

Figure 18.2

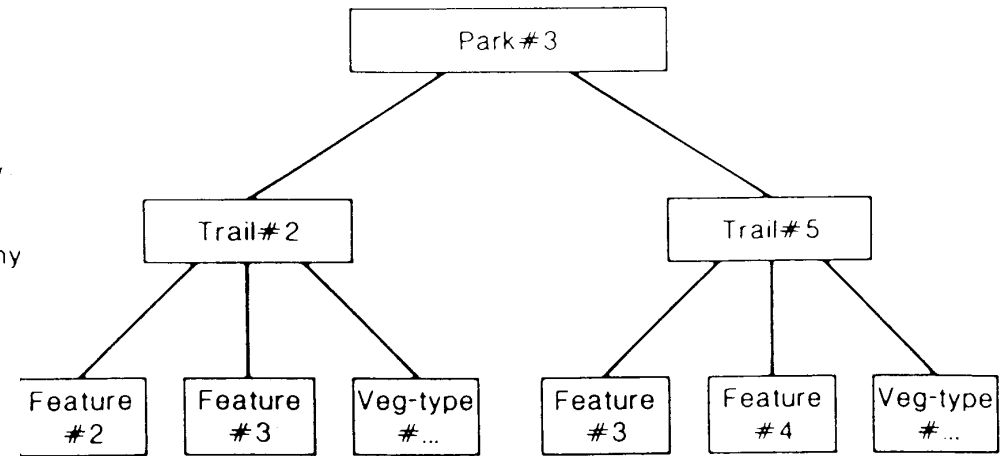


Fig. 18.3 Part of the national parks database in a hierarchical structure.

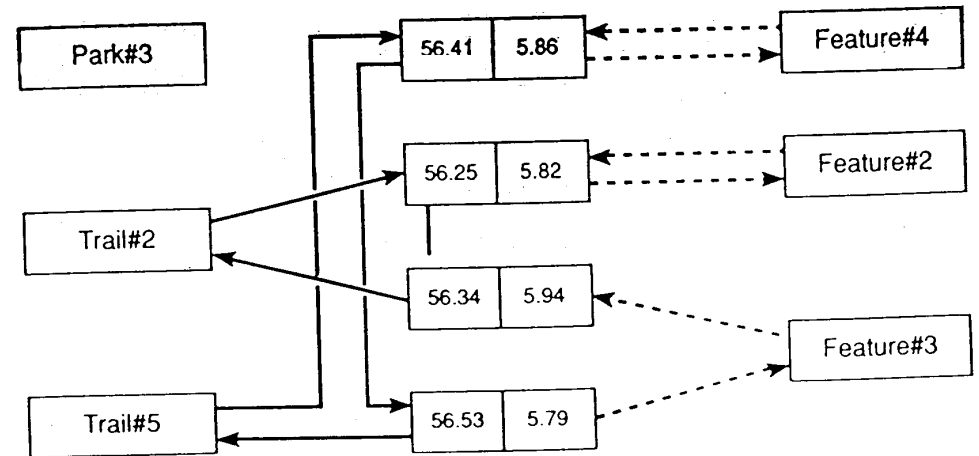


Fig. 18.4 Part of the national parks database in a network structure.

Table 18.1(a) The structure of part of the example database.

1. The National Parks Table

Park #	Name	Size (ha)
1	Ben Wyvis	40 000
2	Braes of Tomintoul	28 000
3	Inveresk Hills	63 000

2. The Trails Table

Trail#	Name	Category	Park#
1	Loch Sissons	D	2
2	Linton Forest	E	3
3	Hutton Craggs	E	1
4	Davis Valley	D	2
5	Gilbert Falls	D	3

3. The Features Table

Feature#	Type	Origin
1	Drumlins	Glacial
2	Braided Channel	Fluvial
3	Delta	Fluvial
4	Corrie	Glacial

4. The Features-Visible Table

Trail#	Feature#	Lat	Long
1	3	57.35	4.52
1	4	57.50	4.48
2	2	56.25	5.82
2	3	56.34	5.94
3	1	57.82	3.55
3	4	57.88	3.62
4	1	57.60	4.45
4	2	57.68	4.39
5	3	56.53	5.79
5	4	56.41	5.86

Table 18.1(b) The Features-Visible Table as an inverted list.

Feature#	Trail#
1	3
	4
2	2
	4
3	1
	2
	5
4	1
	3
	5

Table 18.1c Possible index entries for multiple search keys (partly following Date 1986).

Search key	Data value	Source table	Pointer
Trail#	1	Trails	To disk address of this row
Trail#	1	Features-visible	To disk address of first row with Trail# = 1
Trail#	1	Features-visible	To disk address of last row with Trail# = 1
Trail#	2	Trails	To disk address of this row
Trail#	2	Features-visible	To disk address of first row with Trail# = 2
.	.	.	.
Feature#	1	Features	To disk address of this row
Feature#	1	Features-visible	To disk address of first row with Feature# = 1
.	.	.	.
Trail#/ Feature#	1/3	Features-visible	To disk address of row with Trail# = 1 and Feature# = 3
.	.	.	.

Figure 18.5 Relational Tables and Joins

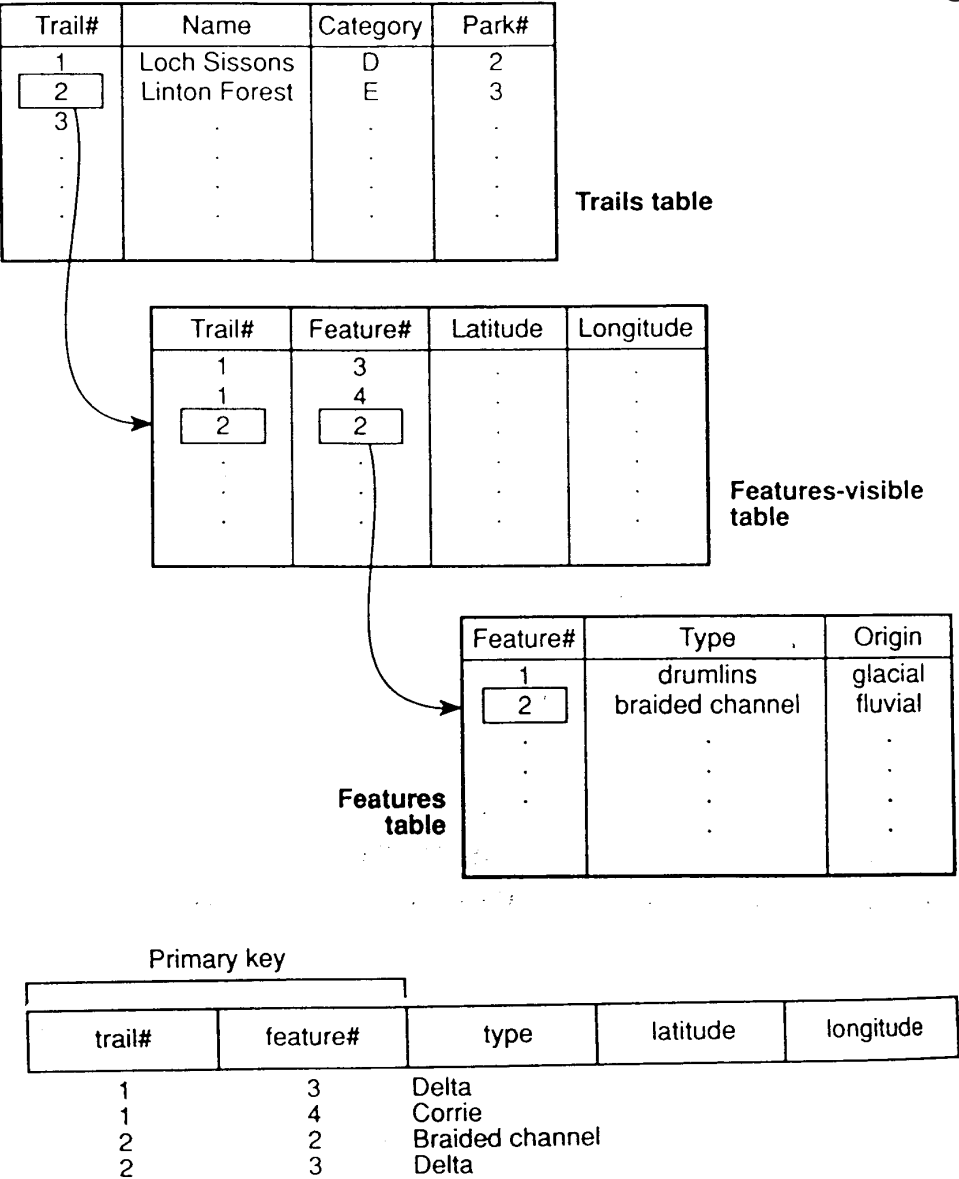
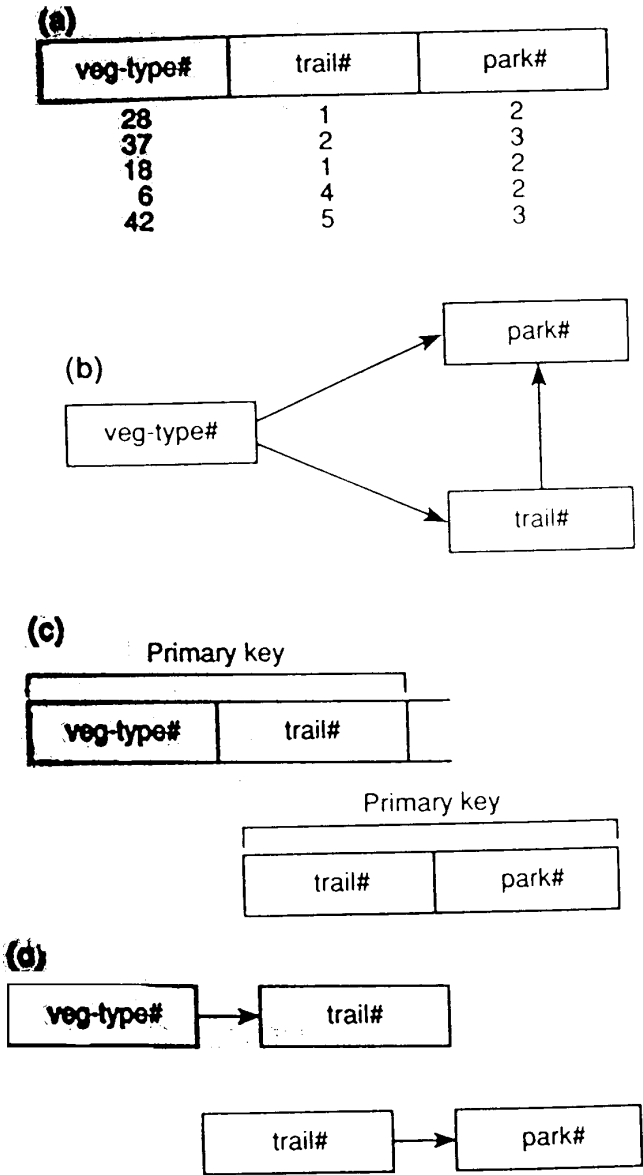


Fig. 18.6 An example of a national parks database table not in second normal form.

Figure 18.7 a) a table not in third normal form; b) transitive dependence; c) normalizing the table structure; d) avoiding transitive dependence



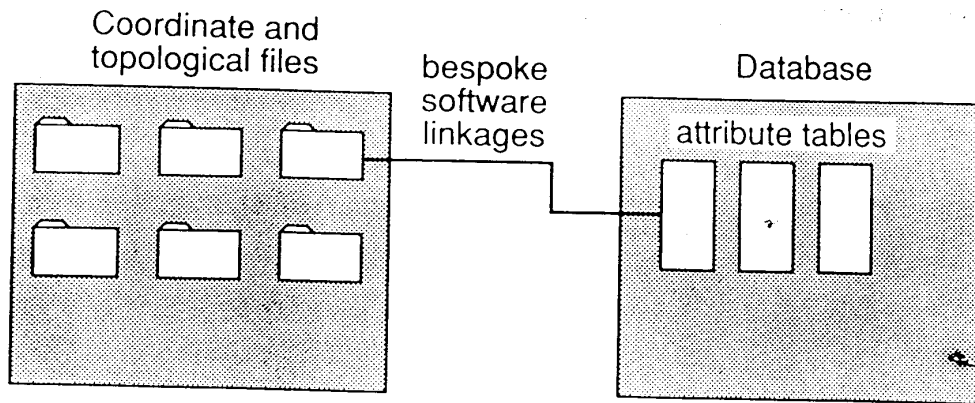


Fig. 18.8 The hybrid GIS model.

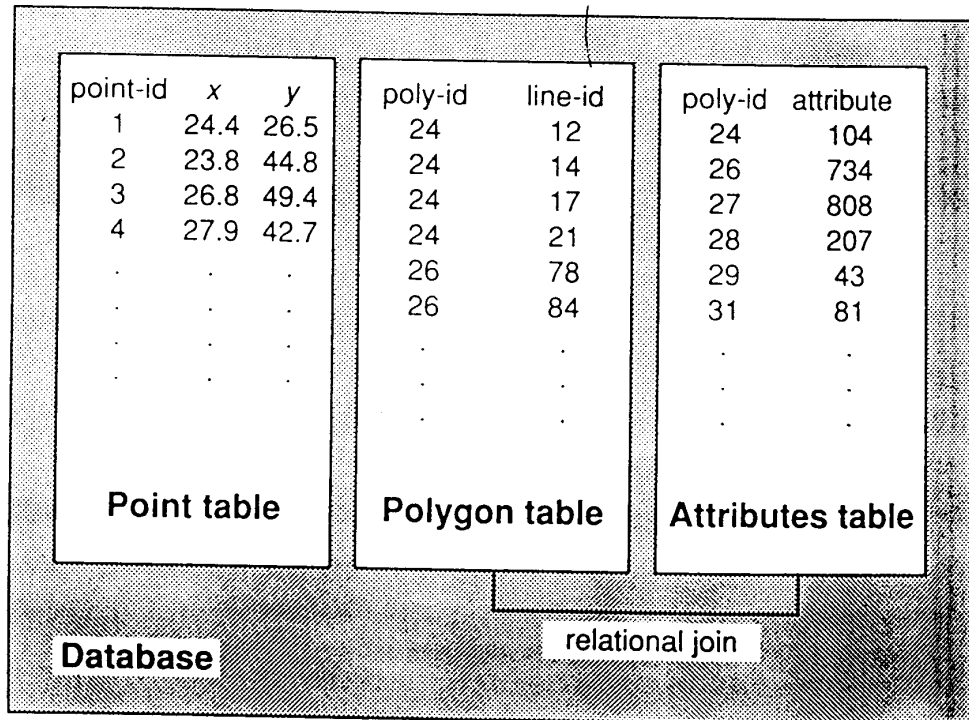


Figure 18.9 Integrated GIS Model with a normalized structure.

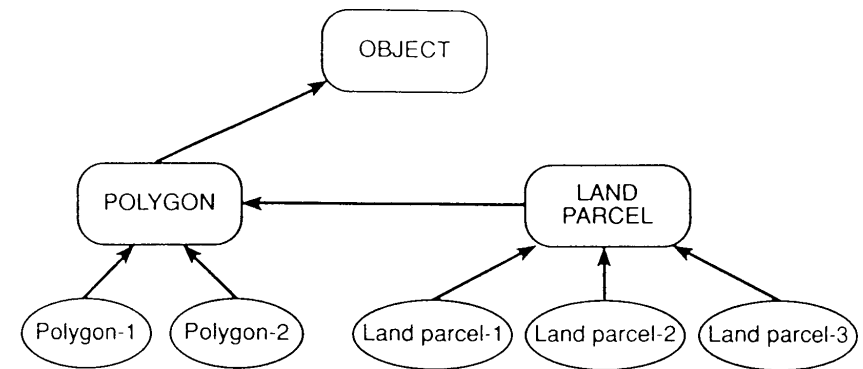


Fig. 18.11 A hierarchy of object classes.

Table 18.3(a) Polygon object definition.

Superclasses (object)	
Class variables	
Number_of_polygons	
Instance variables	
List_of_nodes	
List_of_arcs	
Area	
Instance methods	
Calculate_centroid	
Draw	
Overlay	

Table 18.3(b) Land parcel object definition.

Superclasses (polygon)	
Class variables	
Instance variables	
Value	
Owner	
Instance methods	
Transfer_ownership	
Re_zone	