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ITSS 4300
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Assignment-2

The manager of a consulting firm has asked you to evaluate their database. You have been given the following business rules.

- Every client is located in only one region.
- A region can contain zero or many clients.
- Each consultant can work on zero many contracts
- Each contract might require the services of many consultants.
- A client can sign more than one contract, but each contract is always signed by only one client. A client may not sign a contract.
- Each contract might cover multiple consulting classifications. (For example, a contract may list consulting services in database and networking.)
- Every consultant is located in only one region. A region can have zero or many consultants.
- Each consultant has one or more Skill Sets. For example, a consultant might be classified as an expert in both database design and networking.
- Each Skill Set can have zero or many consultants in it. For example, the consulting company might employ many consultants who are networking experts.

You have been given the following relation:

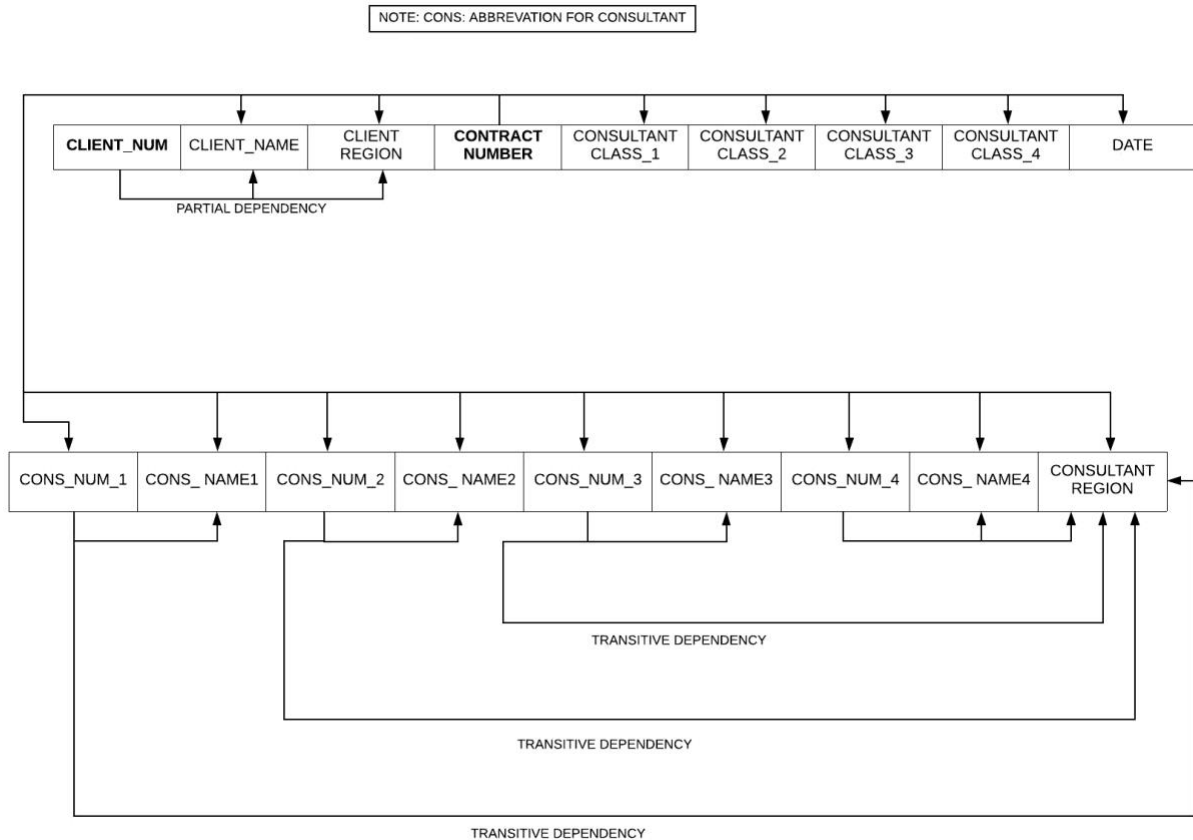
CLIENT (CLIENT_NUM, CLIENT_NAME, CLIENT_REGION, CONTRACT_DATE,
CONTRACT_NUMBER, CONTRACT_AMOUNT, CONSULT_CLASS_1,
CONSULT_CLASS_2, CONSULT_CLASS_3, CONSULT_CLASS_4,
CONSULTANT_NUM_1, CONSULTANT_NAME_1,
CONSULTANT_REGION_1, CONSULTANT_NUM_2, CONSULTANT_NAME_2,
CONSULTANT_REGION_2, CONSULTANT_NUM_3, CONSULTANT_NAME_3,
CONSULTANT_REGION_3, CONSULTANT_NUM_4, CONSULTANT_NAME_4,
CONSULTANT_REGION_4)

1. Answer the following questions:

- a. What is the PK for this relation in its current state? (3 pts)
At current state, the primary key is a composite key:
CLIENT_NUMBER and **CONTRACT_NUMBER**
As we are given a condition that a client may not have signed a contract. So, a client can exist without a contract number and we are referring to all columns in a client table.
- b. What Normal Form is the current state of this relation? (3 pts)
1NF (First Normal Form- as they columns are unique without repetitions)

2. Perform the following Normalization steps:

- a. Draw a dependency diagram showing all functional dependencies in the relation, based on the relation you have been given. (8 pts)



- b. List the partial and transitive dependencies. (6 pts)

Partial dependencies:

CLIENT_NUM-→ CLIENT_NAME, CLIENT REGION

Transitive dependencies:

CONSULTANT_NUM_1→CONSULTANT_NAME_1, CONSULTANT REGION

CONSULTANT_NUM_2→CONSULTANT_NAME_2, CONSULTANT REGION

CONSULTANT_NUM_3→CONSULTANT_NAME_3, CONSULTANT REGION

CONSULTANT_NUM_4→CONSULTANT_NAME_4, CONSULTANT REGION

NAME includes LastName, FirstName and MiddleName.

c. Convert the relation to 3NF. Write the corresponding relational schemas for each new relation. Identify each primary key and each foreign key. (20 pts)

Relational Schema:

(Identification: **PRIMARY KEY**, *FOREIGN KEY*)

CLIENT(**CLIENT_NUM**, *REGION_CODE*, CLIENT_LNAME, CLIENT_FNAME,
CLIENT_MNAME, CLIENT_ADDRESS)

REGION(**REGION_CODE**, REGION_NAME)

CONTRACT(**CONTRACT_NUMBER**, *CLIENT_NUM*, CONTRACT_DATE,
REGION_CODE)

CONSULTANT(**CONSULTANT_NUM**, CONSULTANT_LNAME,
CONSULTANT_FNAME, CONSULTANT_MNAME, *REGION_CODE*)

CLASS(**CLASS_NUM**, CLASS_DESCRIPTION, CLASS_HOUR,
CLASS_CHARGES)

SKILLSET(**CONSULTANT_NUM, CLASS_NUM**, SKILLSET_DESCRIPTION)

PROJECT(**PROJECT_NUM**, *CONSULTANT_NUM*, *CONTRACT_NUMBER*,
CLASS_NUM, PROJECT_DATE, PROJECT_CHARGE)

3. Draw an ERD with the new set of relations and attach it as an image here. (10 pts)

