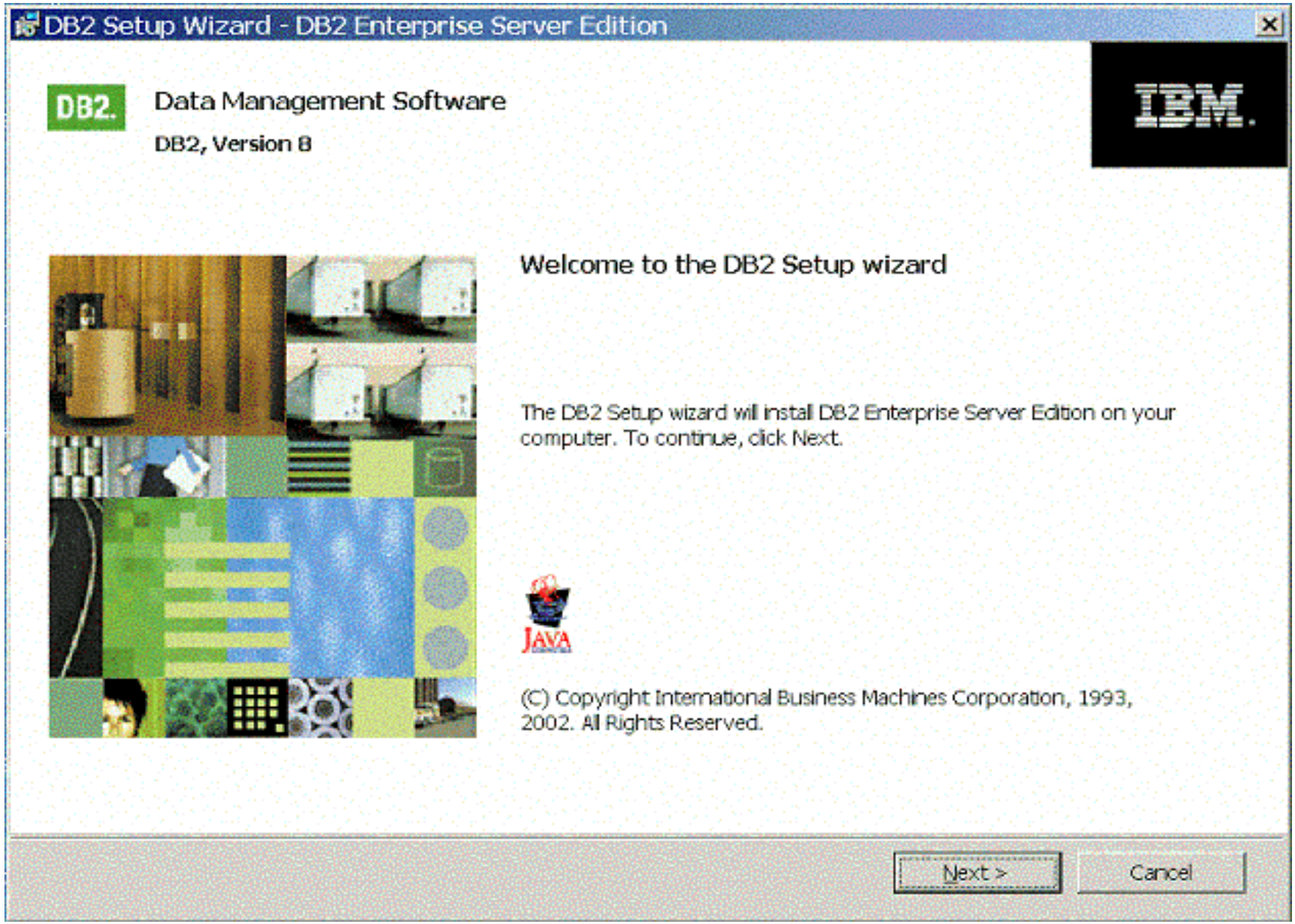
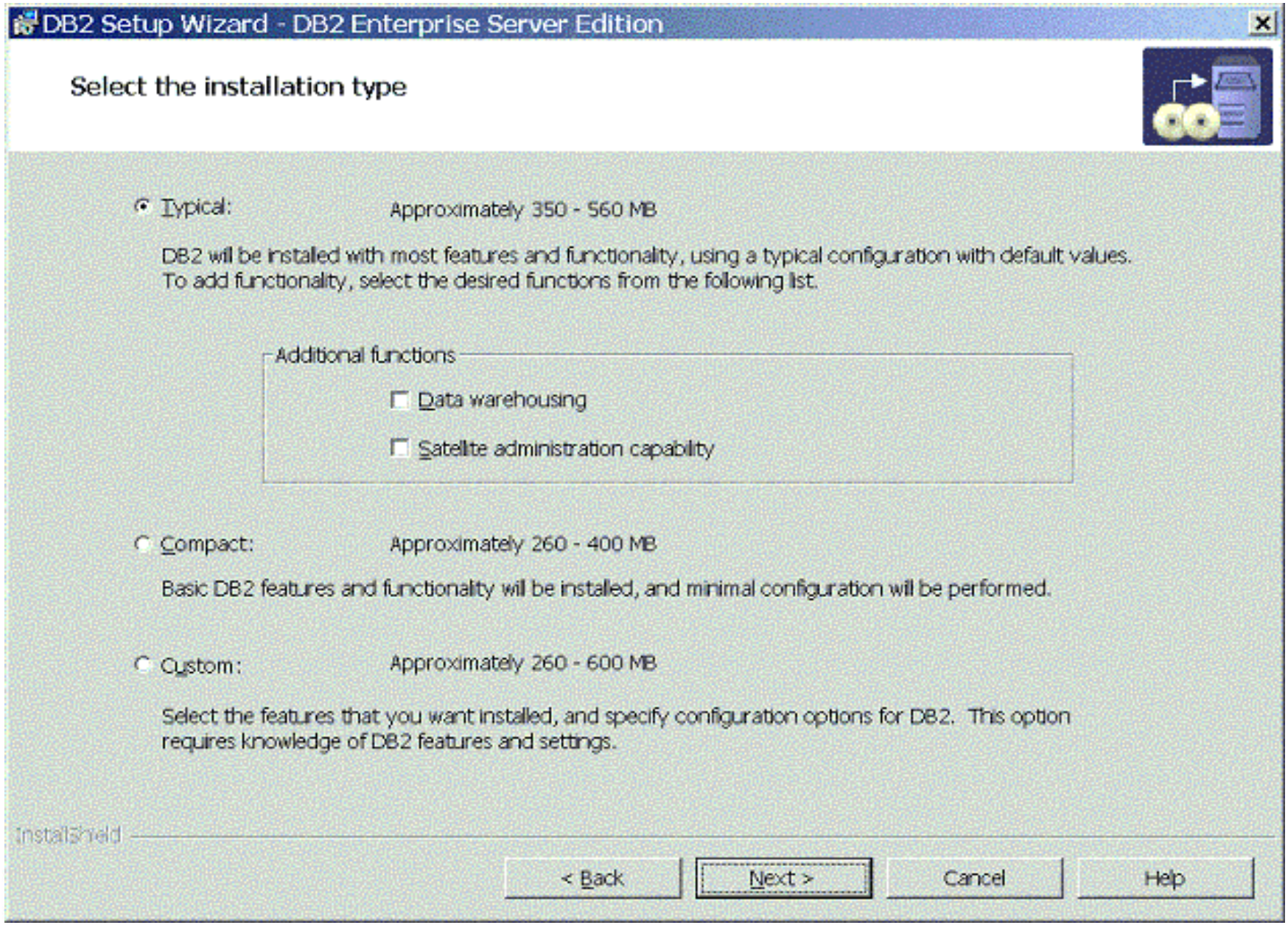
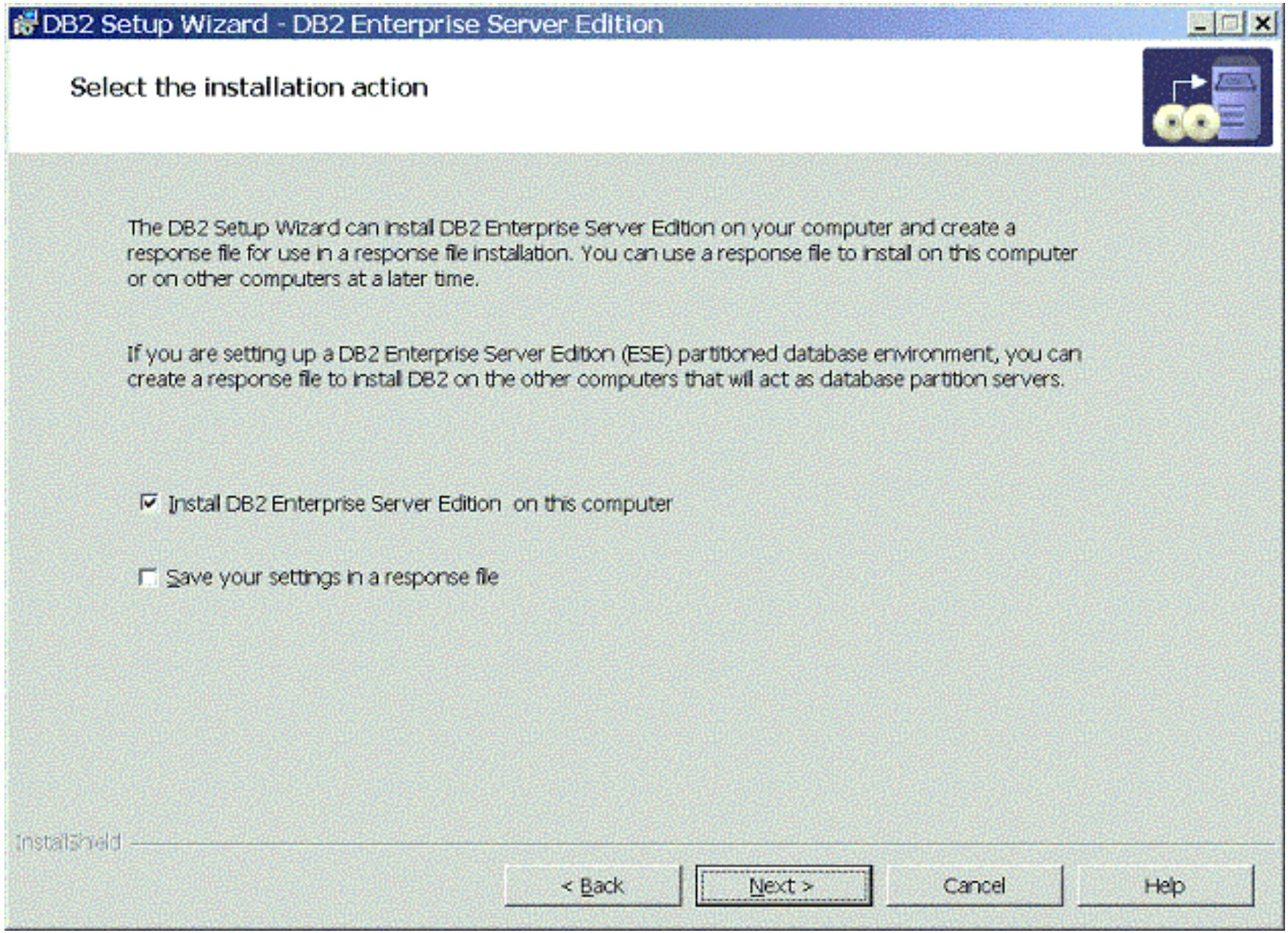
Install for Windows and UNIX (common)



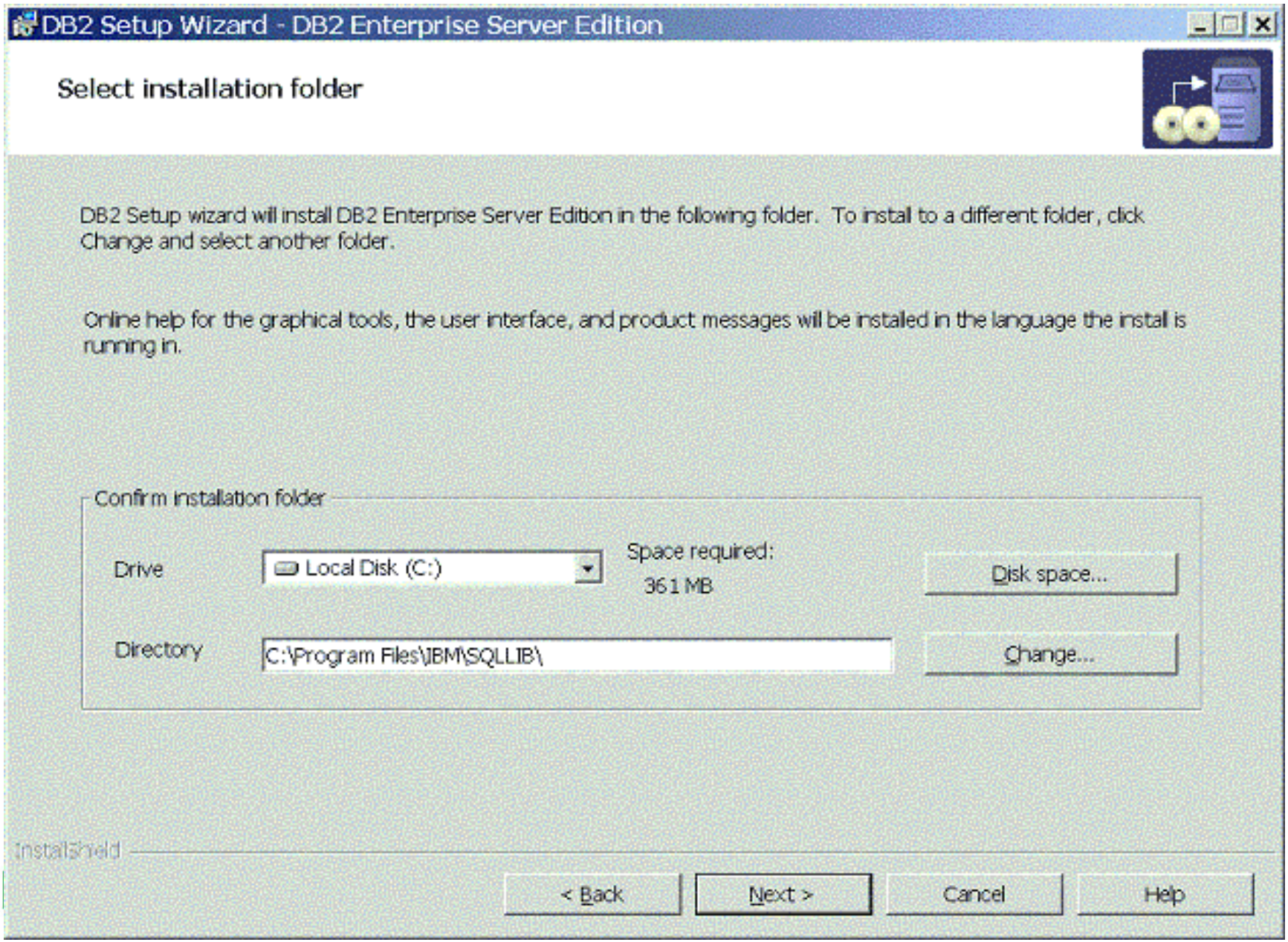
Installation Type



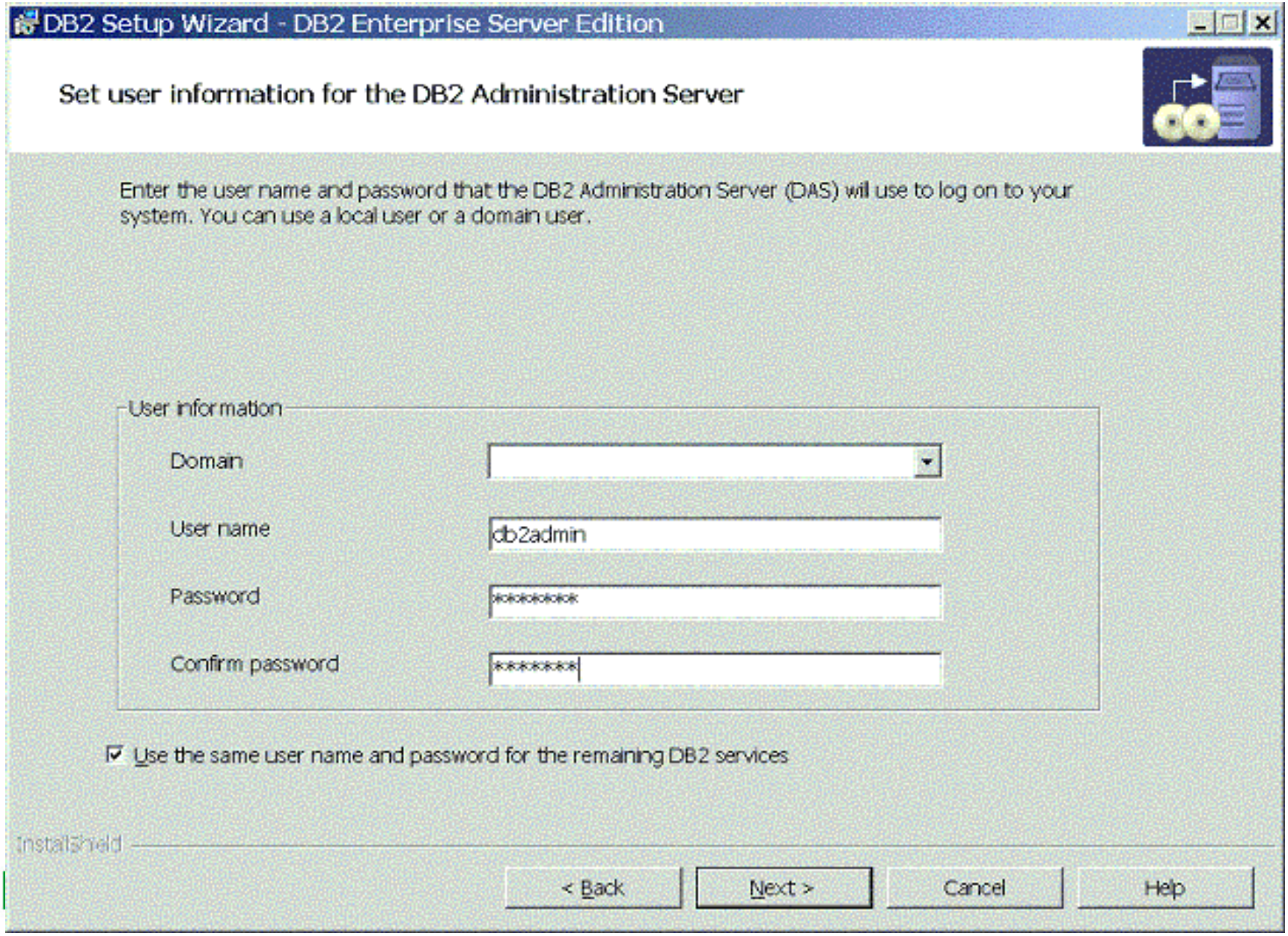
Installation / Response File



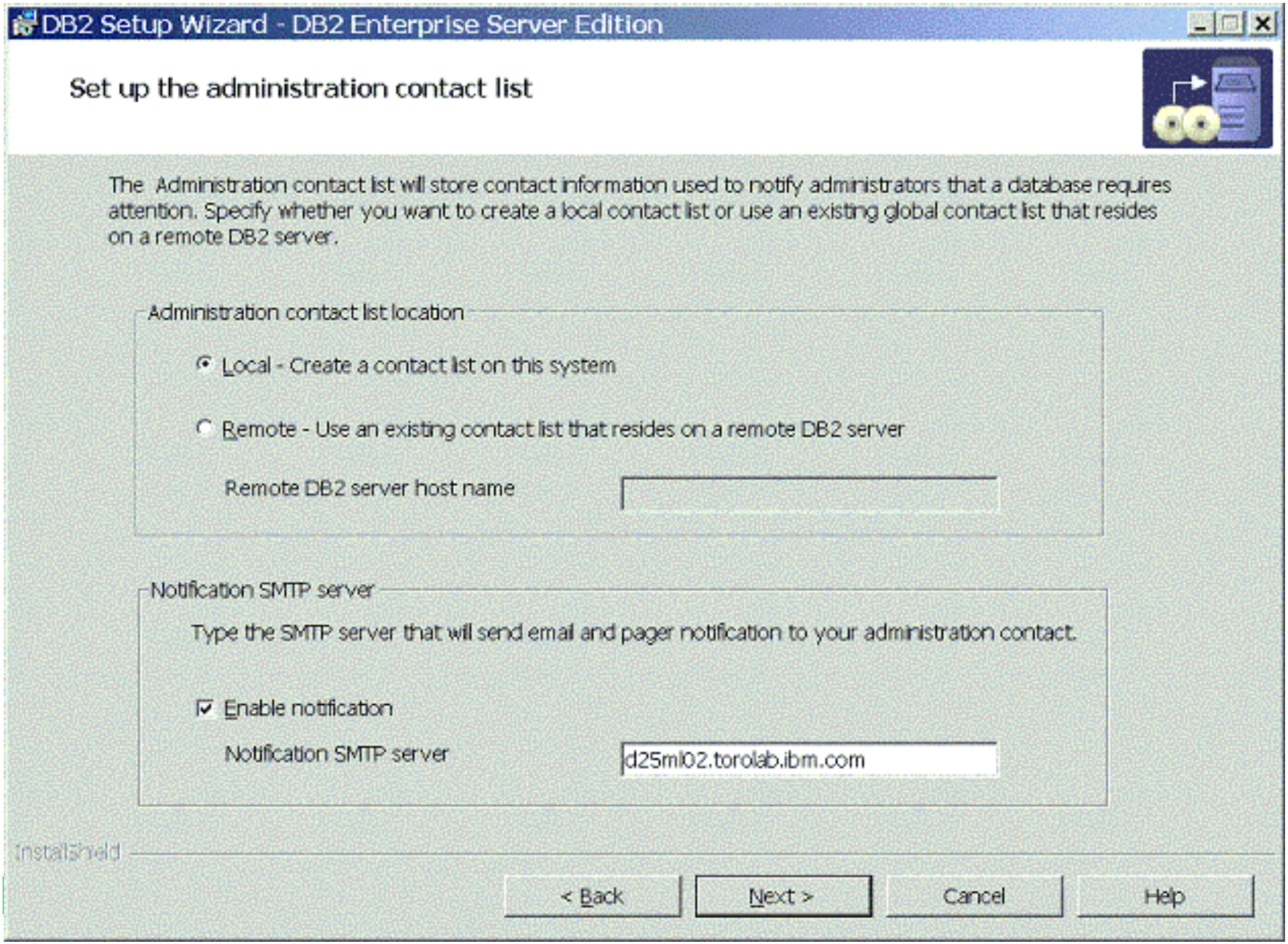
Install Path



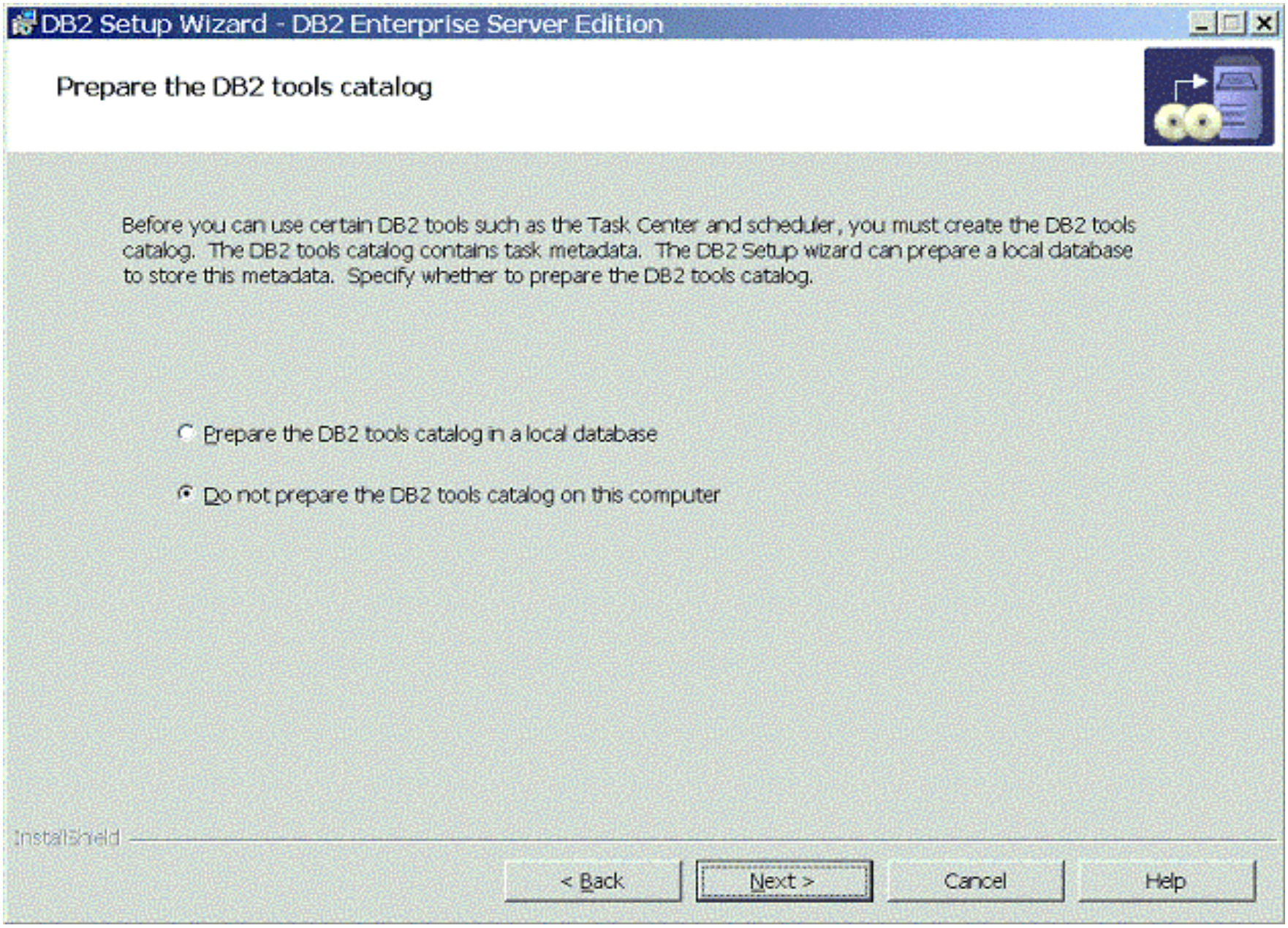
Userid for DB2 Admin Server



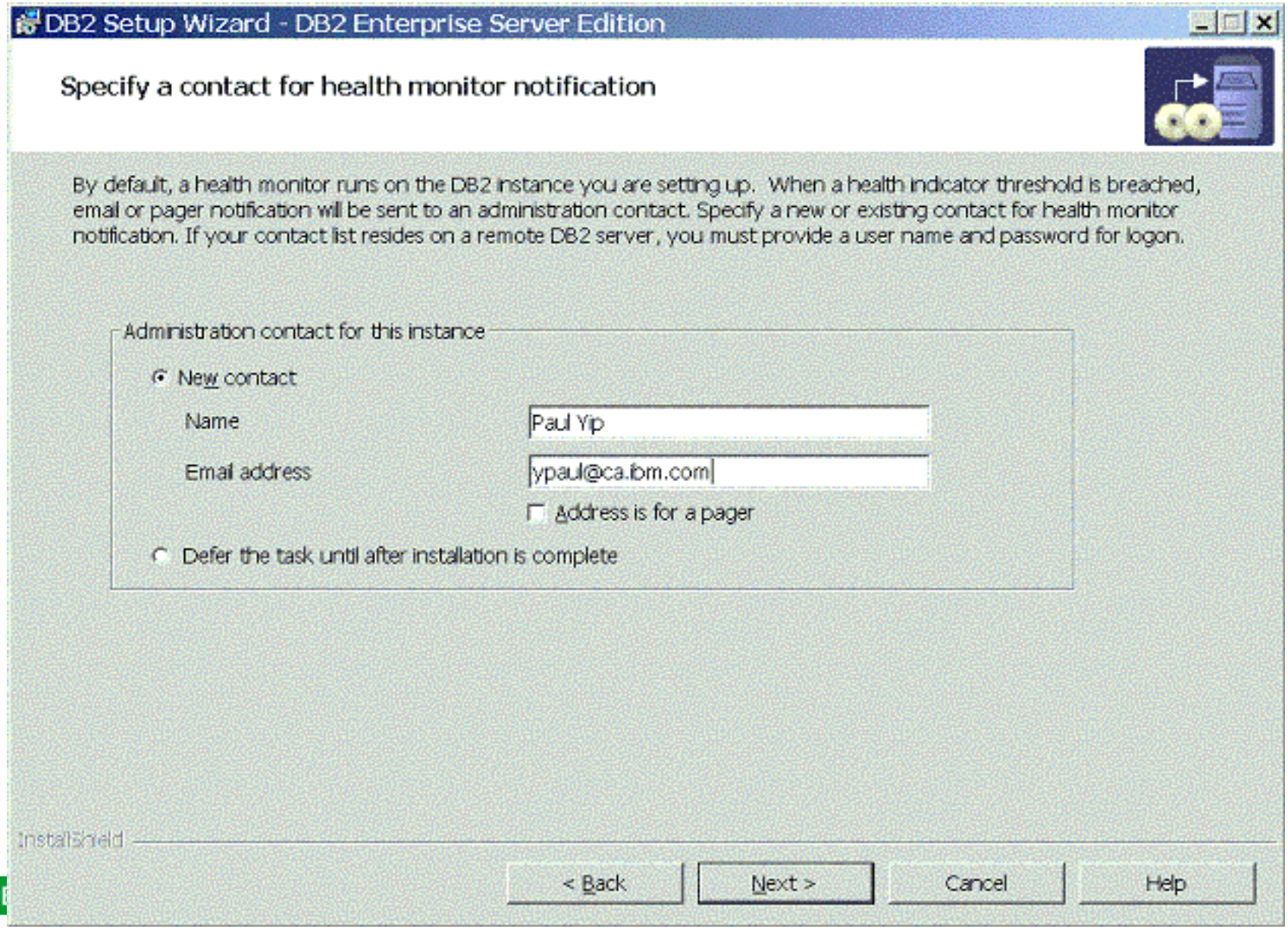
Contact List & Notification



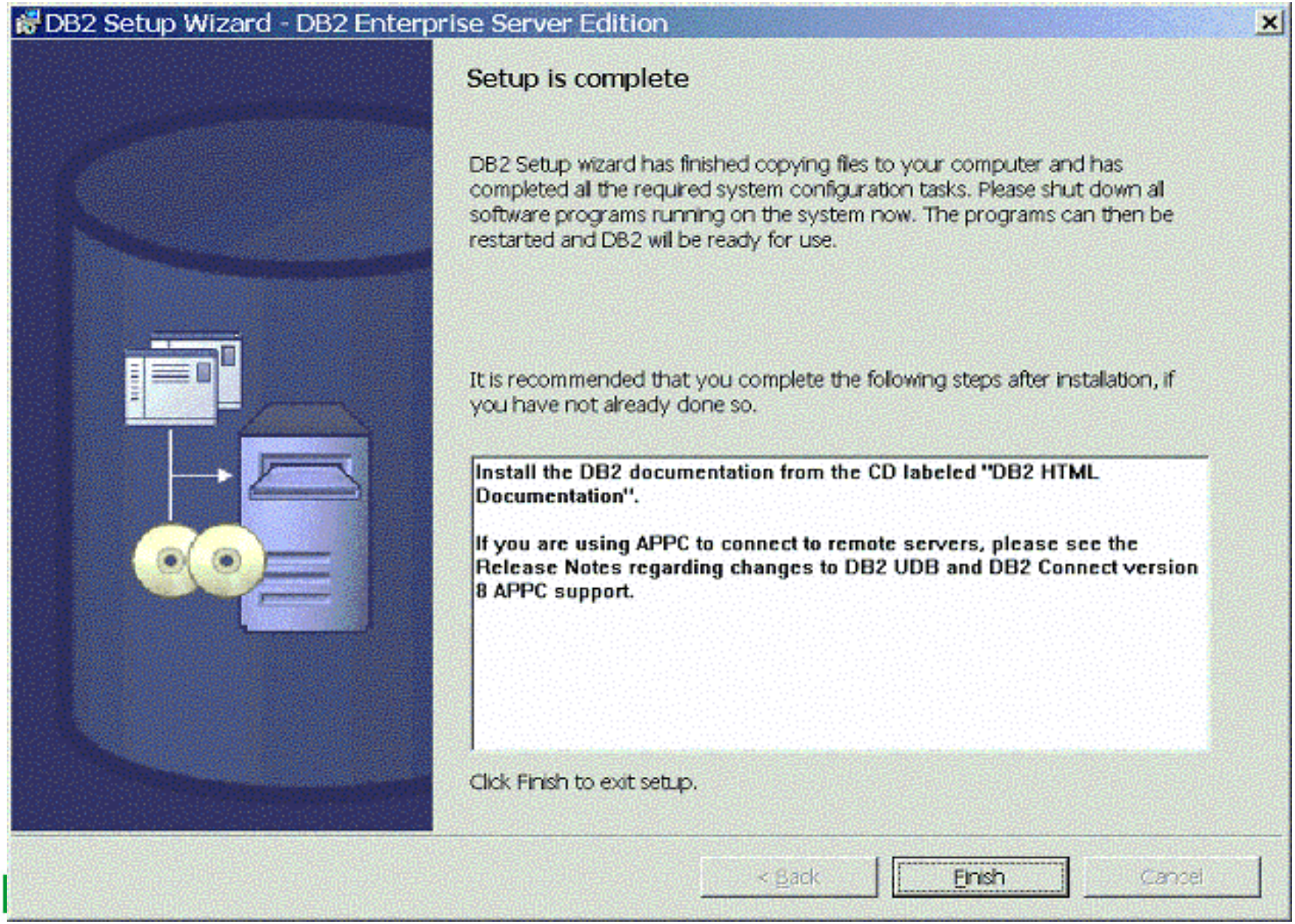
DB2 Tools Catalog



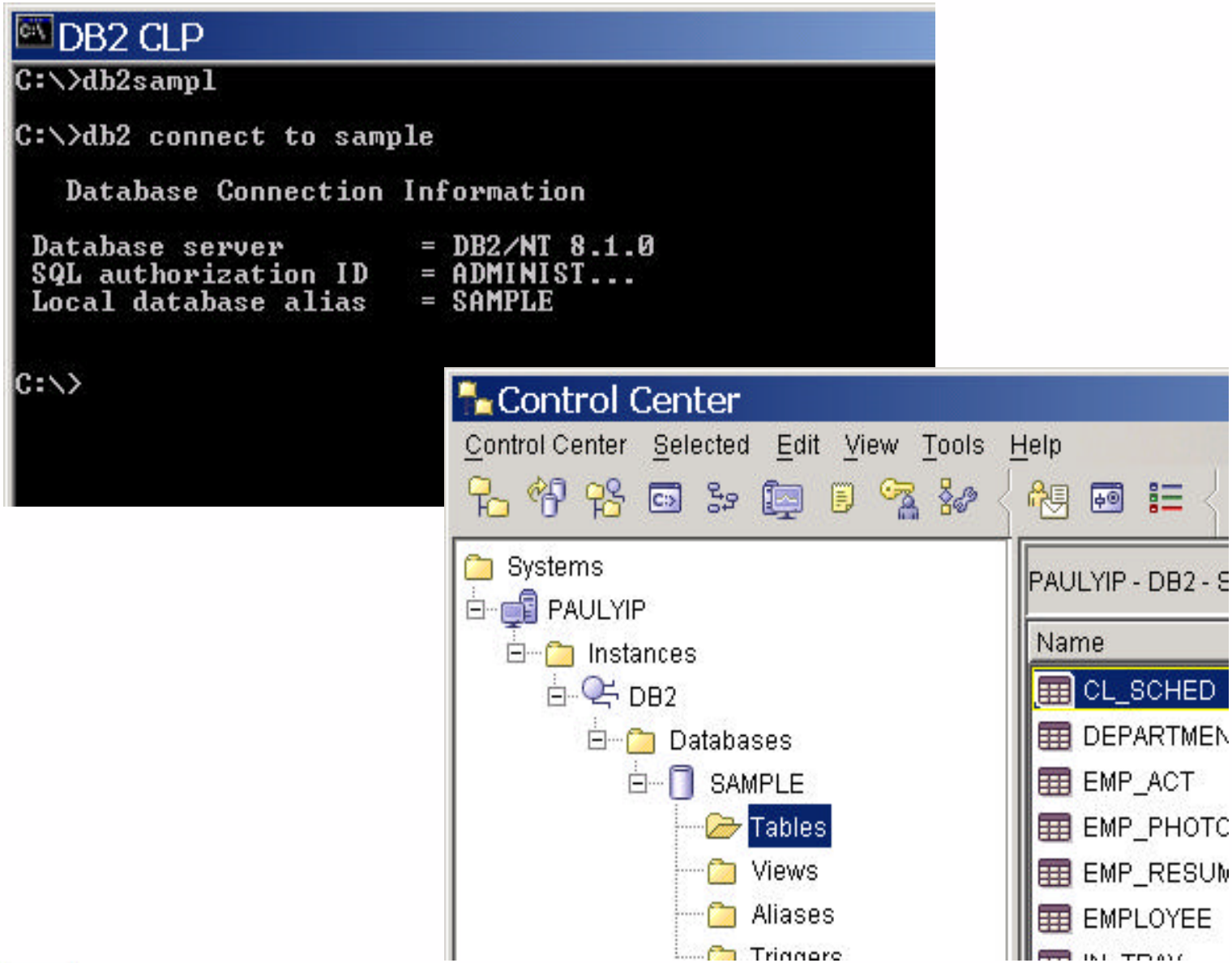
Health Monitor Contact



Setup Completion Summary



Getting Started : SAMPLE database (db2sampl)



DB2 64-bit Support

- Can mix 32-bit clients with 64-bit server and vice versa
- Exploit much larger memory for improved performance

64 Bit Product	AIX PPC	Sun	HP	AIX IA64	Linux IA64	Windows IA64
Personal Edition	N/A	N/A	N/A	N/A	yes	yes
Workgroup Edition	no	no	no	no	no	no
EE / EEE	yes	yes	yes	yes	yes	yes
Connect Personal	N/A	N/A	N/A	N/A	yes	yes
Connect Enterprise	yes	yes	yes	yes	yes	yes
App. Dev. Client	yes	yes	yes	yes	yes	yes
Administration Client	yes	yes	yes	yes	yes	yes
Runtime Client	yes	yes	yes	yes	yes	yes
Relational Connect	yes	yes	yes	yes	yes	yes
Satellite Edition	no	no	no	no	no	no
Datalinks Manager	no	no	no	no	no	no
Spatial Extender	no	no	no	no	no	no
Warehouse Manager	yes	yes	yes	yes	yes	yes

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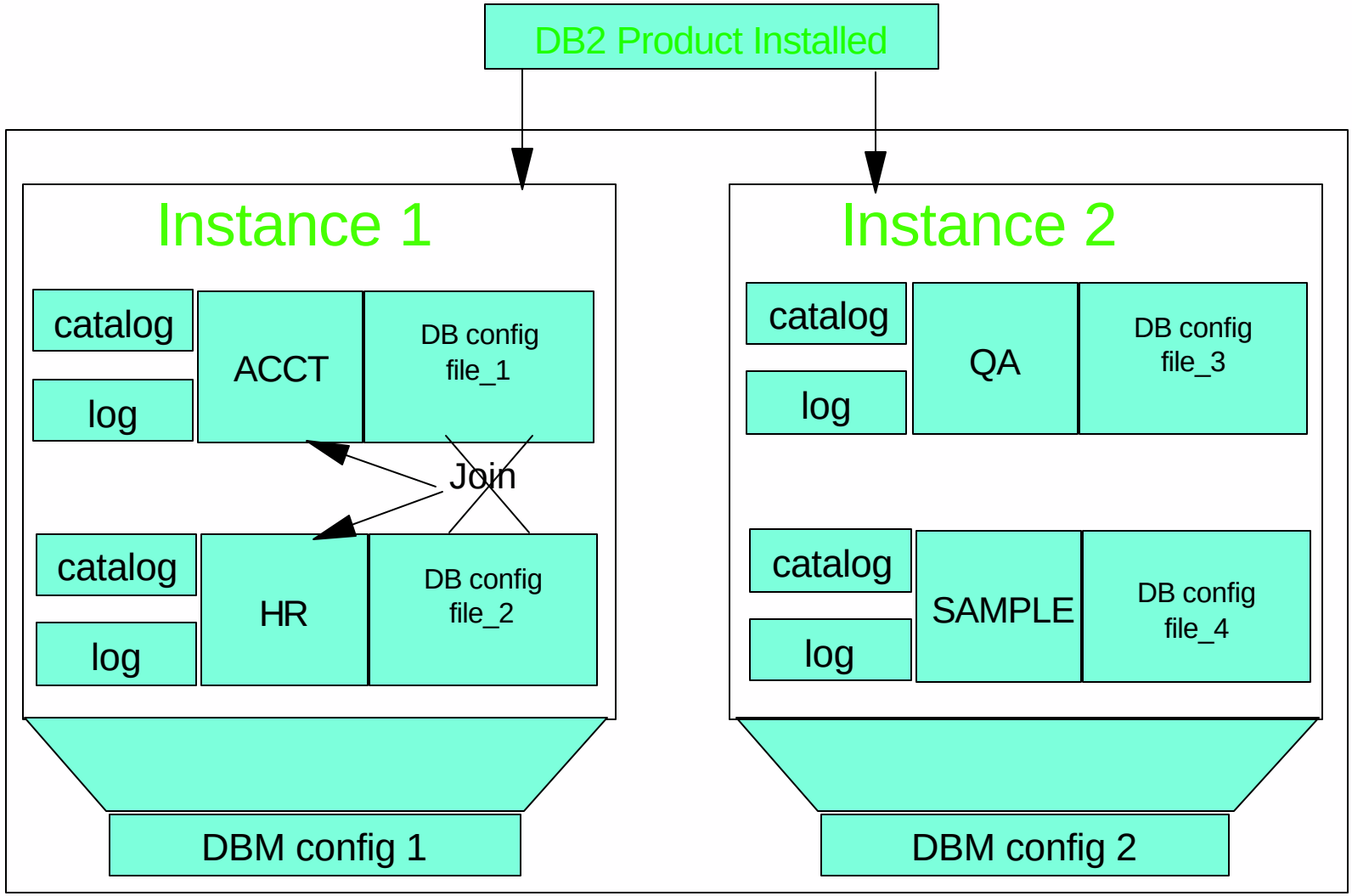
DB2 Instances

- A DB2 instance is a logical context in which DB2 commands and functions are executed
- An instance manages access to database files
- More than one instance can be defined on a server machine
- Each instance is independent of the others
- An instance is created on install by default
  - db2inst1 (UNIX)
  - DB2 (Windows)
- To start an instance
  - db2start
  - Starts a remote instance
    - db2start REMOTE <instance name>
  - Starst the instance in quiesced mode for administration purposes
    - db2start ADMIN MODE
- Terminate all database connections and stop an instance
  - db2stop force

Managing DB2 Instances

- To create additional instances
  - db2icrt -u <fenced user ID> <instance name>
    - must specify fenced user ID for UNIX platforms
  - db2icrt <instance name>
    - for Windows platforms
- Terminate all database connections and drop an instance
  - db2idrop -f <instance name>
- To list existing instances defined in a server
  - db2ilist
- To update a DB2 instance for access to functions associated with installation or removal of certain product options or fix patches
  - db2iupdt <instance name>
- To migrates an existing instance, for UNIX platforms only
  - db2imigr <instance name>
- To create, drop, update, or migrate an instance, root or administrative access is required

DB2 Instances and Databases



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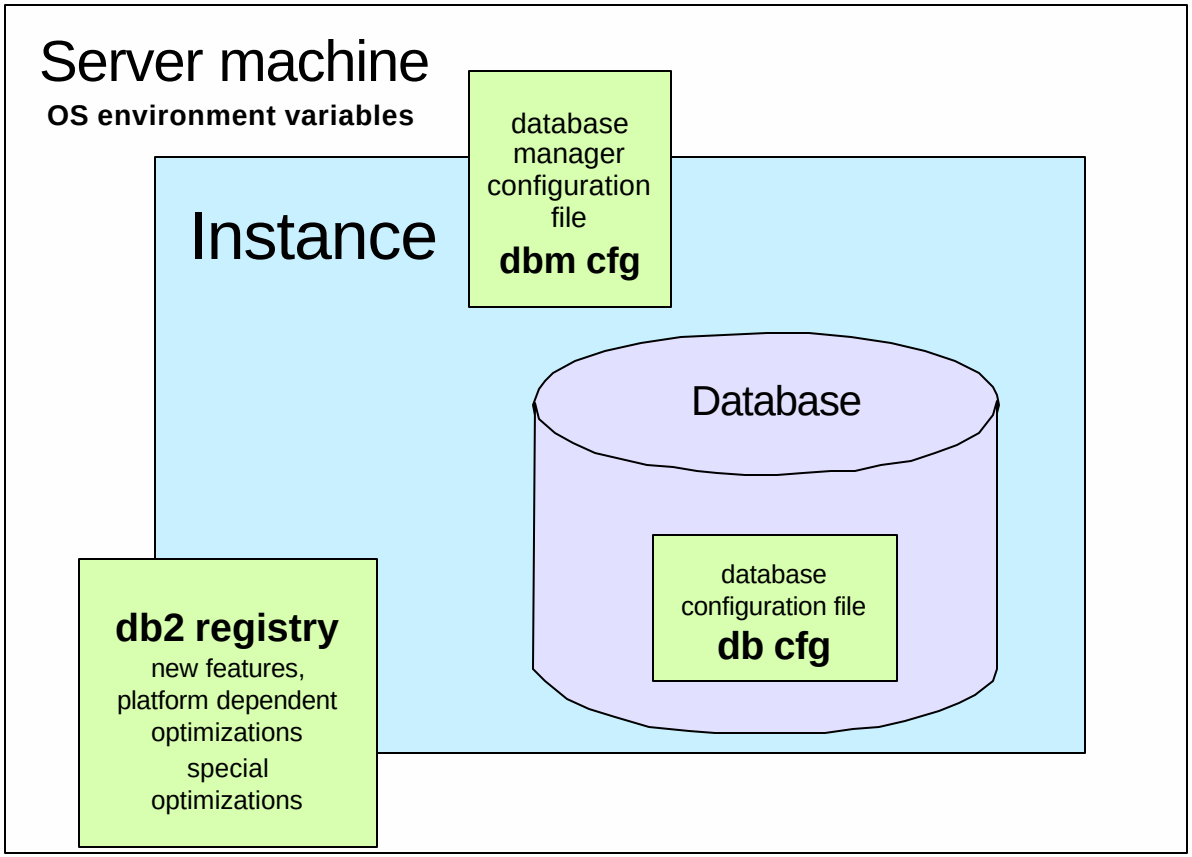
DB2 Environment

- Configure the DB2 environment via:
  - DB2 registry variables
  - Operating System environment variables
  - DB2 database manager configuration parameters
  - DB2 database configuration parameters



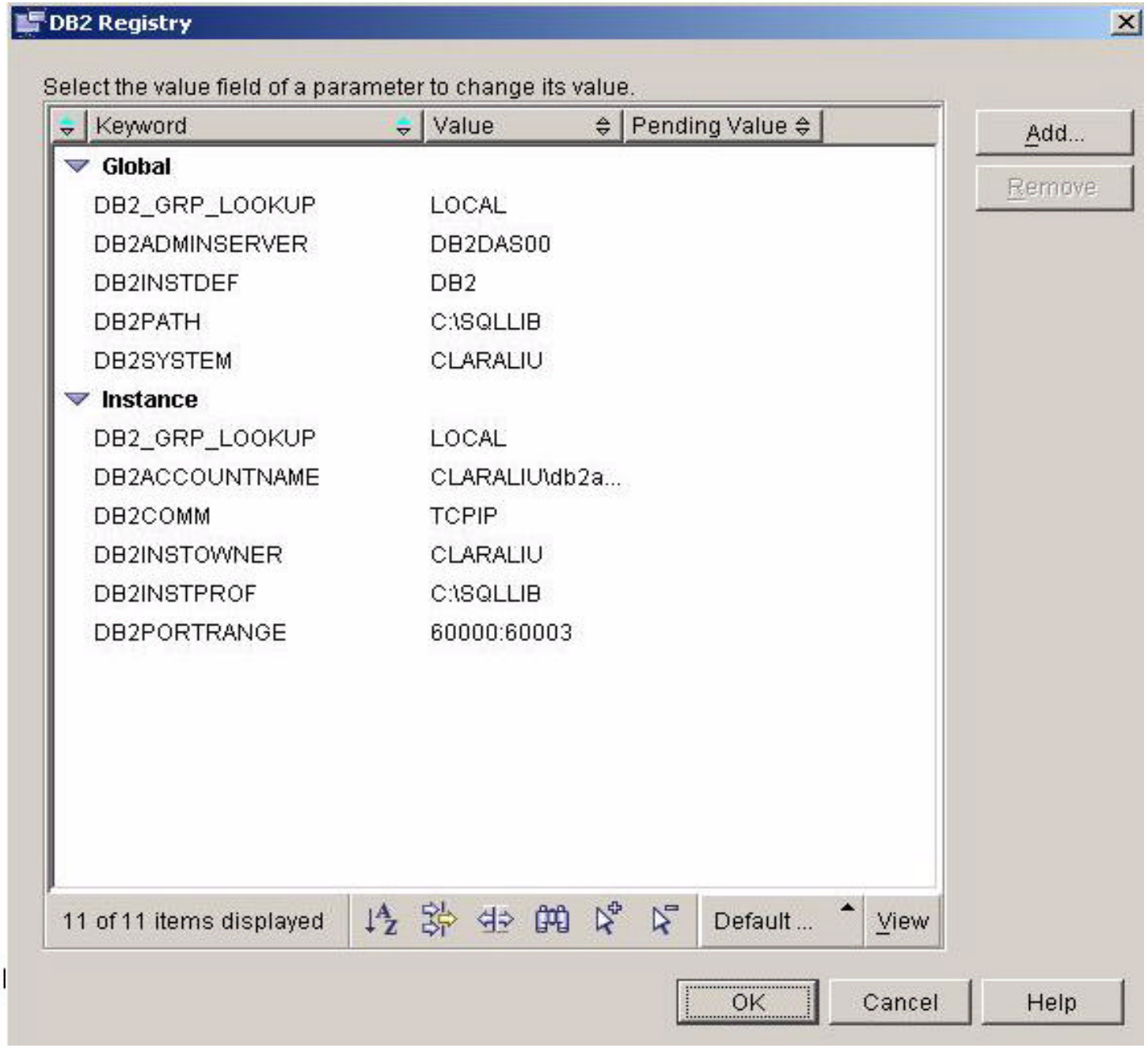
DB2 Profile Registry

- Most of the DB2 environment is controlled by entries stored in the DB2 Profile Registry
- Objective is to centralize control of DB2 environment
- No need to reboot the system after making changes to DB2 Registry
- At its various level, controls many aspects of the DB2 UDB environment
  - DB2 Instance-Level Profile Registry
  - DB2 Global-Level Profile Registry
  - DB2 Instance-Node-Level Profile Registry
  - DB2 Instance Profile Registry

DB2 Profile Registry

- To list all DB2 registry variables currently set
  - db2set -all
- To display global registry variables
  - db2set -g
- To display instance regisry variables
  - db2set -i <instname>
- To list all supported registry variables
  - db2set -lr
- To set a DB2 registry variable
  - db2set <parm>=<value>
  - e.g. db2set DB2COMM=TCPIP
- Must restart the instance for new changes to be in effect
- DB2 Configuration Assistant (db2ca) can also be used to manage DB2 registry variables

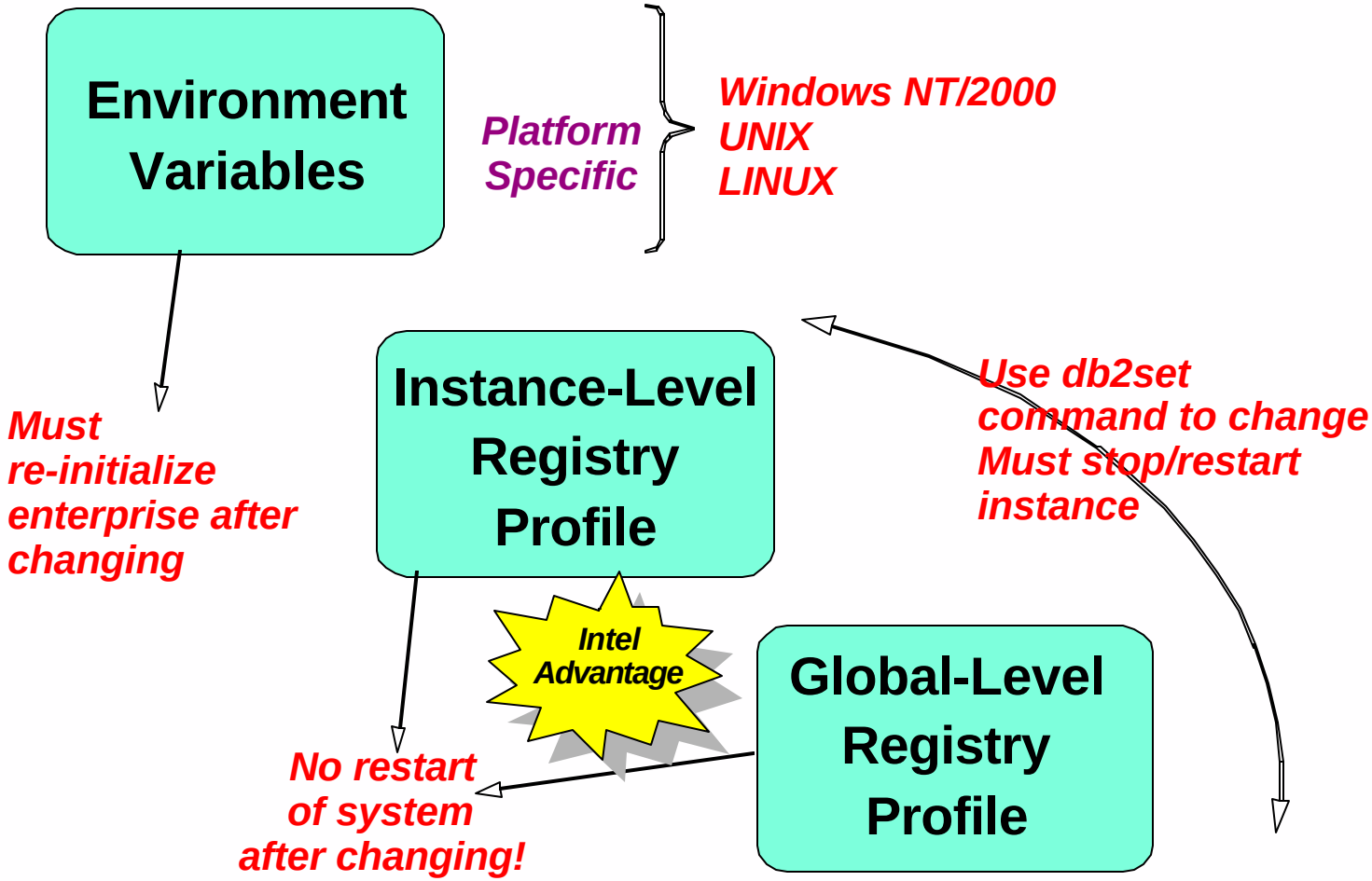
Display DB2 Registry Variable with DB2 CA



OS environment variables

- Most environment variables are controlled by the DB2 Profile Registry - those not stored in the DB2 Profile Registry can be referred to as system environment variables, and are set in a location where the platform stores its system variables:
  - Windows- Control Panel -> System -> Environment Variables
  - UNIX - .profile or .kshrc or .cshrc, they are typically incorporate with db2profile (Bourne or Korn shell) or db2cshrc (C shell) found in the instance owner's home directory
- Examples:
  - Windows - set DB2INSTANCE=PROD
  - UNIX - export DB2INSTNCE=PROD

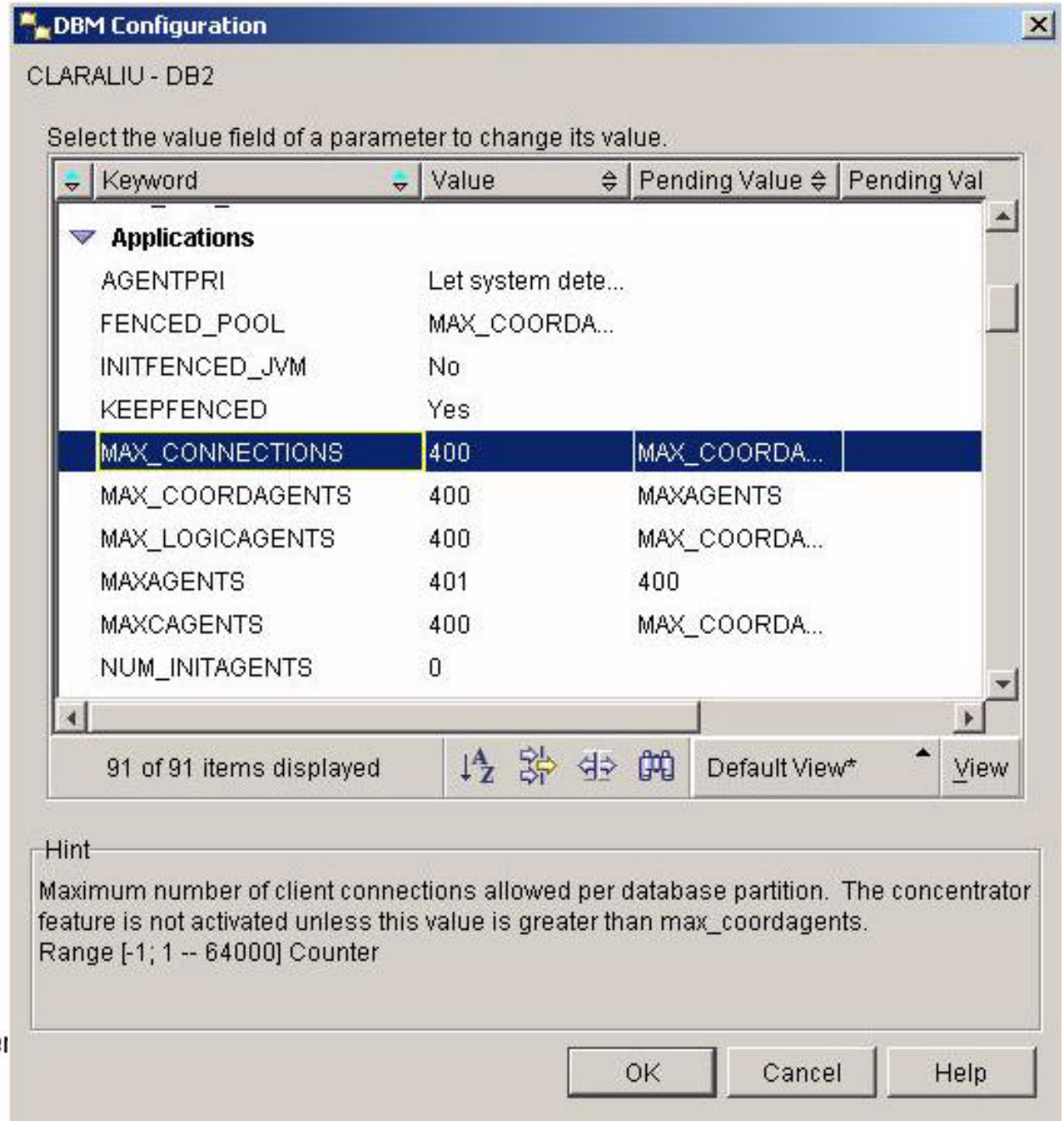
Setting DB2 Variable Values



DB2 Configuration Parameters

- Get/Set/Reset the Database Manager Configuration
  - GET DBM CFG [SHOW DETAIL]
    - show detail displays current and delayed values
  - UPDATE DBM CFG USING <param> <value>
  - RESET DBM CFG
- Get/Set/Reset the Database Configuration
  - GET DB CFG FOR <db> [SHOW DETAIL]
    - show detail displays current and delayed values
  - UPDATE DB CFG FOR <db> USING <param> <value>
  - RESET DB CFG FOR <db>
- DB2 Control Center can be used to display, update, and reset the DBM and DB configuration parameters

Display DBM Configuration Parameters with DB2 CC



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DB2 Command Line Tools

- DB2 Command Line Window (Windows Only)
  - click on the **DB2 Command Window** icon or from MS-DOS prompt, enter **db2cmd**
  - invoke the interpreter by prefacing commands and SQL with '**db2**'
    - e.g. **db2 connect to sample**
    - e.g. **db2 "select * from employee"**
    - e.g. **db2 -tvf createtab.db2**
  - to end command line mode and terminate the DB2 backend process (db2bp), enter **db2 terminate**
  - all OS commands can be issued from the DB2 Command Window
- DB2 Command Line Processor (CLP)
  - click on the **DB2 Command Line Processor** icon or enter **db2** at a command prompt
  - an interactive input prompt appears:
    - **db2 =>**
  - no need to prefix commands with '**db2**'
    - e.g. db2 => **connect to sample**
  - to end the interactive mode, enter **quit**
  - to disconnect from the database and terminate the DB2 backend process (db2bp), enter **terminate**
  - to execute OS commands, enter **!<OS command>**

Command Line Options

- to list default command options
  - **LIST COMMAND OPTIONS**

```
No. of retries to connect to backend        (DB2BQTRY) = 60
 Request queue wait time (seconds)          (DB2RQTIME) = 5
 Input queue wait time (seconds)            (DB2IQTIME) = 5
 Command options                           (DB2OPTIONS) =

 Option  Description                                 Current Setting
 ------  ------------------------------------------  ---------------
   -a    Display SQLCA                               OFF
   -c    Auto-Commit                                 ON
   -e    Display SQLCODE/SQLSTATE                    OFF
   -f    Read from input file                        OFF
   -l    Log commands in history file                OFF
   -n    Remove new line character                   OFF
   -o    Display output                              ON
   -p    Display interactive input prompt            ON
   -r    Save output to report file                  OFF
   -s    Stop execution on command error             OFF
   -t    Set statement termination character         OFF
   -v    Echo current command                        OFF
   -w    Display FETCH/SELECT warning messages       ON
   -x    Suppress printing of column headings        OFF
   -z    Save all output to output file              OFF
```

- To change default command options
  - e.g. turn auto-commit off: **set db2options=+c**
- To change command option for the current session
  - e.g. to save output to file:
    - **UPDATE COMMAND OPTIONS USING z ON output.txt**

Getting Help

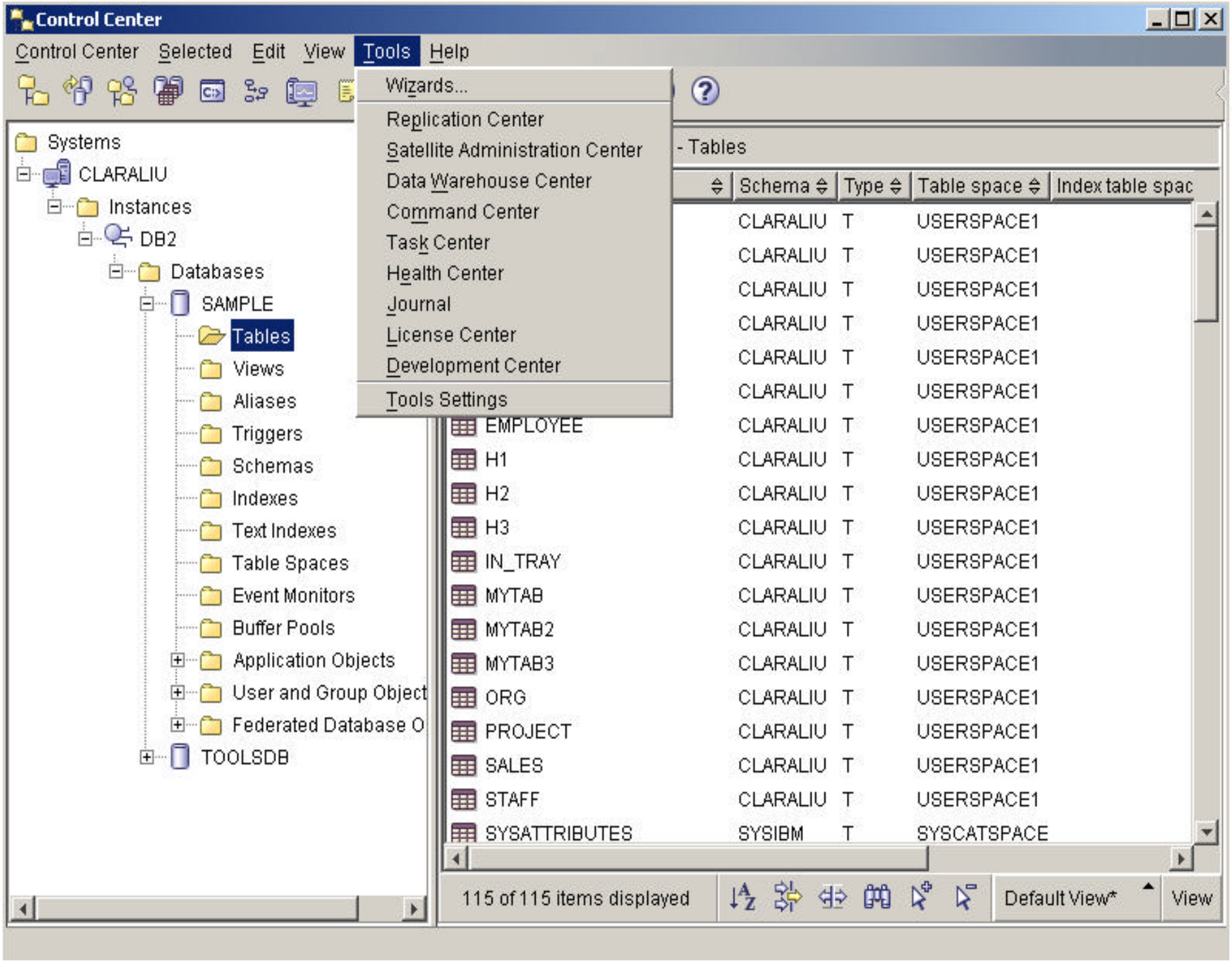
- Obtain syntax and information for DB2 commands from the command line
  - db2 ? — list of all DB2 commands
  - db2 ? <db2-command> — get syntax help for a specific command
  - db2 ? sqlnnnn — get message and brief description of a specific SQLCODE
  - db2 ? db2nnnn — get message and brief description of a DB2 error code
- For example:

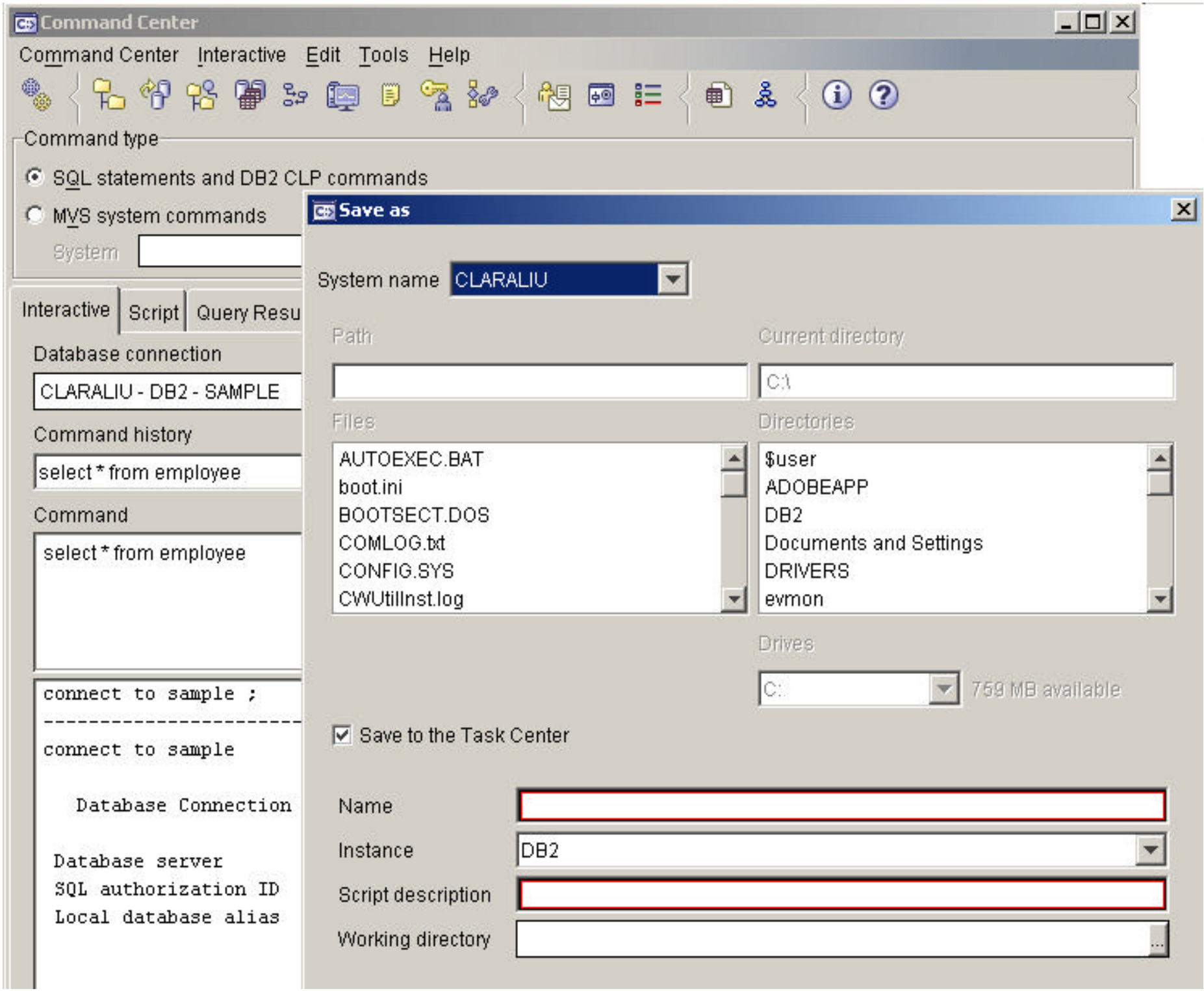
  db2 ? catalog tcpip

  CATALOG [ADMIN] TCPIP NODE node-name REMOTE hostname
  [SERVER service-name] [SECURITY {SOCKS}]
  [REMOTE_INSTANCE instance-name] [SYSTEM system-name]
  [OSTYPE os-type] [WITH "comment string"]

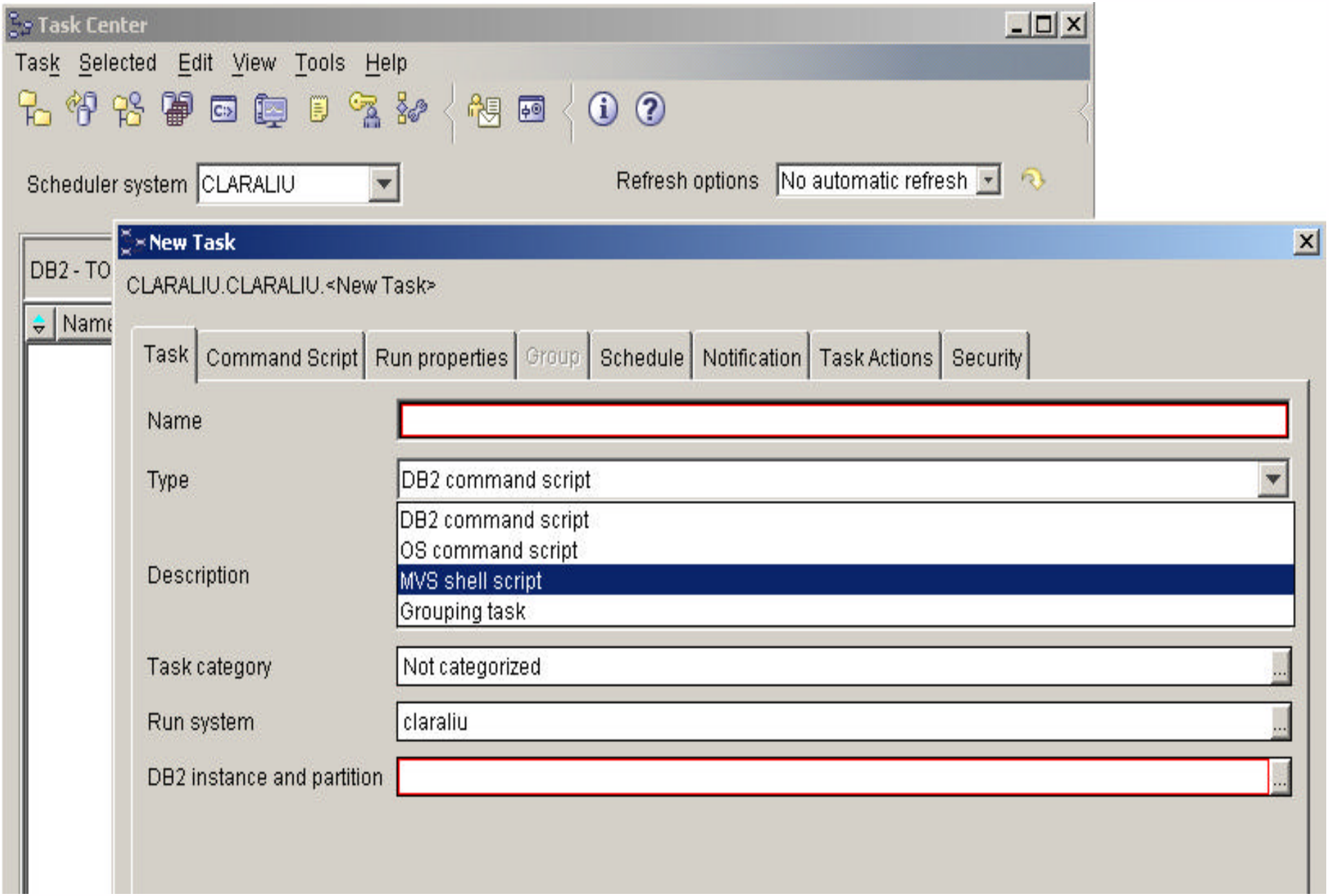
DB2 GUI Tools

- Control Center
  - Central point of administration
- Command Center
  - GUI wrapper for command line processor (CLP)
- Journal
  - Central point for logging DB2 Activities
- License Center
  - Central point of DB2 license management
- Development Center
  - Central point for developing:
    - SQL & Java Stored Procedures
    - SQL & Java User Defined
- Task Center
  - Central point for scheduling database jobs
- Health Center
  - Central point for DB2 Health Montoring
  - Memory Visualizer
- Configuration Assistant
  - Tool to configure the client
  - A light-weight version of the Control Center
- Replication Center
  - A GUI tool to set up and administer a replication environment and to run the Capture and Apply programs

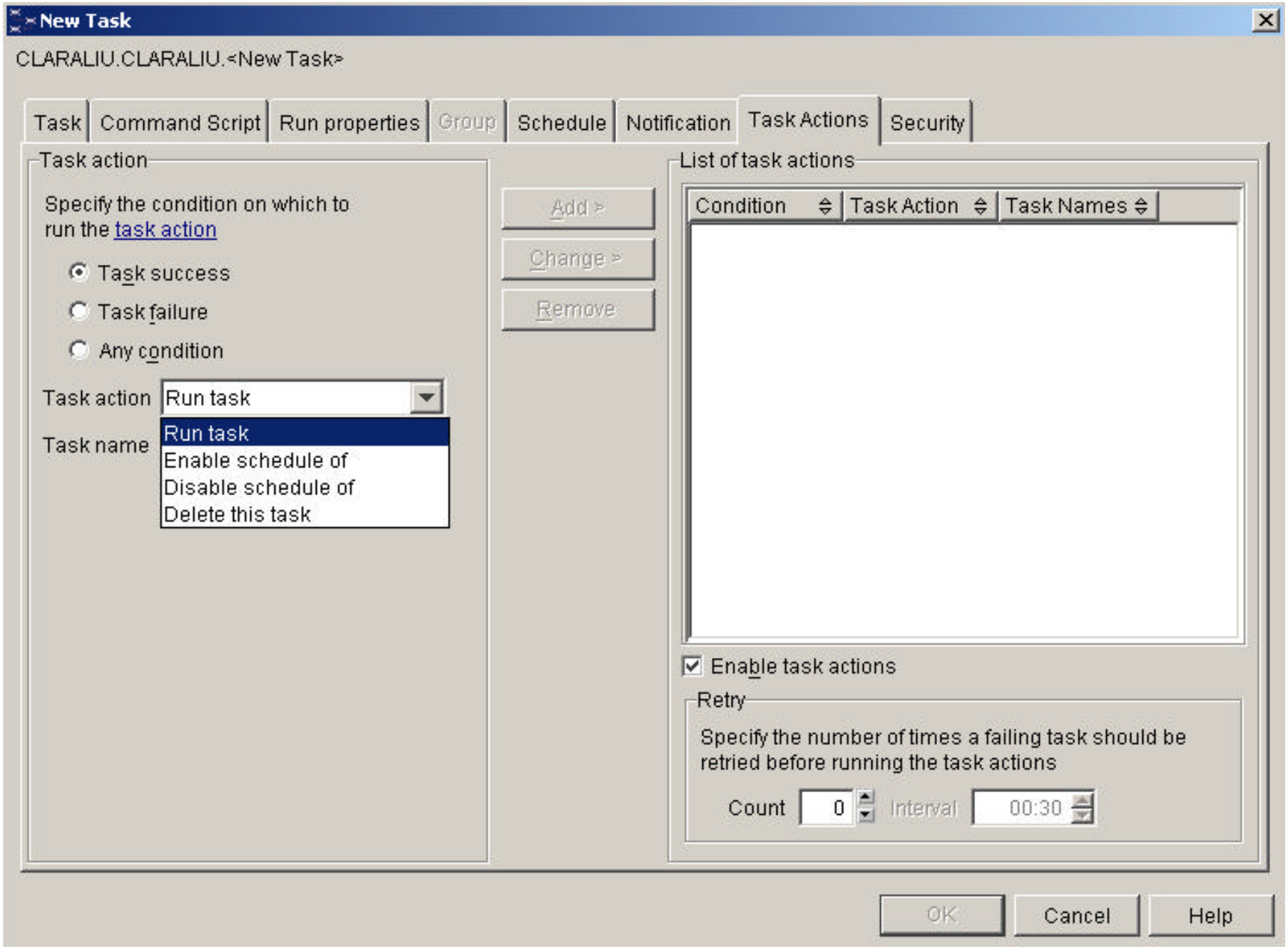

Control Center
Control Center
Selected
Edit
View
Tools
Help
Wizards...
Replication Center
Satellite Administration Center
Data Warehouse Center
Command Center
Task Center
Health Center
Journal
License Center
Development Center
Tools Settings
Systems
CLARALIU
Instances
DB2
Databases
SAMPLE
Tables
Views
Aliases
Triggers
Schemas
Indexes
Text Indexes
Table Spaces
Event Monitors
Buffer Pools
Application Objects
User and Group Object
Federated Database O
TOOLSDB
- Tables
Schema
Type
Table space
Index table spac
EMPLOYEE CLARALIU T USERSPACE1
H1 CLARALIU T USERSPACE1
H2 CLARALIU T USERSPACE1
H3 CLARALIU T USERSPACE1
IN_TRAY CLARALIU T USERSPACE1
MYTAB CLARALIU T USERSPACE1
MYTAB2 CLARALIU T USERSPACE1
MYTAB3 CLARALIU T USERSPACE1
ORG CLARALIU T USERSPACE1
PROJECT CLARALIU T USERSPACE1
SALES CLARALIU T USERSPACE1
STAFF CLARALIU T USERSPACE1
SYSATTRIBUTES SYSIBM T SYSCATSPACE
115 of 115 items displayed
Default View*
View


Command Center
Command Center Interactive Edit Tools Help
Command type
SQL statements and DB2 CLP commands
MVS system commands
System
Interactive Script Query Resu
Database connection
CLARALIU - DB2 - SAMPLE
Command history
select * from employee
Command
select * from employee
connect to sample ;
connect to sample
Database Connection
Database server
SQL authorization ID
Local database alias
Save as
System name CLARALIU
Path
Current directory
C:\
Files
AUTOEXEC.BAT
boot.ini
BOOTSECT.DOS
COMLOG.txt
CONFIG.SYS
CWUtilInst.log
Directories
$user
ADOBEAPP
DB2
Documents and Settings
DRIVERS
evmon
Drives
C:
759 MB available
Save to the Task Center
Name
Instance
DB2
Script description
Working directory

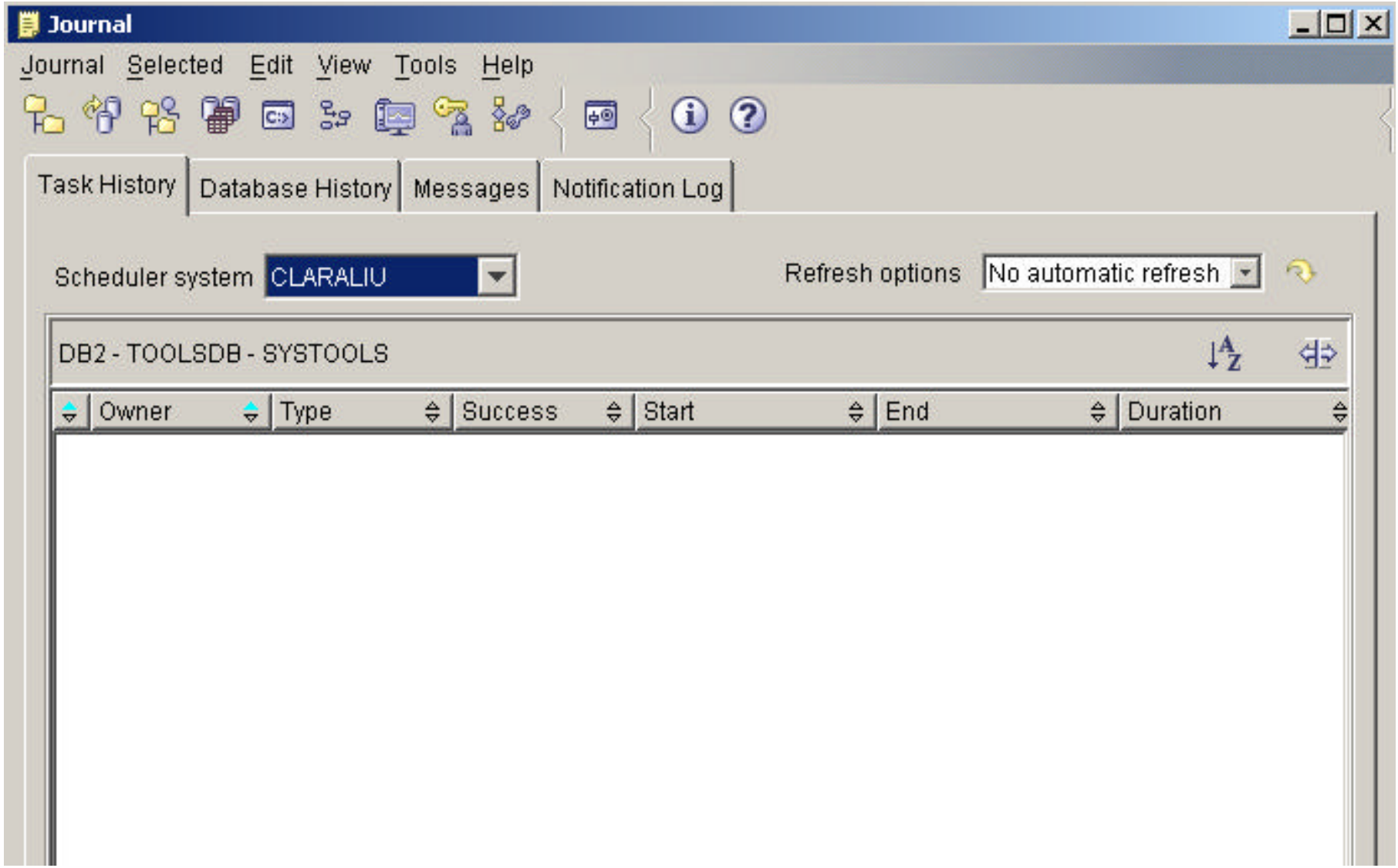
Task Center


Task Center
Task Selected Edit View Tools Help
Scheduler system CLARALIU
Refresh options No automatic refresh
DB2 - TO
Name
New Task
CLARALIU.CLARALIU.<New Task>
Task Command Script Run properties Group Schedule Notification Task Actions Security
Name
Type
DB2 command script
DB2 command script
OS command script
MVS shell script
Grouping task
Description
Task category
Not categorized
Run system
claraliu
DB2 instance and partition

Task Center

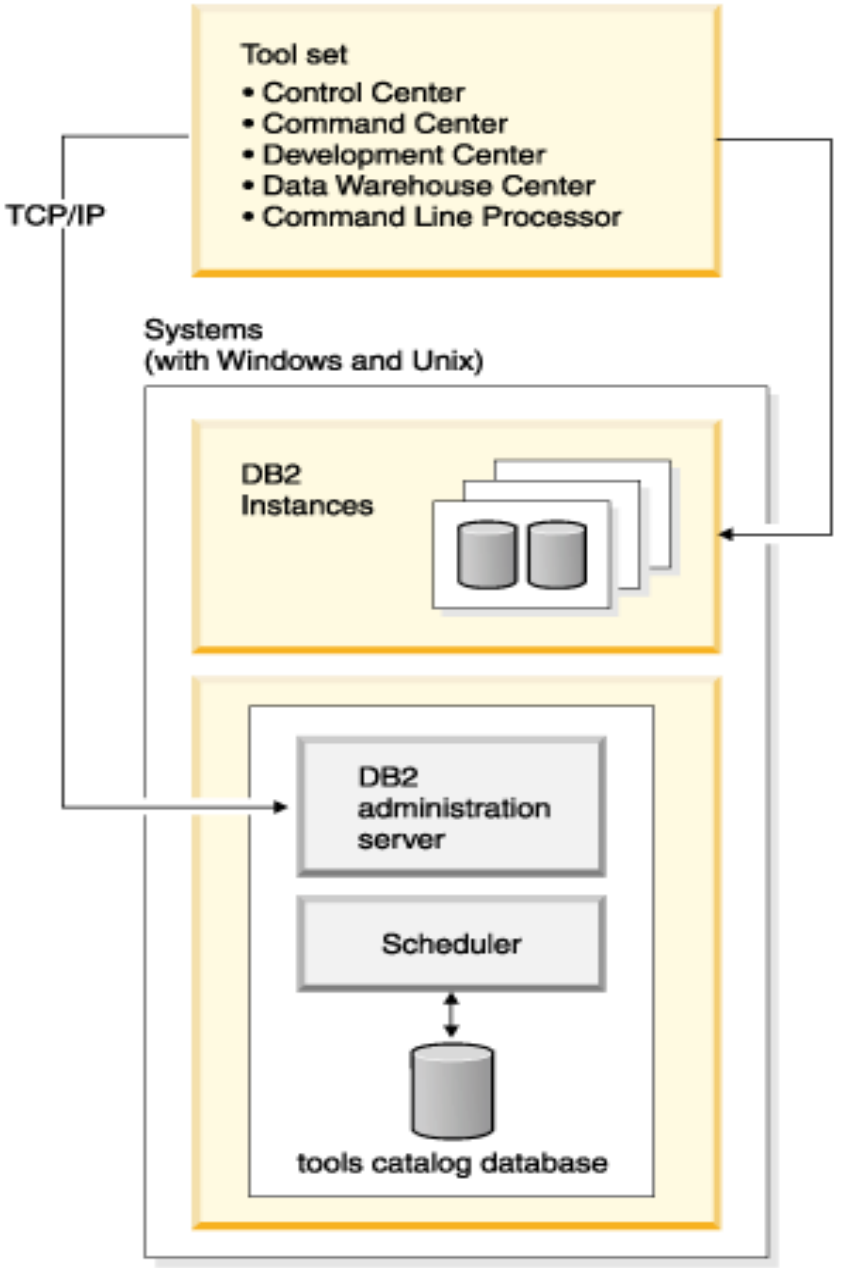

New Task
CLARALIU.CLARALIU.<New Task>
Task
Command Script
Run properties
Group
Schedule
Notification
Task Actions
Security
Task action
Specify the condition on which to run the task action
Task success
Task failure
Any condition
Task action
Run task
Task name
Run task
Enable schedule of
Disable schedule of
Delete this task
Add >
Change >
Remove
List of task actions
Condition
Task Action
Task Names
Enable task actions
Retry
Specify the number of times a failing task should be retried before running the task actions
Count
0
Interval
00:30
OK
Cancel
Help

Journal


Journal
Journal Selected Edit View Tools Help
Task History
Database History
Messages
Notification Log
Scheduler system
CLARALIU
Refresh options
No automatic refresh
DB2 - TOOLSDB - SYSTOOLS
Owner
Type
Success
Start
End
Duration

DB2 Administration Server (DAS)

- A background process to support instance administration
  - **db2as on UNIX (default)**
  - **DB2DAS service on Windows (default)**
- Provides support services for DB2 tools such as the Control Center, Configuration Assistant, Replication Center, and Development Center
- Only one DAS per server machine
- Need correct authorization to create a service, e.g. root authority in UNIX
- Some DAS commands:
  - **db2admin create**
  - **db2admin** (to obtain the name of the DAS on the machine)
  - **db2admin start**
  - **db2admin stop**
  - **db2 get admin cfg**
  - **db2 update admin cfg using <parm> <value>**

Tools Catalog Database

- The DB2 Tools Catalog must be created to enable "scheduling" and automation of tasks
- Can be created ...
  - as an independent database
  - within an existing database
- Can be shared by...
  - the local database
  - all databases in an organization
- Requirements:
  - 32K pagesize tablespaces
  - two 32K pagesize tablespaces are created by default, REGULAR and SYSTEM TEMPORARY tablespaces