CHALMERS UNIVERSITY OF TECHNOLOGY
Department of Computer Science and Engineering

Examination in Databases, TDA357/DIT620

Thursday 4 April 2013, 14:00-18:00
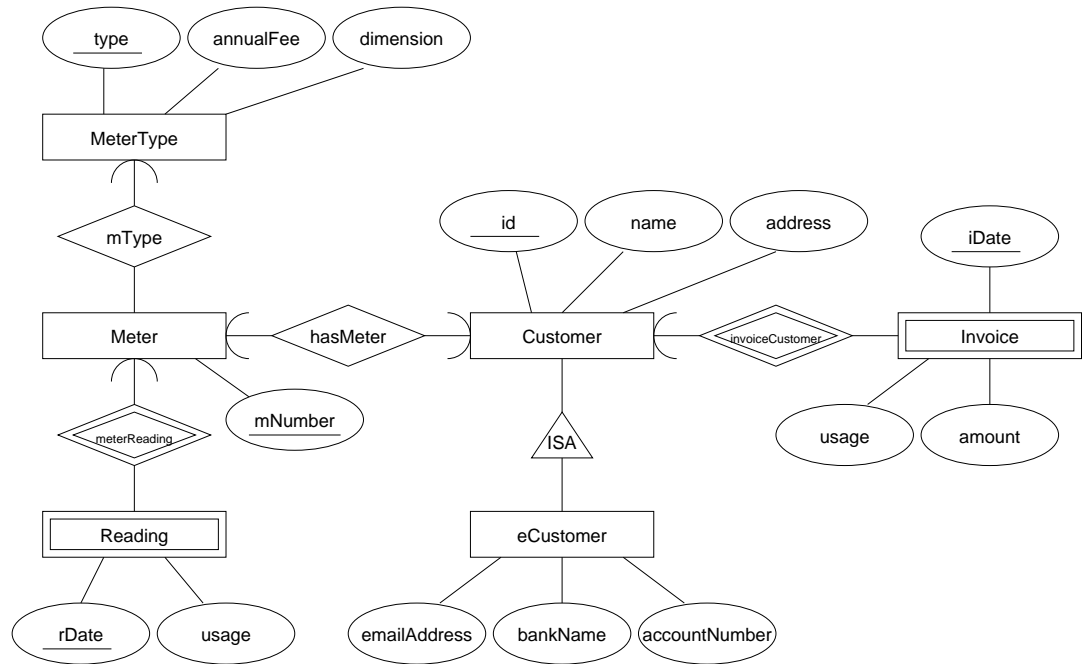
Solutions

Updated 2013-04-17

Question 1. a) (Here is one suggestion. Several other designs are also accepted.)

12 p   E-R diagram:

b) $Customers(\underline{id}, name, address)$

$eCustomers(\underline{id}, emailAddress, bankName, accountNumber)$

$Invoices(\underline{iDate}, \underline{customer}, amount, usage)$
     $customer \rightarrow Customers.id$

$MeterTypes(\underline{mType}, annualFee, dimension)$

$Meters(\underline{mNumber}, mType, customer)$
     $customer \rightarrow Customers.id$
     $mType \rightarrow MeterTypes.mType$

$Readings(\underline{meter}, \underline{rDate}, usage)$
     $meter \rightarrow Meters.mNumber$

Question 3.
9 p

a)
```
CREATE TABLE Clients (
        cid INT PRIMARY KEY,
        name VARCHAR(30),
        telephone VARCHAR(15)
);

CREATE TABLE Properties (
    ref         VARCHAR(10) PRIMARY KEY,
    address     VARCHAR(30),
    area        INT,
    seller INT,
    sold        CHAR(1) DEFAULT 'N' CHECK (sold IN ('Y','N')),
    saleDate DATE,
    FOREIGN KEY (seller) REFERENCES Clients(cid)
--reject deletion or update of referenced row
);

CREATE TABLE Bids (
    property    VARCHAR(10),
    client      INT,
    amount INT,
    PRIMARY KEY (property, client, amount),
    FOREIGN KEY (property) REFERENCES Properties(ref),
        ON DELETE CASCADE
        ON UPDATE CASCADE,
    FOREIGN KEY (client) REFERENCES Clients(cid)
--reject deletion or update of referenced row
);
```

b)
```
CREATE ASSERTION NotBiddingOnOwnProperty CHECK
   ( NOT EXISTS (
        SELECT   seller
        FROM     Properties, Bids
        WHERE    ref = property AND seller = client
   ) );
```

c)
```
CREATE OR REPLACE TRIGGER BidHighEnough
BEFORE INSERT ON Bids
REFERENCING NEW AS new
FOR EACH ROW
DECLARE numHigherBids INT;
BEGIN
    SELECT COUNT(amount) INTO numHigherBids
    FROM   Bids
    WHERE  property = :new.property AND amount > :new.amount;

    IF ( numHigherBids > 0 ) THEN
        RAISE_APPLICATION_ERROR(-20000, 'bid not high enough');
    END IF;
END;
```

Question 5.
9 p

a)
```
SELECT    name, address
FROM      Properties, Clients
WHERE     area > 300 AND cid=seller
ORDER BY area;
```

b)
```
CREATE VIEW v AS
SELECT    property,address, MAX(amount) / area AS price
FROM      Bids, Properties
WHERE     property=ref and sold='Y'
GROUP BY property, address, area;
```

c)
```
-- Find those who bid in 2012
-- Find those who bid in 2011
-- Subtract these
```

Question 7.
8 p

a)
```
<Result>
   {
     let $l := doc("l1.xml")
     for $n in $l//Lab/@number
     let $p := $l//LabPassed[@lab=$n]
     return <Lab number="{$n}">{$p}</Lab>
   }
</Result>
```

b)
```
<Result>
   {
     let $l := doc("l1.xml")
     for $n in $l//Lab/@number
     let $p := $l//LabPassed[@lab=$n]
     return <Lab number="{$n}" numPassed="{count($p)}">
       {
         for $g in $p/@group
         return <Group>{$g}</Group>
       }
     </Lab>
   }
</Result>
```

c)
```
<!DOCTYPE Result [

<!ELEMENT Result (Lab*)>

<!ELEMENT Lab (Group*) >

<!ELEMENT Group EMPTY >

<!ATTLIST Lab
  number CDATA #REQUIRED
  numPassed CDATA #REQUIRED >

<!ATTLIST Group
  group CDATA #REQUIRED >

]>
```