

4. A bank uses the following relational scheme for its customer details

ACCOUNT (account-type, interest-rate, minimum-deposit, withdrawal-notice)

CUST (cust-id, address1, address2, city, phone, occupation)

BALANCE (cust-id, account-type, balance)

CUST stores information about each customer, BALANCE stores the current balance, ACCOUNT stores information about each type of account.

- (a) Define a relational algebra expression that will return the cust-id, name, address1, address2, city, balance, account-type, withdrawal-notice attributes, for accounts that have greater than £100 in them. **(4 marks)**
 - (b) A special financial offer will be made to people having accounts with a withdrawal period of 30 days or less. Write a relational algebra expression that will return the appropriate names and addresses. **(4 marks)**
 - (c) Use query trees to explain how the expression from (b) could be optimised. Clearly show each stage and explain your working along with any assumptions you have made. **(8 marks)**
 - (d) The bank wishes to store audit information so that previous balance information could be retained. Describe ways in which this could be implemented. **(9 marks)**
5. (a) What would be the principle requirements for any system which integrates database applications with the Web? **(5 marks)**
- (b) MySQL does not have support for transactions. Use examples to explain the consequences of this. **(5 marks)**
- (c) Explain the advantages of a three tier web based system over a traditional two tier style system. Use Apache, PHP and MySQL sample code to explain how pages would be generated in a dynamic environment. **(15 marks)**
6. (a) Describe the features proposed in the Object Oriented Database System Manifesto. **(10 marks)**
- (b) Using examples, describe how SQL has been extended to enable processing on an Object Oriented Database. What other features are present in SQL3? **(10 marks)**
- (c) Describe how several Object Oriented Database products have been repositioned as XML repositories. **(5 marks)**

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