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CS6083: Database Systems

Design Example: Video Rental Chain

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Scenario: Video Store (Blockbuster)

- Customers want to rent movies
- Branches (stores) have movies
- Movies have several (many) copies
- Copies belong to one branch
- Need to be returned to same branch
- Several copies of same movie in same branch
- Need to know which customer returned copy
- Customers may rent same movie or same copy of a movie many times

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- **Tasks:**
  - How to design an ER diagram for this task
  - How to model a copy of a movie
  - How to model a rental of a copy of a movie
  - How various assumptions influence design
  - Weak and weaker entities
  - ID or no ID?
  - Converting to relational schema
  - Foreign keys

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Customer

cid
cname
cphone

Branch

Bid
bname
bphone

Movie

mid
mtitle
myear

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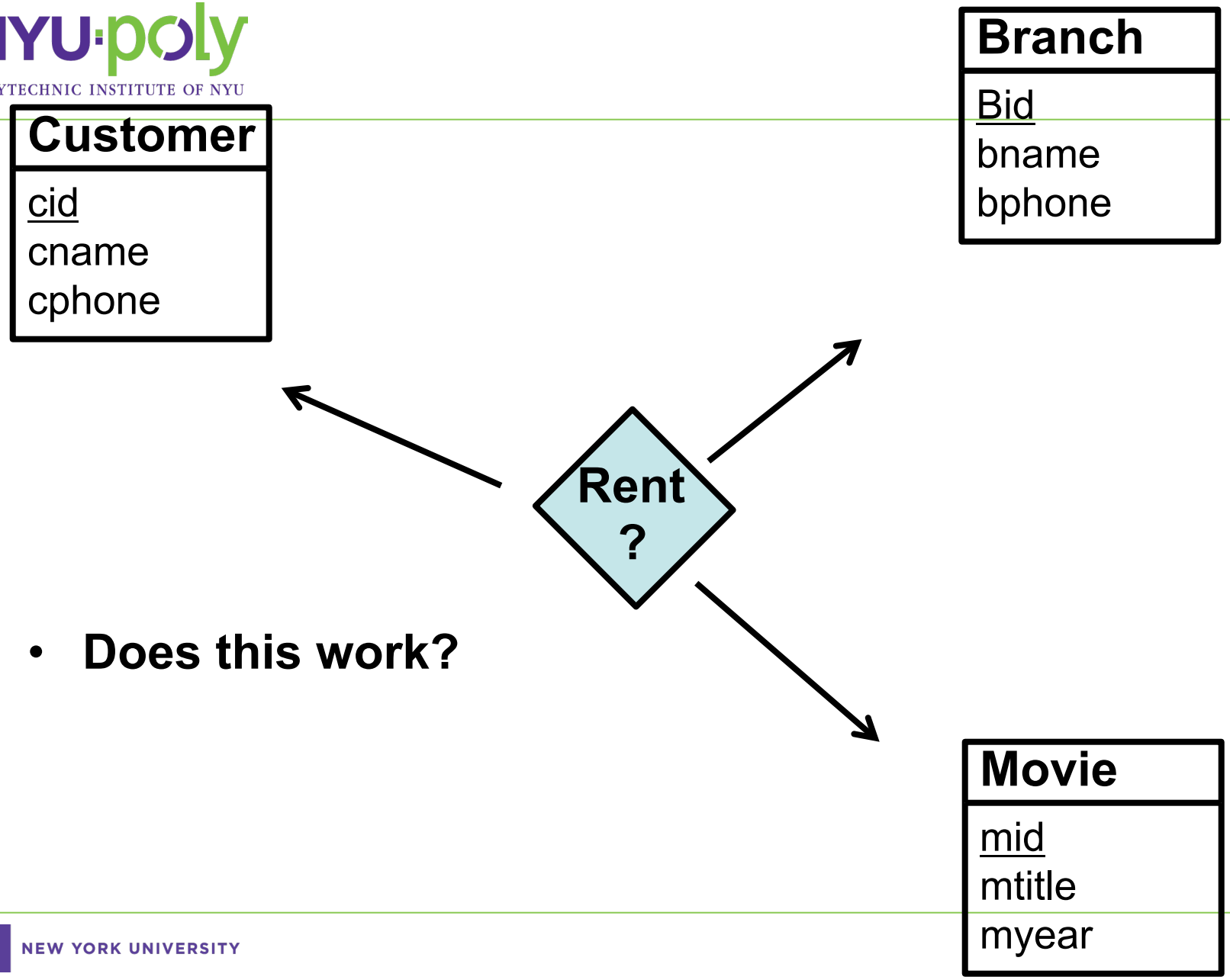
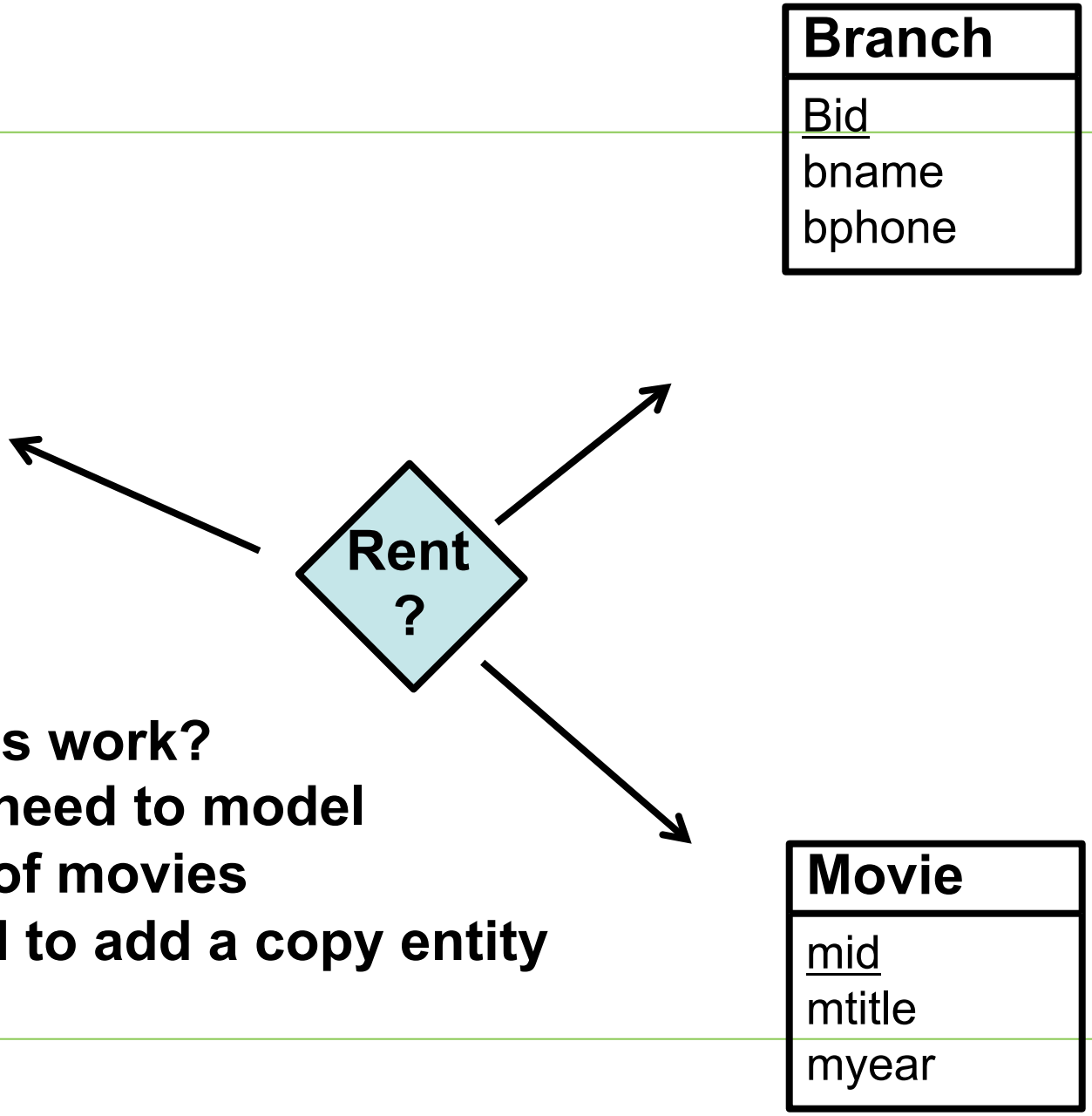
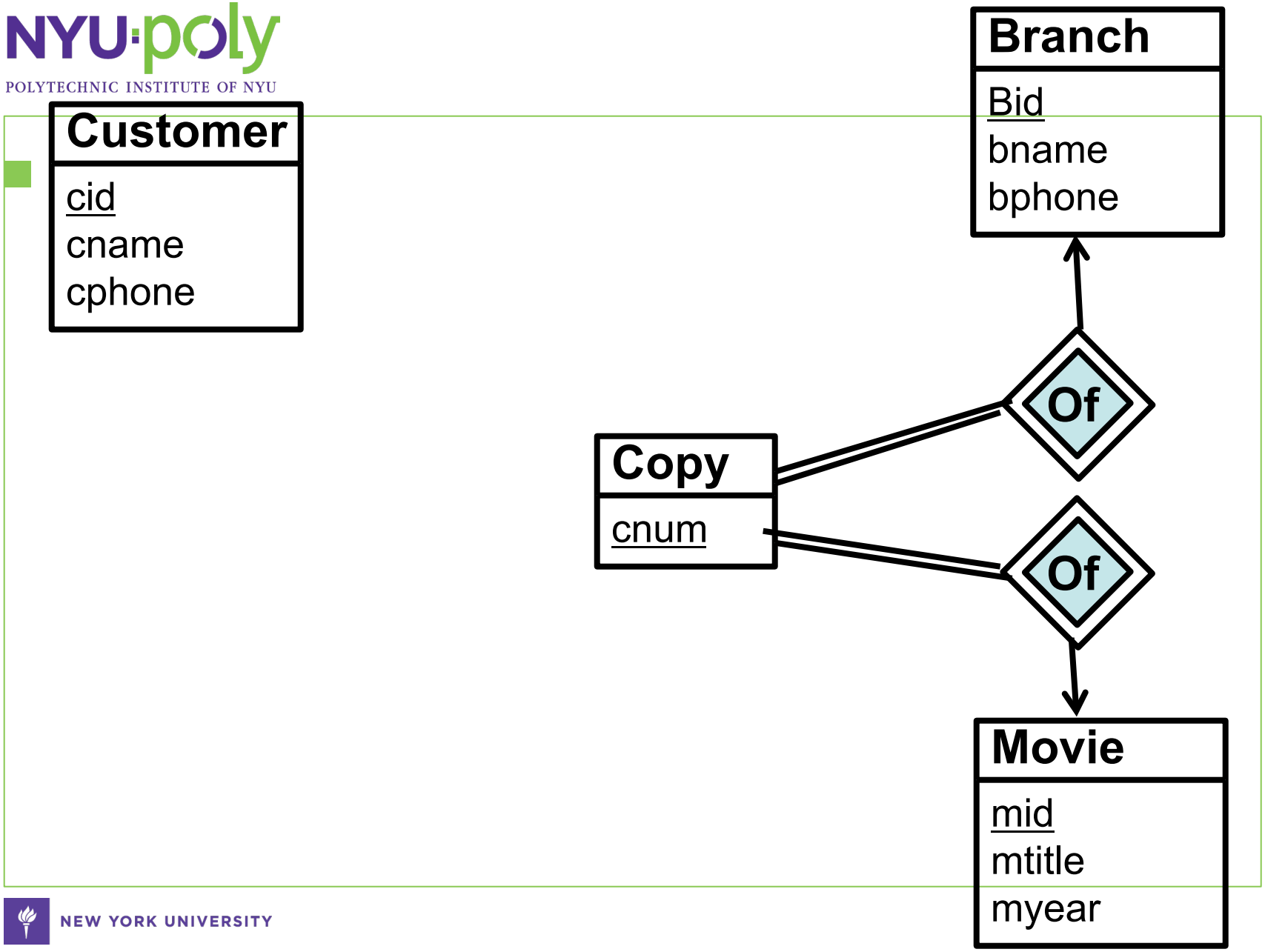


- **Does this work?**



- **Does this work?**
- **No! We need to model copies of movies**
- **We need to add a copy entity**


Customer
cid
cname
cphone
Branch
Bid
bname
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Of
Copy
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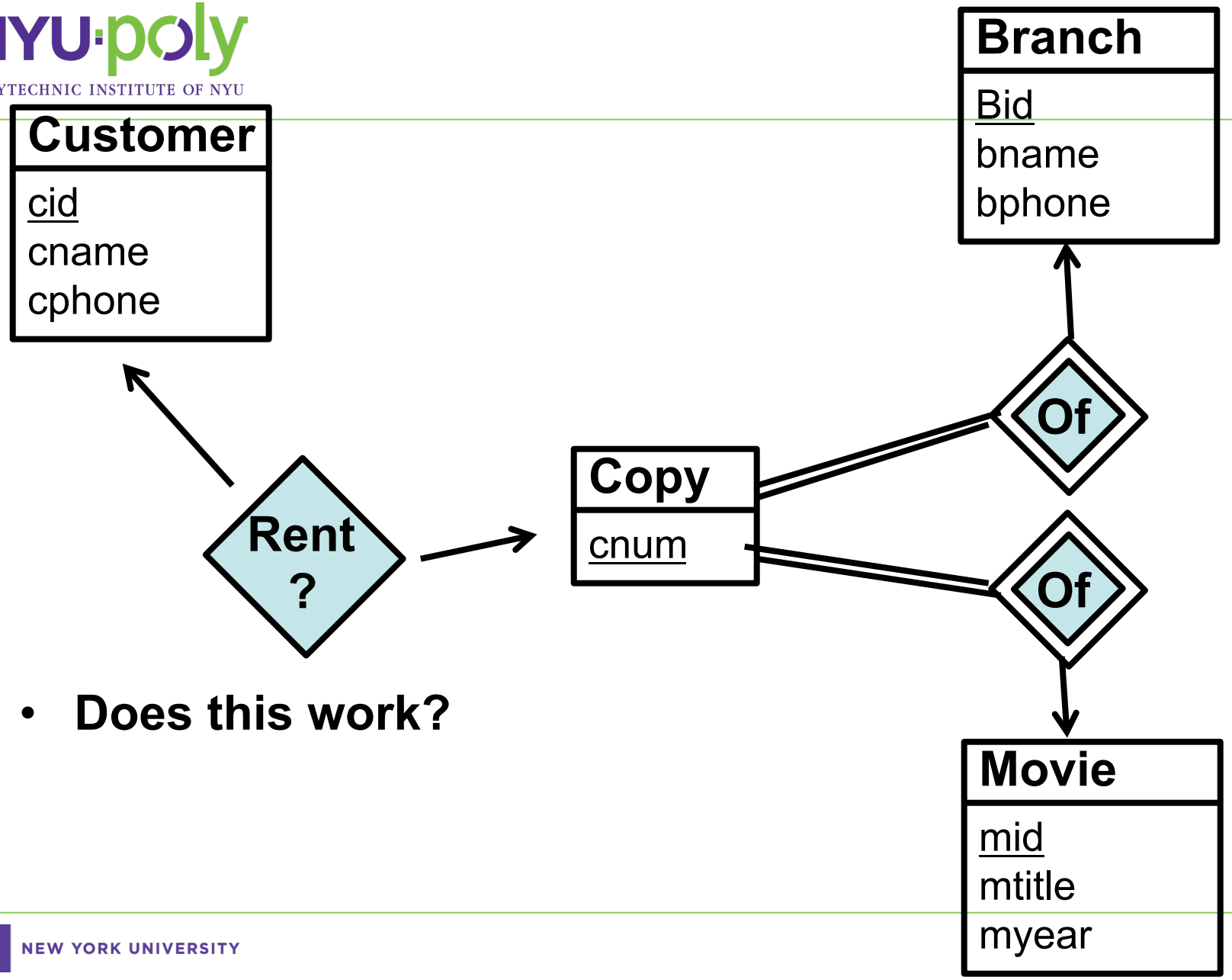

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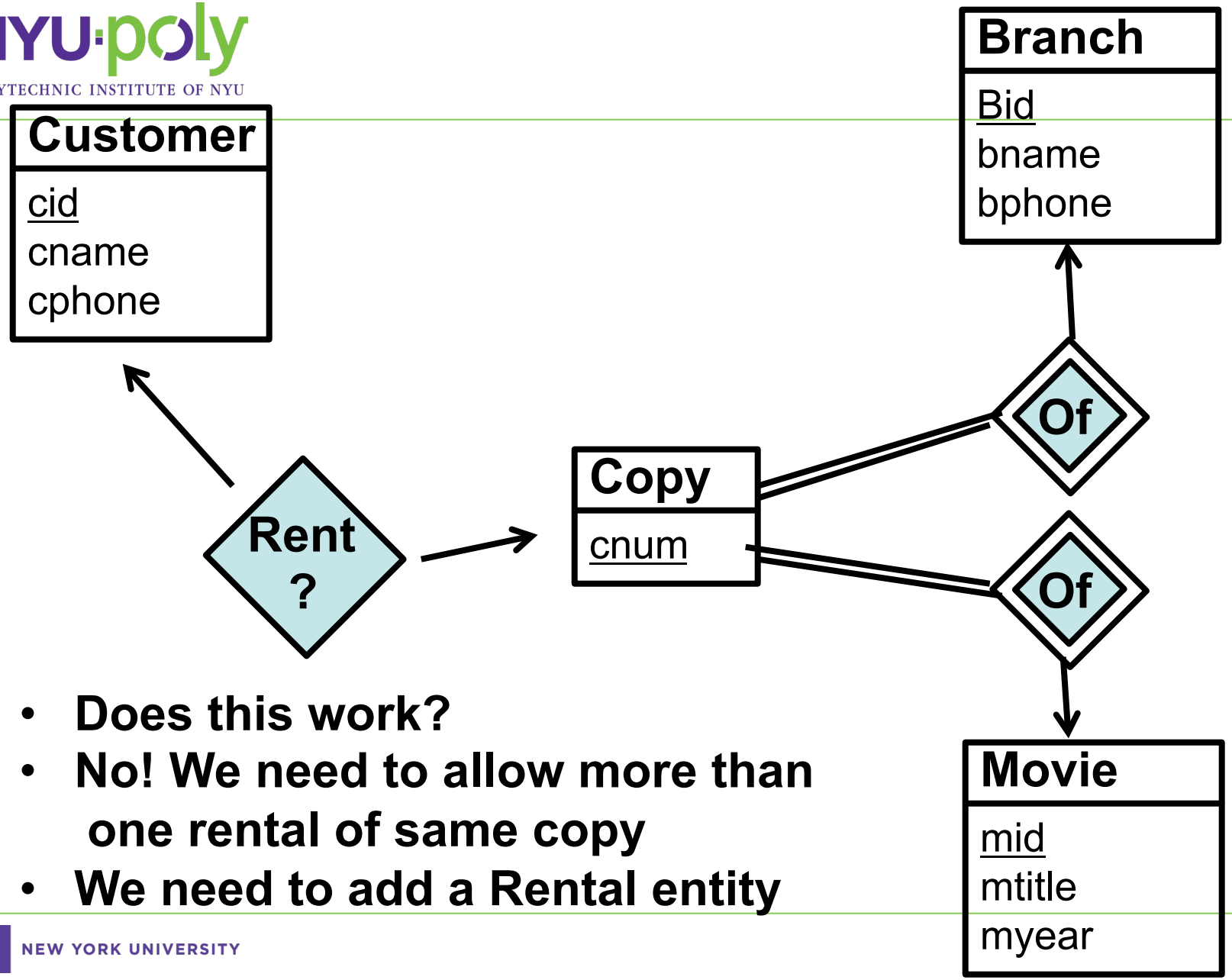

- **Does this work?**
- **No! We need to allow more than one rental of same copy**
- **We need to add a Rental entity**

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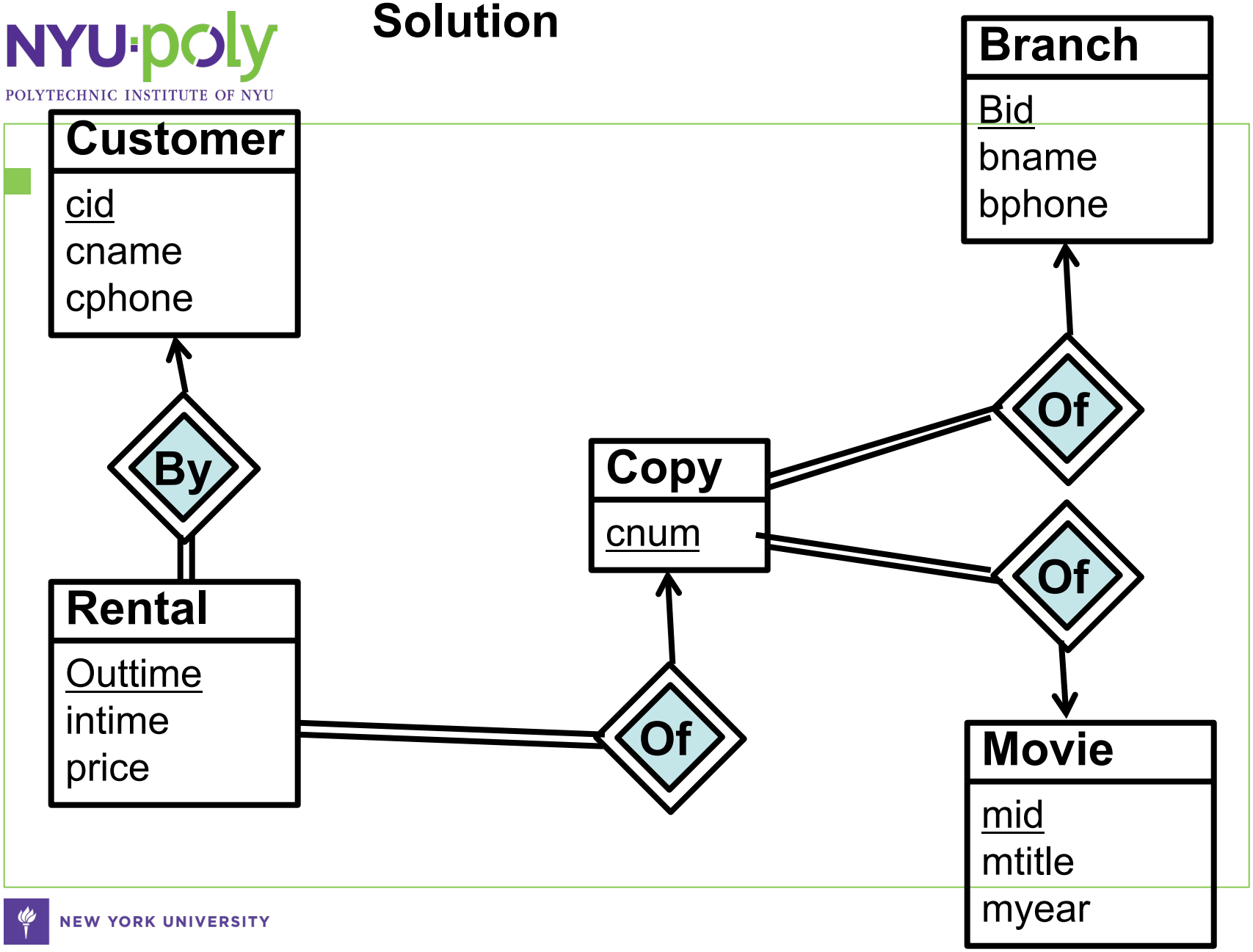
Solution



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Translation to Relational Model

- Customer (cid, cname, cphone, ...)
- Branch (bid, bname, bphone, ...)
- Movie (mid, mtitle, myear, mgenre, ...)
- Copy (cnum, mid, bid)
  foreign keys: mid referencing mid in Movie,
  bid referencing bid in Branch
- Rental (cid, cnum, bid, mid, outtime, intime, price)
  foreign keys: cid referencing cid in Customer,
  (cnum, bid, mid) referencing (cnum, bid, mid) in Copy

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Discussion: Actor-Movie vs. Purchase Schema

- Actor-ActedIn-Movie and Customer-Purchase-Product
- Look (almost) the same in the relational model
- 3 tables, with largest table (ActedIn and Purchase) in middle

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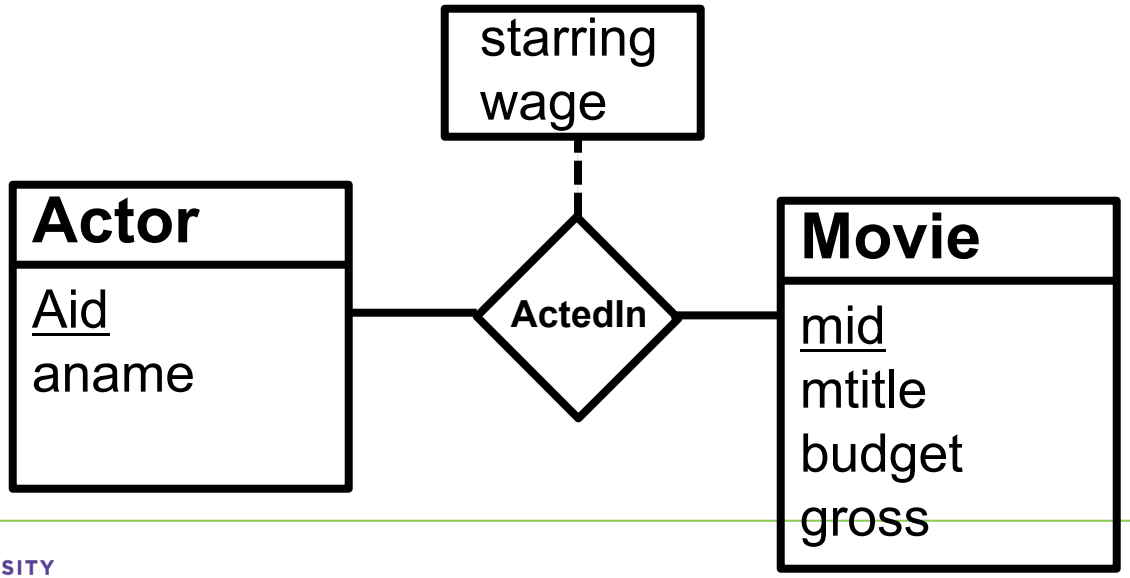

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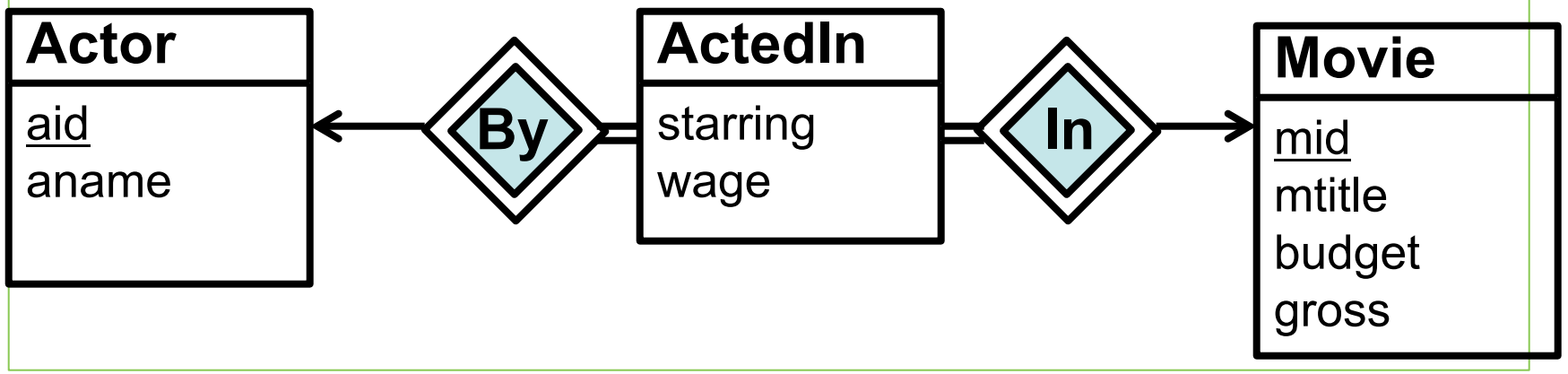

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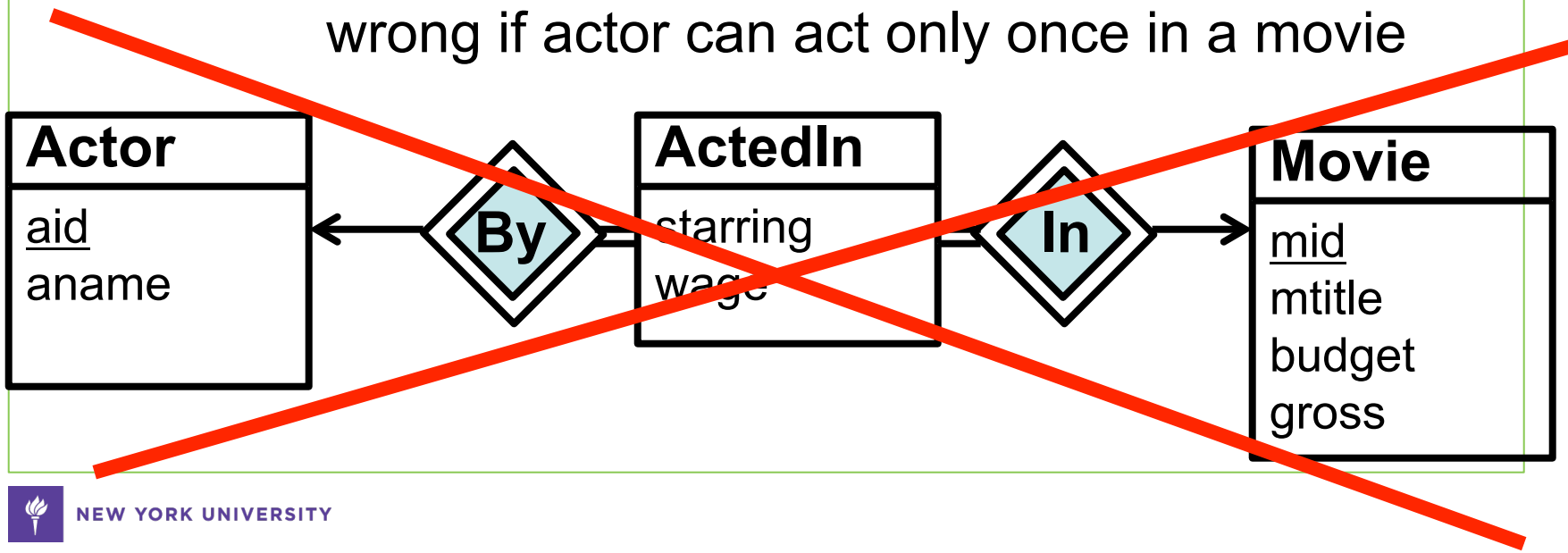

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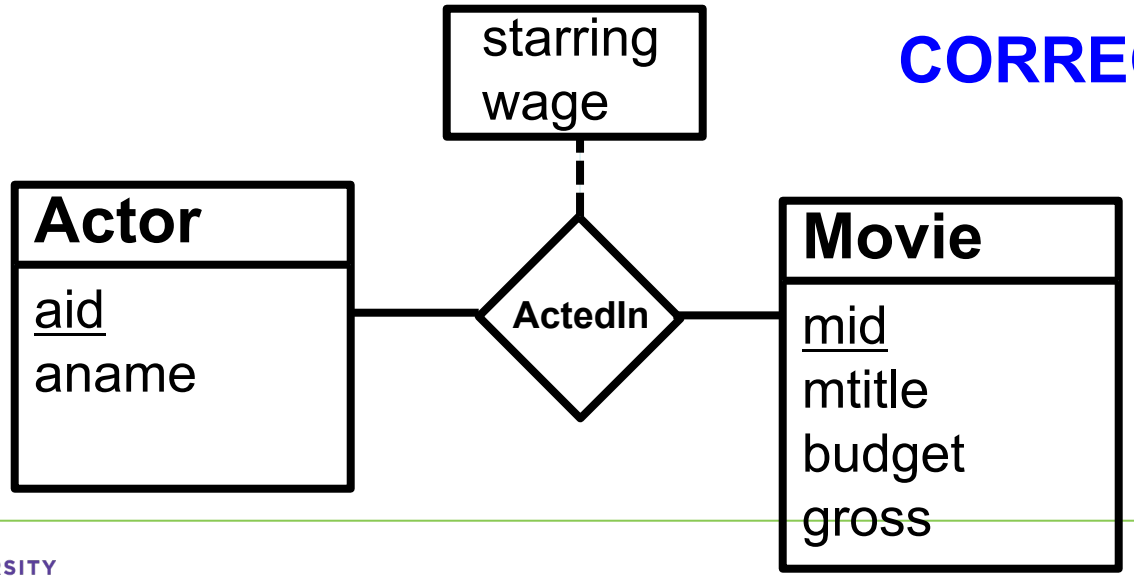

CORRECT

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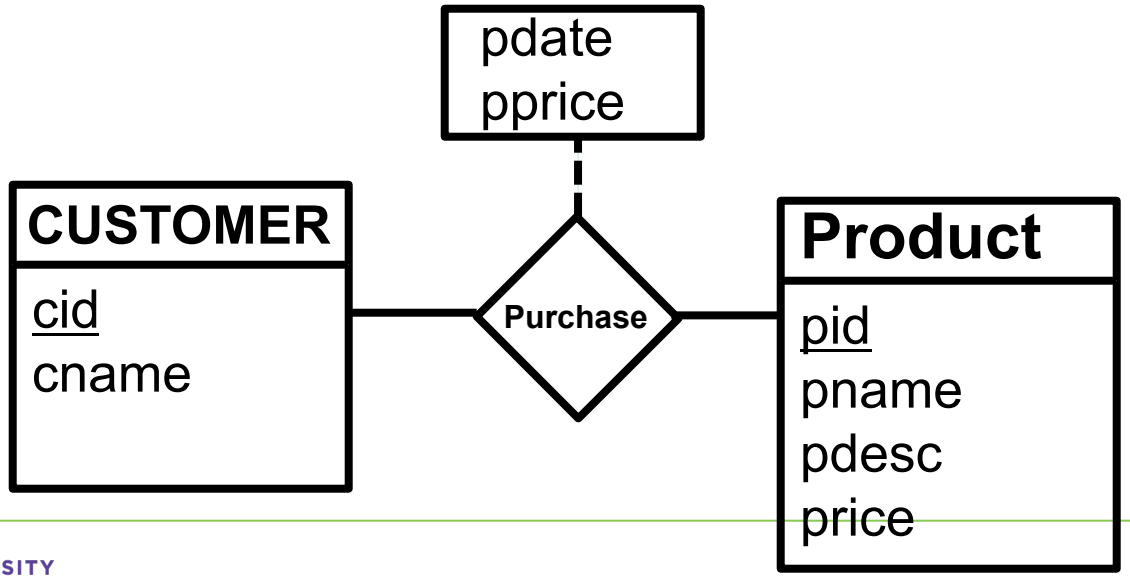

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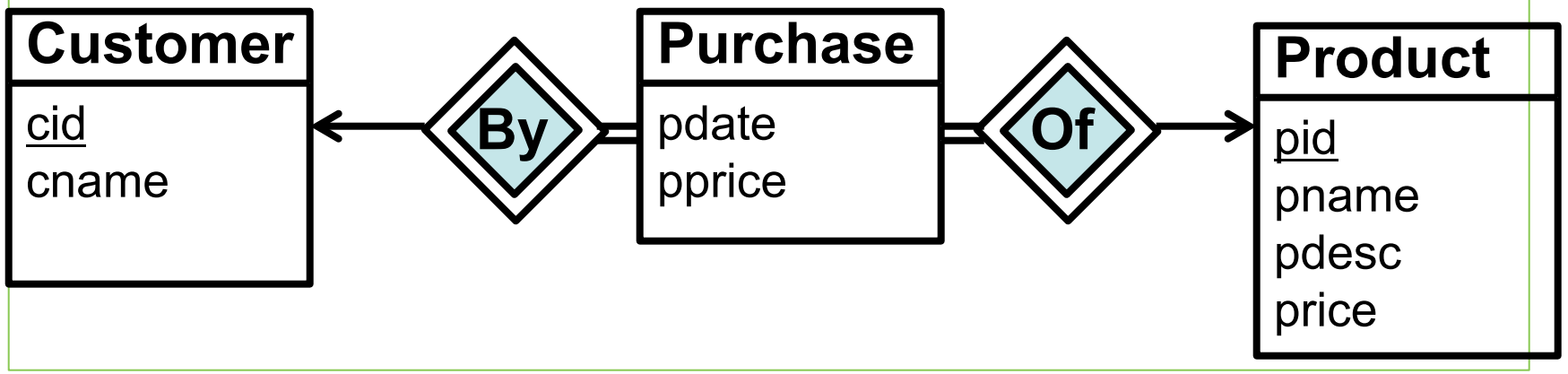

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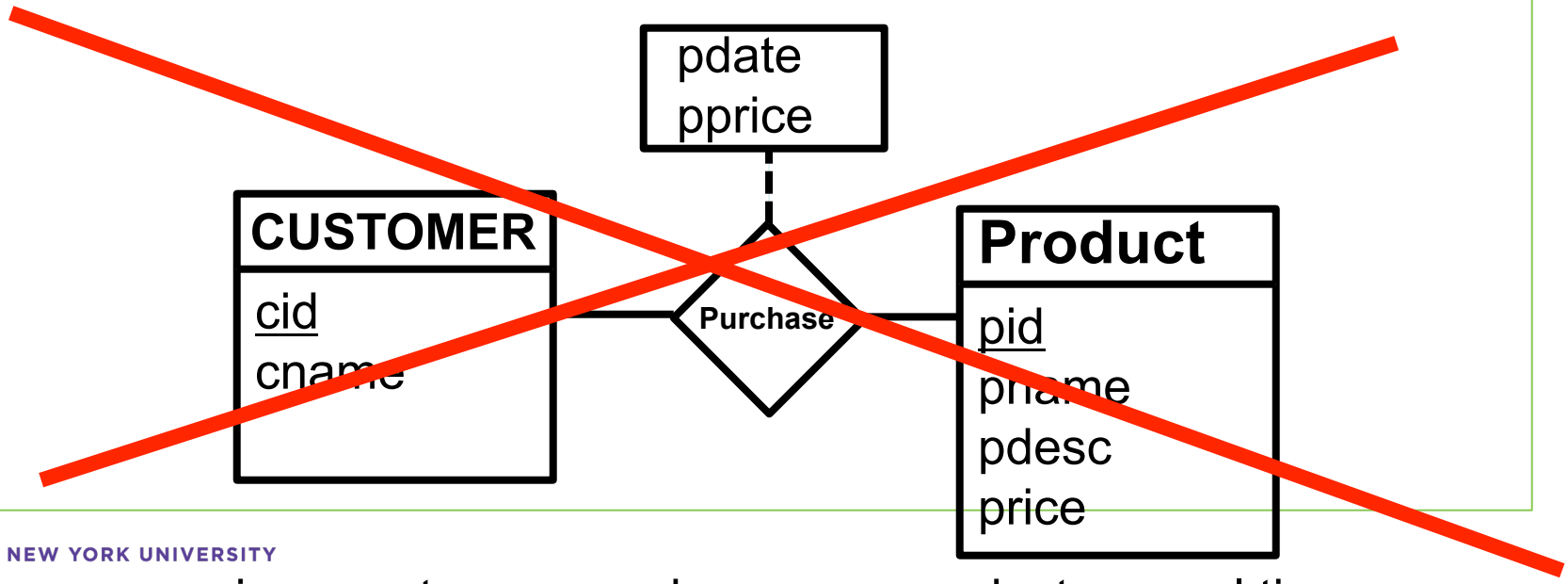

wrong since customer may buy same product several times

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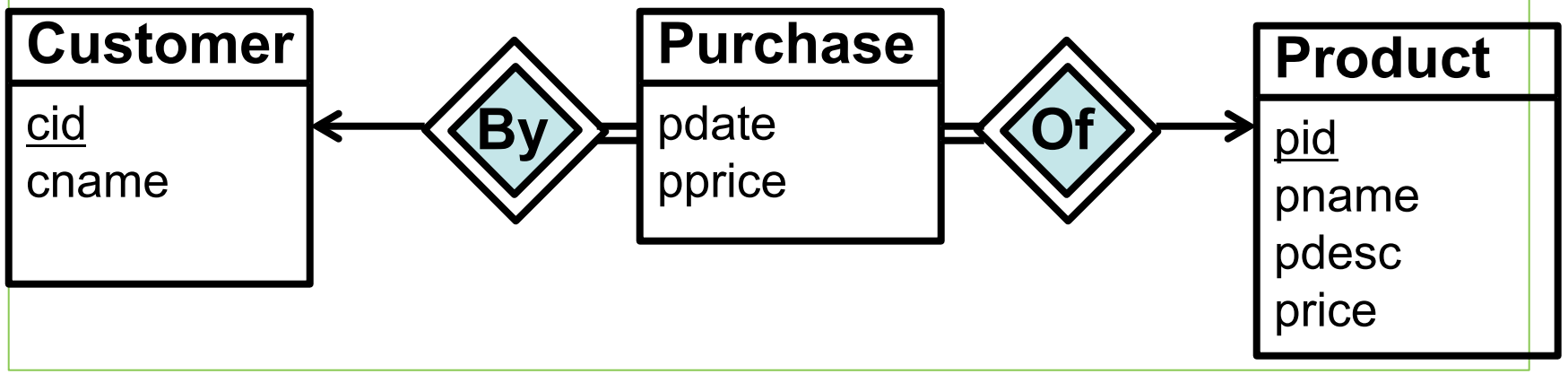

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Discussion: Actor-Movie vs. Purchase Schema

- Actor-ActedIn-Movie and Customer-Purchase-Product
- Look (almost) the same in the relational model
- But in AM, ActedIn becomes a relationship in ER
- In CP, Purchase becomes its own entity in ER

- Why?
- Actors can only act once in one movie (assumption)
- ... but customers can buy the same product many times