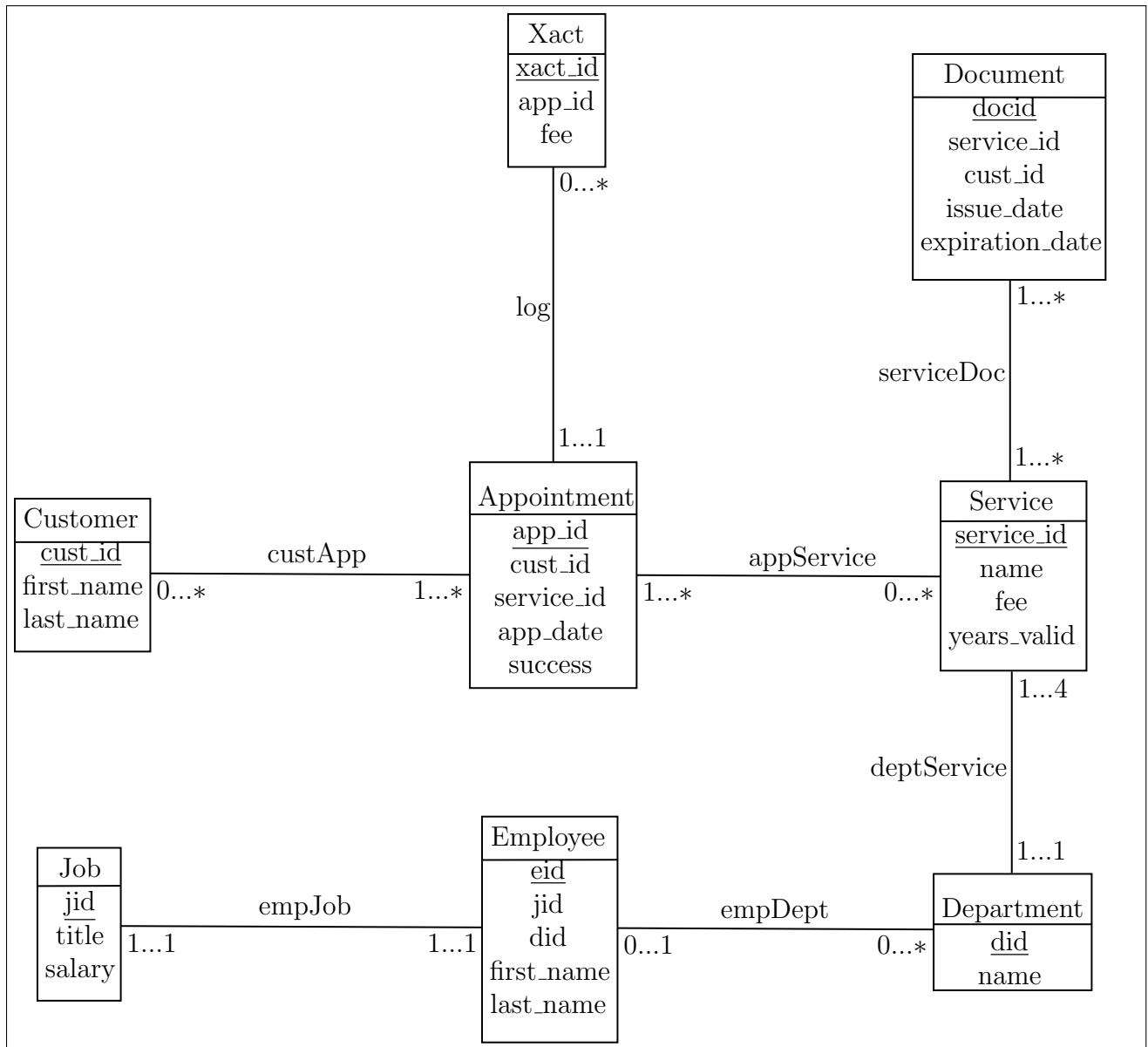# Program #4: Database Design and Implementation

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

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1 Conceptual Database Design

2 Logical database design

Customer | cust_id | first_name | last_name |

Appointment | app_id | cust_id | service_id | app_date | success |

Xact | xact_id | app_id | fee |

Service | service_id | name | fee | years_valid |

Document | docid | service_id | cust_id | issue_date | expiration_date |

Job | jid | title | salary |

Employee | eid | jid | did | first_name | last_name |

Department | did | name |

3 Normalization analysis

Customer:
cust_id→first_name
cust_id→last_name
1NF: Becasue 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: Becasue 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: Becasue 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: Becasue 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: Becasue 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.

<u>Job</u>:
jid→title
jid→salary
1NF: Becasue its attributes are not set-valued.
2NF: Every non-prime attribute is fully functionally dependent upon every CK.
3NF + BCNF: In both FDs <u>jid</u> is a super key of the relation.

<u>Employee</u>:
eid→jid
eid→did
eid→first_name
eid→last_name
1NF: Becasue its attributes are not set-valued.
2NF: Every non-prime attribute is fully functionally dependent upon every CK.
3NF + BCNF: In both FDs <u>eid</u> is a super key of the relation.

<u>Department</u>:
did→name
1NF: Becasue its attributes are not set-valued.
2NF: Every non-prime attribute is fully functionally dependent upon every CK.
3NF + BCNF: In both FDs <u>did</u> 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 preforming 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.