2005 Qualifying Exam
Databases
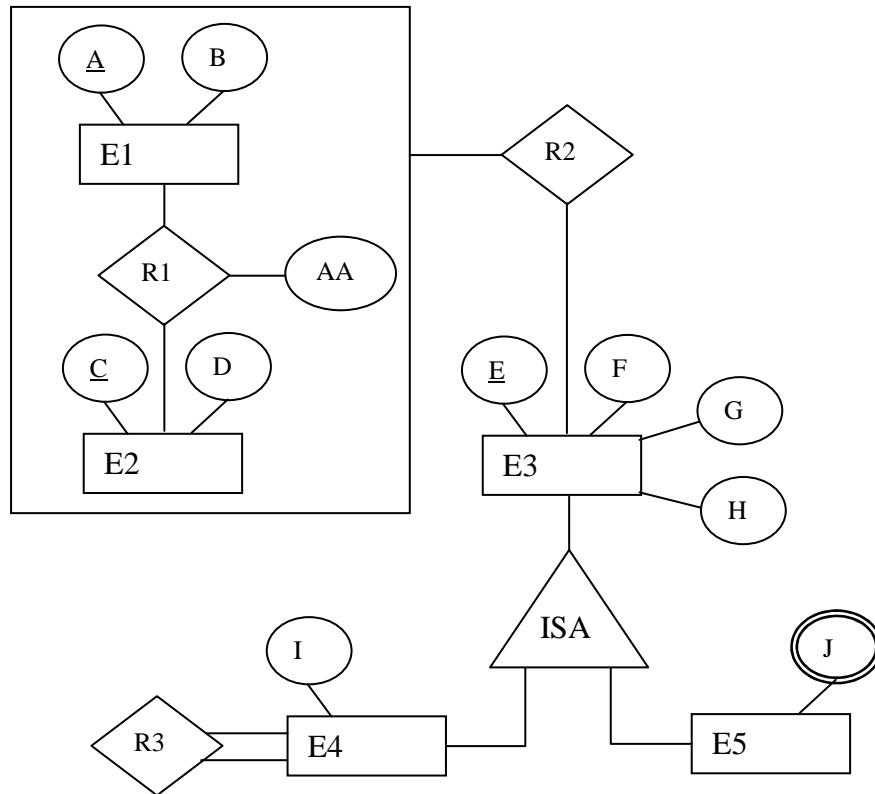Department of Computer Science
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Question 1. Consider the following ER (Entity-Relationship) diagram:

NOTE: J is a multi-value attribute (i.e., list type); A, C, and E are the primary keys of E1, E2, and E3, respectively.
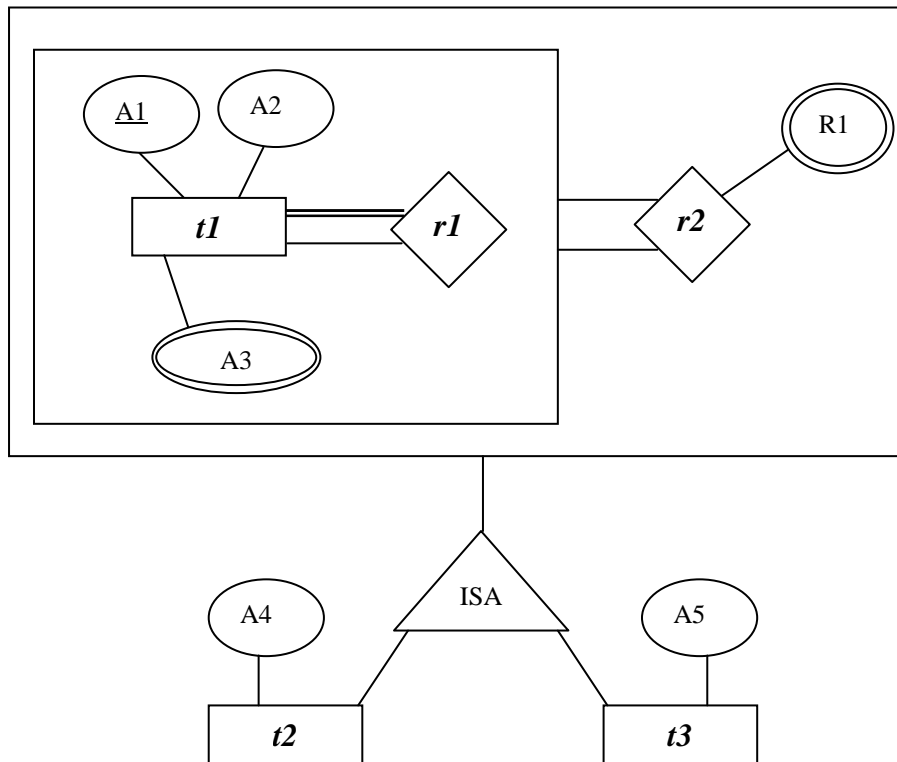
Functional Dependencies:
$$F \rightarrow G$$
$$G \rightarrow H$$

Convert the ER diagram into a normalized relational database schema. For each relation schema, give the primary key, candidate key(s), foreign key(s), and functional dependencies. All relations must be in BCNF.

Question 2.

2.1: Explain the difference between SQL "Constraint" and SQL "Trigger"

2.2: Consider the following ER-Diagram:

1) Construct relation schemas and specify the primary keys and the foreign keys. For each foreign key, specify the referenced table. You can rename the attributes. The attribute names of a foreign key and those of the targeted primary key need not be the same.

2) Assume that *integer* is the domain (data) type of all attributes. Define the relations using the *create table* SQL command.

Question 3. Consider the following database and query:

Relations: T1(a, b, c, d), T2(e, f, g)
Functional Dependencies: F1={ad→bc}, F2={e→fg}
T1.b is a foreign key referencing T2

Select T1.a, T2.b
From T1, T2
Where T1.b = T2.e and
        T2.f > 10 and T2.f < 20 and
        T2.ac = 5;

Optimize this query by creating index structures.
Use the SQL command "create index ~".

END