Conversion ER to Relational

• Recall: ER is a descriptive model
• Relational is a storage model
• Need to do conversion from ER to use in a DB
Review

• In conversion, entities become relations
• Relationships become foreign keys (if 1-1 or 1-N)
• Relationships become relations (if N-N)
• Attributes on relationships go with the corresponding fk
• Weak entities: foreign key becomes part of the key
Weak Entities: Example

- Pet
  - Species
  - Name
- Dependent
  - Name
  - Age
- Child Of
- Owned By
- Emp
  - Name
  - UFID
Weak Entities: Example

Emp converted as usual:

\[ \text{EMP}(\text{UFID}, \text{Name}) \]
Since Dependent weak, EMP.UFID is part of key:

EMP (UFID, Name)

DEPENDENT(Name, Age, UFID; UFID → EMP.UFID)
Weak Entities: Example

Pet is also weak, borrows Dependent’s key:

EMP (UFID, Name)

DEPENDENT(Name, Age, UFID; UFID → EMP.UFID)

PET(PetName, Species, DepName, UFID; DepName, UFID → DEPENDENT.Name, Dependent.UFID)
Surrogate Keys

Long chains of weak entities can create big keys:

\[
\text{PET}(\text{PetName}, \text{Species}, \text{DepName}, \text{UFID}; \text{DepName}, \text{UFID} \rightarrow \text{DEPENDENT.Name}, \text{Dependent.UFID})
\]

• OK to define a “surrogate key” to make things easier
• Usually, this will be implemented as a DB-assigned number (like an auto-increment)

\[
\text{PET}(\text{PetID}, \text{PetName}, \text{Species}, \text{DepName}, \text{UFID}; \text{DepName}, \text{UFID} \rightarrow \text{DEPENDENT.Name}, \text{Dependent.UFID})
\]
Other Parts of Conversion

How to handle multi-valued attributes?

EMP (UFID, Name)
Other Parts of Conversion

Can hold many values, so must be its own relation. Treat like a weak entity:

EMP (UFID, Name)

EMP_PHONE_NUM (NUMBER, UFID; UFID → EMP.UFID)
How About Inheritance?

- Inheritance treated as a 1-N, parent/child relationship
- Entities in inheritance hierarchy w/o own key are treated as weak entities
- To convert: start at top and work down
How About Inheritance?

EMP (SSN, A)
How About Inheritance?

EMP (SSN, A)

Now do next level:

MANAGER (B, C, EMP_SSN; EMP_SSN → EMP.SSN)

PEAN (G, EMP_SSN; EMP_SSN → EMP.SSN)
How About Inheritance?

EMP (SSN, A)
MANAGER (B, C, EMP_SSN; EMP_SSN → EMP.SSN)
PEAN (G, EMP_SSN; EMP_SSN → EMP.SSN)

Now do last level:

CORP (D, EMP_SSN; EMP_SSN → MANAGER.EMP_SSN)
DIV (E, F, EMP_SSN; EMP_SSN → MANAGER.EMP_SSN)