

GEODATABASE CHANGE DETECTION AND SYNCHRONIZATION

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Loudoun County VA**

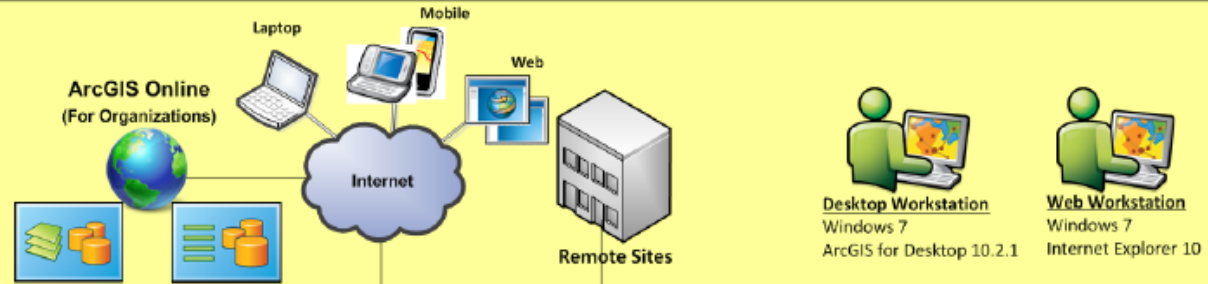


Outline

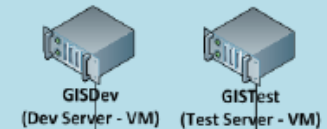
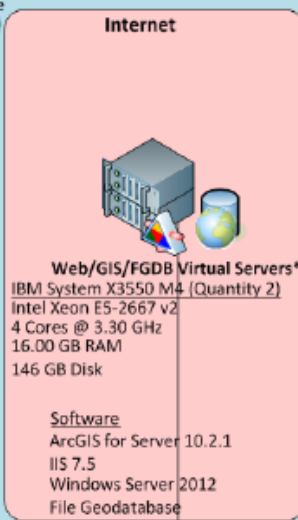
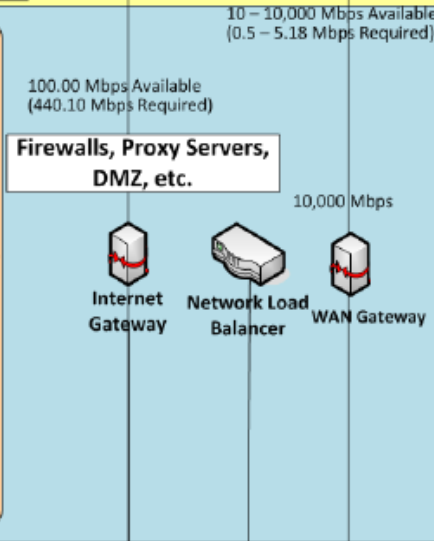
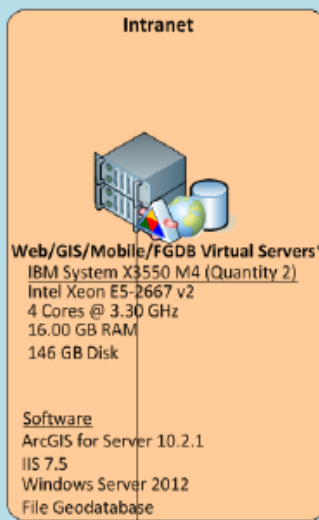
- GIS Architecture
- Database Design
- Geodatabase change detection and Synchronization



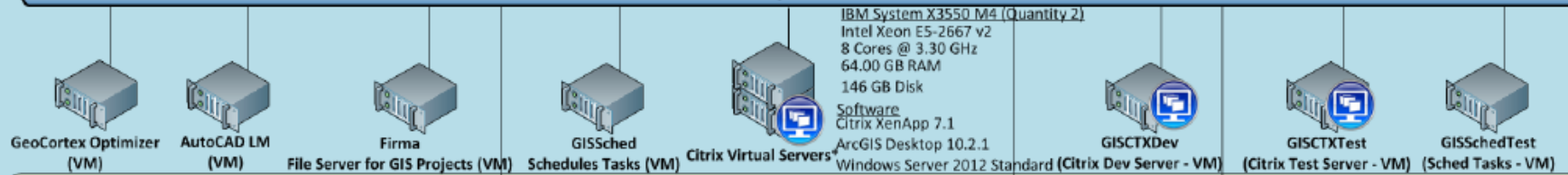
Loudoun County Virginia GIS Architecture



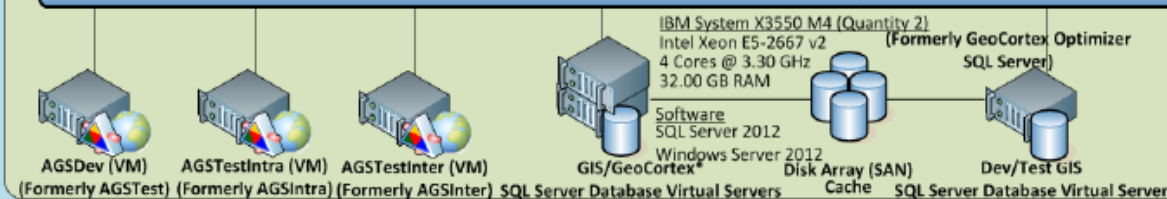
County of Loudoun, Virginia
Site: Department of Information Technology
Leesburg, Virginia



1 Gbps LAN Network



1 Gbps LAN Network



Notes:
13 Existing Virtual Servers are required
8 New Virtual Servers are required (4 Primary and 4 Backup)
40 new virtual cores are required, 20 Cores Primary/20 Cores Backup)
3 Physical Servers are required (16-core) to host new virtual servers
21 Virtual Servers are required
* Active/Passive Microsoft Cluster Server or VM Cluster deployed

Database Migration

From	To
UNIX AIX	Windows
DB2	SQL server
Application Server Connections	Direct Connections
UNIX/DB2 login	Windows Active Directory (Windows Authentication)
Single User Permissions	Group Permissions



Database SQL Servers

- Development Server

Windows 2012

SQL server 2012

- Production Server

Windows 2012

SQL server 2012



Database Design

- Production

Versioned database

- Browse

Non-versioned

- Raster

Orthophotography

- FGDB

Copy of Browse data for the web



Linkage to other Databases

- **LMIS** (Land Management Information System)
DB2
- **Tyler** (Assessor Database)
Oracle
- **Public Safety**
CAD (Computer-aided Dispatch)
- **Health**
Wellpoll

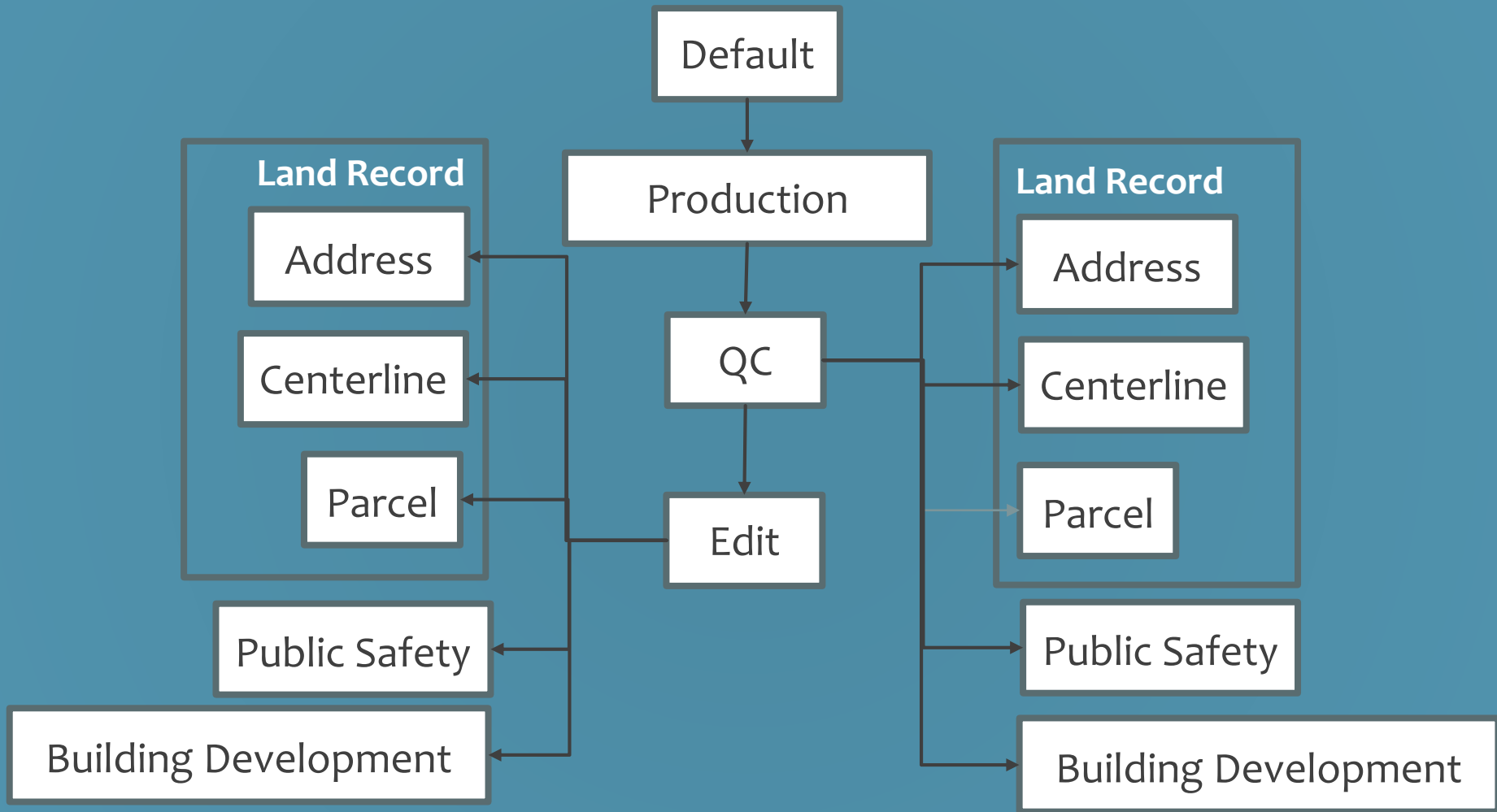


Production Database Versions

- Default
- Production
- QC
 - Address
 - Building development
 - Centerline
 - Parcel
 - Public safety
- Edit
 - Address
 - Building development
 - Centerline
 - Parcel
 - Public safety



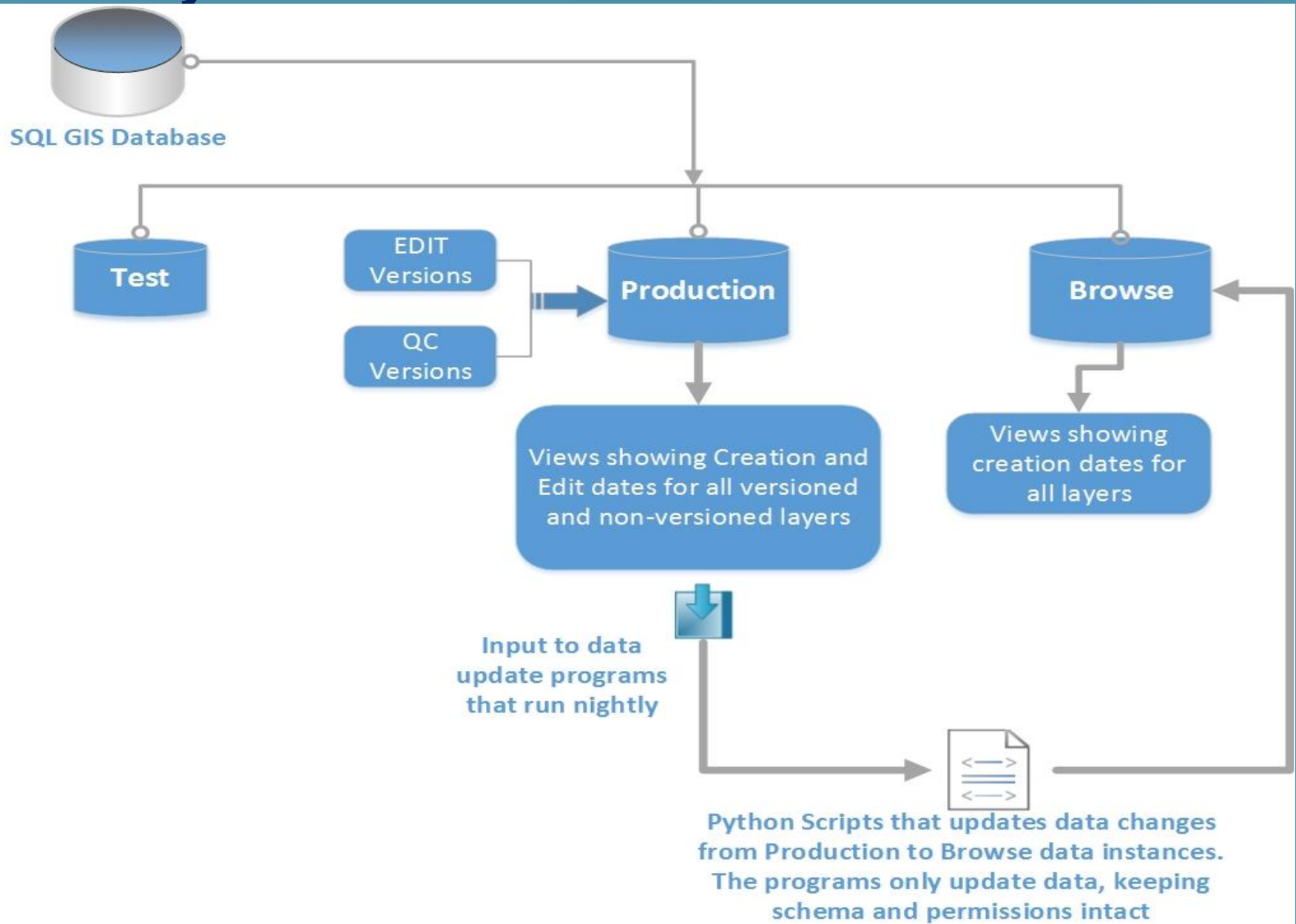
Production Database Versions



- **Detecting changes in geodatabase and updating data**
- **Generating data status reports**



Data Synchronization



Data Update Notifications

2014-11-19 02:30:04.107000

System Generated Message: LR and PS (versioned) datasets, and related LR layers, updated from prod to browse

RECORD COUNTS:

SOURCE (GISDBP):

STREET_CENTERLINE_LINE: 22686
ADDRESS_POINT: 234854
PARCELS_POLY: 115648
TOWNS_POLY: 8
PSRESPONSE_POLY: 807
PSPOLICE_POLY: 34
PSSTATIONS_POINT: 35
STREET_MAST: 12178
PLATFILE: 12759
ADDRCONDO: 35932
PARCEL_XY: 115433
ADDRESS_XY: 117427
ADDRESSMAST: 143190
SUBDIVISION: 4218
GISFS: 132969

DESTINATION (GISDBB):

STREET_CENTERLINE_LINE: 22686
ADDRESS_POINT: 234854
PARCELS_POLY: 115648
TOWNS_POLY: 8
PSRESPONSE_POLY: 807
PSPOLICE_POLY: 34
PSSTATIONS_POINT: 35
STREET_MAST: 12178
PLATFILE: 12759
ADDRCONDO: 35932
PARCEL_XY: 115433
ADDRESS_XY: 117427
ADDRESSMAST: 143190
SUBDIVISION: 4218
GISFS: 132969



ArcSDE System Tables

LAYERS table

The LAYERS table maintains data about each feature class in the database.

VERSIONS table

The versions table contains the version names, their dates and owner information.

SDE_process_information

This table maintains the table names, active processes and their start times.

SPATIAL_REFERENCES table

The spatial_references table contains the coordinate system information and its values



ArcSDE System Tables... contd

STATES table

The states table contains meta-data, state ID, owner, creation and closing time, state ID of the parent state and lineage information.

MVTABLES_MODIFIED

This table contains information for all modified/edited tables.

TABLE_REGISTRY table

This table manages all registered tables. It includes table names, owners, and descriptions.



ArcSDE System Tables... contd

States

state id	owner	creation time	closing time	parent state id	lineage name
0	sde	8/4/2014 8:46 AM	8/4/2014 8:46 AM	0	0
1492	SDE	10/15/2014 4:01 PM	10/15/2014 4:01 PM	0	1199
1600	"PROD\AM...	10/16/2014 12:36 PM	10/16/2014 12:36 PM	1492	1502
3383	SDE	10/22/2014 4:01 PM	10/22/2014 4:01 PM	1492	1199
4384	SDE	10/24/2014 4:01 PM	10/24/2014 4:01 PM	3383	1199
5314	"PROD\KAT...	10/27/2014 5:50 PM	10/27/2014 5:50 PM	4384	5313
8315	SDE	11/6/2014 4:01 PM	11/6/2014 4:01 PM	4384	1199
8327	GPROD	11/6/2014 4:01 PM	11/6/2014 4:01 PM	8315	8327
8630	SDE	11/11/2014 4:00 PM	11/11/2014 4:00 PM	8315	1199
9890	SDE	11/17/2014 4:01 PM	11/17/2014 4:01 PM	8630	1199
9902	GPROD	11/17/2014 4:02 PM	11/17/2014 4:02 PM	9890	9902
10050	"PROD\TRE...	11/18/2014 3:00 PM	11/18/2014 3:00 PM	9902	9902
11043	SDE	11/19/2014 4:01 PM	11/19/2014 4:01 PM	9890	1199
11216	"PROD\GEO...	11/20/2014 10:41 AM	11/20/2014 10:41 AM	8630	8642
11254	"PROD\BRI...	11/20/2014 10:55 AM	11/20/2014 10:55 AM	11043	11047

Mvtables_modified

state_id	registration_id
1492	43
1492	44
1492	46
1492	148
1492	164
1492	184
1492	314
1492	316
1492	318
1492	319
1600	329
3383	43
3383	44
3383	46

Tab_registry

registration_id	database_name	table_name	owner	rowid_columr	description	object_flags	registration_d
45	GISDBP	ADDRESS_XY	GPROD	OBJECTID		3	1407178519
46	GISDBP	ADDRESSLOG	GPROD	OBJECTID		11	1407178683
47	GISDBP	ADDRESSMAST	GPROD	OBJECTID		3	1407178721
48	GISDBP	ADDRLEASE	GPROD	OBJECTID		11	1407178893
49	GISDBP	AGS_FARM_TOUR_POINT	GPROD	OBJECTID		16391	1407179165
50	GISDBP	AGS_GDX_BRIDGES_POINT	GPROD	OBJECTID		16391	1407179230
51	GISDBP	AGS_REC_OPEN_SPACE_P...	GPROD	OBJECTID		16391	1407179276
52	GISDBP	AIRPORTS_POINT	GPROD	OBJECTID		16391	1407179327
53	GISDBP	BLDGS_POLY	GPROD	OBJECTID		16391	1407179374
54	GISDBP	BUS_ROUTES_LINE	GPROD	OBJECTID		16391	1407179547
67	GISDBP	CDKDATAREPOSITORY	GPROD	OBJECTID		3	1407346980
68	GISDBP	CELL_INDEX_POLY	GPROD	OBJECTID		16391	1407347208
69	GISDBP	CENSUS1990_POLY	GPROD	OBJECTID		16391	1407347271
70	GISDBP	CENSUS2000_BLOCKS_P...	GPROD	OBJECTID		16391	1407347303

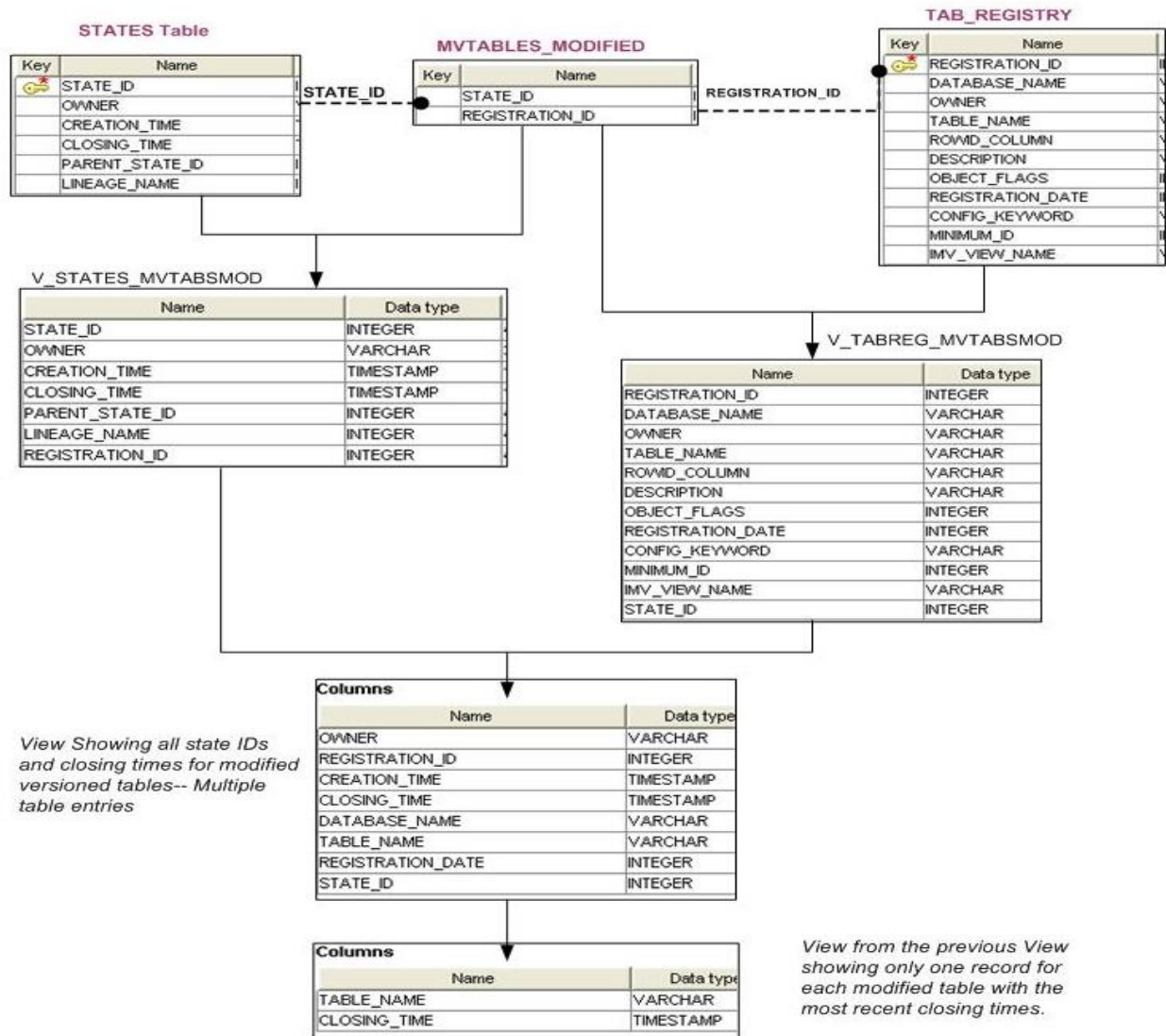


System View Joins to get Closing/Edit Time

Layer Creation time
- SDE Layers table

Layer Edit time
- View showing closing time time

SYSTEM SDE TABLE VIEWS to GET EDIT STATE CLOSING TIME FOR VERSIONED DATA



Data Status Reports

- **Version for Users**
(Deployed on citrix application servers)
- **Version for Development and Systems group**
(Installed on desktops)



Get Creation Date for Data layers

```
SELECT DISTINCT
```

```
sde.SDE_layers.database_name, sde.SDE_layers.owner,  
sde.SDE_layers.table_name,
```

```
DATEADD(Second, sde.SDE_layers.cdate, '01-Jan-1970') AS Creation_Date,  
sde.ST_SPATIAL_REFERENCE_SYSTEMS.definition,  
sde.ST_SPATIAL_REFERENCE_SYSTEMS.organization_cordsys_id
```

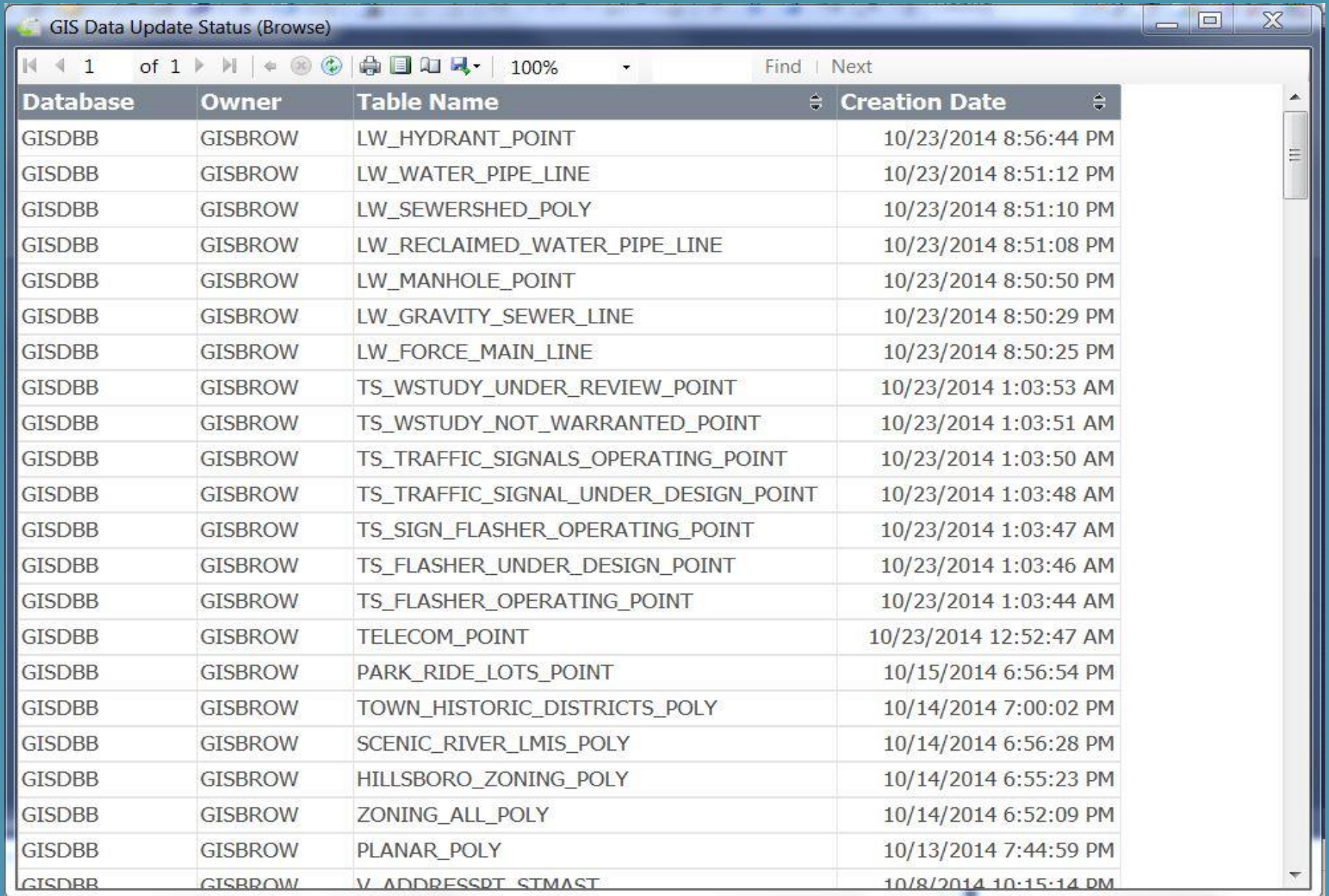
```
FROM sde.SDE_layers
```

```
LEFT OUTER JOIN sde.ST_SPATIAL_REFERENCE_SYSTEMS
```

```
ON sde.SDE_layers.srid=sde.ST_SPATIAL_REFERENCE_SYSTEMS.srs_id
```



Data Reports for Users



The screenshot shows a window titled "GIS Data Update Status (Browse)". The window contains a table with the following columns: Database, Owner, Table Name, and Creation Date. The table lists 20 rows of data, each representing a table in the GISDBB database, owned by GISBROW. The creation dates range from 10/8/2014 to 10/23/2014.

Database	Owner	Table Name	Creation Date
GISDBB	GISBROW	LW_HYDRANT_POINT	10/23/2014 8:56:44 PM
GISDBB	GISBROW	LW_WATER_PIPE_LINE	10/23/2014 8:51:12 PM
GISDBB	GISBROW	LW_SEWERSHED_POLY	10/23/2014 8:51:10 PM
GISDBB	GISBROW	LW_RECLAIMED_WATER_PIPE_LINE	10/23/2014 8:51:08 PM
GISDBB	GISBROW	LW_MANHOLE_POINT	10/23/2014 8:50:50 PM
GISDBB	GISBROW	LW_GRAVITY_SEWER_LINE	10/23/2014 8:50:29 PM
GISDBB	GISBROW	LW_FORCE_MAIN_LINE	10/23/2014 8:50:25 PM
GISDBB	GISBROW	TS_WSTUDY_UNDER_REVIEW_POINT	10/23/2014 1:03:53 AM
GISDBB	GISBROW	TS_WSTUDY_NOT_WARRANTED_POINT	10/23/2014 1:03:51 AM
GISDBB	GISBROW	TS_TRAFFIC_SIGNALS_OPERATING_POINT	10/23/2014 1:03:50 AM
GISDBB	GISBROW	TS_TRAFFIC_SIGNAL_UNDER_DESIGN_POINT	10/23/2014 1:03:48 AM
GISDBB	GISBROW	TS_SIGN_FLASHER_OPERATING_POINT	10/23/2014 1:03:47 AM
GISDBB	GISBROW	TS_FLASHER_UNDER_DESIGN_POINT	10/23/2014 1:03:46 AM
GISDBB	GISBROW	TS_FLASHER_OPERATING_POINT	10/23/2014 1:03:44 AM
GISDBB	GISBROW	TELECOM_POINT	10/23/2014 12:52:47 AM
GISDBB	GISBROW	PARK_RIDE_LOTS_POINT	10/15/2014 6:56:54 PM
GISDBB	GISBROW	TOWN_HISTORIC_DISTRICTS_POLY	10/14/2014 7:00:02 PM
GISDBB	GISBROW	SCENIC_RIVER_LMIS_POLY	10/14/2014 6:56:28 PM
GISDBB	GISBROW	HILLSBORO_ZONING_POLY	10/14/2014 6:55:23 PM
GISDBB	GISBROW	ZONING_ALL_POLY	10/14/2014 6:52:09 PM
GISDBB	GISBROW	PLANAR_POLY	10/13/2014 7:44:59 PM
GISDBB	GISBROW	V_ADDRESSPT_STMAST	10/8/2014 10:15:14 PM



Get Edit Date for Data layers

```
SELECT DISTINCT
    sde.SDE_layers.database_name, sde.SDE_layers.owner,
    sde.SDE_layers.table_name,
DATEADD(Second, sde.SDE_layers.cdate, '01-Jan-1970')
    AS Creation_Date, gisprod.V_UNIQTABSTATESID_EDIT.CLOSING_TIME


FROM    sde.SDE_layers

LEFT OUTER JOIN
    gisprod.V_UNIQTABSTATESID_EDIT
ON
sde.SDE_layers.table_name = gisprod.V_UNIQTABSTATESID_EDIT.TABLE_NAME
```



Data Reports for System Analysis

SDE DSS REPORTS



SDE Data Update Status Reports
OMAGI Loudoun County VA

SQL GIS Production

Prod Process Information | **Prod Versions**

SQL GIS Browse

Browse process Information

SQL GIS Raster

SQL Prod Data Update Status

Database	Owner	Table Name	Creation Date	Edited Date
GISDBP	GPROD	ADDRESS_POINT	10/10/2014 2:00:02 PM	11/14/2014 11:24:12
GISDBP	GPROD	T_3_DIRTYAREAS	10/10/2014 2:06:08 PM	11/14/2014 11:24:12
GISDBP	GPROD	STREET_CENTERLINE_LINE	10/10/2014 2:05:39 PM	11/13/2014 4:12:59 PM
GISDBP	GPROD	FLOOD_CROSS_SECTIONS_LINE	8/6/2014 6:01:01 PM	11/13/2014 4:00:53 PM
GISDBP	GPROD	FLOODS_POLY	8/6/2014 6:01:58 PM	11/13/2014 4:00:53 PM
GISDBP	GPROD	PARCELS_POLY	10/10/2014 2:03:23 PM	11/13/2014 4:00:53 PM

SDE Prod Active Processes

Sde id	Owner	direct connect	SysName	Start time
2974	"PROD\HUSSEIN.YAZDANI"	Y	Win32	11/14/2014 7:18:09 AM
2975	"PROD\BRIAN.WOOLEY"	Y	Win32	11/14/2014 7:26:48 AM
2978	"PROD\BLYTHE.TUCKER"	Y	Win32	11/14/2014 9:02:09 AM

SDE Prod Versions

Version Name	Owner	Parent Name	Parent Owner	Version id	Description	creation time
DEFAULT	sde			1	Instance default version.	8/4/2014 8:46:36 AM
PRODUCTION	GPROD	DEFAULT	SDE	40		10/11/2014 3:15:17 PM
PARCELS_QC	"PROD\MIKE.FAUSS"	PRODUCTION	GPROD	42		10/14/2014 7:00:41 AM
PARCELS_EDIT	"PROD\MIKE.FAUSS"	PARCELS_QC	"PROD\MIKE.FAUSS"	43		10/14/2014 7:00:55 AM
CENTERLINE_QC	"PROD\BRIAN.WOOLEY"	PRODUCTION	GPROD	44		10/14/2014 7:31:21 AM
PARCELS_QC	"PROD\DOUG.PACKARD"	PRODUCTION	GPROD	46	Copy of Production	10/14/2014 8:39:30 AM
PARCELS_EDIT	"PROD\DOUG.PACKARD"	PARCELS_QC	"PROD\DOUG.PACKARD"	47	Copy of Parcels_QC	10/14/2014 8:40:11 AM
ADDRESS_QC	"PROD\BLYTHE.TUCKER"	PRODUCTION	GPROD	48	Copy of Production	10/14/2014 9:23:19 AM



In Conclusion....

- **A reliable way to detect changes**
- **Sync data across instances**
- **Transparency to users and management through reports**





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