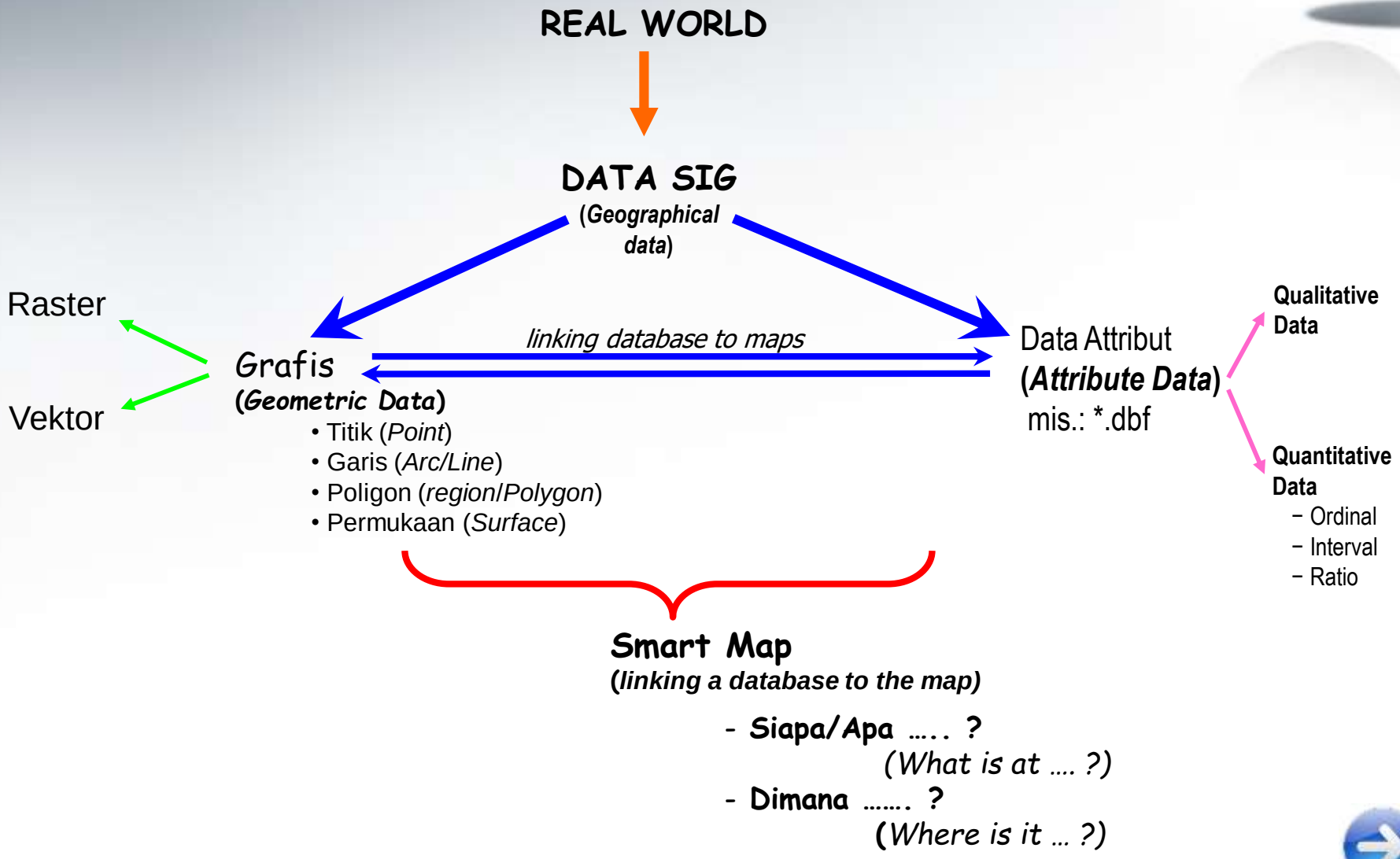
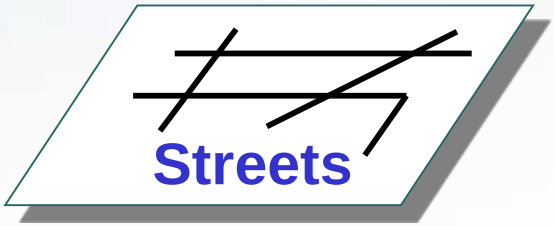
DATA SIG

DATA SPASIAL (SIG)



Components of geographic data

- Three general components to geographic information



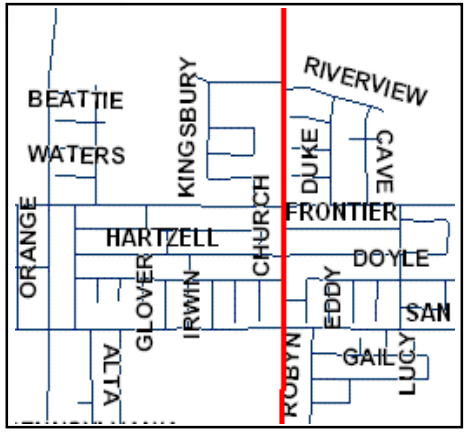
Attributes

Attributes of street

STR_NAME	STR_TYPE
CONE CAMP	RD
CHURCH	ST
OPAL	RD
CHURCH	ST
DISHONG	ST
STATE 30	HWY
STATE 30	HWY
STATE 30	HWY
STATE 30	HWY
OPAL	AV
OPAL	AV

Record: 1

Geometry



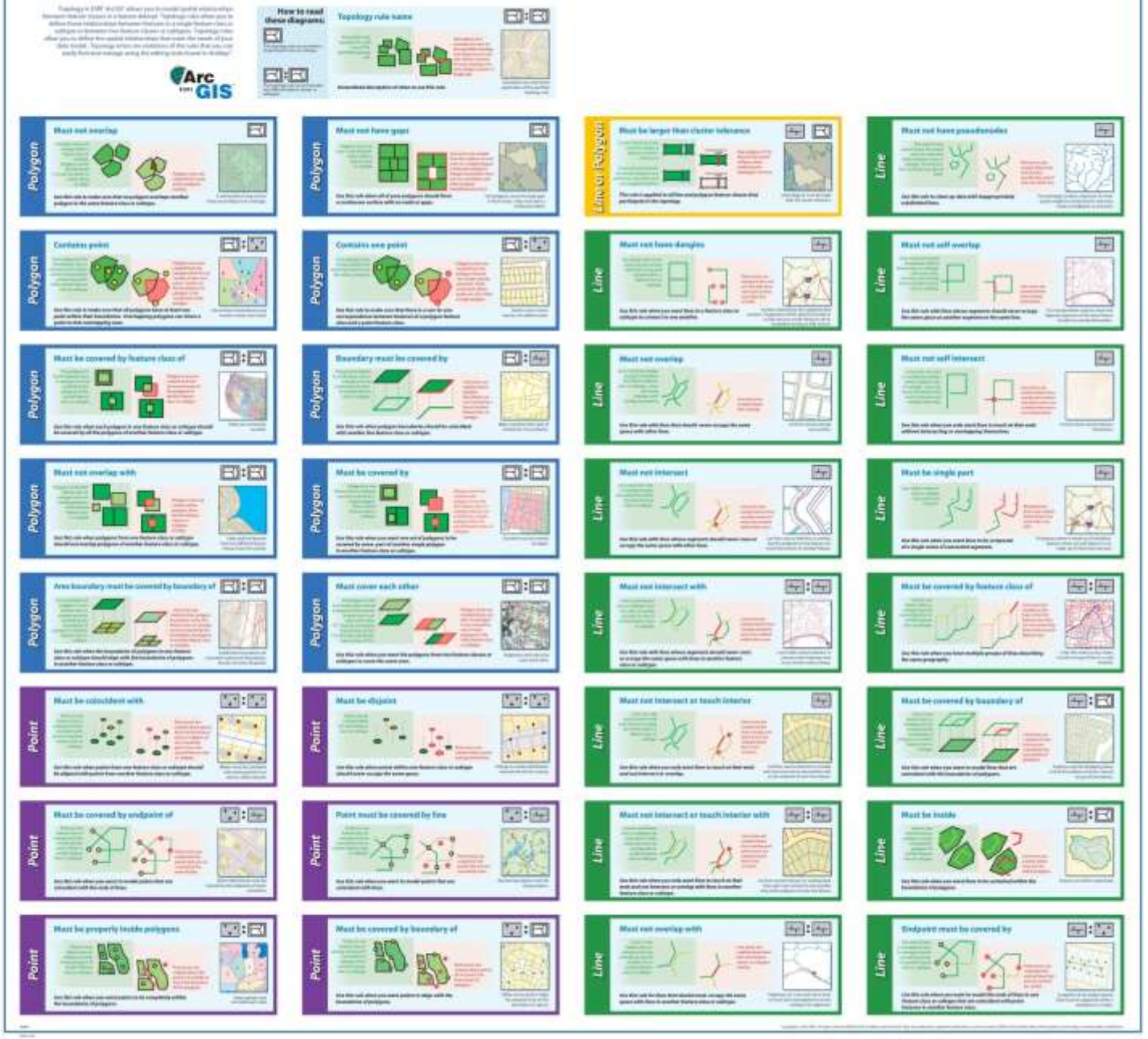
Behavior

Rules

Streets and highways may not intersect

ArcGIS® Geodatabase Topology Rules

ArcGIS® Geodatabase Topology Rules



DATA GRAFIS (*GRAPHIC DATA*) - Spatial data

Says ***where*** the feature is

- Co-ordinate based
- Vector data – discrete features:
  - Points
  - Lines
  - Polygons (zones or areas)
- Raster data:
  - A continuous surface

DATA GRAFIS (*GRAPHIC DATA*)

- *continuous:* elevasi, curah hujan, salinitas air laut

- *area:*
  - *unbounded:* penggunaan lahan, area pasar, jenis tanah, jenis batuan
  - *bounded:* batas kota/negara, persil
  - *moving:* massa udara, kumpulan binatang, kumpulan ikan

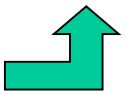
- *networks:* jalan, pipa/kabel transmisi, sungai

- *points:*
  - *fixed:* sumur, lampu jalan, alamat
  - *moving*: mobil, ikan, rusa

DATA ATTRIBUT (*ATRIBUTE DATA*)

Says ***what*** a feature is

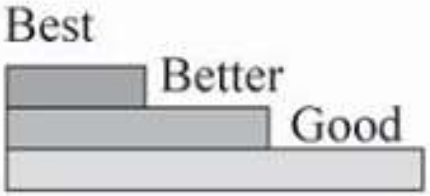
Eg. statistics, text, images, sound, etc.



Attribute Data

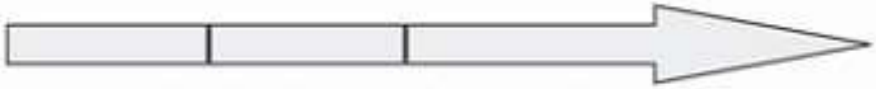
ATTRIBUTE DATA

Qualitative Data



Qualitative Data

Ordinal Data



A 0-10 yrs **B** 10-25 yrs **C** more than 25

Interval Data

R.F. 1:500000

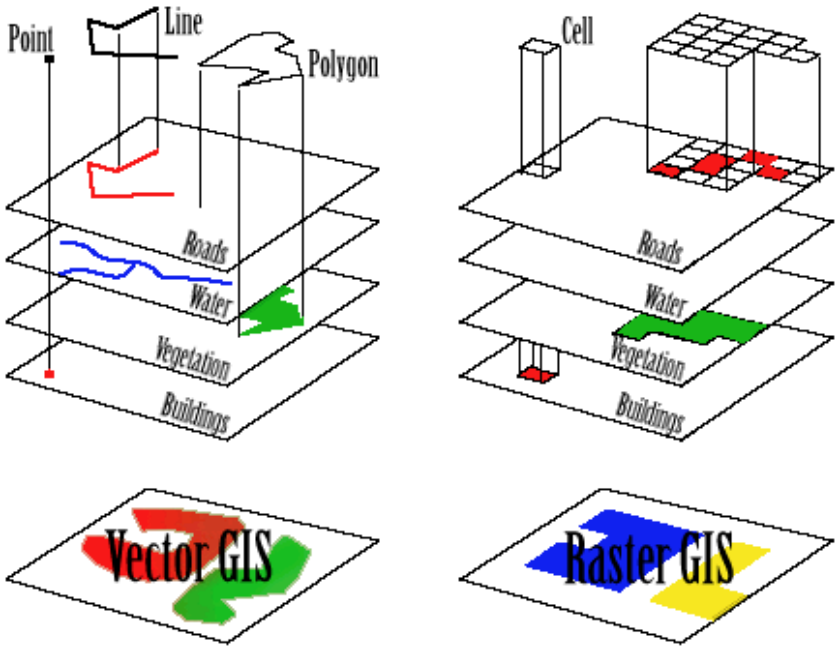
Ratio Data

MODEL DATA SIG

(*Spatial database models*)

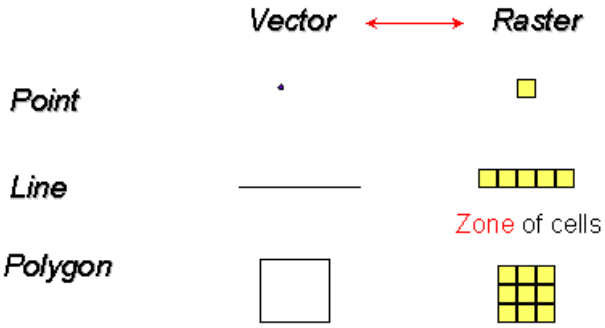
Spatial database models

- Vector – points, lines and polygons
- Raster – gridded, classified space



Raster and Vector Data

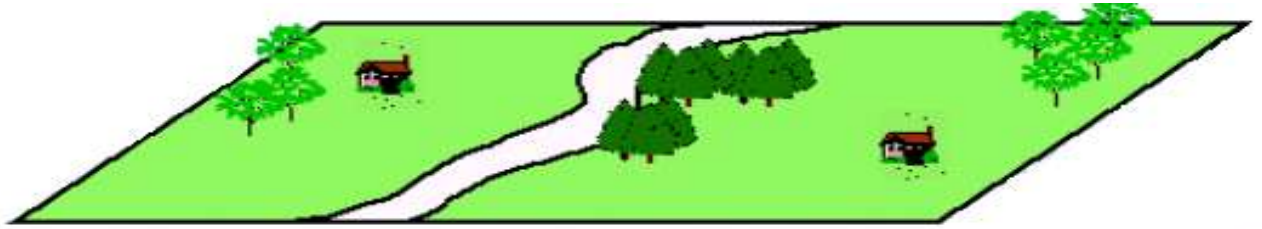
Raster data are described by a cell grid, one value per cell



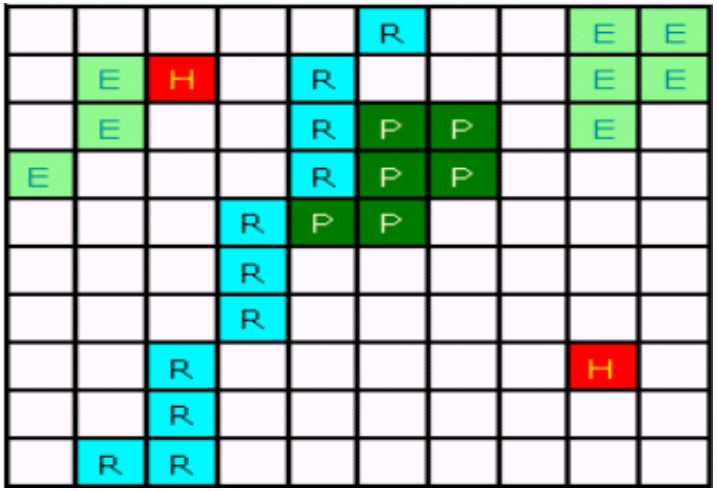
Data Layers in the Database

- Organize by feature type
  - point
  - line
  - polygon
- Organize by thematic grouping
  - roads (lines)
  - land use (polygons)
  - soils (polygons)
  - wells (points)

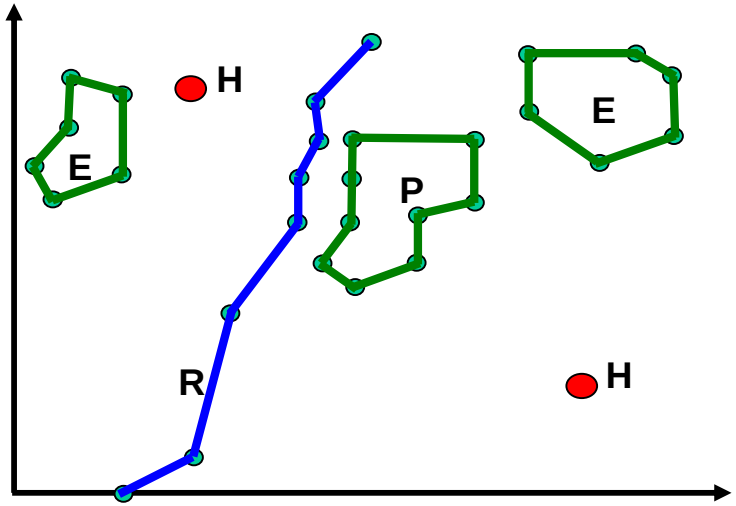
Spatial database models



Real World



Raster Representation



Vector Representation

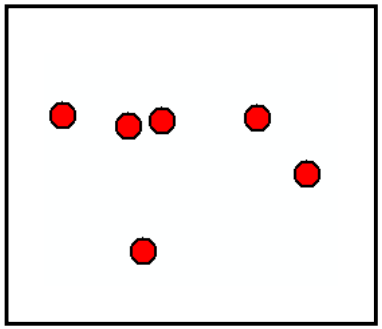
R = River E = Eucalypts P = Pine Forest H = House R = River

Table 8.1 Geographic data models used in GIS

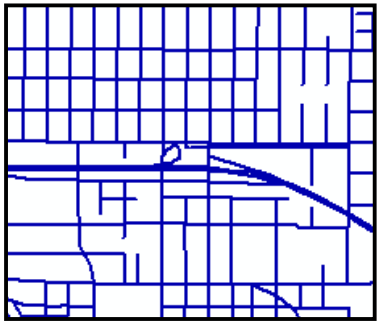
Data model	Example applications
Computer-Aided Design (CAD)	Automating engineering design and drafting.
Graphical (non-topological)	Simple mapping.
Image	Image processing and simple grid analysis.
Raster/Grid	Spatial analysis and modeling especially in environmental and natural resources applications.
Vector/Georelational topological	Many operations on vector geometric features in cartography, socio-economic and resource analysis, and modeling.
Network	Network analysis in transportation, hydrology, and utilities.
Triangulated Irregular Network (TIN)	Surface/terrain visualization, analysis, and modeling.
Object	Many operations on all types of entities (raster/vector/TIN, etc.) in all types of applications.

Representing features in vector data

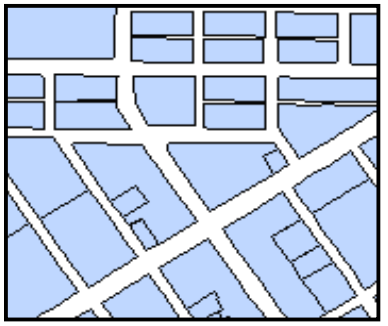
- Real-world entities are abstracted into three basic shapes



Points
(Fire hydrants)

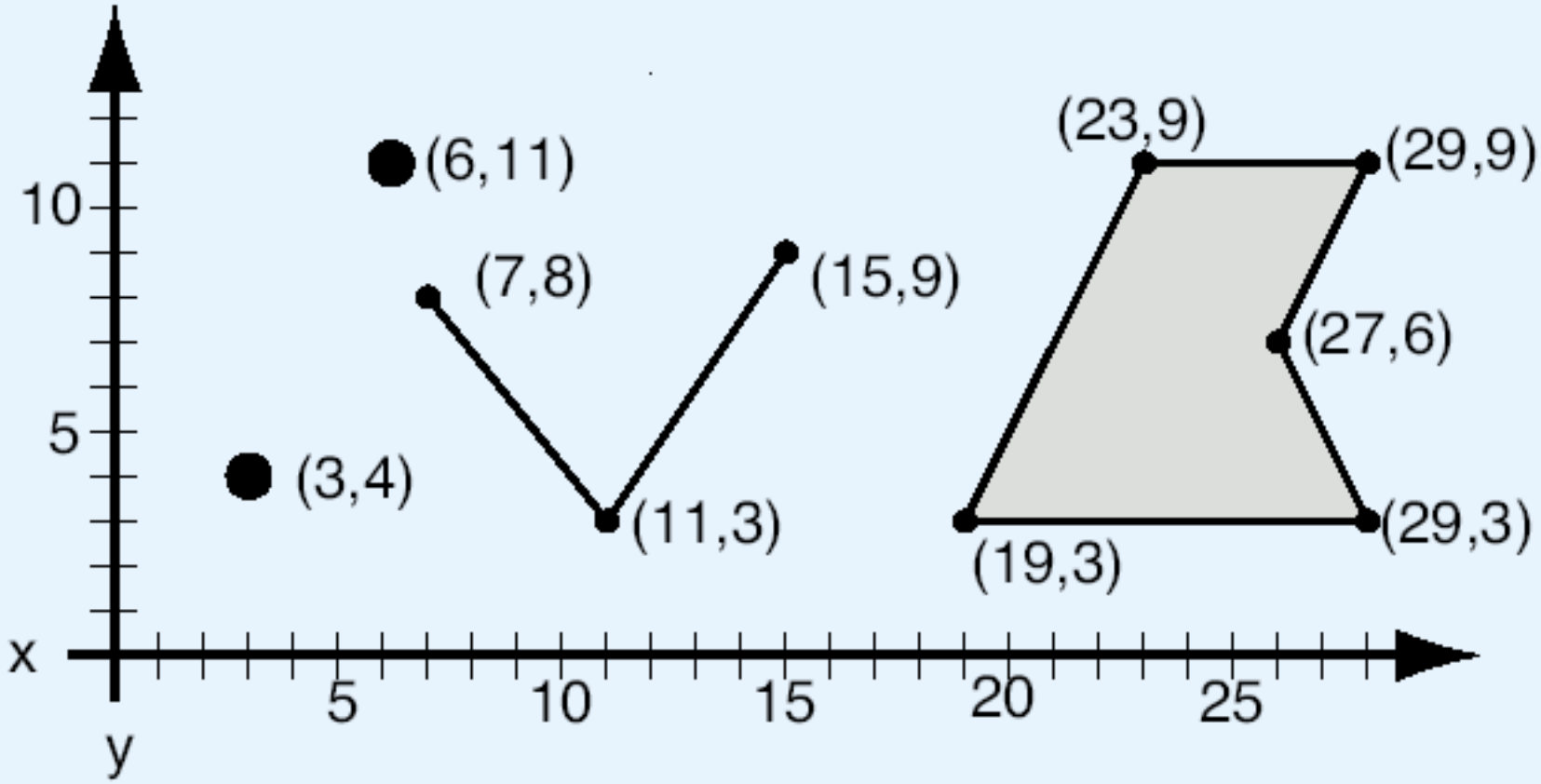


Lines
(Streets)



Polygons
(Parcels, Zoning)

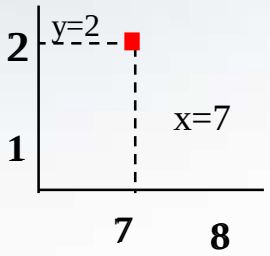
STRUKTUR DATA VEKTOR



STRUKTUR DATA VEKTOR

* **Titik (node/point): *0-dimension***
  - koordinat tunggal (x,y)
  - area/luasan nol

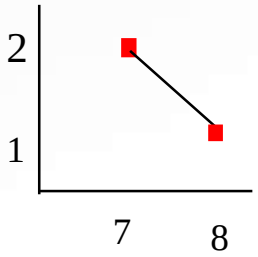
  contoh : pohon, sumur minyak, penempatan label



Point: 7,2

* **Garis (arc/line): *1-dimension***
  - dua (atau lebih] koordinat x,y yang dihubungkan

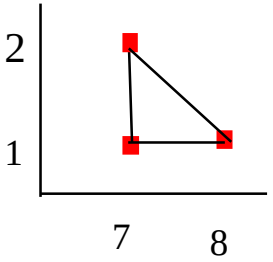
  contoh : jalan, sungai



Line: 7,2 8,1

* **Poligon (polygon/region) : *2-dimensions***
  - empat atau lebih koordinat x,y yang dihubungkan
  - koordinat awal dan akhir sama
  - area yang tertutup

  Contoh : daerah/propinsi, danau

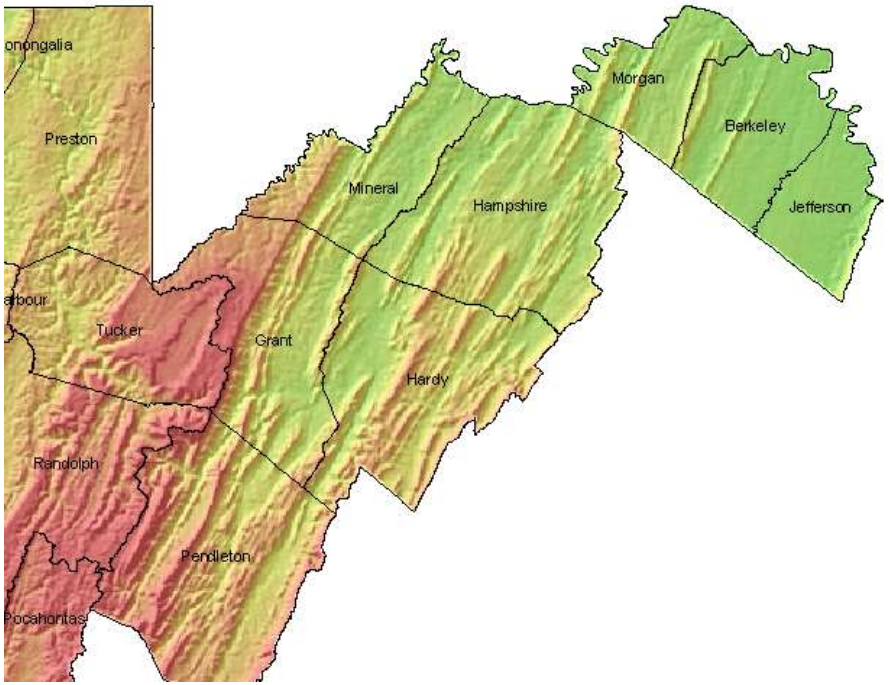


Polygon: 7,2 8,1 7,1 7,2

Raster datasets - GRIDs

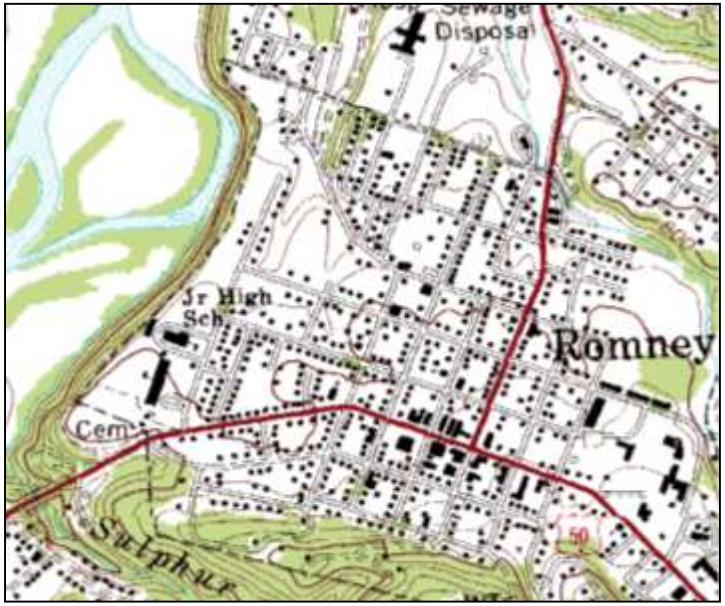
Common GRID format datasets:

- Land use/land cover
- Elevation (DEM)
  - Slope
  - Aspect
  - Shaded relief
- Precipitation
- Temperature

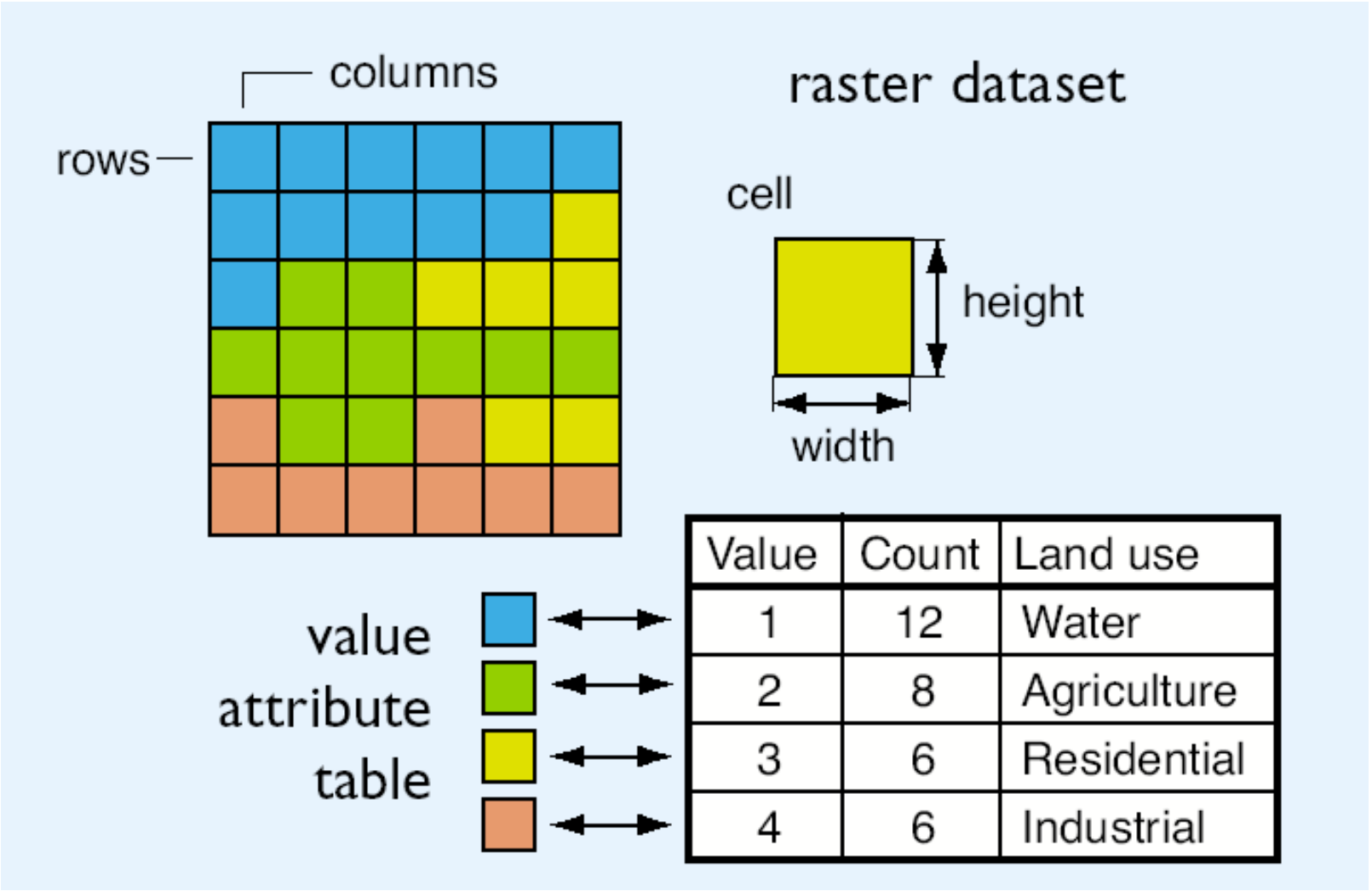


Representing features in the raster data model

- Square cells store values to represent reality
- Images
  - Aerial photos
  - Scanned photos or maps
  - Satellite imagery
- Grids
  - Values represent some measured quantity or classification (elevation, precipitation, land cover)

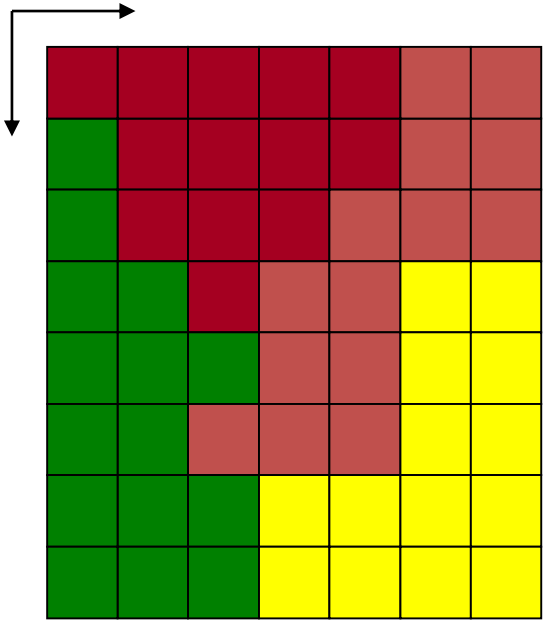


STRUKTUR DATA RASTER



Value	Count	Land use
1	12	Water
2	8	Agriculture
3	6	Residential
4	6	Industrial

RUN-LENGTH CODING



A. Mixed Conifer

B. Douglas Fir

C. Oak Savannah

D. Grassland

Row-by-row coding:

CCCCCBBDCCCCBBDCCCBBBDDCBBAADD
DDBAADDBBBAADDDAAAADDDAAAA

Run-length coding:

5C 2B 1D 4C 2B 1D 3C 3B 2D 1C 2B 2A 4D 1B
2A 2D 3B 2A 3D 4A 3D 4A

- **56 entries for 7x8 array, or**
- **22 pairs (44 entries) for 7x8 array**

Perbandingan Struktur Data Vektor dan Raster

Parameter	Vektor	Raster
Akurasi	Akurat dan lebih presisi	Sangat bergantung dengan ukuran grid/sel
Atribut	Relasi langsung dengan DBMS (database)	Grid/sel merepresentasikan atribut. Relasi dengan DBMS tidak secara langsung
Kompleksitas	Tinggi. Memerlukan algortima dan proses yang sangat kompleks	Mudah dalam mengorganisasi dan proses
Output	Kualitas tinggi sangat bergantung dengan plotter/printer dan kartografi	Bergantung terhadap output printer/plotter
Analisis	Spasial dan atribut terintegrasi. Kompleksitasnya sangat tinggi	Bergantung dengan algortima dan mudah untuk dianalisis
Aplikasi dalam Remote Sensing	Tidak langsung, memerlukan konversi	Langsung, analisis dalam bentuk citra sangat dimungkinkan
Simulasi	Kompleks dan sulit	Mudah untuk dilakukan simulasi
Input	Digitasi, dan memerlukan konversi dari scanner	Sangat memungkinkan untuk diaplikasikan dari hasil konversi dengan menggunakan scan
Volume	Bergantung pada kepadatan dan jumlah verteks	Bergantung pada ukuran grid/sel
Resolusi	Bermacam-macam	Tetap

Sumber : Economic and Social Comminssion for Asia and the Pasific (1996) dan A. Longley, et al. (2001), dlm dhani@bdg.centrin.net.id