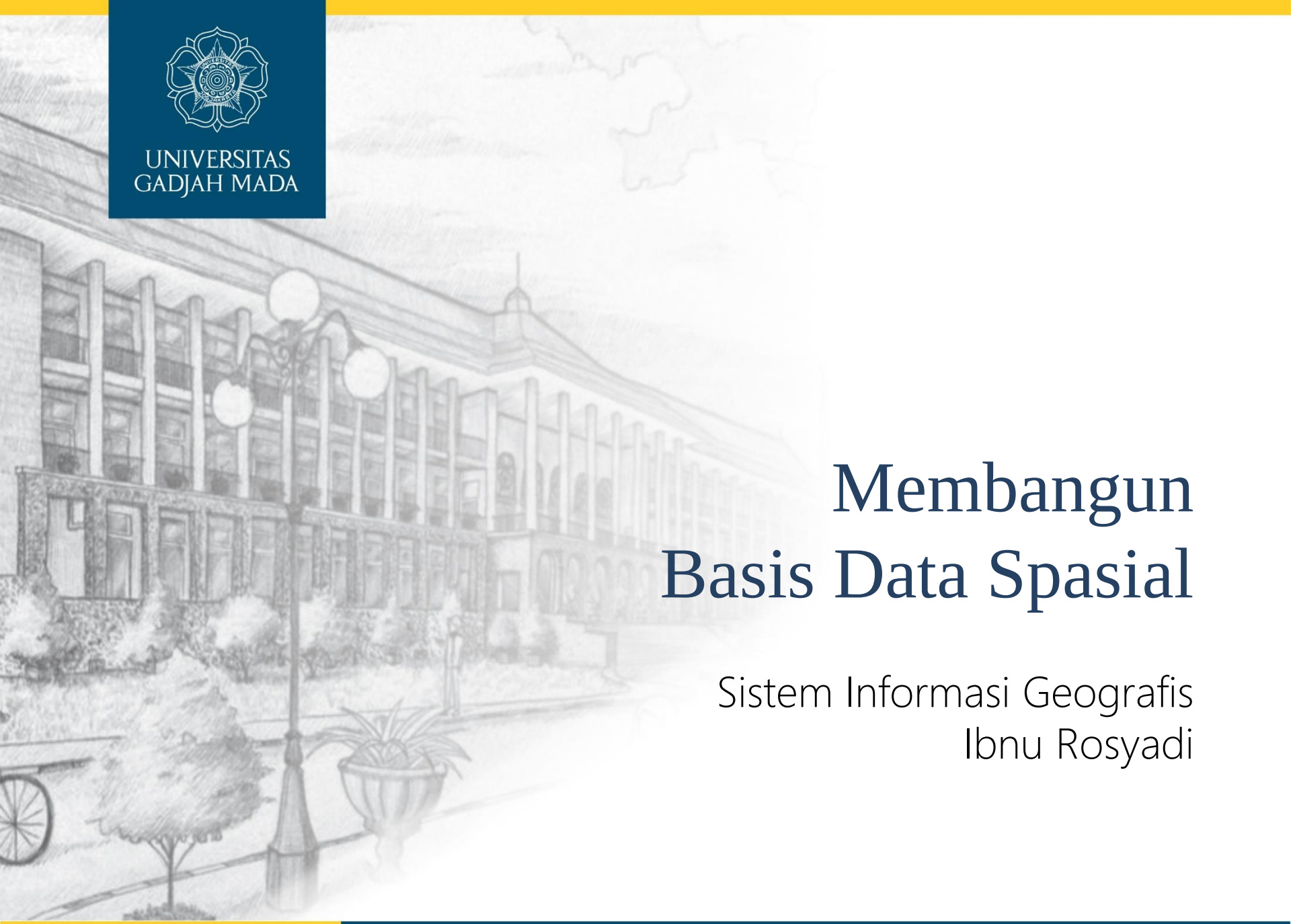

UNIVERSITAS
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Membangun Basis Data Spasial

Sistem Informasi Geografis

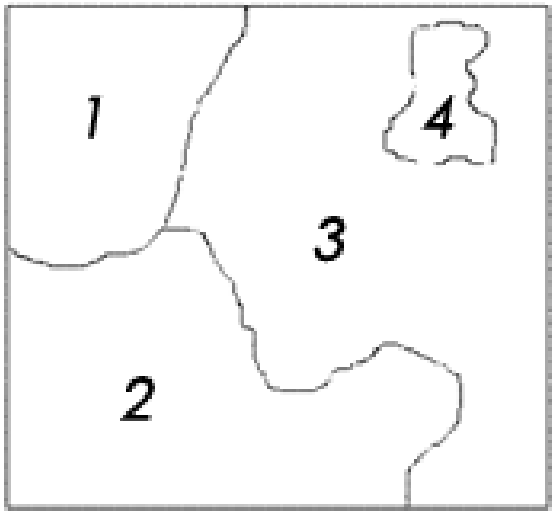
Ibnu Rosyadi

Spatial database systems

- Database systems that are enabled to store and manage geometries as special data types are called *spatial database systems.*
- By defining one or more columns of a relational table as *abstract data types*, a user can store geometries in a conventional database and manage them in much the same way alpha-numeric data are managed

penyimpanan feature class pada basis data sig

Geographic View



Tables View

Object ID	Shape	Name	LV Code	Management Agency
1		Shady Pines	20	Private
2		Pinewood Village	30	Pinewood Village Association
3		Sarah Park	80	City Park Board
4		Town Park	99	City Park Board

http://spatialreference.org

UNIVERSITAS GADJAH MADA

Spatial Reference System Identifier (SRID)

EPSG (European Petroleum Survey Group) merilis database dari sistem-sistem koordinat

Spatial Reference spatial reference list

Home | Upload Your Own | List user-contributed references | List all references

4326 Search

Search References: 4326 Search

Next Page

Did you mean one of:

- EPSG:4326: WGS 84

Other Results

- SR-ORG:3: copy of 4326
- SR-ORG:4: another 4326 copy
- SR-ORG:5: wgs copy 3
- SR-ORG:8: Upload test via OGC WKT
- SR-ORG:29: WRF Lambert Conformal Conic
- SR-ORG:44: Albers_Equal_area
- SR-ORG:62: Albers Equal Area
- SR-ORG:98: Mapy.cz Projection
- SR-ORG:108: test
- EPSG:2309: WGS 84 / TM 116 SE
- EPSG:2310: WGS 84 / TM 132 SE
- EPSG:2311: WGS 84 / TM 6 NE
- EPSG:3031: WGS 84 / Antarctic Polar Stereographic
- EPSG:3032: WGS 84 / Australian Antarctic Polar Stereographic
- EPSG:3033: WGS 84 / Australian Antarctic Lambert
- EPSG:3204: WGS 84 / SCAR IMW SP19-20
- EPSG:3205: WGS 84 / SCAR IMW SP21-22
- EPSG:3206: WGS 84 / SCAR IMW SP23-24
- EPSG:3207: WGS 84 / SCAR IMW SQ01-02
- EPSG:3208: WGS 84 / SCAR IMW SQ19-20
- EPSG:3209: WGS 84 / SCAR IMW SQ21-22
- EPSG:3210: WGS 84 / SCAR IMW SQ37-38
- EPSG:3211: WGS 84 / SCAR IMW SQ39-40
- EPSG:3212: WGS 84 / SCAR IMW SQ41-42
- EPSG:3213: WGS 84 / SCAR IMW SQ43-44
- EPSG:3214: WGS 84 / SCAR IMW SQ45-46
- EPSG:3215: WGS 84 / SCAR IMW SQ47-48
- EPSG:3216: WGS 84 / SCAR IMW SQ49-50
- EPSG:3217: WGS 84 / SCAR IMW SQ51-52
- EPSG:3218: WGS 84 / SCAR IMW SQ53-54
- EPSG:3219: WGS 84 / SCAR IMW SQ55-56
- EPSG:3220: WGS 84 / SCAR IMW SQ57-58
- EPSG:3221: WGS 84 / SCAR IMW SR13-14
- EPSG:3222: WGS 84 / SCAR IMW SR15-16
- EPSG:3223: WGS 84 / SCAR IMW SR17-18
- EPSG:3224: WGS 84 / SCAR IMW SR19-20
- EPSG:3225: WGS 84 / SCAR IMW SR27-28
- EPSG:3226: WGS 84 / SCAR IMW SR29-30
- EPSG:3227: WGS 84 / SCAR IMW SR31-32
- EPSG:3228: WGS 84 / SCAR IMW SR33-34
- EPSG:3229: WGS 84 / SCAR IMW SR35-36
- EPSG:3230: WGS 84 / SCAR IMW SR37-38
- EPSG:3231: WGS 84 / SCAR IMW SR39-40
- EPSG:3232: WGS 84 / SCAR IMW SR41-42
- EPSG:3233: WGS 84 / SCAR IMW SR43-44
- EPSG:3234: WGS 84 / SCAR IMW SR45-46
- EPSG:3235: WGS 84 / SCAR IMW SR47-48
- EPSG:3236: WGS 84 / SCAR IMW SR49-50
- EPSG:3237: WGS 84 / SCAR IMW SR51-52
- EPSG:3238: WGS 84 / SCAR IMW SR53-54

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pgAdmin 4 File Object Tools Help

Browser

- plpgsql
- postgis
- Foreign Data Wrappers
- Languages
- Schemas (1)
  - public
    - Collations
    - Domains
    - FTS Configurations
    - FTS Dictionaries
    - FTS Parsers
    - FTS Templates
    - Foreign Tables
    - Functions
    - Materialized Views
    - Sequences
    - Tables (2)
      - batas_administrasi
        - Columns
        - Constraints
        - Indexes
        - Rules
        - Triggers
      - spatial_ref_sys
    - Trigger Functions
    - Types
    - Views

Dashboard Properties SQL Statistics Dependencies Dependents Edit Data - sleman on postgres@PostgreSQL 10

No limit

sleman on postgres@PostgreSQL 10

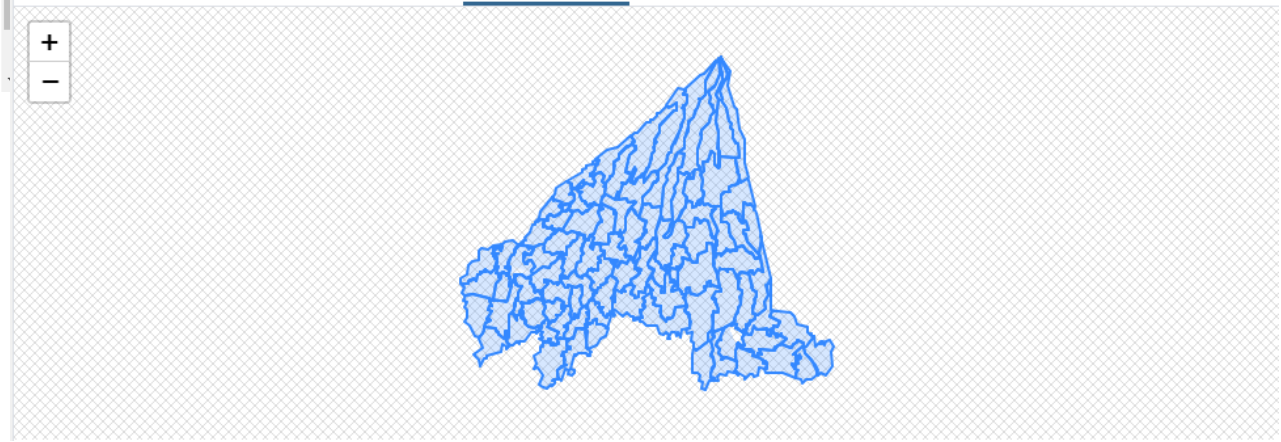
Query Editor Query History

```
1  SELECT * FROM public.batas_administrasi
2
```

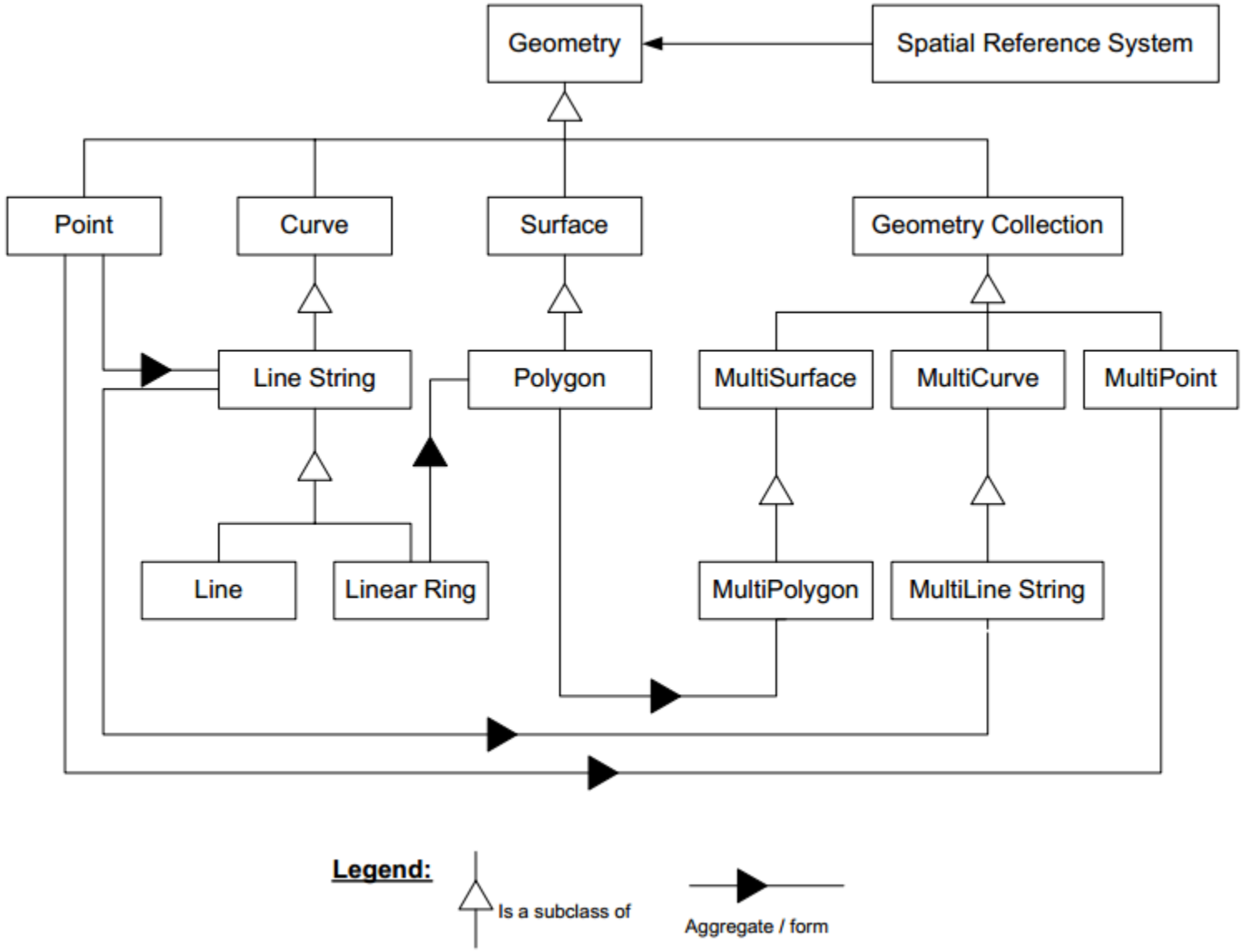
Data Output Explain Messages Notifications Geometry Viewer

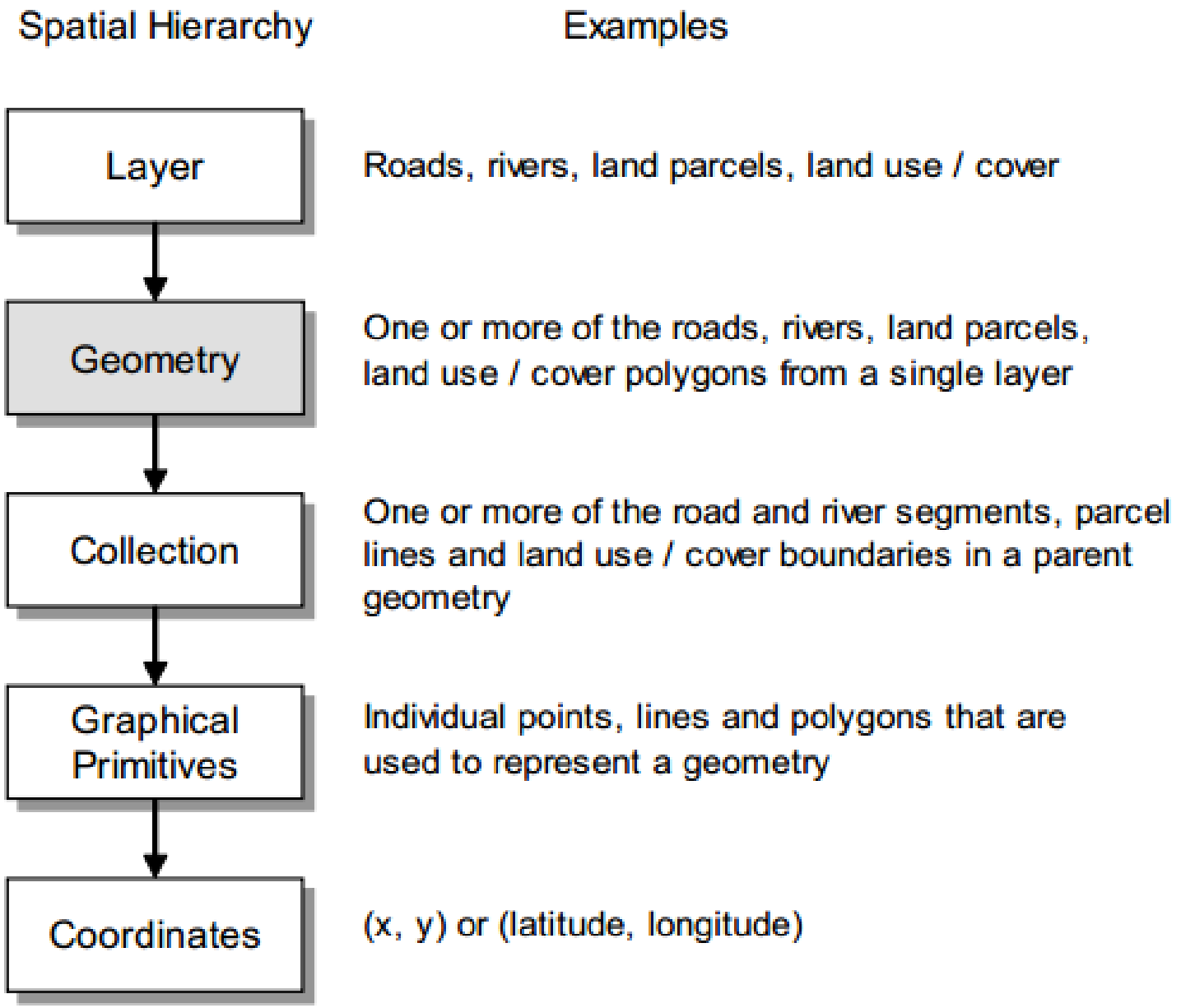
	gid [PK] integer	desa character varying (50)	kecamatan character varying (50)	sumber character varying (100)	geom geometry
1	1	Wukirharjo	Prambanan	Peta Kalurahan Lama	0106000020ED7...
2	2	Jogotirto	Berbah	Peta Kalurahan Lama, Berit...	0106000020ED7...
3	3	Sumberharjo	Prambanan	Peta Kalurahan Lama	0106000020ED7...
4	4	Balecatur	Gamping	Peta Kalurahan Lama, Berit...	0106000020ED7...
5	5	Gayamharjo	Prambanan	Peta Kalurahan Lama	0106000020ED7...
6	6	Sendangtirto	Berbah	Peta Kalurahan Lama, Berit...	0106000020ED7...
7	7	Tegaltirto	Berbah	Peta Kalurahan Lama, Berit...	0106000020ED7...
8	8	Ambarketawang	Gamping	Peta Kalurahan Lama, Berit...	0106000020ED7...

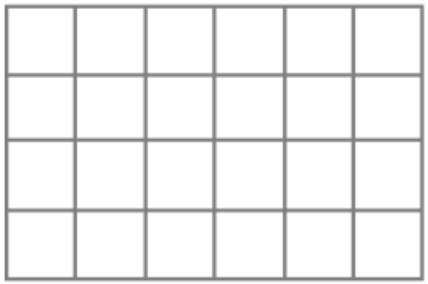
Data Output Explain Messages Notifications Geometry Viewer

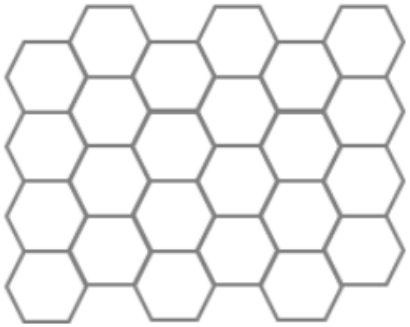


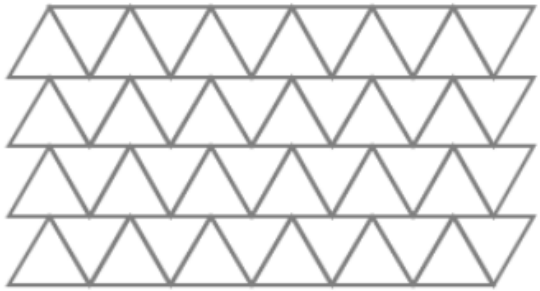
The OGC geometry object model

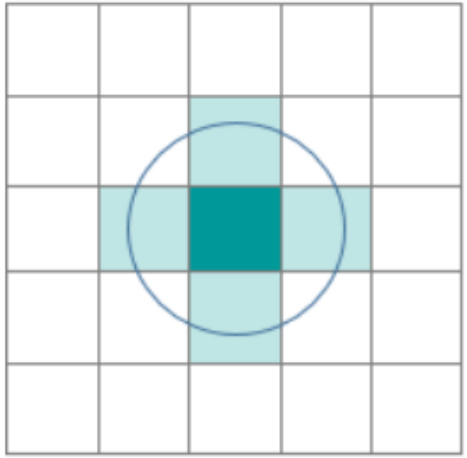


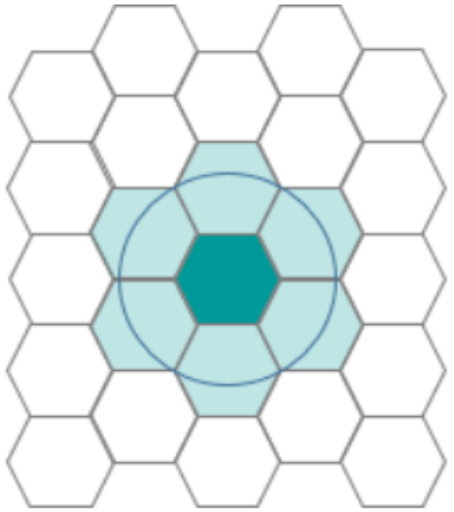

Spatial Hierarchy
Examples
Layer
Roads, rivers, land parcels, land use / cover
Geometry
One or more of the roads, rivers, land parcels, land use / cover polygons from a single layer
Collection
One or more of the road and river segments, parcel lines and land use / cover boundaries in a parent geometry
Graphical Primitives
Individual points, lines and polygons that are used to represent a geometry
Coordinates
(x, y) or (latitude, longitude)





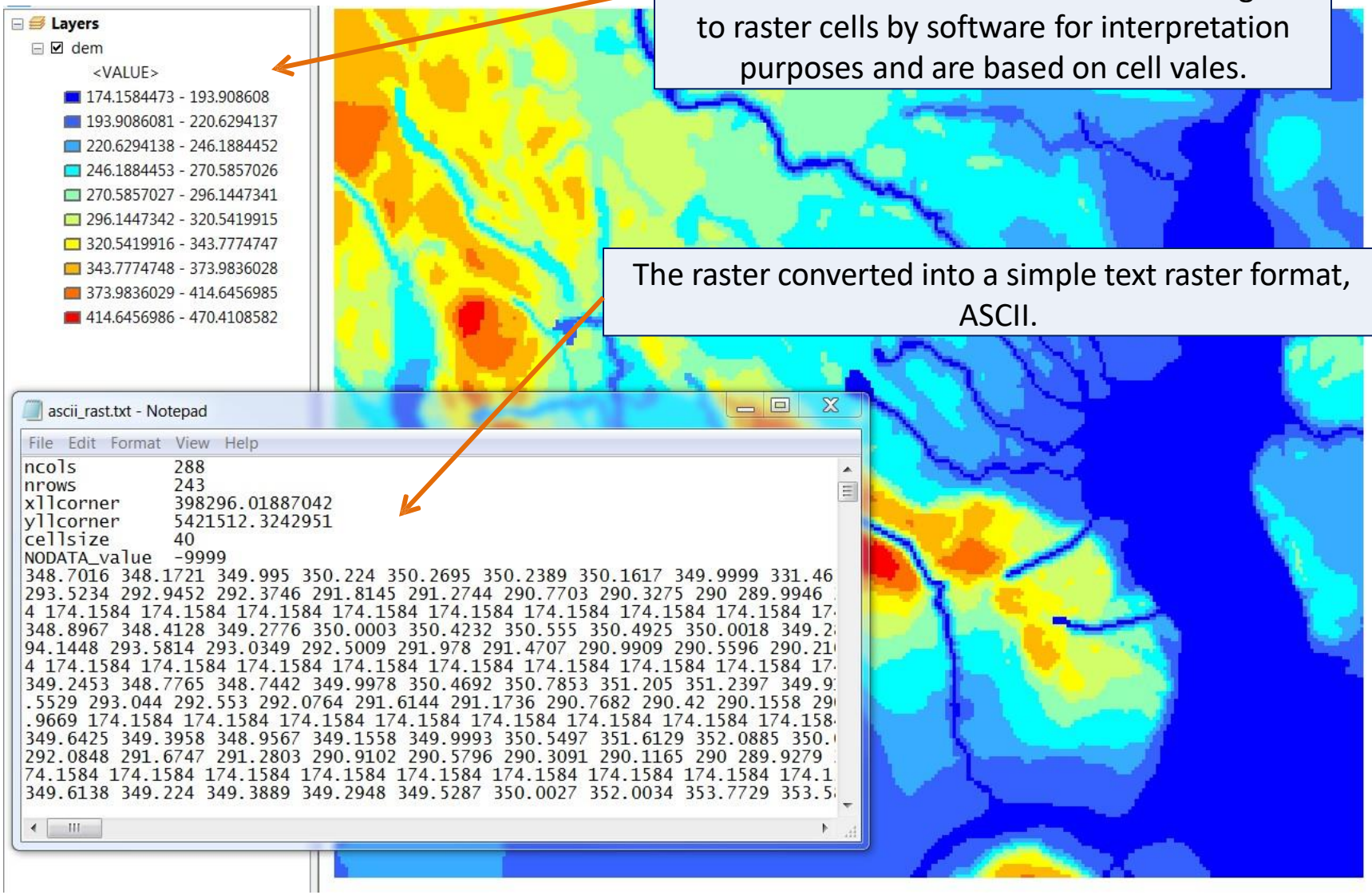






https://strimas.com/post/hexagonal-grids/

- A raster dataset representing terrain.



Topology and Topological Data Structures

Diperkenalkan tahun 1960 – 1970

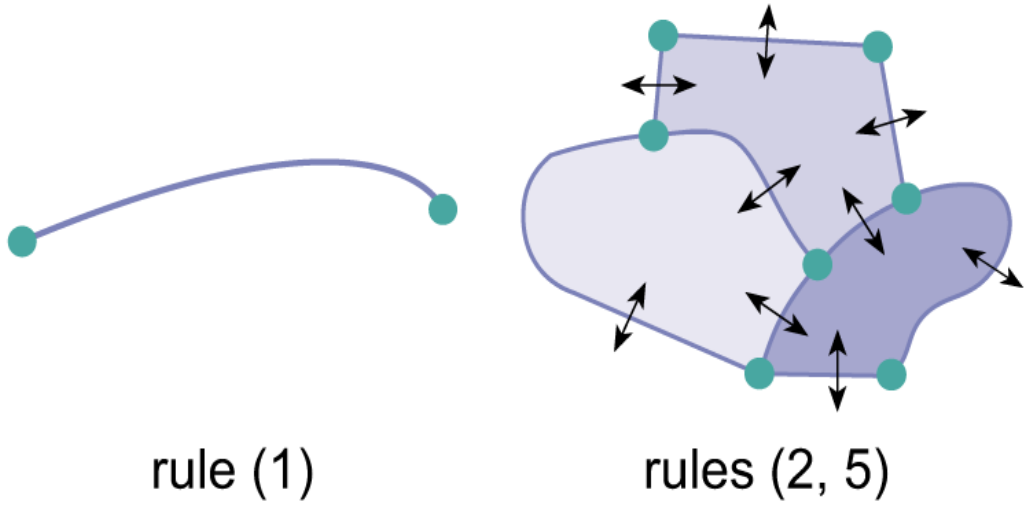
Topologi

- Topologi adalah bidang matematika yang mempelajari sifat – sifat bentuk geometris yang tetap tidak berubah saat bentuk itu dipelintir, diregangkan, menyusut atau distorsi tanpa putus (West et al., 1982).
- Apabila topologi diterapkan pada struktur data spasial, biasanya didefinisikan sebagai hubungan spasial diantara fitur dunia nyata, termasuk kedekatan, konektivitas dan penahanan (Lo dan Yeung, 2006).
- Struktur data topologi adalah struktur data dimana hubungan spasial yang melekat diantara fitur dunia nyata secara eksplisit disimpan

Catatan

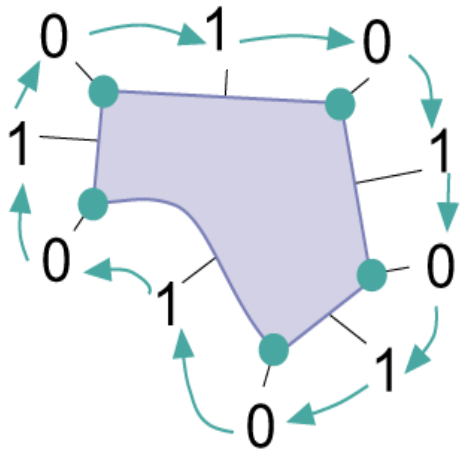
Fitur: abstraksi fenomena dunia nyata [ISO 19101]

Lima Aturan Dalam Konsistensi Topologi

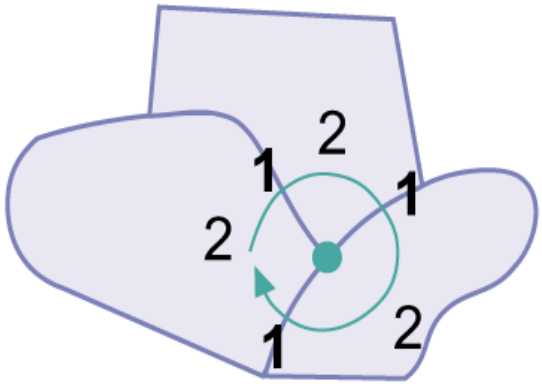


1. Setiap arc dibentuk oleh node-node (*begin and end*)
2. Setiap arc dibatasi 2 poligon (*left and right polygon*)
5. Arc-arc hanya berpotongan di node-node mereka

Lima Aturan Dalam Konsistensi Topologi



rule (3)



rule (4)

3. Setiap poligon mempunyai *boundery* yang tertutup terdiri dari rangkaian node dan arc.
4. Setiap node dilingkari oleh arc dan poligon

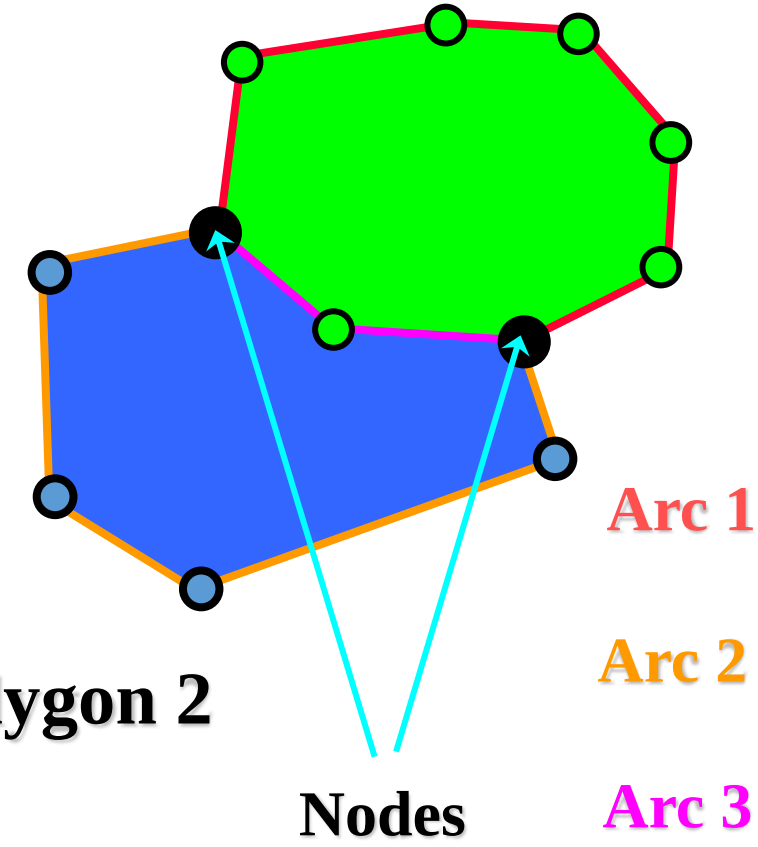
Struktur Data Topologi

polygon 1

Vertices polygon 1

polygon 2

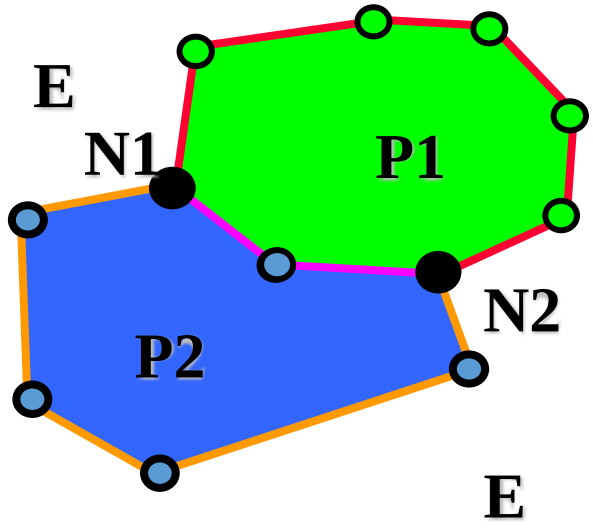
Additional vertices polygon 2



Struktur Data Topologi

Polygon topology

P1	Arc 1	Arc 3
P2	Arc 2	Arc 3
E	outside coverage	



Node topology

N1	Arc 1	Arc 2	Arc 3
N2	Arc 1	Arc 2	Arc 3

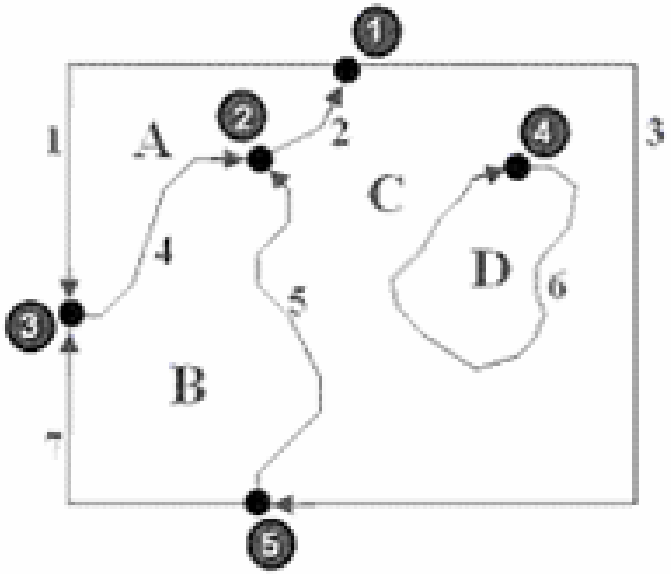
Arc topology

Arc	start node	end node	left polygon	right polygon
Arc 1	N1	N2	E	P1
Arc 2	N2	N1	E	P2
Arc 3	N2	N1	P2	P1

Arc coordinate data

Arc	start	intermediate	end
Arc 1	x_1, y_1	x_2,y_2, .., .. x_6,y_6	x_7,y_7
Arc 2	x_7, y_7	x_8,y_8, .., .. x_{11},y_{11}	x_1,y_1
Arc 3	x_7, y_7	x_{12},y_{12}	x_1,y_1

Topological Elements and Relationships



A Face

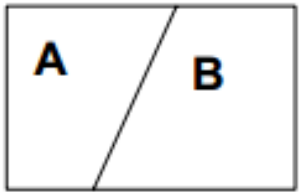
1 Edge

3 Node

Direction of edge

Face	Edges	Nodes
A	1, 2, 4	1, 2, 3
B	4, 5, 7	2, 5, 3
C	2, 3, 5, 0, 6	1, 5, 2, 0, 4
D	6	4

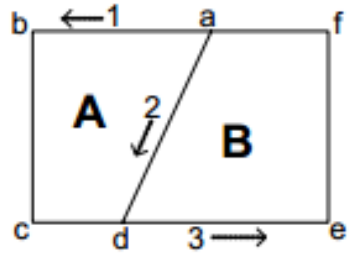
Edge	Left Face	Right Face	From-Node	To-Node
1	A	---	1	3
2	A	C	2	1
3	---	C	1	5
4	A	B	3	2
5	B	C	5	2
6	C	D	4	4
7	---	B	5	3



Polygon A = (403600, 275700), (403000, 275700), (403000, 275000), (403300, 275000), (403600, 275700)

Polygon B = (403600, 275700), (403300, 275000), (404000, 275700), (404000, 275700)

(a) Non-topological (cartographic) data structure



Polygon File

Poly_ID	Arcs
A	1, 2
B	2, 3

Arc File

Arc_ID	Vertices
1	b,c
2	-
3	e,f

Node File

Node_ID	X	Y
a	403600	275700
d	403300	275000

Coordinate File

Vertice_ID	X	Y
b	403000	275700
c	403000	275000
e	404000	270500
f	404000	275700

Network Topology File

Arc_ID	F_node	T_node
1	a	d
2	d	a
3	d	a

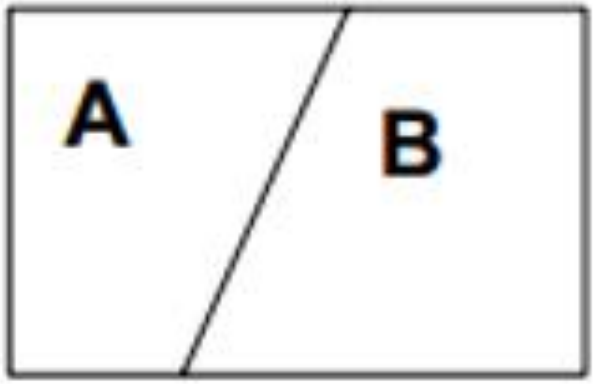
Polygon Topology File

Arc_ID	L_Poly	R_Poly
1	A	World
2	A	B
3	B	World

(b) Topological data structure

Non-topological Data Structure

Tidak secara eksplisit menyimpan spatial relationship, contoh: model data spaghetthi shape file (1990)



Polygon A = (403600, 275700), (403000, 275700), (403000, 275000), (403300, 275000), (403600, 275700)

Polygon B = (403600, 275700), (403300, 275000), (404000, 275700), (404000, 275700)

Struktur Data Non-topological Spaghetti, batas bersama dari dua poligon tetangga didefinisikan sebagai dua garis yang terpisah dan identik. Dimasukkannya topologi ke dalam model data memungkinkan satu baris untuk mewakili batas bersama ini dengan referensi eksplisit untuk menunjukkan sisi mana dari garis yang termasuk poligon.

Topologi juga berkaitan dengan pelestarian sifat spasial ketika bentuknya ditekuk, diregangkan, atau ditempatkan di bawah transformasi geometrik yang serupa, yang memungkinkan proyeksi dan reprojeksi file peta yang lebih efisien.

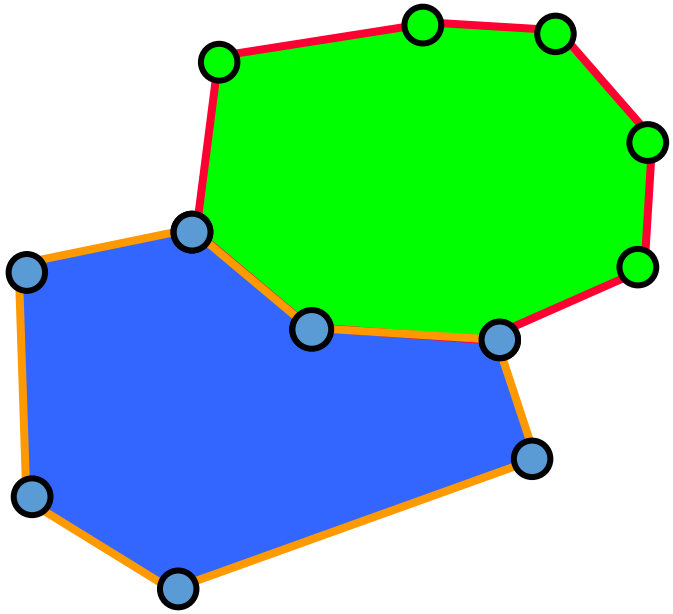
Struktur Data Spaghetthi

poligon 1

Vertices poligon 1

polygon 2

Vertices poligon 2



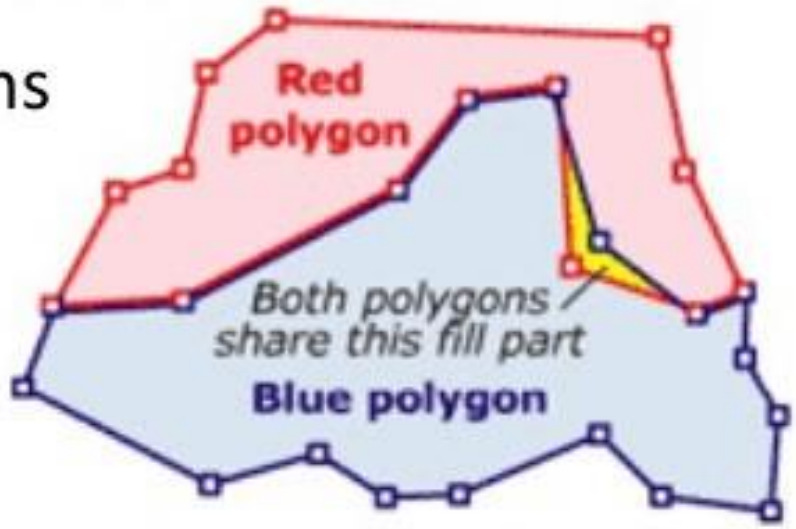
Feature	koordinate
poligon 1	x_1,y_1, x_2,y_2, .,.. x_1,y_1
poligon 2	x_1,y_1, x_n,y_n, .,.. x_1,y_1

Struktur Data Spaghetthi

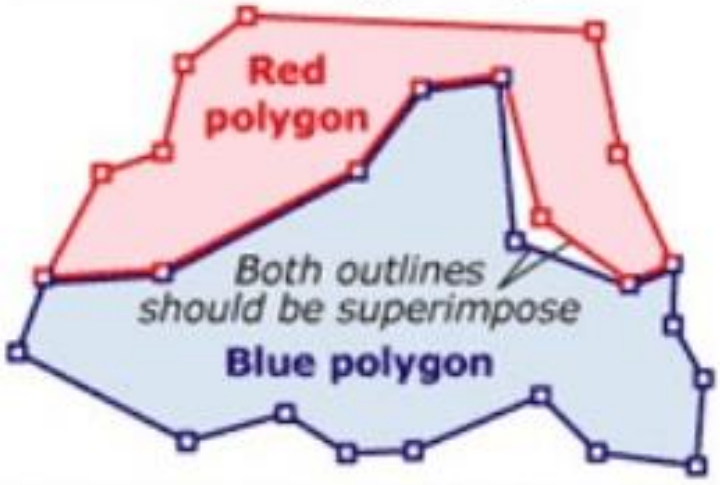
- Pada Struktur Data ini, peta di translasikan garis demi garis ke dalam list koordinat(x,y) dalam format digital.
- Titik dikodekan sebagai pasangan koordinat(x,y) tunggal.
- Garis dikodekan sebagai list atau string pasangan koordinat (x,y).
- Area atau luasan dikodekan sebagai pasangan koordinat closed loop yang mendefinisikan batas-batasnya.

Masalah pada Struktur Data Spaghetthi

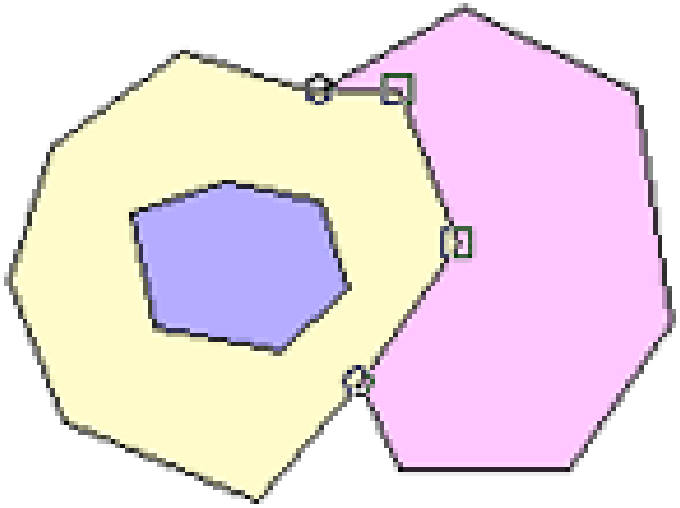
- Overlap: Sliver polygons



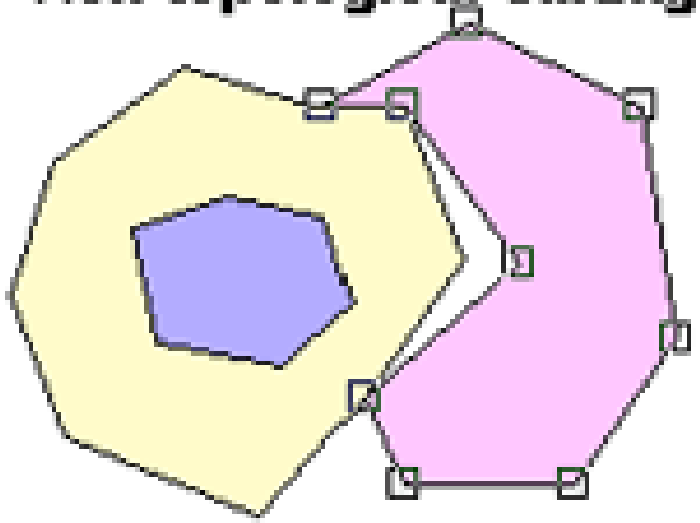
- Gaps



Topological editing

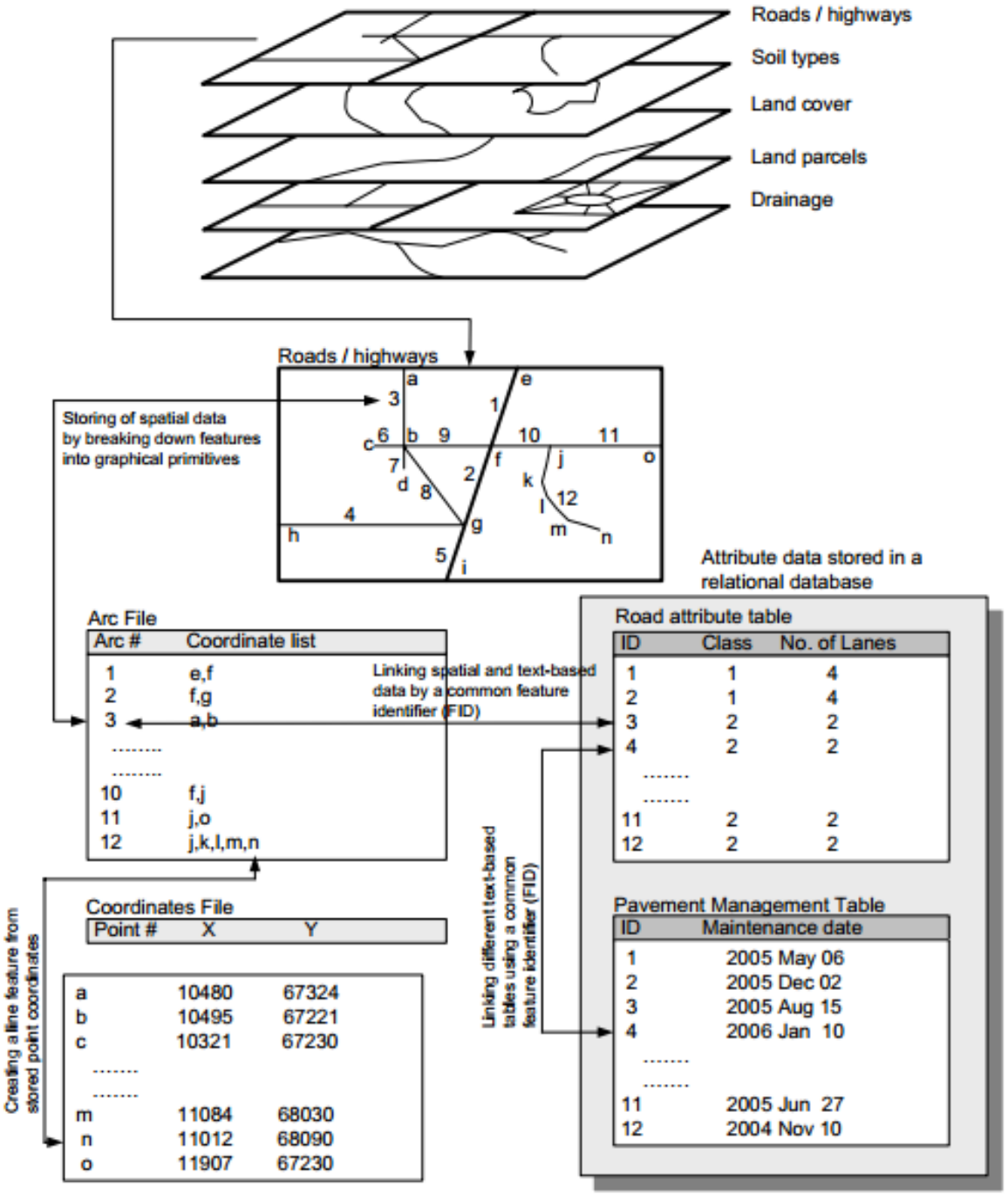


Non-topological editing



Geo-relational Model

(Morehouse, 1985 and 1989)

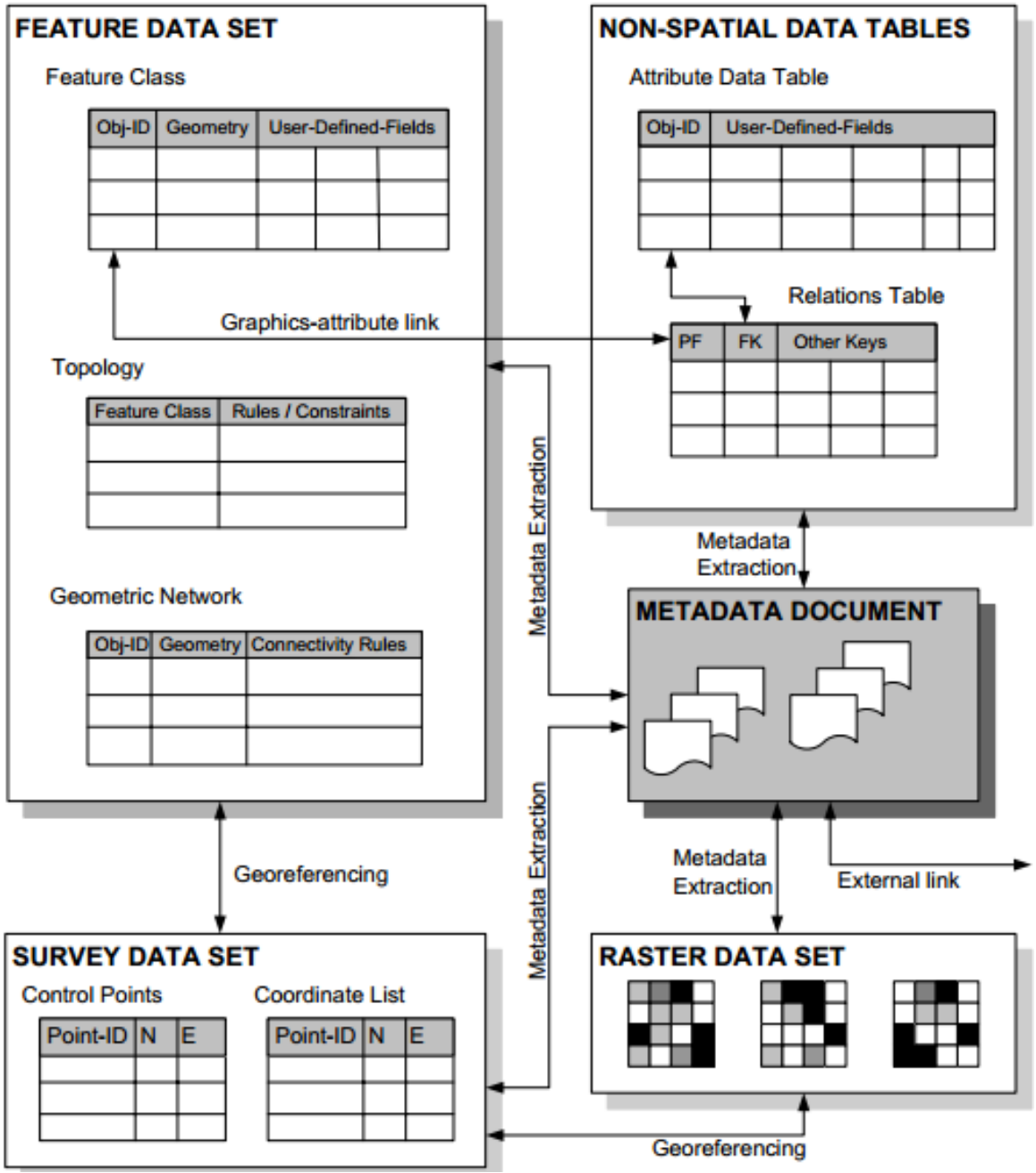

Roads / highways
Soil types
Land cover
Land parcels
Drainage
Roads / highways
Storing of spatial data by breaking down features into graphical primitives
Attribute data stored in a relational database
Arc File
Arc # Coordinate list
1 e,f
2 f,g
3 a,b
10 f,j
11 j,o
12 j,k,l,m,n
Linking spatial and text-based data by a common feature identifier (FID)
Road attribute table
ID Class No. of Lanes
1 1 4
2 1 4
3 2 2
4 2 2
11 2 2
12 2 2
Linking different text-based tables using a common feature identifier (FID)
Pavement Management Table
ID Maintenance date
1 2005 May 06
2 2005 Dec 02
3 2005 Aug 15
4 2006 Jan 10
11 2005 Jun 27
12 2004 Nov 10
Creating a line feature from stored point coordinates
Coordinates File
Point # X Y
a 10480 67324
b 10495 67221
c 10321 67230
m 11084 68030
n 11012 68090
o 11907 67230

Geo-relational Model

- data spasial diabstraksikan menjadi serangkaian *layer* yang ditentukan secara independen.
- Fitur spasial mewakili setiap *layer* diklasifikasikan dan disimpan secara terpisah sesuai dengan bentuk dasar grafis primitif atau elemen yang mewakilinya
- Layer dibedakan
  - bentuk grafis primitif
  - tipe fitur atau entity

Geodatabase Model

Stores various types of spatial data, topology, attribute data and metadata all using a single database system.



Structure of a spatial database using a DBMS for the storage of spatial data and topological relationships

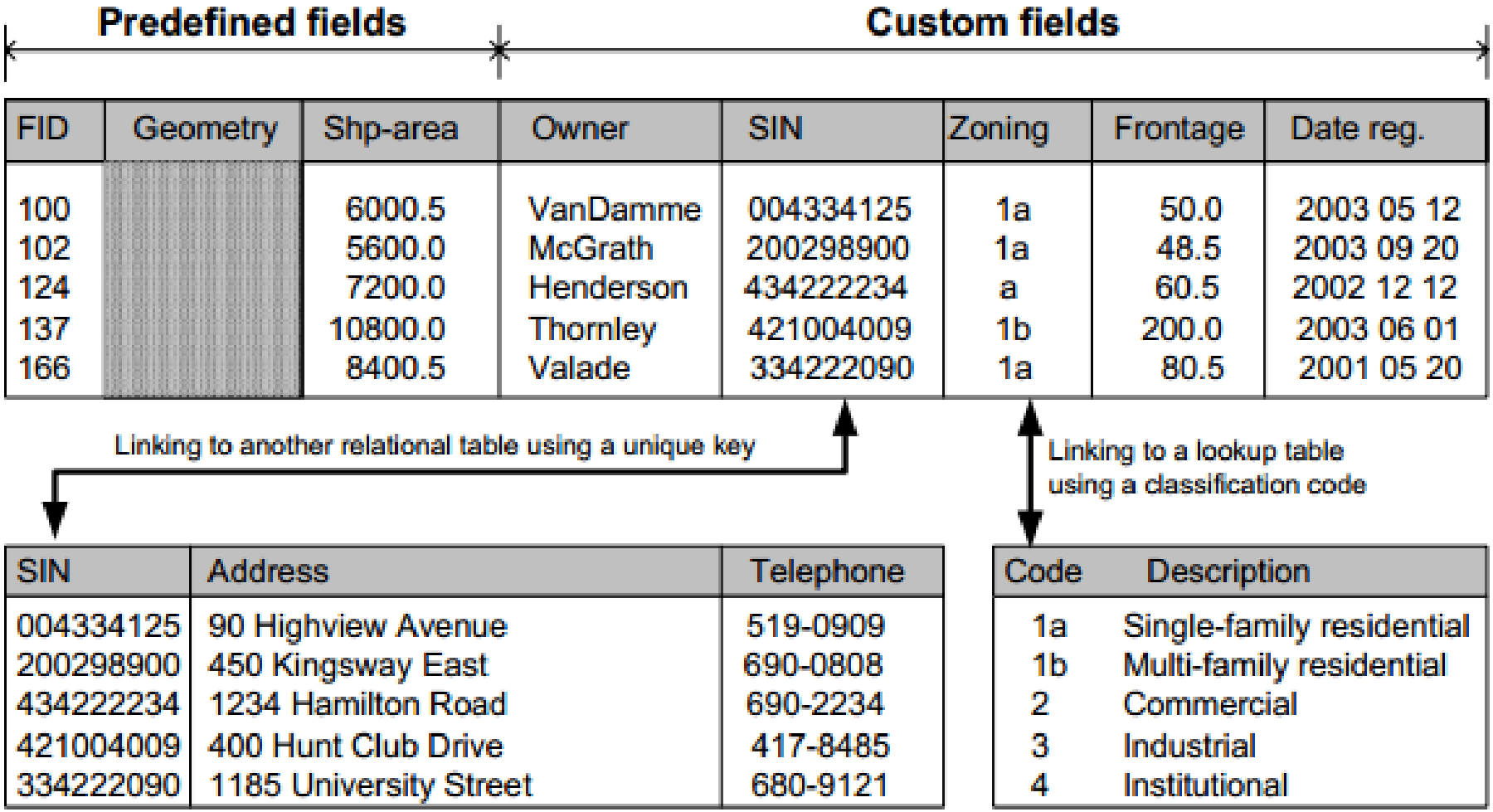
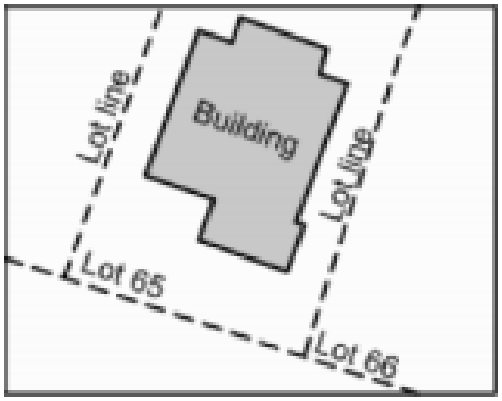


Table structure of a geodatabase



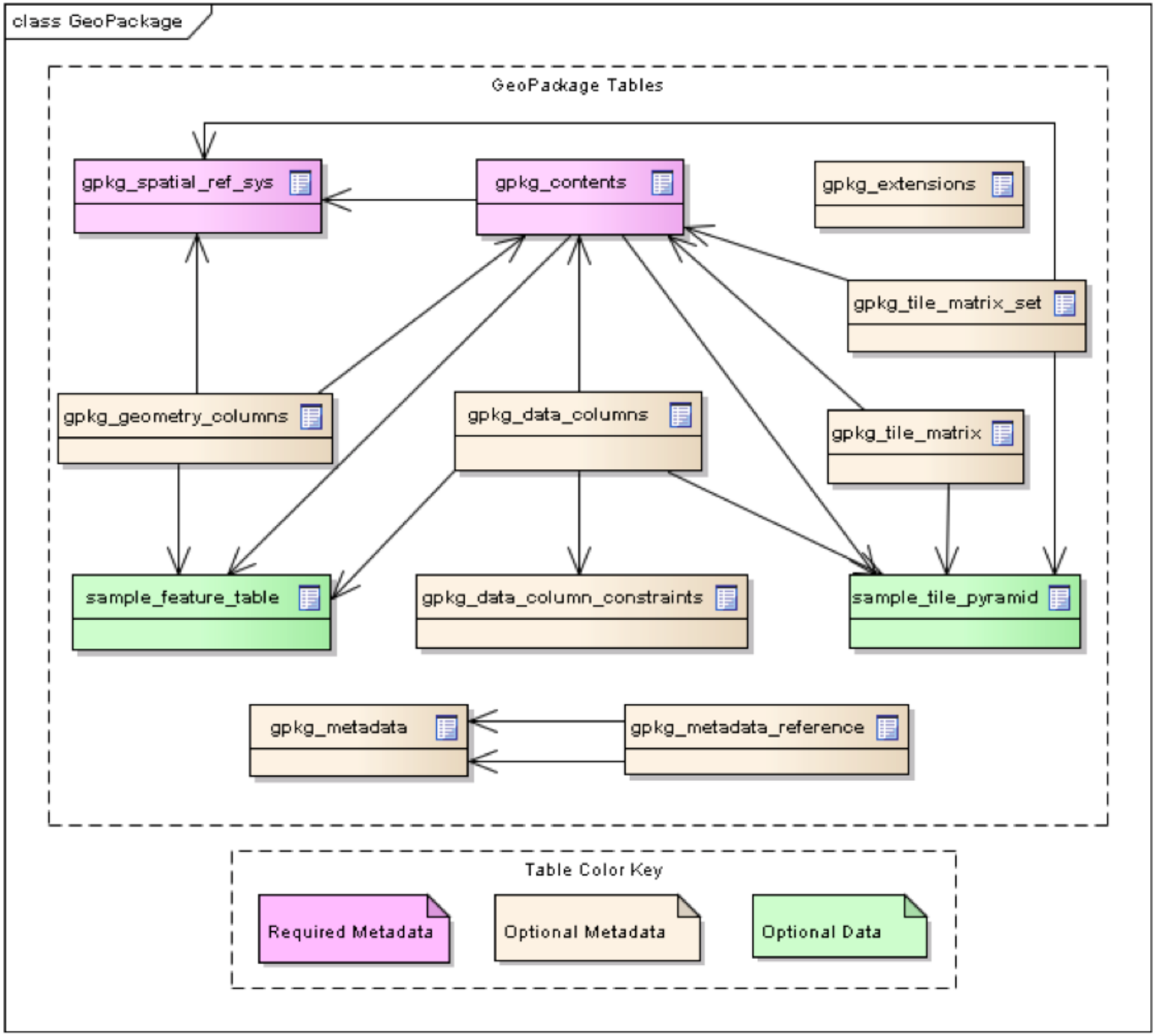
Topology File

Feature Class	Rule	Feature Class
Lot_lines	Must not have dangles	
Lots	Must not overlap	
Owner_parcel	Must be closed	
Lot_lines	Must be covered by	Lots
Buildings	Must be covered by	Owner-parcel
Buildings	Must be covered by	Lots
Buildings	Must not overlap	Lot_lines
Lots	Must be formed by	Lot-lines
Lot_lines	Must not overlap	Buildings

Storing topological relationships using an integrity rule

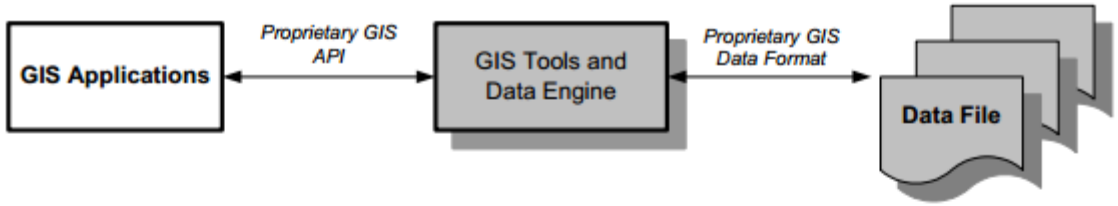
GeoPackage

- GeoPackage is an open, standards-based, platform-independent, portable, self-describing, compact format for transferring geospatial information.
- The GeoPackage Encoding Standard describes a set of conventions for storing the following within an SQLite database:
  - vector features
  - tile matrix sets of imagery and raster maps at various scales
  - attributes (non-spatial data)
  - Extensions
- GeoPackage is a database container, it supports direct use. This means that the data in a GeoPackage can be accessed and updated in a "native" storage format without intermediate format translations.

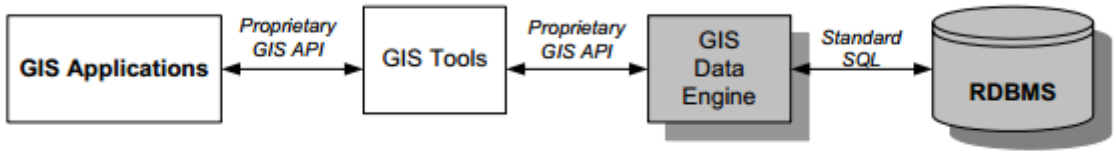

class GeoPackage
GeoPackage Tables
gpkg_spatial_ref_sys
gpkg_contents
gpkg_extensions
gpkg_tile_matrix_set
gpkg_geometry_columns
gpkg_data_columns
gpkg_tile_matrix
sample_feature_table
gpkg_data_column_constraints
sample_tile_pyramid
gpkg_metadata
gpkg_metadata_reference
Table Color Key
Required Metadata
Optional Metadata
Optional Data

Characteristics of Spatial Database Systems

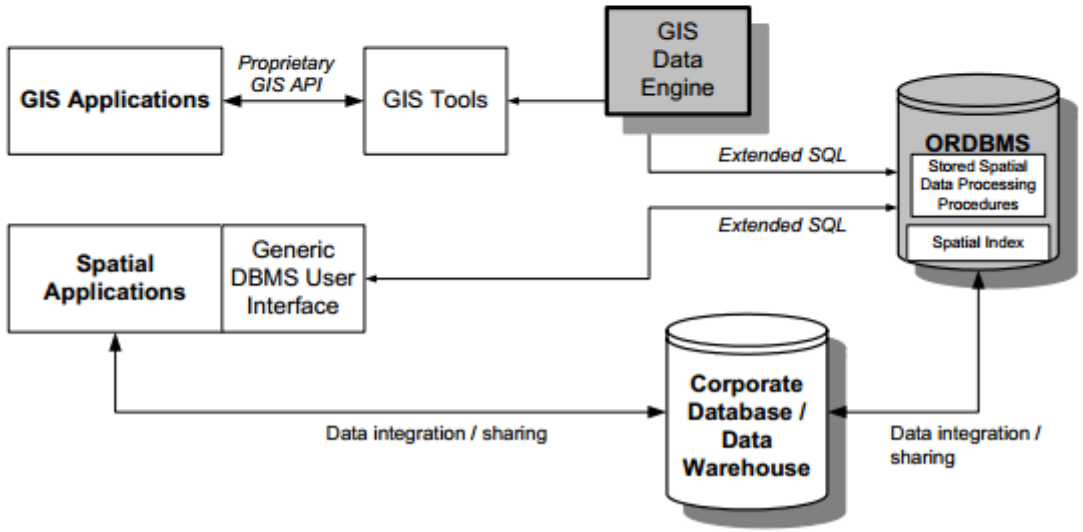
Evolution of spatial data processing



(a) Data file-based spatial data processing using a GIS before the mid-1990s

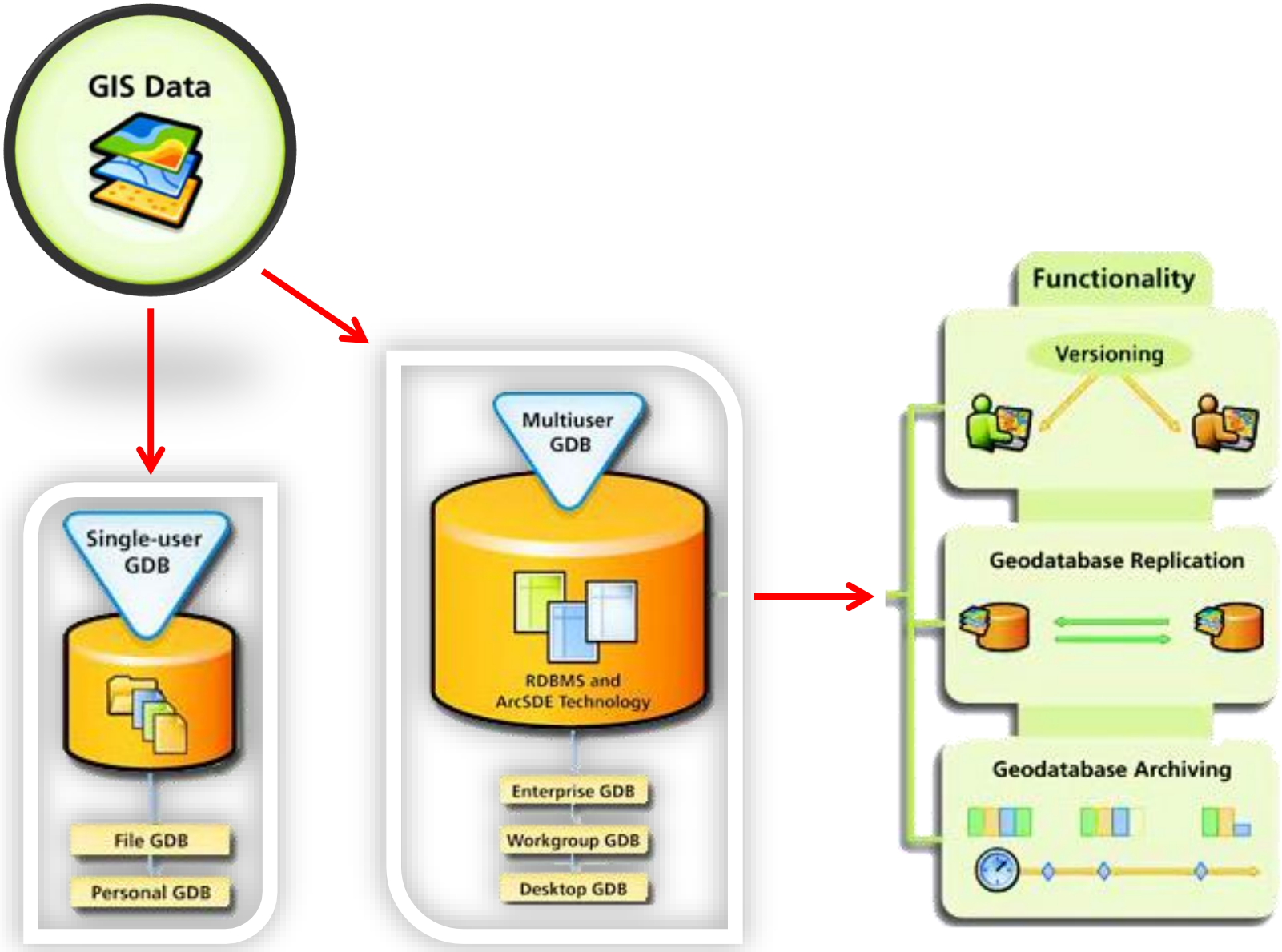


(b) DBMS-based spatial data processing using a GIS in the late 1990s



(c) Today's spatial data processing environment

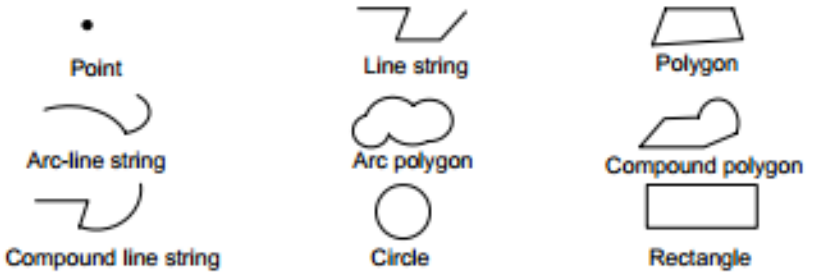
Geodatabase



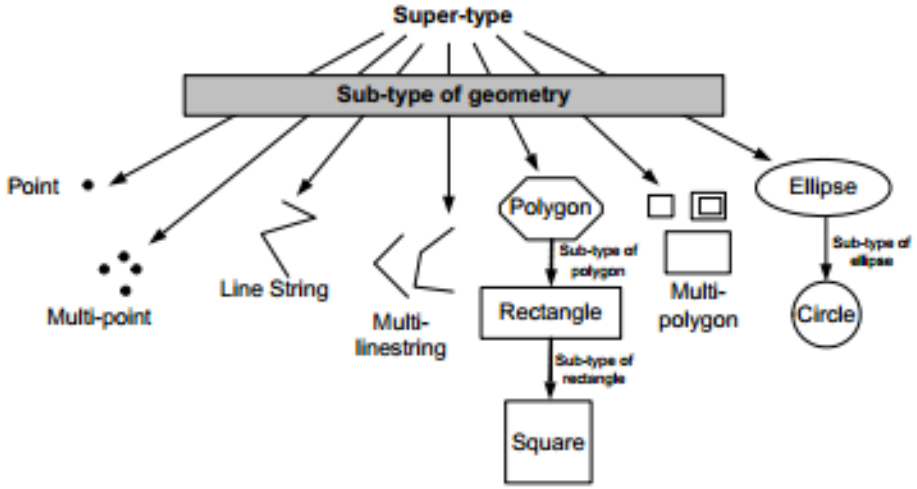
The division of work between spatial database systems and GIS

Systems	***Primary Tasks***
Geographic Information Systems	o Data Collection and Editing o Data Analysis o Generation of Maps and Cartographic Information Products
Spatial Database Systems	o Data Storage and Management o Spatial Indexing o Data Security and Integrity o Spatial Data Query

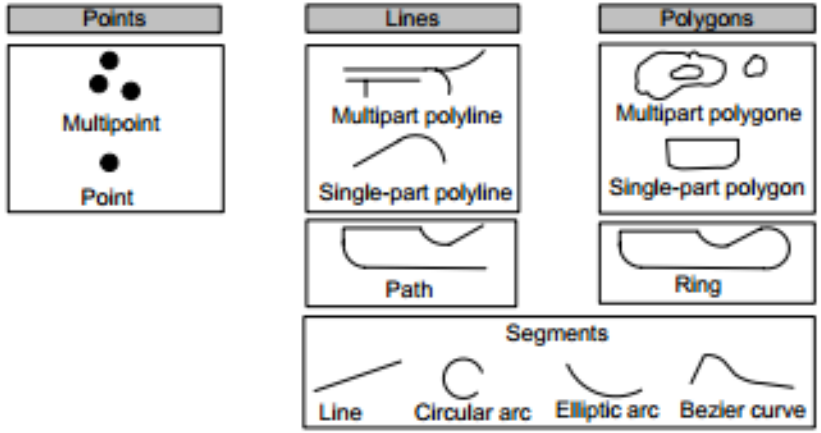
Spatial Data Type



(a) Geometry types used in the object-oriented model of Oracle Spatial

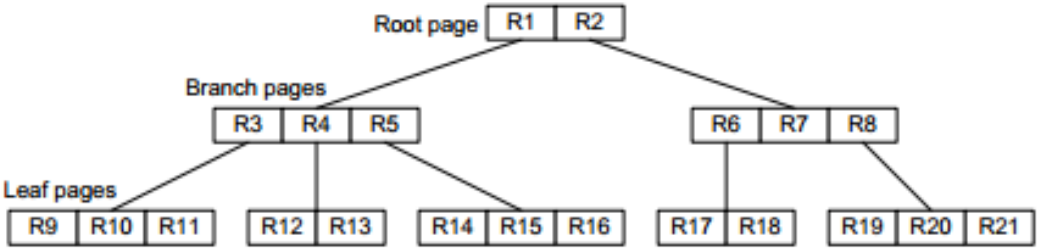


(b) Geometry types and sub-types of DB2 Spatial Extender

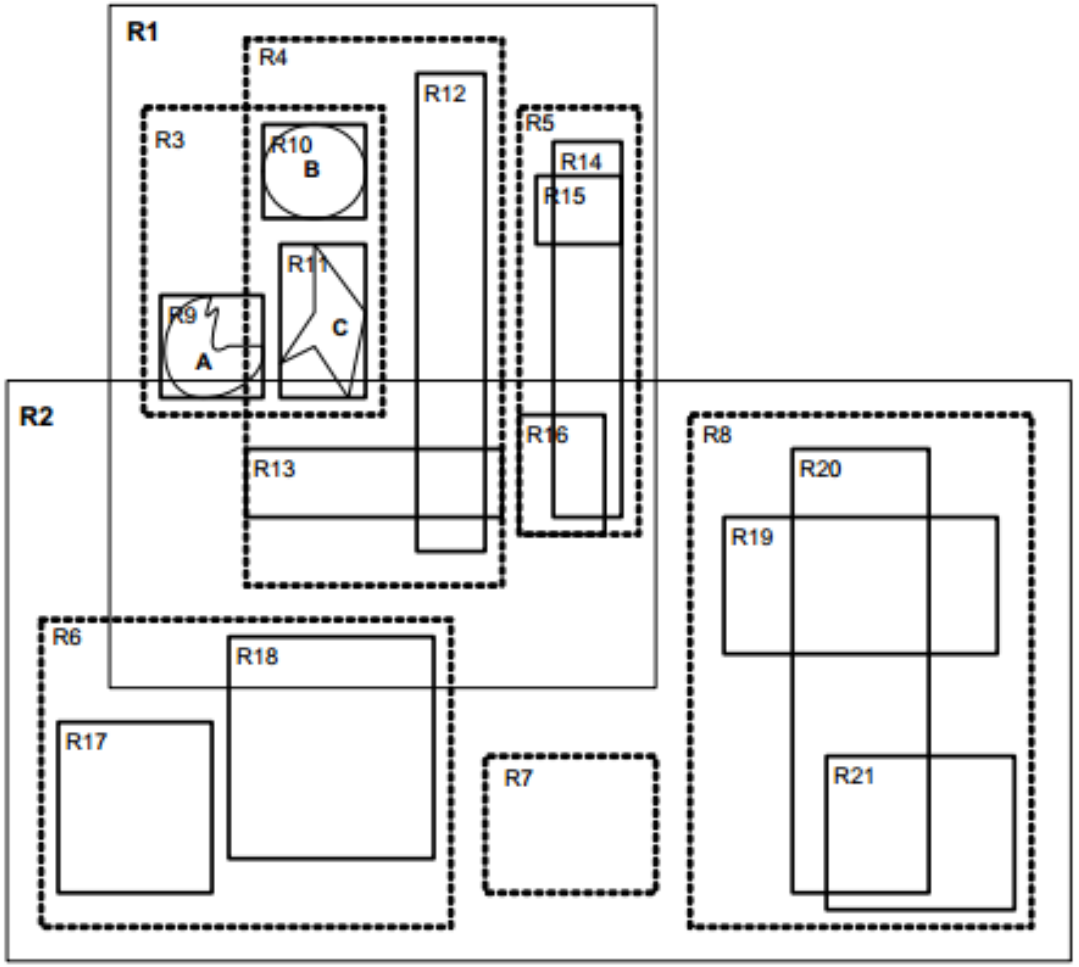


(c) Feature geometry of ArcGIS Geodatabase

Spatial Data Indexing



(a) The R-tree indexing hierarchy



(b) Spatial relationships among bounding boxes in a R-tree index

Bappeda DIY

Sistem Informasi Metadata Spasial Daerah

Home | Administration | Contact us | Links | About | Help |

English

User: admin admin Logout

Simple Search | Advanced Search

WHAT?

WHERE?

Indonesia

Search

Reset

⊞Options

- Applications
- Audio/Video
- Case studies, best practices
- Conference proceedings
- Datasets
- Directories
- Interactive resources
- Maps & graphics
- Other information resources

Show map

FIND INTERACTIVE MAPS, GIS DATASETS, SATELLITE IMAGERY AND RELATED APPLICATIONS

GEONETWORK'S PURPOSE IS:

- To improve access to and integrated use of spatial data and information
- To support decision making
- To promote multidisciplinary approaches to sustainable development
- To enhance understanding of the benefits of geographic information

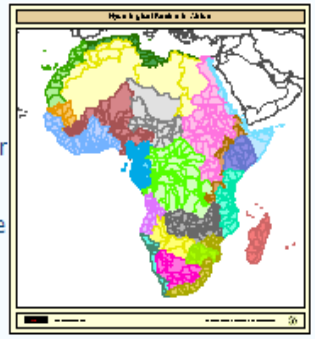
GeoNetwork opensource allows to easily share geographically referenced thematic information between different organizations. For more information please contact

Featured map

HYDROLOGICAL BASINS IN AFRICA (SAMPLE RECORD, PLEASE REMOVE!)

Major hydrological basins and their sub-basins. This dataset divides the African continent according to its hydrological characteristics. The dataset consists of the following information:- numerical

...more...



Beranda Data Peta Tentang Search Masuk

Telusuri Layer

Unggah Layer

Cart

Add resources through the "Add to cart" buttons.

Buat Peta

Filters Bersihkan

TEKS

Search by text

KATA KUNCI

TIPE

Vector 5

KATEGORI

Total: 5

TRANSPORTATION

Sungai (polygon)

No abstract provided

admin 26 Jul 2017 0 0 0 Buat Peta

TRANSPORTATION

Jaringan Jalan

No abstract provided

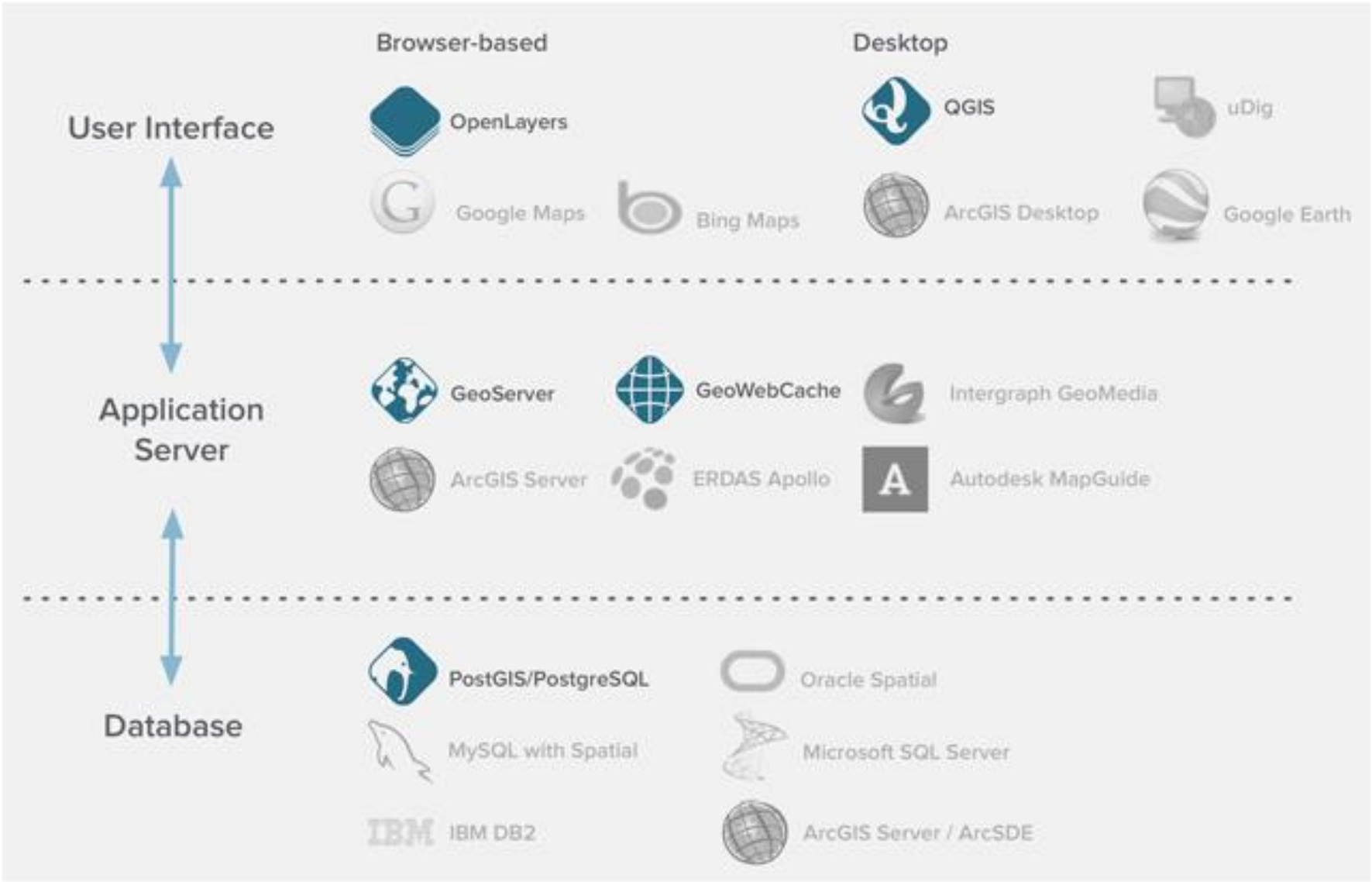
admin 26 Jul 2017 0 0 0 Buat Peta

LUASNYA

Spatial Data Processing

OGC spatial operators defined on the class geometry

Classes	*Operators*	*Operator Functions*
Basic Operators	Spatial Reference	Returns the reference system of the geometry
	Envelope	Returns the minimum bounding rectangle of the geometry
	Export	Converts the geometry into a different representation
	IsEmpty	Tests if the geometry is the empty set or not
	IsSimple	Returns TRUE if the geometry is simple
	Boundary	Returns the boundary of the geometry
Topological Operators	Equal	Tests if the geometries are spatially equal
	Disjoint	Tests if the geometries are disjoint
	Intersect	Tests if the geometries intersect
	Touch	Tests if the geometries touch each other
	Cross	Tests if the geometries cross each other
	Within	Tests if a geometry is within another geometry
	Contain	Tests if a given geometry contains another geometry
	Overlap	Tests if a given geometry overlaps another given geometry
	Relate	Returns TRUE if the spatial relationship specified by the 9-Intersection matrix holds
Spatial Analysis Operators	Distance	Returns the shortest distance between any two points of two given geometries
	Buffer	Returns a geometry that represents all points whose distance from the given geometry is less than or equal to a specified distance
	ConvexHull	Returns the convex hull of a given geometry
	Intersection	Returns the intersection of two geometries
	Union	Returns the union of two geometries
	Difference	Returns the difference of two geometries
	SymDifference	Returns the symmetric difference (i.e. the logical XOR) of two geometries


Browser-based
Desktop
User Interface
OpenLayers
QGIS
uDig
Google Maps
Bing Maps
ArcGIS Desktop
Google Earth
Application Server
GeoServer
GeoWebCache
Intergraph GeoMedia
ArcGIS Server
ERDAS Apollo
Autodesk MapGuide
Database
PostGIS/PostgreSQL
Oracle Spatial
MySQL with Spatial
Microsoft SQL Server
IBM DB2
ArcGIS Server / ArcSDE

QUERY

SQL

- Bahasa *query* merupakan bahasa yang dikhususkan untuk mengajukan pertanyaan (*query*), yang melibatkan data dalam sebuah database.
- SQL (*Structured Query Language*) merupakan bahasa pemrograman database, semula dikembangkan sebagai bahasa *query* dari sistem relasional DBMS di IBM.
- Sampai saat ini SQL menjadi bahasa yang paling sering digunakan untuk membuat, memanipulasi, dan mengajukan pertanyaan pada DBMS relasional. Standard SQL pertama dikembangkan pada tahun 1986 oleh *American National Standards Institute* (ANSI) dan disebut SQL-86

Attribute Queries - SQL

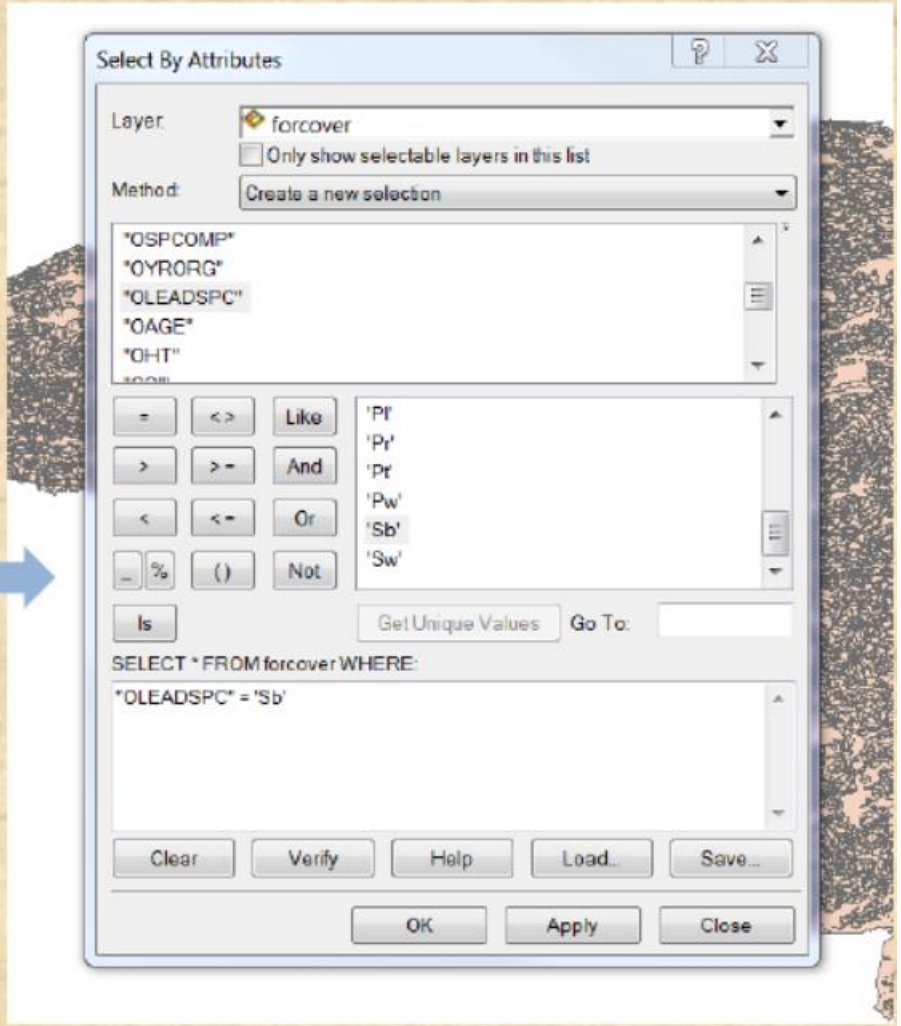
SQL Template

select <attribute list>
from <relation (table)>
where <condition>

Example

select forcover.*
from forcover
where forcover.OLEADSPC = 'Sb'

In ArcGIS Desktop



- In GIS, involvement of multiple tables is solved by joining or relating them.

pgAdmin 4 File Object Tools Help

Browser

- plpgsql
- postgis
- Foreign Data Wrappers
- Languages
- Schemas (1)
  - public
    - Collations
    - Domains
    - FTS Configurations
    - FTS Dictionaries
    - FTS Parsers
    - FTS Templates
    - Foreign Tables
    - Functions
    - Materialized Views
    - Sequences
    - Tables (2)
      - batas_administrasi
        - Columns
        - Constraints
        - Indexes
        - Rules
        - Triggers
      - spatial_ref_sys
    - Trigger Functions
    - Types
    - Views

Dashboard Properties SQL Statistics Dependencies Dependents Edit Data - sleman on postgres@PostgreSQL 10

No limit

sleman on postgres@PostgreSQL 10

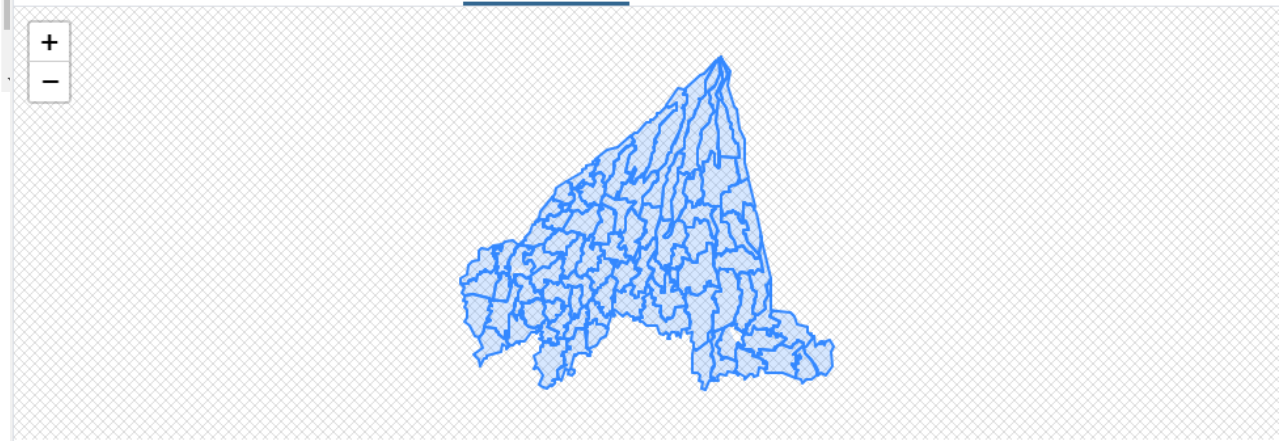
Query Editor Query History

```
1  SELECT * FROM public.batas_administrasi
2
```

Data Output Explain Messages Notifications Geometry Viewer

	gid [PK] integer	desa character varying (50)	kecamatan character varying (50)	sumber character varying (100)	geom geometry
1	1	Wukirharjo	Prambanan	Peta Kalurahan Lama	0106000020ED7...
2	2	Jogotirto	Berbah	Peta Kalurahan Lama, Berit...	0106000020ED7...
3	3	Sumberharjo	Prambanan	Peta Kalurahan Lama	0106000020ED7...
4	4	Balecatur	Gamping	Peta Kalurahan Lama, Berit...	0106000020ED7...
5	5	Gayamharjo	Prambanan	Peta Kalurahan Lama	0106000020ED7...
6	6	Sendangtirto	Berbah	Peta Kalurahan Lama, Berit...	0106000020ED7...
7	7	Tegaltirto	Berbah	Peta Kalurahan Lama, Berit...	0106000020ED7...
8	8	Ambarketawang	Gamping	Peta Kalurahan Lama, Berit...	0106000020ED7...

Data Output Explain Messages Notifications Geometry Viewer



• In ArcGIS SQL, strings (text data type) are case-sensitive.

"WG" = 'PJ' AND "HT_M" > 5 ⬅ Not the same ➡ "WG" = 'pj' AND "HT_M" > 5

• Field denotation depends on the GIS file format:

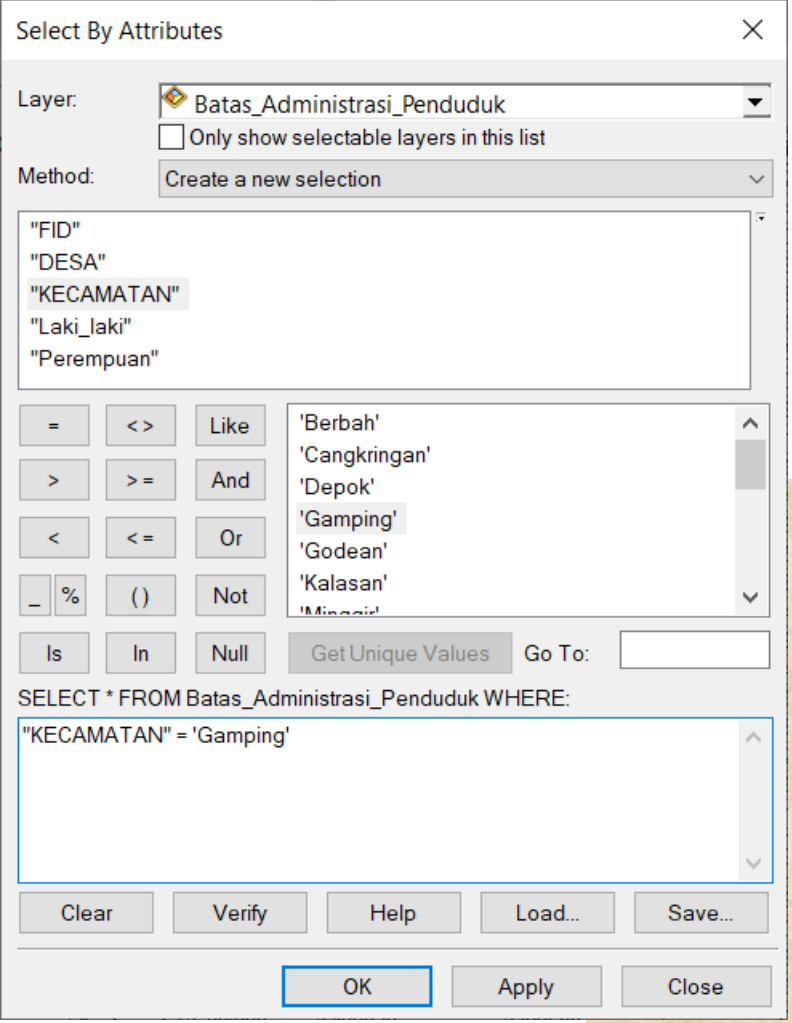
Shapefile (double quotation marks)	File Geodatabase (no marks)	Personal Geodatabase (square brackets)
"WG" = 'PJ' AND "HT_M" > 5	WG = 'PJ' AND HT_M > 5	[WG] = "PJ" AND [HT_M] > 5

• Numbers (numeric data types) are not assigned quotation marks.

"WG" = 'PJ' AND "HT_M" > 5

But, this particular query is correct. Why?

"PRCDCSD" = '3501012'



SQL Operators

Arithmetic Operators

*	/	+	-

Comparison Operators

=	<	<=	<>	>	>=	LIKE	IS [NOT] NULL	[NOT] IN

Logical Operators

AND	OR	NOT

Logika And (Boolean)

B \ A	True	False
True	True	False
False	False	False

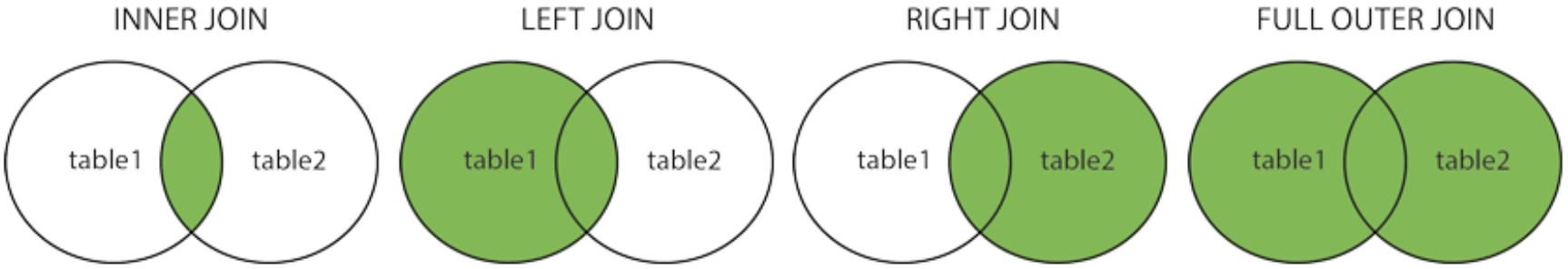
Logika Or (Boolean)

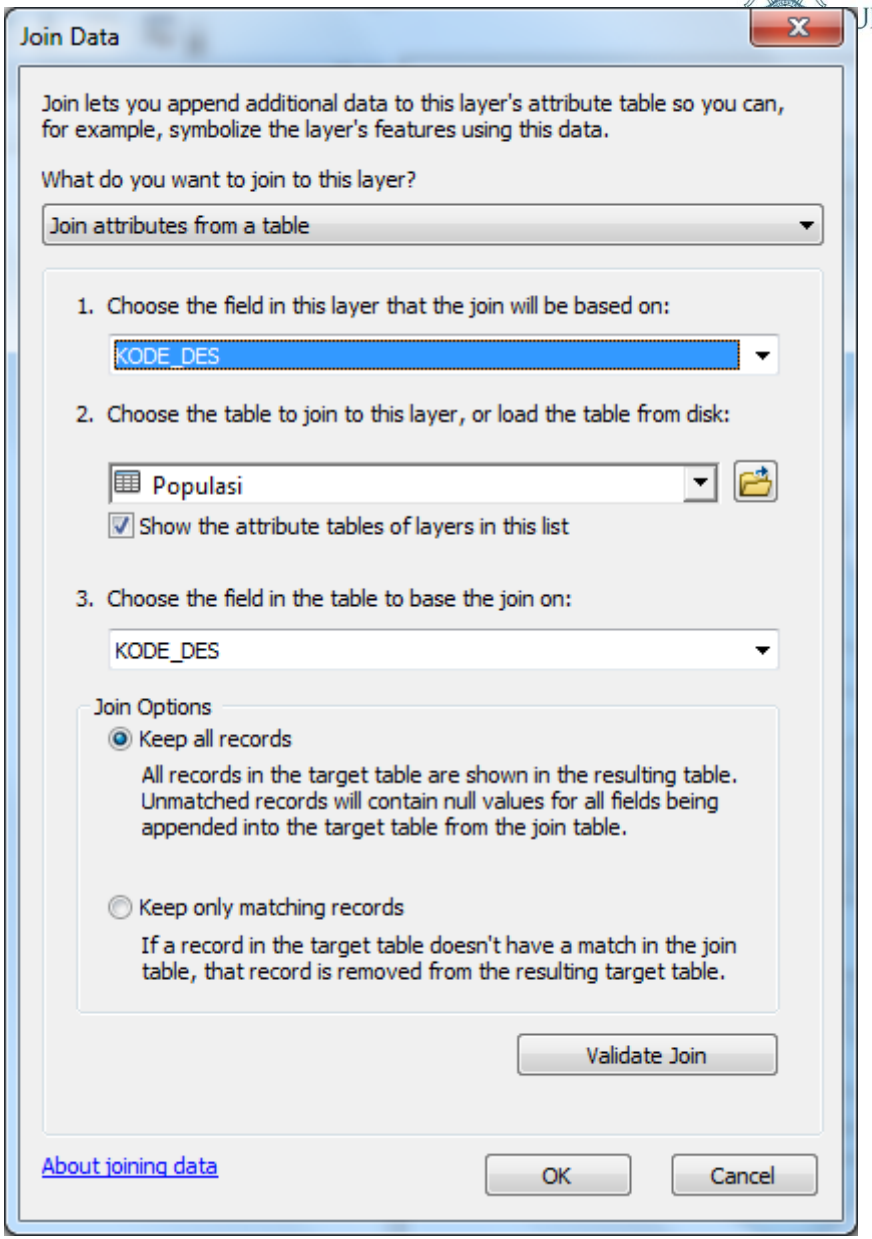
B \ A	True	False
True	True	True
False	True	False

Different Types of SQL JOINs

Here are the different types of the JOINs in SQL:

- **(INNER) JOIN**: Returns records that have matching values in both tables
- **LEFT (OUTER) JOIN**: Return all records from the left table, and the matched records from the right table
- **RIGHT (OUTER) JOIN**: Return all records from the right table, and the matched records from the left table
- **FULL (OUTER) JOIN**: Return all records when there is a match in either left or right table




Join Data
Join lets you append additional data to this layer's attribute table so you can, for example, symbolize the layer's features using this data.
What do you want to join to this layer?
Join attributes from a table
1. Choose the field in this layer that the join will be based on:
KODE_DES
2. Choose the table to join to this layer, or load the table from disk:
Populasi
Show the attribute tables of layers in this list
3. Choose the field in the table to base the join on:
KODE_DES
Join Options
Keep all records
All records in the target table are shown in the resulting table. Unmatched records will contain null values for all fields being appended into the target table from the join table.
Keep only matching records
If a record in the target table doesn't have a match in the join table, that record is removed from the resulting target table.
Validate Join
About joining data
OK
Cancel