



Bersama Respati Raih Prestasi

Membangun Data Spasial Sistem Informasi Geografis

Oleh: Dr. Agus Qomaruddin Munir., ST., MCs
Pertemuan - 09



Spatial Database Systems

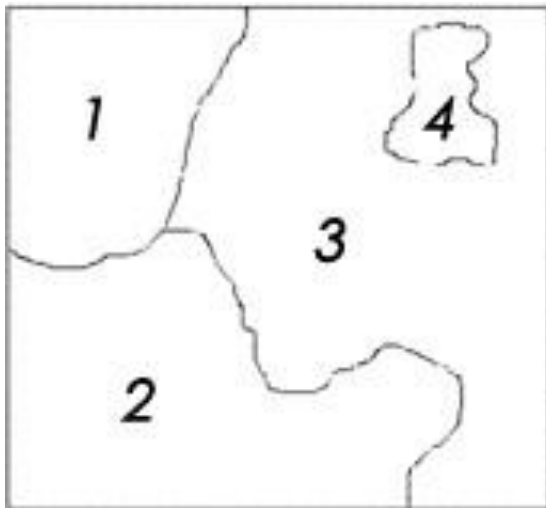
- Database systems that are enabled to store and manage geometries as special data types are called *spatial database systems*.
- By defining one or more columns of a **relational table** as *abstract data types*, a user can store geometries in a conventional database and manage them in much the same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



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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 Poard



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<http://spatialreference.org>

rg

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

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
- postgres
- 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)
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 - 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

Query Editor Query History

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

Data Output Explain Messages Notifications Geometry Viewer

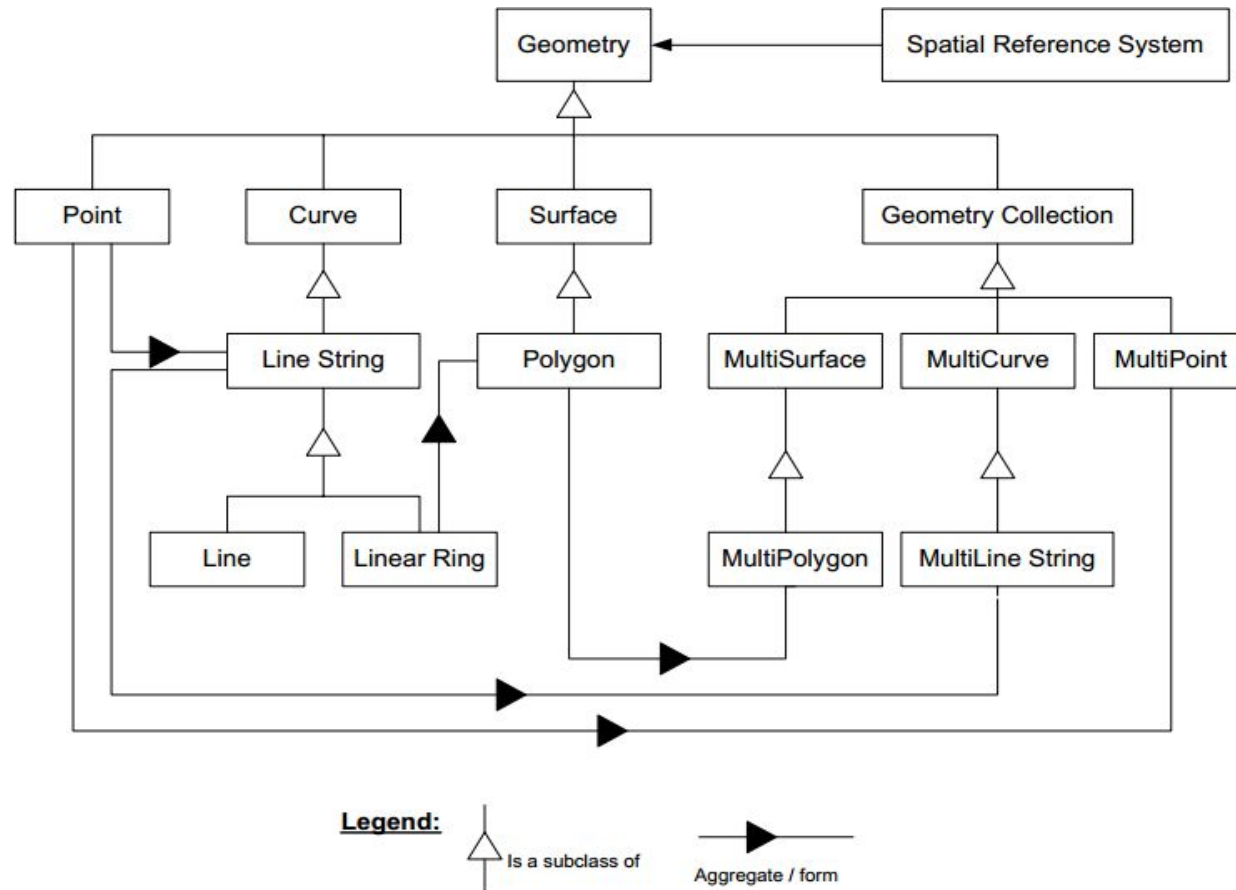
	gid [PK] integer	desa character varying (50)	kecamatan character varying (50)	sumber character varying (100)	geom geometry
1	1	Wukirharjo	Prambanan	Peta Kalurahan Lama	0106000020ED7...
2	2	Jogotirto	Berbah	Peta Kalurahan Lama, Berit...	0106000020ED7...
3	3	Sumberharjo	Prambanan	Peta Kalurahan Lama	0106000020ED7...
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



Bersama Respati Raih Prestasi

The OGC geometry object Model

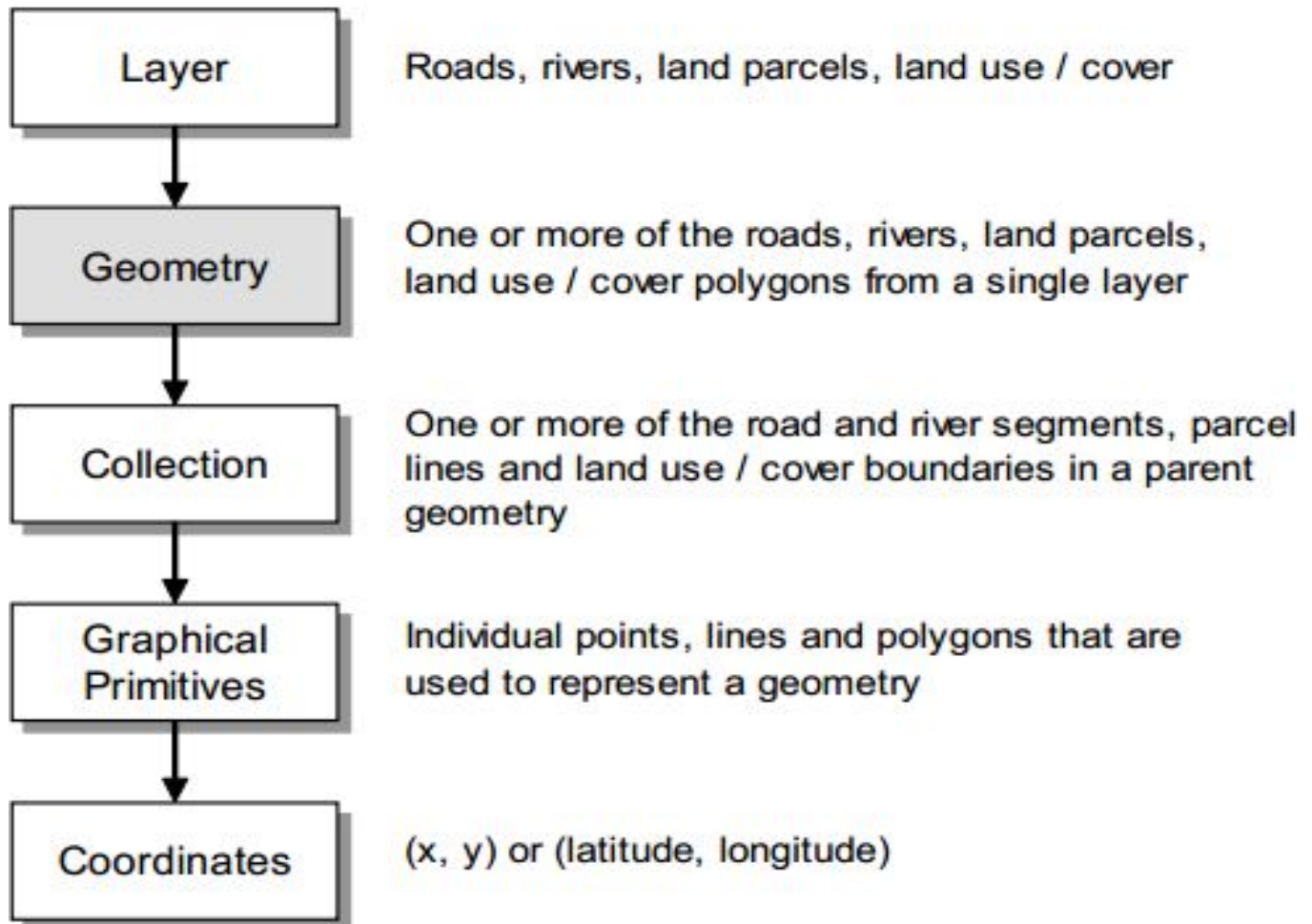




Bersama Respati Raih Prestasi

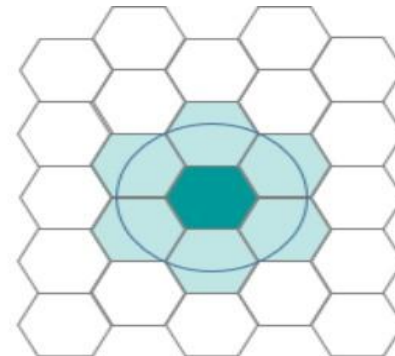
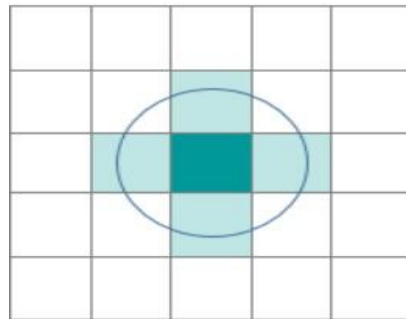
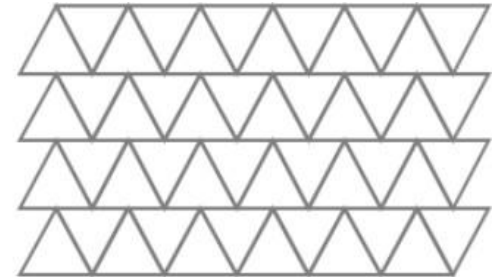
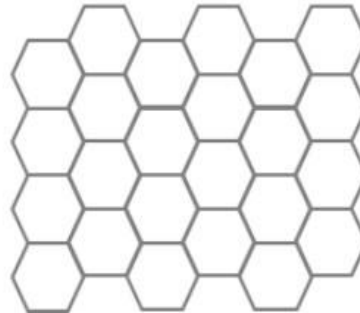
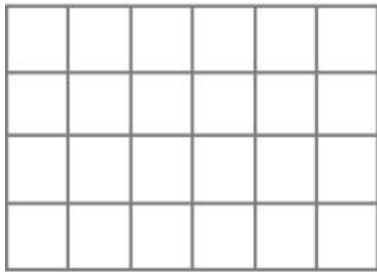
Spatial Hierarchy

Examples





Bersama Respati Raih Prestasi



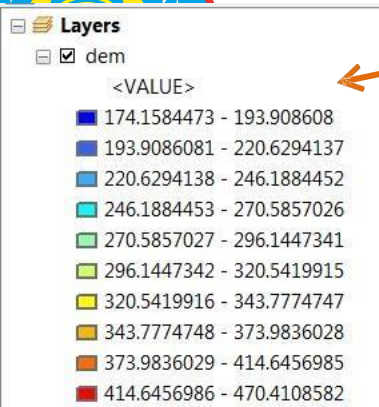
<https://strimas.com/post/hexagonal-grids/>

- A raster dataset representing terrain.

Bersama Respati Raih Prestasi

An ArcMap layer representing a raster that contains elevation values. The raster itself doesn't contain colours – colours are assigned to raster cells by software for interpretation purposes and are based on cell values.

The raster converted into a simple text raster format, ASCII.



ascii_rast.txt - Notepad

File Edit Format View Help

```
ncols      288
nrows      243
xllcorner  398296.01887042
yllcorner  5421512.3242951
cellsize   40
NODATA_value -9999
348.7016 348.1721 349.995 350.224 350.2695 350.2389 350.1617 349.9999 331.46
293.5234 292.9452 292.3746 291.8145 291.2744 290.7703 290.3275 290.289 289.9946
4 174.1584 174.1584 174.1584 174.1584 174.1584 174.1584 174.1584 174.1584 17
348.8967 348.4128 349.2776 350.0003 350.4232 350.555 350.4925 350.0018 349.2
94.1448 293.5814 293.0349 292.5009 291.978 291.4707 290.9909 290.5596 290.21
4 174.1584 174.1584 174.1584 174.1584 174.1584 174.1584 174.1584 174.1584 17
349.2453 348.7765 348.7442 349.9978 350.4692 350.7853 351.205 351.2397 349.9
.5529 293.044 292.553 292.0764 291.6144 291.1736 290.7682 290.42 290.1558 29
.9669 174.1584 174.1584 174.1584 174.1584 174.1584 174.1584 174.1584 174.158
349.6425 349.3958 348.9567 349.1558 349.9993 350.5497 351.6129 352.0885 350.
292.0848 291.6747 291.2803 290.9102 290.5796 290.3091 290.1165 290.289 29279
74.1584 174.1584 174.1584 174.1584 174.1584 174.1584 174.1584 174.1584 174.1
349.6138 349.224 349.3889 349.2948 349.5287 350.0027 352.0034 353.7729 353.5
```



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Topology and Topological Data Structures

Diperkenalkan tahun 1960 – 1970



Topologi

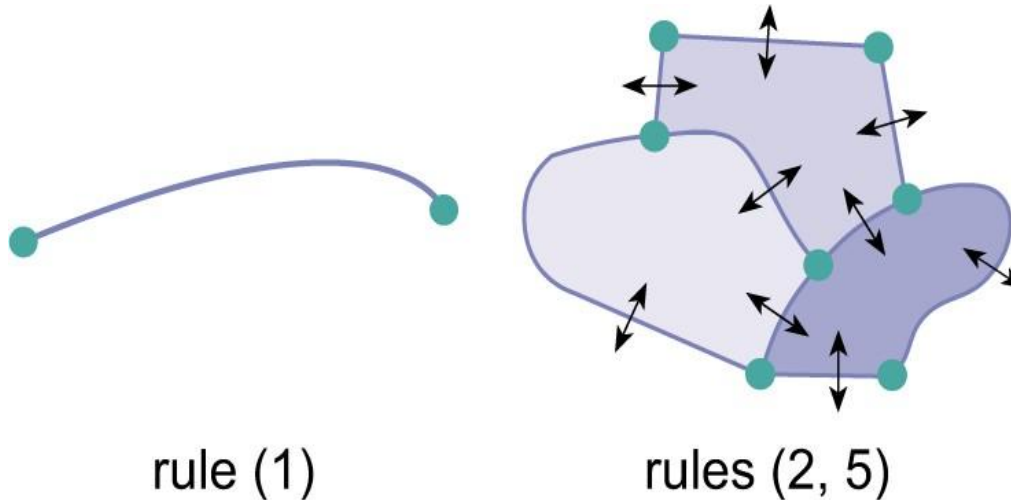
- Topologi adalah bidang matematika yang mempelajari sifat – sifat bentuk geometris yang tetap tidak berubah saat bentuk itu dipelintir, diregangkan, menyusut atau distorsi tanpa putus (West et al., 1982).
- Apabila topologi diterapkan pada struktur data spasial, biasanya didefinisikan sebagai hubungan 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



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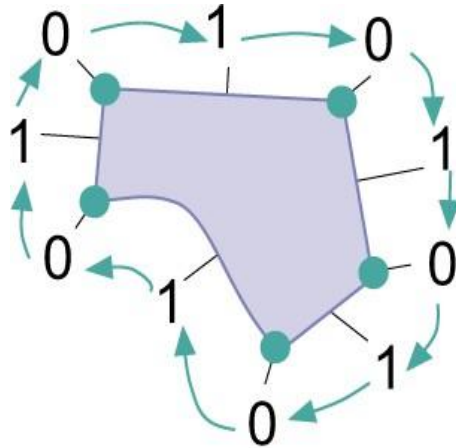
Lima Aturan Dalam Konsistensi Topologi



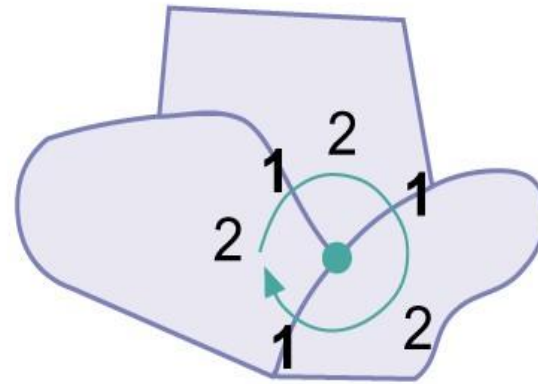
1. Setiap arc dibentuk oleh node-node (*begin and end*)
2. Setiap arc dibatasi 2 poligon (*left and right polygon*)
5. Arc-arc hanya berpotongan di node-node mereka



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 polygon.



Bersama Respati Raih Prestasi

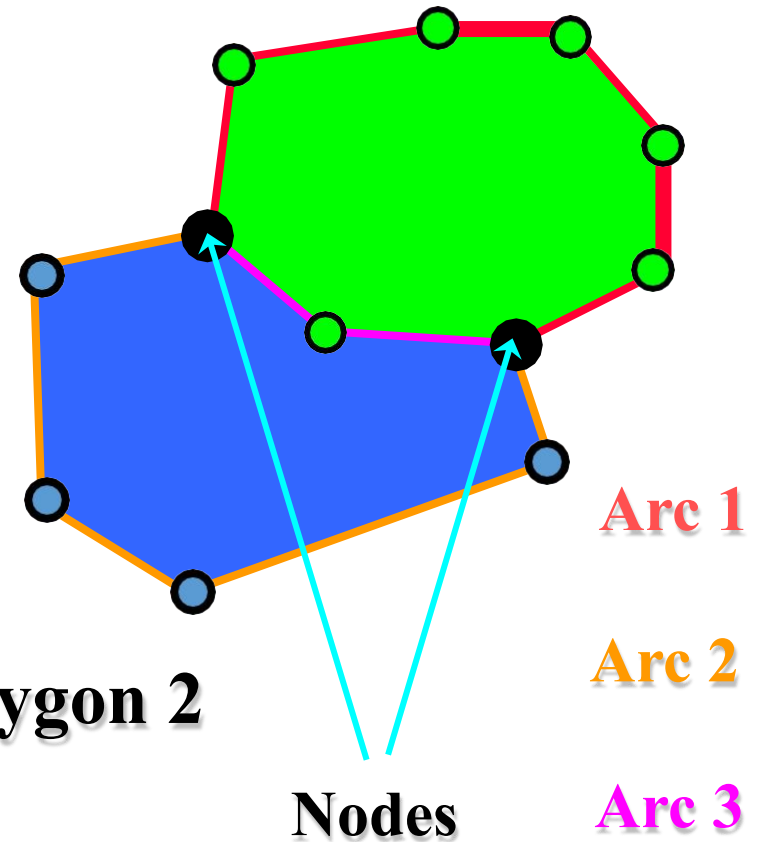
Struktur Data Topologi

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

coverage

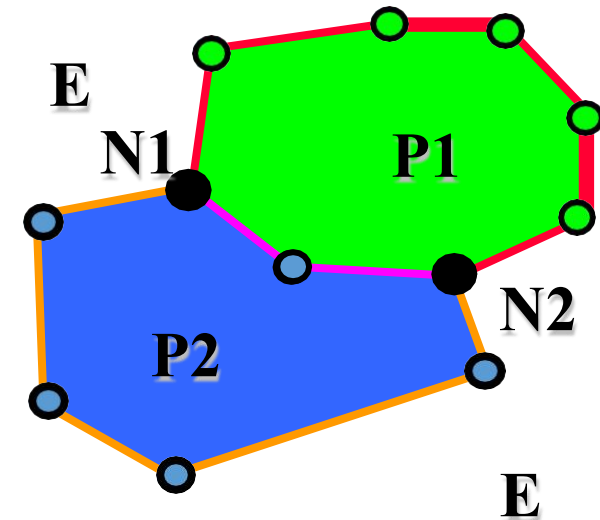
Node topology

N1 Arc 1 Arc 2 Arc 3

N2 Arc 1 Arc 2 Arc 3

Arc topology

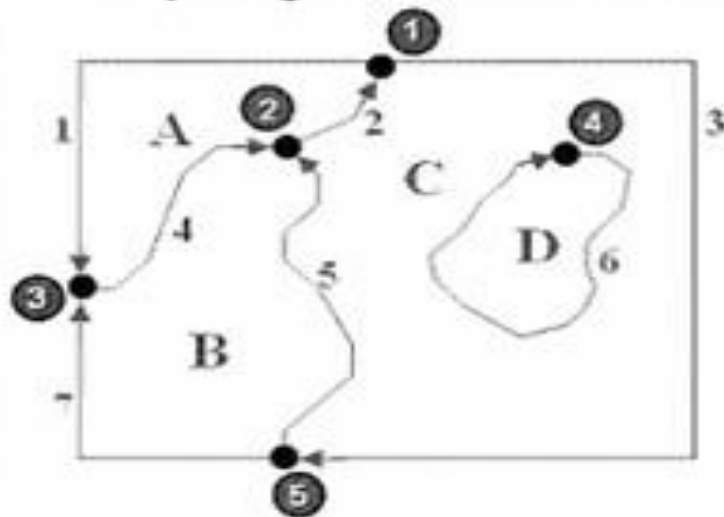
Arc	start node	end node	left polygon	right polygon
Arc 1	N1	N2	E	P1
Arc 2	N2	N1	E	P2
Arc 3	N2	N1	P2	P1



Arc coordinate data

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

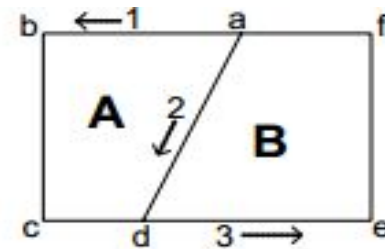
Edge	Left Face	Right Face	From-Node	To-Node
1	A	---	1	3
2	A	C	2	1
3	---	C	1	5
4	A	B	3	2
5	B	C	5	2
6	C	D	4	4
7	---	B	5	3



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

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

Vertex_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



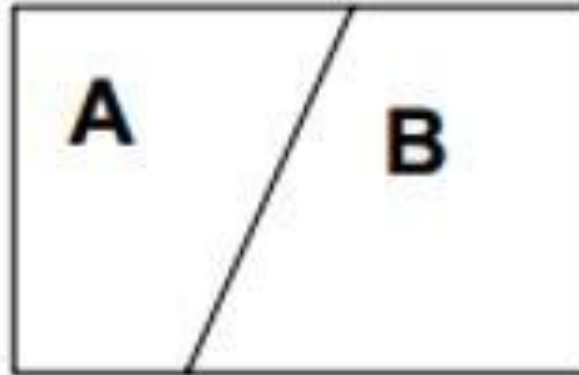
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Non-topological Data Structure

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



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

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



Bersama Respati Raih Prestasi

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.



Bersama Respati Raih Prestasi

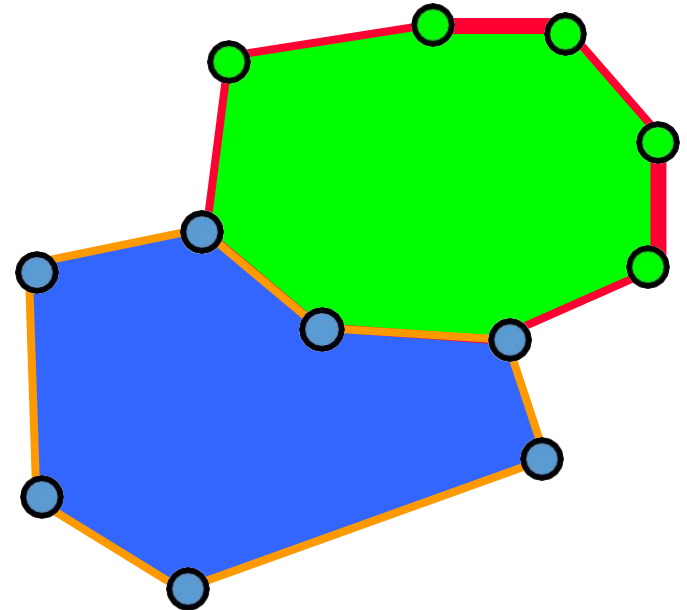
Struktur Data Spaghetthi

poligon 1

Vertices poligon 1

poligon 2

Vertices poligon 2



Feature

koordinat

poligon 1

$x_1, y_1, x_2, y_2, \dots, x_1, y_1$

poligon 2

$x_1, y_1, x_n, y_n, \dots, x_1, y_1$

poligon 2

$x_1, y_1, x_n, y_n, \dots, x_1, y_1$



Struktur Data Spaghetthi

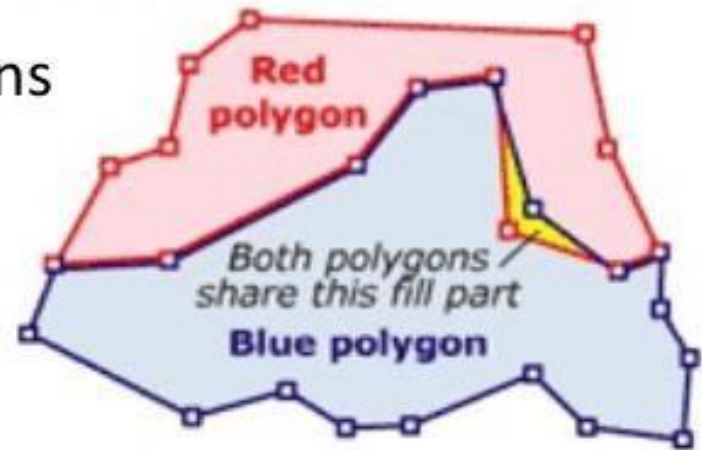
- Pada Struktur Data ini, peta di translasikan garis demi garis ke dalam list koordinat(x,y) dalam format digital.
- Titik dikodekan sebagai pasangan koordinat(x,y) tunggal.
- Garis dikodekan sebagai list atau string pasangan koordinat (x,y).
- Area atau luasan dikodekan sebagai pasangan koordinat closed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



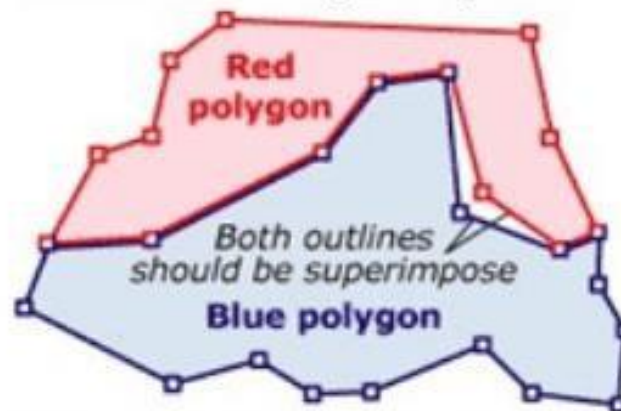
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Masalah pada Struktur Data Spaghetthi

- Overlap: Sliver polygons



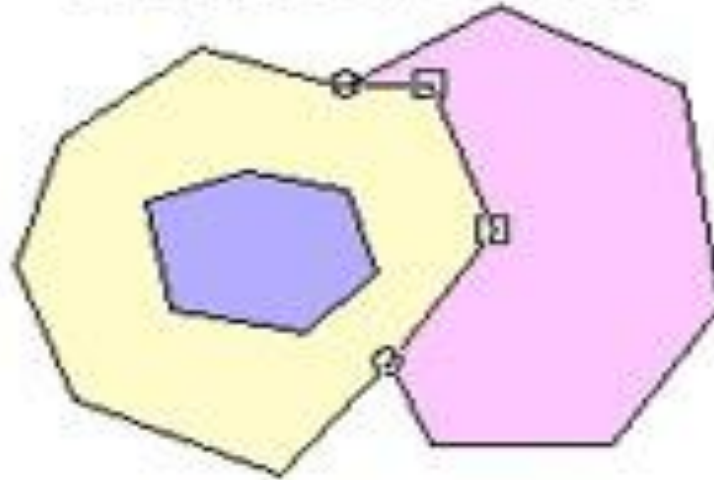
- Gaps



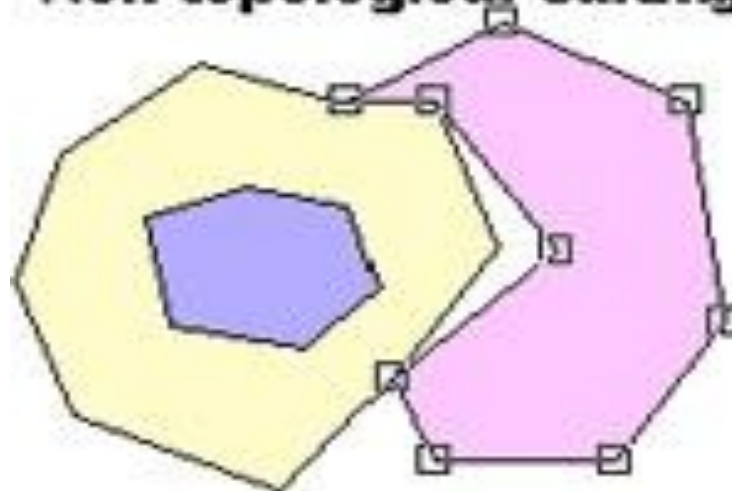


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Topological editing



Non-topological editing





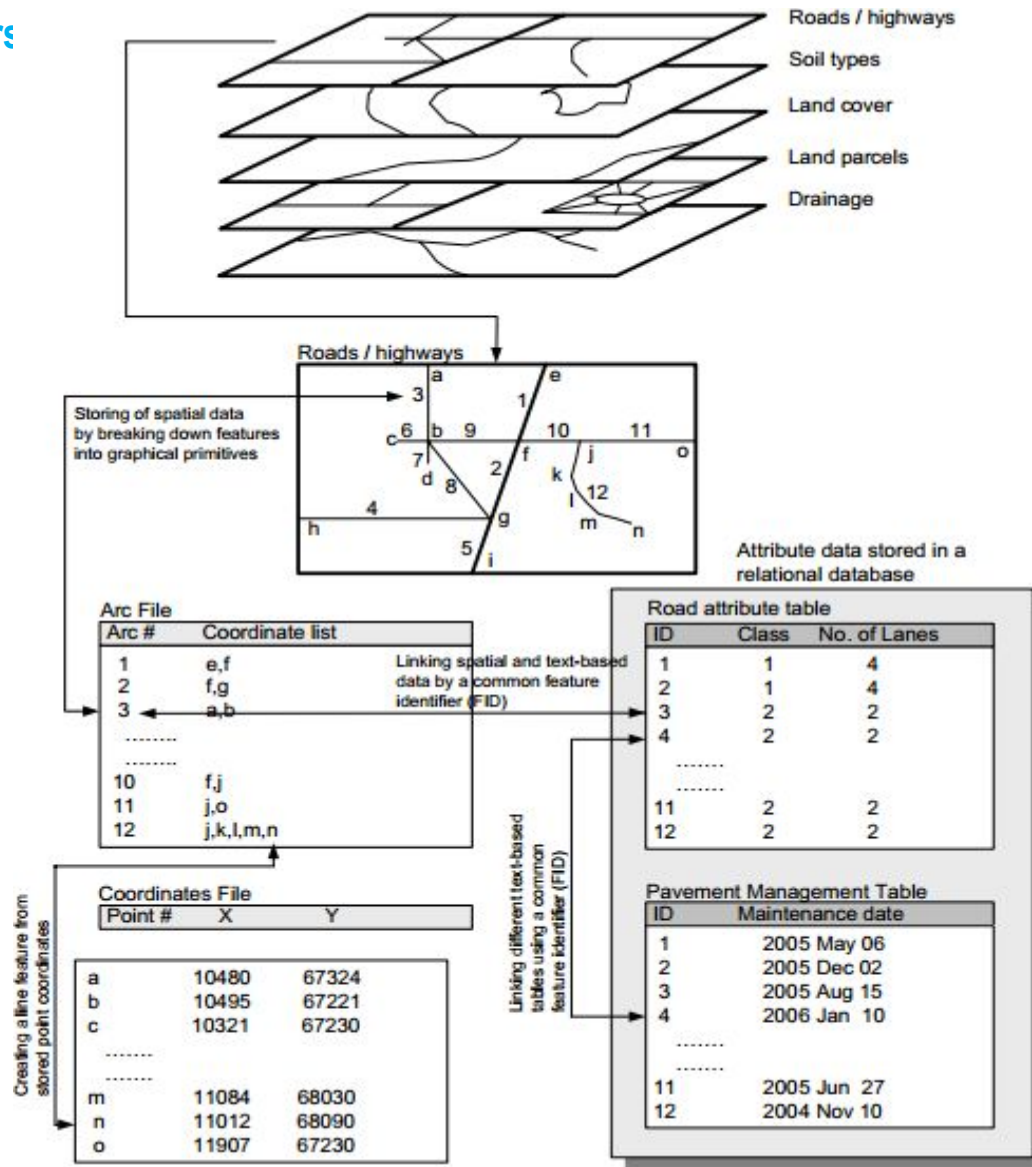
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Geo-relational Model

(Morehouse, 1985 and 1989)



Bers





Geo-relational Model

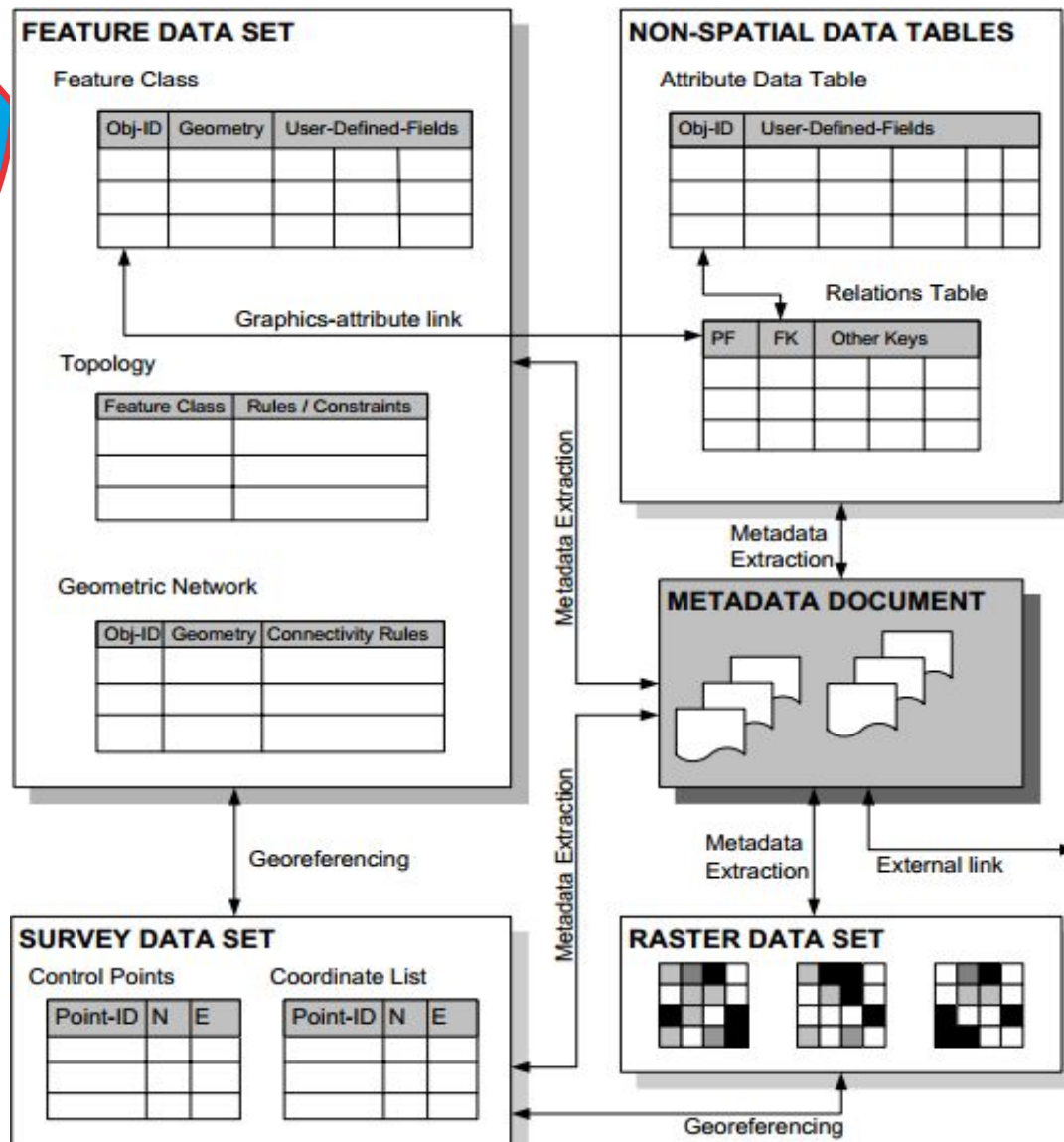
- Data spasial diabstraksikan menjadi serangkaian *layer* yang ditentukan secara independen.
- Fitur spasial mewakili setiap *layer* diklasifikasikan dan disimpan secara terpisah sesuai dengan bentuk dasar grafis primitif atau elemen yang mewakilinya
- Layer dibedakan
 - bentuk grafis primitif
 - tipe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



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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

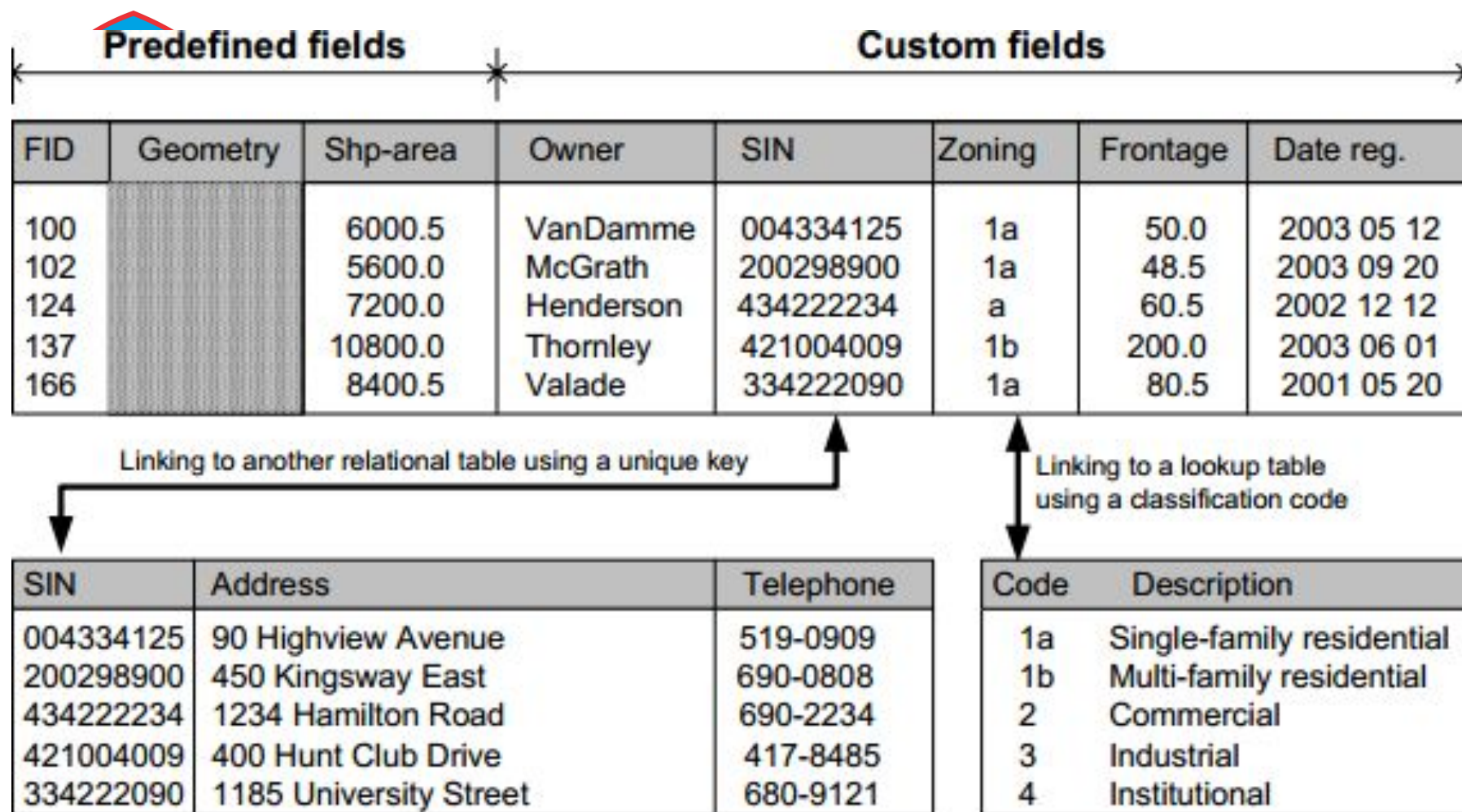
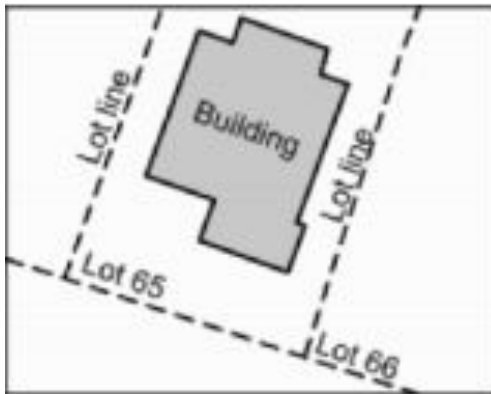


Table structure of a geodatabase



Bersama Respati Raih Prestasi



Topology File

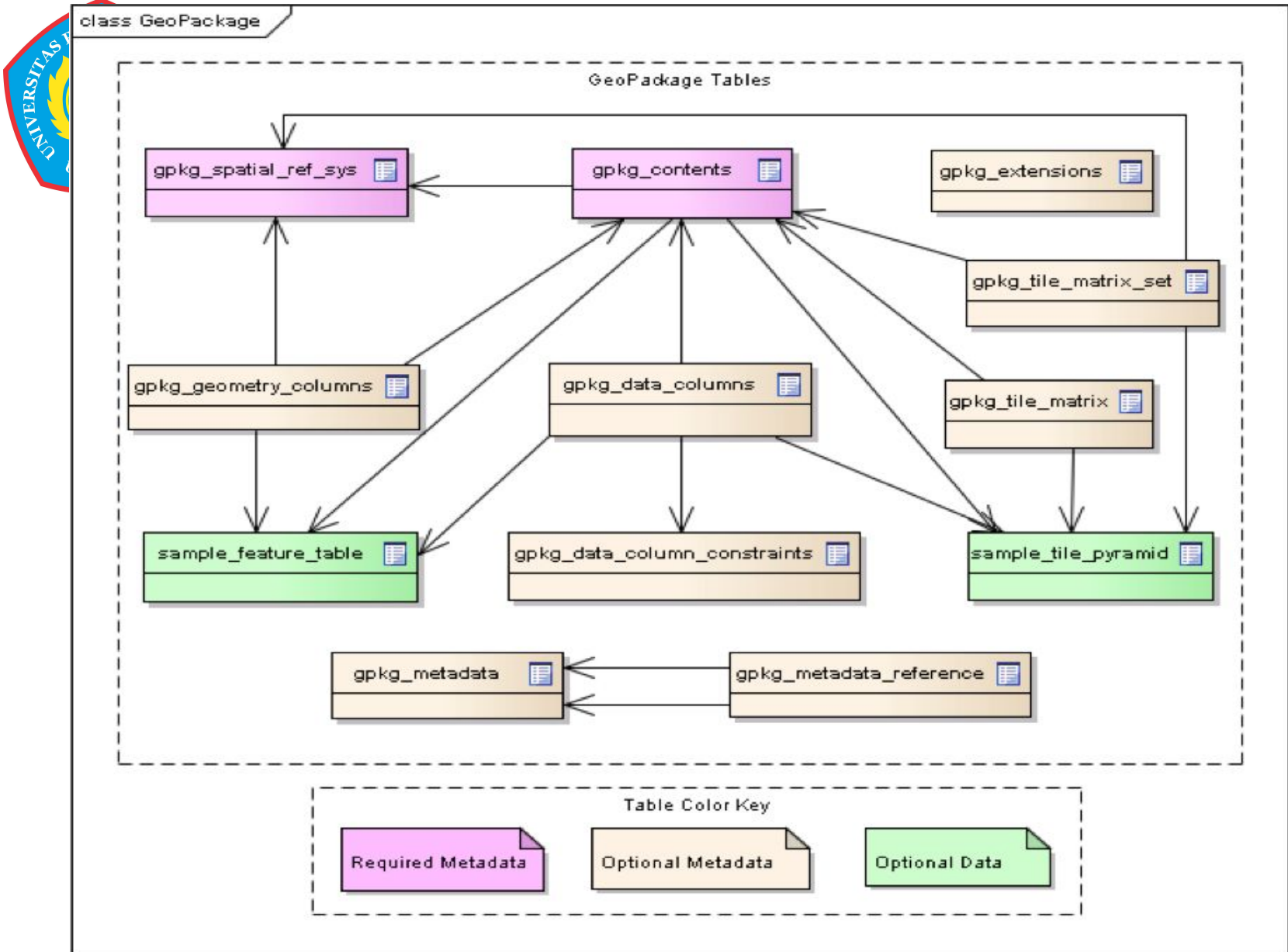
Feature Class	Rule	Feature Class
Lot_lines	Must not have dangles	
Lots	Must not overlap	
Owner_parcel	Must be closed	
Lot_lines	Must be covered by	Lots
Buildings	Must be covered by	Owner-parcel
Buildings	Must be covered by	Lots
Buildings	Must not overlap	Lot_lines
Lots	Must be formed by	Lot-lines
Lot_lines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





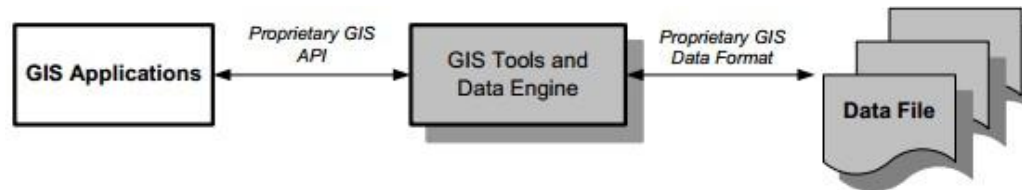
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Characteristics of Spatial Database Systems

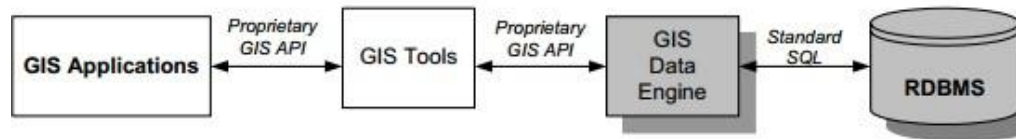


Bersama Respati Raih Prestasi

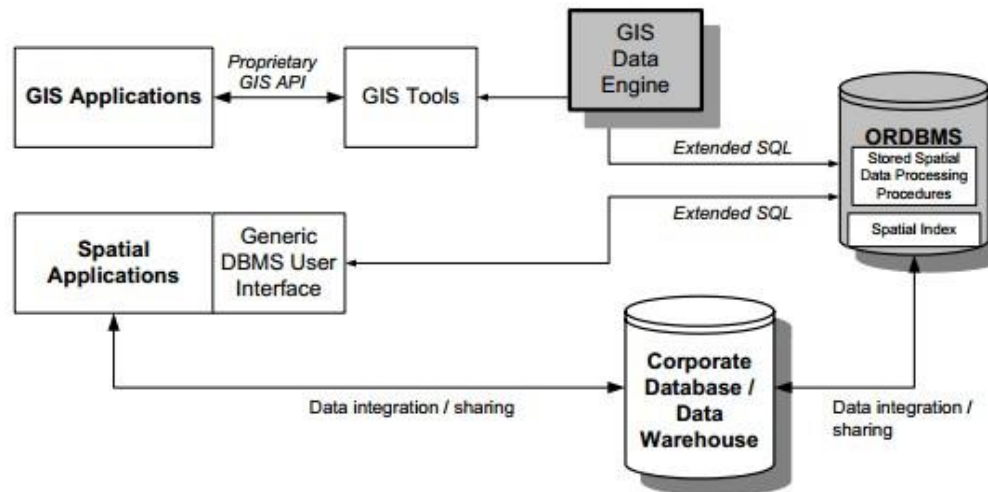
Evolution of Spatial Data Processing



(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

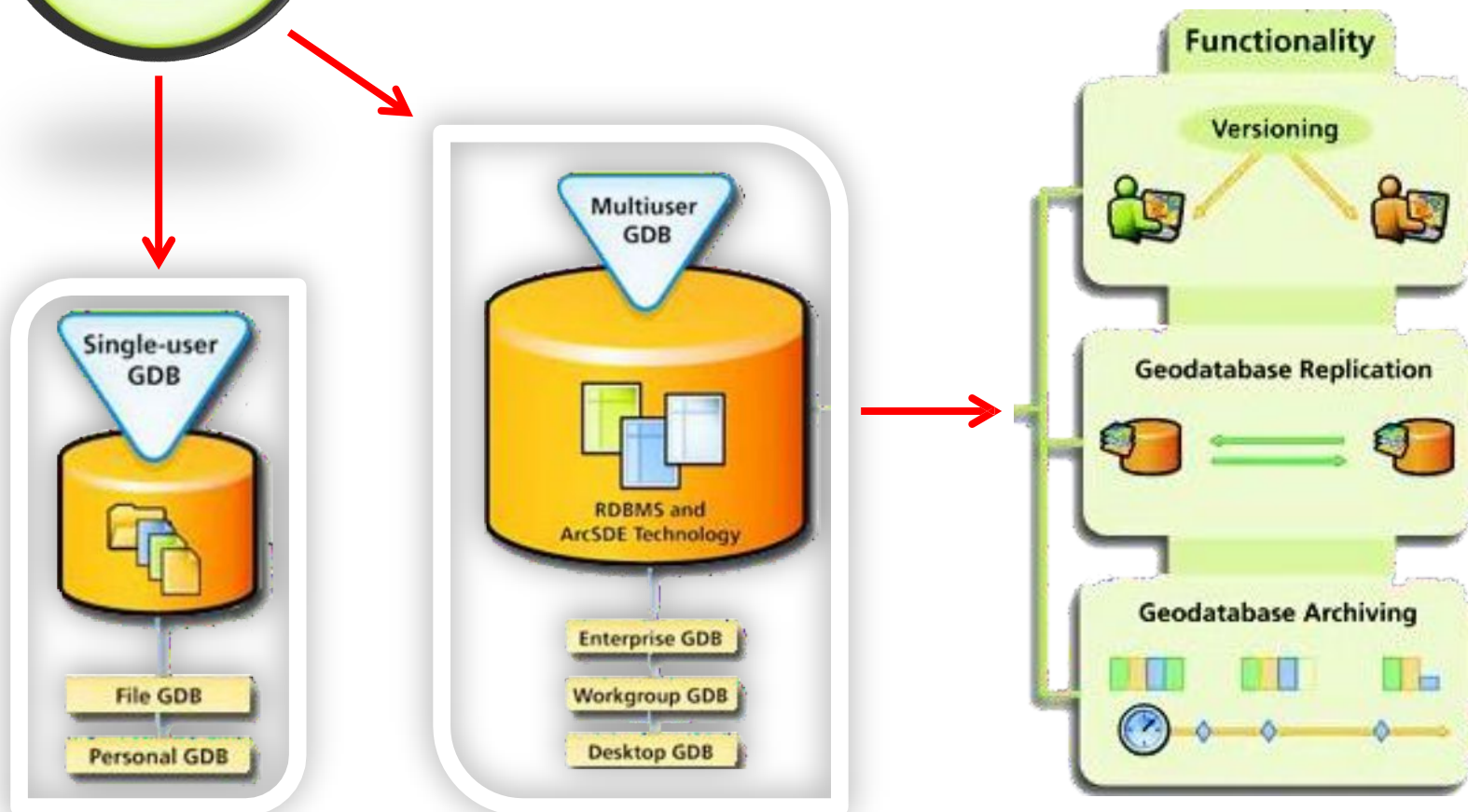


(c) Today's spatial data processing environment



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Geodatabase





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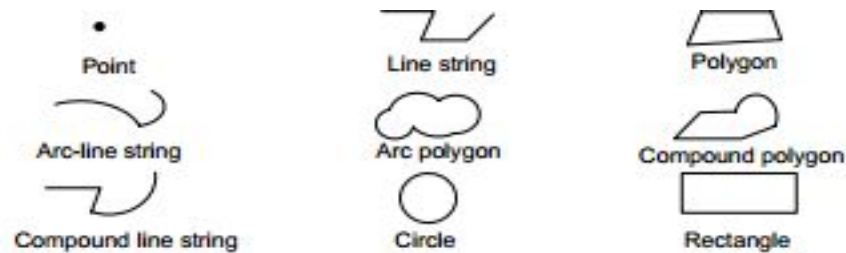
The division of work between spatial database systems and GIS

<i>Systems</i>	<i>Primary Tasks</i>
Geographic Information Systems	<ul style="list-style-type: none">○ Data Collection and Editing○ Data Analysis○ Generation of Maps and Cartographic Information Products
Spatial Database Systems	<ul style="list-style-type: none">○ Data Storage and Management○ Spatial Indexing○ Data Security and Integrity○ Spatial Data Query

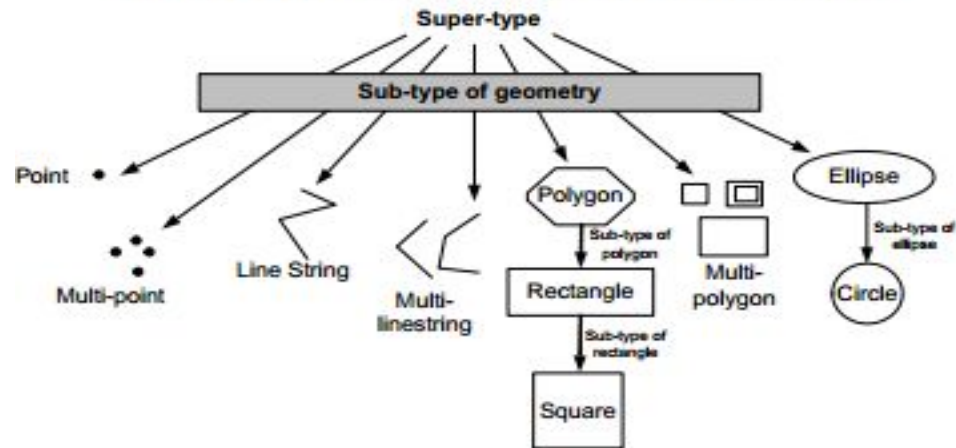


Bersama Respati

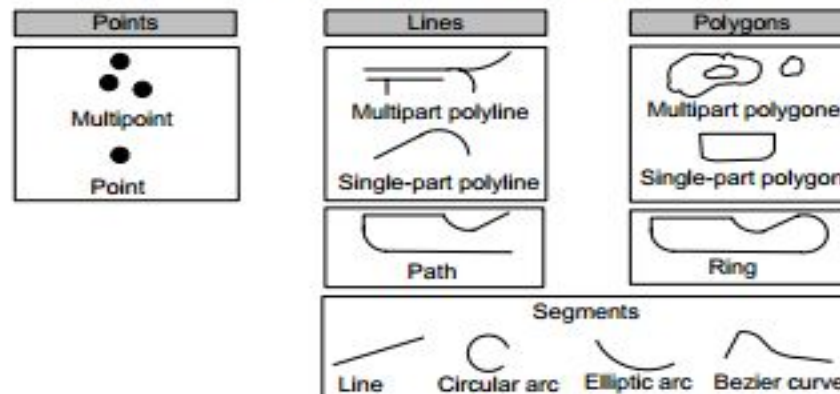
Spatial Data Type



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



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

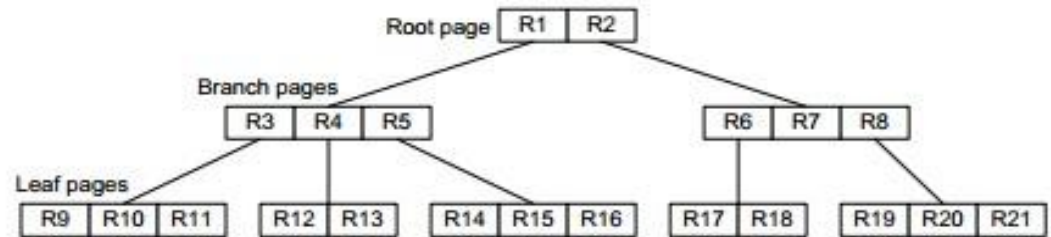


(c) Feature geometry of ArcGIS Geodatabase

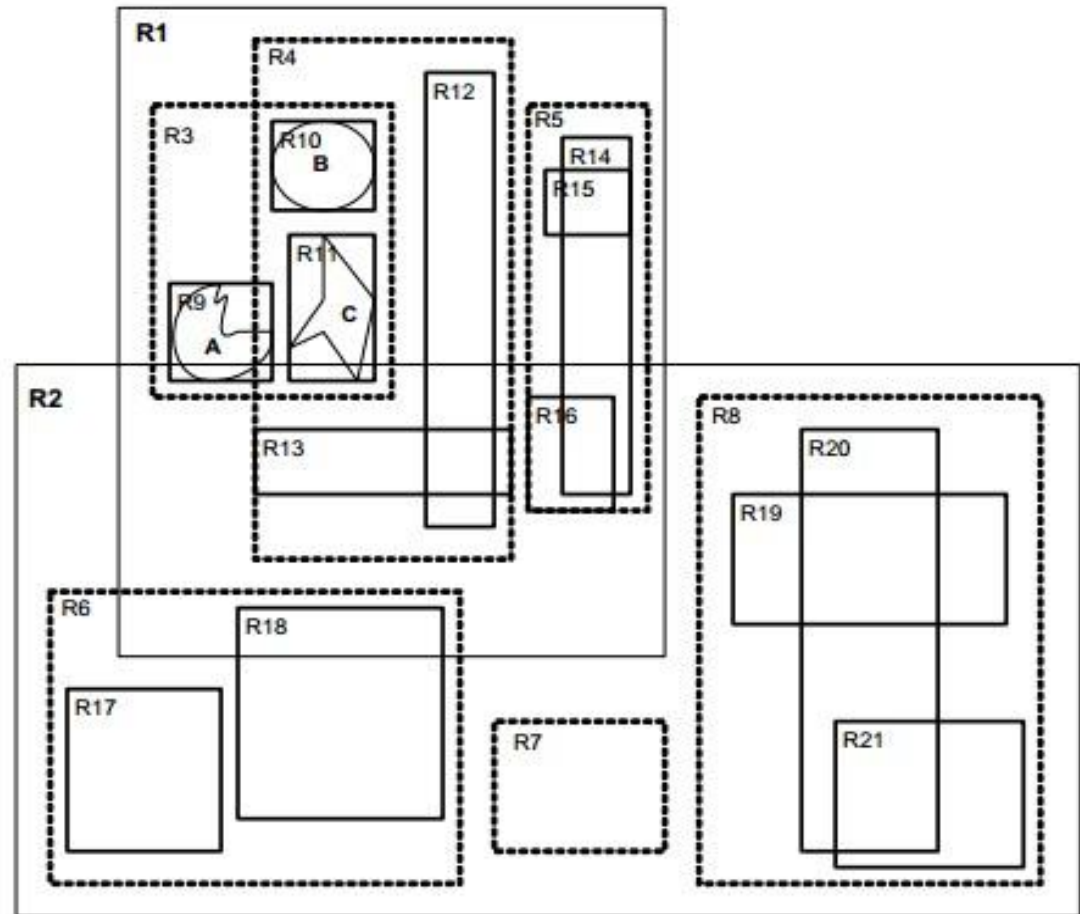


Bersama Respati R

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*

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English

User: admin admin Logout

Simple Search

Advanced Search

WHAT?

WHERE?



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:

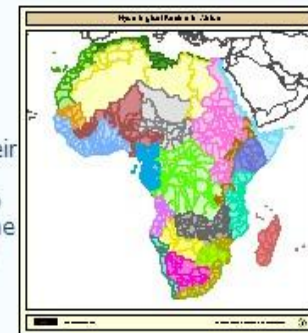
- To improve access to and integrated use of spatial data and information
- To support decision making
- To promote multidisciplinary approaches to sustainable development
- To enhance understanding of the benefits of geographic information

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...





Bersama Respati Raih Prestasi

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 3

KATEGORI

Total: 5

TRANSPORTATION

Sungai (polygon)

No abstract provided

admin 26 Jul 2017 0 0 0 0 Buat Peta

TRANSPORTATION

Jaringan Jalan

No abstract provided

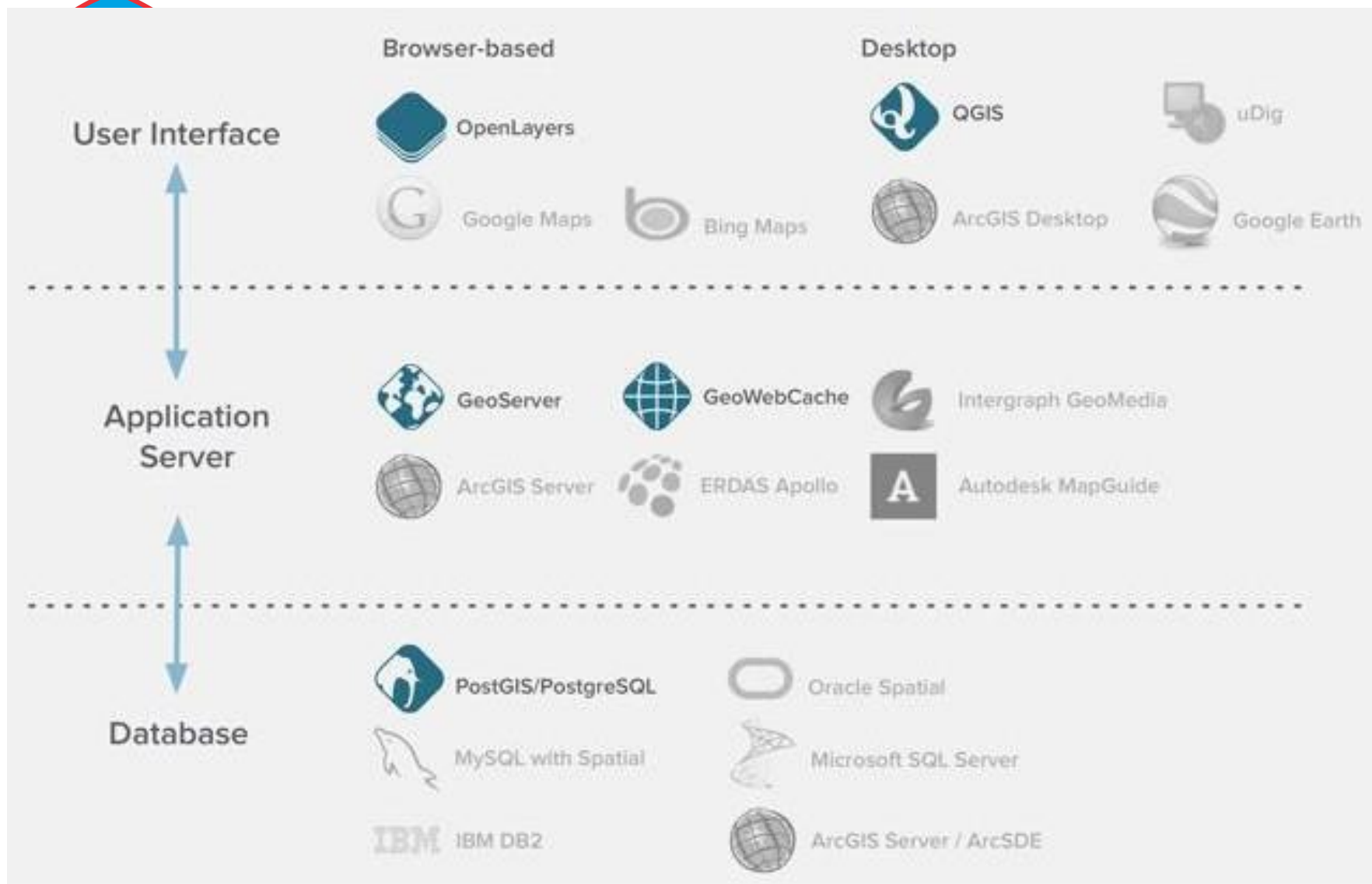
admin 26 Jul 2017 0 0 0 0 Buat Peta





OGC spatial operators defined on the class geometry

<i>Classes</i>	<i>Operators</i>	<i>Operator Functions</i>
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





Bersama Respati Raih Prestasi

QUER
Y



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

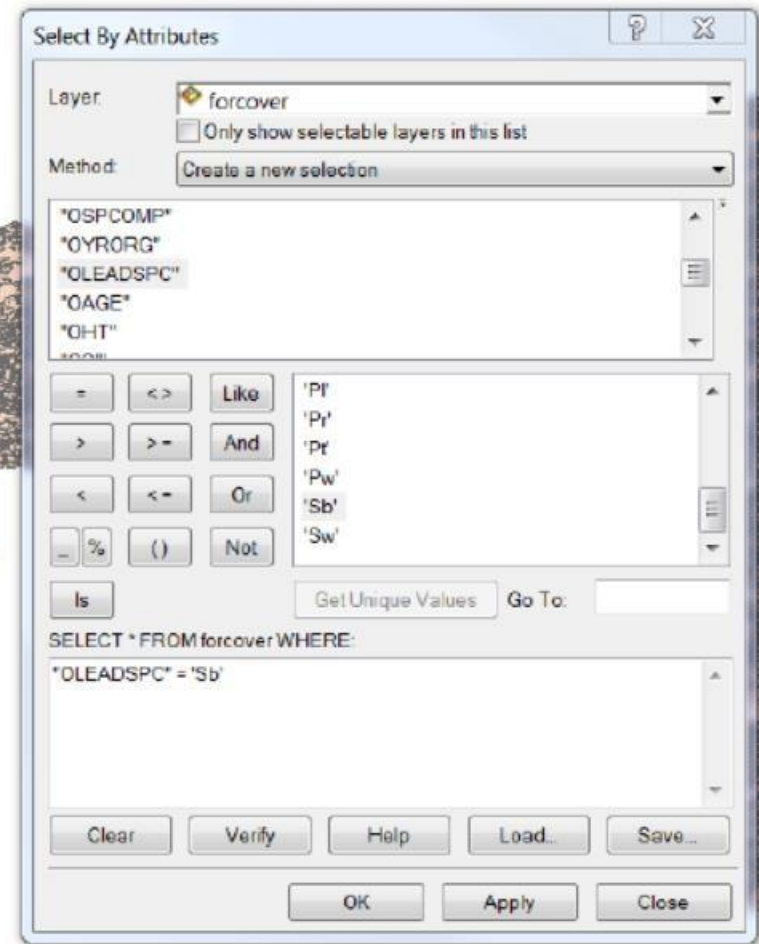
```
select <attribute list>  
from <relation (table)>  
where <condition>
```

Example

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

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

In ArcGIS
Desktop



pgAdmin 4 File Object Tools Help

Browser

- plpgsql
- postgres
- 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
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 - Indexes
 - Rules
 - Triggers
 - spatial_ref_sys
 - Trigger Functions
 - Types
 - Views

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

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)

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

File Geodatabase
(no marks)

WG = 'PJ' AND HT_M > 5

Personal Geodatabase
(square brackets)

[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'

Select By Attributes

Layer: Batas_Administrasi_Penduduk

☐ Only show selectable layers in this list

Method: Create a new selection

"FID"
 "DESA"
 "KECAMATAN"
 "Laki_laki"
 "Perempuan"

= <> Like
 > >= And
 < <= Or
 _ % () Not
 Is In Null

'Berbah'
 'Cangkringan'
 'Depok'
 'Gamping'
 'Godean'
 'Kalasan'
 'Minggiri'

Get Unique Values Go To:

SELECT * FROM Batas_Administrasi_Penduduk WHERE:
 "KECAMATAN" = 'Gamping'

Clear Verify Help Load... Save...

OK Apply Close

estasi

SQL Operators

Arithmetic Operators

*	/	+	-
---	---	---	---

Comparison Operators

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

Logical Operators

AND	OR	NOT
-----	----	-----



Bersama Respati Raih Prestasi

Logika And (Boolean)

B A	True	False
	True	False
True	True	False
False	False	False



Bersama Respati Raih Prestasi

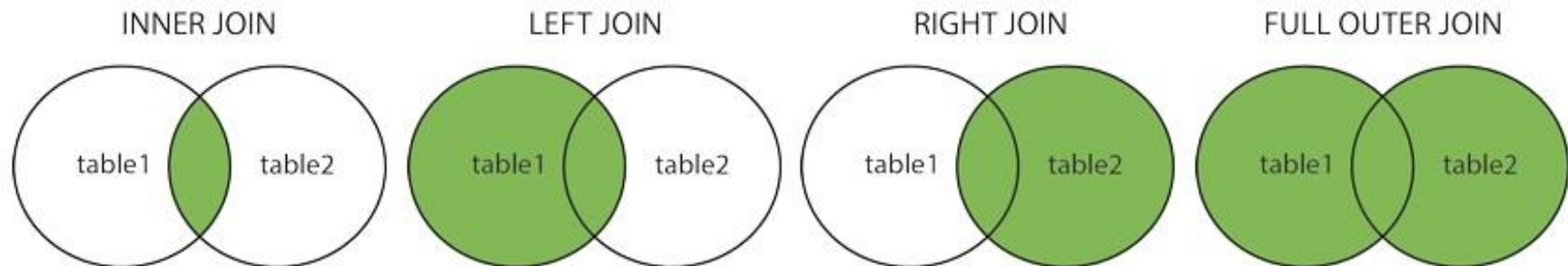
Logika Or (Boolean)

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



Bersama Respati Raih Prestasi

Terima Kasih



Tugas Pertemuan – 09: [23 November 2021]

Carilah peta wilayah Kabupaten Sleman kemudian tampilkan:

1. Objek Data Spasial
2. Objek Data Non Spasial
3. Relasikan menggunakan Ms Visio atau DFD *Maker Online*.