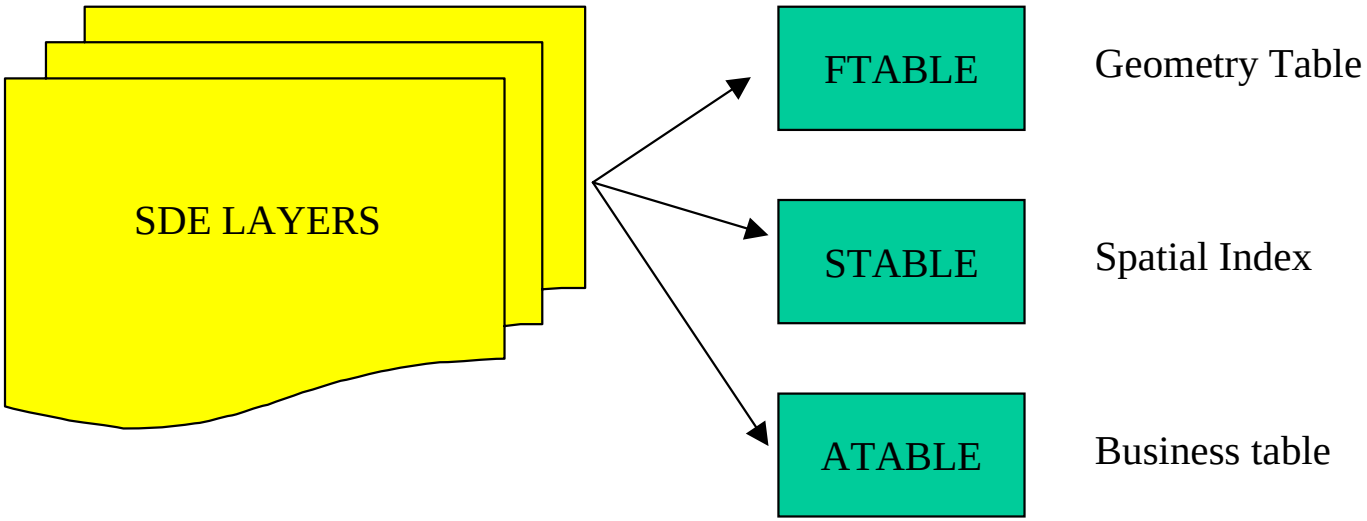
Real Life SDE Applications

- Virtual Layers
- Partitioning Very Large Datasets.
- Geocoding in SDE
- SDE Shape Table
- Deploy SDE on the Web
- SDE and Images
- SDE and COM/Java
- *Bonus: SDE Web Admin Utility*
- Q&A

Virtual Layers

- One Layer of Data With Different Views.
- Views Are Very Different in Sizes.
- Different “Sweet Spot” Grid Sizes.
- Do Not Want To Duplicate Data.
- Performance issue

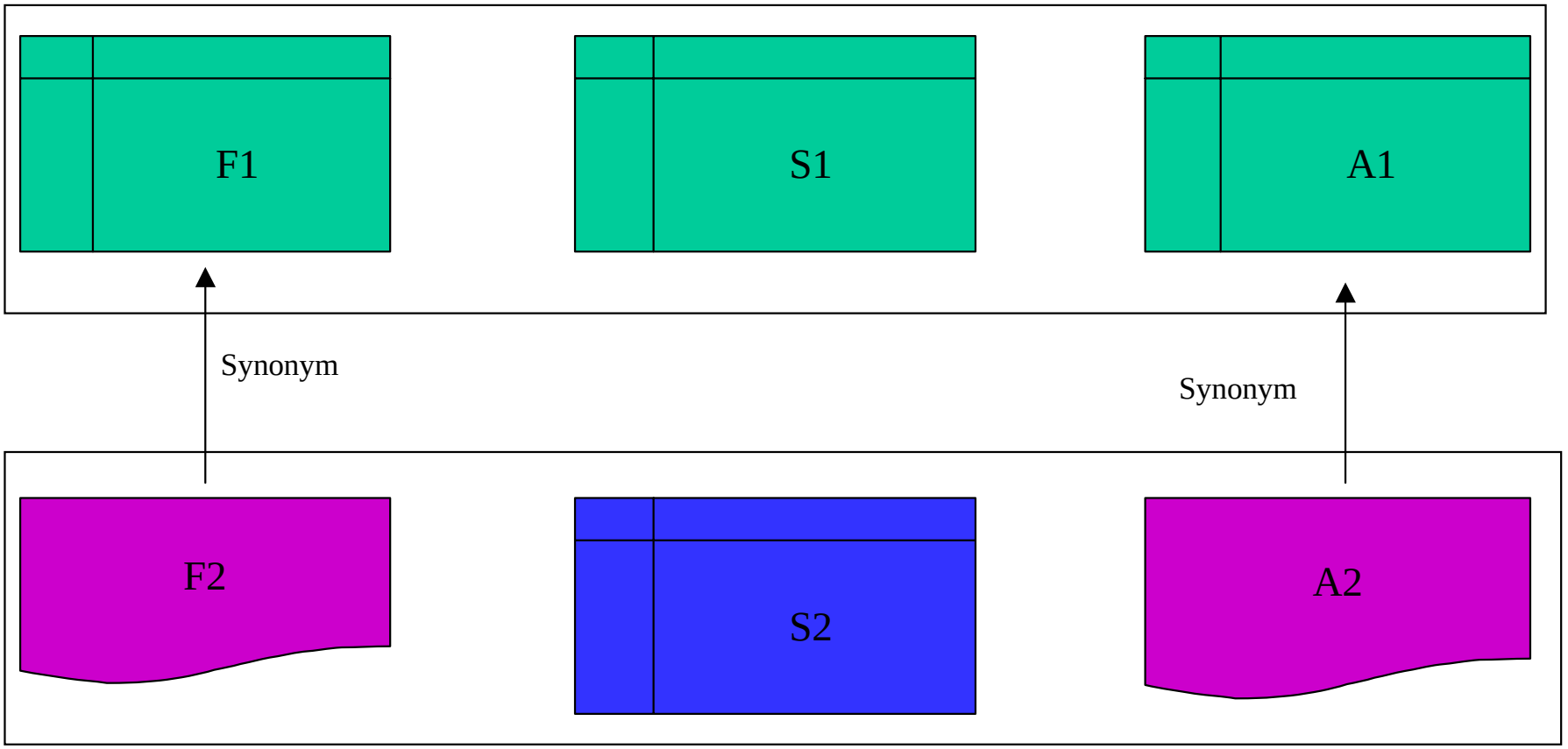
Virtual Layers



Virtual Layers

- Create “dummy” layer using sdelayer.
- Using “sqlplus” drop new Ftable and Atable
- Create a synonym for the original table as the new ftable and the new atable.
- Data and Geometry the same.
- Spatially indexed differently.
- User accesses layer based on view extent.

Virtual Layers



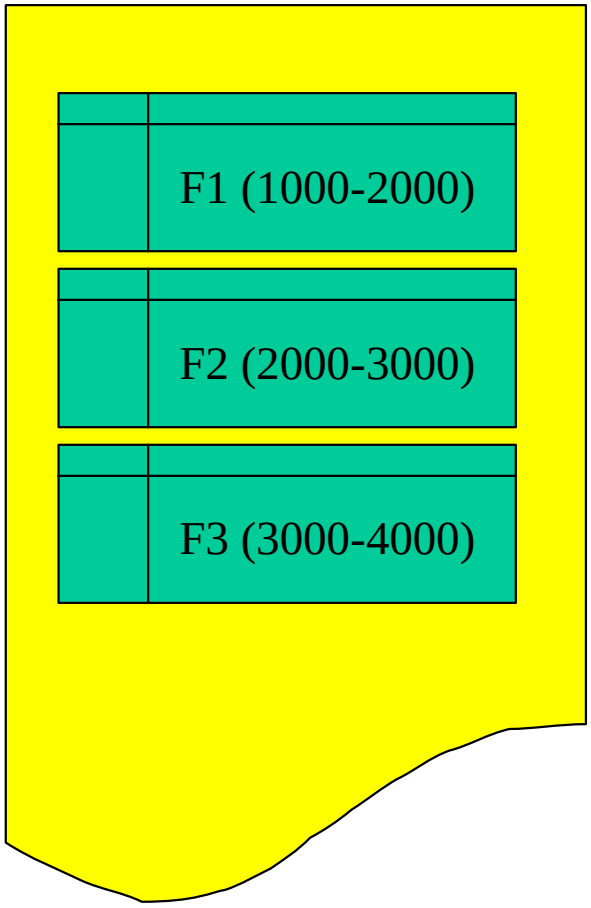
Partitioning Very Large Data

- TRUE, SDE enables seamless dataset.
- For sanity and maintenance sake, partition the layer into smaller layers.
- Create a “master” layer that “points” to the partitioned layer.
- Oracle 8.x partition scheme.

Oracle 8 Partition

- Instead of a table of a 10 million rows.
- Create a view as “select union all” of 10 one million row tables.
- Create range of fids for each layer in the view.

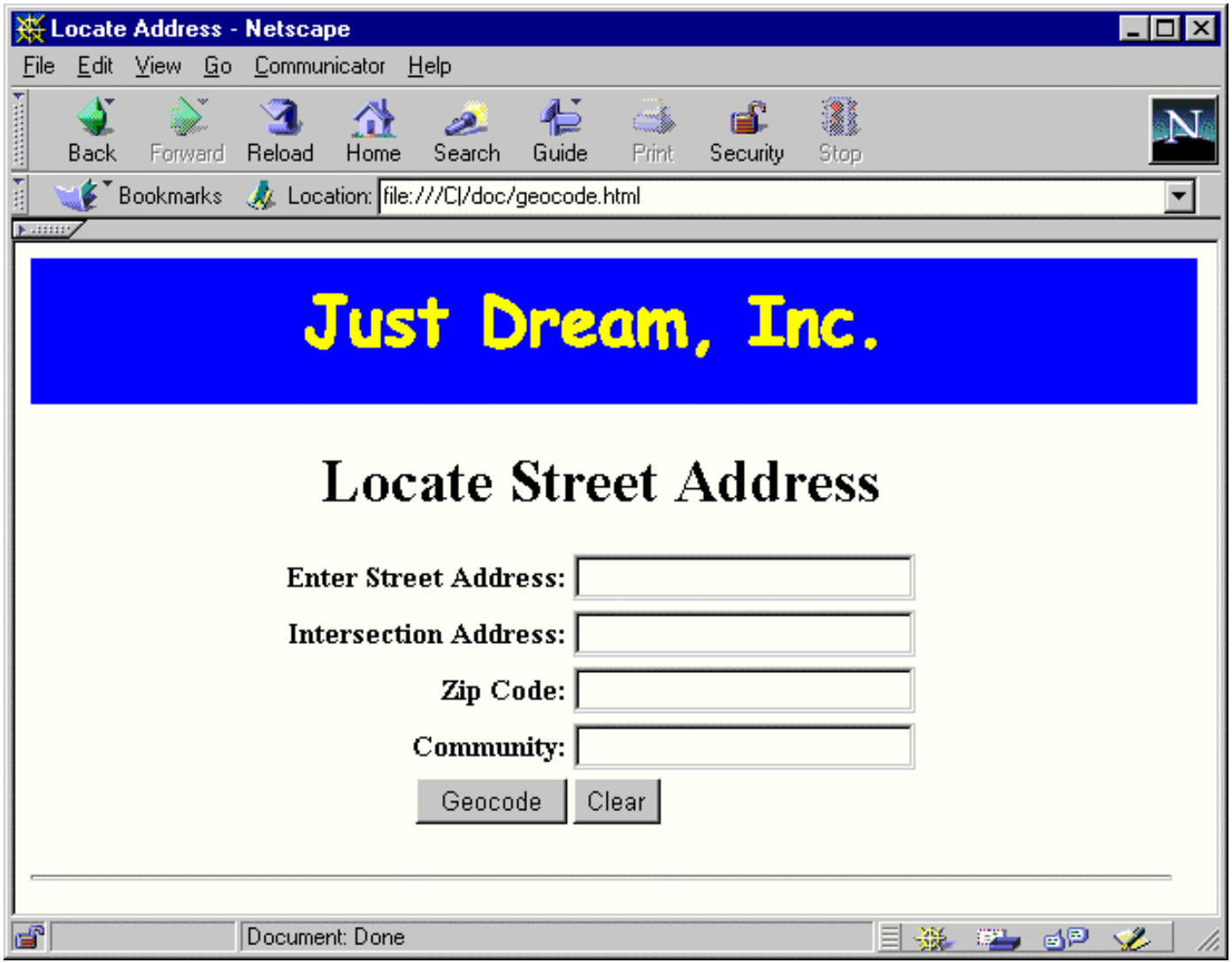
SDE Partition




```
CREATE VIEW F100 AS
SELECT * FROM F1 UNION ALL
SEELCT * FROM F2 UNION ALL
SELECT * FROM F3…..
```

Geocoding in SDE

- Assume we are in a state in the U.S.
- Assume Simple Line Layer
- Assume we have Business Table with:
  - Left/Right, From/To Street Range
  - Street Prefix,Name,Type,Suffix
  - Left/Right Zip Code
  - Other criteria (Community, Wire Center, etc…)


Locate Address - Netscape
File Edit View Go Communicator Help
Back Forward Reload Home Search Guide Print Security Stop
Bookmarks Location: file:///C|/doc/geocode.html
Just Dream, Inc.
Locate Street Address
Enter Street Address:
Intersection Address:
Zip Code:
Community:
Geocode
Clear
Document: Done

Geocoding in SDE

- Create LUT for Directional Prefix and Suffix.
- Create LUT for Street Types.
- LUT are created once as RDBMS tables and loaded into memory by the geocoding application.

Directional LUT

ALIAS	NAME
WEST	W
NORTH	N
NORTE	N

Street Type LUT

ALIAS	NAME
STREET	ST
STR	ST
AVENUE	AV
AVE	AV
AV	AV

Geocoding in SDE

- Given for example: 123 West Main Str, 92373
- Uppercase the string and remove excessive blanks
- Tokenize the address from both ends scanning for keywords based on LUT.
- Result:
  - Number: 123
  - Prefix: W
  - Name: MAIN
  - Type: ST

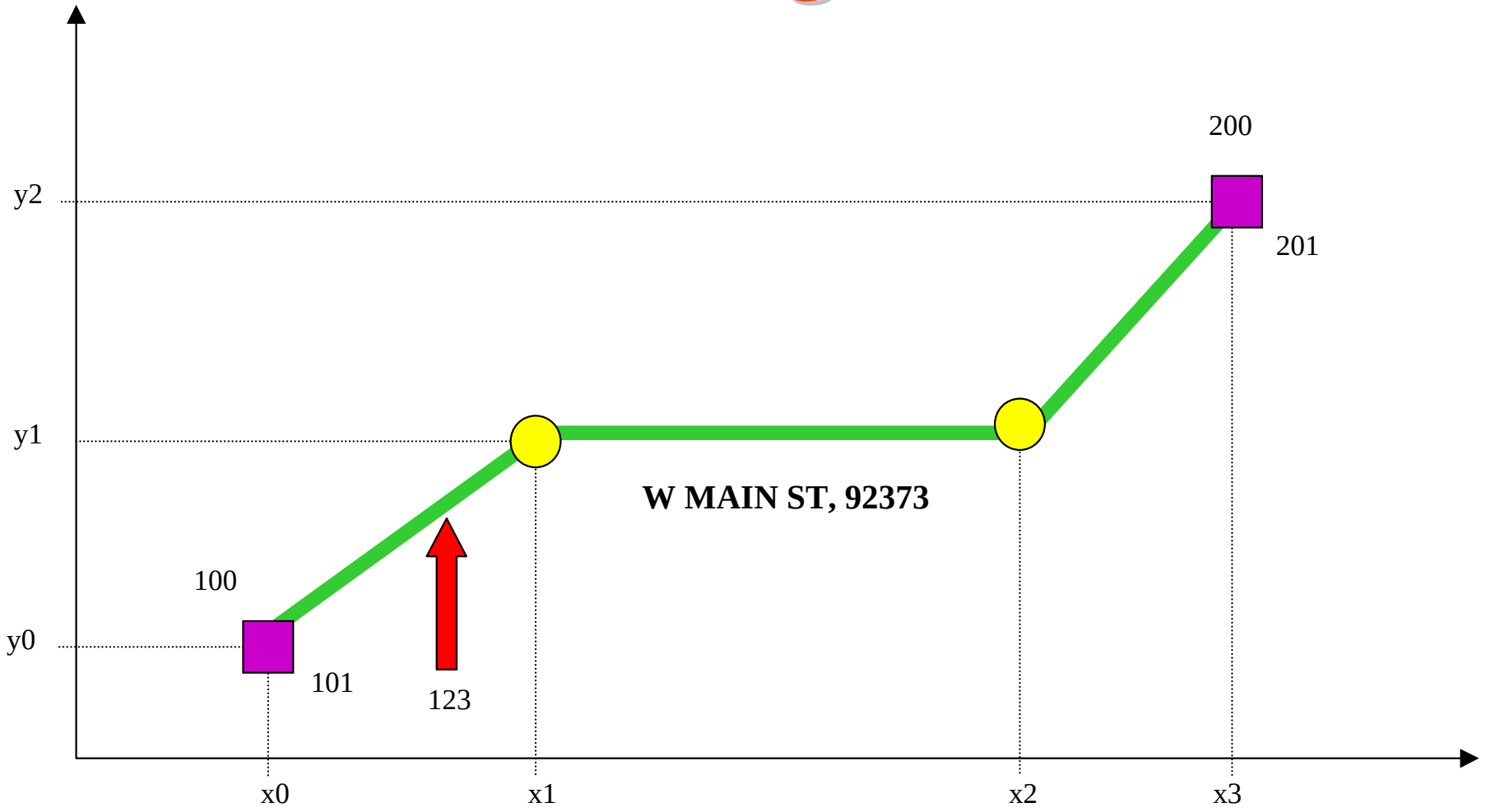
Geocoding in SDE

- Construct SQL Where clause with the resulting values.
  - PREFIX='W' AND NAME='MAIN' AND TYPE='ST' AND ZIPL=92373 AND FADDR<=123 AND 123<= TADDR
- Apply Where clause to a SE_STREAM SDE Object.

Geocoding SDE Pseudo Code

```
SE_connection_create(&connection, host,instance,user,password);
SE_shape_create( NULL, &shape);
SE_stream_create( &connection, &stream);
CHAR * col[] = { “SHAPE”, “FADDR”, “TADDR”, “PREFIX”, “NAME”,”TYPE”,”SUFFIX”,”LZIP”};
CHAR * tab[] = { “STREETS”};
SE_SQL_CONSTRUCT sqlConstruct;
sqlConstruct.num_tables = 1;
sqlConstruct.tables = tab;
sqlContruct.where = “PREFIX=‘W’ AND NAME=‘MAIN’ AND TYPE=‘ST’ AND ZIPL=92373”
                    “ AND FADDR<=123 AND 123<= TADDR”;
SE_stream_query( stream, 8, col, &sqlConstruct);
SE_bind_output_column( stream, 1, shape, &ind);
SE_bind_output_column( stream, 2, faddr, &ind);
….
SE_stream_execute( stream);
while( (se=SE_stream_fetch( stream)) == SE_SUCCESS){
  calcLocation( shape, faddr, taddr);
}
SE_stream_close( stream);
SE_stream_free( stream);
SE_connection_close( connection);
```

Geocoding in SDE



Geocoding in SDE

- Given the nodes and the vertices x and y coordinates.
- Given the address range.
- Assuming a *linear* distribution.
- Calculate the location of the given address.

Geocoding Pitfalls

- Select range distribution based on *EVEN* or *ODD* side.
- Not guaranteed that the *FROM* address range is less that the *TO* address range
- Watch for “123 North Avenue”

Cannot Geocode

- Cannot geocode with given values.
- Should be 123 *E* Main Street.
- Present the user with alternative candidates.
- Candidates should be “close” to the given values.
- Proceed with elimination and permutation.

Elimination And Permutation

- Iterate over presence of tokens (prefix, suffix, type,…) to find one or more candidate.
- Name is always a present token.
- Eliminate in order of importance the most likely token in error. First, prefix. Next, type. Etc...
- Rebuild SQL Where clause with present tokens and execute the statement.
- If candidate is found, stop the iteration.

Geocoding in SDE

- Given for example “123 South Main St W”
- In Database
  - PREFIX=S
  - NAME=MAIN
  - *TYPE=AV*
  - SUFFIX=W

Geocoding in SDE

- Remove Suffix
  - PREFIX='N' AND NAME='MAIN' AND TYPE='ST'
- Remove Prefix
  - NAME='MAIN' AND TYPE='ST' AND SUFFIX='W'
- Remove Type
  - PREFIX='N' AND NAME='MAIN' AND SUFFIX='W'

Geocoding Iteration

The iteration of the permutations and elimination of the tokens is driven by a BIT MASK table.

```
  private static final int ZBIT = 8; // Zip
  private static final int TBIT = 4; // Street
  private static final int PBIT = 2; // Prefix
  private static final int SBIT = 1; // Suffix
  private static final int ZERO = 0;

  private static final int MASK[] = {
    ZBIT|TBIT|PBIT|SBIT, // Process all tokens (if available)
    ZBIT|TBIT|PBIT|ZERO, // Zip, Type, Prefix
    ZBIT|TBIT|ZERO|SBIT, //Zip, Type, Suffix
    ZBIT|TBIT|ZERO|ZERO, // Zip, Type
    ….
};
```

Geocoding Extensions

- Perform SOUNDEX searches in the iteration process.
  - Something that sounds like ‘MAIN’ is ‘MAINE’
- Restrict SPATIALLY the retrieved features.
  - Geocode only based on streets in *this* region.
- Create a serializable LRU cache of geocoded values.

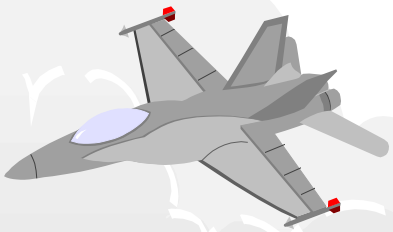
SDE Shape-Table

- “C” API Functions.
- CLIENT side operation.
- In memory collection of spatially enabled features.
- Each feature can be associated with a User-Defined Data.
- All the Spatial Search Methods are Applicable.
- Very Fast.

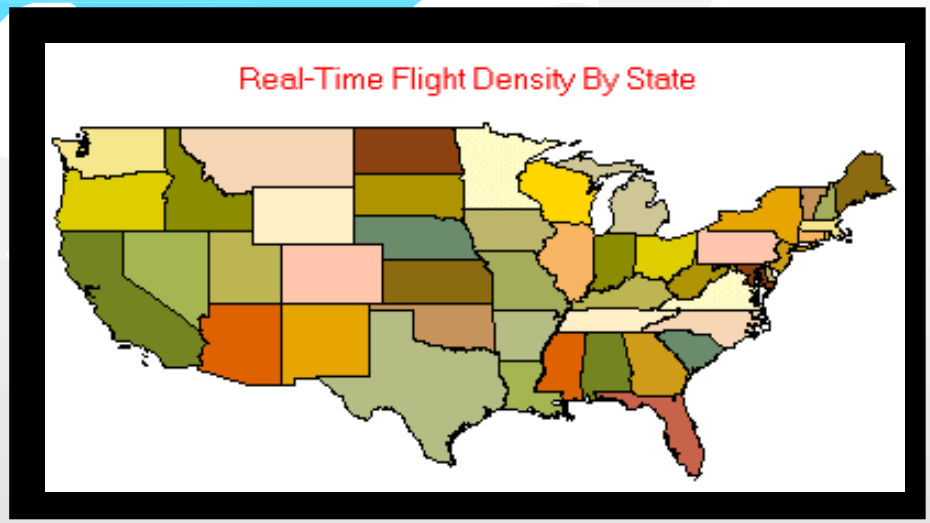
SDE Shape-Table Usage

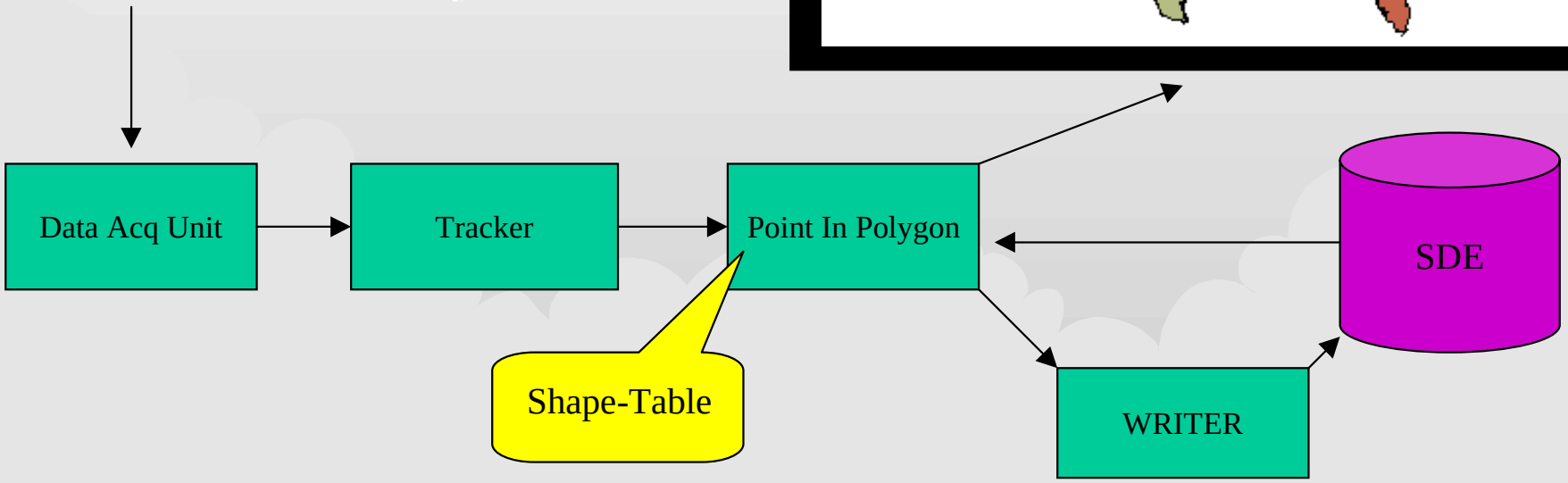
- High volume of spatial requests on a layer.
- Reduction of Disk I/O
- Reduction of Network Traffic.
- Construction of user-defined spatial objects that need to spatially enabled.
- Real-Time Tracking with Spatial Properties.

Shape-Table Application



ACID,Latitude,Longitude,Altitude





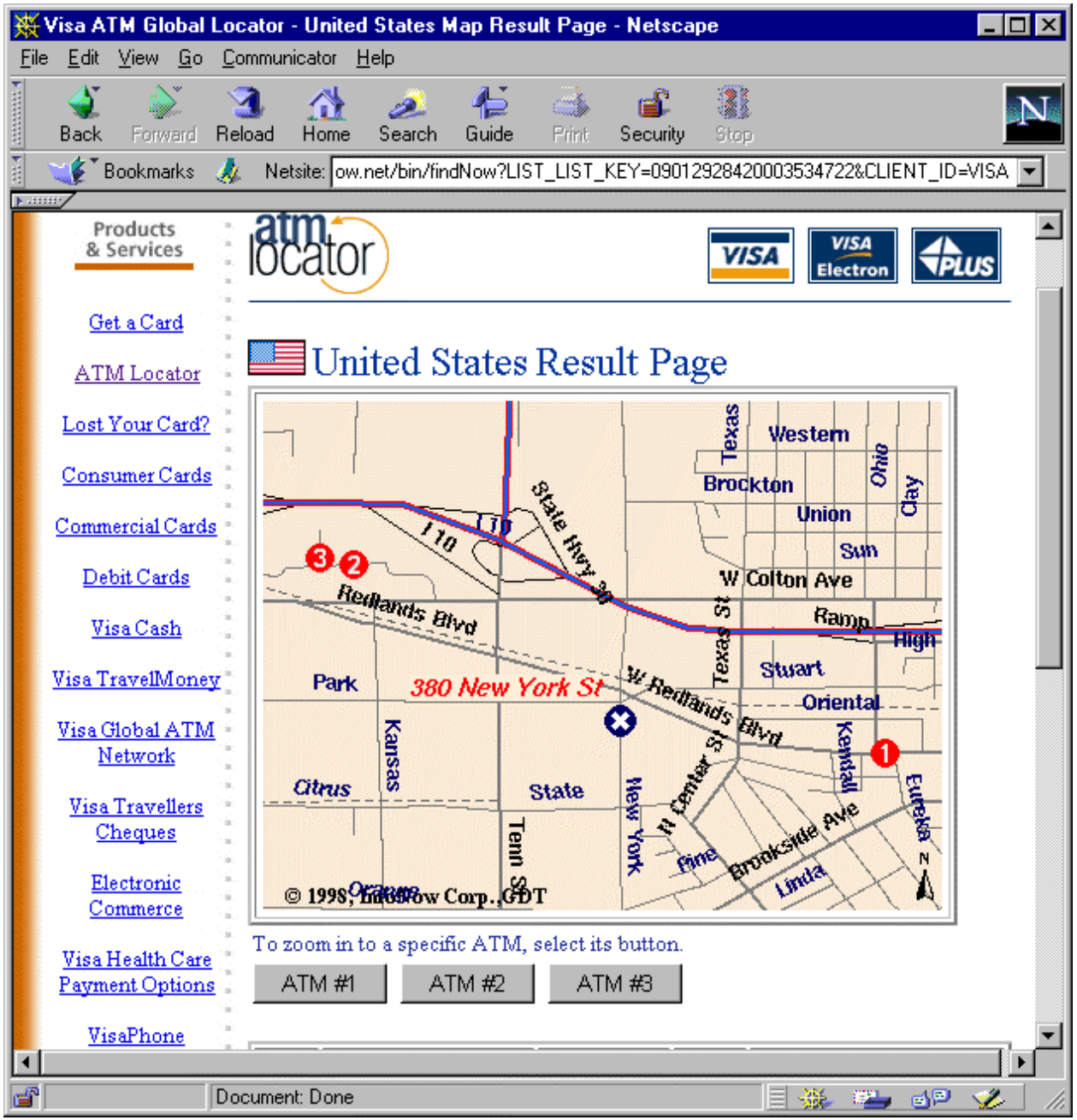
Other Shape-Table Applications

- Route tracker from GPS feed with Fuzzy logic analysis.
  - Closest Street.
  - Aligned with Street.
  - Most probable street continuation.
- Post processing geographical associations.

SDE on the Web

- Visa ATM application
- Realtor.com.
- ARC Data Online.
- MSP Flight Track Data.


Visa ATM Global Locator - United States - Netscape
File Edit View Go Communicator Help
Back Forward Reload Home Search Guide Print Security Stop
Bookmarks Netsite: ttp://visaatm.infonow.net/bin/findNow?LIST_LIST_KEY=09012928290003534647
VISA
Home
Products & Services
Offers & Promotions
Consumer Tips
For Businesses
Sponsorships & Events
New Technologies
About Visa
Products & Services
atm locator
VISA
VISA Electron
PLUS
Get a Card
ATM Locator
Lost Your Card?
Consumer Cards
Commercial Cards
Debit Cards
Visa Cash
Visa TravelMoney
Visa Global ATM Network
Visa Travellers Cheques
Electronic Commerce
United States
To find the three closest ATM's to your location, please type information and click "SUBMIT". For a map, you must enter a valid street address or cross-streets, as well as a city and state. A minimum of a city and state is required for a list-only response.
1 Street Address
380 new york st
1a Or Cross Street
2 City
redlands
3 State/Province
CALIFORNIA
4 Postal Code
92373
Map and List
List Only
SUBMIT
North America
Click to select
Go!
Document: Done


Visa ATM Global Locator - United States Map Result Page - Netscape
File Edit View Go Communicator Help
Back Forward Reload Home Search Guide Print Security Stop
Bookmarks Netsite: ow.net/bin/findNow?LIST_LIST_KEY=0901292842000353472 2&CLIENT_ID=VISA
Products & Services
atm locator
VISA
VISA Electron
PLUS
Get a Card
ATM Locator
Lost Your Card?
Consumer Cards
Commercial Cards
Debit Cards
Visa Cash
Visa TravelMoney
Visa Global ATM Network
Visa Travellers Cheques
Electronic Commerce
Visa Health Care Payment Options
VisaPhone
United States Result Page
380 New York St
Redlands Blvd
W Redlands Blvd
W Colton Ave
State Hwy 30
110
Texas
Western
Brockton
Union
Sun
Ramp
High
Stuart
Oriental
Park
Kansas
Citrus
State
New York
N Center St
Kendall
Eureka
Brookside Ave
Linda
Pine
Tenn St
Ohio
Clay
© 1998, InfoNow Corp., GDT
To zoom in to a specific ATM, select its button.
ATM #1
ATM #2
ATM #3
Document: Done

SDE on the Web

- Integrate with a Web Server.
- Communicate via CGI or Servlet.
- Handle lots of users.
- Fast Reply.
- Load Balancing.
- Scalable.
- Flexible.

SDE on the Web

- Adopted a Multi-Tier architecture
- Separated
  - Business Logic
  - Data Access
  - Data Presentation
- Platform independent
- Protocol independent

SDE on the Web

Data Presentation

Graphics, Tables

Business Logic That Calls Data Access Layer Objects

Math, If-then-else logic

Data Access Agent that does one thing very well

Divide and Conquer Approach.

1

WWW

2

WWW.VISA.COM

Web Server

CGI/SERVLET

3

Business Logic

8

7

IMS CORE

4

Server Broker

GEOCODER

PROXIMITY

MAPPER

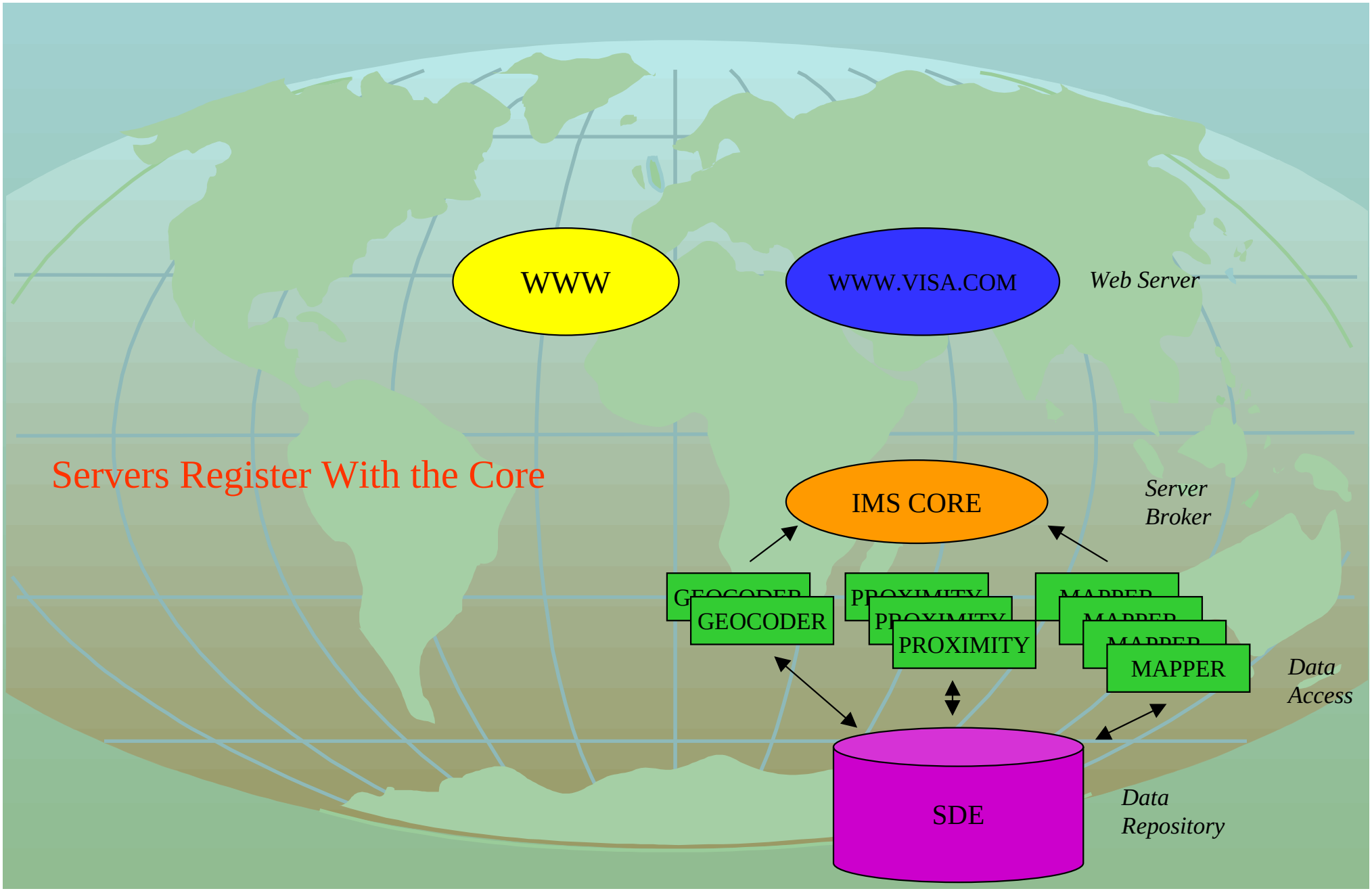
5

Data Access

6

SDE

Data Repository


WWW
WWW.VISA.COM
Web Server
Servers Register With the Core
IMS CORE
Server
Broker
GEOCODER
PROXIMITY
MAPPER
Data
Access
SDE
Data
Repository

WWW

WWW.VISA.COM

Web Server

User Clicks on "Submit" Button

IMS CORE

Server Broker

GEOCODER

PROXIMITY

MAPPER

Data Access

SDE

Data Repository

WWW

WWW.VISA.COM

Web Server

CGI/SERVLET

Business Logic

IMS CORE

Web Server Starts Business Logic Object
That Calls IMS Core For a Server
If A Server Is Busy, The Request Is Queued

GEOCODER

PROXIMITY

MAPPER

SDE

Data Repository

WWW

WWW.VISA.COM

Web Server

CGI/SERVLET

Business Logic

IMS CORE

GEOCODER

PROXIMITY

MAPPER

Data Access

SDE

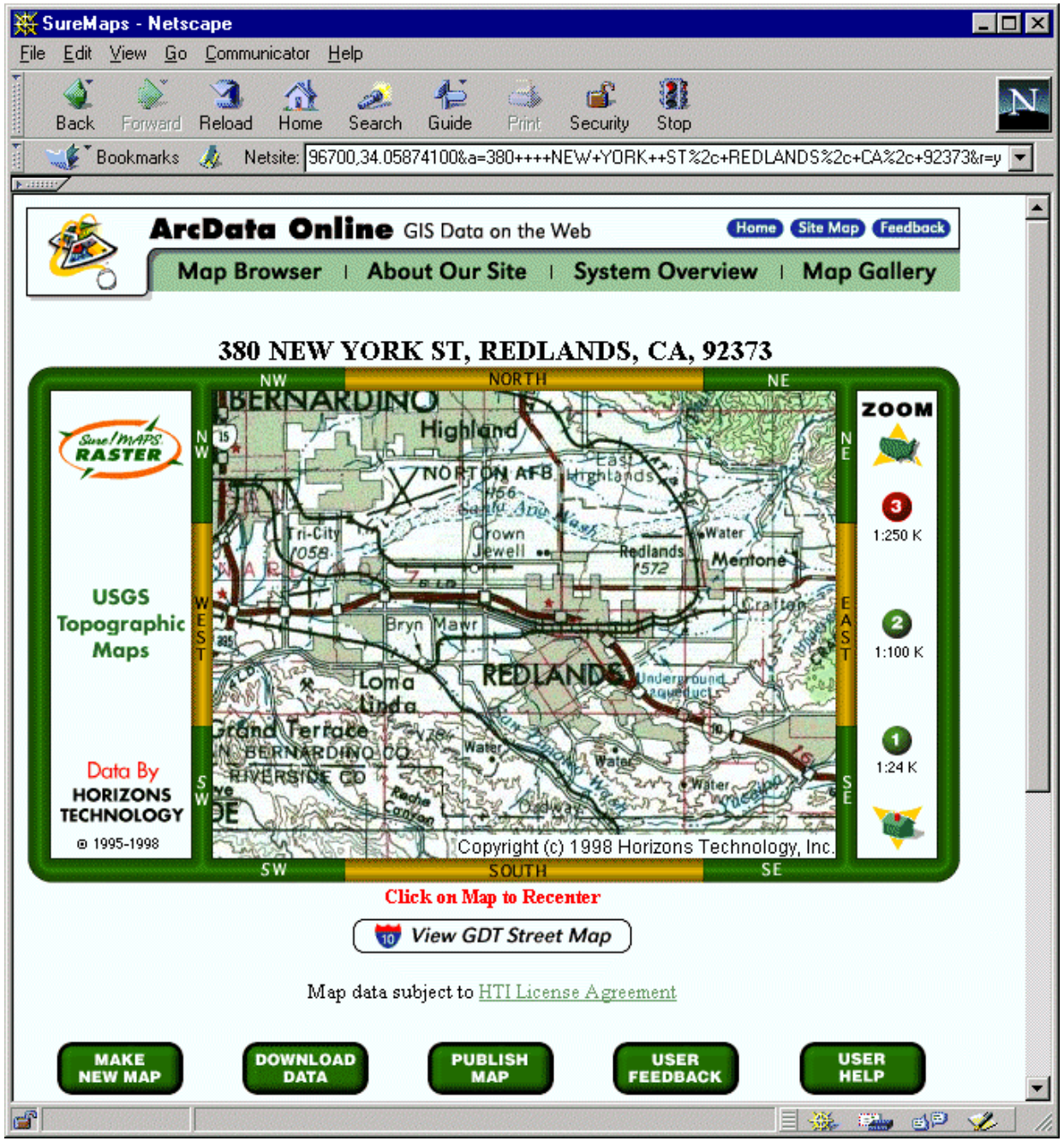
Data Repository

SDE on the Web

- Create SDE Agents with persistent connection.
- Agents are small and do one thing and one thing very well.
- Agent should be platform and protocol independent.
- Agents with Read-Only features should adopt caching strategy all the way to the middle tier.
- Design with reuse in mind.

SDE on the Web Stats

- SUN Enterprise 6000
  - 8 CPU
  - 4 Gigabyte of RAM (2 for Oracle SGA)
  - 12 Disk Controllers managing 350 Gigabyte of Storage (RAID 1)
- 22 Mappers, 2 Geocoders, 6 Query.
- 2 seconds / map (most time in gif file creation)
- 150,000 maps / day
- 10,000 requests / hour
- 340 SDE Layers


SureMaps - Netscape
File Edit View Go Communicator Help
Back Forward Reload Home Search Guide Print Security Stop
Bookmarks Netsite: 96700,34.05874100&a=380++++NEW+YORK++ST%2c+REDLANDS%2c+CA%2c+92373&r=y
ArcData Online GIS Data on the Web
Home Site Map Feedback
Map Browser | About Our Site | System Overview | Map Gallery
380 NEW YORK ST, REDLANDS, CA, 92373
NW NORTH NE
SUREMAPS RASTER
USGS Topographic Maps
Data By HORIZONS TECHNOLOGY
© 1995-1998
SAN BERNARDINO
Highland
NORTON AFB
Tri-City
Crown Jewell
Redlands
Mentone
Bryn Mawr
REDLANDS
Loma Linda
Grand Terrace
SAN BERNARDINO CO
RIVERSIDE CO
Copyright (c) 1998 Horizons Technology, Inc.
WEST
EAST
SW SOUTH SE
ZOOM
3 1:250 K
2 1:100 K
1 1:24 K
Click on Map to Recenter
View GDT Street Map
Map data subject to HTI License Agreement
MAKE NEW MAP
DOWNLOAD DATA
PUBLISH MAP
USER FEEDBACK
USER HELP

SDE and Images

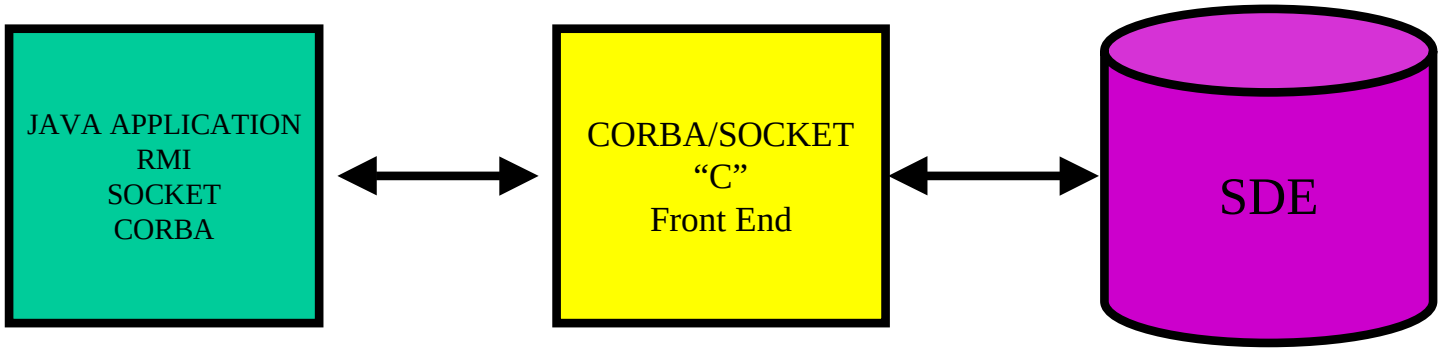
- Images are stored as Blobs in the business table.
- Images are compressed and cached in the SGA.
- The envelope of the images represents the geometry in the F-Table.
- World File info are stored as additional attributes.
- Cookie-cutting and mosaic is the responsibility of the application.

SDE and COM

- SDE is “C” API.
- Using Visual “C” Wizards, You Can Create COM DLL and Services, That Encapsulates Logic.
- MapObjects (v1) is Missing projection.
- COM Wrap Projection API And Instantiate in the Application.

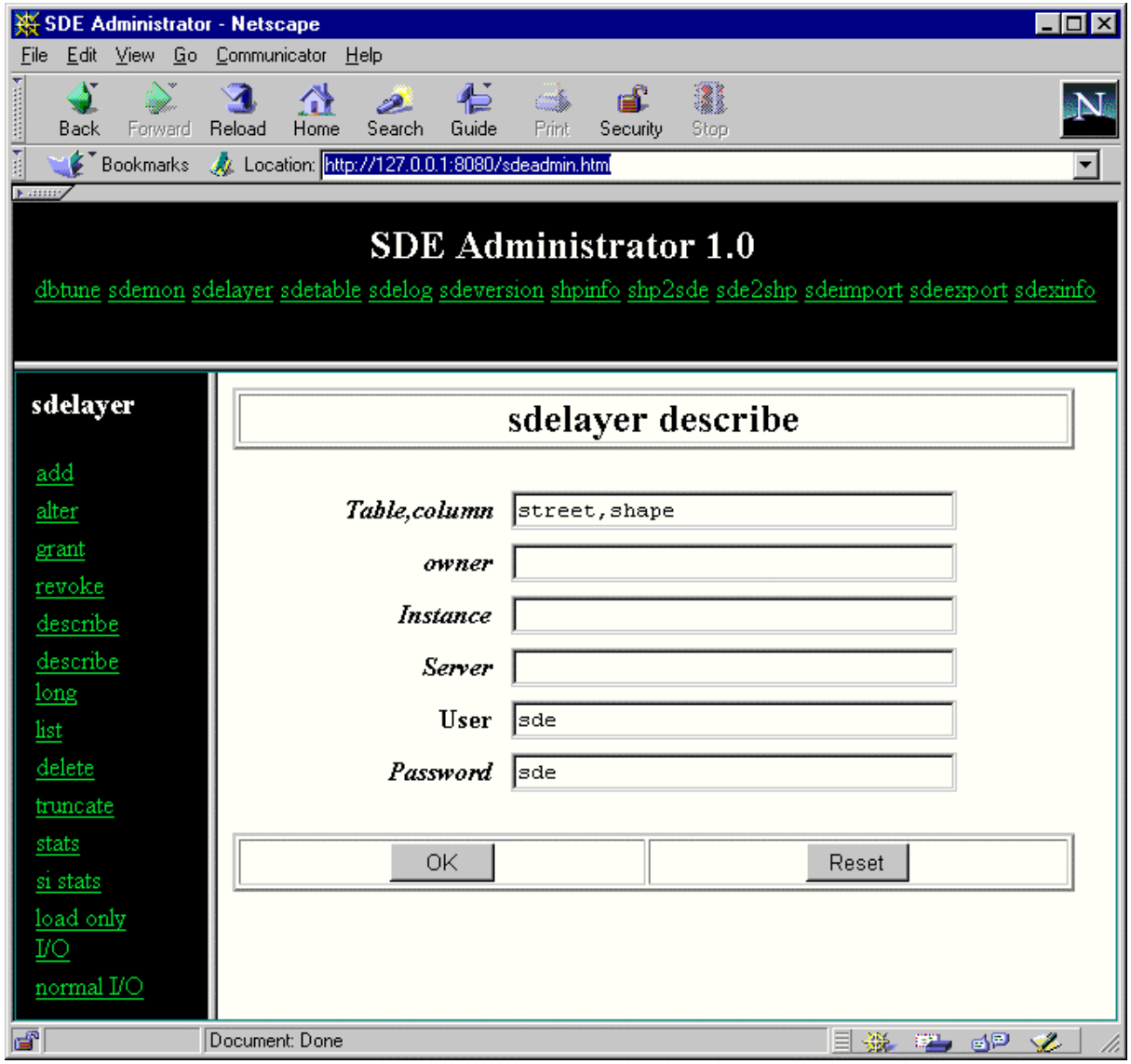
SDE and JAVA

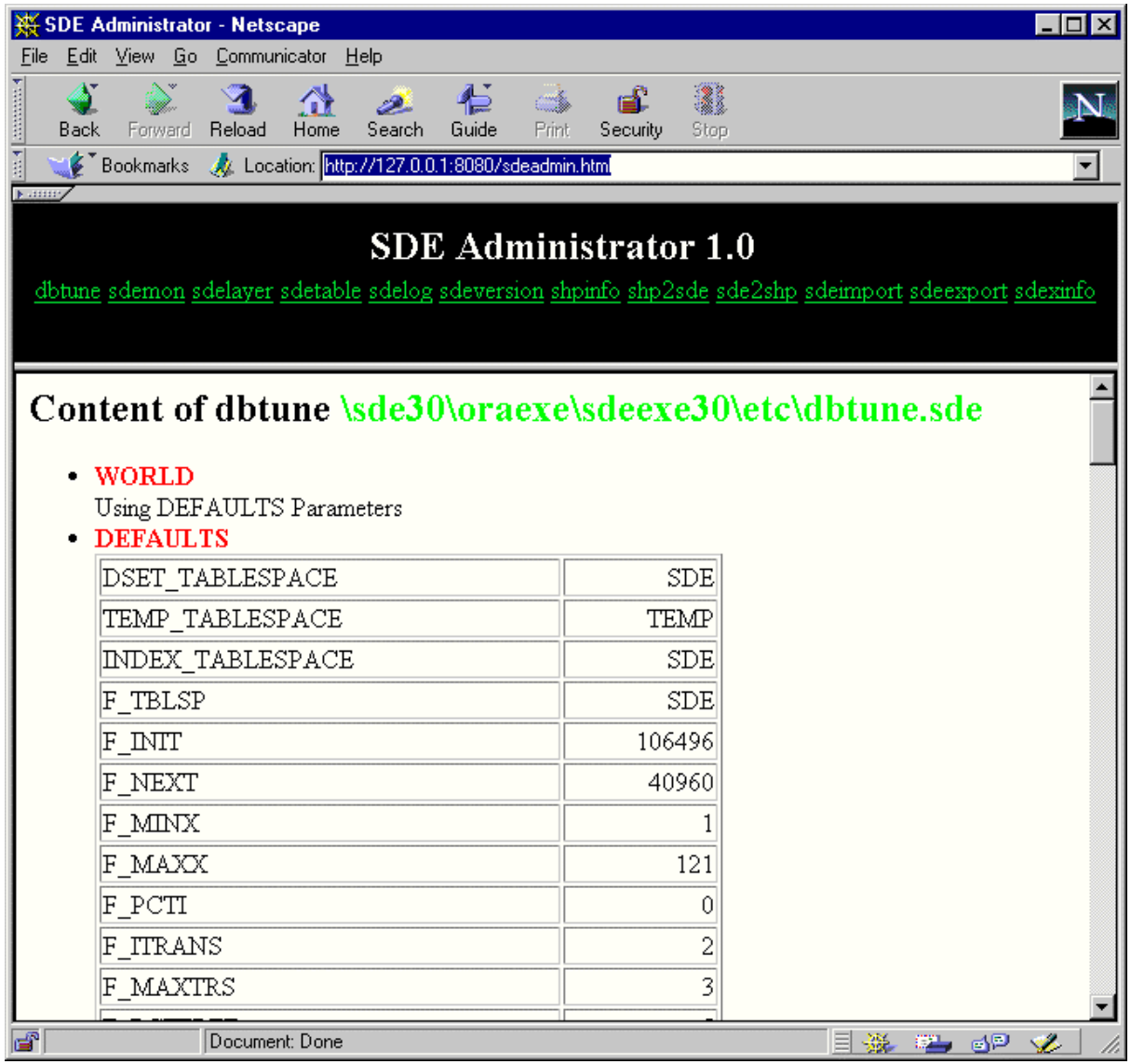
- **Do Not Use JNI (Java Native Interface)**
- Create Java Front End To SDE
  - CORBA
  - Socket Interface
- Methods That Encapsulates Spatial Operations.



SDE Administration

- Enable Remote Access.
- Too Many Options To Remember.
- Need Friendly GUI.
- Platform Independent.
- Use existing SDE admin tools.
- The Web Tools Are Cool.


SDE Administrator - Netscape
File Edit View Go Communicator Help
Back Forward Reload Home Search Guide Print Security Stop
Bookmarks Location: http://127.0.0.1:8080/sdeadmin.html
SDE Administrator 1.0
dbtune sdemon sdelayer sdetable sdelog sdeversion shpinfo shp2sde sde2shp sdeimport sdeexport sdexinfo
sdelayer
add
alter
grant
revoke
describe
describe long
list
delete
truncate
stats
si stats
load only I/O
normal I/O
sdelayer describe
Table,column
street,shape
owner
Instance
Server
User
sde
Password
sde
OK
Reset
Document: Done


SDE Administrator - Netscape
File Edit View Go Communicator Help
Back Forward Reload Home Search Guide Print Security Stop
Bookmarks Location: http://127.0.0.1:8080/sdeadmin.html
SDE Administrator 1.0
dbtune sdemon sdelayer sdetable sdelog sdeversion shpinfo shp2sde sde2shp sdeimport sdeexport sdexinfo
Content of dbtune \sde30\oraexe\sdeexe30\etc\dbtune.sde
WORLD
Using DEFAULTS Parameters
DEFAULTS
DSET_TABLESPACE SDE
TEMP_TABLESPACE TEMP
INDEX_TABLESPACE SDE
F_TBLSP SDE
F_INIT 106496
F_NEXT 40960
F_MINX 1
F_MAXX 121
F_PCTI 0
F_ITRANS 2
F_MAXTRS 3
Document: Done

SDE HTML Requirements

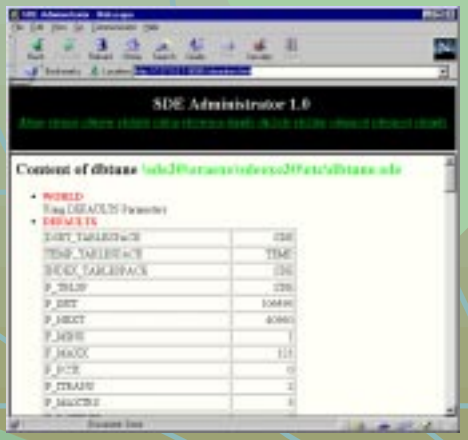
- JavaScript Enabled Web Browser.
- Servlet Enabled Web Server.
  - CGI version also available
- SDE 3.x Version.
- Downloaded *.html, *.class files.

SDE HTML Admin

WEB Server

Dbtune Servlet

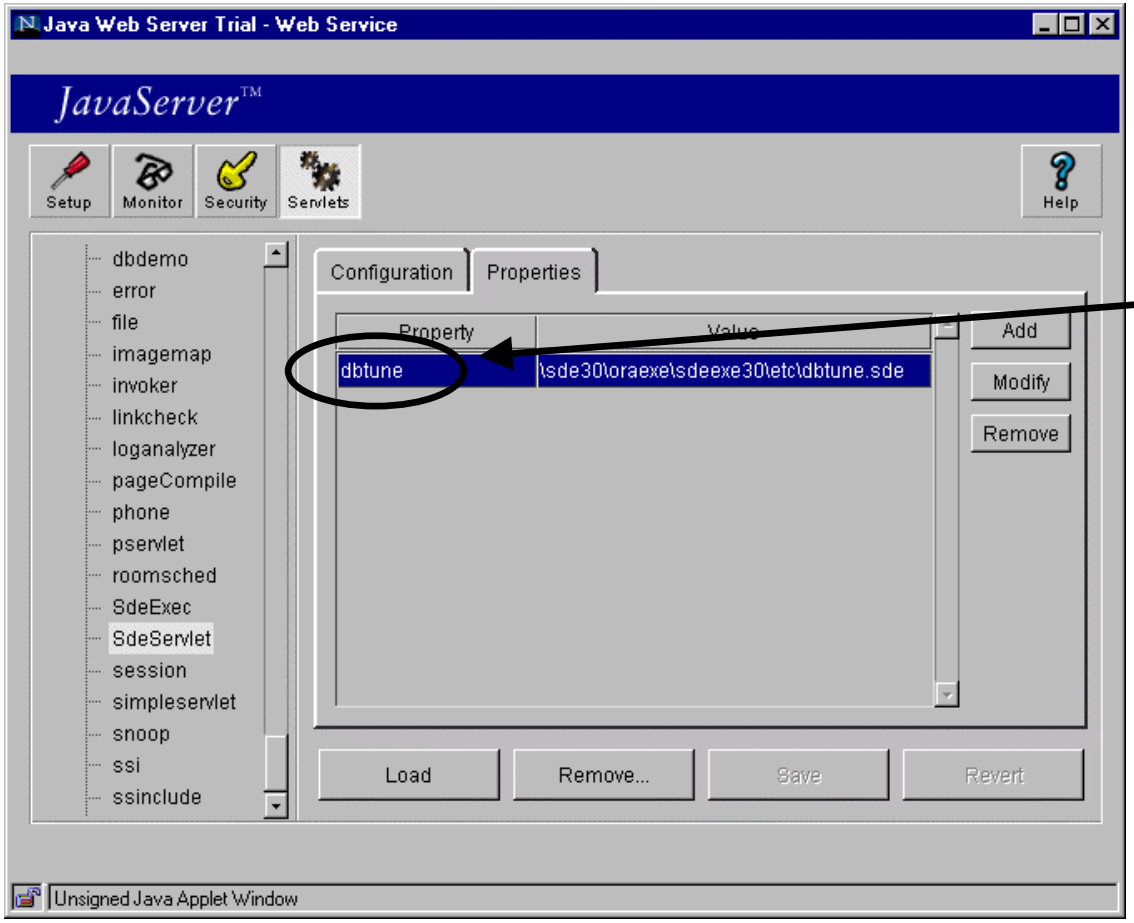
Sdeexec Servlet



##WORLD
END
##DEFAULTS
DSET_TABLESPACE SDE
TEMP_TABLESPACE TEMP
INDEX_TABLESPACE SDE
F_TBLSP SDE
F_INIT 106496
F_NEXT 40960
F_MINX 1
F_MAXX 121
F_PCTI 0
F_ITRANS 2

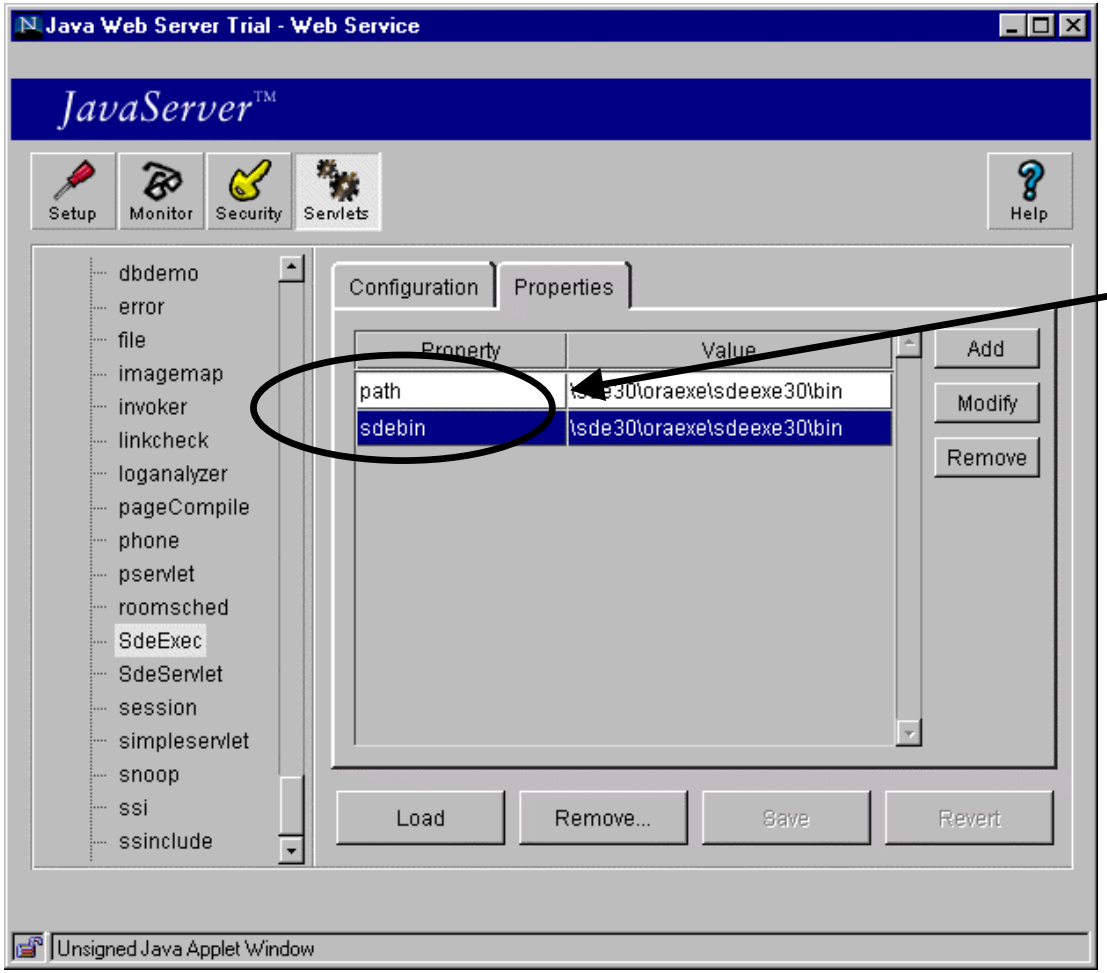
SDE Admin Command
sdemon
sdelayer
….

Dbtune Servlet Setup



The **dbtune** Property should be set to the full path/file of the dbtune.sde

Sdeexec Servlet Setup



The **path** property should be set as the OS path environment variable. The **sdebin** property should point to the directory where the sde admin executables are located.

Questions & Answers Survey Sheet

Mraad@esri.com

lbynum@esri.com