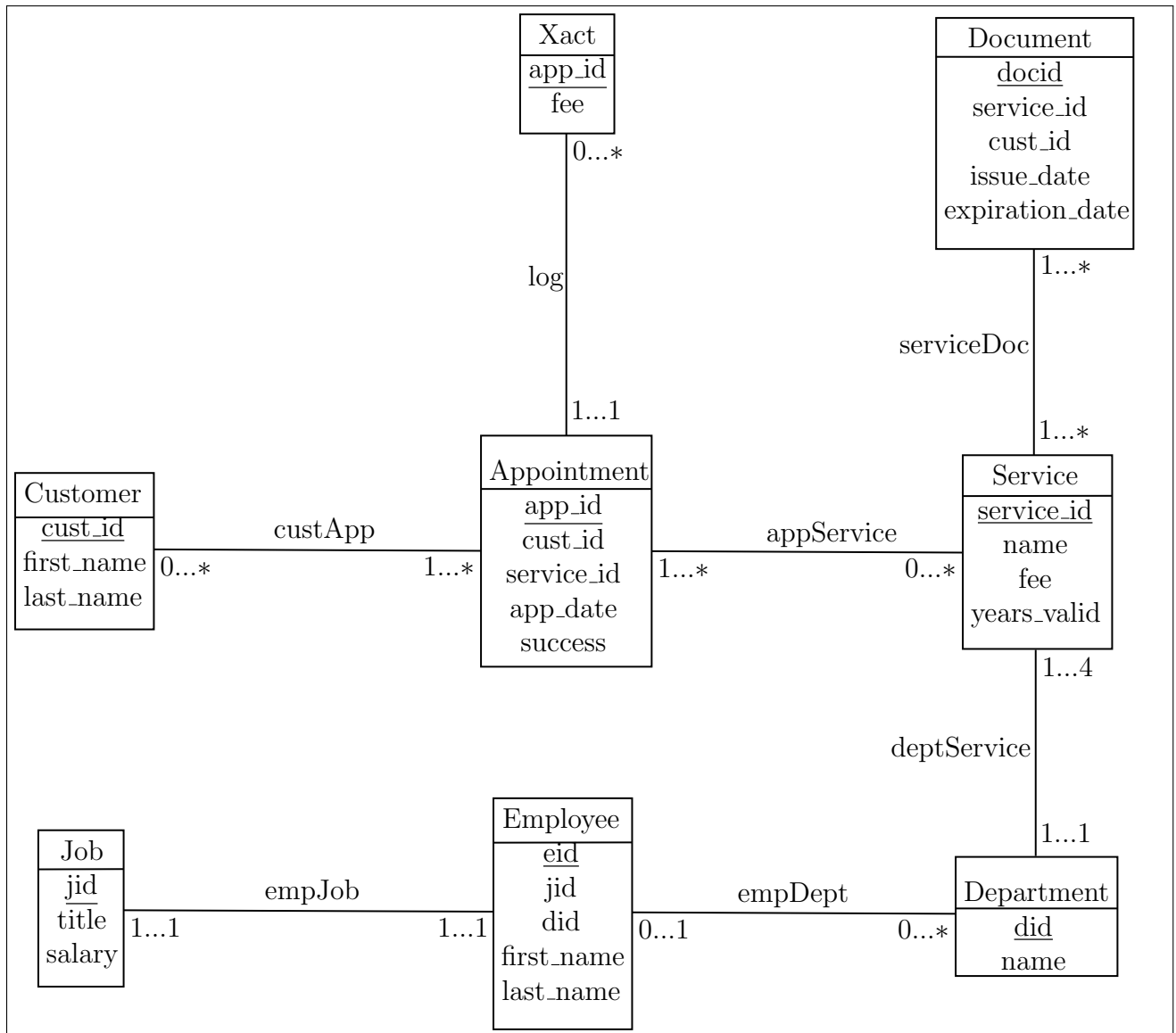


## Program #4: Database Design and Implementation

*Due Date: December 6<sup>th</sup>, 2021, at the beginning of class*

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### 1 Conceptual Database Design



## 2 Logical database design

Customer 

<u>cust_id</u>	first_name	last_name
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Appointment 

<u>app_id</u>	cust_id	service_id	app_date	success
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Xact 

<u>xact_id</u>	app_id	fee
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Service 

<u>service_id</u>	name	fee	years_valid
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Document 

<u>docid</u>	service_id	cust_id	issue_date	expiration_date
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Job 

<u>jid</u>	title	salary
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Employee 

<u>eid</u>	jid	did	first_name	last_name
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Department 

<u>did</u>	name
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### 3 Normalization analysis

#### Customer:

cust\_id → first\_name

cust\_id → last\_name

1NF: Because its attributes are not set-valued.

2NF: Every non-prime attribute is fully functionally dependent upon every CK.

3NF + BCNF: In both FDs cust\_id is a super key of the relation.

#### Appointment:

app\_id → cust\_id

app\_id → service\_id

app\_id → app\_app\_date

app\_id → success

1NF: Because its attributes are not set-valued.

2NF: Every non-prime attribute is fully functionally dependent upon every CK.

3NF + BCNF: In both FDs app\_id is a super key of the relation.

#### Xact:

xact\_id → app\_id

xact\_id → fee

1NF: Because its attributes are not set-valued.

2NF: Every non-prime attribute is fully functionally dependent upon every CK.

3NF + BCNF: In both FDs xact\_id is a super key of the relation.

#### Service:

service\_id → name

service\_id → fee

service\_id → years\_valid

1NF: Because its attributes are not set-valued.

2NF: Every non-prime attribute is fully functionally dependent upon every CK.

3NF + BCNF: In both FDs service\_id is a super key of the relation.

#### Document:

doc\_id → service\_id

doc\_id → cust\_id

doc\_id → expiration\_date

1NF: Because its attributes are not set-valued.

2NF: Every non-prime attribute is fully functionally dependent upon every CK.

3NF + BCNF: In both FDs doc\_id is a super key of the relation.

Job:

$\text{jid} \rightarrow \text{title}$

$\text{jid} \rightarrow \text{salary}$

1NF: Because its attributes are not set-valued.

2NF: Every non-prime attribute is fully functionally dependent upon every CK.

3NF + BCNF: In both FDs jid is a super key of the relation.

Employee:

$\text{eid} \rightarrow \text{jid}$

$\text{eid} \rightarrow \text{did}$

$\text{eid} \rightarrow \text{first\_name}$

$\text{eid} \rightarrow \text{last\_name}$

1NF: Because its attributes are not set-valued.

2NF: Every non-prime attribute is fully functionally dependent upon every CK.

3NF + BCNF: In both FDs eid is a super key of the relation.

Department:

$\text{did} \rightarrow \text{name}$

1NF: Because its attributes are not set-valued.

2NF: Every non-prime attribute is fully functionally dependent upon every CK.

3NF + BCNF: In both FDs did is a super key of the relation.

## 4 Query description

```
SELECT salary
FROM Job, Employee
WHERE Job.jid = Employee.jid
AND Employee.first_name = '%s'
AND Employee.last_name = '%s'
```

Our self-designed query answers the question: “What is the salary of a given Employee”. Given the first and last name from the user and by performing a join on the Employee and Job relations, we are able to determine the answer to this question. The utility of the query allows users to get insight into the people that work at the DMV.