University of Strathclyde Glasgow

Department of Computer and Information Sciences

CS992 Database Development

Monday 24th April 2023 **9:30am – 10:30am**

Duration: 1 hour

Attempt ALL questions

Question 1

(a) There are a number of types of database that would typically be classified as belonging to the "NoSQL" group. Which of these would you consider to be the most important ***types*** of NoSQL database (you should select at least two types and should give a specific example of a leading platform for each type that you have selected). For each type of NoSQL approach that you consider to be important, indicate the key benefits they offer by referring to a 'use case' that illustrates their advantages over a traditional RDBMS.

(8 marks)

(b) The terms 'schema-on-write' and 'schema-on-read' are sometimes used to describe the differences between leading database approaches. Explain these terms and comment on whether you think this is a helpful distinction. How would you characterise the differences between a 'data warehouse' and a 'data lake', and to what extent do issues related to schema feature in such a characterisation?

(6 marks)

(c) A podcast interviewee states, "there isn't much point spending time learning SQL anymore; soon most applications will be based on NoSQL approaches". Do you broadly agree or disagree with this statement, and if so why or why not? (Note: Marks will be given primarily for the 'why/why not' part of your response, as opposed to whether you happen to agree or disagree.)

(6 marks)

Question 2

(a) Briefly explain what is meant when reference is made to *declarative* and *procedural* approaches to data processing. The relational model and SQL can be considered to adopt a *declarative* approach. Illustrate what this means in practice and describe at least two benefits that this enables SQL to bring to the process of database management.

(5 marks)

(b) In many 'real world' settings, there is a need to bring together SQL statements (*declarative*) with more record-oriented (*procedural*) code. Outline some approaches that exist to bring together set-oriented SQL statements with more procedural elements. Your answer may refer to specific aspects of SQL/PSM (or PL/SQL from our exposure to these approaches in the lab), as well to the integration of SQL directly into programmatic code. Comment on the benefits and limitations of each approach.

(9 marks)

(c) Explain the need for / value of introducing an additional layer of abstraction to an RDBMS such as *SQLite*, when embedding SQL code and database access / editing operations within a mobile application. What advantages can be derived by using such an approach? Might there be some potential pit-falls?

(6 marks)

END OF PAPER

(Prof Crawford Revie)