IMS (Information Management System) Data Model

(Hierarchical Data Model) from C J Date's book (3rd Ed. 1981)

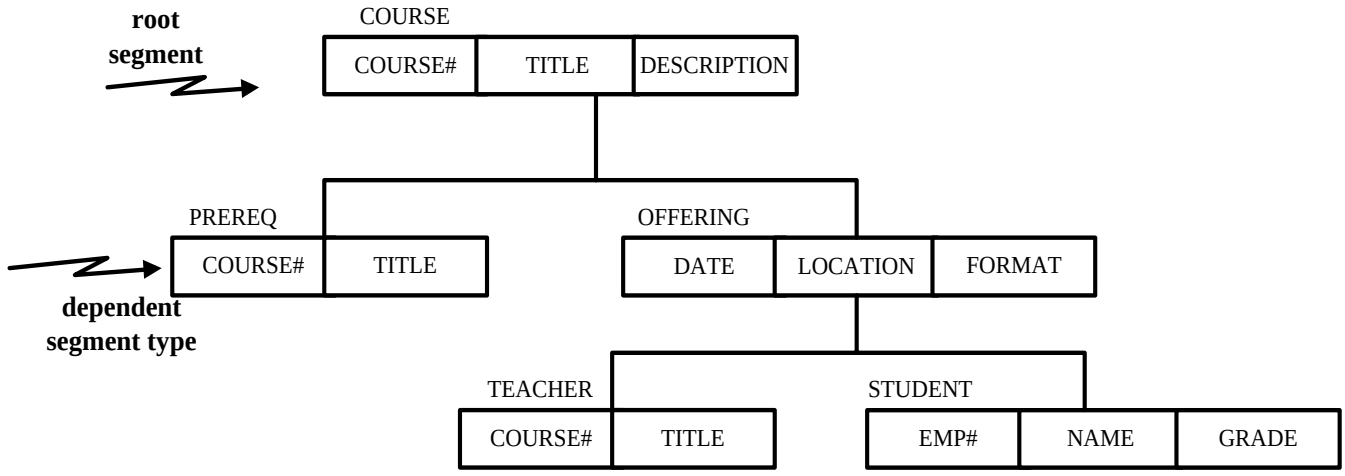


Fig. 16.1 PDBR type for the education database (schema)

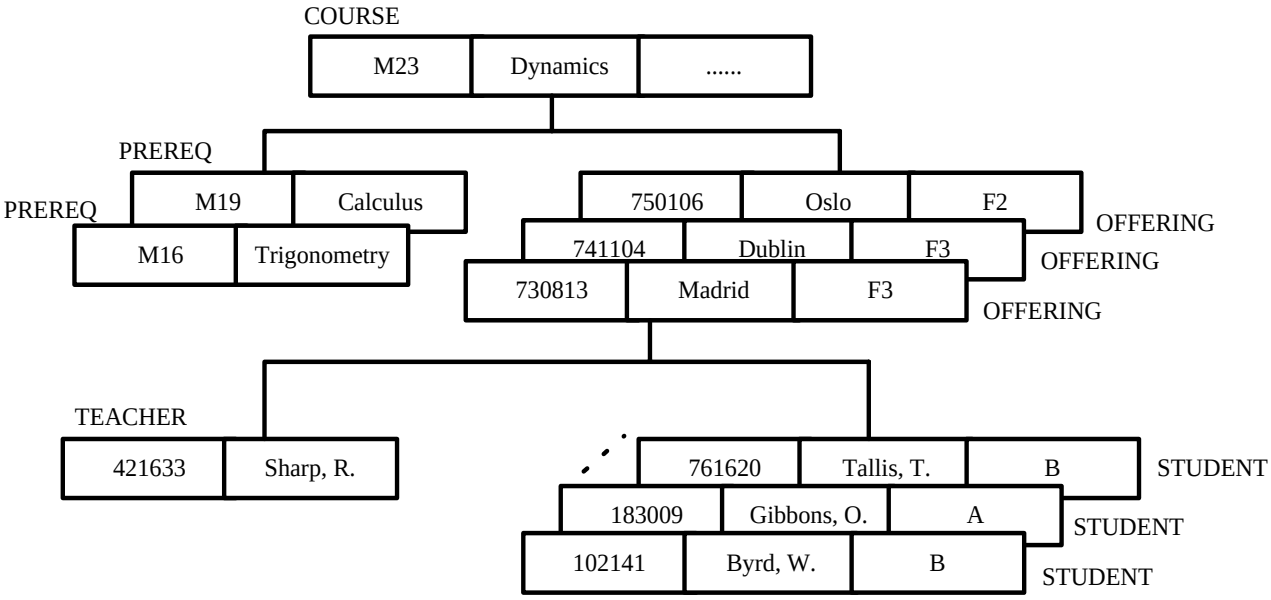


Fig 16.2 Sample PDBR occurrence for the education database (database instance)

Many-to-many Relationships using Logical parent pointers

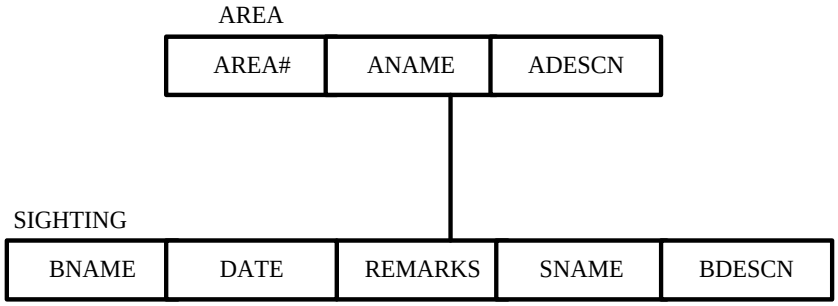


Fig 20.1 Required record structure for the survey database

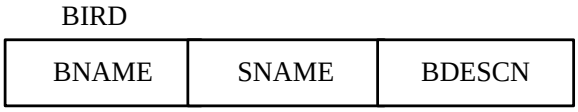


Fig 20.2 Record structure of the bird database

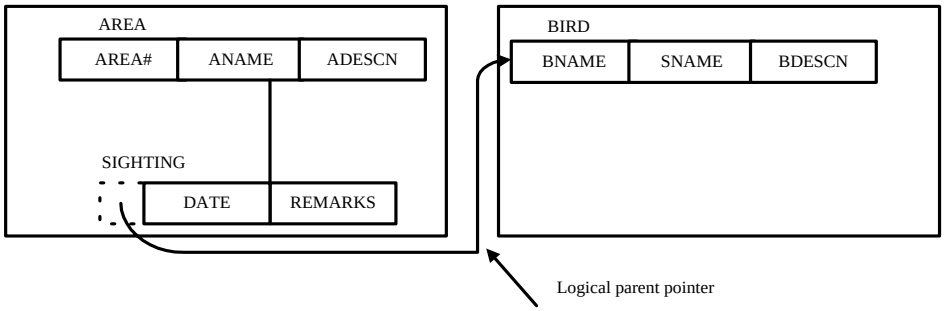


Fig 20.3 Area and BIRD POBS.

SURVEY LDB

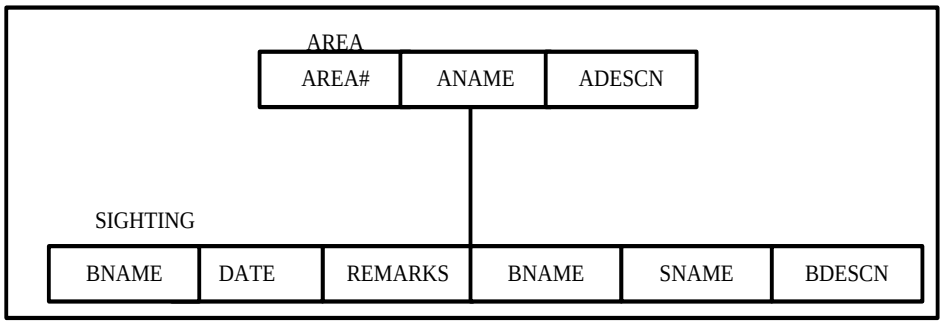


Fig 20.4 The SURVEY LDB

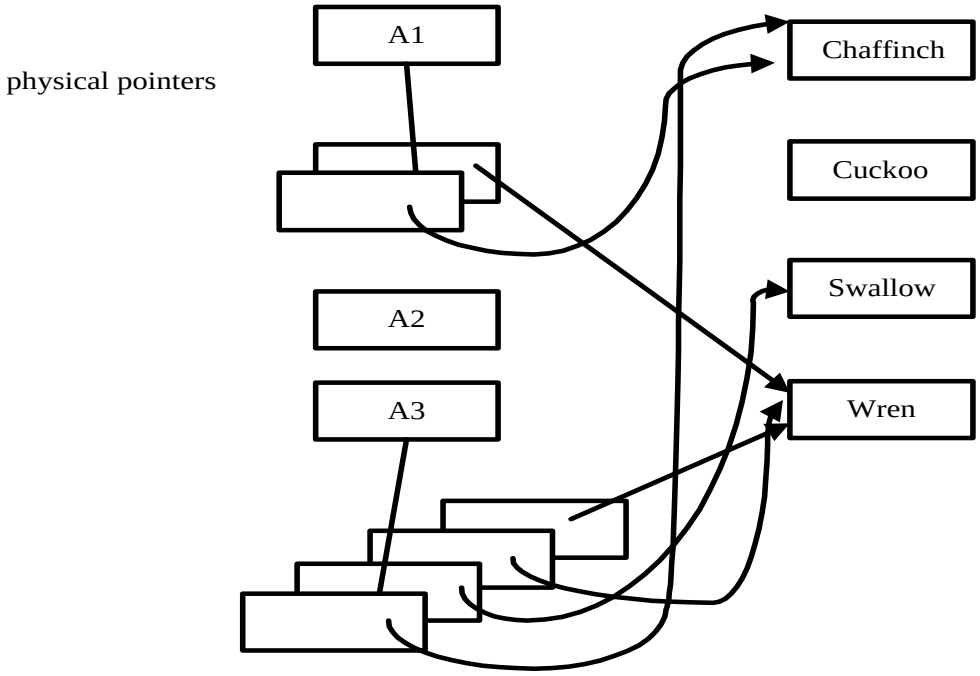


Fig 20.5 Sample PDBS (AREA and BIRD)

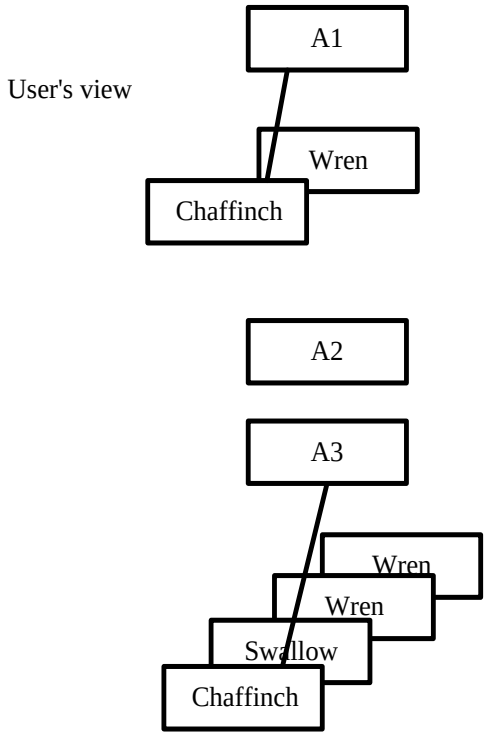


Fig 20.6 Corresponding LDB (SURVEY)

Physical pairing / virtual pairing

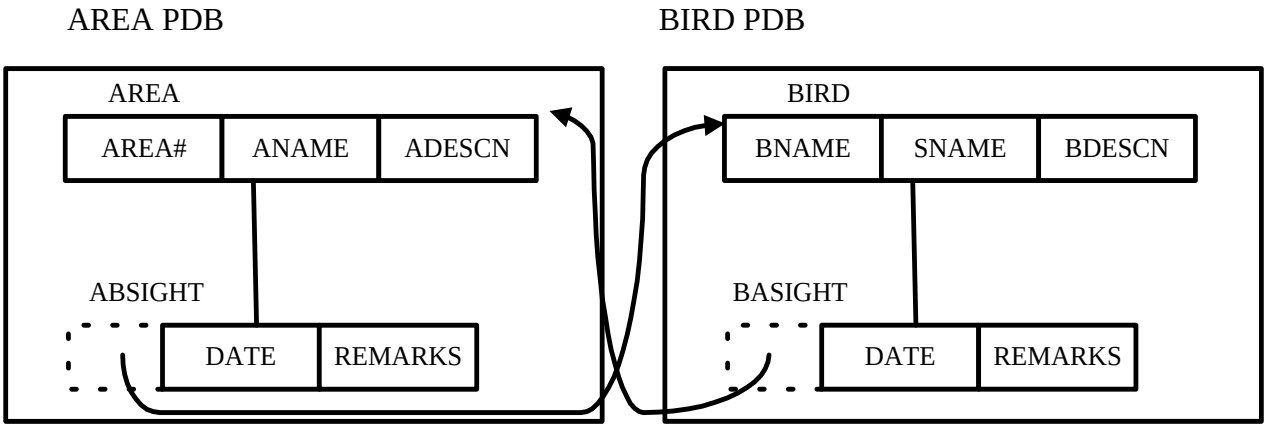


Fig 20.11 AREA and BIRD PDBS (with physical pairing)

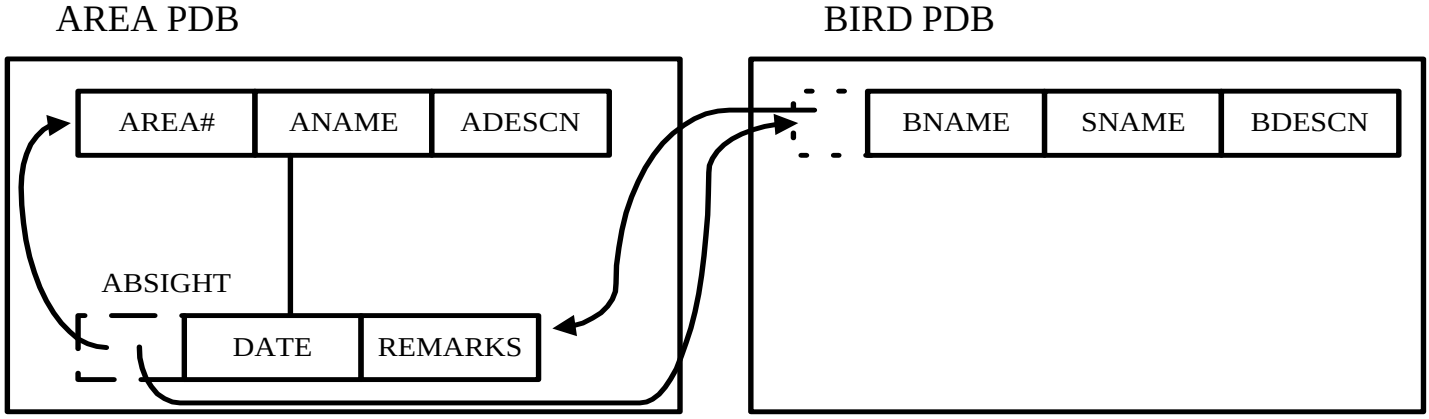


Fig 20.14 AREA and BIRD PDBs (with virtual pairing)

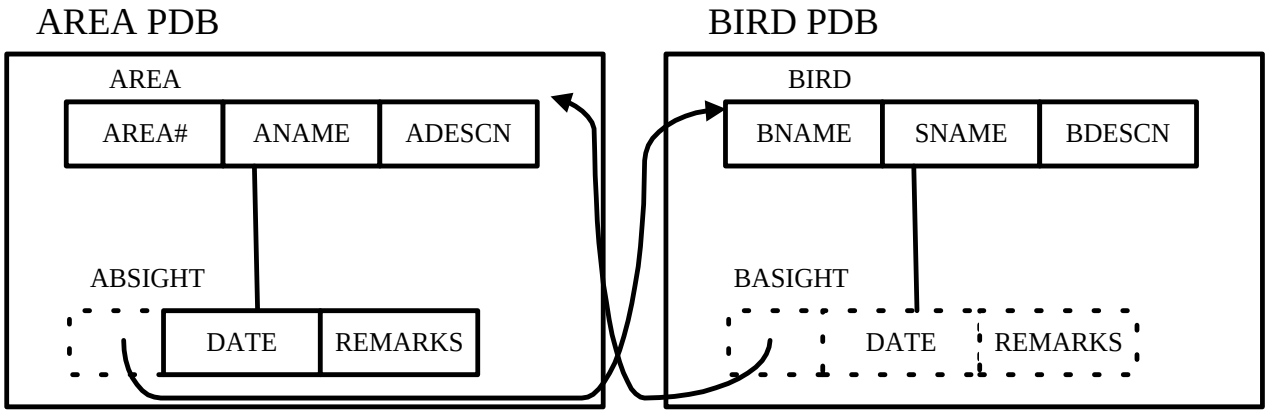


Fig 20.15 AREA and BIRD PDBs (with virtual I pairing)-conventional representation.

Recursive Relationships

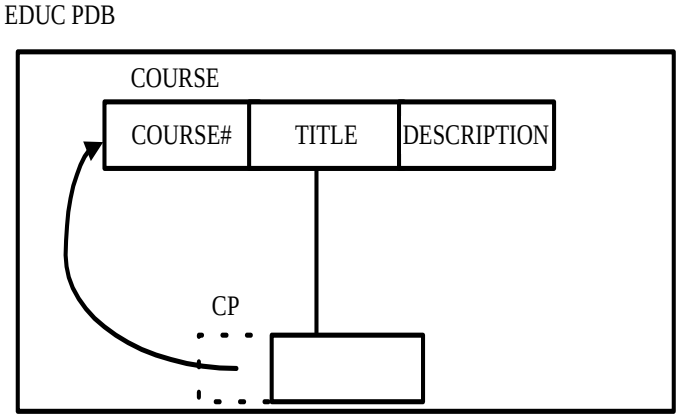


Fig 20.18 The EDUC PDB

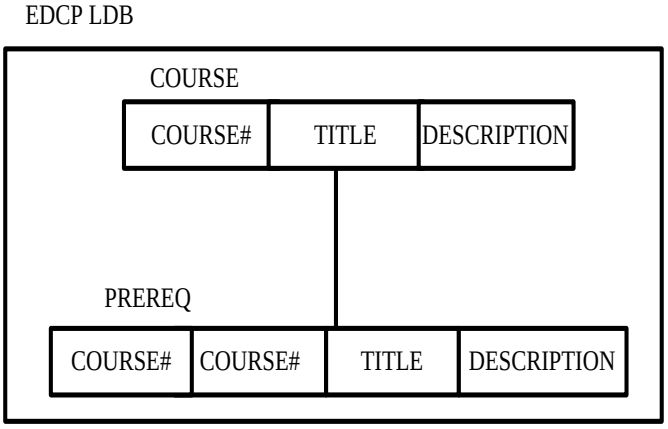


Fig 20.19 The EDCP LDB

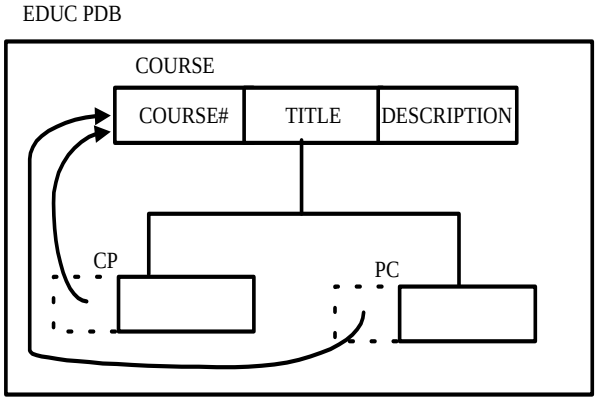


Fig 20.20 The EDUC (with virtual paring) conventional representation

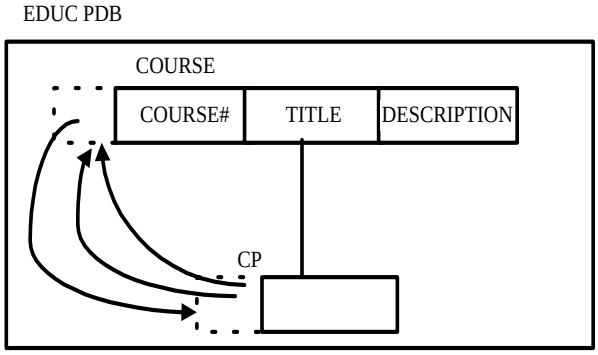


Fig 20.21 The EDUC PDB (with virtual pairing)

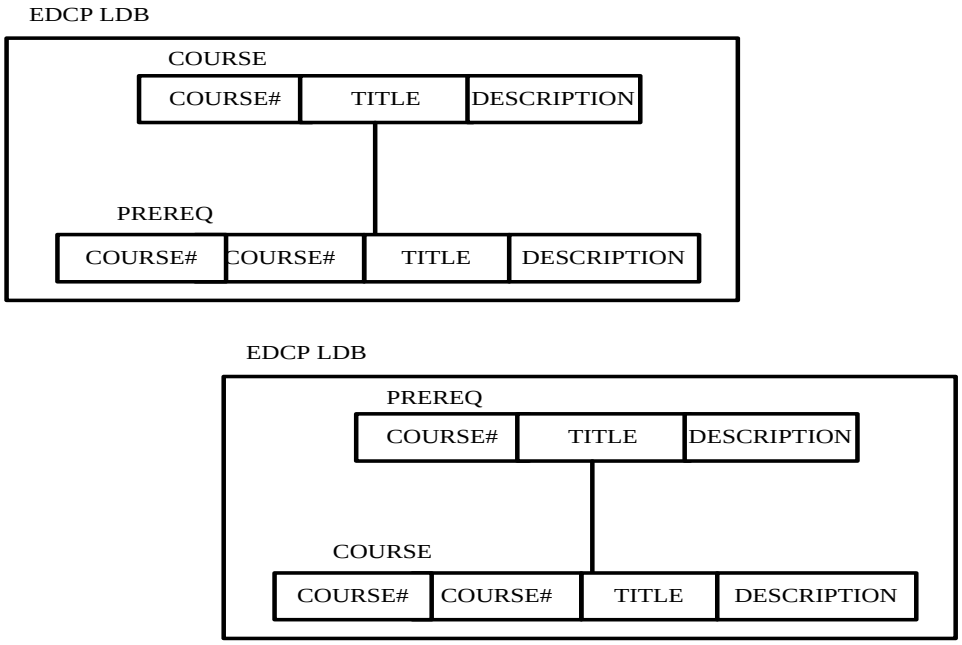
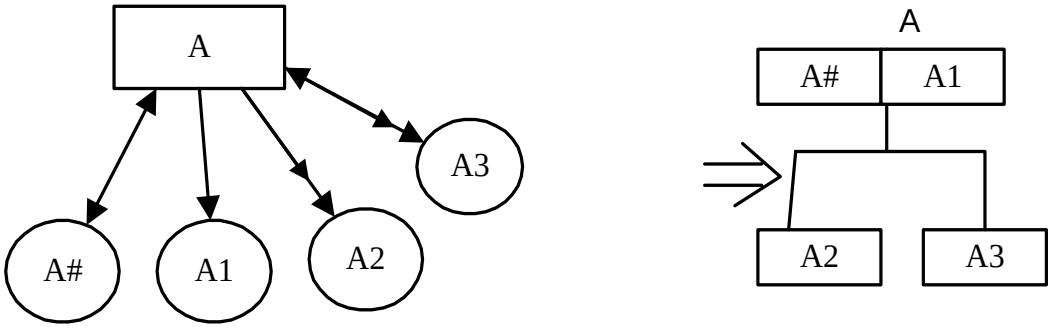


Fig 20.22 The EDCP and EDPC LDBs.

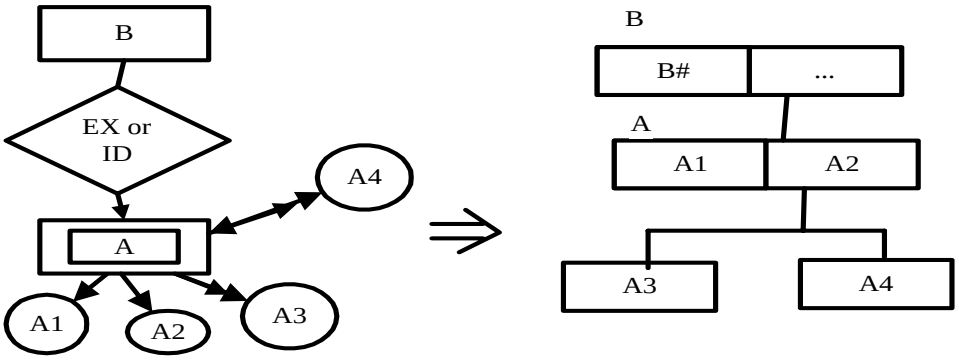
Converting an ER diagram to a hierarchical database mdoel

Rule 1. For each regular entity type A.



- All single attribute of A form a segment, all 1:1 attributes are unique in the segment, the identifier of A becomes the unique sequential field of the segment.
- Each multivalued attribute becomes a dependent segment of the segment A
- 1: m attributes have extra constraints which can't be specified in hierarchical model, e.g., A3 is unique.

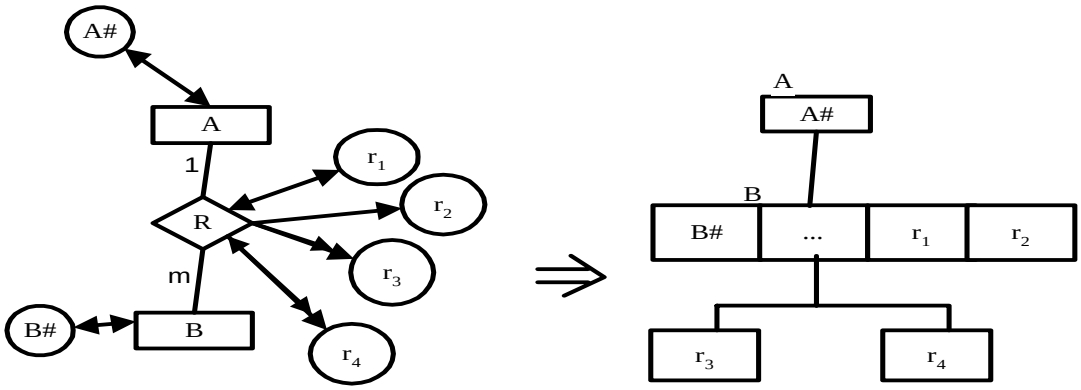
Rule 2 EX or ID



Note: if A1 and B# form the identifier of the weak entity type B, then A1 is the unique sequential field of segments.

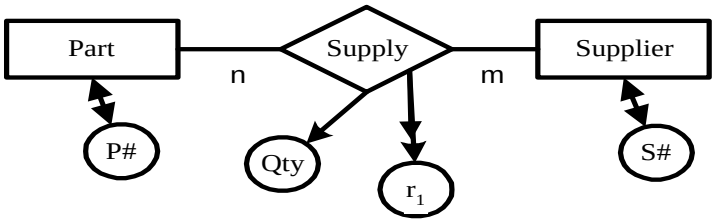
Rule 3 Only segments which represent regular entity types of the ER diagram can become the root segment of a hierarchical database.

Rule 4 For each 1: m binary relationship type.

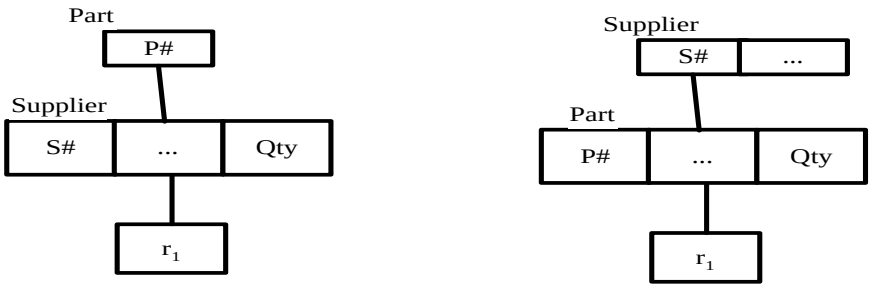


Note: B# is the unique sequential field in B.
r_1 is also unique in the segment B.
In fact, B# and r_1 are unique in the database, these are constraints.

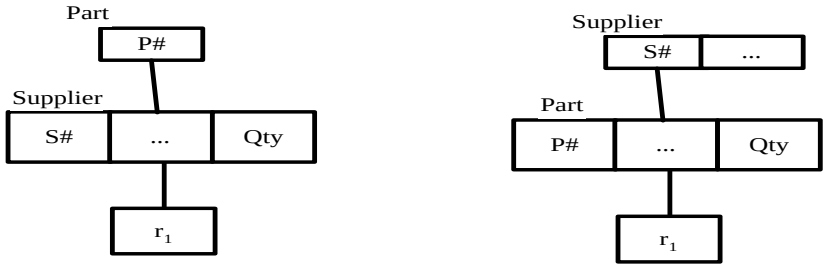
Rule 5 For each n : m binary relationship type, there are few ways to translate it.



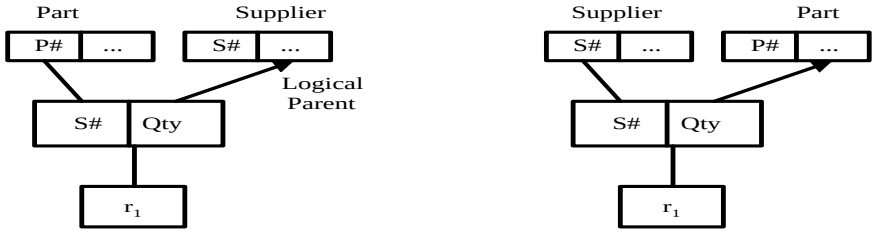
(a) (b)



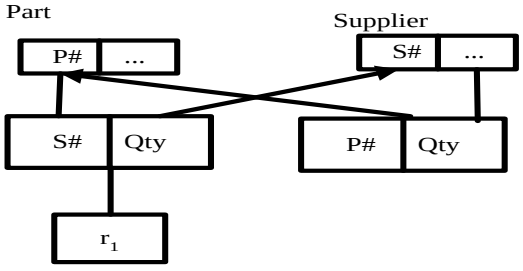
(c)



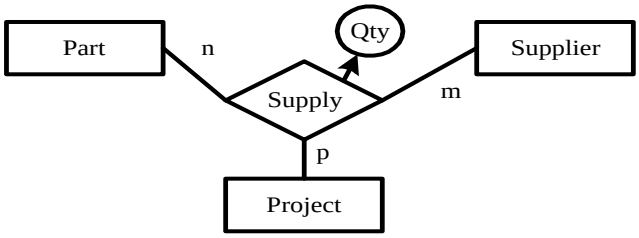
(d) (e)



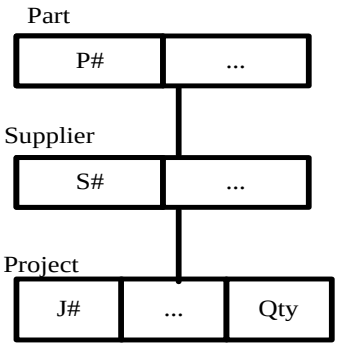
(f) virtual / physical pairing



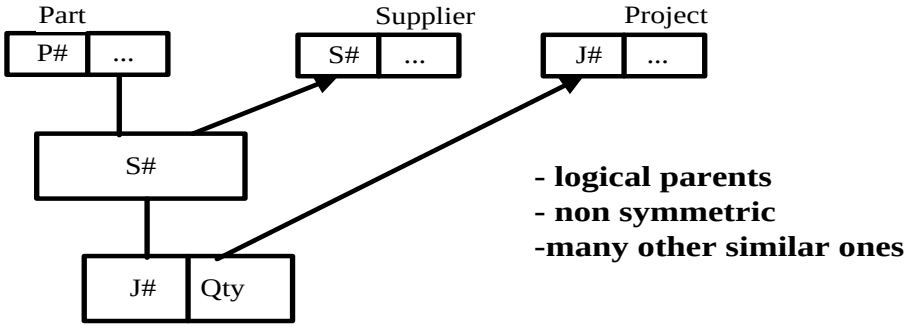
Rule 6 For each n-ary (n > 2) relationship type, there are many ways to translate it.



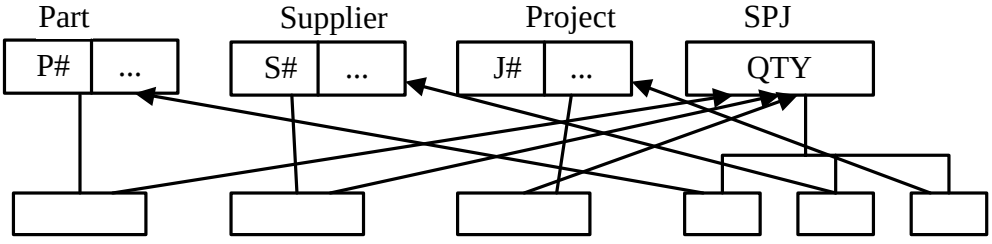
(a) - and many other similar one;
- too many redundancy



(b)

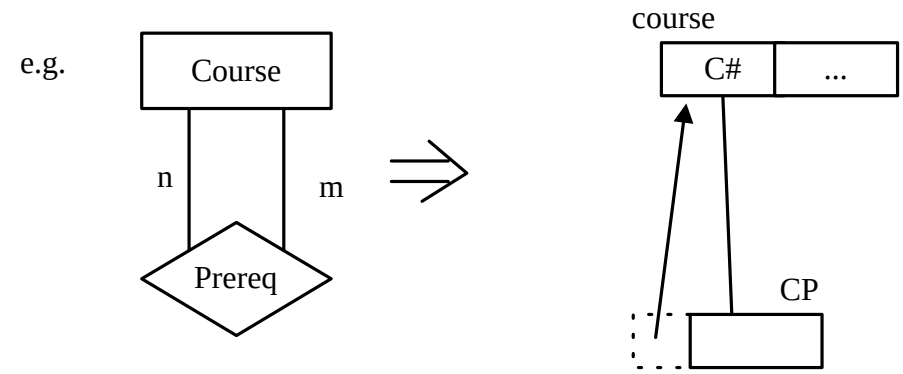


(c) virtual pairing solution ? (CJ Date)

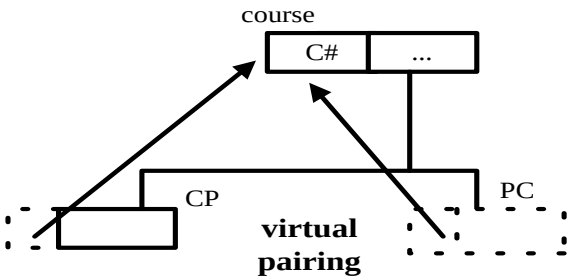


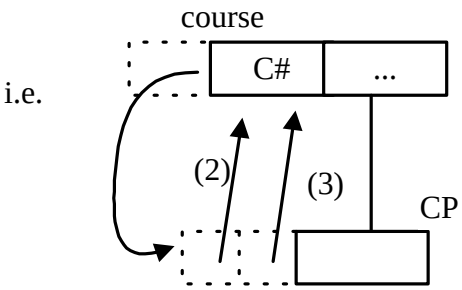
(d) other solution ?

Rule 7 Recursive relationship type



For symmetric queries





Question: How about EMPLOYEE and MANAGER relationship ?

Rule 8 Other special relationships, e.g., ISA, UNION, INTERSECT, etc ?