CS585

Database Systems

Fall 2005

Midterm Exam

Name: _____

Student ID: _____

	Maximum	Received
Problem 1	10	
Problem 2	10	
Problem 3	15	
Problem 4	20	
Problem 5	10	
Problem 6	10	
Problem 7	10	
Problem 8	15	

1) 10 pts
Indicate whether each of the following statements is true or false (T/F):

___The expression (Student.Age >= 18) used in a WHERE clause will evaluate to “TRUE” if the Age attribute happens to be NULL.

___ The expression (Student.Age < 18) used in a WHERE clause will evaluate to “FALSE” if the Age attribute happens to be NULL.

___Referential integrity constraint: A tuple in one relation that refers to another relation must refer to an existing tuple in that relation.

___ Integrity constraints are defined at the logical database design level.

___Stored procedures help improve the efficiency of the database application because they compute the results and store it only once during the execution of the application.

___JDBC has the advantage that it could make an application database independent.

___In an ORDBMS every object type has a constructor method implicitly defined by the system to instantiate an object.

___In an ORDBMS every object type has a map method implicitly defined by the system to allow for comparison operations.

___ Quad trees have an advantage over kd-trees in that they keep the tree balanced therefore keeping the search efficient at all times.

___In an R-Tree, we may not know exactly which branch of the tree to follow to find an object stored in the database.

2) 10 pts
Briefly answer the following questions:

- What is a weak entity set?

- Describe the relation between superkey, candidate key, and primary key of a given relation.

- Describe the reasons why foreign keys are used.

- What is a table constraint?

- In an object relational database what is the order method of an ADT used for?

3) 15 pts
Consider the schema design below:

Plants (PlantName, Type, MaxHeight)
GrowIn (PlantName, RegionName, Country)
Regions (RegionName, Country, altitude, latitude, climate)

Write an SQL statement for each of the following queries:

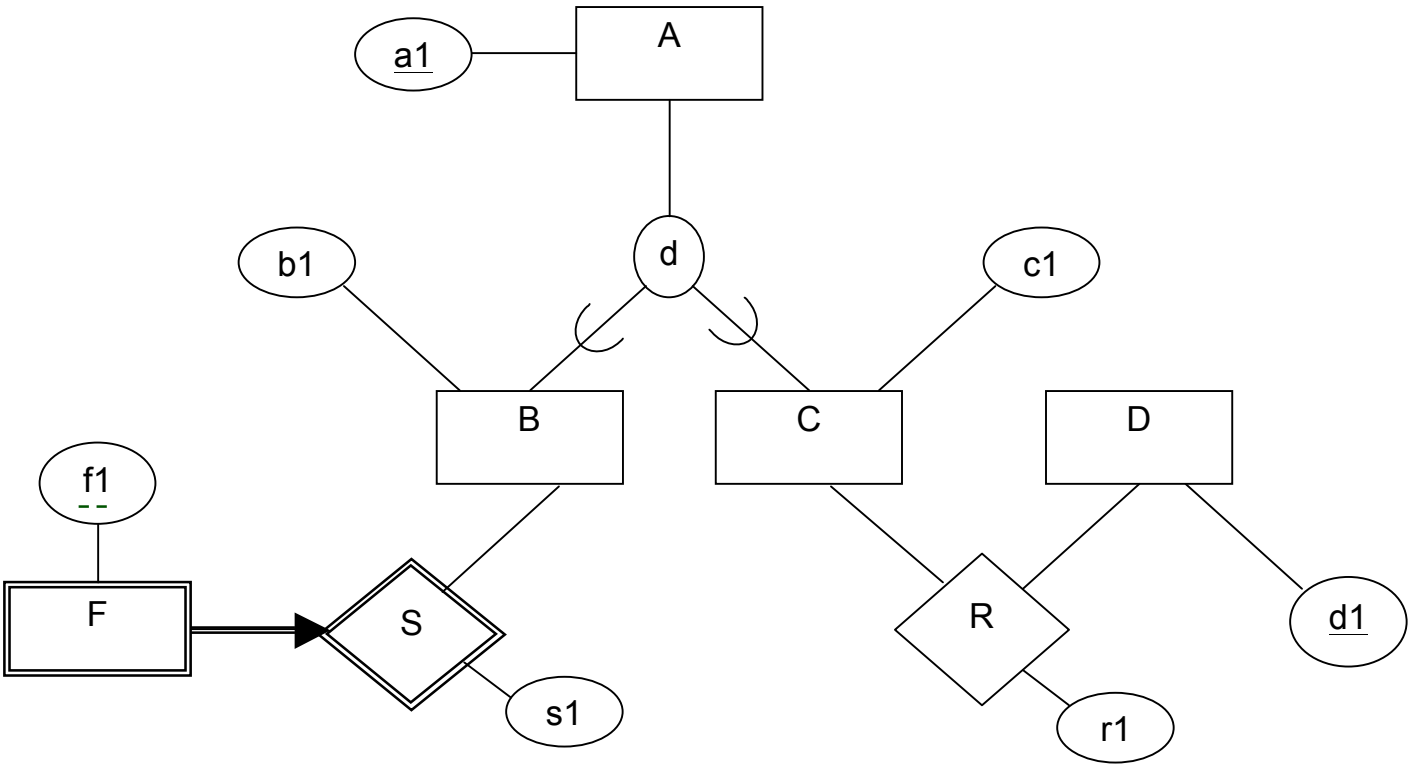
a- Find the name of all plants of type “Conifer” that can grow in “Dry” climates.

b- Find out if Roses (Rose being the Name of the plant) can grow in altitudes above 7000 feet and latitudes above 45 degree.

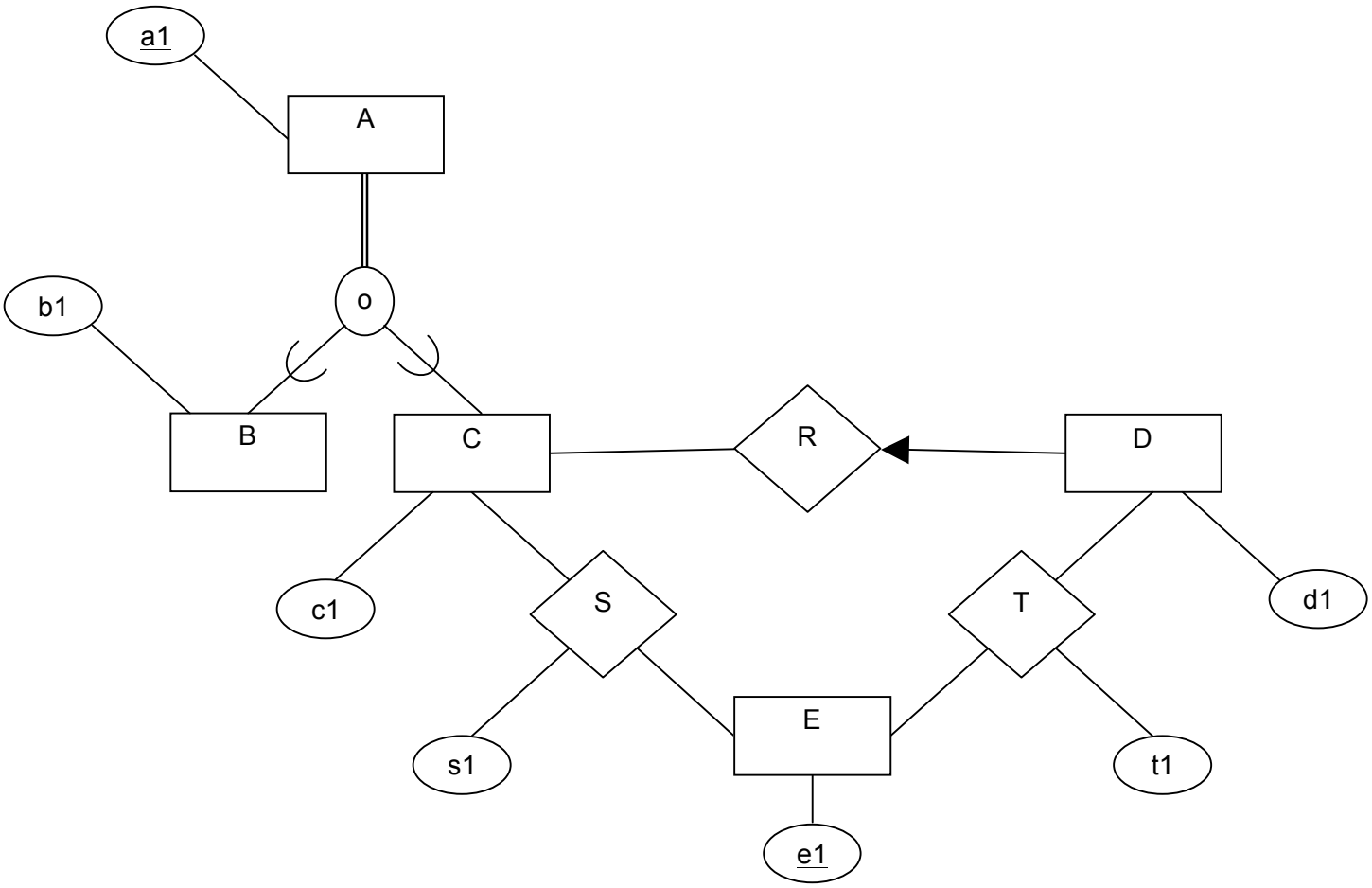
c- Find all plants that are unique to each country.

4) 20 pts
Reduce the following 2 EER diagrams to relations using the *pure relational model* (i.e., No Object Oriented or Object Relational). Make sure to identify all primary and foreign keys.

a-



b-



Additional space for problem 4.

5) 10 pts
Consider the schema design below:

Plants (PlantName, Type, MaxHeight)
GrowIn (PlantName, RegionName)
Regions (RegionName, Country, altitude, latitude, climate)

Correct the SQL statements below if necessary for the following 2 queries:

a- Find the country(or countries) with the largest variety of plant types

```
SELECT R.Country
FROM    Regions R, Plants P
WHERE  COUNT (P.Type) = MAX (SELECT COUNT(P.Type)
                                    FROM Plants P1
                                    WHERE P1.Type=P.Type)
```

b- For each plant find the average altitude and average latitude they grow in for all regions excluding those regions with “Tropical” climates.

```
SELECT AVG(P.Altitude), AVG(P.latitude)
FROM Plants P, Regions R
WHERE R.climate <> “Tropical”
```

6) 10 pts
In extending an RDBMS to efficiently support spatial data types such as points, lines, and regions, describe all the work that needs to be done at each level in order to provide such spatial capabilities.
a- At the logical level

b- At the physical level

7) 10 pts

The following 6 points are insterted into a spatial DBMS that uses an R-Tree of size (2,4) as an index structure to store points. Show the R-Tree after each insert in the given order.

Point #	X	Y
1	2.	3.
2	1.	2.
3	3.	3.
4	1.	4.
5	3.	2.
6	2.	1.

8) 15 pts
Describe the following three technologies and identify their pros and cons. (part c is on the next page)

a- Embedded SQL

b- Dynamic SQL

c- SQLJ

Additional Space

Additional Space