RELATIONAL DATABASES

OBJECTIVES

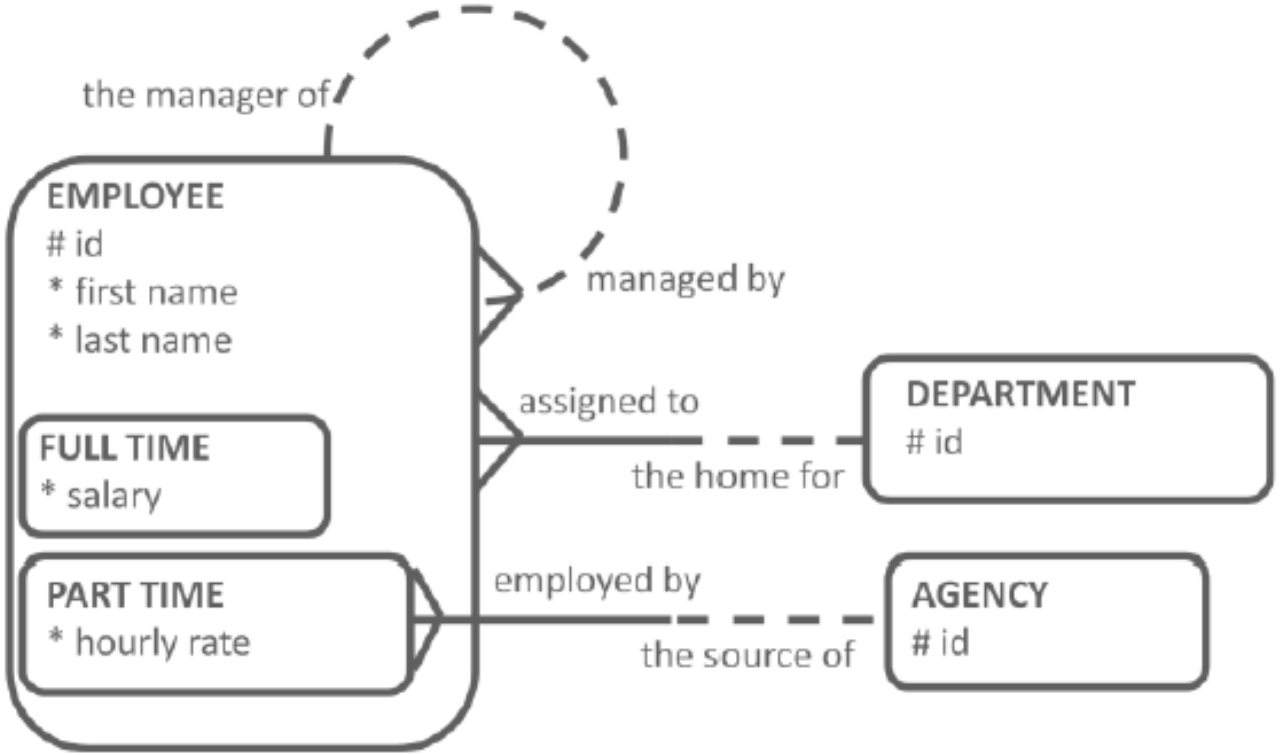
- STATE AND APPLY THE TABLE, COLUMN, IDENTIFIERS, RELATIONSHIP, AND INTEGRITY CONSTRAINT RULES FOR MAPPING:
  - SUPERTYPES
  - SUBTYPES

SUPERTYPE SUBTYPE IMPLEMENTATION

- SINGLE TABLE IMPLEMENTATION:
- PRODUCES A SINGLE TABLE FOR SUPER AND SUB TYPES
- RULES:
  - TABLES: ONLY ONE TABLE IS CREATED, REGARDLESS OF THE NUMBER OF SUBTYPES
  - COLUMNS: THE SINGLE TABLE GETS ONE COLUMN FOR EACH ATTRIBUTE OF THE SUPERTYPE, KEEPING THE ORIGINAL OPTIONALITY OF THE ATTRIBUTE.

SUPERTYPE SUBTYPE IMPLEMENTATION

- RULES:
  - THE TABLE ALSO GETS A COLUMN FOR EACH ATTRIBUTE BELONGING TO THE SUBTYPE, BUT THE COLUMNS ALL BECOME OPTIONAL
  - ADDITIONALLY, A MANDATORY COLUMN SHOULD BE CREATED TO ACT AS A DISCRIMINATOR COLUMN TO DISTINGUISH BETWEEN THE DIFFERENT SUBTYPES OF THE ENTITY
  - VALUE IT HOLDS IS FROM THE SET OF ALL THE SUBTYPE NAMES
  - THIS COLUMN IS USUALLY CALLED X_TYPE



DEPARTMENTS (DPT)		
pk	*	id

AGENCIES (AGY)		
pk	*	id

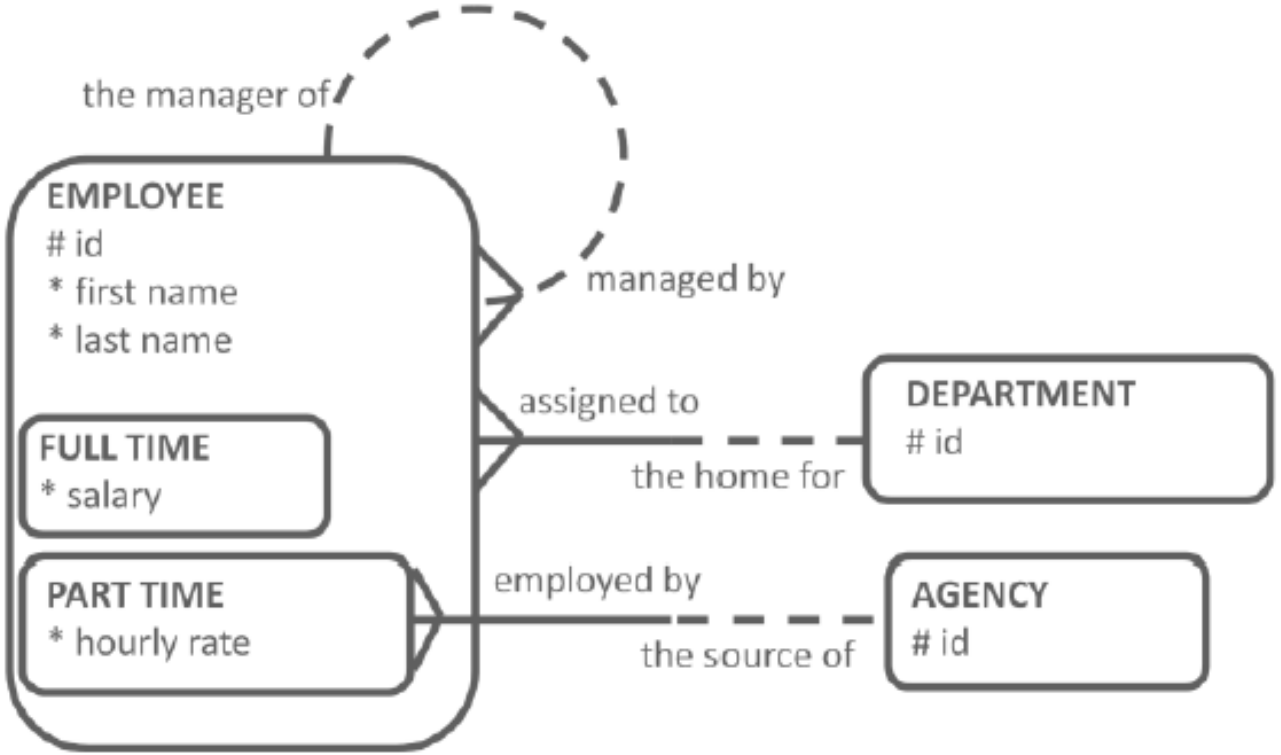
EMPLOYEES (EPE)		
Key Type	**Optionality**	**Column Name**
pk	*	id
	*	first_name
	*	last_name
	o	salary
	o	hourly_rate
fk1	*	dpt_id
fk2	o	agy_id
	*	epe_type
fk3	o	mgr_id

SUPERTYPE SUBTYPE IMPLEMENTATION

- RULES:
  - IDENTIFIERS: UNIQUE IDENTIFIERS TRANSFORM INTO PRIMARY AND UNIQUE KEYS
  - RELATIONSHIPS: RELATIONSHIPS AT THE SUPERTYPE LEVEL TRANSFORM AS USUAL. RELATIONSHIPS AT THE SUBTYPE LEVEL ARE IMPLEMENTED AS OPTIONAL FOREIGN KEY COLUMNS
  - INTEGRITY CONSTRAINTS: A CHECK CONSTRAINT IS NEEDED TO ENSURE THAT FOR EACH PARTICULAR SUBTYPE, ALL COLUMNS THAT COME FROM MANDATORY ATTRIBUTES ARE NOT NULL.

SUPERTYPE SUBTYPE IMPLEMENTATION

- IN THE ER MODEL, SALARY IS MANDATORY FOR FULL TIME EMPLOYEES AND HOURLY RATE IS MANDATORY FOR PART TIME EMPLOYEES..
- WHEN THE EMPLOYEE SUPERTYPE IS IMPLEMENTED AS A SINGLE TABLE IN THE PHYSICAL MODEL, THESE ATTRIBUTES BECOME OPTIONAL
- A CHECK CONSTRAINT IS NEEDED TO ENFORCE THE BUSINESS RULES MODELED IN THE ERD



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EMPLOYEES (EPE)		
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	*	first_name
	*	last_name
	o	salary
	o	hourly_rate
fk1	*	dpt_id
fk2	o	agy_id
	*	epe_type
fk3	o	mgr_id

SUPERTYPE SUBTYPE IMPLEMENTATION

- THE CODE FOR THE CHECK CONSTRAINT WOULD LOKK LIKE THIS:

CHECK(EPE_TYPE = ‘FTE’ AND SALARY IS NOT NULL AND HOURLY_RATE IS NULL AND AGY_ID IS NULL)

OR (EPE_TYPE = ‘PTE’ AND SALARY IS NULL AND HOURLY_RATE IS NOT NULL AND AGY_ID IS NOT NULL)

SUPERTYPE SUBTYPE IMPLEMENTATION

Sample Data for EMPLOYEES

id	first_name	last_name	salary	hourly_rate	dpt_id	agy_id	epe_type	epe_id
2000	Joan	Merrick	50000		10		FTE	111
111	Sylvia	Patakis	90000		10		FTE	
2101	Marcus	Rivera		65.00	10	17	PTE	111
2102	Hector	Chen		75.00	25	17	PTE	45
45	Rajesh	Vishwan	90000		25		FTE	

SUPERTYPE SUBTYPE IMPLEMENTATION

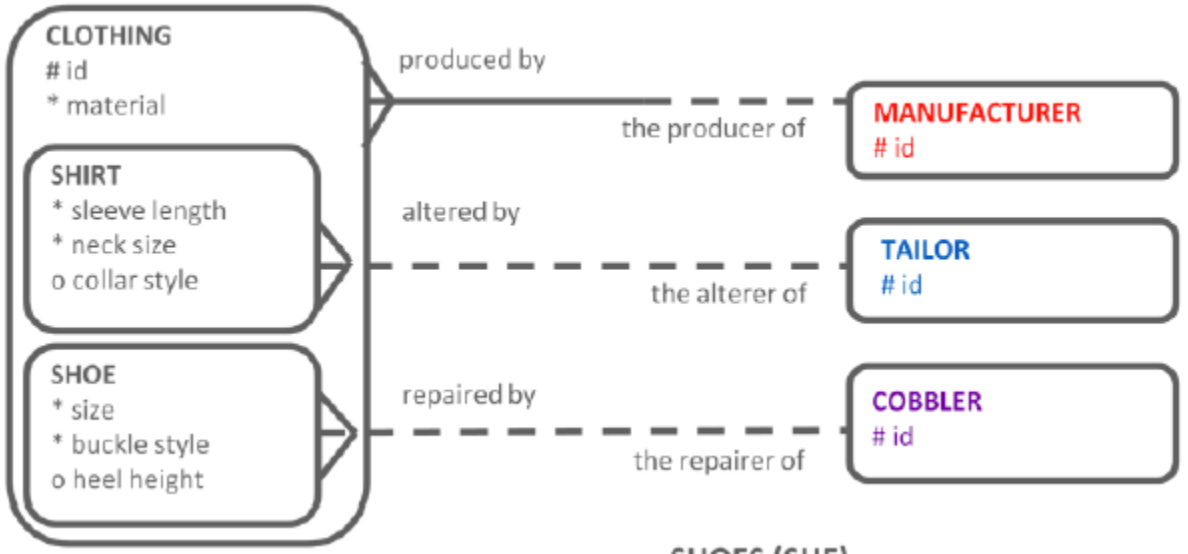
- WHEN DO YOU CHOOSE THE SINGLE TABLE IMPLEMENTATION:
  - THIS IS A COMMON AND FLEXIBLE IMPLEMENTATION
  - APPROPRIATE WHERE:
    - MOST OF THE ATTRIBUTES ARE AT THE SUPERTYPE LEVEL
    - MOST OF THE RELATIONSHIPS ARE AT THE SUPERTYPE LEVEL
    - BUSINESS RULES ARE GLOBALLY THE SAME FOR THE SUBTYPES

SUPERTYPE SUBTYPE IMPLEMENTATION

- SUBTYPE IMPLEMENTATION: TWO TABLE
  - YOU CREATE A TABLE FOR EACH OF THE SUBTYPES
- RULES:
  - TABLES: ONE TABLE PER FIRST LEVEL SUBTYPE
  - COLUMNS: EACH TABLE GETS ONE COLUMN FOR EACH ATTRIBUTE OF THE SUPERTYPE WITH ITS ORIGINAL OPTIONALITY
  - EACH TABLE ALSO GETS ONE COLUMN FOR EACH ATTRIBUTE AT THE SUBTYPE LEVEL WITH ITS ORIGINAL OPTIONALITY

SUPERTYPE SUBTYPE IMPLEMENTATION

- RULES:
  - IDENTIFIERS: THE PRIMARY UID AT THE SUPERTYPE IS THE PRIMARY KEY FOR EACH TABLE. SECONDARD UIS'S ARE UNIQUE KEYS
  - RELATIOINSHIPS: ALL TABLES GET A FOREIGN KEY FOR A RELATIONSHIP AT THE SUPERTYPE LEVEL WITH THE ORIGINAL OPTIONALITY
    - FOR RELATIONSHIPS AT THE SUBTYPE LEVEL THE FOREIGN KEY IS IMPLEMENTED IN THE TABLE IT IS MAPPED TO
    - ORIGINAL OPTIONALITY RETAINED.



SHIRTS (SHT)

Key Type	Optionality	Column Name
pk	*	id
	*	material
	*	sleeve_length
	*	neck_size
	o	collar_style
fk1	o	tlr_id
fk2	*	mnr_id

refers to manufacturers

refers to tailors

SHOES (SHE)

Key Type	Optionality	Column Name
pk	*	id
	*	material
	*	size
	*	buckle_style
	o	heel_height
fk1	o	clr_id
fk2	*	mnr_id

refers to manufacturers

refers to cobblers

Sample Data for SHIRTS

id	material	sleeve_length	neck_size	collar_style	mnr_id	tlr_id
10	linen	33	16	button down	65	14
11	wool	32	15.5	nehru	65	22
14	cotton	33	15.5		60	22

Sample Data for SHOES

id	material	size	buckle_style	heel_height	mnr_id	clr_id
3	leather	7.5	monkstrap	1.5	75	44
7	canvas	8	velcro	1	70	44

SUPERTYPE SUBTYPE IMPLEMENTATION

- SUBTYPE IMPLEMENTATION MAY BE APPROPRIATE WHEN:
  - SUBTYPES HAVE LITTLE IN COMMON. FEW ATTRIBUTES AT THE SUPERTYPE
  - MOST OF THE RELATIONSHIPS ARE AT THE SUBTYPE LEVEL
  - BUSINESS RULES AND FUNCTIONALITY DIFFER BETWEEN SUBTYPES
  - HOW TABLES ARE USED IS DIFFERENT E.G. ONE FOR QUERYING ONE FOR UPDATING