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STANDARD TEST FOR JOB APPLICANTS

The following questions and simple projects are designed to allow Sybrin Systems to evaluate your development strengths and coding style.

Time is not restricted on these samples but obviously completing them quickly will be taken into consideration.

You are also not restricted from using books, notes or the Internet. This is an evaluation of your overall capability, which includes your ability to research. Please note, however, that simply copying solutions from reference material will provide us with an inaccurate assessment of your skills and this will jeopardize your work enjoyment should you be accepted.

It is important that you answer each question as fully as possible. If you can provide only a partial answer, please do so as this will help in your evaluation.

Section 1: Logic and Algorithms

This section evaluates your ability to understand and work through a problem logically. Please use flow-diagrams or pseudo-code to answer these questions, do not use any specific language or tool. For example, Question 1 could be answered using a very simple SQL statement, but that is not the purpose of this section.

Question 1:

Given an alphabetically sorted list of 500,000 people's names and telephone numbers, describe an algorithm that you could implement that would allow you to find a given person's telephone number in the shortest amount of time.

Question 2:

Given a list containing Province, CustomerName and SalesValue (sorted by Province and CustomerName), describe an algorithm you could use that would output each CustomerName and SalesValue with the total SalesValue per Province.

Question 3:

You have been given a large list of people's names and have been asked to highlight all duplicates where the exact same name appears more than once, as well as highlight any possible duplicates where there may be misspellings of the same name. Describe an algorithm you could use that would produce the required output.

Question 4:

You are required to use a single integer value to store multiple values. Describe how you would achieve this.

Section 2: Programming

This section evaluates your technical capabilities and allows us to determine your knowledge of the tools as well as your style.

Question 1:

Given the table from Fig.1, write an SQL Select statement that would re-organize the results to look like Fig.2

Region	Contact
Cape Town	Fred
Cape Town	Joe
Cape Town	Anna
Durban	John
Durban	Mary
Johannesburg	Frank

Fig. 1

Region	Contact
Durban	John
Durban	Mary
Johannesburg	Frank
Cape Town	Anna
Cape Town	Fred
Cape Town	Joe

Fig. 2

Question 2:

Write a program in the language of your choice to input a sentence from the user and then output the sentence in reverse. For example, if the user types in "The Rain in Spain", then the output should be "Spain in Rain The".

Question 3:

If we list all the natural (integer) numbers below 10 that are multiples of 3 or 5, we get 3, 5, 6 and 9. The sum of these multiples is 23.

Write a program in the language of your choice to calculate the sum of all the multiples of 3 or 5 below 1000. Include the source code and the calculated value in your answer.

Question 4:

By listing the first six prime numbers: 2, 3, 5, 7, 11, and 13, we can see that the 6th prime is 13.

Write a program in the language of your choice to output the 10001st prime number. Include the source code and the value in your answer.

Question 5:

Each new term in the Fibonacci sequence is generated by adding the previous two terms. By starting with 1 and 2, the first 10 terms will be:

1, 2, 3, 5, 8, 13, 21, 34, 55, 89,...

Write a program in the language of your choice to consider the terms in the Fibonacci sequence whose values do not exceed four million and find the sum of the even-valued terms. Include the source code and the calculated value in your answer.

Section 3: Database

This section evaluates your technical capabilities and allows us to determine your knowledge of the tools as well as your style.

Please use the below to tables for answering the questions in this section.

Table Name: Employee

ID	Name	Surname	Position
1	Scrooge	McDuck	Manager
2	Daizy	Duck	Manager
3	Donald	Duck	Support
4	Minnie	Mouse	Support
5	Micky	Mouse	Support
6	Goofy		Support
7	Pluto		Support
8	Huey	Duck	Support
9	Dewey	Duck	Support
10	Louie	Duck	Support

Table Name: StaffLink

EmpID	ManID
3	1
7	1
6	2
4	2
2	1
1	2
5	2

Question 1:

List which fields are primary keys and foreign keys?

Question 2:

Write a SQL statement that will Output the following result:

ID	Name	Surname	Position
2	Daizy	Duck	Manager
9	Dewey	Duck	Support
3	Donald	Duck	Support
6	Goofy		Support
8	Huey	Duck	Support
10	Louie	Duck	Support
5	Micky	Mouse	Support
4	Minnie	Mouse	Support
7	Pluto		Support
1	Scrooge	McDuck	Manager

Question 3:

Write a SQL statement that will Output the following result:

Name	Surname	Position	ManagerName	ManagerPosition
Donald	Duck	Support	Scrooge	Manager
Pluto		Support	Scrooge	Manager
Goofy		Support	Daizy	Manager
Minnie	Mouse	Support	Daizy	Manager
Daizy	Duck	Manager	Scrooge	Manager
Scrooge	McDuck	Manager	Daizy	Manager
Micky	Mouse	Support	Daizy	Manager

Question 4:

Write a SQL statement that will Output the following result:

Name	Surname	Position	ManagerName	ManagerPosition
Scrooge	McDuck	Manager	Daizy	Manager
Daizy	Duck	Manager	Scrooge	Manager
Donald	Duck	Support	Scrooge	Manager
Minnie	Mouse	Support	Daizy	Manager
Micky	Mouse	Support	Daizy	Manager
Goofy		Support	Daizy	Manager
Pluto		Support	Scrooge	Manager
Huey	Duck	Support	NULL	NULL
Dewey	Duck	Support	NULL	NULL
Louie	Duck	Support	NULL	NULL

Question 5:

Write a SQL statement that will Output the following result:

StaffCount	Name
4	Daizy
3	Scrooge

Section 4: Problem Solving Style

The section is designed to evaluate your overall problem-solving approach.

Question 1:

Why are computer monitors and TV sets rectangular?

Question 2:

You have written a program that takes several hours to run. The program sometimes fails, but usually only after a few hours of running and only when running on the production server. What steps would you take to identify the problem?

Question 3:

You have designed a system that accesses and updates a database. When you first install the database and system at the customer, the system runs with good performance. However 3 months later, the Customer phones and says that it is taking a long time to search for information from the database. What would you do to diagnose and correct this problem?

Question 4:

You are working on a project for a very important customer and are at least three weeks from being able to complete the project. Suddenly your customer informs you that due to circumstances beyond their control the system must be implemented in one week. What would you do?

Question 5:

A drawer contains 10 black and 10 brown socks that are all mixed up. What is the fewest number of socks you can take from the drawer without looking and be sure to get 2 of the same colour.