Geodatabase Parcel Data Model

Presentation/Discussion

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SE Minnesota GIS Users Group Meeting

Rochester, MN

Doug Avoles
GIS Project Manager & “Average GIS Joe”
Applied Data Consultants, Inc.

Intro to ADC

- Incorporated in 1996
- Full Service GIS
- 30 GIS Professionals
- Offices in **Eau Claire**, WI and **Omaha**, NE
- Commitment to Quality
- Importance Placed on Partnerships
- We Truly Enjoy What We Do!

ADC Clients

Chippewa County, WI
Pepin County, WI
Outagamie County, WI
Monroe County, WI
Eau Claire County, WI
Iowa County, WI
Washington County, NE

Dunn County, WI
Polk County, WI
Rusk County, WI
Price County, WI
Burnett County, WI
Goodhue County, MN

Ashland County, WI
Barron County, WI
Green County, WI
Lincoln County, WI
Douglas County, WI
Sarpy County, NE

Wisconsin – DNR
City of Medford, WI
InfoUSA
Crop Insurance
American Materials
V2K

US Army Corps (9 districts)
Village of Hallie, WI
St. Croix Chippewa Tribe
Directory Distributing Assoc.
Innovative Software Solutions, Inc.
Forum Analytics

City of Eau Claire, WI
Jennie-O
Ho-Chunk Nation
Farmers
Signature Press
Lake Associations

AREAS OF EXPERTISE

GIS Data Development	Application Development	GIS Web Development
Needs Assessment & Integration	Training	Federal GIS Web Development

For More Info – See Our Web Site

http://www.adc4gis.com/

Intro to Doug

- Born and raised in St. Paul, MN
- Forest Management Degree - UWSP
- GIS experience dates to PC Arc/Info (1987?)
- Primary experience has been in parcel mapping
- 9 yrs - Monroe County LIO
- 1+ yr with ADC
- “Just an Average GIS Joe”, Hockey Fan, & I Prefer Bow Hunting to Pro Football

Tell Me A Little About You

What County/Agency are you with?

What is your experience with the Parcel Data Model & GDB?

ESRI Parcel Data Model

- My Parcel GDB experience/background
- Appears Overwhelming
- Don’t be intimidated by it
- Jump in and experiment – there are things you can do to fix most “screw-ups”
- Back Up Your Data!

ESRI Parcel Data Model

Your Participation In This Discussion Is Greatly Desired & Encouraged!

Ask Questions

Make Comments

How Some Things Change:
So will the GDB and Parcel Model

ESRI Parcel Data Model

- Some Background – Developed to Follow FGDC Cadastral Standards
  - Documentation of source data for features
    "Imbedded Metadata"
  - Think Regionally – Maintain Locally
- Useful URL:

http://www.nationalcad.org/

Document Details - FGDC Subcommittee on Cadastral Data - Microsoft Internet Explorer

File Edit View Favorites Tools Help Back Search Favorites

Address http://www.nationalcad.org/showdoclist.asp?doctype=1&navsrc=Re Go Links Customize Links Free Hotmail Windows Windows Marketplace Windows Media

FGDC Cadastral Subcommittee

Western Steering Committee ⊙ National Subcommittee ⊙ Eastern Steering Committee

Click on the ▶ buttons for more options.

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- ▶ Cadastral Standards
- ▶ Land Records and Contacts
- ▶ Links & Events
- ▶ Search and Query

SUBCOMMITTEE STANDARDS

Sort By Name | Sort By Date

Document Title	Version	Date
Cadastral Core Data Draft Version 7	v 7	6/23/2005
Guidance for FGDC Data Standards - 2004	version 1	6/1/2004
FGDC Cadastral Data Content Standard version 1.3	ver 1.3	5/1/2003
Changes from Standard v 1.2 and 1.3	1.3	5/1/2003
images supporting the fgdc data content standard in zip file format	1.3	

Internet

ESRI Parcel Data Model

Let’s examine some of the Core Components

&

Concepts

Boundary FC – Most Important (PLSS Lines?)
"Line Work Should be King"

Boundary

Simple feature class
Boundary

Geometry *Polyline*
Contains M values *No*
Contains Z values *No*

Field name	Data type	Allow nulls	Default value	Domain	Prec-ision	Scale	Length	
OBJECTID	OID							
Shape	Geometry	Yes						
RecordBoundaryID	String	Yes					30	The primary key for the line entity.
RecordBounds	String	Yes					30	Describes a boundary location through a call to a legal location, a related document, or a known location.
RecordBoundaryStatus	String	Yes	Constructed	RecordBoundaryStatus			30	Identifies the record boundary's status from a legal perspective.
OffsetLeft	Double	Yes			0	0		The distance to the left of and perpendicular to a defined boundary line that defines the record boundary.
OffsetRight	Double	Yes			0	0		The distance to the right of and perpendicular to a defined boundary line that defines the record boundary.
RecordBoundaryComment	String	Yes					100	Contains additional information about the record boundary that may be in public record.
Direction	String	Yes					30	Direction is the angle between a line and an arbitrary chosen reference line.
Distance	String	Yes					30	The quantity for the distance of a boundary. Distance is the linear measure along a line.
DirectionType	String	Yes	Unknown	DirectionType			30	This attribute is the "basis of bearing" or "basis of azimuth" for the direction.
DirectionUnit	String	Yes	DMS	DirectionUnit			30	Indicates the units for a direction.
DirectionQuadrant	String	Yes					10	Directions can be measured as either bearings or azimuth.
DistanceUnit	String	Yes	US Survey Feet	DistanceUnit			30	Defines the units of measure and reference plane upon which distance measurements are taken.
DistanceType	String	Yes	Unknown	DistanceType			30	Describes the reference surface for the distance.
Radius	String	Yes					8	The radius is the distance from the center of the curve to any point on the circular curve.
Delta	String	Yes					10	The central angle of a circular curve.
Tangent	String	Yes					8	This is a term from the Arc Cogo process and the Cogo line type.
ArcLength	String	Yes					8	The arc length is the long chord length.
Side	String	Yes					1	This is a term from the Arc Cogo process and the Cogo line type.
RBSourceAgent	String	Yes					30	The source agent is the individual or organization, which determined the record boundary values.
RBSourceIndex	String	Yes					30	The value assigned to a record boundary document to file or identify the source from which the record boundary originated.
RBSourceType	String	Yes					30	Describes a family of documents, files, images, or other formats having some common unifying characteristic.
RBSourceDate	Date	Yes			0	0	8	The date of the record boundary document or other record.
RecordBoundaryType	Integer	Yes	1		0			An indication of the classification of the boundary line that is used to support the definition of subtypes.
Shape_Length	Double	Yes			0	0		

A record boundary is the linear feature that represents the edge of an polygon feature, which may be a parcel or a parcel framework.

Subtypes & Domains

Think "Cartegraphic Output" - Performance - & Data Consistancy/Control

Subtypes of Boundary

Subtype field *RecordBoundaryType*

Default subtype *1*

List of defined default values and domains for subtypes in this class

Subtype Code	Subtype Description	Field name	Default value	Domain
1	Right of Way	RecordBoundaryStatus	Constructed	RecordBoundaryStatus
		DirectionType	Assumed	DirectionType
		DirectionUnit	Unknown	DirectionUnit
		DistanceUnit	US Survey Feet	DistanceUnit
		DistanceType	Ground	DistanceType
2	Subdivision Boundary	RecordBoundaryStatus	Constructed	RecordBoundaryStatus
		DirectionType	Assumed	DirectionType
		DirectionUnit	Unknown	DirectionUnit
		DistanceUnit	US Survey Feet	DistanceUnit
		DistanceType	Ground	DistanceType
3	Parcel	RecordBoundaryStatus	Constructed	RecordBoundaryStatus
		DirectionType	Assumed	DirectionType
		DirectionUnit	Unknown	DirectionUnit
		DistanceUnit	US Survey Feet	DistanceUnit
		DistanceType	Ground	DistanceType
4	Lot Line	RecordBoundaryStatus	Constructed	RecordBoundaryStatus
		DirectionType	Assumed	DirectionType
		DirectionUnit	Unknown	DirectionUnit
		DistanceUnit	US Survey Feet	DistanceUnit
		DistanceType	Ground	DistanceType
5	Parcel Split	RecordBoundaryStatus	Constructed	RecordBoundaryStatus
		DirectionType	Assumed	DirectionType
		DirectionUnit	Unknown	DirectionUnit
		DistanceUnit	US Survey Feet	DistanceUnit
		DistanceType	Ground	DistanceType
6	Private Road	RecordBoundaryStatus	Constructed	RecordBoundaryStatus
		DirectionType	Assumed	DirectionType
		DirectionUnit	Unknown	DirectionUnit
		DistanceUnit	US Survey Feet	DistanceUnit
		DistanceType	Ground	DistanceType
7	Water	RecordBoundaryStatus	Constructed	RecordBoundaryStatus
		DirectionType	Assumed	DirectionType
		DirectionUnit	Unknown	DirectionUnit
		DistanceUnit	US Survey Feet	DistanceUnit
		DistanceType	Ground	DistanceType

Coded value domain
DirectionType
Description
Field type *String*
Split policy *Default Value*
Merge policy *Default Value*

Code	Description
Assumed	Assumed
Astronomical North	Astronomical North
Astronomical South	Astronomical South
Geodetic North	Geodetic North
Geodetic South	Geodetic South
Magnetic North	Magnetic North
Magnetic South	Magnetic South
Unknown	Unknown

Coded value domain
DistanceUnit
Description
Field type *String*
Split policy *Default Value*
Merge policy *Default Value*

Code	Description
Chains	Chains
US Survey Feet	US Survey Feet
International Feet	International Feet
Meters	Meters
Pole	Pole
Arpent	Arpent
Perch	Perch
Rod	Rod
Stick	Stick
Vara	Vara
Vara - California	Vara - California
Vara - Texas	Vara - Texas
Unknown	Unknown

Coded value domain
DistanceType
Description
Field type *String*
Split policy *Default Value*
Merge policy *Default Value*

Code	Description
Ground	Ground
Sea Level	Sea Level
Grid	Grid
Unknown	Unknown

Coded value domain
DirectionUnit
Description
Field type *String*
Split policy *Default Value*
Merge policy *Default Value*

Code	Description
Deg	Decimal Degrees
DMS	Degrees Minutes Seconds
Rad	Radians
Grad	Gradians
Gons	Gons
Other	Other
Unknown	Unknown

Coded value domain
RecordBoundaryStatus
Description
Field type *String*
Split policy *Default Value*
Merge policy *Default Value*

Code	Description
Ambulatory	Ambulatory
Tidal	Tidal
Disputed	Disputed
Adjudicated	Adjudicated
Connecting Line	Connecting Line
Computed	Computed
Constructed	Constructed
Duplicate	Duplicate
Archived	Archived
Unknown	Unknown

Parcel Framework – PLSS & Survey FC's

Parcel framework

Simple feature class SimultaneousConveyance

Geometry: Polygon
Contains M values: No
Contains Z values: Optional

Field name	Data type	Allow nulls	Default value	Domain	Precision	Scale	Length
OBJECTID	OID						
Shape	Geometry	Yes					
ConveyanceID	String	Yes					64
ConveyanceDesignator	String	Yes					64
ConveyanceType	String	Yes	Subdivision	Simultaneous-ConveyanceType			30
Shape_Length	Double	Yes			0	0	
Shape_Area	Double	Yes			0	0	

A simultaneous conveyance is a named or numbered area of land that can be identified by a type and a designator. These types of survey systems were created at one time in one document and all of the interior lines will have equal standing with one another.

This is a primary key for the polygon feature.
The conveyance name is an identifying name or number for a specific type of conveyance.
Indicates the category or major class of the description, such as subdivision or assessor plat.

Simple feature class SurveyFirstDivision

Geometry: Polygon
Contains M values: No
Contains Z values: Optional

Field name	Data type	Allow nulls	Default value	Domain	Precision	Scale	Length
OBJECTID	OID						
Shape	Geometry	Yes					
ConveyanceID	String	Yes					64
ConveyanceDesignator	String	Yes					64
ConveyanceType	String	Yes	Subdivision	Simultaneous-ConveyanceType			30
FirstDivisionID	String	Yes					100
FirstDivisionDesignator	String	Yes					100
FirstDivisionType	String	Yes	Block	FirstDivisionType			30
Shape_Length	Double	Yes			0	0	
Shape_Area	Double	Yes			0	0	

The first division is the primary division of the survey system. Examples are blocks and lots. These are nested within the simultaneous conveyance and do not cross it's boundaries. First divisions may or may not tessellate or uniquely divide the entire simultaneous conveyance.

See SimultaneousConveyance
Name for the Conveyance, often a numeric value.
The type of conveyance.
The primary key for the polygon feature.
An alpha, numeric, or alpha-numeric designator used to identify the first division of the survey system.
The classification of the first survey system division.

Simple feature class SurveySecondDivision

Geometry: Polygon
Contains M values: No
Contains Z values: Optional

Field name	Data type	Allow nulls	Default value	Domain	Precision	Scale	Length
OBJECTID	OID						
Shape	Geometry	Yes					
ConveyanceID	String	Yes					64
ConveyanceDesignator	String	Yes					64
ConveyanceType	String	Yes	Subdivision	Simultaneous-ConveyanceType			30
FirstDivisionID	String	Yes					100
FirstDivisionDesignator	String	Yes					100
FirstDivisionType	String	Yes	Block	FirstDivisionType			30
SecondDivisionID	String	Yes					100
SecondDivisionDesignator	String	Yes					100
SecondDivisionType	String	Yes	Lot	SecondDivisionType			30
Shape_Length	Double	Yes			0	0	
Shape_Area	Double	Yes			0	0	

The second survey division is the subdivision of the first division. These are nested within the first division and do not cross the first division boundaries. The second division may not tessellate or uniquely divide the entire first division.

See SimultaneousConveyance

See SurveyFirstDivision

The primary key for the polygon feature.
An alpha, numeric, or alpha-numeric designator used to identify the first division of the survey system.
Describes the classification of the first survey system division.

Coded value domain SecondDivisonType

Description
Field type: String
Split policy: Default Value
Merge policy: Default Value

Code	Description
Fractional Part	Fractional Part
Outlot	Outlot
Lot	Lot
Tract	Tract
Parcel	Parcel
Other	Other

Coded value domain FirstDivisionType

Description
Field type: String
Split policy: Default Value
Merge policy: Default Value

Code	Description
Block	Block
Lot	Lot
Tract	Tract
Right of Way	Right of Way
Unit	Unit
Fractional Part	Fractional Part
Claim	Claim
Parcel	Parcel
Plot	Plot
Survey	Survey
Other	Other

Coded value domain SimultaneousConveyanceType

Description
Field type: String
Split policy: Default Value
Merge policy: Default Value

Code	Description
Assessor Plat	Assessor Plat
Cemetery	Cemetery
Condominium	Condominium
Farm Lot	Farm Lot
French Long Lot	French Long Lot
Indian Allotment	Indian Allotment
Plat of Survey	Plat of Survey
Protraction Block	Protraction Block
Small Holding Claim	Small Holding Claim
Small Tracts Act	Small Tracts Act
Subdivision	Subdivision
Survey	Survey
Townsite	Townsite
United States Survey	United States Survey
Other	Other

Simple feature class PLSSTownship

Geometry: Polygon
Contains M values: No
Contains Z values: Optional

Field name	Data type	Allow nulls	Default value	Domain	Precision	Scale	Length
OBJECTID	OID						
Shape	Geometry	Yes					
PLSSID	String	Yes					64
PrincipalMeridian	String	Yes	NA	PrincipalMeridian			64
TownshipDesignator	String	Yes					30
TownshipDirection	String	Yes		TownshipTownDirection			2
TownshipFraction	Integer	Yes			0		
RangeDesignator	String	Yes					30
RangeDirection	String	Yes		TownshipRangeDirection			1
RangeFraction	Integer	Yes			0		
TownshipType	String	Yes	PLSS	Township Type			60
StateCode	Integer	Yes			0		
Shape_Length	Double	Yes			0	0	
Shape_Area	Double	Yes			0	0	

Townships as defined in the United States Public Land Survey System.

Primary key for the polygon feature.
Reference for the numbering of township and range within a public land survey area.
The number of rows of townships, north or south from a Public Land Survey System origin.
Direction of a row of townships from a Public Land Survey System origin.
Township fractions are created when there are gaps between surveyed township boundaries.
Indicates the number of columns of townships, east or west from a Public Land Survey System origin.
Direction of a column of townships from a Public Land Survey System origin.
Range fractions are created when there are gaps between surveyed township boundaries.
An indicator as to whether the township is surveyed, protracted or unsurveyed.
An indication of the state in which the PLSS township is located.

Simple feature class PLSSFirstDivision

Geometry: Polygon
Contains M values: No
Contains Z values: Optional

Field name	Data type	Allow nulls	Default value	Domain	Precision	Scale	Length
OBJECTID	OID						
Shape	Geometry	Yes					
PLSSID	String	Yes					64
PrincipalMeridian	String	Yes					64
TownshipDesignator	String	Yes					30
TownshipDirection	String	Yes		TownshipTownDirection			2
TownshipFraction	Integer	Yes			0		
RangeDesignator	String	Yes		FirstDivisionSectionRange			30
RangeDirection	String	Yes		TownshipRangeDirection			1
RangeFraction	Integer	Yes			0		
TownshipType	String	Yes	PLSS	Township Type			60
StateCode	Integer	Yes			0		
FirstDivisionID	String	Yes					30
FirstDivisionDesignator	String	Yes					10
FirstDivisionSuffix	String	Yes					10
FirstDivisionType	String	Yes	Section	First Division Type			30
Shape_Length	Double	Yes			0	0	
Shape_Area	Double	Yes			0	0	

Public Land Survey System township first divisions are normally tracts or sections. This entity is the primary or first subdivisions of a township.

See PLSSTownship

The numeric identifier of the first division.
The letter, number, or letter number combination that identifies the first division, such as a section number.
The suffix to the designator such as fractional section under localized conditions.
The primary or first subdivision category. In most cases, this is a section.

Simple feature class PLSSSecondDivision

Geometry: Polygon
Contains M values: No
Contains Z values: Optional

Field name	Data type	Allow nulls	Default value	Domain	Precision	Scale	Length
OBJECTID	OID						
Shape	Geometry	Yes					
PLSSID	String	Yes					64
PrincipalMeridian	String	Yes					64
TownshipDesignator	String	Yes					30
TownshipDirection	String	Yes		TownshipTownDirection			2
TownshipFraction	Integer	Yes			0		
RangeDesignator	String	Yes					30
RangeDirection	String	Yes		TownshipRangeDirection			1
RangeFraction	Integer	Yes			0		
TownshipType	String	Yes	PLSS	Township Type			60
StateCode	Integer	Yes			0		
FirstDivisionID	String	Yes					30
FirstDivisionDesignator	String	Yes					10
FirstDivisionSuffix	String	Yes					10
FirstDivisionType	String	Yes	Section	First Division Type			30
SecondDivisionID	String	Yes					30
SecondDivisionDesignator	String	Yes					10
SecondDivisionSuffix	String	Yes					10
SecondDivisionType	String	Yes	Quarter Section	Second Division Type			30
Shape_Length	Double	Yes			0	0	
Shape_Area	Double	Yes			0	0	

Public Land Survey System township second divisions are normally aliquot parts or government lots. This entity is the second subdivision of a Public Land Survey System township. The second division may extend to the quarter or quarter-quarter division of a section. Divisions below the sixteenth (quarter-quarter) are in the PLSS third division.

See PLSSTownship

See PLSSFirstDivision

Primary key that identifies each record in the Public Land Survey System township second division entity.
The letter, number, or letter number combination that identifies the second division.
The indicator for duplicate second divisions.
The second subdivision category, such as block and lot.

Coded value domain PrincipalMeridian

Description: Range direction
Field type: String
Split policy: Default Value
Merge policy: Default Value

Code and description
Base Line of the U.S. Military Survey
Black Hills Meridian
Boise Meridian
Chickasaw Meridian
Choctaw Meridian
Cimarron Meridian
Copper River Meridian
Extended Fourth Principal Meridian
Fairbanks Meridian
Fifth Principal Meridian
First Principal Meridian
Fourth Principal Meridian
Gila and Salt River Meridian
Great Miami River
Humboldt Meridian
Huntsville Meridian
Indian Meridian
Kateel River Meridian
Louisiana Meridian
New Mexico Principal Meridian
Michigan Meridian
Mount Diablo Meridian
Muskingum River
Navajo Meridian
Ohio River
Ohio Company Purchase
St. Helena Meridian
St. Stephens Meridian
Salt Lake Meridian
San Bernardino Meridian
Second Principal Meridian
Seward Meridian
Scioto River
Sixth Principal Meridian
Tallahassee Meridian
Third Principal Meridian
Twelve Mile Square Reserve
Uintah Meridian
Umiat Meridian
Ute Meridian
Washington Meridian
Willamette Meridian
Wind River Meridian
Not Applicable

Coded value domain Township Type

Description: Section values
Field type: String
Split policy: Default Value
Merge policy: Default Value

Code and description
PLSS
Donation Land Claim
Indian Lands
Land Grants
Civil Colonies
Military Reservation
Overlapping Land Grant
Private Survey
Not Part of PLSS
Water
Unsurveyed Area
Refugee Lands
Michigan Survey
Muskingum River Survey
Ohio River Survey
Scioto River Base
Between the Miamis
North of Symmes Purchase
Symmes Purchase
Twelve Mile Square Reserve
West of the Great Miami
United States Military Survey
Connecticut Western Reserve
Virginia Military Survey
Virginia Military District
Ohio Company Purchase
Old Seven Ranges
Congress Lands North of Old Seven Ranges
Congress Lands East of Scioto River
Other

Coded value domain TownshipRangeDirection

Description: Range direction
Field type: String
Split policy: Default Value
Merge policy: Default Value

Code	Description
W	West
E	East

Coded value domain TownshipTownDirection

Description: Town direction
Field type: String
Split policy: Default Value
Merge policy: Default Value

Code	Description
N	North
S	South

Coded value domain Second Division Type

Description: Section values
Field type: String
Split policy: Default Value
Merge policy: Default Value

Code	Description
Unsectionalized Area	Undivided Area
Block	Block
Lot	Lot
Other Aliquot Part	Other Aliquot Part
Government Lot	Government Lot
Quarter Section	Quarter Section
Sixteenth Section	Sixteenth Section
Tract	Tract
Protracted Lot	Protracted Lot
Other	Other

Coded value domain First Division Type

Description: Section values
Field type: String
Split policy: Default Value
Merge policy: Default Value

Code	Description
Unsectionalized Area	Unsectionalized Area
Section	Section
Lot	Lot
Tract	Tract
Protraction Block	Protraction Block
PLSS Tract	PLSS Tract
Parcel	Parcel
DLC	Donation Land Claim
Fractional Section	Fractional Section
Other	Other

Coded value domain FirstDivisionSectionRange

Description: Section values
Field type: String
Split policy: Default Value
Merge policy: Default Value

Code and description	
1	19
2	20
3	21
4	22
5	23
6	24
7	25
8	26
9	27
10	28
11	29
12	30
13	31
14	32
15	33
16	34
17	35
18	36

Parcel Framework – PLSS FC's

Simple feature class
PLSSFirstDivision

Geometry *Polygon*
Contains M values *No*
Contains Z values *Optional*

Field name	Data type	Allow nulls	Default value	Domain	Prec-ision	Scale	Length
OBJECTID	OID						
Shape	Geometry	Yes					
PLSSID	String	Yes					64
PrincipalMeridian	String	Yes					64
TownshipDesignator	String	Yes					30
TownshipDirection	String	Yes		TownshipTownDirection			2
TownshipFraction	Integer	Yes			0		
RangeDesignator	String	Yes		FirstDivisionSectionRange			30
RangeDirection	String	Yes		TownshipRangeDirection			1
RangeFraction	Integer	Yes			0		
TownshipType	String	Yes	PLSS	Township Type			60
StateCode	Integer	Yes			0		
FirstDivisionID	String	Yes					30
FirstDivisionDesignator	String	Yes					10
FirstDivisionSuffix	String	Yes					10
FirstDivisionType	String	Yes	Section	First Division Type			30
Shape_Length	Double	Yes			0	0	
Shape_Area	Double	Yes			0	0	

Public Land Survey System township first divisions are normally tracts or sections. This entity is the primary or first subdivisions of a township.

See PLSSTownship

The numeric identifier of the first division.
The letter, number, or letter number combination that identifies the first division, such as a section number.
The suffix to the designator such as fractional section under localized conditions.
The primary or first subdivision category. In most cases, this is a section.

"Nested"

Simple feature class
PLSSSecondDivision

Geometry *Polygon*
Contains M values *No*
Contains Z values *Optional*

Field name	Data type	Allow nulls	Default value	Domain	Prec-ision	Scale	Length
OBJECTID	OID						
Shape	Geometry	Yes					
PLSSID	String	Yes					64
PrincipalMeridian	String	Yes					64
TownshipDesignator	String	Yes					30
TownshipDirection	String	Yes		TownshipTownDirection			2
TownshipFraction	Integer	Yes			0		
RangeDesignator	String	Yes					30
RangeDirection	String	Yes		TownshipRangeDirection			1
RangeFraction	Integer	Yes			0		
TownshipType	String	Yes	PLSS	Township Type			60
StateCode	Integer	Yes			0		
FirstDivisionID	String	Yes					30
FirstDivisionDesignator	String	Yes					10
FirstDivisionSuffix	String	Yes					10
FirstDivisionType	String	Yes	Section	First Division Type			30
SecondDivisionID	String	Yes					30
SecondDivisionDesignator	String	Yes					10
SecondDivisionSuffix	String	Yes					10
SecondDivisionType	String	Yes	Quarter Section	Second Division Type			30
Shape_Length	Double	Yes			0	0	
Shape_Area	Double	Yes			0	0	

Public Land Survey System township second divisions are normally aliquot parts or government lots. This entity is the second subdivision of a Public Land Survey System township. The second division may extend to the quarter or quarter-quarter division of a section. Divisions below the sixteenth (quarter-quarter) are in the PLSS third division.

See PLSSTownship

See PLSSFirstDivision

Primary key that identifies each record in the Public Land Survey System township second division entity.
The letter, number, or letter number combination that identifies the second division.
The indicator for duplicate second divisions.
The second subdivision category, such as block and lot.

Coded value domain

Edit/Derive

Parcel Framework – Survey FC's

Simple feature class
SimultaneousConveyance

Geometry *Polygon*
Contains M values *No*
Contains Z values *Optional*

Field name	Data type	Allow nulls	Default value	Domain	Prec-ision	Scale	Length
OBJECTID	OID						
Shape	Geometry	Yes					
ConveyanceID	String	Yes					64
ConveyanceDesignator	String	Yes					64
ConveyanceType	String	Yes	Subdivision	Simultaneous-ConveyanceType			30
Shape_Length	Double	Yes			0	0	
Shape_Area	Double	Yes			0	0	

A simultaneous conveyance is a named or numbered area of land that can be identified by a type and a designator. These types of survey systems were created at one time in one document and all of the interior lines will have equal standing with one another.

This is a primary key for the polygon feature.
The conveyance name is an identifying name or number for a specific type of conveyance.
Indicates the category or major class of the description, such as subdivision or assessor plat.

Simultaneous Conveyance

Simple feature class
SurveyFirstDivision

Geometry *Polygon*
Contains M values *No*
Contains Z values *Optional*

Field name	Data type	Allow nulls	Default value	Domain	Prec-ision	Scale	Length
OBJECTID	OID						
Shape	Geometry	Yes					
ConveyanceID	String	Yes					64
ConveyanceDesignator	String	Yes					64
ConveyanceType	String	Yes	Subdivision	Simultaneous-ConveyanceType			30
FirstDivisionID	String	Yes					100
FirstDivisionDesignator	String	Yes					100
FirstDivisionType	String	Yes	Block	FirstDivisionType			30
Shape_Length	Double	Yes			0	0	
Shape_Area	Double	Yes			0	0	

The first division is the primary division of the survey system. Examples are blocks and lots. These are nested within the simultaneous conveyance and do not cross it's boundaries. First divisions may or may not tessellate or uniquely divide the entire simultaneous conveyance.

See SimultaneousConveyance
Name for the Conveyance, often a numeric value.
The type of conveyance.
The primary key for the polygon feature.
An alpha, numeric, or alpha-numeric designator used to identify the first division of the survey system.
The classification of the first survey system division.

Blocks/Lots

Simple feature class
SurveySecondDivision

Geometry *Polygon*
Contains M values *No*
Contains Z values *Optional*

Field name	Data type	Allow nulls	Default value	Domain	Prec-ision	Scale	Length
OBJECTID	OID						
Shape	Geometry	Yes					
ConveyanceID	String	Yes					64
ConveyanceDesignator	String	Yes					64
ConveyanceType	String	Yes	Subdivision	Simultaneous-ConveyanceType			30
FirstDivisionID	String	Yes					100
FirstDivisionDesignator	String	Yes					100
FirstDivisionType	String	Yes	Block	FirstDivisionType			30
SecondDivisionID	String	Yes					100
SecondDivisionDesignator	String	Yes					100
SecondDivisionType	String	Yes	Lot	SecondDivisonType			30
Shape_Length	Double	Yes			0	0	
Shape_Area	Double	Yes			0	0	

The second survey division is the subdivision of the first division. These are nested within the first division and do not cross the first division boundaries. The second division may not tessellate or uniquely divide the entire first division.

See SimultaneousConveyance

See SurveyFirstDivision

The primary key for the polygon feature.
An alpha, numeric, or alpha-numeric designator used to identify the first division of the survey system.
Describes the classification of the first survey system division.

Corner FC's

Simple feature class
Corner

Geometry *Point*
Contains M values *No*
Contains Z values *Optional*

Field name	Data type	Allow nulls	Default value	Domain	Precision	Scale	Length
OBJECTID	OID						
Shape	Geometry	Yes					
CornerID	String	Yes					30
CornerType	String	Yes	Other	CornerClassification			30
CornerLabel	String	Yes					100
CornerLocalLabel	String	Yes					60

A corner is a legal location. It may mark the extremity of parcel or a parcel framework polygon. A corner may have multiple monuments which serve as physical markers for the legal location of the corner.

Primary key for the feature class polygon.
A named corner classification.
A name describing the legal location. For Public Land Survey System corners, these are names for corners on the base land net.
Any number of alternative names or aliases for the corner.

Coded value domain
Corner Type
Description
Field type *String*
Split policy *Default Value*
Merge policy *Default Value*

Code	Description
AC	Aliquot Part
AMC	Aux Meander Corner
AP	Angle Point
CAC	Closing Aliquot Part
CCC	Crossing Closing Corner
CQC	Closing Quarter Corner
CSC	Closing Section Corner
IP	Intersection Point
LC	Location Corner
LM	Location Monument
MC	Meander Corner
MP	Mile Post/Mile Corner
POL	Point on Line
QC	Quarter Corner
SC	Section Corner
SMC	Special Meander Corner
TC	Township Corner
WP	Witness Point
CS	Center of Section
CTC	Closing Township Corner
O	Other
U	Unknown

Legal Corners

Relationship class
CornerHasMonuments

Type *Simple*
Cardinality *One To Many*
Notification *None*
Forward label *Monument*
Backward label *Corner*

Origin feature class	Destination feature class
Name *Corner*	Name *Monument*
Primary key *CornerID*	
Foreign key *CornerID*	

No relationship rules defined.

Simple feature class
Monument

Geometry *Point*
Contains M values *No*
Contains Z values *No*

Field name	Data type	Allow nulls	Default value	Domain	Precision	Scale	Length
OBJECTID	OID						
Shape	Geometry	Yes					
CornerPointID	String	Yes					30
CornerID	String	Yes					30
MonumentType	String	Yes					30
MounmentDateSet	Date	Yes			0	0	8
CPSourceAgent	String	Yes					100
CPSourceIndex	String	Yes					100
CPSourceType	String	Yes					100
CPSourceDate	Date	Yes			0	0	8
CornerPointStatus	String	Yes					100

A monument is a point feature which marks the ends of record boundaries or the extremities of a parcel or a parcel framework polygon. A corner may or not be monument and it is possible that there is only one monument per corner. The relationship allows for multiple monuments for corners.

A primary key for the point feature.
Pointer to the corner point feature to identify which corner the monument is attached to.
Describes the material, composition, and other characteristics of the physical corner marker, if present.
The date the monument was set.
The individual or organization which established the monument.
A value assigned to a monument record file or a way to identify the record where information about the monument is kept.
The type of source for the monument information.
The monument record or file.
Describes the monument's relationship to other monuments at the same corner.

Monuments (allows multiples)

Relationship class
MonumentHasCornerCoordinates

Type *Simple*
Cardinality *One To Many*
Notification *None*
Forward label *CornerCoordinate*
Backward label *Monument*

Origin feature class	Destination feature class
Name *Monument*	Name *CornerCoordinate*
Primary key *CornerPointID*	
Foreign key *CornerPointID*	

No relationship rules defined.

Simple feature class
CornerCoordinate

Geometry *Point*
Contains M values *No*
Contains Z values *No*

Field name	Data type	Allow nulls	Default value	Domain	Precision	Scale	Length
OBJECTID	OID						
Shape	Geometry	Yes					
CornerCoordinateID	String	Yes					30
CornerPointID	String	Yes					30
XCoordinate	Double	Yes			0	0	
YCoordinate	Double	Yes			0	0	
ZCoordinate	Double	Yes			0	0	
CoordinateValue	String	Yes					30
CoordinateStatus	String	Yes	Active	CoordinateStatus			30
CSourceAgent	String	Yes					100
CSourceIndex	String	Yes					100
CSourceType	String	Yes					100
CSourceDate	Date	Yes			0	0	8
CSourceComments	String	Yes					100
XAccuracy	Double	Yes			0	0	
YAccuracy	Double	Yes			0	0	
ZAccuracy	Double	Yes			0	0	
Reliability	String	Yes					30
AccuracyComments	String	Yes					30
HorizontalDatum	String	Yes	NAD83	HorizontalDatum			30
CoordinateSystem	String	Yes					30
VerticalDatum	String	Yes	North American Vertical Datum of 1988	ElevationDatum			60
CoordinateMethod	String	Yes	Total Station	CoordinateMethod			30
CoordinateProcedure	String	Yes	Other	CoordinateProcedure			30
VerticalUnits	String	Yes	International Feet	ElevationUnits			30

The corner point measured coordinate is a (x,y), (x,y,z), or z value for a monument. Note that measured does not imply surveyed. Digitizing from a map is a type of measurement.

Primary key for the feature.
Points to the monument which the coordinate represents.
The X coordinate value or easting for a coordinate set.
The Y coordinate value or northing for a coordinate set.
The Z coordinate value or elevation.
Indicates whether the measured coordinate was obtained as part of a legal description.
The legal value for the position of the corner point.
The individual or organization or agency that determined the coordinate value.
A coordinate value to file or identify the adjustment or survey from which the coordinate value originated.
The date of the coordinate record such as the date of the adjustment.
Any additional notes or information about the methods used to obtain a measurement or the accuracy of the resulting measurements.
The accuracy of the x or east coordinate expressed as the x component of a 95% percent error ellipse.
The accuracy of the y or north coordinate expressed as the y component of a 95% percent error ellipse.
The accuracy of the z or elevation expressed as the semi-major axis of the 95% percent error ellipse.
A measure of the total accuracy of a coordinate value.
Any statements or qualifications about the accuracy of a coordinate value.
The identification given to the reference system used for defining the coordinates of points.
The reference frame or system from which linear or angular quantities are measured and assigned to the position that a point occupies.
The vertical datum is the identification given to the reference system used for defining the elevation of points.
The technology that was used to establish the coordinate value.
the procedure using the methods above to measure the coordinate value.
The units of measure for the elevation values, such as survey feet or meters.

Coordinates (allows multiples)

Coded value domain
CornerClassification
Description *Range direction*
Field type *String*
Split policy *Default Value*
Merge policy *Default Value*

Code	Description
Angle Point	Angle Point
Auxiliary Meander Corner	Auxiliary Meander Corner
Center Quarter Section Quarter	Center Quarter Section Quarter
Intersection Point	Intersection Point
Crosssing Closing Quarter	Crosssing Closing Quarter
Location Corner	Location Corner
Location Monument	Location Monument
Meander Corner	Meander Corner
Mile Corner	Mile Corner
Mile Post	Mile Post
Point on Line	Point on Line
Quarter Corner	Quarter Corner
Section Corner	Section Corner
Special Meander Corner	Special Meander Corner
Subdivision of Section Corner	Subdivision of Section Corner
Township Corner	Township Corner
Witness Point	Witness Point
Other	Other

Coded value domain
CoordinateProcedure
Description
Field type *String*
Split policy *Default Value*
Merge policy *Default Value*

Code	Description
A Order	A Order
B Order	B Order
First Order	First Order
Second Order	Second Order
RTK	RTK
HARN	HARN
Other	Other

Coded value domain
CoordinateStatus
Description
Field type *String*
Split policy *Default Value*
Merge policy *Default Value*

Code	Description
Record	Record
Informational	Informational
Active	Active
Other	Other

Coded value domain
ElevationDatum
Description
Field type *String*
Split policy *Default Value*
Merge policy *Default Value*

Code	Description
National Geodetic Vertical Datum of 1929	National Geodetic Vertical Datum of 1929
North American Vertical Datum of 1988	North American Vertical Datum of 1988
Other	Other

Coded value domain
ElevationUnits
Description
Field type *String*
Split policy *Default Value*
Merge policy *Default Value*

Code	Description
International Feet	International Feet
US Survey Feet	US Survey Feet
Meters	Meters
Other	Other

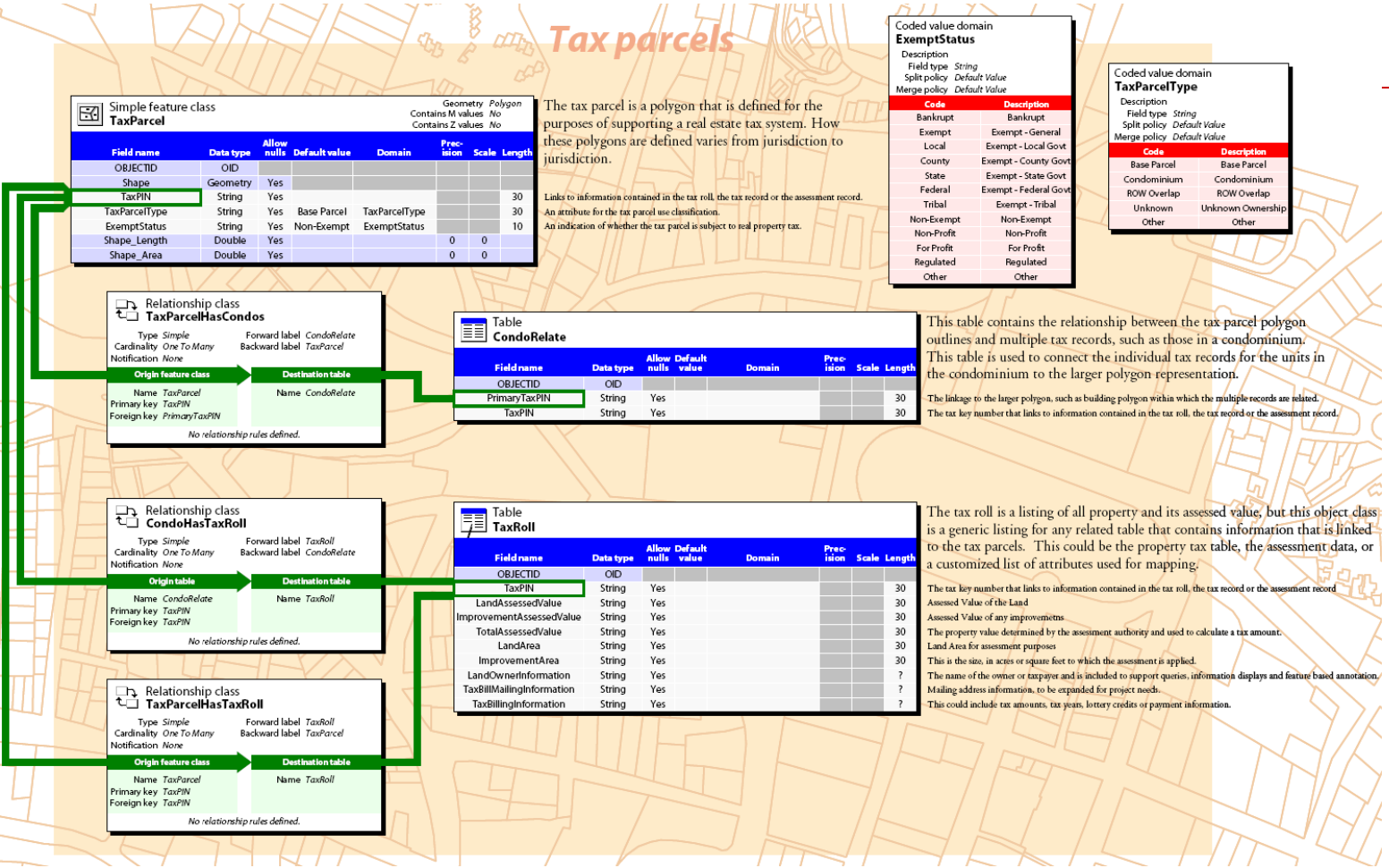
Coded value domain
HorizontalDatum
Description
Field type *String*
Split policy *Default Value*
Merge policy *Default Value*

Code	Description
NAD27	NAD27
NAD83	NAD83
Local	Local
None	None
Other	Other

Coded value domain
CoordinateMethod
Description
Field type *String*
Split policy *Default Value*
Merge policy *Default Value*

Code	Description
Traverse Line of Sight Survey	Traverse Line of Sight Survey
Doppler	Doppler
Inertial Survey	Inertial Survey
Digitized	Digitized
Global Positioning System	Global Positioning System
Radial Survey Line of Sight	Radial Survey Line of Sight
Total Station	Total Station
Other	Other

Tax Parcel FC



Links to Tax & Other Related Databases

Relationship Class to deal with condos

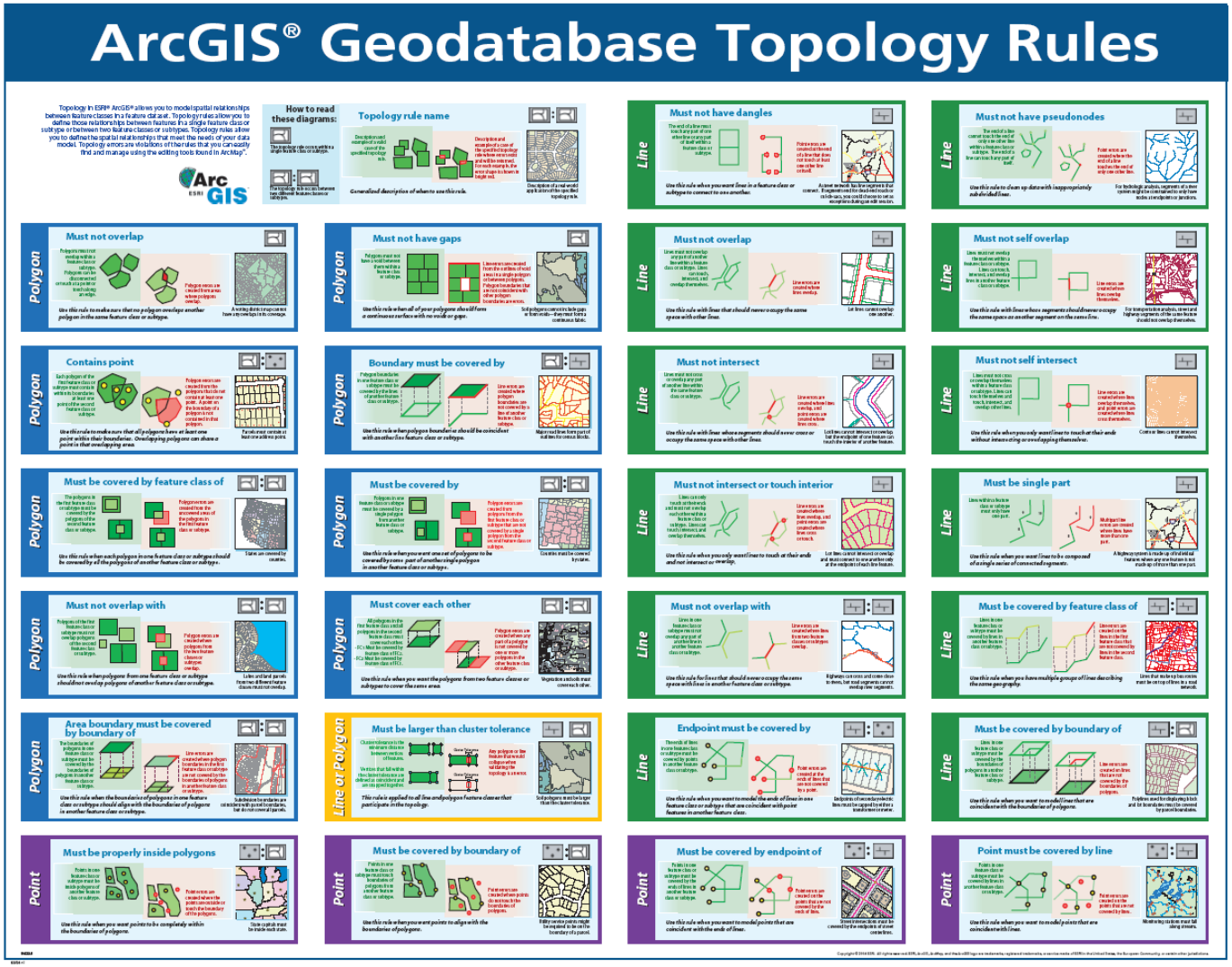
(Also Condo alternative)

ESRI Parcel Data Model

Break?

Topology & Validation

26 Rules



Poster Available in ArcGIS Documents Folder Or Via Desktop Help

Use caution try on copy GDB or have backup before validating

Topology & Validation

Topology
ParcelFeatures_Topology

Cluster tolerance *0.000247*

Participating feature classes and ranks

Feature class	Rank
Corner	1
Boundary	2
TaxParcel	3
SimultaneousConveyance	4
SurveyFirstDivision	5
SurveySecondDivision	6

Topology rules

Origin feature class	Topology rule	Comparision feature class
Corner	Must be covered by endpoint of	Boundary
Boundary	Endpoint must be covered by	Corner
Boundary	Must not have dangles	
TaxParcel	Boundary must be covered by	Boundary
SimultaneousConveyance	Boundary must be covered by	Boundary
SurveyFirstDivision	Boundary must be covered by	Boundary
TaxParcel	Must not overlap	
SimultaneousConveyance	Must not overlap	
SurveyFirstDivision	Must be covered by	SimultaneousConveyance
SurveyFirstDivision	Must not overlap	
SurveySecondDivision	Must be covered by	SurveyFirstDivision
SurveySecondDivision	Must not overlap	

Ranking (no FC Locking)

Rules

Keep Simple

Tolerances

Use caution try on copy GDB or have backup before validating

Variations to Consider

- ✓ PLSS Line FC
- ✓ PLSS FC's in separate Feature Data Set
- ✓ Derived FC's – Use Dissolve to Create
- ✓ Additional Fields
  - ❖ Recorded Distance/Bearing (Boundary, PLSS lines)
  - ❖ Editing Date Stamp
  - ❖ GIS Agent
  - ❖ Calculated Acres (auto-calc?)

Feature Linked Annotation

Using Multiple Annotation Classes with SQL Queries to Auto-Create Anno of Different Font Sizes Based on Length and Area.

Other Suggestions - "Rules of Thumb" - & Tips

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- Education User Conference
  August 5–8, 2006 · San Diego, CA
- 26th International User Conference
  August 7–11, 2006 · San Diego, CA

  Online registration now available.

Internet

Other Suggestions - "Rules of Thumb" - & Tips

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Geodatabase Spatial Domain Analysis

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Author	Chuck Gaffney
File Name	SpatialDomainAnalysis.zip
Language	Visual Basic
Last Modified	Mar 1 2005
Software	ArcGIS - ArcView
File Size	85.36 kb
Downloads	726

Summary

The Spatial Domain Analyzer adds a new "Analyze Domain" tab to the ArcCatalog view window and allows for interactive visualization of the relationship of a proposed geodatabase domain to an existing vector data extent. The source data can be in one of the following formats; shapefile, ESRI coverage, ESRI-supported CAD features, ESRI Personal Geodatabase, and ESRI Enterprise Geodatabase.

There are options to:

- display the source data
- center the domain about the source data (click the Center data in domain checkbox)
- change precision of the domain with either a precision value or a grid spacing unit in data units
- update 1 or more extent values of the domain
- use combinations of domain definition parameters
- lock precision and extent parameters so that new parameter adjustments cannot change locked values
- display the default domain calculated by ArcCatalog for the given set of data
- display the actual domain for a geodatabase featureclass

The SDA will automatically evaluate the types of updates being called for and report if any combination is invalid. For example, it is not valid to update both an extent range (XMIN and XMAX), simultaneously with a precision update since updating the range requires the system to determine to the new precision possible within the new range, ie. "something's gotta give".

Other Suggestions - "Rules of Thumb" - & Tips

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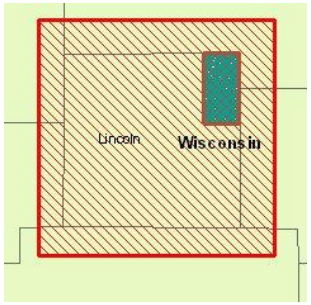
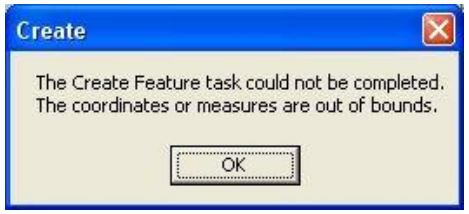
Data Design Considerations: Assigning Spatial Reference (SR)

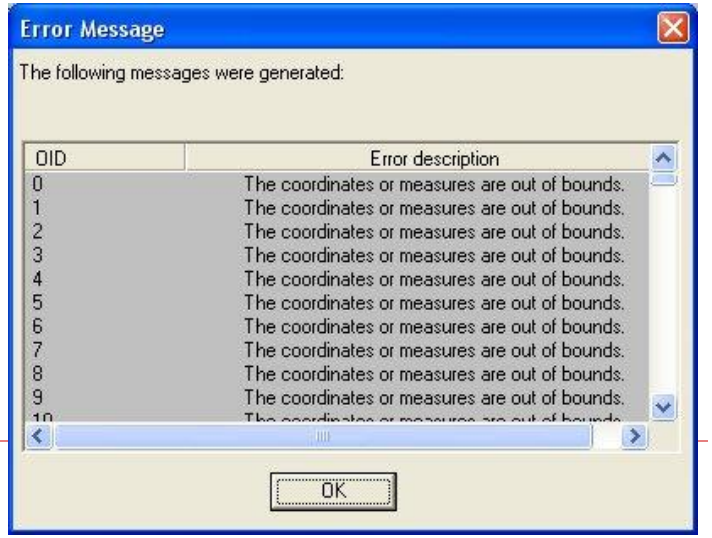
- Precision
  - Precision defines the level of detail that is maintained when data values are stored in the **geographic database**
  - Stores coordinates as positive 4-byte integers that have a maximum value of 2.14 billion
  - The range of integers is called the Spatial or X/Y Domain
  - The Domain is the extent within which you can store data



Data Design Considerations: Assigning Spatial Reference (SR)

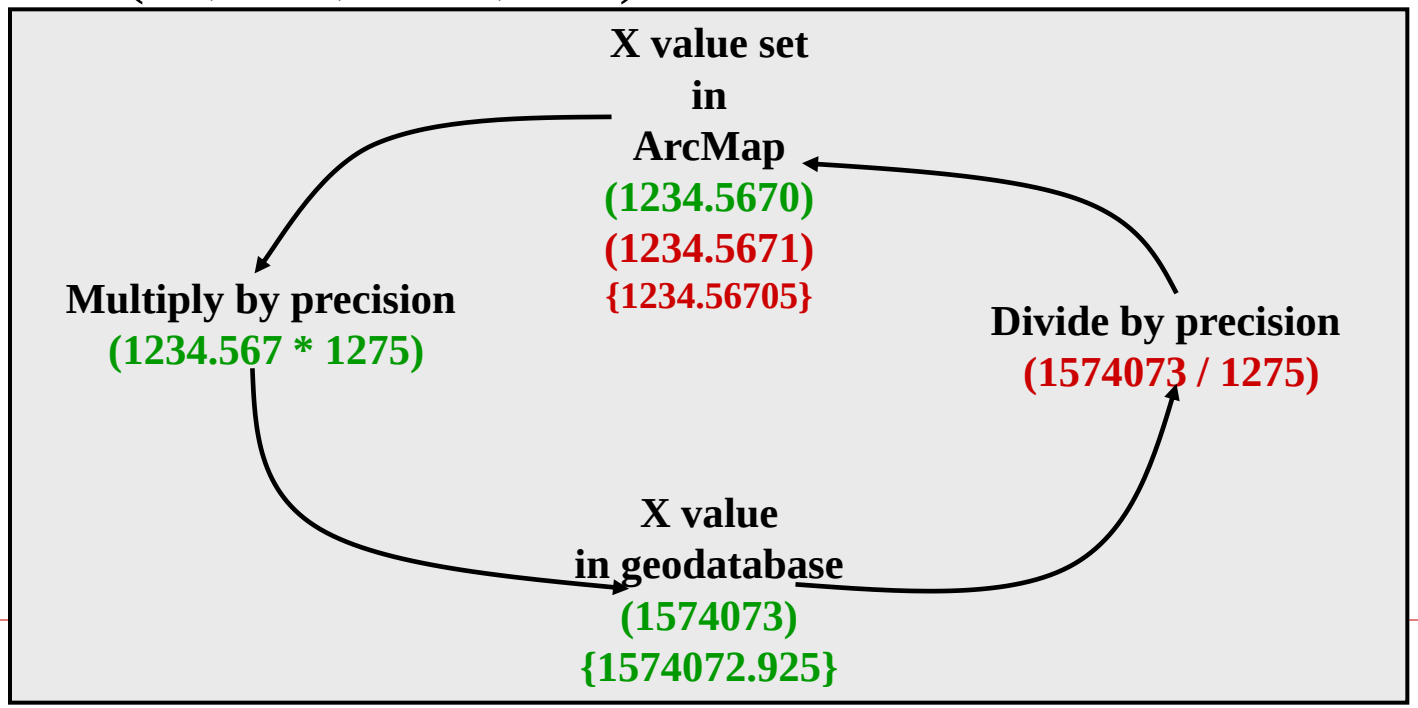
- X/Y Domain - Considerations
  - In determining the best values, you need to balance data accuracy and Domain extents
  - ArcGIS errors are encountered if an attempt is made to create data outside of Domain





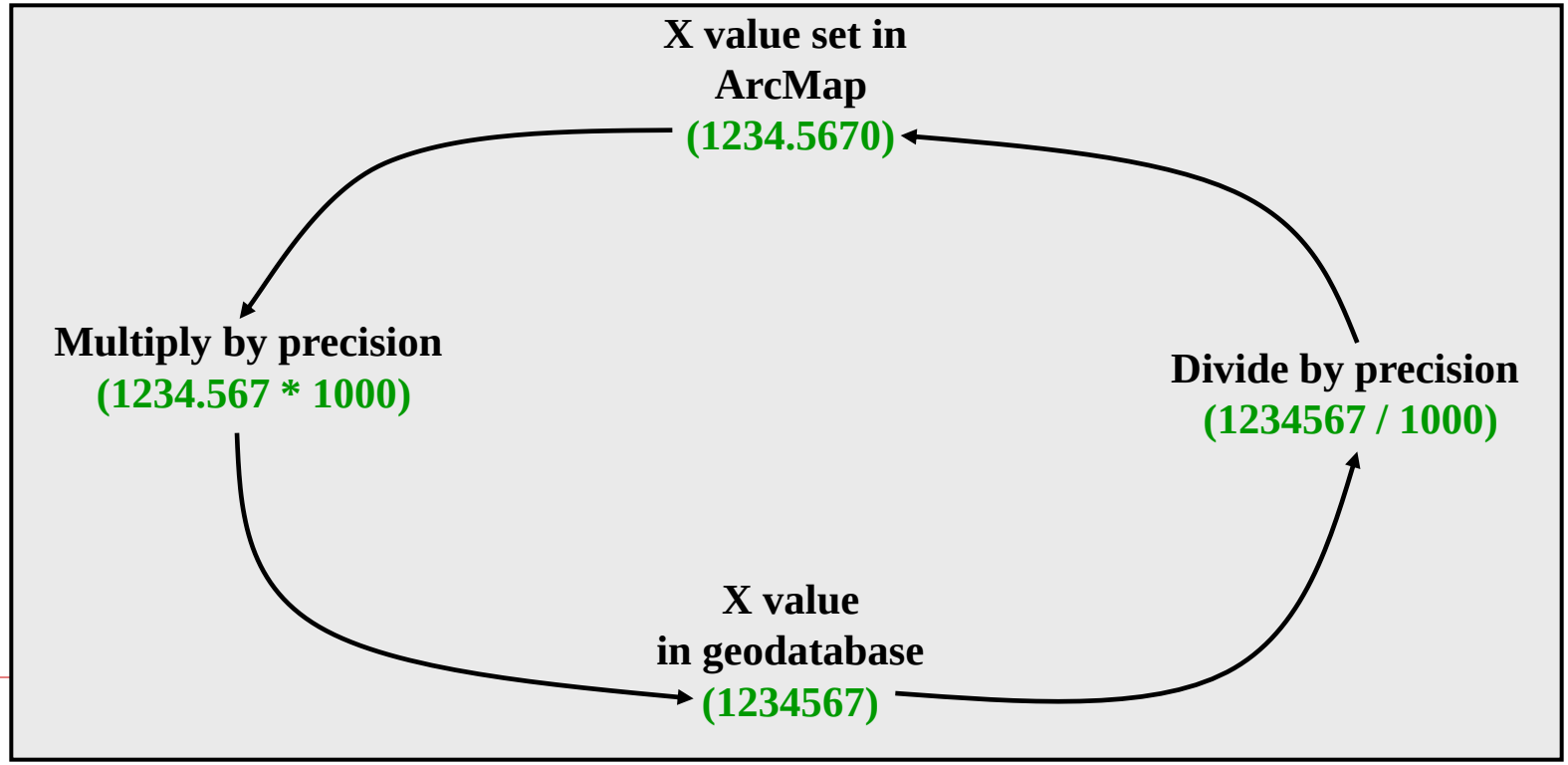
Data Design Considerations: Assigning Spatial Reference (SR)

- Precision and Coordinate Lifecycle
  - To avoid accuracy loss from rounding during conversion, precision should be a multiple and power of 10 (10, 100, 1000, etc.)



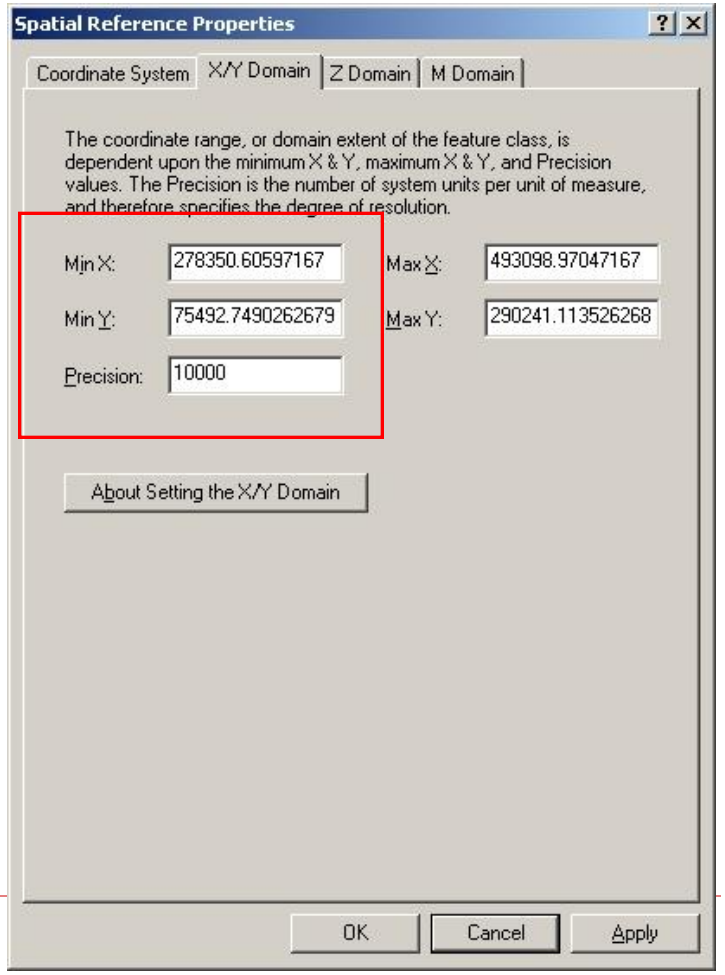
Data Design Considerations: Assigning Spatial Reference (SR)

- Precision and Coordinate Lifecycle
  - When a multiple and power of 10 is used, values are unchanged in the round-trip to the GDB integers



Data Design Considerations: Assigning Spatial Reference (SR)

- X/Y Domain - Setting
  - Key values are the MinX, MinY and Precision
  - Not necessary, and actually more problematic, if MaxX and MaxY are manually set. Allow setting of MinX, MinY and Precision to define MaxX and MaxY.



Other Suggestions - "Rules of Thumb" - & Tips

Spatial Extents and Precision

Good News!

At Ver. 9.2 This Issue Is Going Away

Other Suggestions - "Rules of Thumb" - & Tips

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Analyze Domain Tab in ArcCatalog

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Thank You!