

## ENHANCED ER (EER) MODELING

developed by Teorey, Yang, and Fry [1986]  
extends Chen's ER model [1976]  
object-oriented features:  
sub/superclasses,  
inheritance,  
categories

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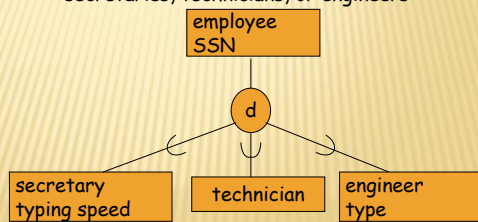
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## SUBCLASS/SUPERCLASS

Employees can be  
secretaries, technicians, or engineers



Note local and global attributes (inheritance).

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## EXAMPLE

Employees can be hourly, in which case we want their ID, name, Address, the day they were hired, and the rate at which they were hired. For salaried employees we want to store their ID, name, address, the day they were hired, and their annual salary and stock options. Consultants also get an ID, and we store their name, address, hiring date, contract number, and billing rate.

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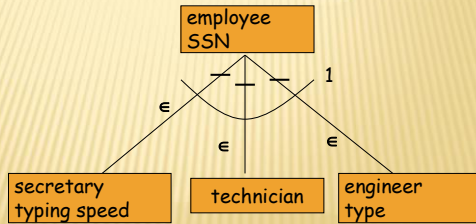
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## ALTERNATE NOTATION




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## CLASSES

- allows specialization and generalization
- allow specific (local) attributes
- disjointness constraints
- subclasses can enter relationships
- multiple inheritance

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## EXAMPLE, GENERALIZATION

### Book Store

Henry Books has opened an online branch of their bookstore in which on top of traditional books, they also sell ebooks and ebook readers. For e-books we store the same kind of information as for books, but we also store their size and format. For readers we store their name, company, price. We also keep track which e-books are compatible with which readers.

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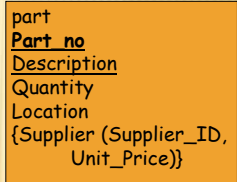
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### EXAMPLE, SPECIALIZATION

Parts have a unique Part\_no and description; for each part we store quantity and location. Some parts we manufacture ourselves, but some parts are also purchased, in which case we need to know the suppliers (unique ID) and the unit price.



better design?

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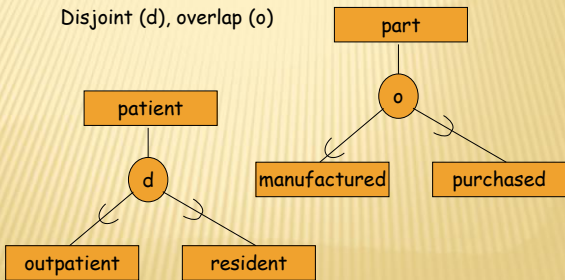
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### CONSTRAINTS

Disjoint (d), overlap (o)




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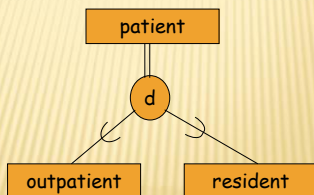
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### COMPLETENESS CONSTRAINTS

Double line: has to participate




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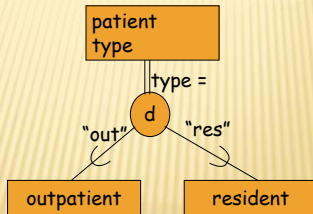
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## SUBTYPE DISCRIMINATORS




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## UNIVERSITY EXAMPLE

The human resource department at the university keeps track of two different types of people: employees (faculty and staff) and students (alumni and current). For everybody we have a unique ID, name, address, dob. For employees we store SSN and salary, for alumni the degrees they have earned (title, date), and for current students major and year they started. For graduate students we keep track of waived prerequisite courses, and for undergraduates we store the current standing. For faculty we store their rank and for staff their position. For both we store office information. Students (both current and alumni) can set up appointments with a faculty member. Current students are assigned an advisor.

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