Databases

(a) OLAP and OLTP.

(i) What is on-line transaction processing (OLTP)? [2 marks]

(ii) What is on-line analytic processing (OLAP)? [2 marks]

(iii) If you were designing a relational database system, how would your approach to schema design differ for OLTP and OLAP systems? [3 marks]

(iv) In OLAP, what is the meaning of the terms drill down, roll up, and slice? [3 marks]

(v) What is a star schema? [1 mark]

(b) Suppose we have the following relational schema,

\[
\begin{align*}
\text{Supplier}(sid: \text{integer}, \text{name: string}, \text{postcode: string}) \\
\text{Parts}(pid: \text{integer}, \text{name: string}, \text{description: string}) \\
\text{SuppliedBy}(sid: \text{integer}, pid: \text{integer}, \text{weight: integer})
\end{align*}
\]

where the underlined attributes represent the primary keys of the associated relation. The table \textit{SuppliedBy} implements a relationship between suppliers and parts — indicating which parts are supplied by which supplier — using foreign keys pointing into the \textit{Parts} and \textit{Supplier} tables. The \textit{weight} attribute is the parts weight in grams.

Write an SQL query that will return a list, without duplicates, of all postcodes associated with suppliers of parts less than one kilogram in weight. [5 marks]

(c) Define and explain the ACID properties of database transactions. [4 marks]