

AQA Computer Science A-Level
4.2.6 Hash tables
Past Paper Questions

Additional Specimen Paper 1

0 5

A designer jewellery company have a scheme where people can pay a fee to borrow one or more items of jewellery for a week. This scheme is often used by actors and musicians attending awards ceremonies and parties.

A computer program running on the jewellery company's server uses a dictionary to store details about who is currently borrowing which item of jewellery. A dictionary is a data structure that contains a collection of key-value pairs where the value is accessed via the associated key. The key used in the dictionary is the catalogue number of the item of jewellery and the key is the name of the client.

The current state of the dictionary is shown in **Figure 4**.

Figure 4

{1045 : 'Clark Gable', 1050 : 'Ingrid Bergman', 1052 : 'Katherine Hepburn', 2012 : 'Lauren Bacall'}

0 5 . 1

What value will be returned by a lookup operation using the key 1052?

[1 mark]

A hash table has been used to implement the dictionary. The hashing algorithm that has been used is `Catalogue Number MOD 100`.

0 5 . 2

What value is returned by the hashing function when it is applied to the catalogue number 1052?

[1 mark]

0 5 . 3

Explain how a value is stored in a hash table.

[4 marks]

When a large number of the possible positions in a hash table are filled it becomes inefficient; rehashing is often used to sort out this problem.

0 5 . 4

Describe the steps involved in rehashing.

[3 marks]

The jewellery company would also like to be able to complete lookup operations based on the client name to find out which items of jewellery are being borrowed by a particular client.

0 5 . 5

Explain how the jewellery company could set up a dictionary with the name of the client as the key and the catalogue numbers as the value.

[1 mark]

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9 (g) The DBMS organises the data in the database in files using hashing.

9 (g) (i) Why is hashing used?

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(1 mark)

9 (g) (ii) In the context of storing data in a file, explain what a *hash function* is.

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(2 marks)

9 (g) (iii) Collisions can occur when hashing is used.

In this context, explain what a *collision* is and how one might be dealt with.

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(2 marks)