

Database Assignment 1

Date: _____

QUESTION #1

- (a) File systems for data management face issues like weak security controls, challenges in scaling up as data volumes increase, risks of inconsistent data across files, and poor integrity enforcement. Redundancy is also common, where the same information gets stored in multiple places, raising the chance of errors during updates.
- (b) A composite primary key combines multiple attributes to form a unique identifier for records in a table when one attribute isn't enough. For instance, in a table tracking class registrations, you might use both Learner Number and Classcode as the composite key. Individually these could repeat (e.g. one learner in many classes or one class with many learners) but together they guarantee no duplicates.
- (c) With a DBMS in place, application software handles tasks such as building database structures (like tables and fields with rules), adding new entries (via inserts), fetching information (through queries), altering or removing existing entries (updates and deletes), managing user permissions for access, and maintaining data accuracy and consistency overall.
- (d) In the three schema model, achieving logical data independence is tougher because external views and programs are closely linked to the core conceptual layer. Even minor adjustments there can disrupt higher level elements. Take a scenario where a unified "Registration" table exists in the conceptual schema, showing students detail alongside course info and grades. If it's later divided into separate "StudentInfo" and "CourseDetails" tables for better organization, user interfaces or reports built on the original view might break, as they expect the old combined structure without automatic ~~adaption~~ adaptation.

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e. This means a key qualifies as a superkey (since it uniquely pins down rows), but superkeys are not always keys, because they might include extra, non-essential parts. Consider a relation for people with attributes like PersonID, FullName, ContactEmail, and PhoneNum. $\{ \text{PersonID} \}$ could be a key - it's the smallest set for uniqueness. But $\{ \text{PersonID}, \text{FullName}, \text{ContactEmail} \}$ is a superkey; it works for identification but isn't minimal, as dropping the extras still leaves uniqueness intact.