UC98

San Diego, California

Powering Up SDE

Overview of installation, administration and tuning so that your SDE instance is up and running as quickly and as effectively as possible.

Notes

- **SDE 3.x versions (not extension technologies)**
- **Where possible, this is a generalized discussion of SDE (including NT, UNIX, and supported DBMS')**
- **Discussion organized as a typical SDE implementation (i.e. install, configure, then tune).**
- **Who should be here? SDE curious, beginner, and veteran. Knowledge of SDE and RDBMS concepts.**
- **Questions? Please wait till the end, or find us at the SDE Island in the ESRI Demo Area**
- **Who is here? SDE experienced? What DBMS'? WhatOS'?**

Our Ambitious Goals:

- Know the major parts and pieces of SDE.

- Know what to expect during the SDE installation process.

- Know what tools are available to administer SDE.

- Know what opportunities exist to tune SDE.

Agenda

- **Describe a Typical SDE Configuration**
- **Describe Some Processing Examples**
- **Discuss the SDE Installation Process**
- **Discuss SDE Administration**
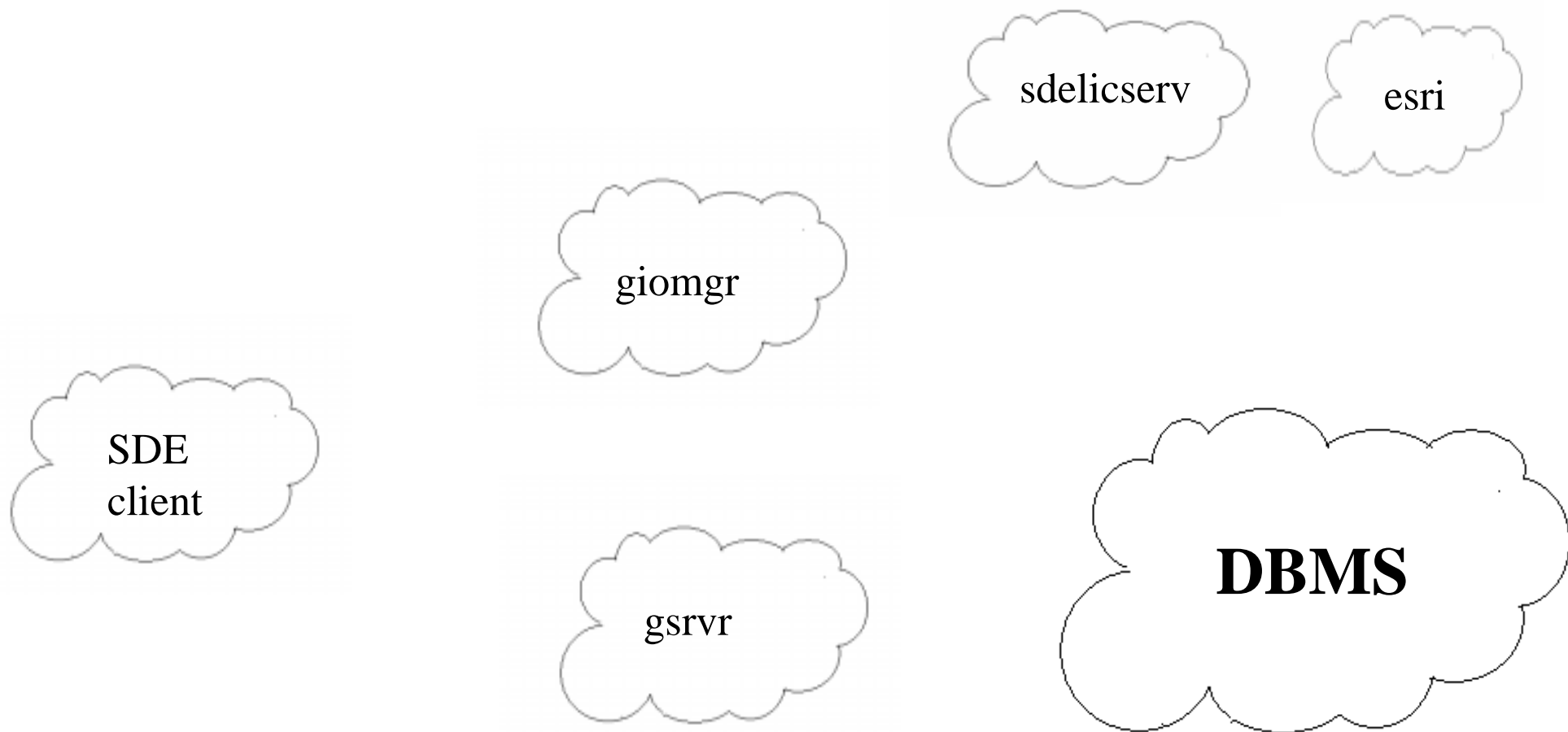- **Discuss SDE Tuning Opportunities**

A Typical SDE Configuration

"What are we installing, administering, and tuning anyway ...?"

A typical SDE configuration includes:

- an SDE server/instance (i.e. giomgr, gsrvr, and sdelicserv processes)
- an SDE client application (e.g. ArcView, MO IMS, SDE tools, etc.)
- an ESRI License Manager (i.e. esri process, tools)
- an SDE supported DBMS (e.g. Oracle, SQL Server, Sybase, etc.)

A Typical SDE Configuration

sdelicserv

esri

giomgr

SDE
client

gsrvr

DBMS

SDE Server Started
(no client connection)

Geography Matters

Services

Service	Status	Startup
Protected Storage	Started	Automatic
Remote Procedure Call (RPC) Locator		Manual
Remote Procedure Call (RPC) Service	Started	Automatic
Schedule		Manual
SDE Service(esri_dbg)		Manual
SDE Service(esri_sde)	Started	Manual
Server	Started	Automatic
Spooler	Started	Automatic
SQLExecutive		Manual
TCP/IP NetBIOS Helper	Started	Automatic

Startup Parameters:

Buttons: Close, Start, Stop, Pause, Continue, Startup..., HW Profiles..., Help

Windows NT Task Manager

File Options View Help

Applications | Processes | Performance

Image Name	PID	CPU	CPU Time	Mem Usage	Threads
csrss.exe	28	00	0:06:29	764 K	8
esri.exe	144	00	0:04:15	660 K	2
Explorer.exe	129	00	1:00:56	3252 K	3
giomgr.exe	247	00	0:00:26	344 K	4
lmgrd.exe	205	00	0:00:06	544 K	3
loadwc.exe	148	00	0:00:01	120 K	2
lsass.exe	44	00	0:00:01	608 K	11
nddeagnt.exe	106	00	0:00:00	84 K	1
NPROTECT.EXE	92	00	0:00:09	304 K	8
ntvdm.exe	242	00	0:00:00	216 K	2
wowexec.exe		00	0:00:01		1
PowerPnt.exe	234	00	0:12:10	1540 K	5
pstores.exe	124	00	0:00:52	672 K	4
RpcSs.exe	100	00	0:00:14	380 K	8
rundll32.exe	94	00	0:00:00	2548 K	1
sdelicserv.exe	236	00	0:00:03	388 K	4
SDSRV.EXE	89	00	0:00:00	0 K	4
services.exe	41	00	0:04:39	888 K	16
smss.exe	21	00	0:00:00	120 K	6
spoolss.exe	68	00	0:00:00	36 K	7
SQLSERVR.EXE	212	00	0:08:00	3608 K	25
System	2	00	0:06:46	120 K	27
System Idle Process	0	98	178:41:39	16 K	1
taskmgr.exe	185	02	0:59:57	1264 K	3
winlogon.exe	35	00	0:00:03	40 K	3

End Process

Processes: 24   CPU Usage: 2%   Mem Usage: 64304K / 183048K

Start | Windows NT Task M... | Microsoft PowerPoint - [po...   2:39 PM

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Single SDE Client and Server Running

2 SDE Clients and Server Running

Some Processing Examples

"What are we installing, administering, and tuning anyway ...?"

What happens when you start the SDE server?

Geography Matters

sdelicserv ↔ esri

giomgr
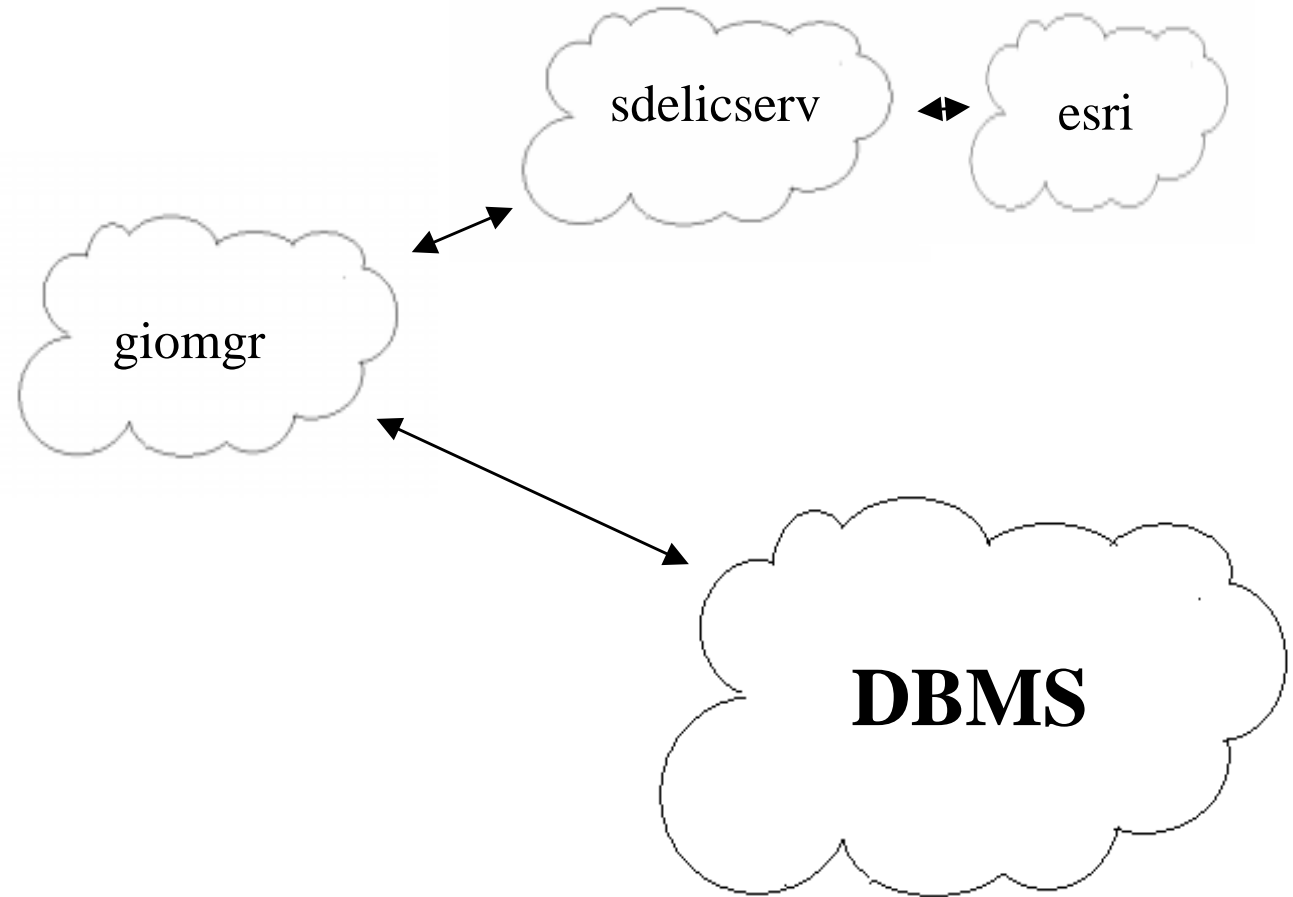
DBMS

What happens when a client connects to SDE?

Geography Matters

sdelicserv ◆ esri

giomgr

SDE client

DBMS

gsrvr
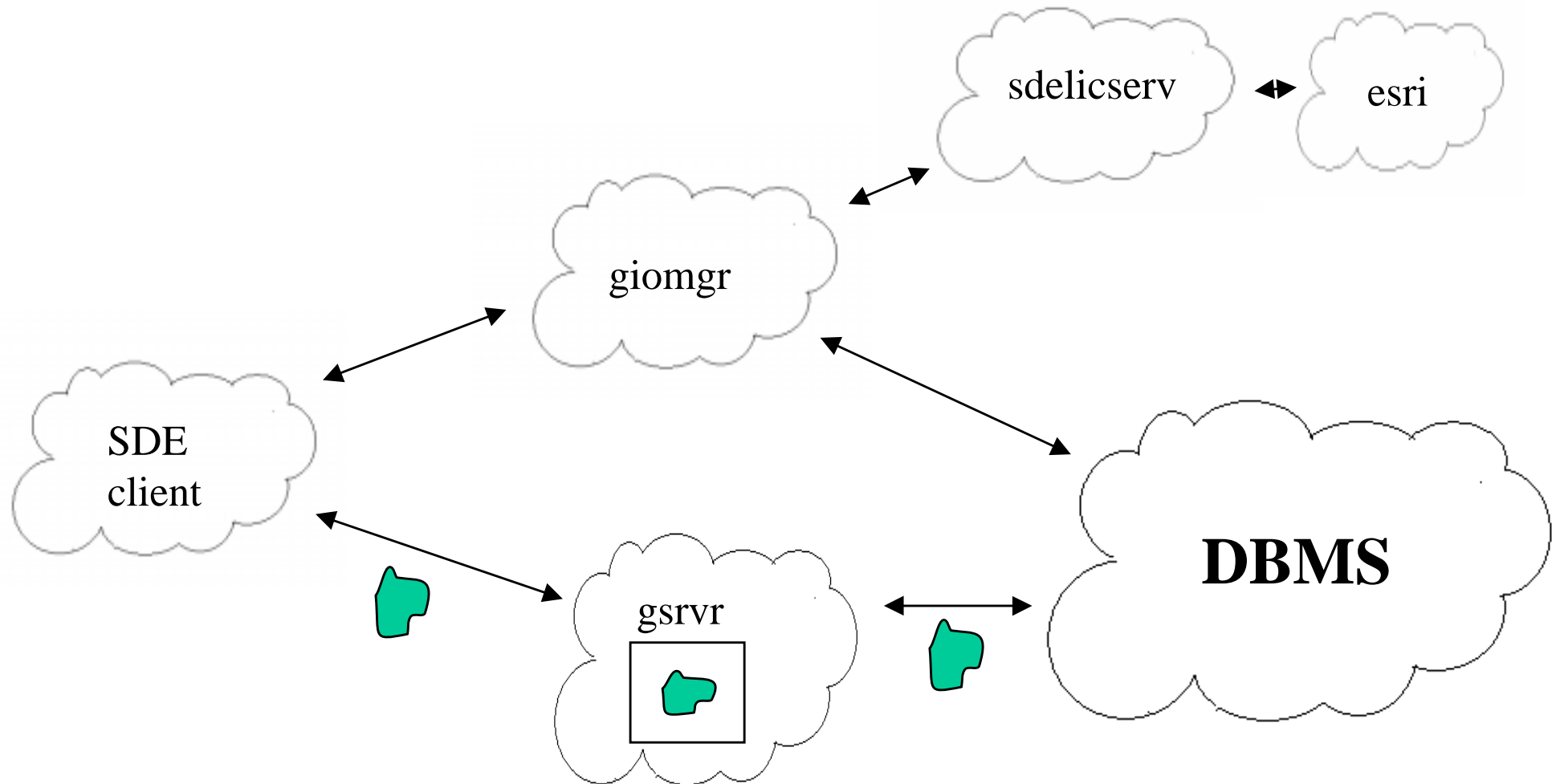
Note: processes may be running on different machines to balance resources and loads

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SDE Installation Process

"At a glance," to install SDE you will need to:

- prepare the DBMS
- prepare the client and server operating systems
- prepare the ESRI License Manager

Recommended SDE Installation Process:

- 1. Install and configure the DBMS.

- 2. Install and configure the ESRI License Manager via various ESRI setup executables (including SDE).

- 3. Install and configure SDE via the setup executable

- 4. Install and configure SDE client applications.

The Recommended SDE Installation Process

sdelicserv

esri

2. Install ESRI License Manager

SDE tools

giomgr

SDE client

gsrvr

DBMS

4. Install SDE Client

3. Install SDE
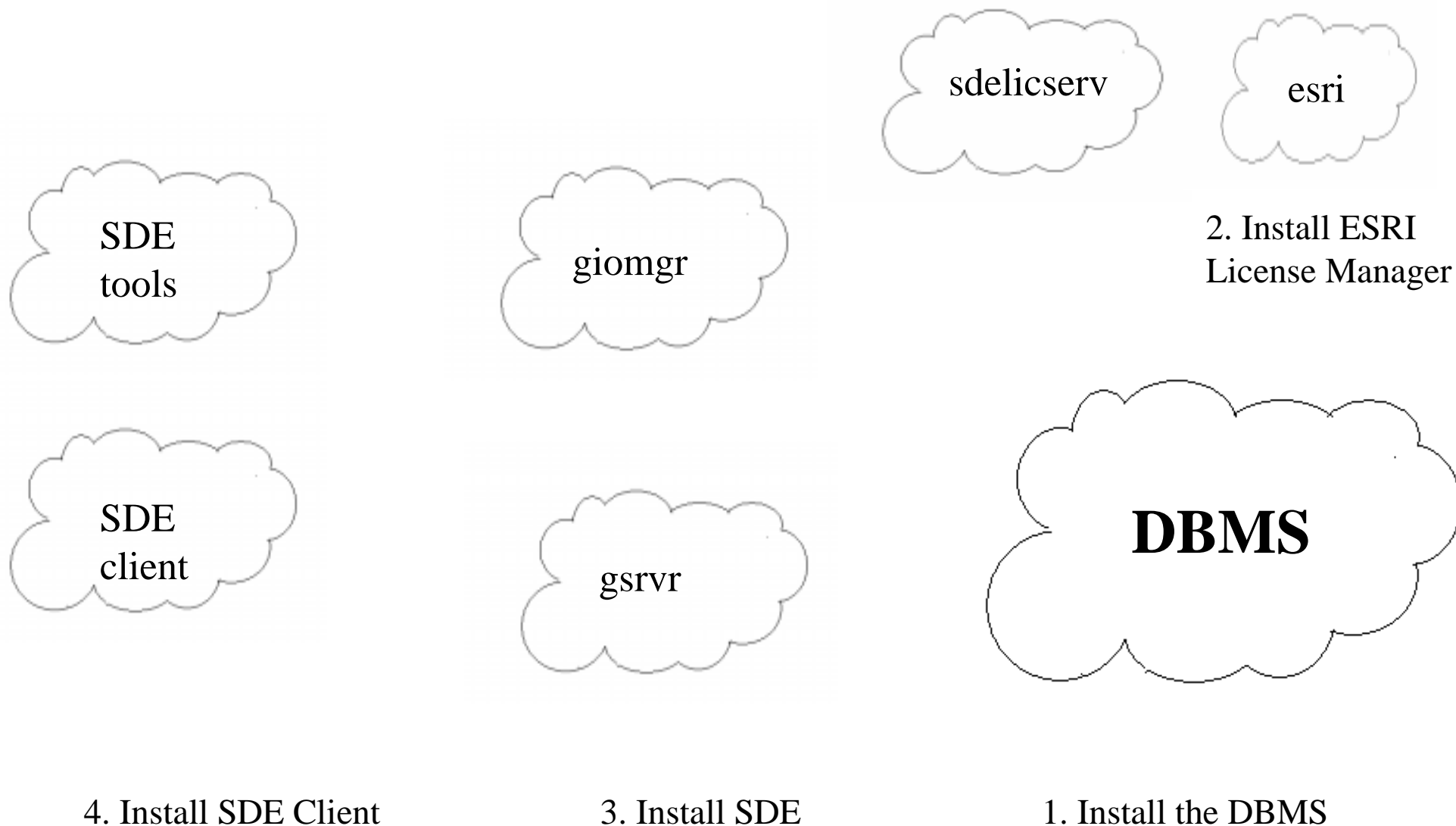
1. Install the DBMS

1. Install and config. the DBMS for SDE

- create an 'sde' database user
- grant 'sde' user create table perm.
- start and prepare DBMS for connections
  - Oracle and Sybase envir.variables
  - SQL Server ODBC System DSN (called 'sde' using the 'sde' database)
- Sybase and SQL Server DBMS', create an 'sde' database, then do above
- add any additional client accounts (some sites already have their database online)

2. Install and config. the ESRI License Manager

- **use ARC/INFO, ArcView, SDE, etc. setup programs**

- **collect your hardware key and keycode from ESRI**

- **NT 3.0.1 Servers should modify the registry key LICENSE_SERVER to boost connection performance (from 8-9 secs to 1-2 secs)**

- **Floating licenses are not node locked**

3. Install and configure SDE

- Add a port entry to etc\services file for SDE server (e.g. esri_sde)
- Know what the 'sde' user's password is after configuring your DBMS
- Know the ESRI license manager server name
- NT config's, have a power user or administrator account to assign the SDE Service
- SQL Server users may need to toil with ODBC versions (depending on the implementation)
- NT users must install in directory no longer than 32 characters at SDE 3.0.1. (Fixed at SDE 3.0.2).

4. Install and configure SDE Client Applications

- **Add a port entry to etc\services file matching the SDE server's instance name and number (e.g. esri_sde)**

Snags you might encounter in the process:

- **SQL Server config's, be careful about the supported ODBC versions, service packs, and loading new MS software**
- **services entry is incompatible or not recognized**
- **on NT, the owner of the service is not actually a power user or administrator**
- **database was not actually ready for SDE**
  - **rollback or transaction logs not configured/allocated**
  - **'sde' user doesn't have 'create table' permissions**

Final Comments about the installation process

- remember what you are installing - middleware (see the overview)
- all of this is documented in the installation guide

SDE Administration Includes:

- **Managing the SDE Server**
- **Managing the DBMS (i.e tables, spatial columns, etc.)**
- **Managing SDE Data Log files**
- **Loading Spatial Data**
- **SDE Troubleshooting**
- **Managing the ESRI License Manager**

Managing the SDE Server cont'd

- on NT you may use the Service Control Manager to start, stop, pause, and continue.

- use sdeversion to check the version of the SDE server currently installed

- on NT use sdeservice to register/edit an SDE Service (e.g. SDEHOME, SDE passwd, instance name)

Managing a DBMS Table

- **use sdetable to**
  - create, delete, or drop a table
  - describe a table
  - create or delete a DBMS index
- **native database tools**
  - should be used with care

Managing an SDE Spatial Column (layer)

- **use sdelayer to**
  - **create, delete, or drop a new spatial column**
  - **change a spatial column's definition**
  - **grant, revoke privileges of a spatial column to other users**
  - **list spatial columns**
- **sdelayer does not delete the business table**
  - **use sdetable to delete everything**

Managing an SDE Spatial Column (layer) cont'd

- **use sdelayer to**
  - **change to load or normal mode**
  - **check spatial index statistics**
- **native database tools**
  - **deleting F<n> and S<n> tables will result in problems, use *sdelayer***
  - **when deleting records from the LAYERS table via native commands, one must delete the corresponding F<n> and S<n> tables**

Spatial Column from the API/Client viewpoint

Business Table

V1	Shape1	V2	V3	Vn

Spatial Column Implementation

Business Table

V1	Shape1	V2	V3	Vn

F<layer_ID>
FID, type,
numofpts,
point blob, etc.

S<layer_ID>
GX,GY,SP_FID,
xmin,ymin,
xmax,ymax

Spatial Column Constraints and Indices

- **Business Table**
  - **Delete and Insert Constraints maintain the relationship between the business table and the feature table (F<layer> and S<layer>)**
  - **A<layer>_IX1 (Unique) index on the spatial column**

- **F<layer> table**
  - **F<layer>_UK1 (Non-unique) on the fid column**

Spatial Column Constraints and Indices con't

- **S<layer> table**
  - **SDE 3.0**
    - **S< layer_id>_IX1 - sp_fid**
    - **S< layer_id>_IX2 - gx, gySDE 3.0**
  - **SDE 3.0.1**
    - **S< layer_id>_IX1 - gx, gy, eminx, eminy, emaxx, emaxy, sp_fid**
  - **SDE 3.0.2**
    - **S< layer_id>_IX1 - gx, gy, eminx, eminy, emaxx, emaxy, sp_fid**
    - **S< layer_id>_IX2 - sp_fid**

Managing an SDE Logfile

- **use sdelog to**
  - **list logfiles**
  - **delete a logfile**
  - **clean (delete) a logfile**
  - **display a logfile**
- **currently file based, will be DBMS based at SDE 4.0**

Loading Spatial Data

- **shapefile tools (sde2shp, shp2sde, shpinfo)**
  - attribute and spatial data from shapefiles
- **SDE import/export tools (sdeimport, sdeexport, sdexinfo)**
  - attribute and spatial data from SDE format files
  - easiest among the three file formats because it stores SDE related/configured data
- **coverage tools (cov2sde, sde2cov)**
  - attribute and spatial data from coverages (AI, ArcStorm, Librarian)

Potential Loading Issues

- **Rejected features**
  - **SE_TOO_FEW_POINTS and SE_SELF_INTERSECTING**
    - **xyscale is too small, increase the scale (100 -> 1000)**
  - **SE_COORD_OUT_OF_BOUNDS**
    - **adjust the x,y offset**
  - **Use the rejects option and correct the problem using ArcView**

Potential Loading Issues cont'd

- **Attributes**
  - **Column names**
    - **Names reserved by the RDBMS will fail**
    - **duplicate names will file**
    - **re-map the column names using the *-a file=* option**
  - **Unrecognizable data**
    - **The problem will be reported**
    - **A null will be inserted if allowed by the RDBMS column definition.**

Potential Loading Issues cont'd

- **LOAD_ONLY_IO / NORMAL_IO**
  - **Extent problems with S<layer_id>_IX1 or S<layer_id>_IX2**
    - **Increase the intial extent in the dbtune.sde file and use** *sdelayer*
  - **TEMP TABLESPACE**
    - **Increase the size of temp (see the Tuning Guide)**
  - **Rollbacks/Transaction Logs**
    - **Oracle, make sure that the rollback storage is set to optimal**
      ALTER ROLLBACK SEGMENT R01 STORAGE (OPTIMAL 1M);
    - **SQL Server/Sybase, either turn off or increase**

SDE Troubleshooting Tips

- **Check SDE logfiles (SDEHOME/etc.)**
  - **giomgr.log (status and error messages from giomgr)**
    - ignore "Can't Locate SHM for pid 289." Dropped at SDE 4.0.
  - **sde.errlog (error messages from gsrvr)**
  - **sde.outlog (status messages from gsrvr)**
  - **sdelic.log (status and error messages from sdelicserv)**
- **Set SDEVERBOSE = TRUE**

Interpreting Error Codes

- **SDE error code ranges**
  - **fatals -1 through -168**
  - **nonfatal -1000 through -1008**
- **RDBMS error code ranges**
  - **Oracle**
    - **Positive numbers, 0-20000 (aprox.) (oerr)**
  - **Sybase**
    - **Positive numbers, same range as Oracle**

Interpreting Error Codes cont'd

- **RDBMS error code ranges cont'd**
  - **SQL Server, DB2**
    - **Alphanumeric**
  - **Informix**
    - **Negative numbers, ranging similar to Oracle and Sybase (finderr)**

Common Oracle errors

- **1017: init_DB DB_connect error: -51: DBMS error code: 1017: invalid username/password**
  - **The SDE Oracle user:**
    - **MUST exist before starting SDE. (This user will own the VERSION and LAYERS tables.)**
    - **MUST be named "SDE". (SDE software hard-codes this username.)**
    - **MUST be granted CONNECT and RESOURCE.**

Common Oracle errors cont'd

- **SDE Service fails to start after reboot (Oracle, Windows NT)**
  - **Make the SDE service a manual service**
  - **Reboot and wait one minute before starting SDE**
- **Error creating VERSION table. (-51),DBMS error code: 933**
  - **The Version table has changed format, follow the upgrade path for the SDE Version.**
  - **Problem between upgrades 2.x -> 3.x ->4.x**

Common NT Error Codes

- 1068 ("dependency ...") - run sdeservice to delete the existing SDE service and recreate it.
- 1069 error ("logon failure") implies the NT user is not an administrator, power user, bad password, or domain user error.
- 1072 ("Registry was busy ...") implies the registry was being used by another appl., like regedit32
- 2140 ("Internal windows NT ...") implies the giomgr had trouble initializing.
  - bad 'sde' user password
  - giomgr could not talk to license manager, create a table (see SDE logs)
  - service control manager cannot find giomgr.exe (i.e. bad SDEHOME)
  - dependency not available, like Net Logon
- 2186 ("Service not responding ...") implies giomgr responding to service control manager.
  - license server malfunctioning (i.e. esri)
  - giomgr, gsrvr's, sdelicserv process(es) is already running. (see killp under SDEHOME\tools)

Common NT Error Codes

- **See Readme.wri file for current list**

Common NT Error Codes

- **Troul**~~...~~**omain syste**~~...~~
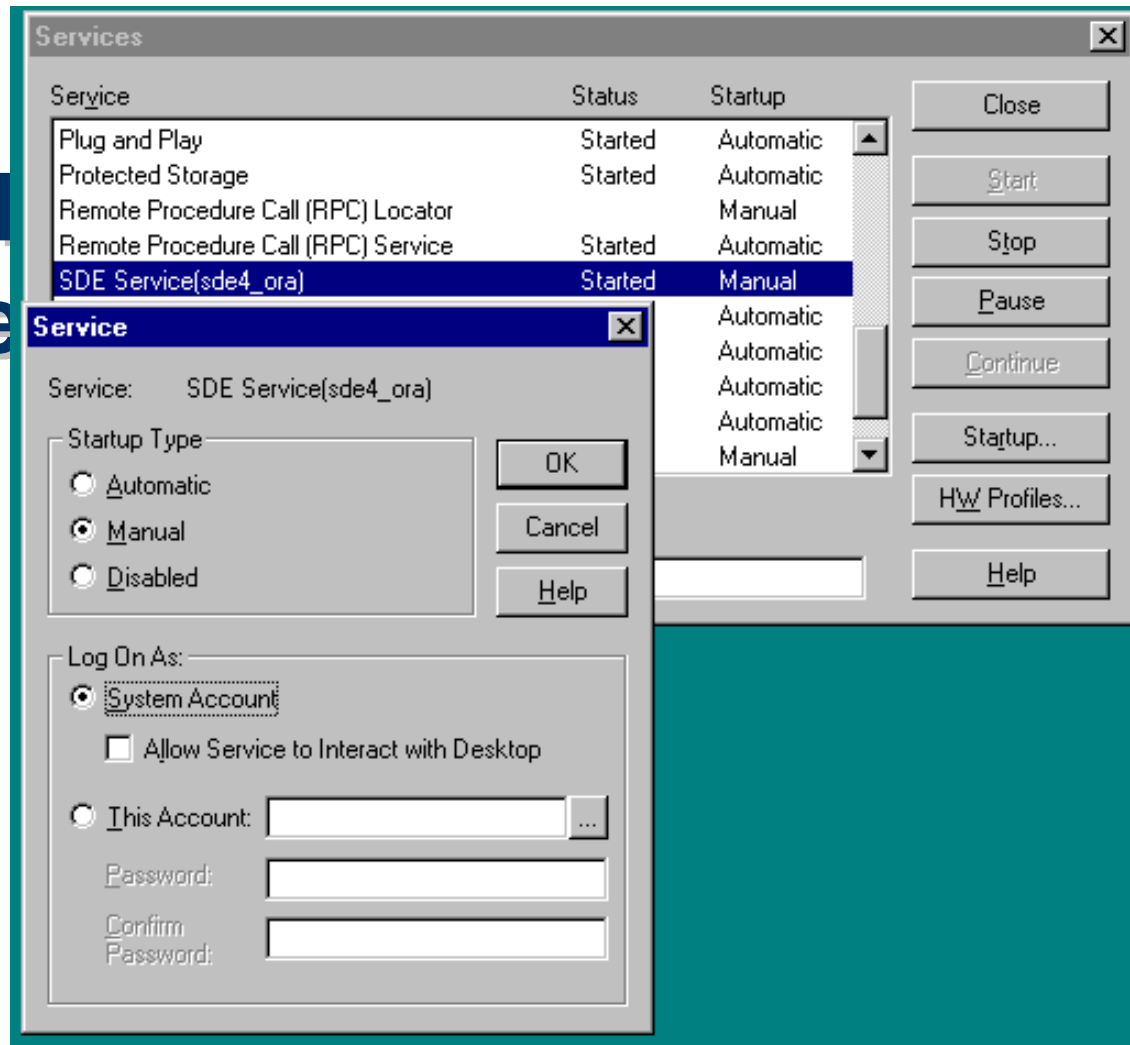
Managing the ESRI License Manager

- **License Manager tools on Unix**
  - **lmgrd - Starts the license manager**
  - **lmutil - Commonly used options**
    - `lmutil lmdown`
      - `shuts down the server`
    - `lmutil lmhostid`
      - `returns the host id`
    - `lmutil lmreread`
      - `re-reads the license.dat file`
    - `lmutil lmstat`
      - `returns the status of the server`

ESRI License Manager Tools on the NT
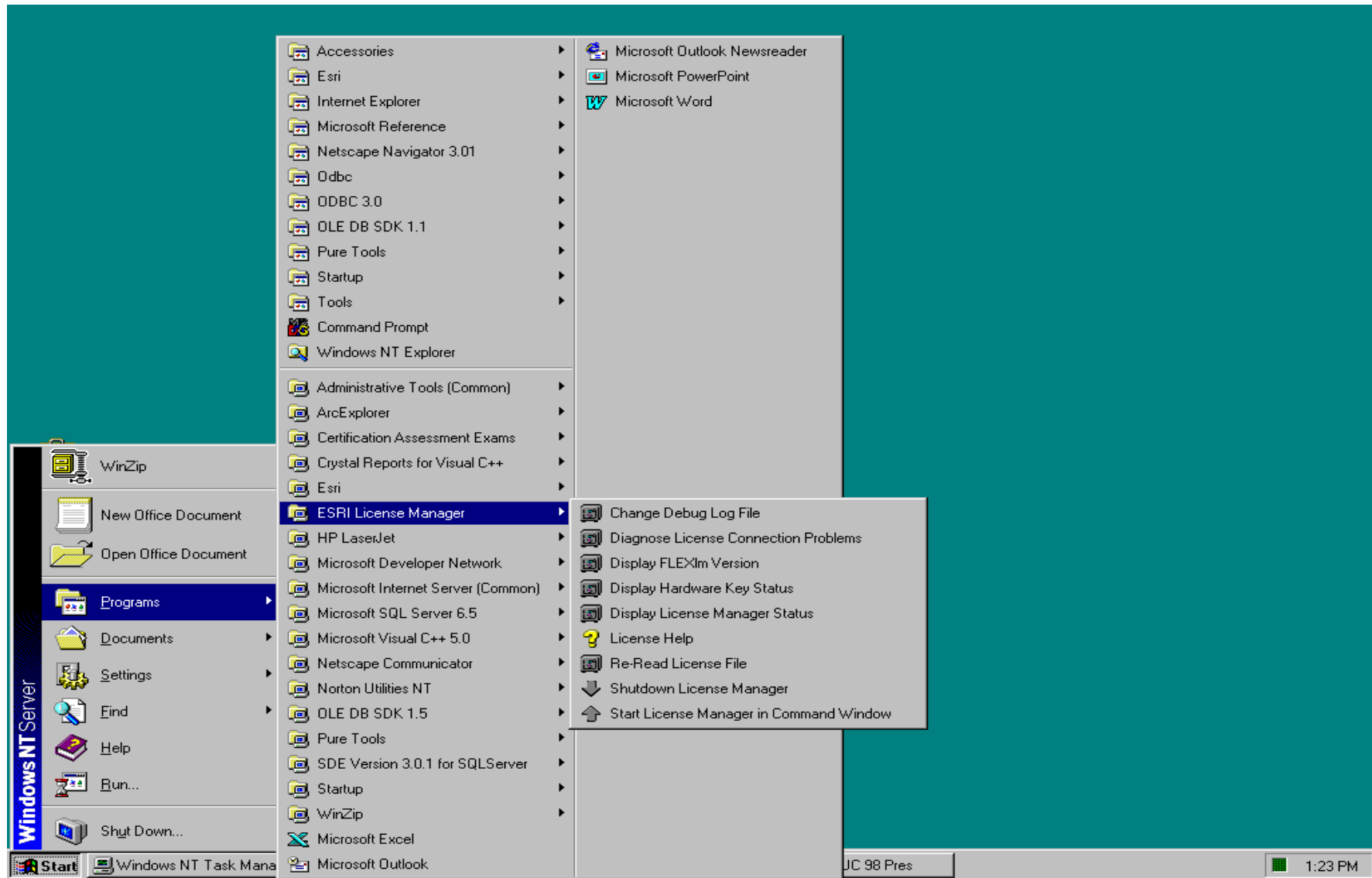
Tuning opportunities exist in:

- **the DBMS**
- **the network**
- **SDE**

Tuning the DBMS

- **see your vendor**
- **Use the tuning guide supplied with the product (specific to each database)**
- **Publications**

Tuning the Network

- **giomgr.defs**

- **tuning for faster network performance**
  - Note your general network performance

- **You should see improved network performance on NT/NT, NT/UNIX sites at SDE 3.0.2.**

Tuning SDE

- **Found under $SDEHOME/etc (%SDEHOME%/etc)**
- **giomgr.defs**
- **dbtune.sde**
  - why must you use it?
  - general or default behavior
  - DEFAULTS Keyword
  - A basic Keyword
  - calculating Keywords

Giomgr.defs

- **Sets various giomgr buffer sizes and limits**

- **Only read when the SDE server is started**

- **Tune the transmission buffer thresholds**

Giomgr.defs cont'd

- **modify the default values in the GIOMGR.DEFS file**

–	MINBUFSIZE	409600	# minimum buffer size
–	MAXBUFSIZE	819200	# maximum buffer size >
	MINBUFSIZE		
–	MINBUFOBJECTS	512	# minimum number of buffer
	objects		

- **may improve performance as much as 10 times, when starting with the DEFAULT values**

dbtune.sde

- **You must use it**
  - **RDBMS defaults only large enough to load very small layers**
- **Default behavior**
  - **If no keyword is given, the system default will be used**
  - **You must set the values of the DEFAULT keyword**
  - **Any parameters missed in a keyword definition will be picked up from the DEFAULT keyword**
- **Read when you load data in general**
- **Sybase and SQL Server, network packet size tuned**

dbtune.sde: A basic Keyword

```
note: example for Oracle.   Other DBMS' vary


##WORLD
INDEX_TABLESPACE WORLD_DATA
F_TBLSP          WORLD_DATA
F_INIT           409600              #         INITIAL Extent
F_NEXT           40960               #         NEXT Extent
F_MINX           1                   #         Minextents
F_MAXX           505                 #         Maxextents
F_PCTI           0                   #         PCTINCREASE
F_ITRANS         2                   #
F_MAXTRS         3                   #
F_PCTFREE        1                   #         PCTFREE
F_PCTUSD         90                  #         PCTUSED (80%)


F_IX1_INIT       4096                #         Feature DBMS Index INITIAL
F_IX1_NEXT       1024                #         NEXT
```

dbtune.sde: A basic Keyword cont'd

A_TBLSP	WORLD_DATA		
A_INIT	4096	#	INITIAL
A_NEXT	1024	#	NEXT
A_MINX	1	#	MINEXTENTS
A_MAXX	505	#	MAXEXTENTS
A_PCTI	0	#	PCTINCREASE
A_ITRANS	2	#	INITTRANS
A_MAXTRS	3	#	MAXTRANS
A_PCTFREE	1		
A_PCTUSD	90	#	PCTUSED

dbtune.sde: A basic Keyword cont'd

```
S_TBLSP          WORLD_DATA
S_INIT           40960                #        INITIAL
S_NEXT           40960                #        NEXT
S_MINX           1                    #        Minextents
S_MAXX           505                  #        Maxextents
S_PCTI           0                    #        PCTINCREASE
S_ITRANS         2                    #        INITTRANS
S_MAXTRS         3                    #        MAXTRANS
S_PCTFREE        1                    #        PCTFREE
S_PCTUSD         90                   #        PCTUSED


S_IX1_INIT       4096                 # Spatial DBMS Index INITIAL
S_IX1_NEXT       1024                 #                    NEXT


END
```

dbtune.sde: Calculating Keywords

- **Use the formulas in the tuning guide**
  - **Average number of points in a feature and number of features is required**
    - **shpinfo (SDE)**
    - **describe (ARC/INFO)**
  - **Use a simple program or a spread sheet if you are doing this a lot**
- **When loading shapefiles use the size of the .DBF file to estimate the A_INIT**

dbtune.sde: Calculating Keywords

- **For optimal storage ANALYZE (in Oracle) the tables and set the initial extent in the dbtune for the keywords to the results**
  - ANALYZE TABLE <business table> COMPUTE STATISTICS;
  - SELECT BLOCKS*8192 FROM USER_TABLES WHERE TABLE_NAME = '<business table>' ;
  - SELECT LEAF_BLOCKS*8192, INDEX_NAME FROM USER_INDEXES WHERE TABLE_NAME = '<business table>' ;
  - ANALYZE TABLE <business table> DELETE STATISTICS;