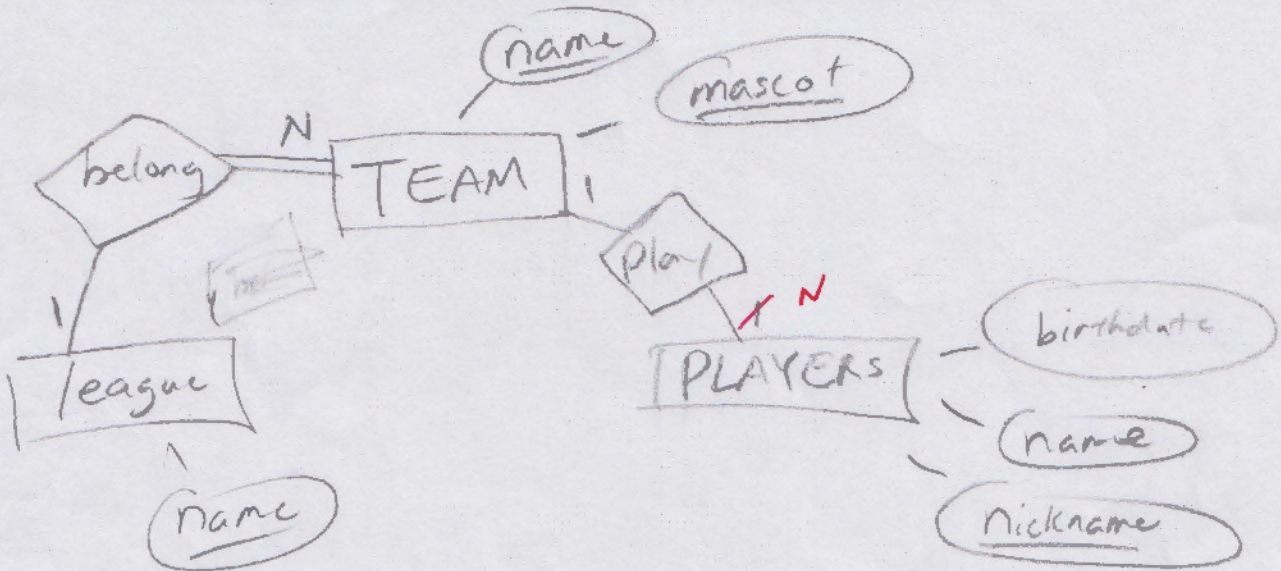


98/100

CSC134 Spring 2019
Quiz 1
100 points

Name: Rongguang Ou

1. (40 pts) In a local group of sports leagues, each team has a unique name and a unique mascot. Each team must belong to one league, but a league may have several teams. Players play for no more than one team, and players have a birthdate, a name, and a unique nickname shared by no other player. Draw the ER diagram.



2. (15 pts) An employee has attributes of FirstName, LastName, BirthDate, SSN, and EmployeeId. Which attribute(s) are keys? Why?

SSN is a Key because no other person will have the same SSN.

EmployeeId is a key, assume is human-created and is unique identifier.

3. (15 pts) What does total participation in a relationship mean?

The entity must participate in the relationship. It is existence dependency.

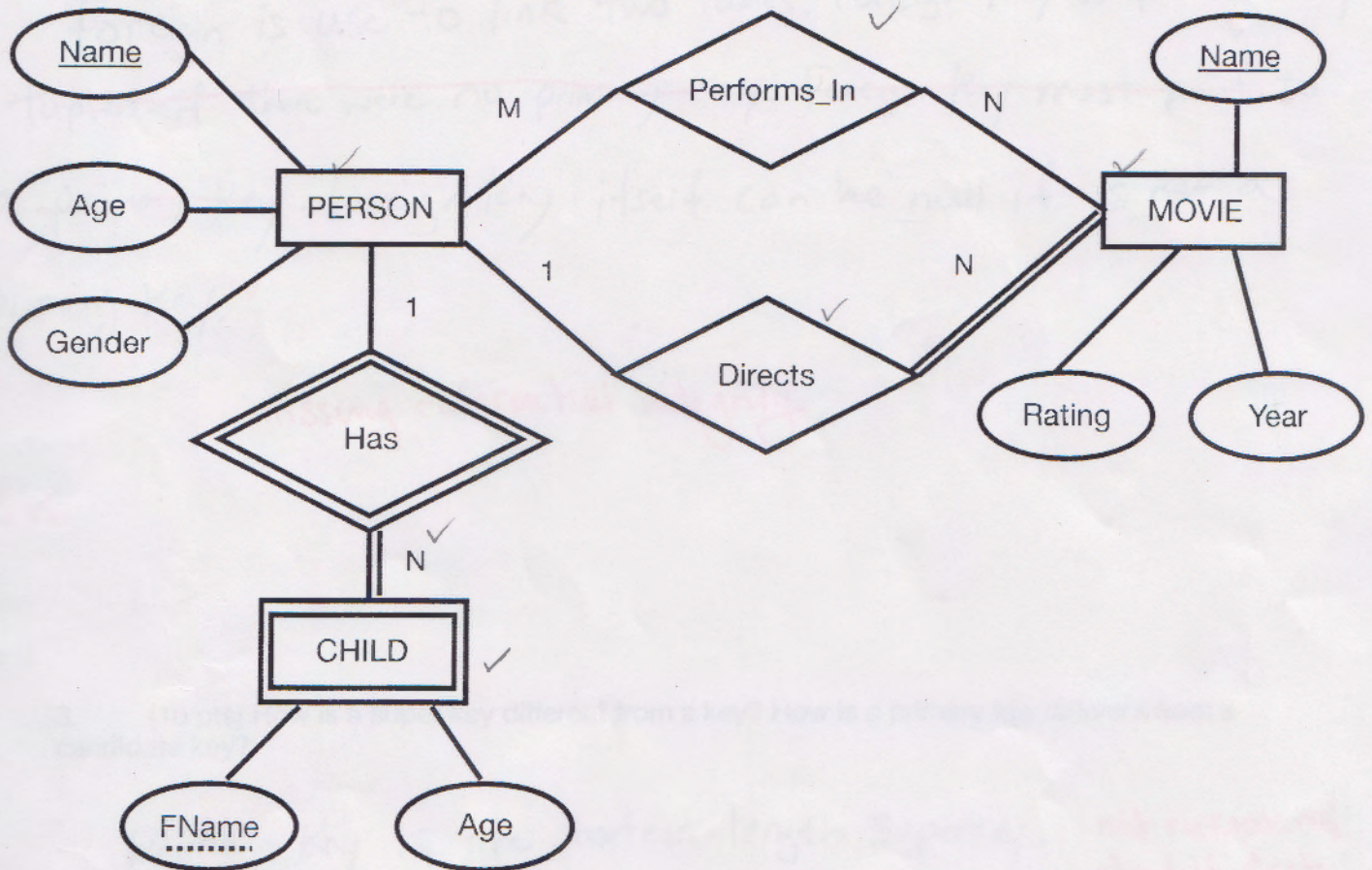
4. (15 pts) How do we recognize / draw derived attributes on an ER diagram?

~~dotted~~ derived attributes are ones that can be calculated and is represented by dotted oval.

5. (15 pts) What is the difference between a weak entity and a strong entity?

Weak entity, is one without a Key. It needs an identifying entity. Strong entity has Key attribute. Weak entity's attribute is not unique unless pair with a strong entity.

1. (70 pts) Map the following ER diagram to a relational model:



Person ✓

<u>Name</u>	Age	Gender
-------------	-----	--------

CHILD ✓

<u>Name</u>	<u>FName</u>	Age
-------------	--------------	-----

Movie ✓

<u>Name</u>	Rating	Year	P_name
-------------	--------	------	--------

Performs-IN

name	P_name
------	--------

missing keys

Name: Rongguang Ou

2. (20 pts) Define foreign key and explain its use. What does referential integrity mean with respect to foreign keys?

Foreign is use to link two tables. ~~Foreign key helps identify tuples if there were no primary key. Foreign key must point to a primary key.~~ Foreign key itself can be null if it is not a primary key. ✓

missing referential integrity

-15

3. (10 pts) How is a super key different from a key? How is a primary key different from a candidate key?

Primary Key is the shortest length / Superkey.
Candidate key is alternative primary key.
not necessarily shortest just minimal

~~Superkey can uniquely identify tuples and keys cannot.~~

is composed of all column attribute
and key is part of a superkey but still must be able to uniquely identify rows / tuples.

all attributes is just one of many superkeys
key is minimal

-5

10
5
40
30

85

Name: Rongguang Ou

Part 1

1. (10 pts) What two things must hold for sets to be union compatible?

10/10

Same type aka attributes are same domain

Same size aka same degree

2. (10 pts) Relational algebra operations always return relations, which are sets of tuples. What are two major properties of sets?

5/10

NO duplicate

~~NO empty~~

no order

Part 2

Using the supplied relational model, write relational algebra expressions that find the following data:

1. (40 pts) The first and last name of all employees who work more than 10 hours on a project located in 'Folsom'

40/40

Folsom-project $\leftarrow \sigma_{\text{LOCATION} = \text{'Folsom'}} (\text{Project})$ ✓
TEN-HOUR $\leftarrow \sigma_{\text{HOURS} > 10} (\text{WORKS-ON})$ ✓
Folsom-TEN $\leftarrow \text{Folsom-project} \bowtie_{\text{PNO} = \text{PNUMBER}} \text{TEN-HOUR}$ ✓
Result $\leftarrow \pi_{\text{FNAME}, \text{LNAME}} (\text{EMPLOYEE} \bowtie_{\text{ASSN} = \text{ESSN}} \text{Folsom-TEN})$

2. (40 pts) The first and last name of all employees who manage a department but who do not work on the project named 'Unicorn'.

need to make intermediate results union compatible before last line

Managers $\leftarrow \text{EMPLOYEE} \bowtie_{\text{ASSN} = \text{ESSN}} \text{DEPARTMENT}$
~~Unicorn~~ Unicorn $\leftarrow \sigma_{\text{PNAME} = \text{'Unicorn'}} (\text{Project})$
work-unicorn $\leftarrow \text{Unicorn} \bowtie_{\text{PNO} = \text{PNUMBER}} (\text{WORKS-ON})$
Manager-unicorn $\leftarrow \text{Managers} \bowtie_{\text{ESSN} = \text{SSN}} \text{work-unicorn}$
Result $\leftarrow \pi_{\text{fname}, \text{lname}} (\text{Manager-unicorn} - \text{Manager})$

30/40

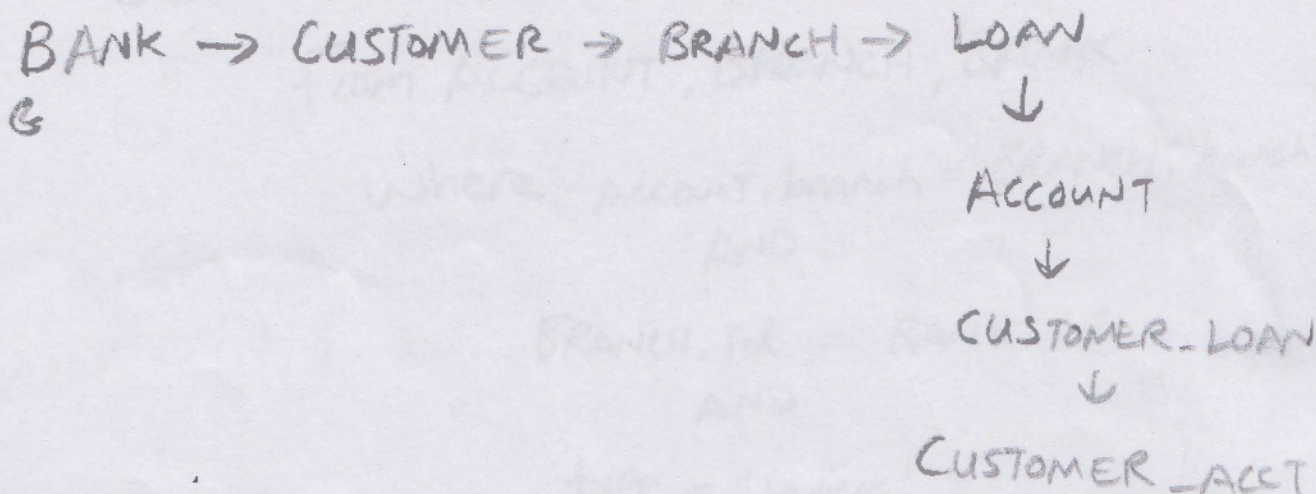
CSC134 Spring 2019

Quiz 4

100 points

96/100

- 1) (25 pts) Give a valid order the tables could be created in that would not cause errors and would not require using ALTER TABLE to add all the constraints shown above.



- ✓ 2) (15 pts) What is the largest account balance we can store with a format of DECIMAL(5,2) ?

999.99

- ✓ 3) (30 pts) Write a valid SQL query that finds the name and social security number of all customers who have loans with a balance over \$1000. Correct syntax must be used.

2

Select name, ssn ← needs disambiguation too
From CUSTOMER ~~SSN~~, CUSTOMER-LOAN,
LOAN

Where CUSTOMER-LOAN.loan_num = LOAN.loan_num
AND
CUSTOMER-LOAN.ssn = CUSTOMER.ssn
AND
LOAN.balance > 1000 ;

- 4) (30 pts) Write a valid SQL query that finds the name and address of all banks that have accounts that have a type of 'savings' with a balance of less than \$25. Correct syntax must be used.

Select name, address ← needs disambiguation

From ACCOUNT, BRANCH, BANK

Where Account.branch = BRANCH.branch-id
AND

BRANCH.id = BANK.id
AND

type = 'savings'

AND

balance < 25 ;

- 5) (30 pts) Write a valid SQL query that finds the name and social security number of all customers who have loans with a balance over \$1000. Correct syntax must be used.

Select name, ssn ← needs disambiguation too

From Customer, Customer_Loan,
Loan

Where Customer_Loan.customer_id = Loan.customer_id
AND

Customer_loan.ssn = Customer.ssn
AND

Loan.balance > 1000 ;

CSC134 Spring 2019
Quiz 4

Use the following schema to answer the quiz questions. You may use this page as scratch paper – you do not need to turn it in:

- ① BANK(id, name, address)
- ④ LOAN(loan_num, balance, type, branch) foreign key (branch) references to
BRANCH(branch_id)
- ② CUSTOMER(ssn, name, address, phone)
- ⑥ CUSTOMER_LOAN(ssn, loan_num) foreign key (ssn) references to CUSTOMER(ssn),
foreign key (loan_num) references to LOAN(loan_num)
- ③ BRANCH(bank_id, branch_id, name, address) foreign key (bank_id) references to
BANK(id)
- ⑤ ACCOUNT(acct_num, branch, balance, type) foreign key (branch) references to
BRANCH(branch_id)
- ⑦ CUSTOMER_ACCT(ssn, acct_num) foreign key (ssn) references to CUSTOMER(ssn),
foreign key (acct_num) references to ACCOUNT (acct_num)

CSC134 Spring 2019

Quiz 5

100 points

1. (40 pts) Given $F = \{ A \rightarrow \{B, C\}, \{A, B\} \rightarrow \{D, F\}, D \rightarrow E, F \rightarrow G \}$, calculate $\{A, B\}^+$.

Show your steps for full credit.

✓ $\{A, B\}^+ = A, B$

① = A, B, C

② = A, B, C, D, F

③ = A, B, C, D, E, F

④ = $\{A, B, C, D, E, F, G\}$

2. (10 pts) In problem 1, would $\{A, B\}$ be a candidate for a primary key? Why or why not?

✓ it would be a good candidate because $\{A, B\}$ can functionally determine all attribute. That's what primary should do. able to uniquely identify tuples.

3. (20 pts) Given the following tables:

TABLE1

A1	B1
1	Egg
2	Milk
3	Butter

TABLE2

A2	B2
1	Red
2	Yellow

What is the output of the following query (include column headers in output):

SELECT * FROM TABLE1 LEFT OUTER JOIN TABLE2 ON A1 = A2;

A1	B1	B2
1	Egg	Red
2	Milk	Yellow
3	null	null

missing column A2

4. (30 pts) What question would be answered with the following query (i.e. give a plain English description of what this query returns):

SELECT grade_level, COUNT(*), AVG(gpa)
FROM STUDENT
GROUP BY grade_level;

~~Find the average gpa of every student and group them by grade level~~ ~~grade level~~ ~~for every~~ ~~grade level~~

Find the average gpa, grade level, count the # of student in that grade level
For every grade level, ~~find the average gpa~~ and
the avg gpa for that grade level.