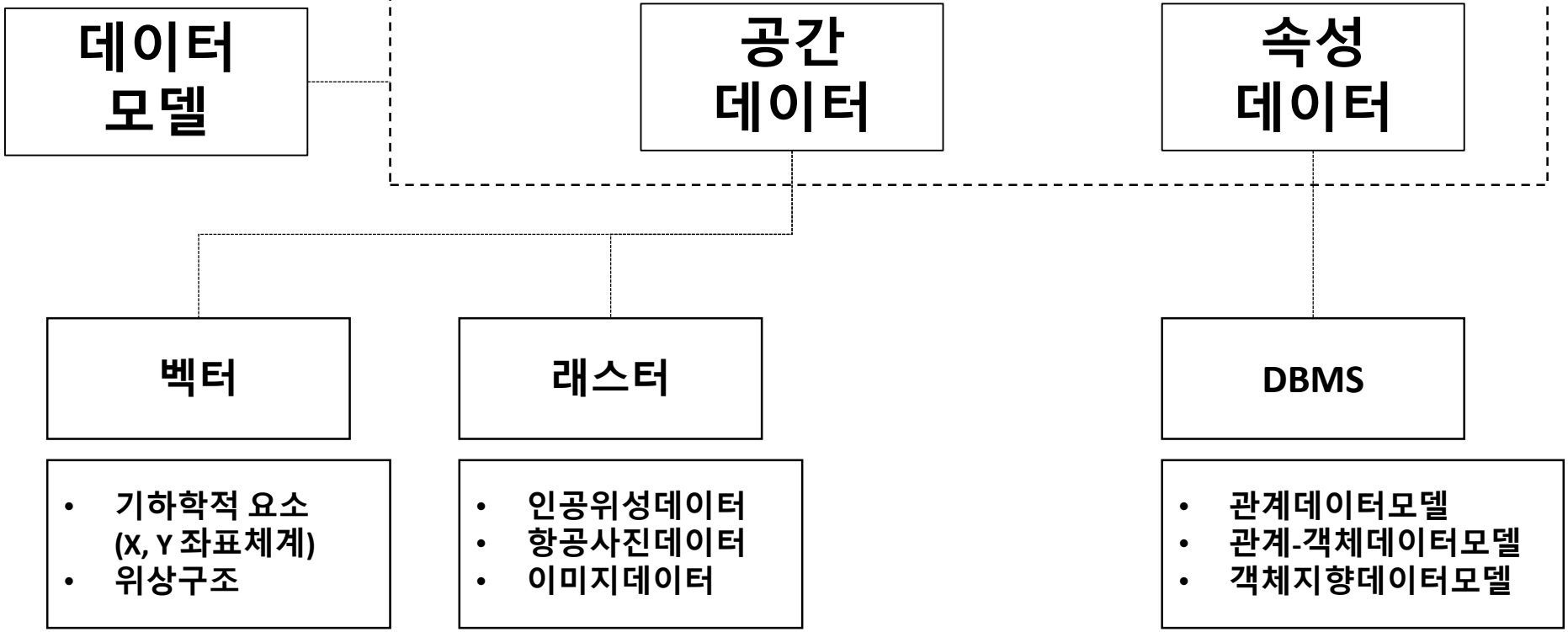
데이터 모델

Data model

데이터 모델

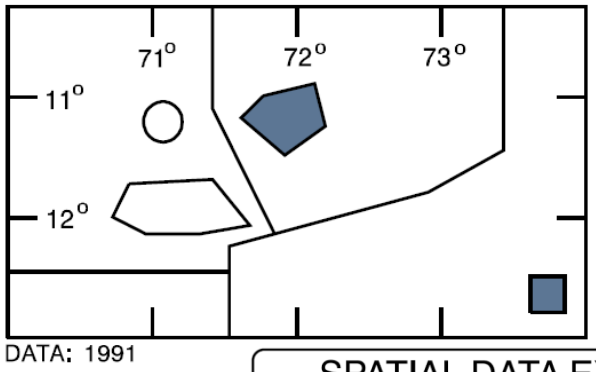
GIS 데이터

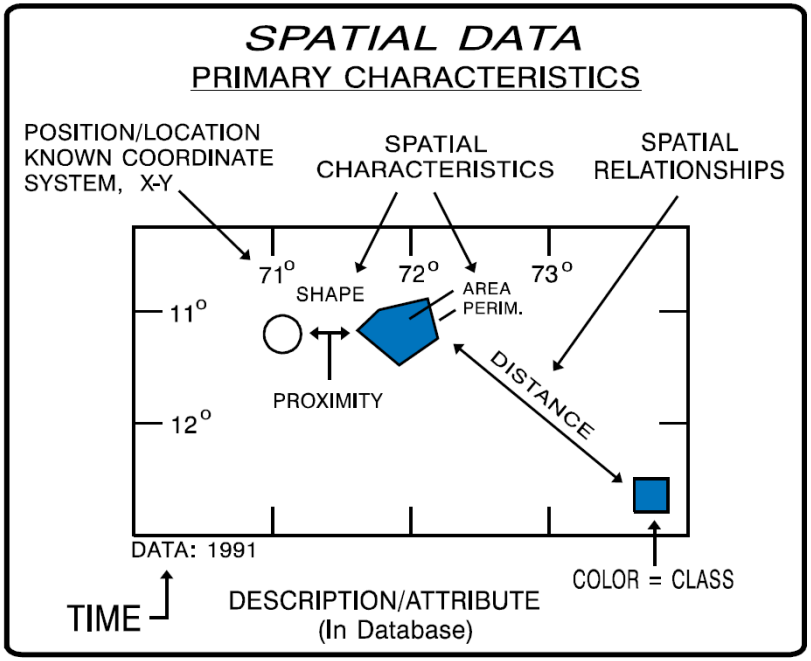


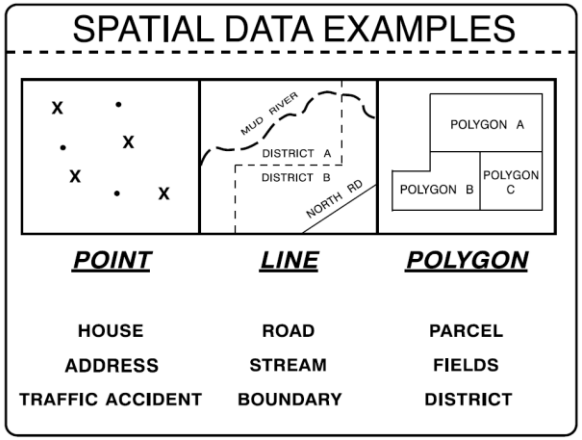
데이터 모델

공간 데이터

SPATIAL DATA





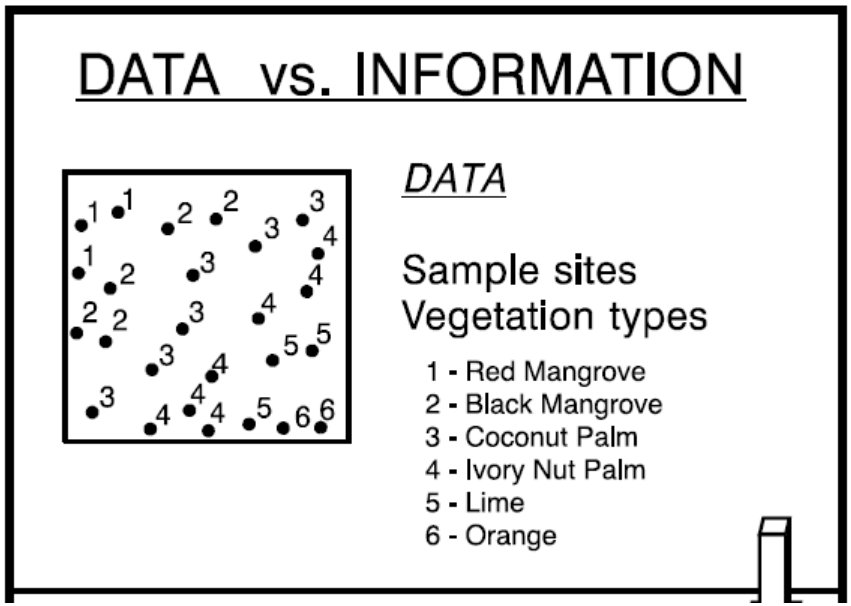


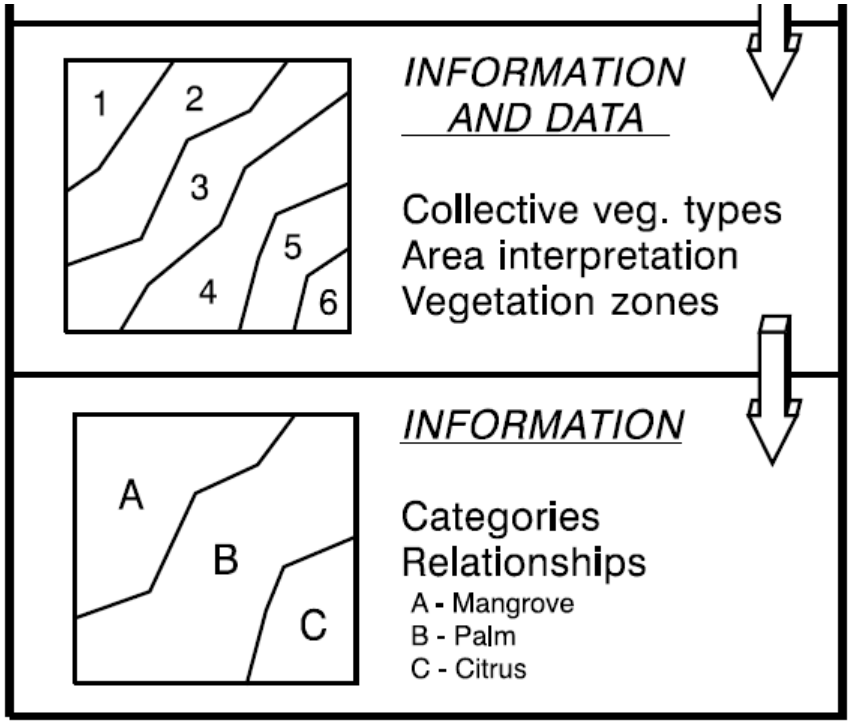
Object

Feature

데이터 모델

데이터 VS 정보

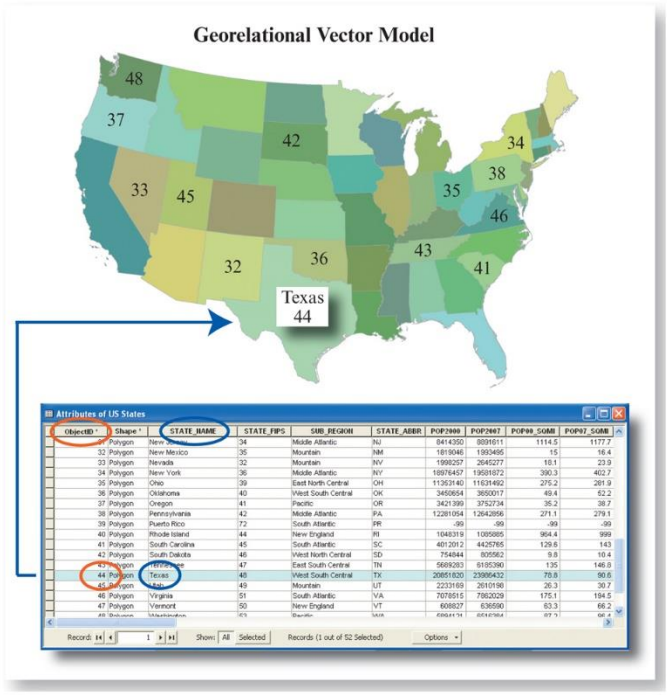


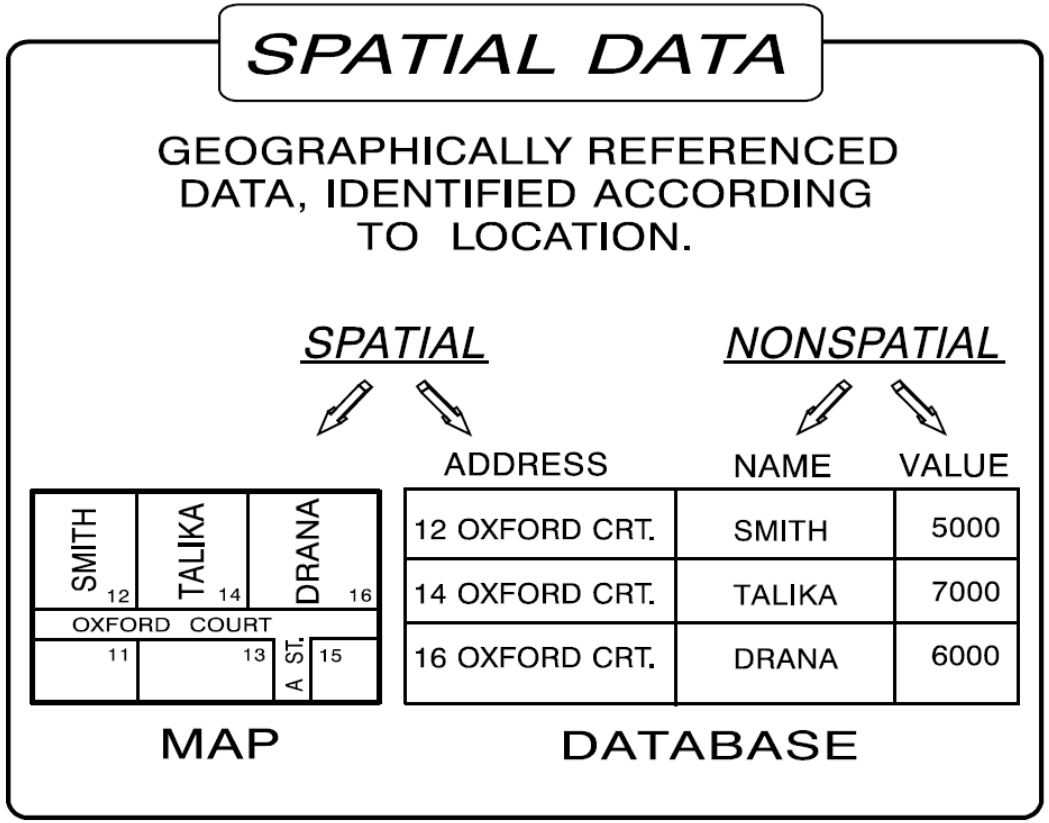


데이터 모델

공간 데이터 구분

- **Spatial & Non Spatial**
- **Map & Database**





데이터 모델

데이터베이스 (속성정보)

- 데이터가 표 형태로 저장 (관계형)
- 행 = 레코드(record)
- 열 = 필드(field)

- 정렬 / 검색 / 필터 등

DATABASE

AREA	NAME	SIZE (SQ KM)	MAJOR CROP	POP (000)
A	DUBOP	11	RICE	1.1
B	JUMOM	22	RICE	1.7
C	TEROP	21	NONE	2.0
D	EERTO	17	RICE	0.7
E	BUROP	20	FRUIT	0.3

DATABASE: A list or table of data arranged by:
Columns: categories of data termed "Fields"
Rows: "Record" of each entry or observation.

DATABASE

SELECTION OPTIONS

AREA	NAME	SIZE (Ha)	MAJOR CROP	POP (000)	
A	DUBOP	11	RICE	1.1	+ 0.3 = 1.4
B	JUMOM	22	RICE	1.7	
C	TEROP	21	NONE	2.0	
D	EERTO	17	RICE	0.7	
E	BUROP	20	FRUIT	0.3	

1. List selected records. ***LIST B***
   List selected fields. ***LIST CROPS***

2. Sort any field alphabetically or numerically. ***SORT NAMES***
   Sort any field ascending or descending.

3. List by range of field data.
   SHOW POPULATION 1,100 - 1,800

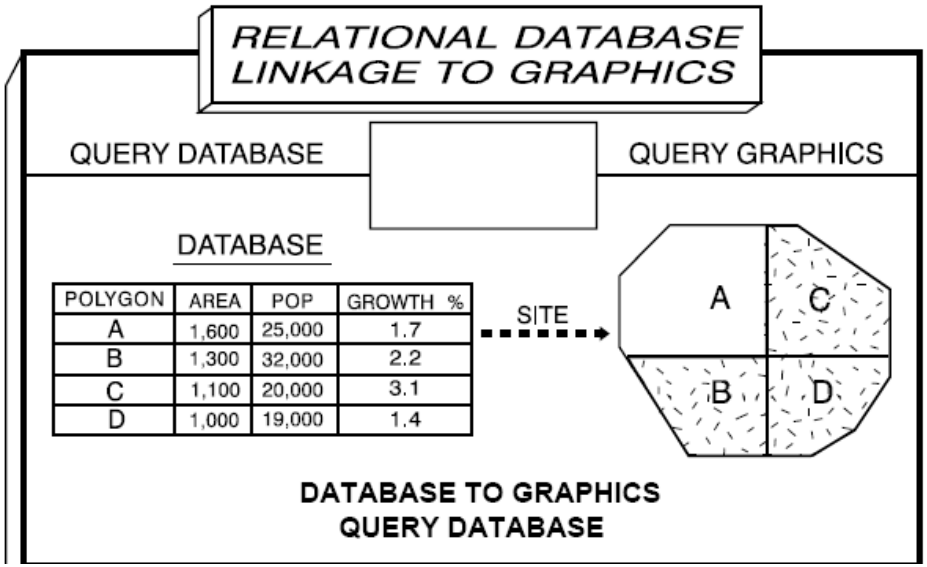
4. Any combination of above.
   SHOW AREAS > 18 Ha, NOT RICE, POP > 1.3

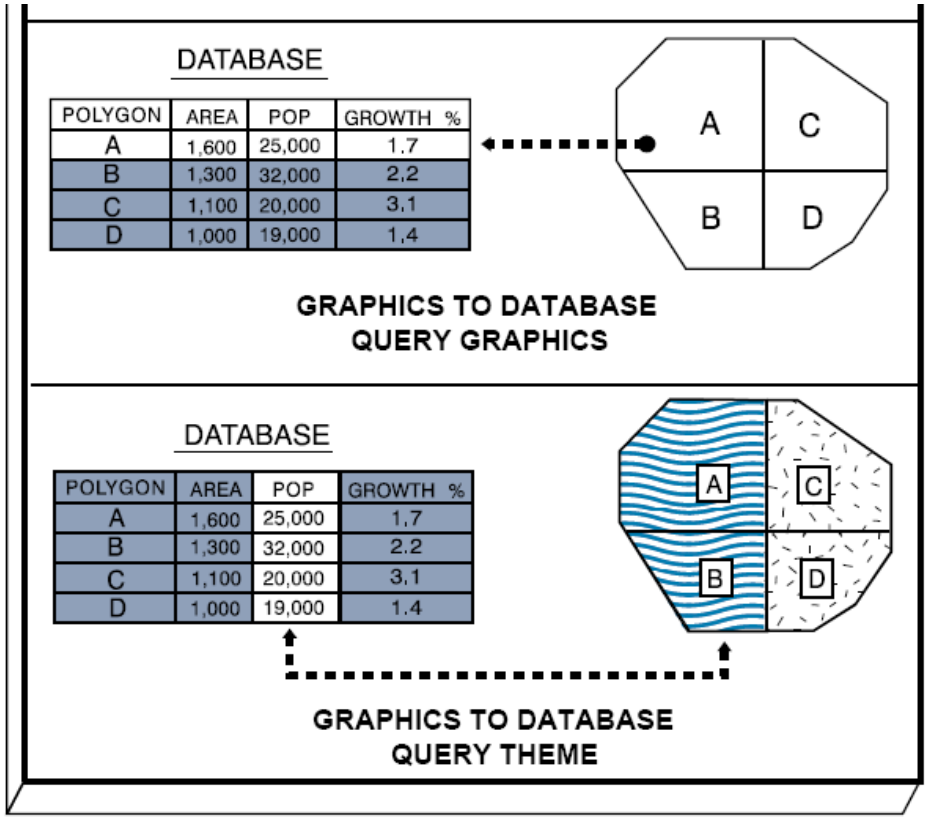
5. Can be modified or appended.
   MODIFY: ADD 0.3 TO AREA A POP

데이터 모델

데이터베이스(속성정보)와 공간 연계

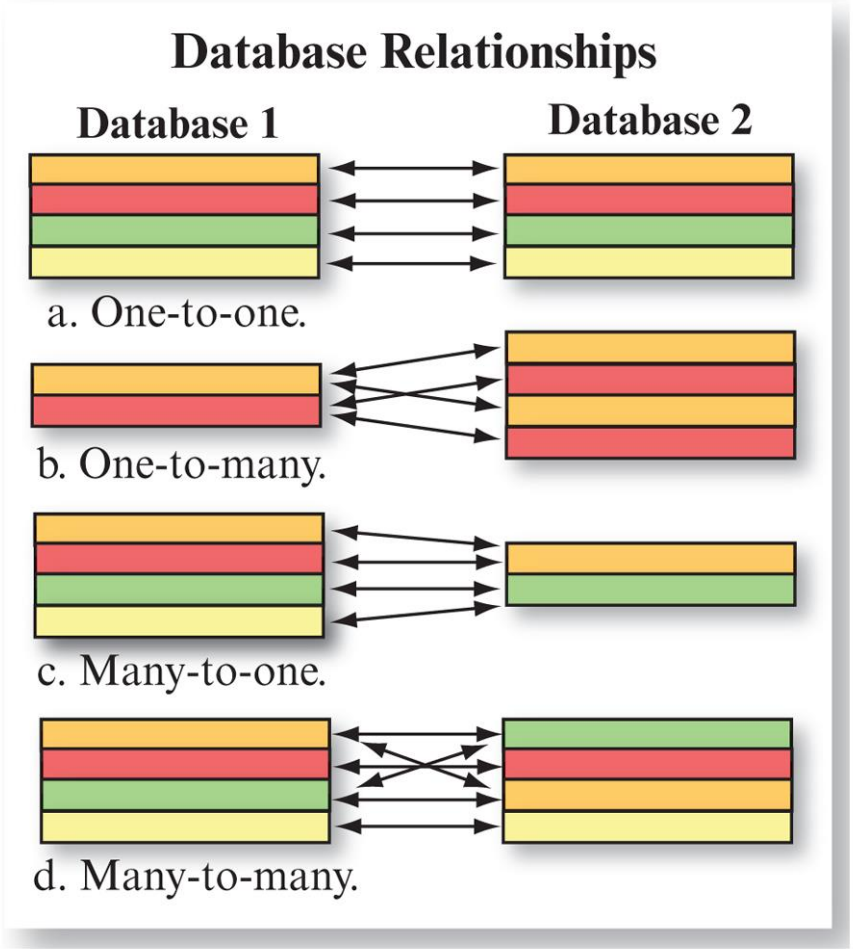
- 해당 ID 체계를 통해 공간 데이터와 연계
- 연계하여 쿼리(검색) 가능

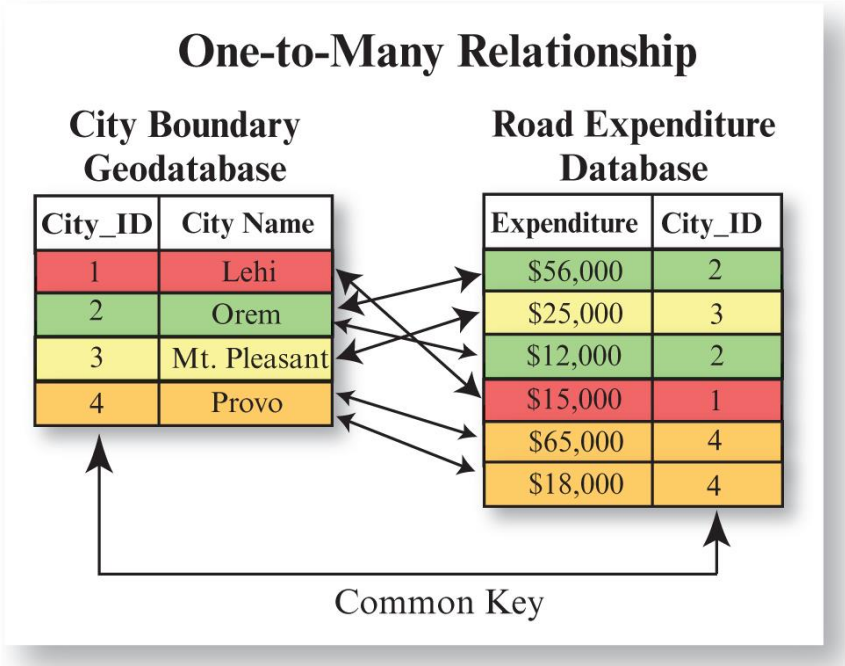




데이터 모델

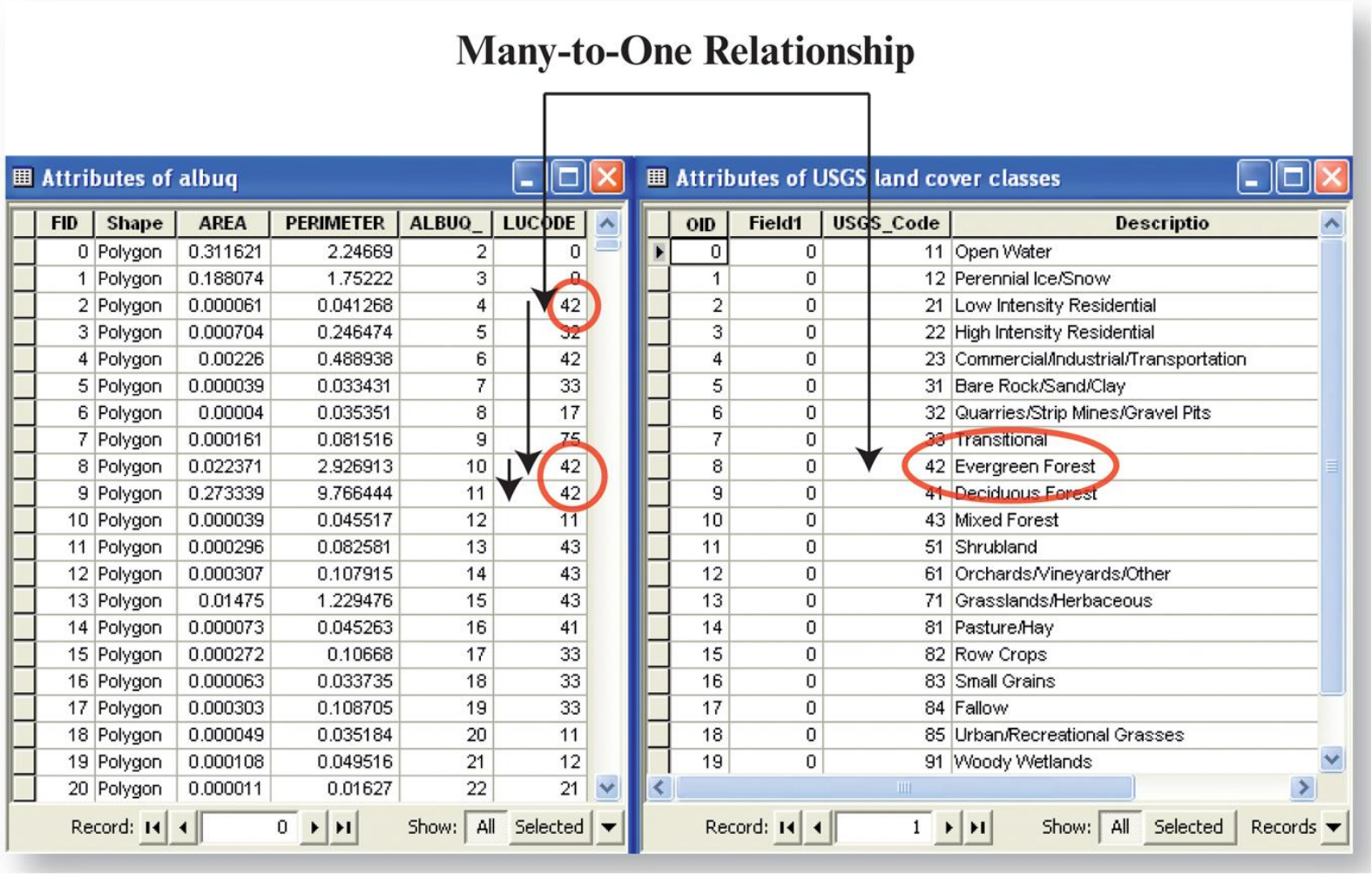
데이터베이스 모델





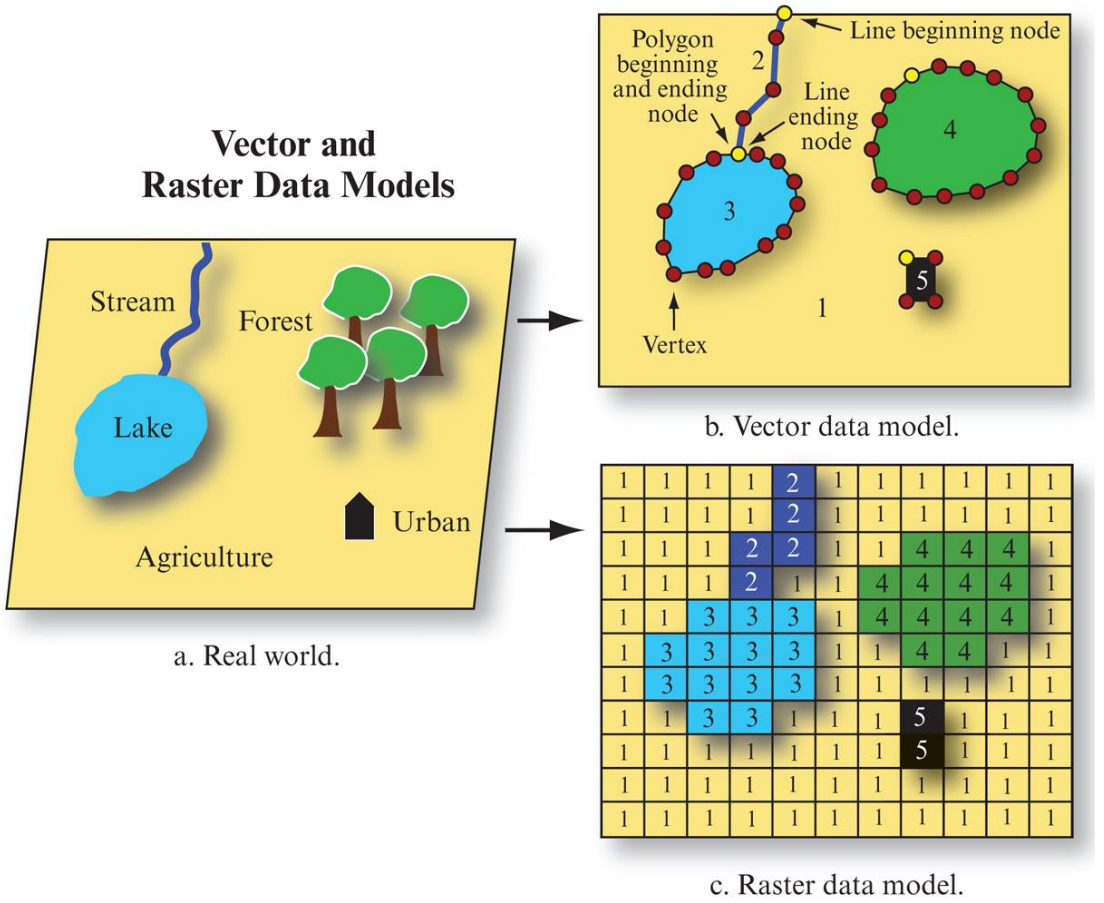
데이터 모델

공간 속성 Many to One Relationshop



데이터 모델

벡터 데이터와 래스터 데이터 모델



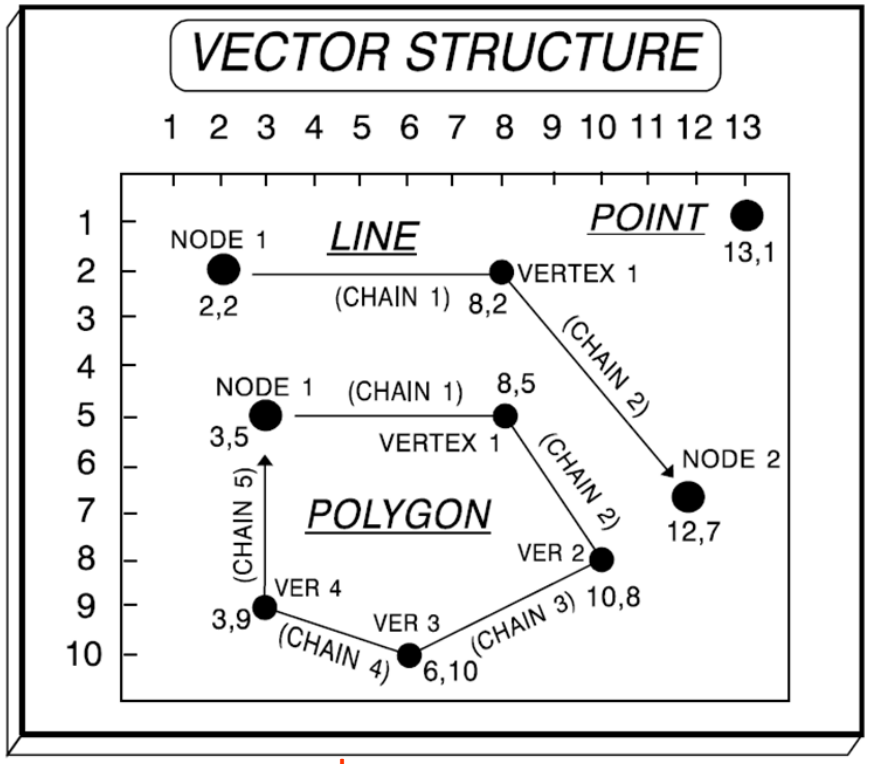
Point
Line
Polygon

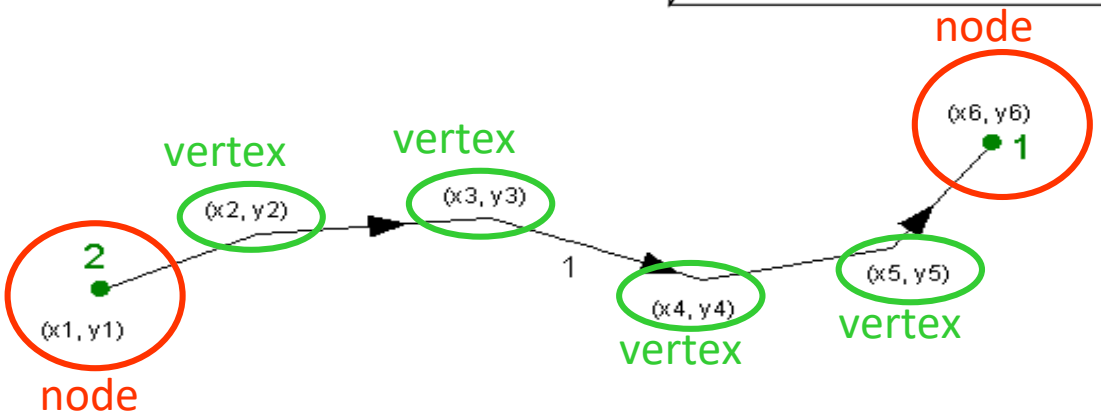
Pixel

데이터 모델

벡터 데이터 구조

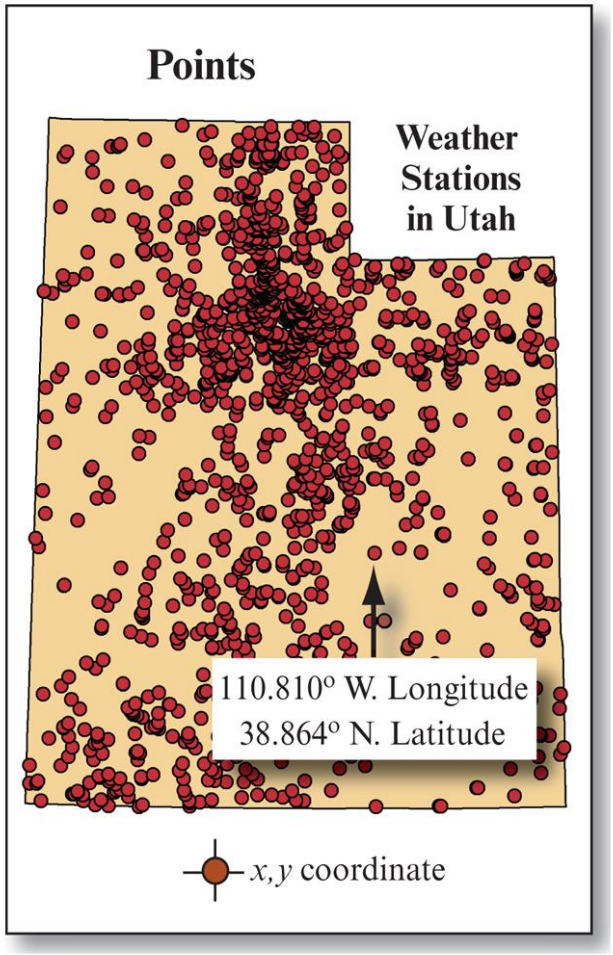
- Node
- Vertex
- Line
- Chain = Arc
- Line segment
- Line string





데이터 모델

벡터 데이터 타입



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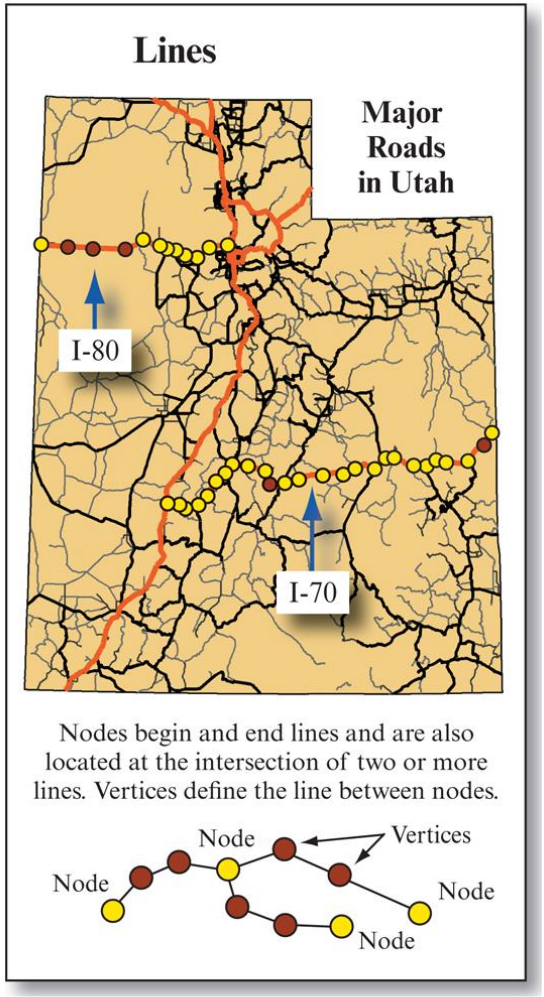

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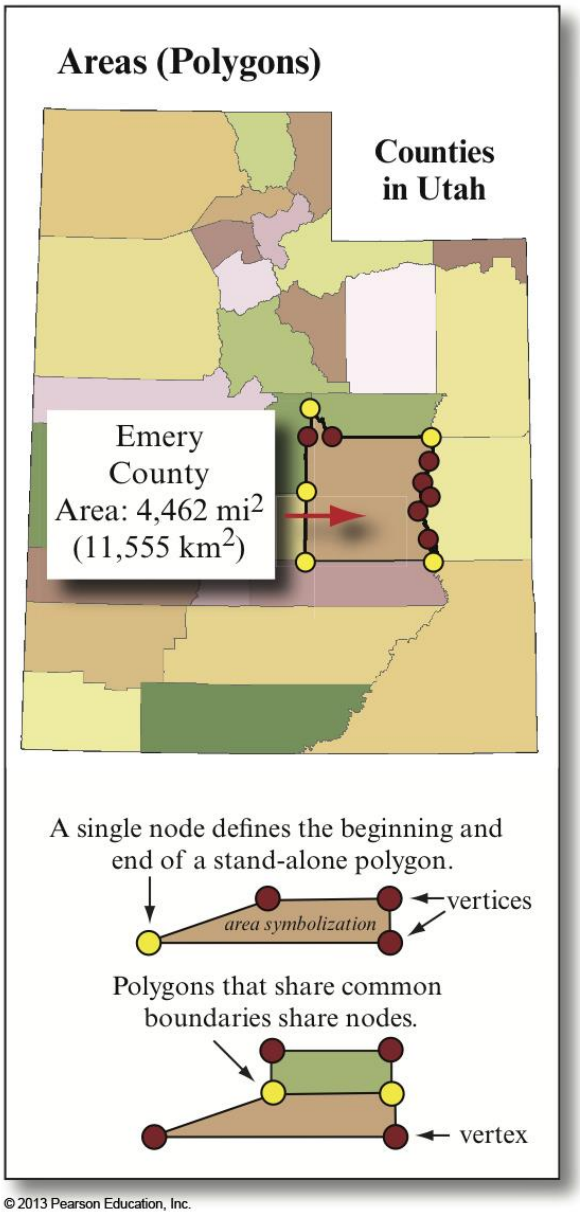

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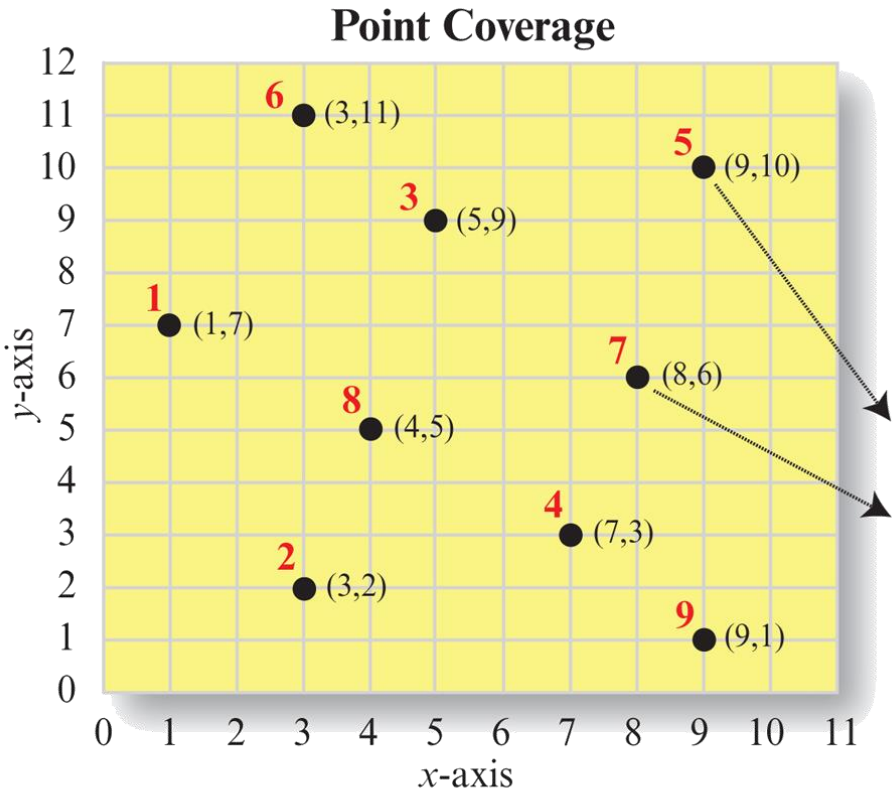
데이터 모델

벡터 데이터(Point)

- Layer / Coverage

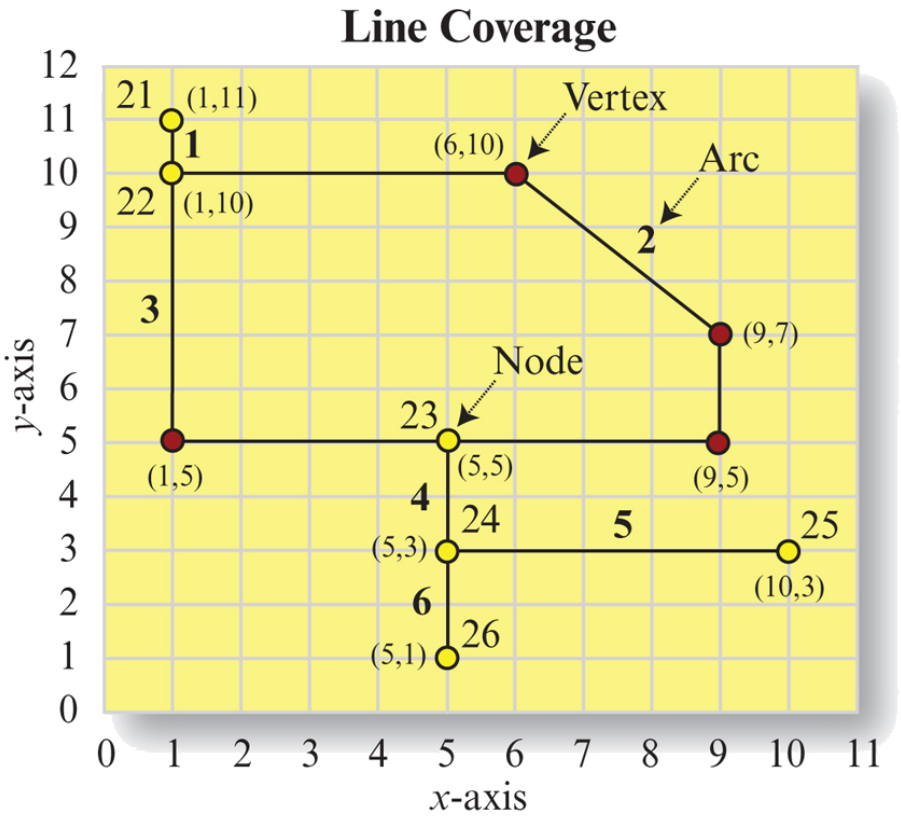


Point Attribute Table	
ID	*x*,*y* Coordinates
1	1,7
2	3,2
3	5,9
4	7,3
5	9,10
6	3,11
7	8,6
8	4,5
9	9,1

데이터 모델

벡터 데이터(Line)

- Fnode Tnode



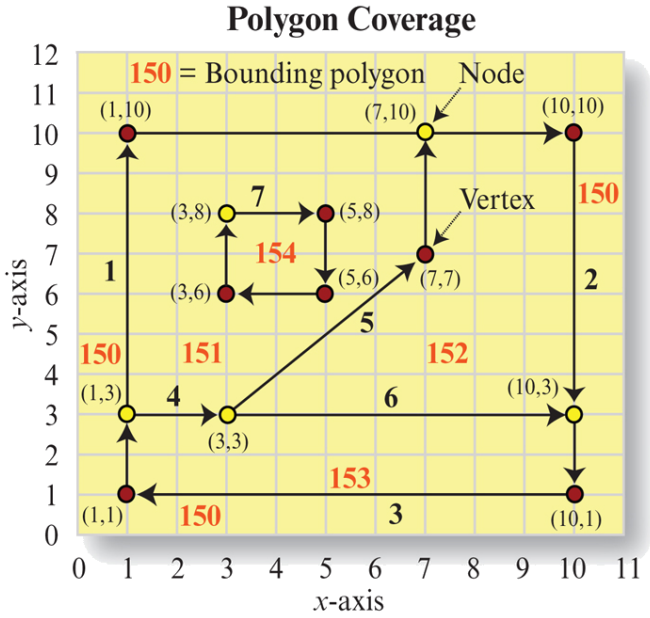
Arc Nodes		
Arc	*From* node	*To* node
1	21	22
2	22	23
3	23	22
4	23	24
5	24	25
6	24	26

Arc Coordinates	
Arc	*x,y* Coordinates
1	(1,11) (1,10)
2	(1,10) (6,10) (9,7) (9,5) (5,5)
3	(5,5) (1,5) (1,10)
4	(5,5) (5,3)
5	(5,3) (10,3)
6	(5,3) (5,1)

데이터 모델

벡터 데이터(Polygon)

- **Shapefile**
- **Exchange file format**



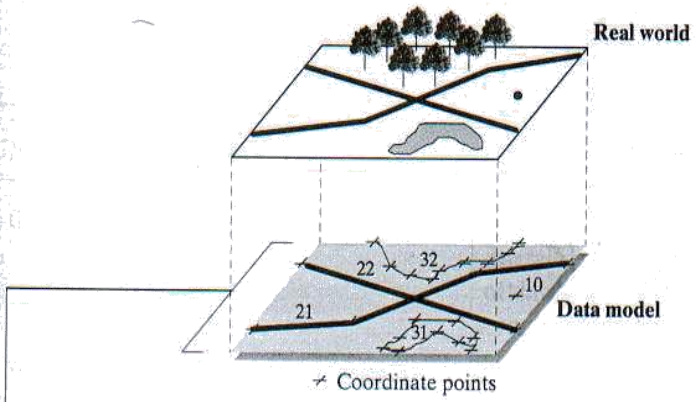
Left-Right Polygons		
Arc	Left Polygon	Right Polygon
1	150	151
2	150	152
3	150	153
4	151	153
5	151	152
6	152	153
7	151	154

Polygon Arcs	
Polygon	Arc
151	1,4,5,0,7
152	5,2,6
153	6,3,4
154	7

Arc Coordinates	
Arc	*x,y* Coordinates
1	(1,3) (1,10) (7,10)
2	(7,10) (10,10) (10,3)
3	(10,3) (10,1) (1,1) (1,3)
4	(1,3) (3,3)
5	(3,3) (7,7) (7,10)
6	(3,3) (10,3)
7	(3,8) (5,8) (5,6) (3,6) (3,8)

데이터 모델

스파게티 데이터 모델



Stored data

Feature ID	Feature Type	Location
10	Point	xy
21	Line	$x_1y_1, x_2y_2, x_3y_3 \ldots x_ny_n$ (string)
22	Line	$x_1y_1, x_2y_2, x_3y_3 \ldots x_ny_n$ (string)
31	Polygon	$x_1y_1, x_2y_2, x_3y_3 \ldots x_1y_1$ (closed loop)
32	Polygon	$x_1y_1, x_2y_2, x_3y_3 \ldots x_1y_1$ (closed loop)

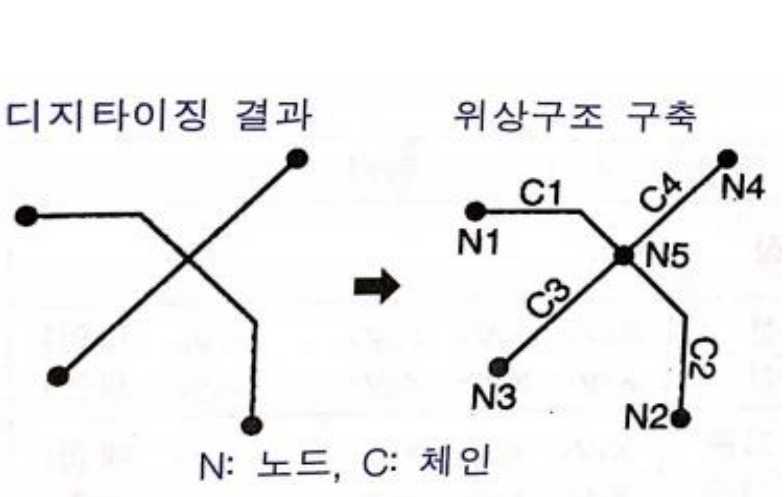
FIGURE 3.20
The Spaghetti Data Model. The Spaghetti Data Model stores geographic data in the form of graphical elements (point, line, and polygon), but not as individually identifiable graphical entities such as a lake, a wooded area, or a highway.

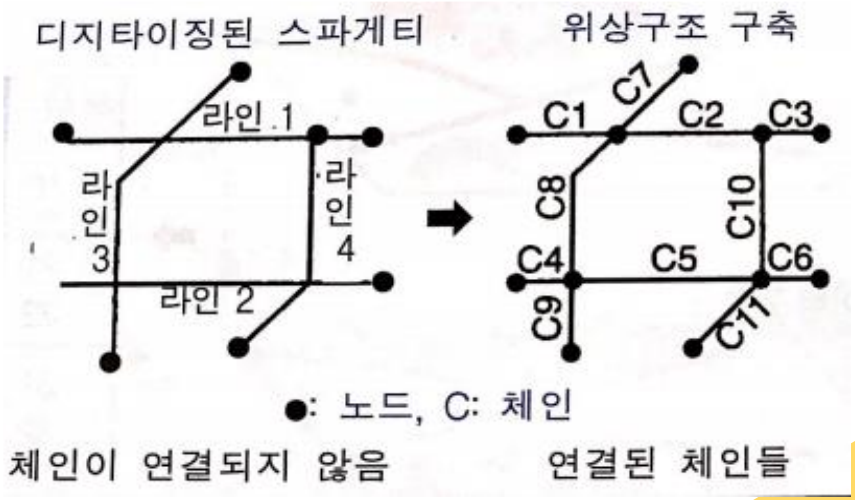
- 구조화 되어있지 않은 그래픽 모형
- 객체가 단순히 일련의 X, Y좌표에 의한 그래픽 형태로 저장(점, 선, 면적)
- 객체들간의 공간 관계에 대한 정보 X
- 인접 다각형의 경계 변은 두 번씩 중복 저장
- 객체들의 공간 관계가 없으므로 계산에 의해 정보를 생성해야하므로 분석시 비효율적
- 매우 간단하고 이해하기 쉬움
- 위상구조가 없기 때문에 간단한 수치지도를 제작하고 갱신하는 경우 오히려 효과적

데이터 모델

위상 구조 (토폴로지 자료구조)

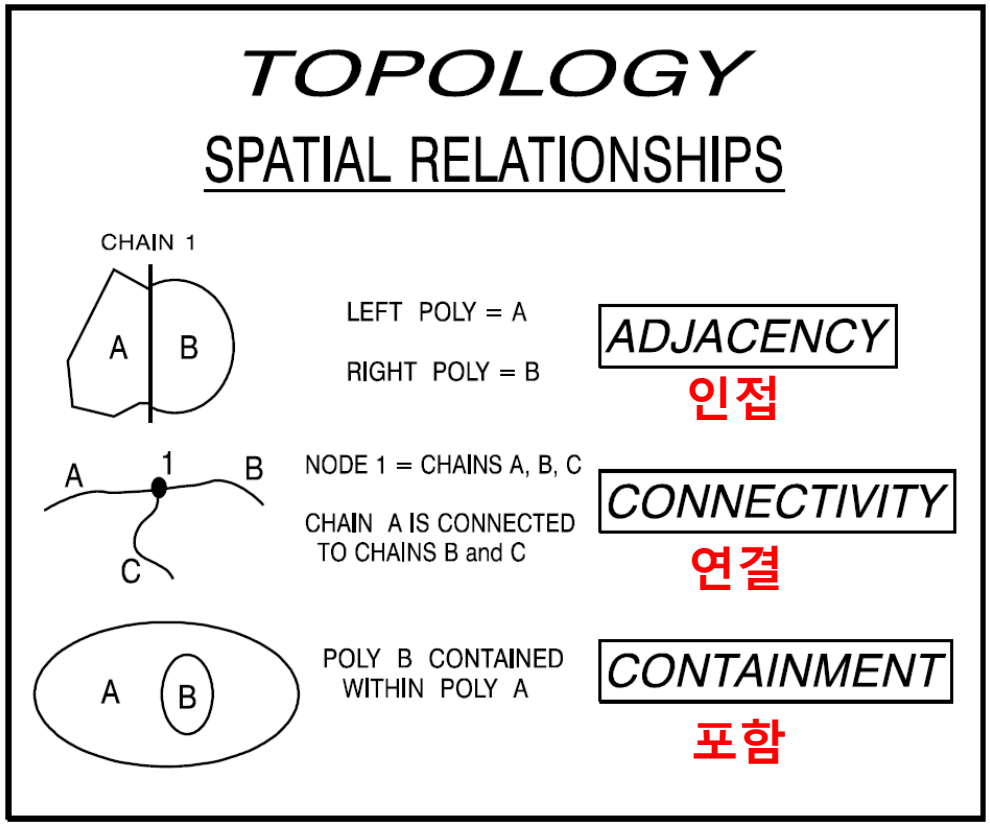
- 객체들간 공간 관계를 파악
- 선과 선이 만나는 교차점에 노드가 형성
- 노드와 선에 대해서는 체인으로 고유 아이디 생성
- 다양한 공간 분석 기능을 수행할 수 있음
- 하지만, 많은 속성 테이블이 생성되며, 데이터가 갱신 될 때마다 위상 구조가 바뀌므로 많은 시간 소요. 그렇기 때문에 일반적인 수치 지도를 제작할 때에는 이로 구축하는 것이 비 효율적일 수 있음

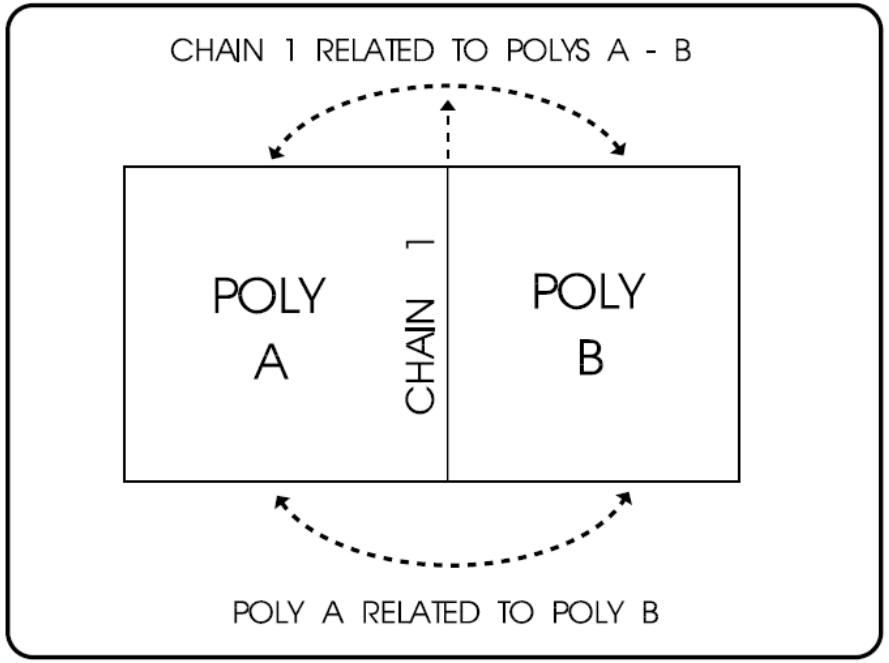




데이터 모델

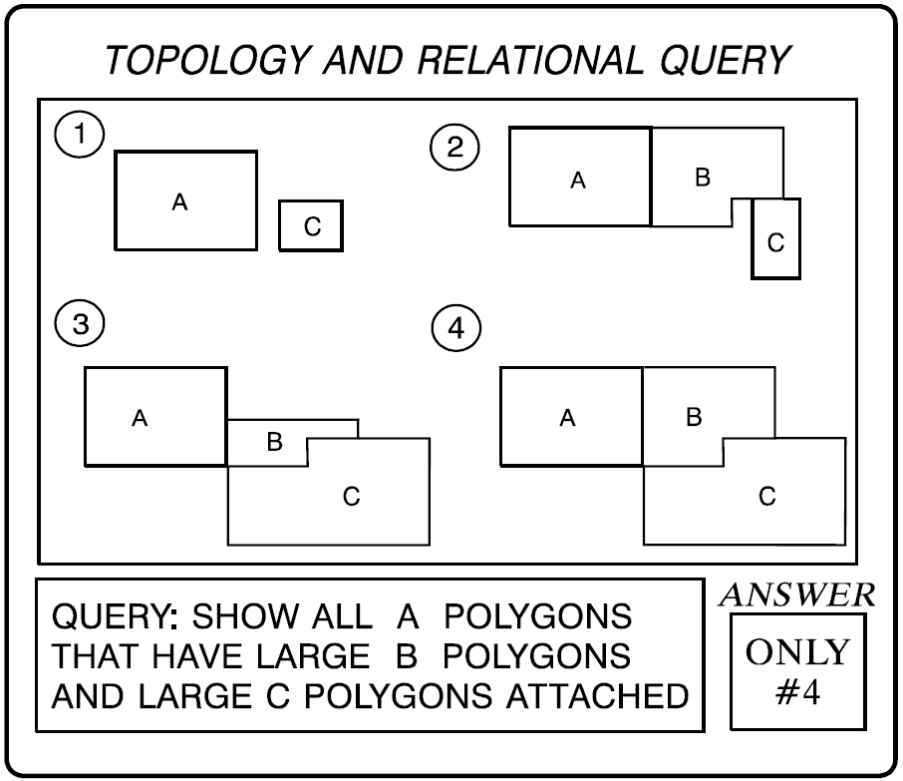
위상 구조 (토폴로지 자료구조)

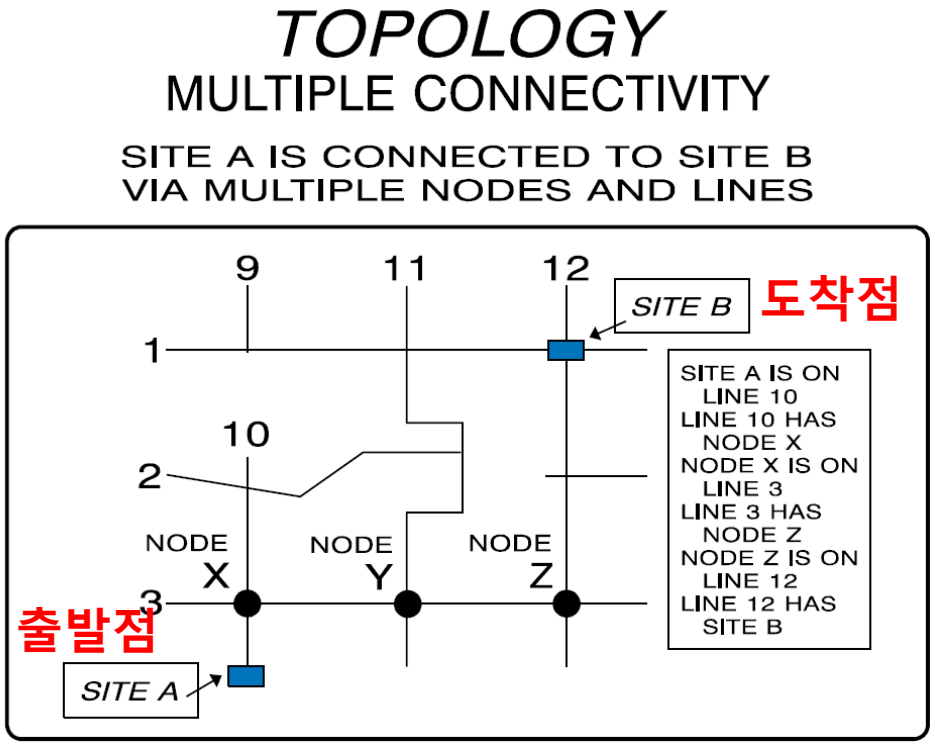




데이터 모델

위상 구조 (토폴로지 자료구조)





데이터 모델

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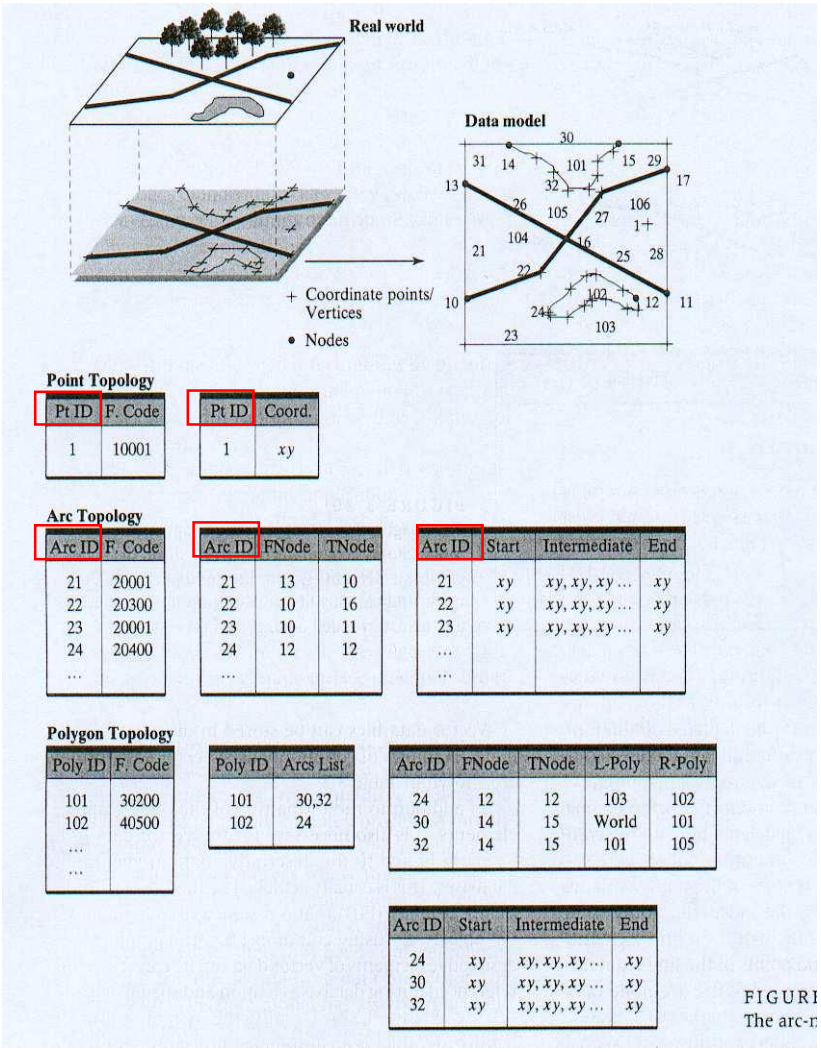
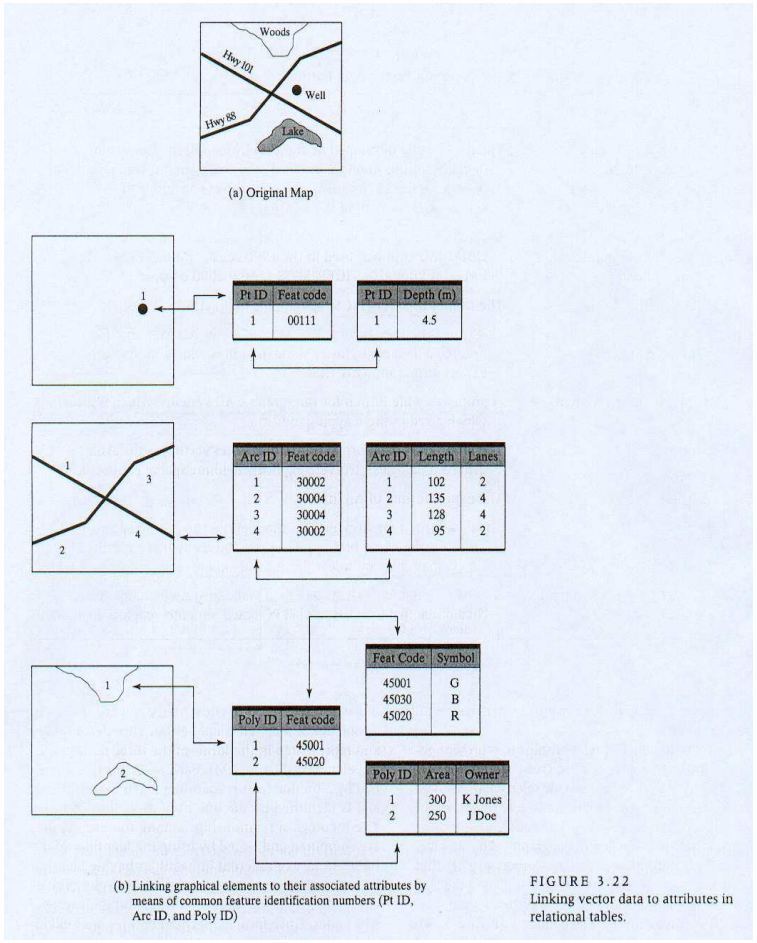




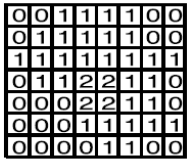
데이터 모델

래스터 / 벡터 모델

RASTER AND VECTOR FORMAT

RASTER

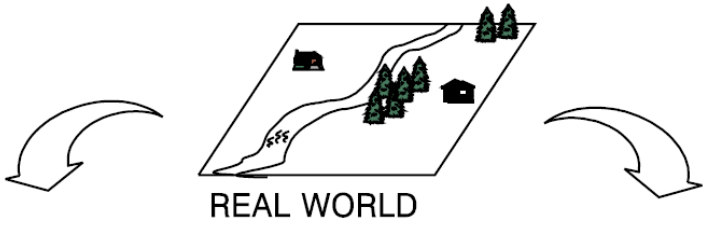
GRIDDED, GENERALIZED REALITY

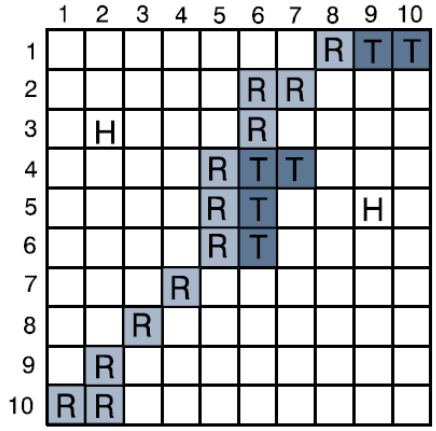


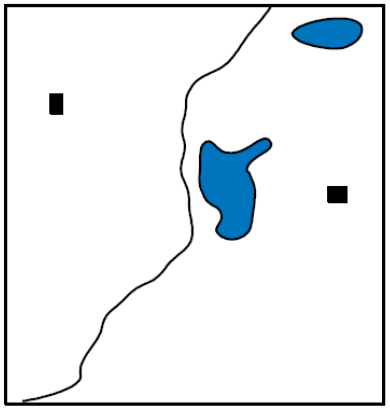
VECTOR

CARTOGRAPHIC MAP ANALOG

RASTER AND VECTOR DATA MODELS



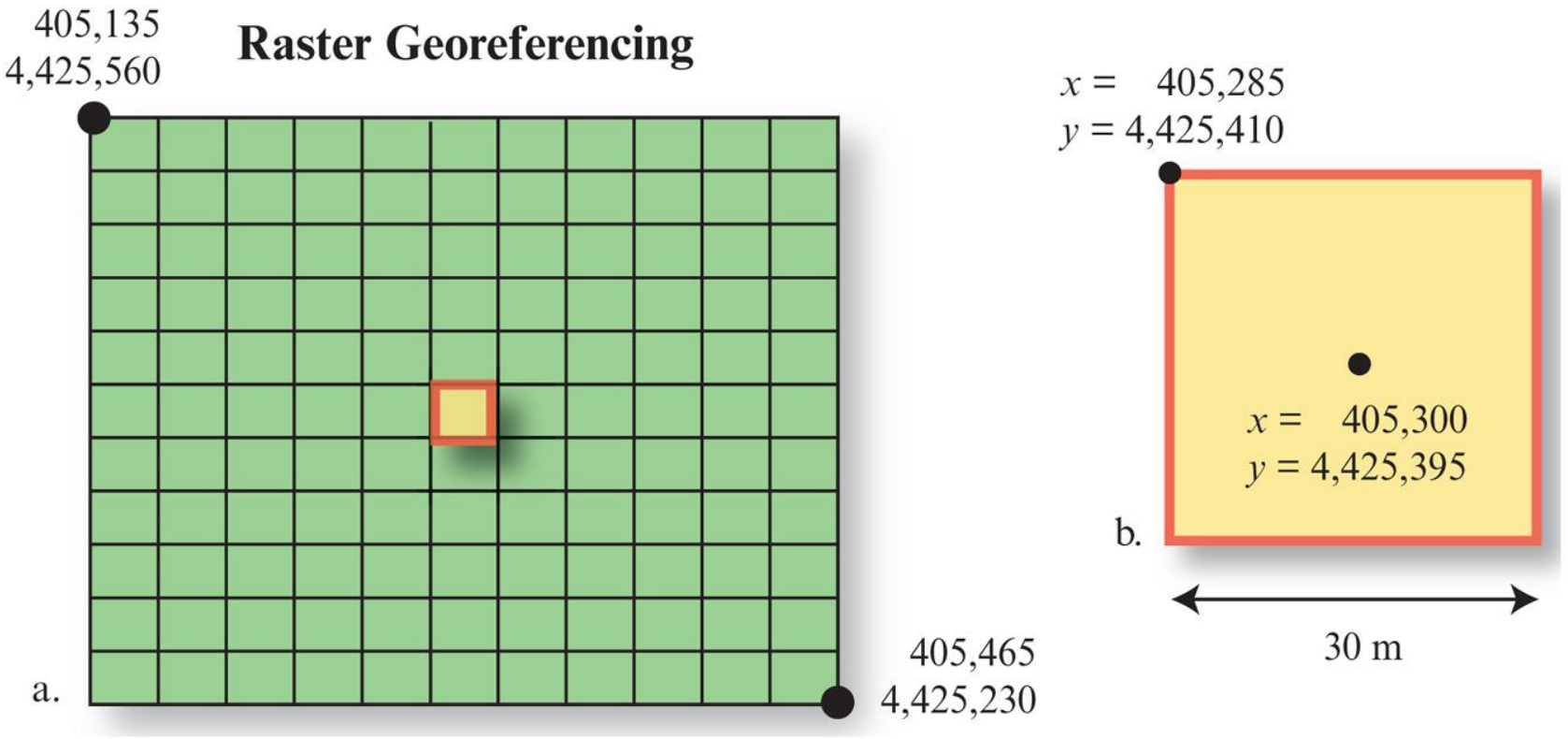




데이터 모델

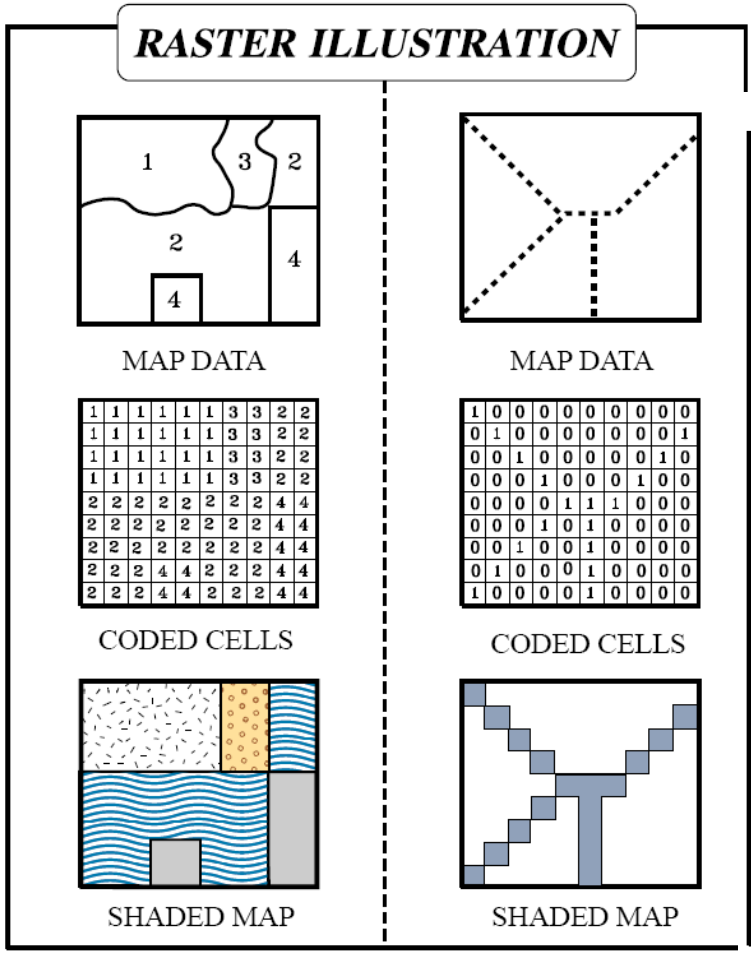
래스터 모델

지구좌표입력

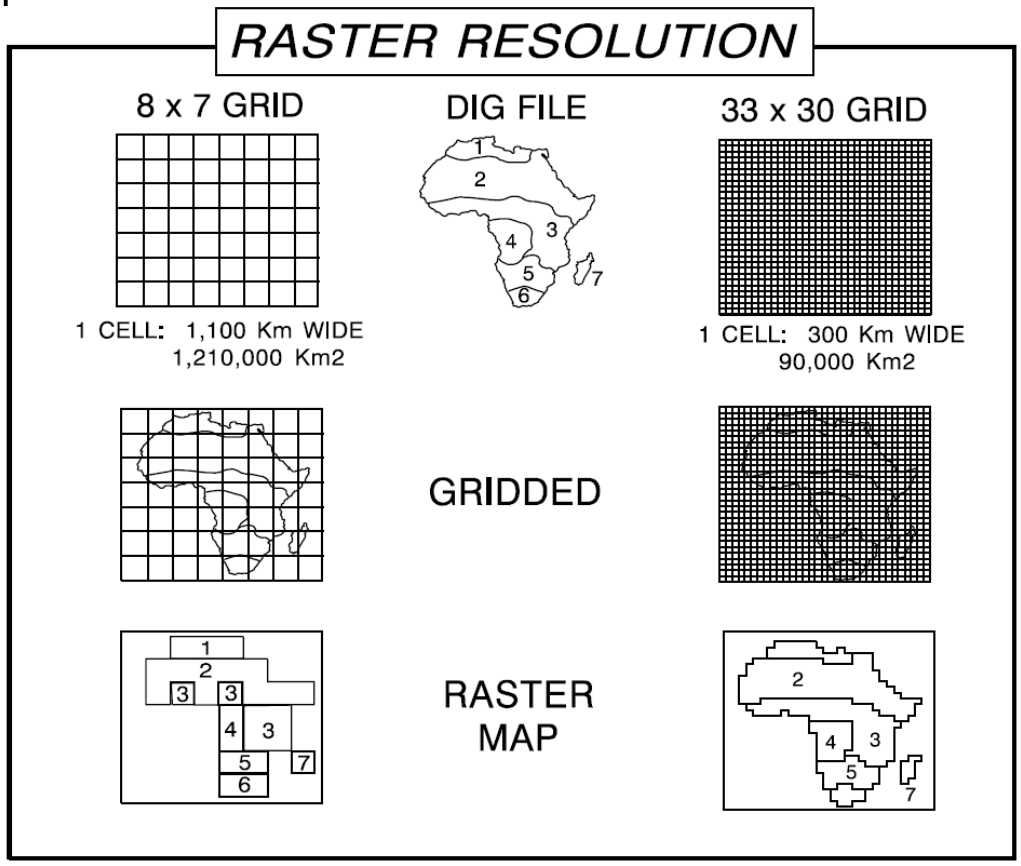


데이터 모델

래스터 모델

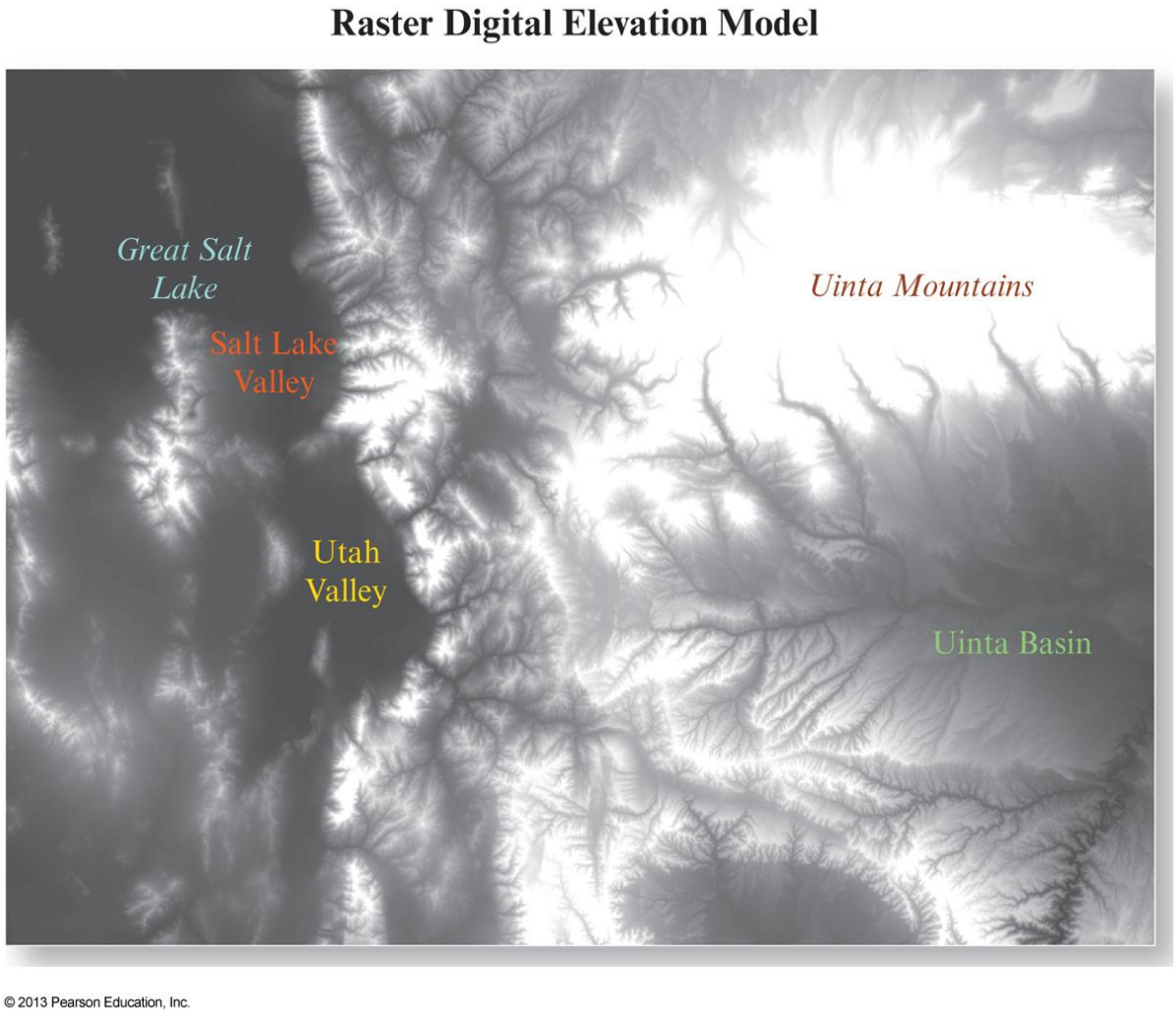


Grid 격자 = Cell 셀 (= Pixel)



데이터 모델

래스터 모델


Raster Digital Elevation Model
Great Salt Lake
Salt Lake Valley
Utah Valley
Uinta Mountains
Uinta Basin
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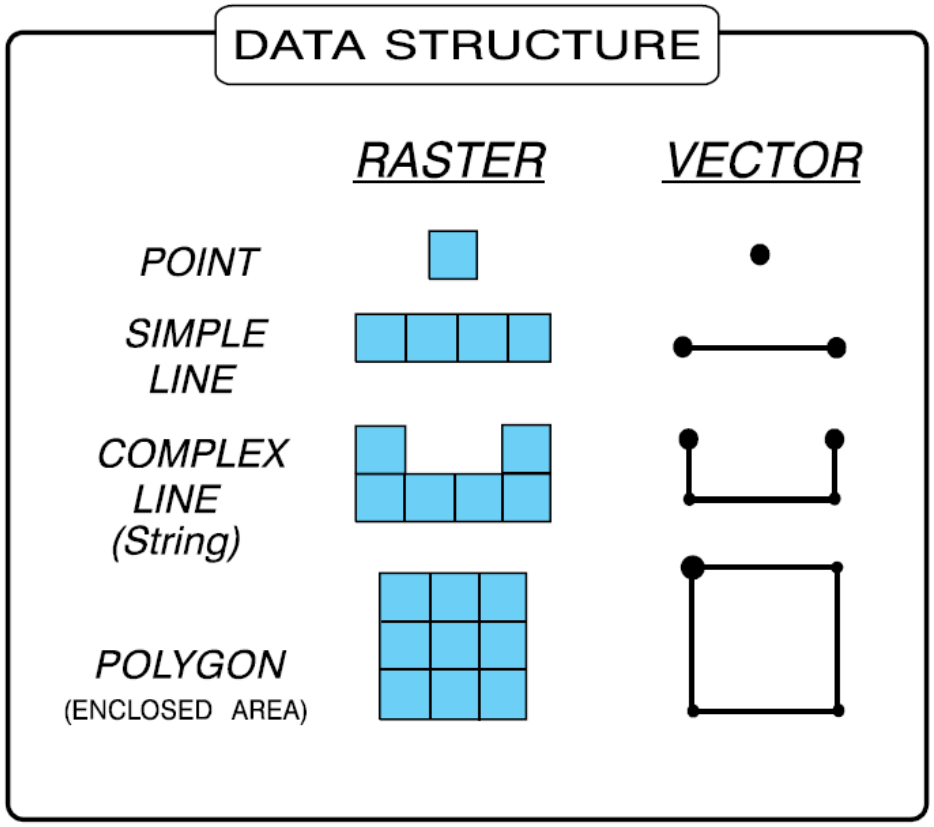
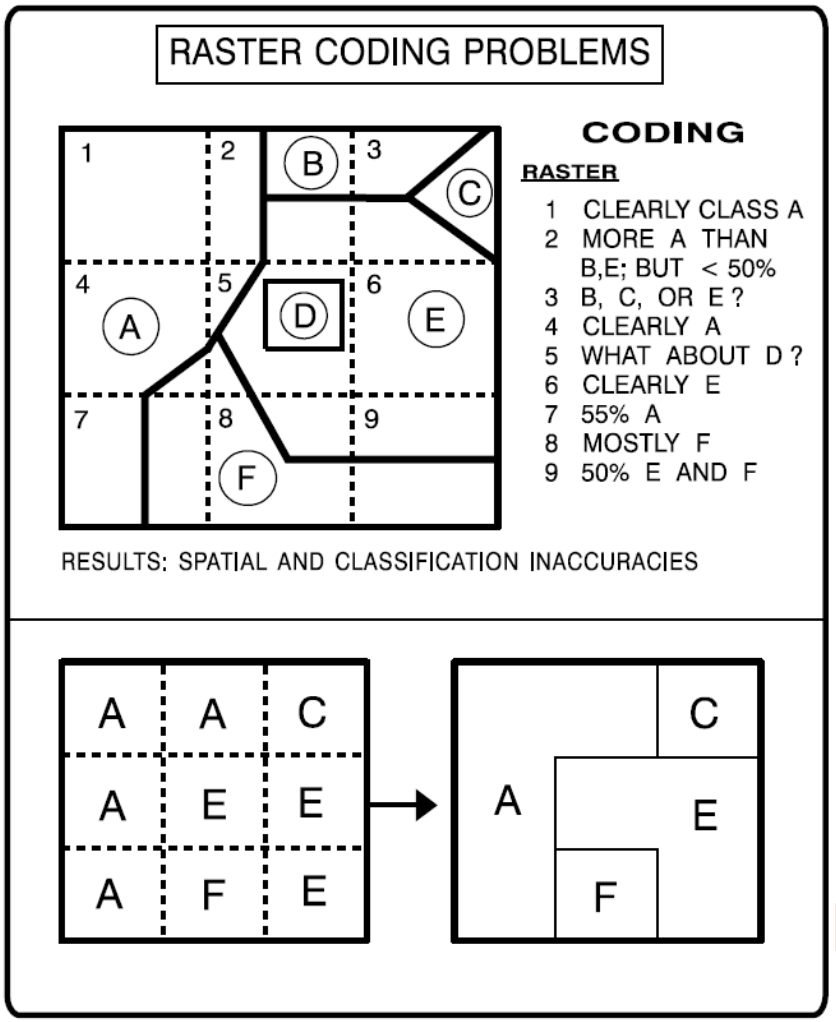
데이터 모델

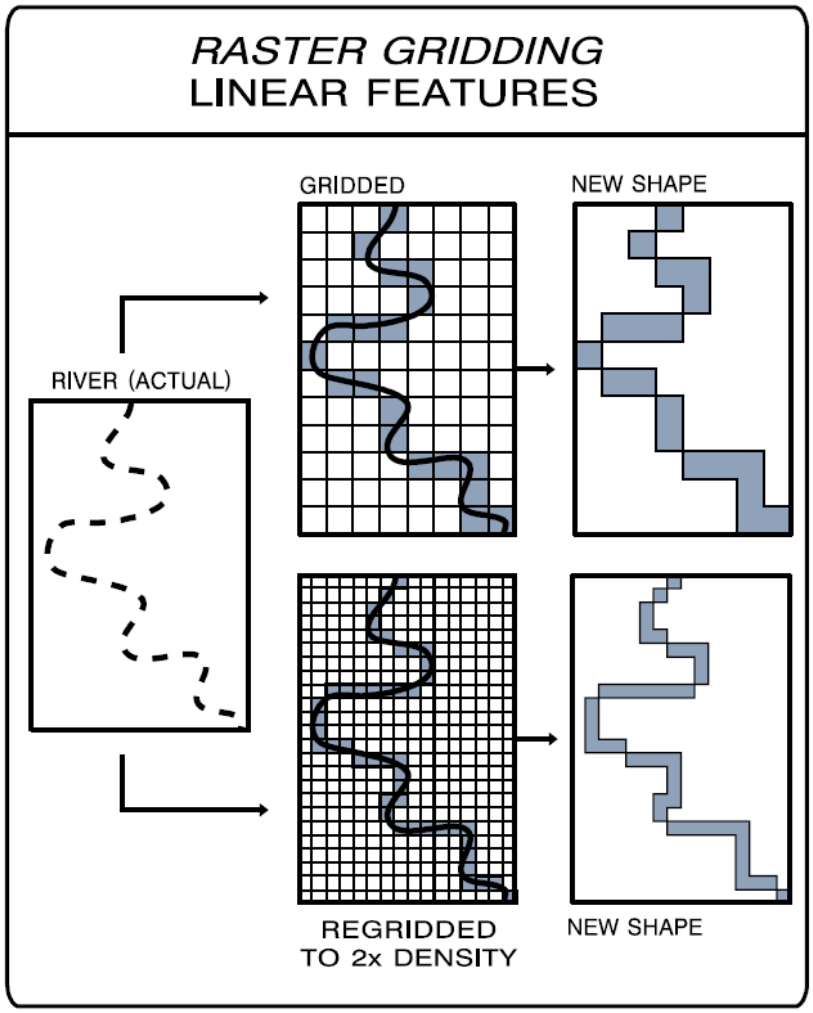
래스터 / 벡터 데이터 구조 차이

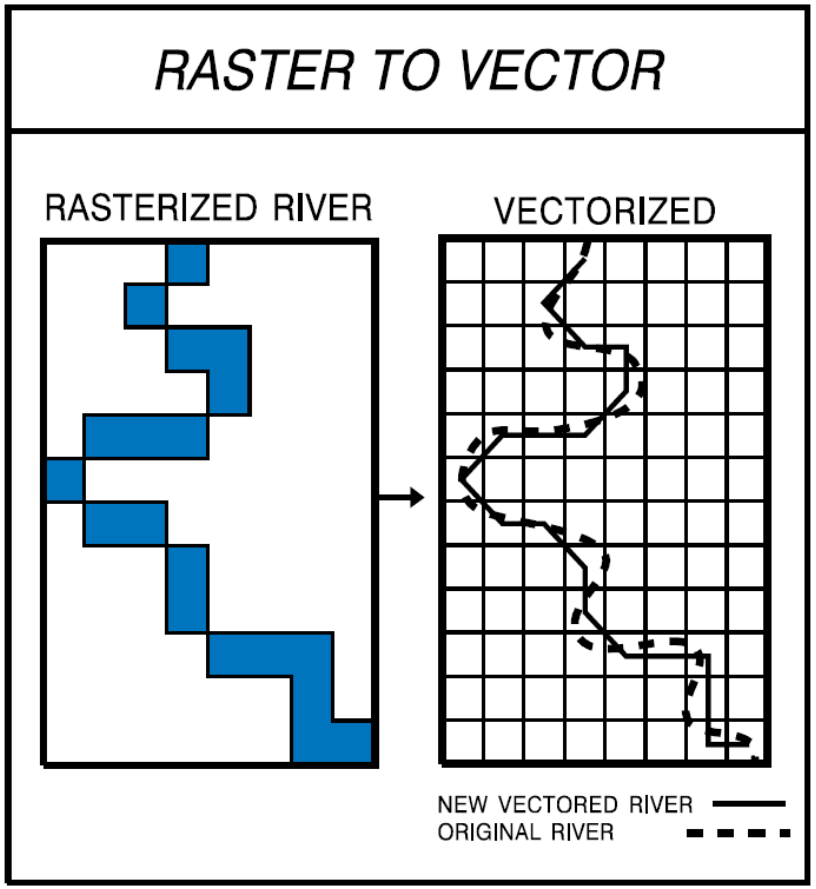




데이터 모델

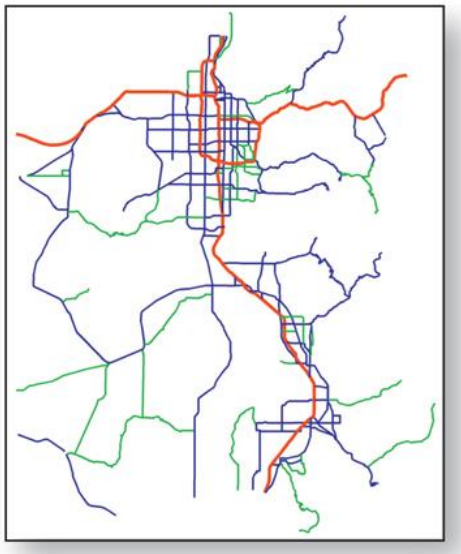
래스터 / 벡터 데이터 간 변환





데이터 모델

래스터 / 벡터 데이터 간 변환



a. Vector road network information.

Vector-to-Raster Conversion

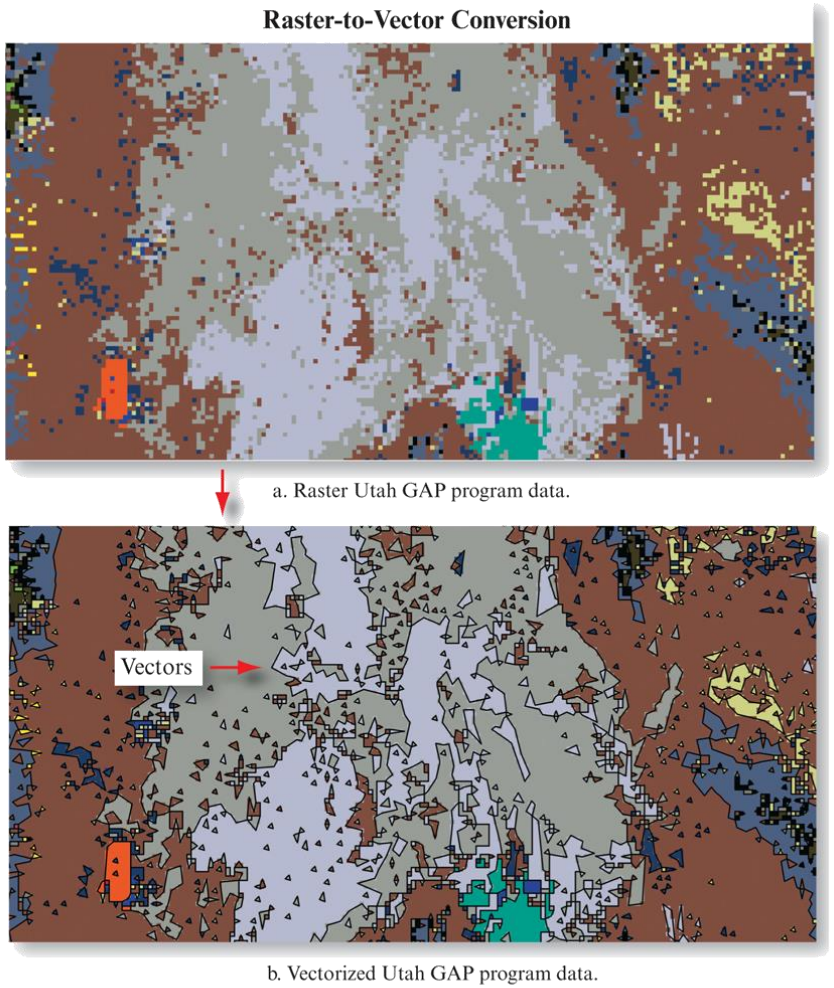
- Interstate highway
- State highway
- Paved local road

b. Vector-to-raster conversion with a pixel size of 250 x 250 m.

c. Vector-to-raster conversion with a pixel size of 500 x 500 m.

데이터 모델

래스터 / 벡터 데이터 간 변환



a. Raster Utah GAP program data.

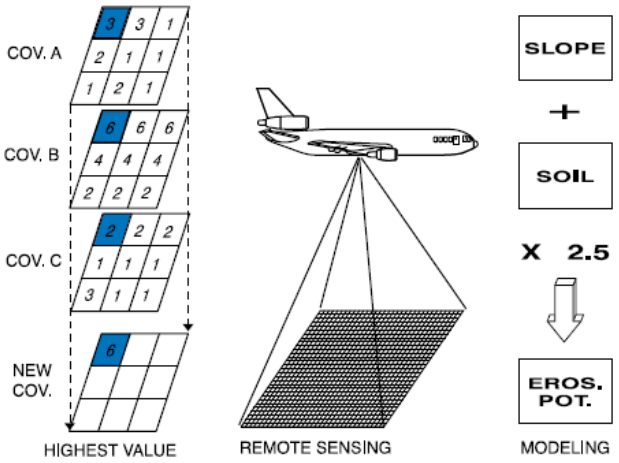
b. Vectorized Utah GAP program data.

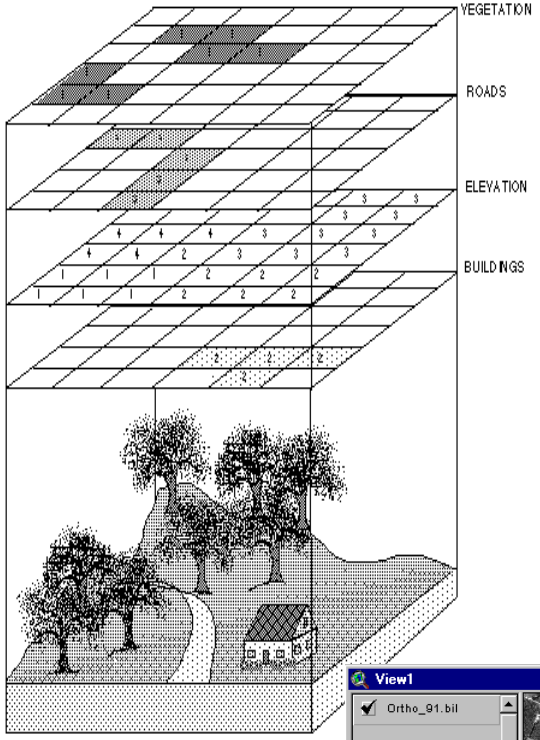
데이터 모델

래스터 장점? 단점?

RASTER ADVANTAGES

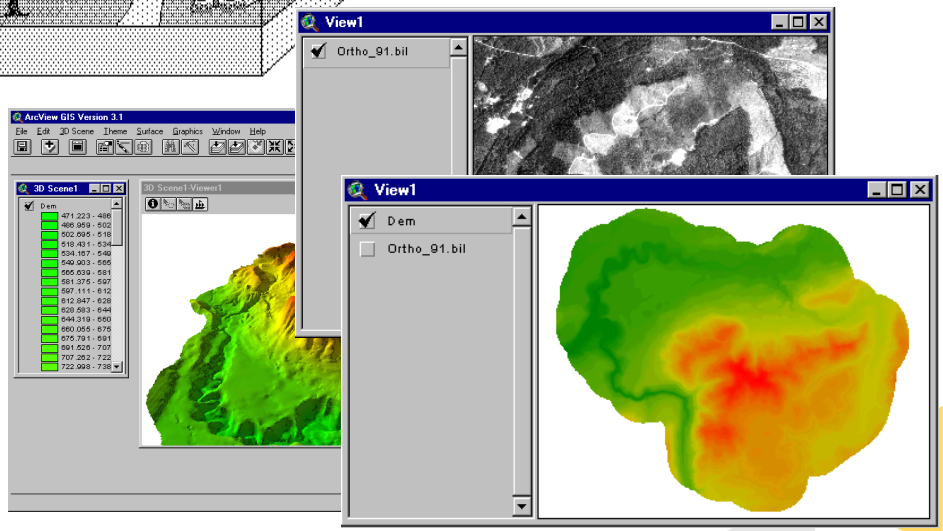
- SIMPLE DATA STRUCTURE
- EASY ANALYSIS
- LOW-TECH HARDWARE
- COMPATIBLE WITH IMAGERY
- EASY MODELING



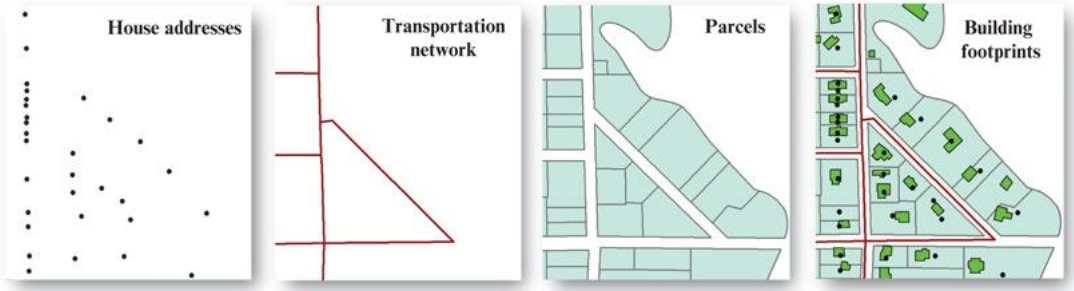


Raster 단점 (disadvantages)

- 정확, 정밀 표현 ?
- DB 속성 테이블 ?
- 파일 크기 ?



Point, Line, and Area Discrete Features

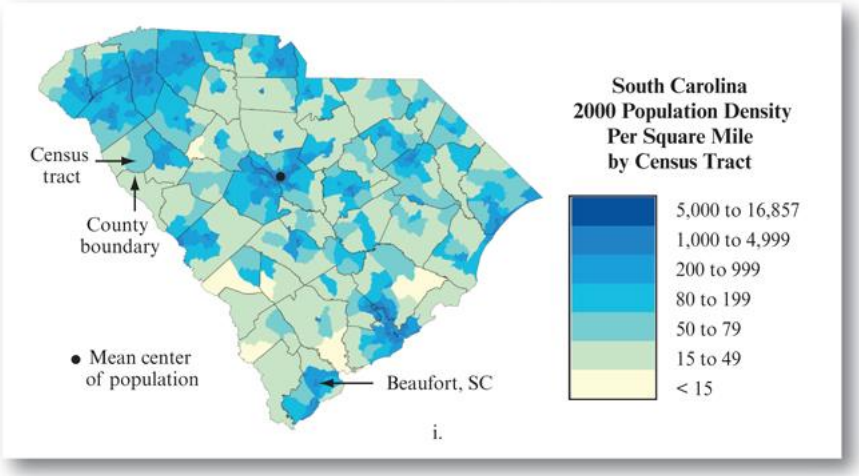


a. Point. b. Line. c. Area. d. Area.

Continuous Geographic Features

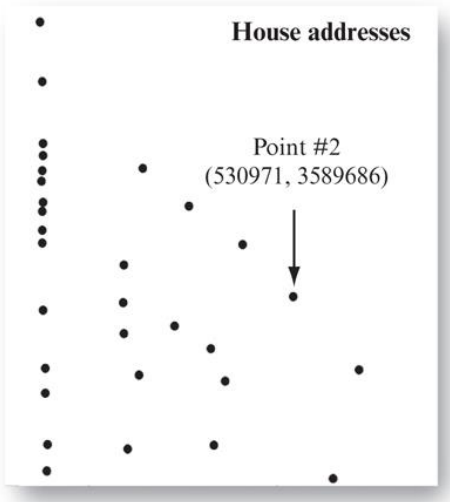
e. Elevation. f. Composite of d and e. g. Color-infrared orthophoto. h. Composite of d and g.

Features Summarized by Geographic Area

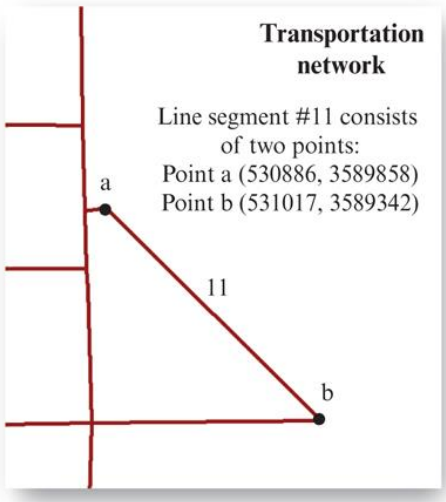


i.

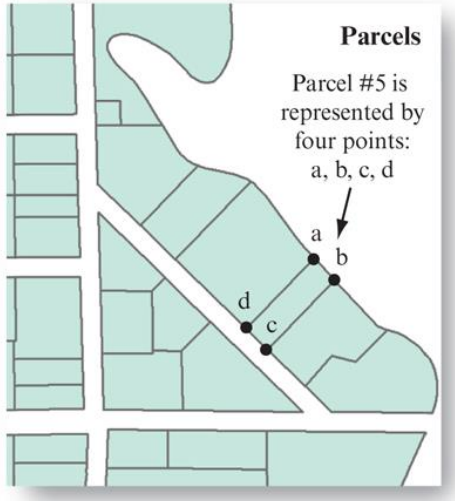
Vector versus Raster Data Structures (Topology)



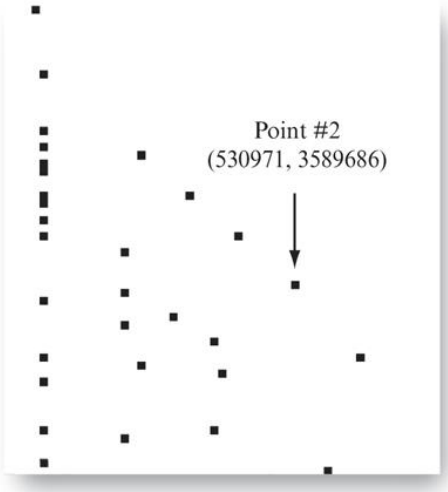
a. Point (Vector).



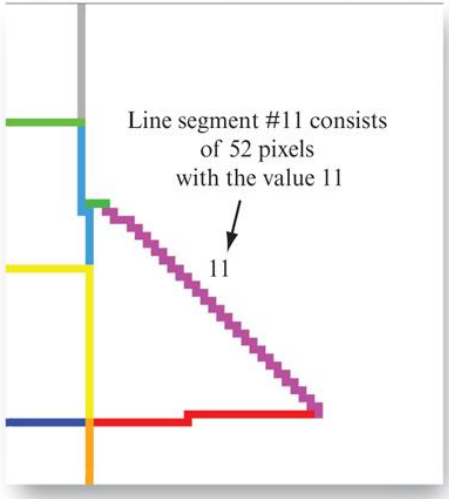
b. Line (Vector).



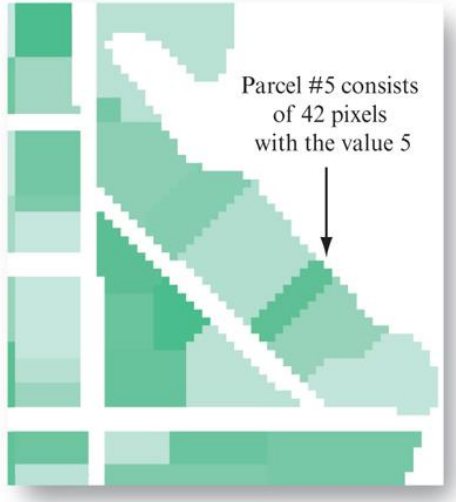
c. Area (Vector).



d. Point (Raster).

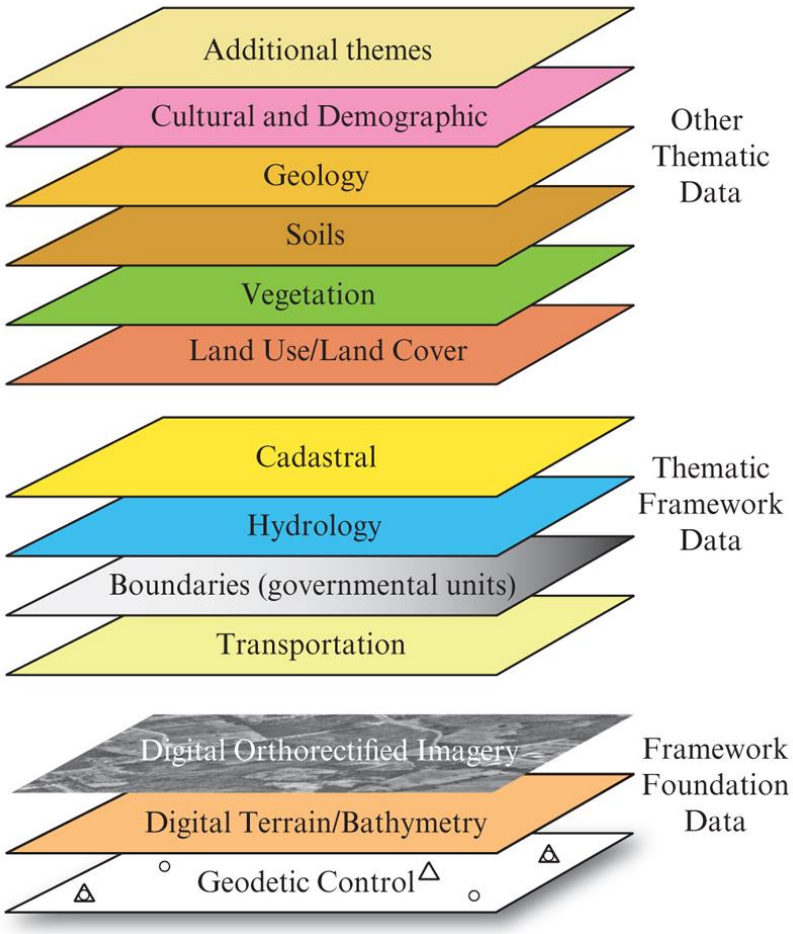


e. Line (Raster).



f. Area (Raster).

National Spatial Data Infrastructure



Selected Databases from the Beaufort County, SC, Spatial Data Infrastructure