3: Entity-Relationship Modeling

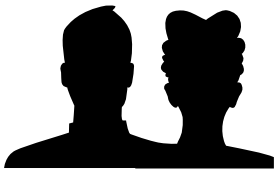
(part two)

design-specific er model

for database designers/administrators

not a science

systematic



target audience: database designer/admin

technology-independent

two phases

coarse granularity and fine granularity

coarse-granular design-specific

collect additional attribute characteristics

data type/size

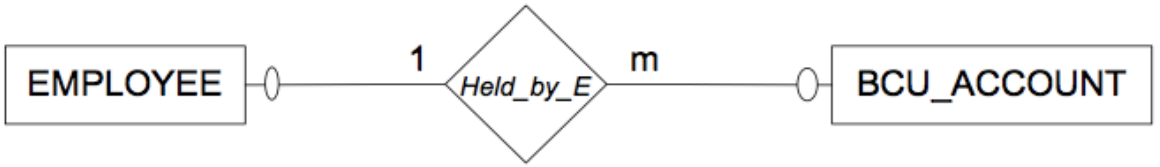
update semantic integrity constraints

more technically precise notation

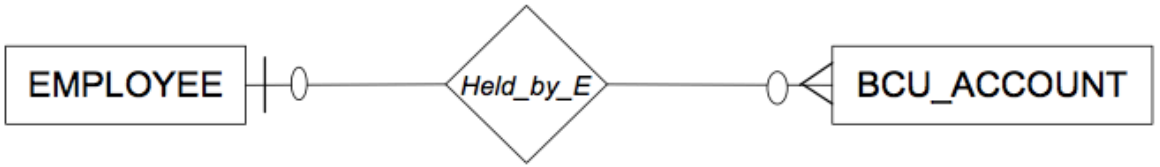
min/max

map deletion rules

min/max notation

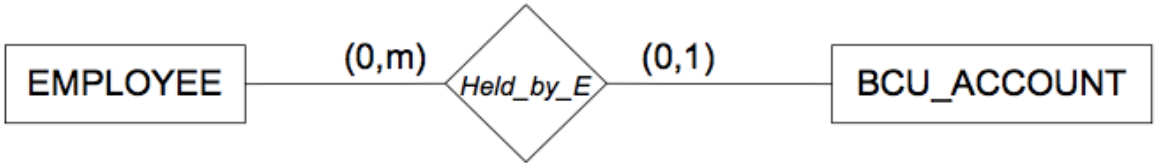


(a)
'Look Across' (Chen's) Notation for a Binary Relationship



Note: the bar adjacent to EMPLOYEE and the crow's foot adjacent to BCU_ACCOUNT convey the cardinality ratio of 1:m.

(b)
'Look across' (Crow's foot variant) notation for a binary relationship



(c)
'Look here' (min, max) notation for a binary relationship

Figure 3.4 Introduction of (min, max) notation for a binary relationship

min/max notation

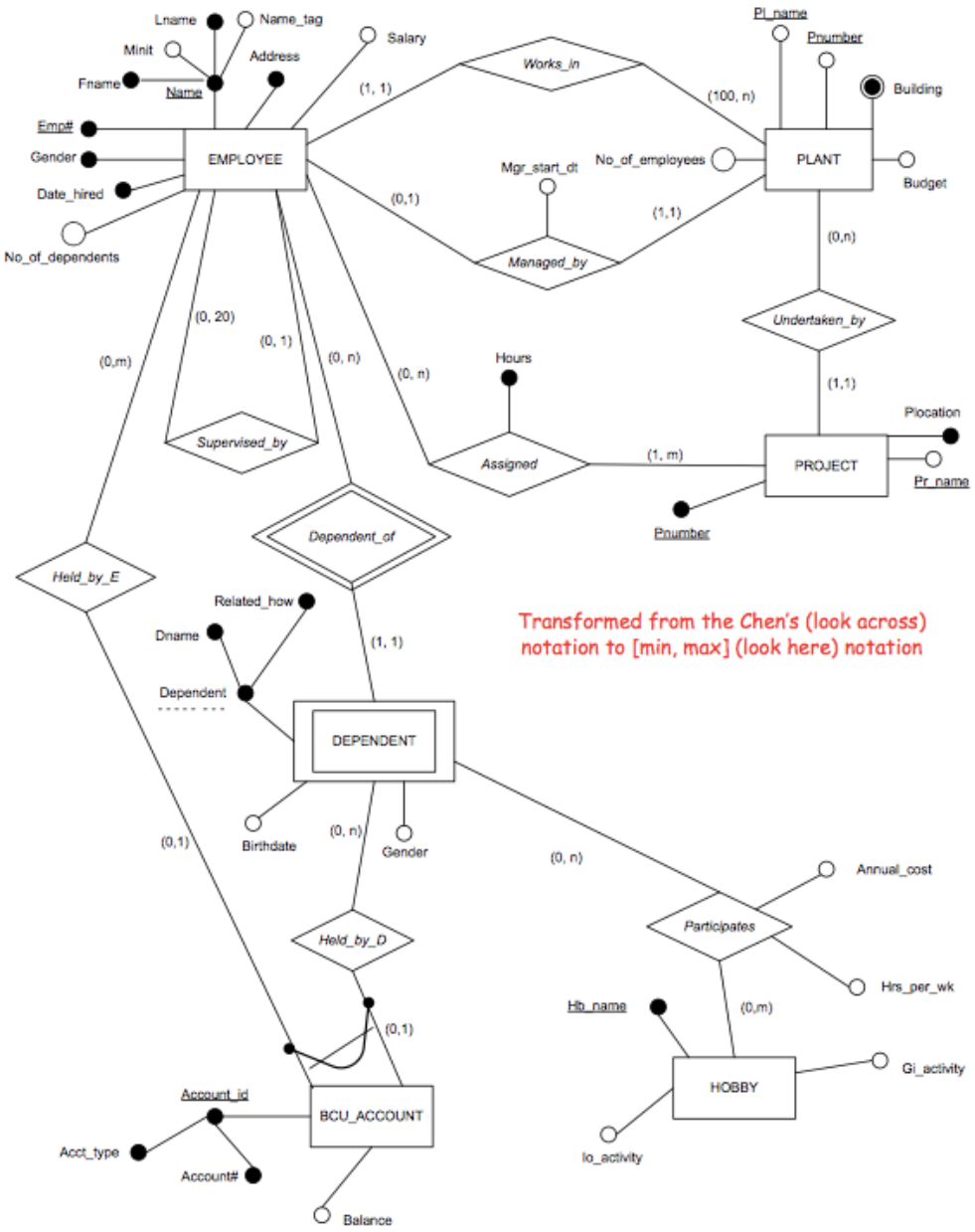
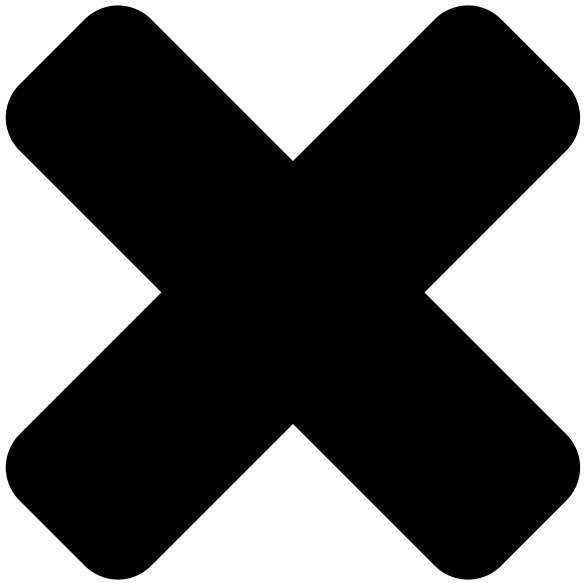


Figure 3.5 Course-granular Design-Specific ER diagram for Bearcat, Incorporated - Stage 1

deletion rules

what happens when an entity type gets deleted? pg. 101



restrict

cascade

set null

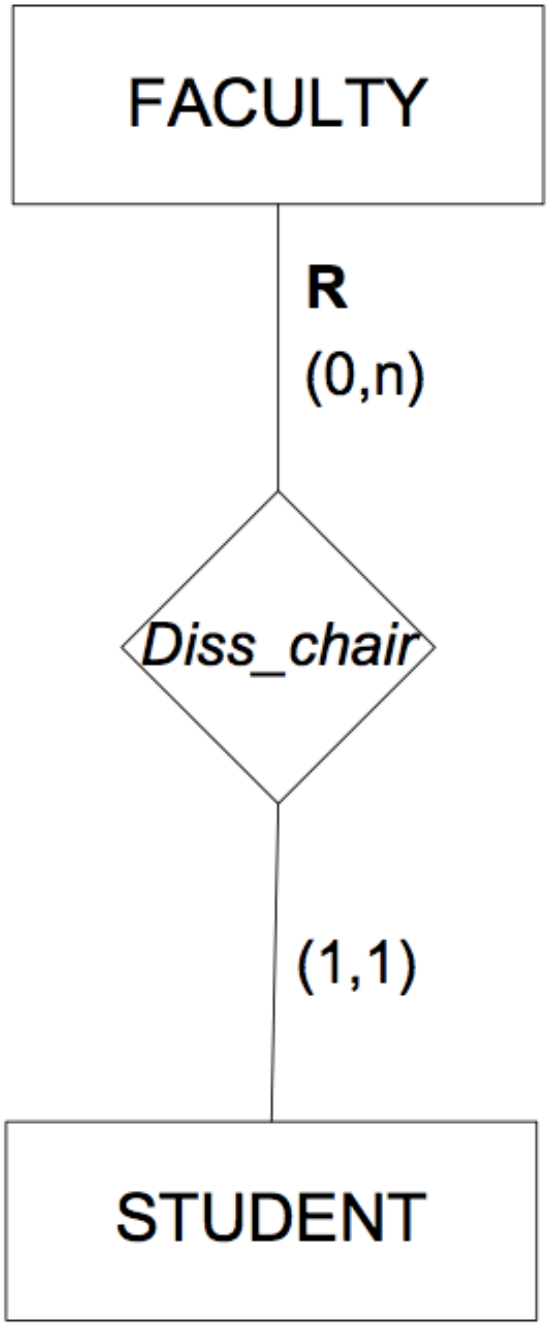
set default

restrict (R)

if there is a parent-child relationship, the parent cannot be deleted.

(default deletion rule)

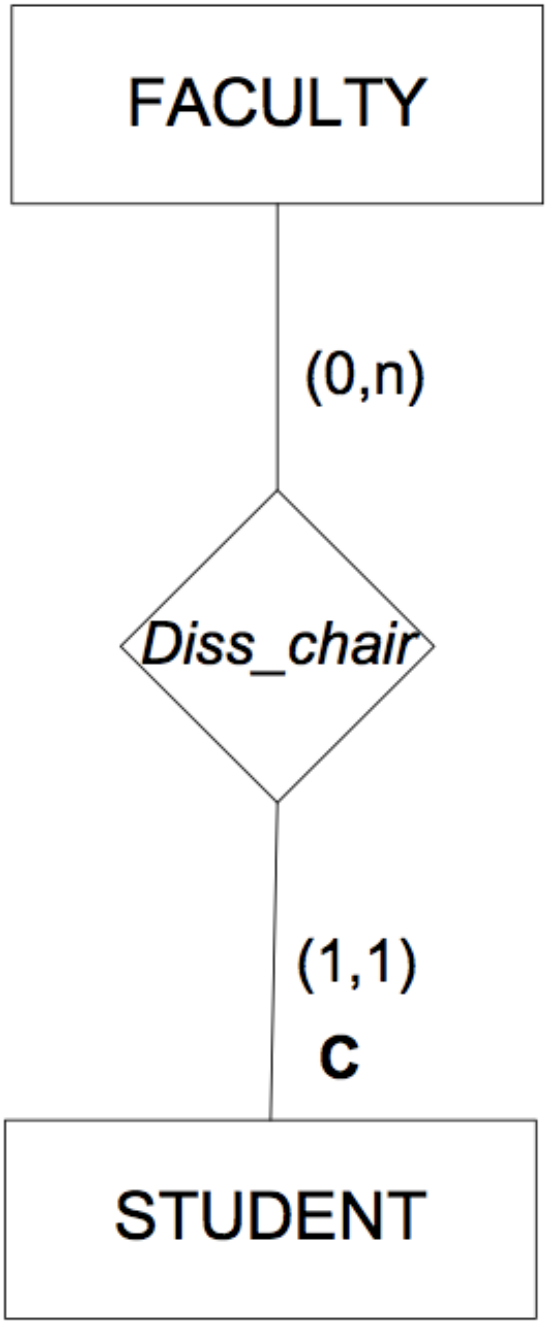
restrict (R)



cascade (C)

if a parent is deleted, then the children are deleted as well.

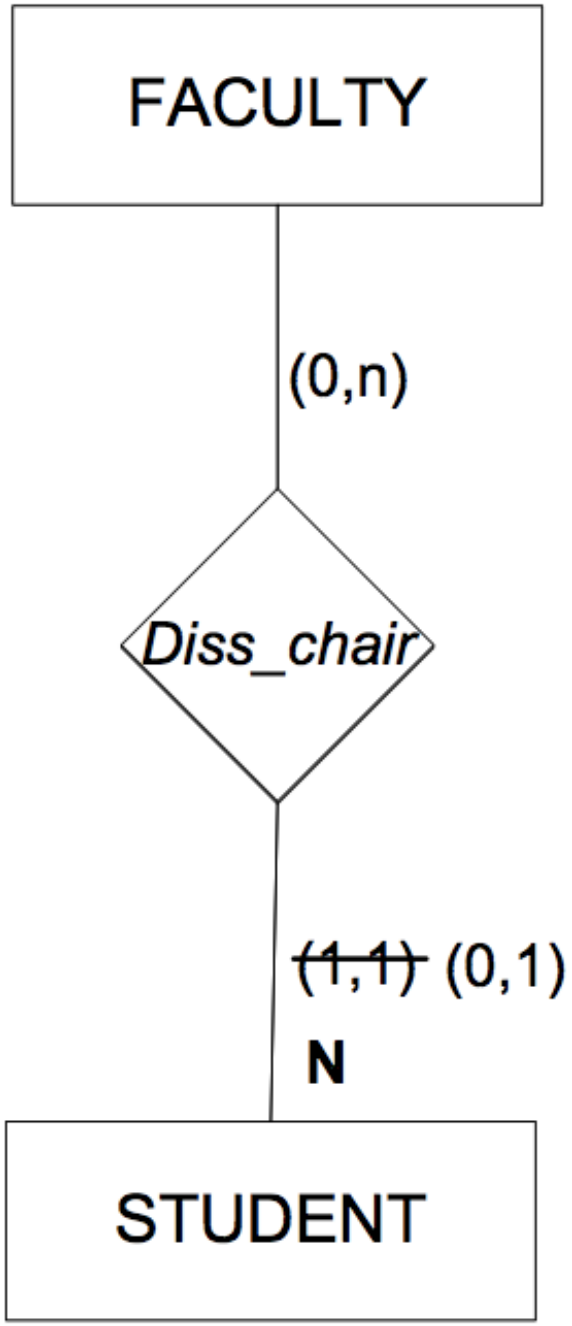
cascade (C)



set null (N)

if a parent is deleted, then the relationship ceases to exist.

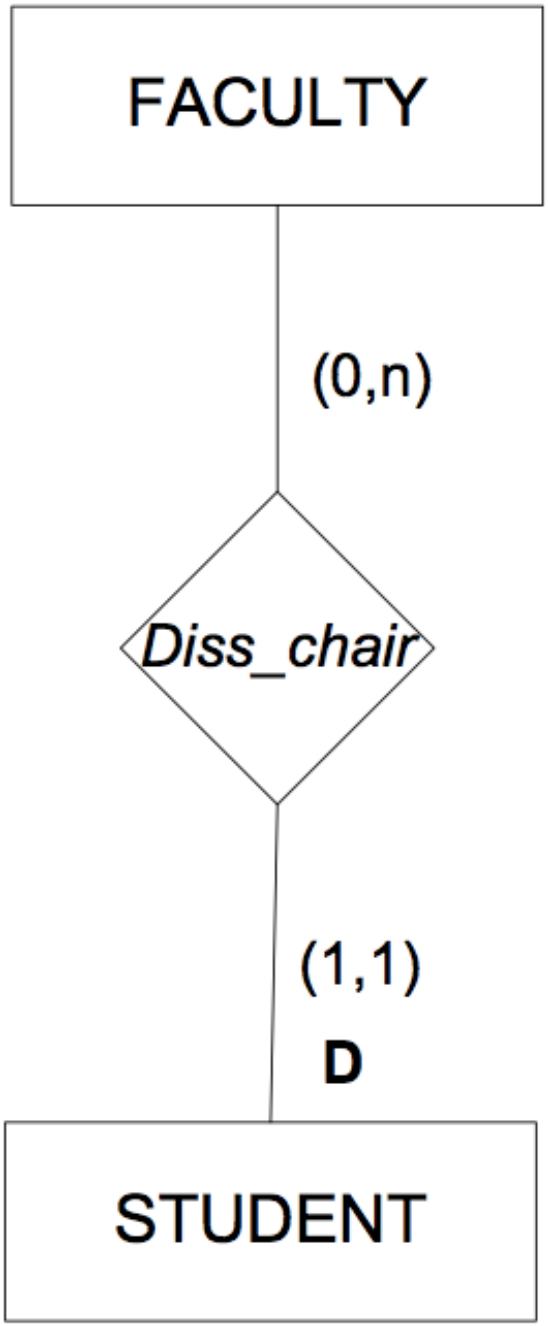
set null (N)



set default (D)

if a parent is deleted, then the child is assigned to another parent.

set default (D)



deletion constraints using rules

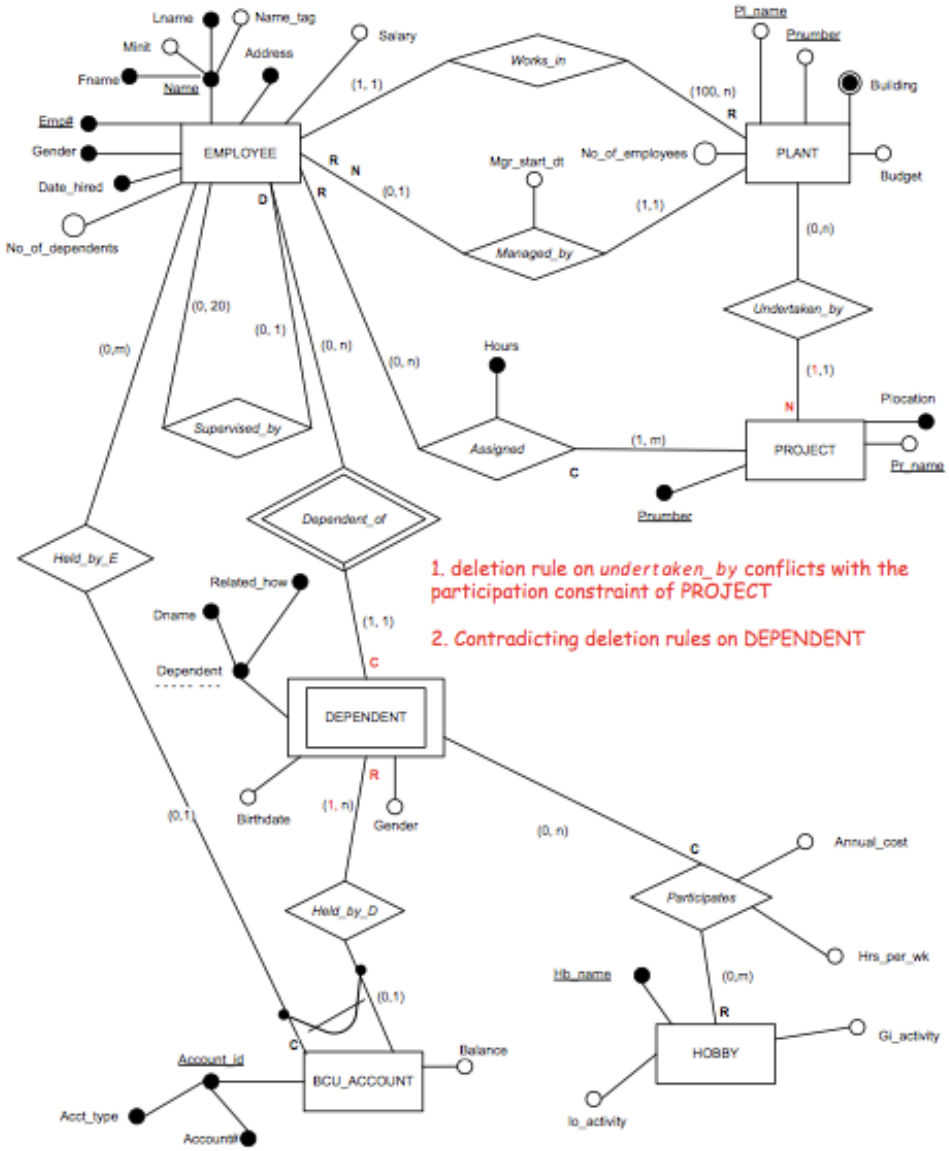


Figure 3.7 Course-granular Design-Specific ER diagram for Bearcat, Incorporated - Stage 2
{deletion constraints added}

deletion constraints using rules

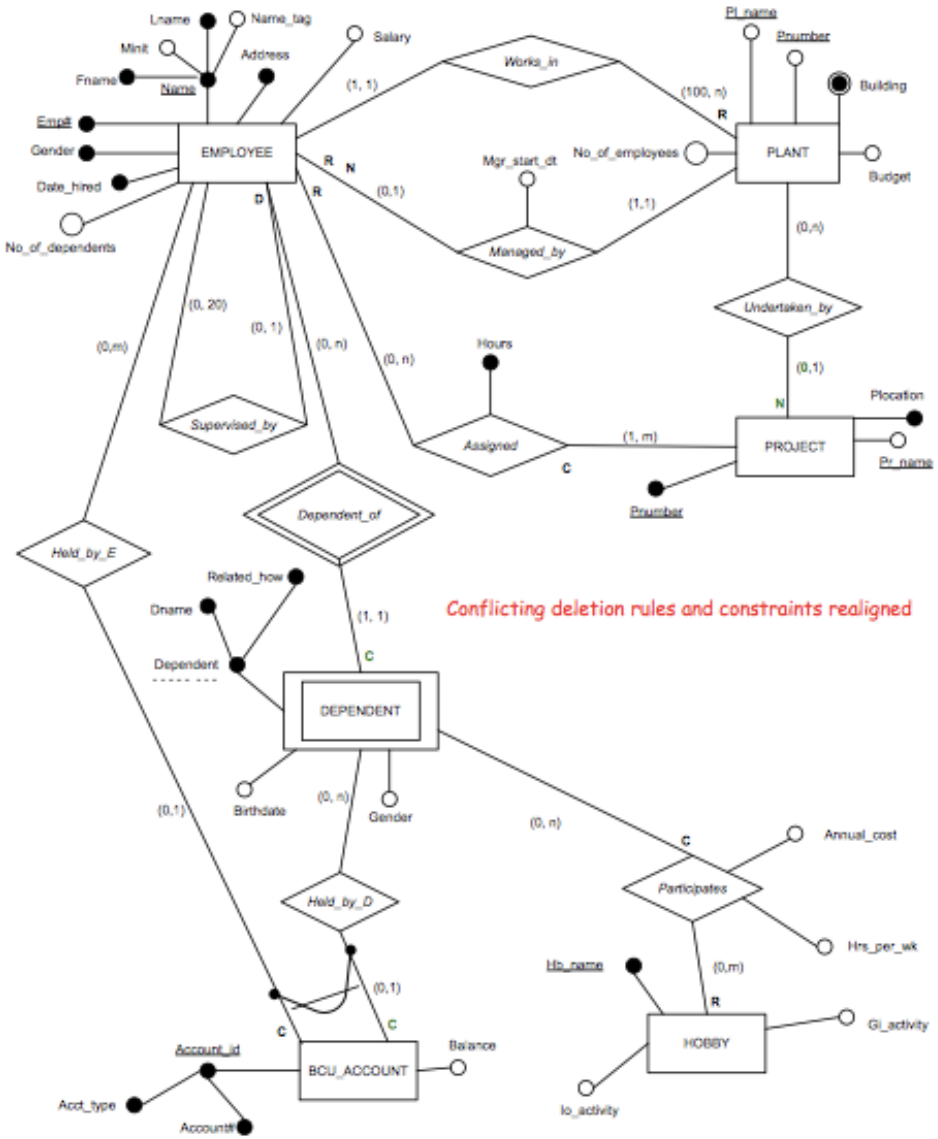


Figure 3.8 Course-granular Design-Specific ER diagram for Bearcat, Incorporated - Final

fine-granular design-specific

map additional attribute characteristics

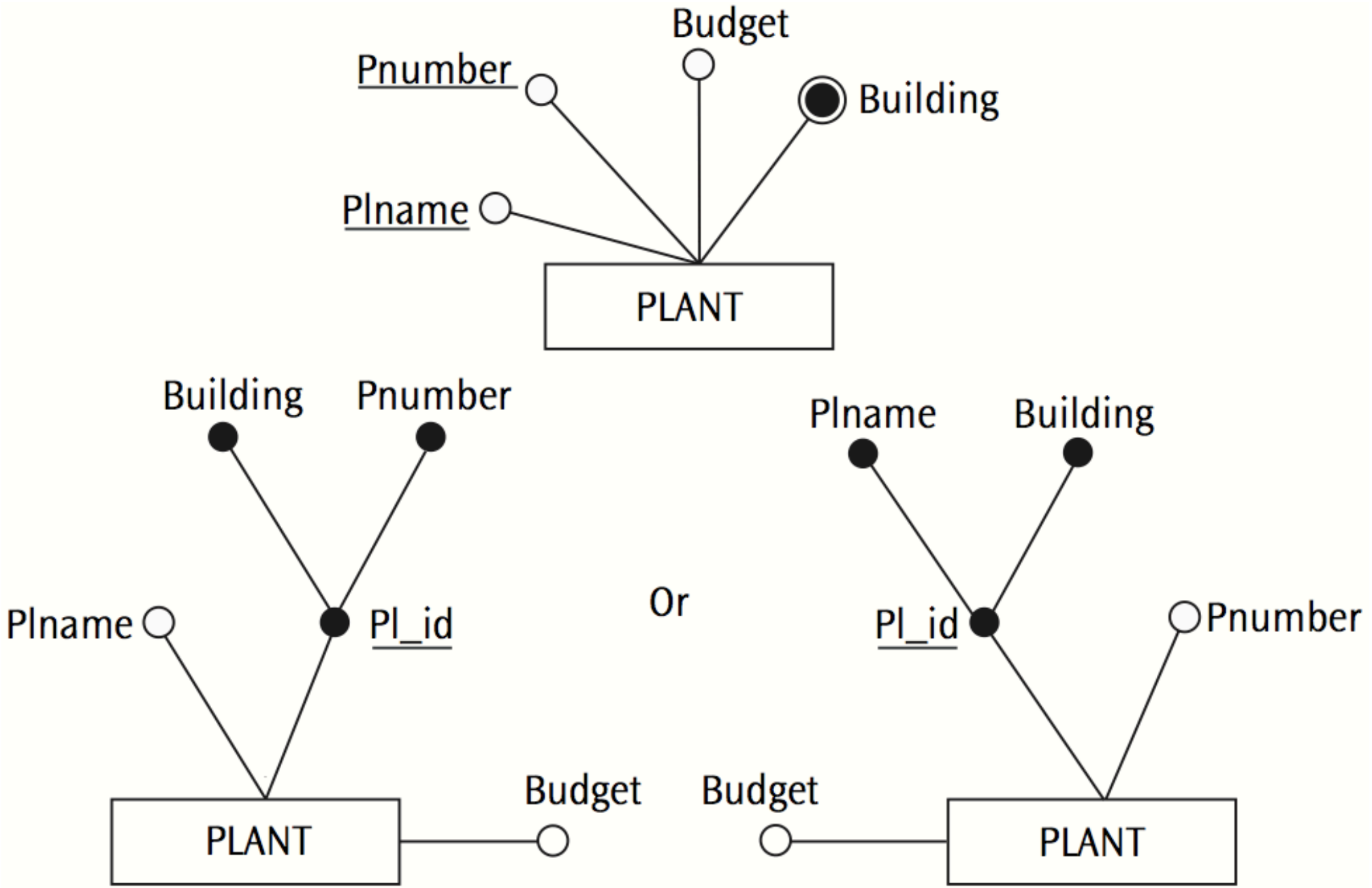
data type/size

update semantic integrity constraints

decompose er constructs

multi-valued attributes and m:n cardinality constraints

replacing multi-valued attributes



using sample data

Original PLANT Data Set

Pnumber	Plname	Budget	Building
10	Underwood	3000000	1
			2
			3
11	Garnett	3000000	1
			2
12	Belmont	3500000	1
13	Vanderbilt	3500000	1
			2

Revised PLANT Data Set- Variation 1

Pnumber	Building	Plname	Budget
10	1	Underwood	3000000
10	2	Underwood	3000000
10	3	Underwood	3000000
11	1	Garnett	3000000
11	2	Garnett	3000000
12	1	Belmont	3500000
13	1	Vanderbilt	3500000
13	2	Vanderbilt	3500000

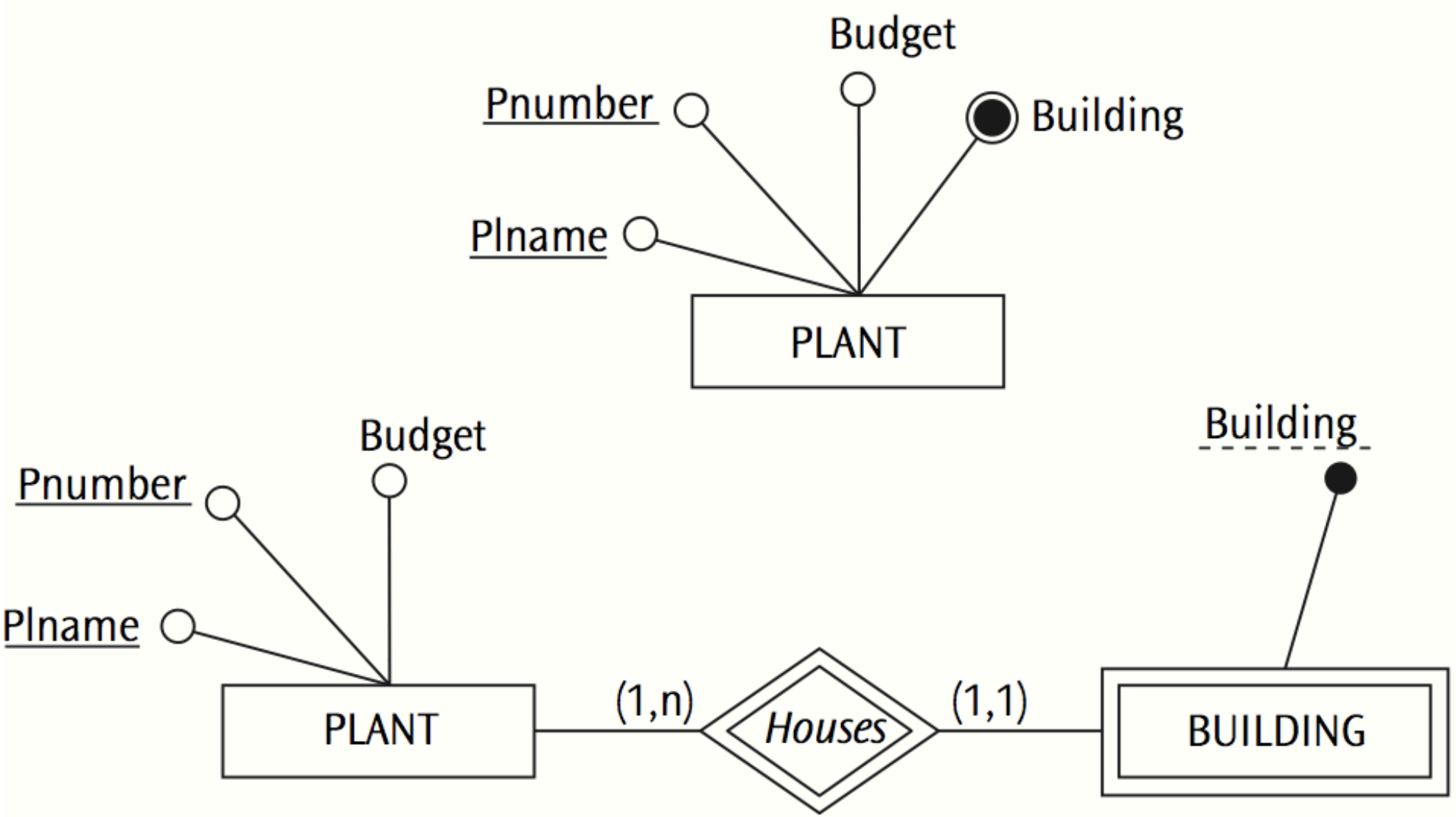
Revised PLANT Data Set- Variation 2

Pnumber	Building	Plname	Budget
10	1	Underwood	3000000
10	2	Underwood	3000000
10	3	Underwood	3000000
11	1	Garnett	3000000
11	2	Garnett	3000000
12	1	Belmont	3500000
13	1	Vanderbilt	3500000
13	2	Vanderbilt	3500000

(a)

Sample data illustrating the transformation of a multi-valued attribute to a single-valued attribute (see Figure 3.9a)

replacing multi-valued attributes



using sample data

Original PLANT Data Set

Pnumber	Plname	Budget	Building
10	Underwood	3000000	1 2 3
11	Garnett	3000000	1 2
12	Belmont	3500000	1
13	Vanderbilt	3500000	1 2

Revised PLANT Data Set

Pnumber	Plname	Budget
10	Underwood	3000000
11	Garnett	3000000
12	Belmont	3500000
13	Vanderbilt	3500000

Revised BUILDING Data Set

Building
1
2
3
1
2
1
1
2

(b)

Sample data illustrating the transformation of a multi-valued attribute to a weak entity type (see Figure 3.9b)

creating a gerund entity type

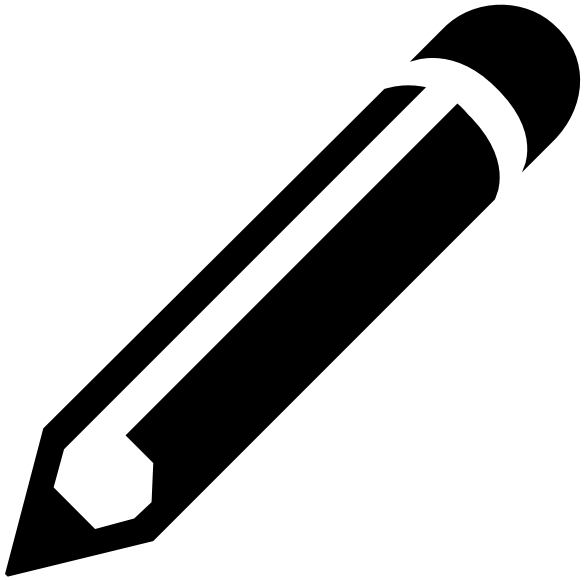
(a)

An m:n relationship between EMPLOYEE and PROJECT

(b)

Decomposition of *Assigned* relationship type to eliminate m:n cardinality ratio

map additional attribute characteristics



A - alphabetic

N - numeric

X - alphanumeric

Dt - date

fine-granular design-specific

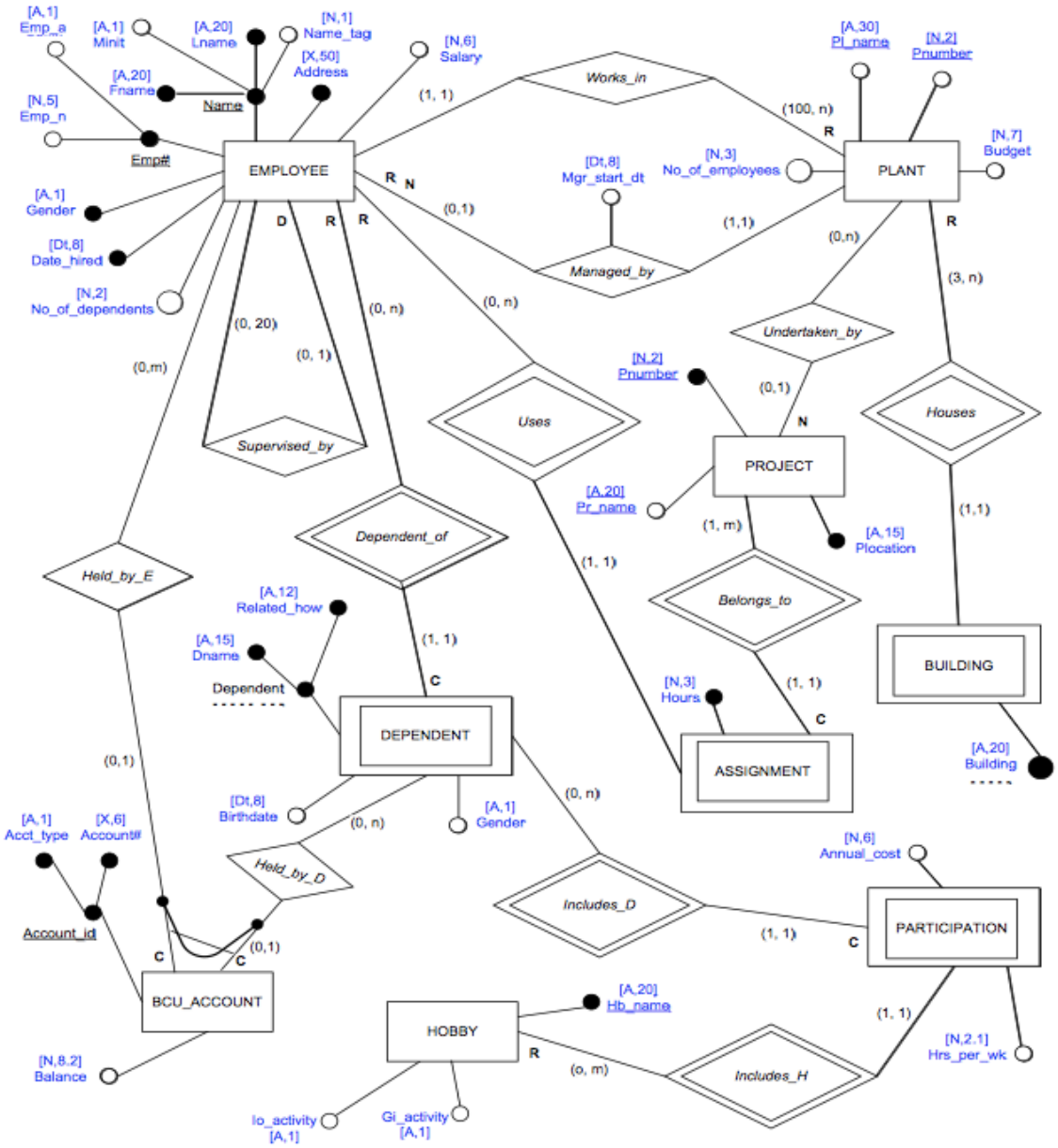


Figure 3.11 Fine-granular Design-Specific ER diagram for Bearcat, Incorporated

conceptual modeling

summary

presentation-layer er model

diagram+semantic integrity constraints

coarse-granular er model

collect attribute characteristics

min/max notation

deletion rules

fine-granular er model

map the attribute characteristics

decompose multi-valued attributes and m:n relationship types