employee (*person_name, street, city*)
company (*company_name, city*)
works (*person_name, company_name, salary*)

Figure 1. An Employee database.

A simple Employee database is shown in Figure 1. Please answer Questions 1-3 based on this schema.

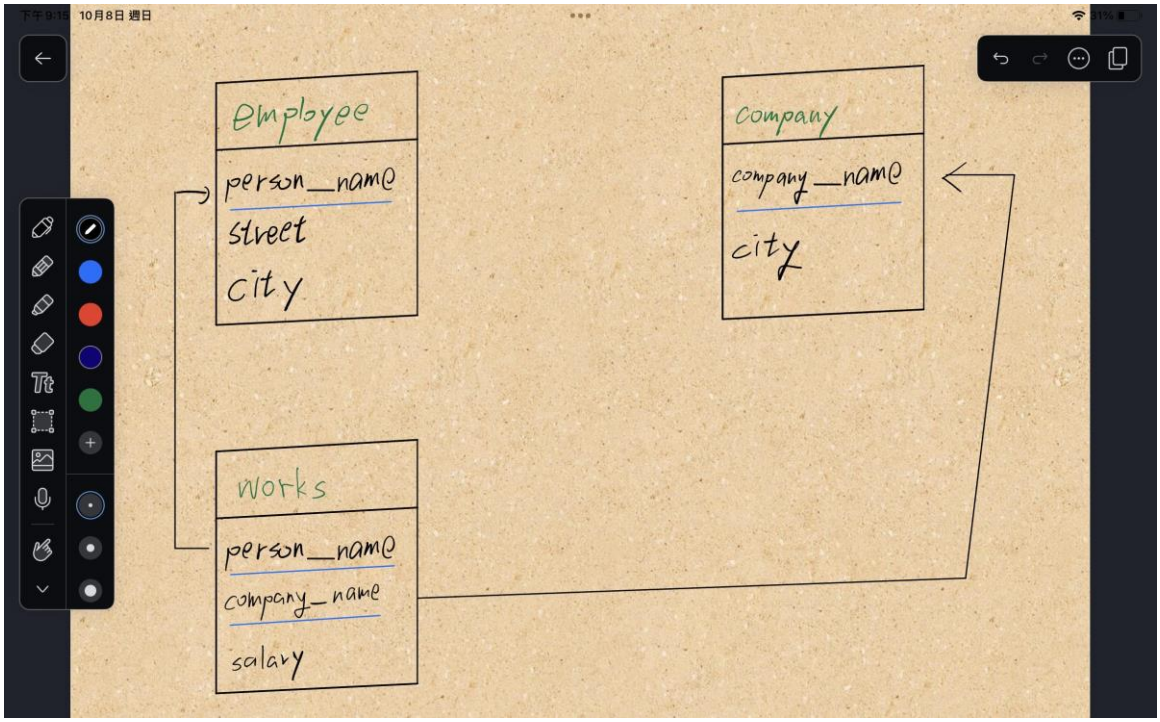
1. (20%) The attribute *person_name* is defined as the primary key of the *employee* relation for simplicity (假設沒有兩個人同名), and the attribute *company_name* is defined as the primary key of the *company* relation. The *works* relation describes which company(s) a person works for and the associated salary(s). Please determine what the **best** primary key of the *works* relation should be based on the following two assumptions, respectively. Note that you need to explain your answer.
   (a) An employee can work for only one company in this database.
   (b) An employee might work for many companies in this database.

ANS:
(a): 主鍵為(person_name)，因為一個人只能在一家公司工作，因此員工名即可識別唯一的鍵值
(b): 主鍵為(person_name,company_name)，相對於第一題，由於一個人可以在不同公司工作，因此若只單一判斷員工名，會發生同一個員工可能在不同公司的狀況，導致無法識別唯一的鍵值

2. (20%) Suppose that the primary key of the *works* relation is (person_name, company_name).
   (a) Identify the two appropriate foreign keys of the *works* relation.
   (b) Construct a schema diagram for this database.

ANS:
(a):
person_name in works is a foreign key from works referencing employee
company_name in works is a foreign key from works referencing company

(b): 在 employee 沒有同名且 company 也沒有同名的狀況下，employee 的主鍵為 person_name，而 company 的主鍵為 company_name



3. (40%) Suppose that the primary key of the *works* relation is the attribute *person_name*. Give an expression in the relational algebra for each of the following queries, respectively.
   (a) Find the name of each employee who lives in the city “Miami”.
   (b) Find the name of each employee who lives in the city “Miami” and whose salary is greater than $100000.
   (c) Find the name and the city of residence of each employee who works for “FirstBank”.
   (d) Find the name of each employee who does NOT work for “FirstBank”.

ANS:

(a): π person_name $(\sigma$ city=”Miami” (employee) $)$

(b): π person_name $(\sigma$ city=”Miami” ^ salary > 100000 (employee $\times$ works) $)$

(c): π person_name , city $(\sigma$ company_name = ”FirstBank” (employee $\times$ works) $)$

(d): π person_name $(\sigma$ company_name $\neq$ ”FirstBank” (works) $)$

4. (20%) 請回答下述有關SQL的問題。<u>You need to list the references (e.g., URLs) you used.</u>
   (a) ISO最新通過的SQL標準版本為何? (答案的格式應該是SQL:XXXX，其中XXXX代表

年分。)並請列出至少兩項新增之處 (與上一標準版本相比)。

(b) Microsoft SQL Server專用的SQL語言名稱。

(c) Oracle專用的SQL語言名稱。

ANS:

(a): SQL2022 :

1. **Disaster recovery (災難復原)**
2. **Failover and restore example (故障轉移和復原範例)**
3. **Azure Synapse integration (Azure Synapse 整合)**
4. **Built-in query intelligence (內建查詢智慧)**
5. **See it in action (查看實際操作)**

參考: What's new in SQL Server 2022

網址: https://microsoftmechanics.libsyn.com/podcast/whats-new-in-sql-server-2022

(b): Transact-SQL

(c): PL-SQL

Note: Please submit your homework in a single PDF file to Tronclass before 2023/10/8 23:59.