Specialisation and Generalisation

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SYNONYMS
refinement, abstraction, hierarchies, subtype;
clustering, grouping, inheritance

DEFINITION
Specialisation and generalisation are main principles of database modelling. Specialisation is based on a refinement of types or classes to more specific ones. Generalisation maps or groups types or classes to more abstract or combined ones. Typically, generalisations and specialisations form a hierarchy of types and classes.

MAIN TEXT
Specialisation introduces a new entity type by adding specific properties belonging to that type which are different from the general properties of its more general type. Is-A associations specialise a type to a more specific one. Is-A-Role-Of associations consider a specific behaviour of objects. Is-More-Specific-To associations specialise properties of objects of the more general type. The student type and the customer type are specialisations of the person type. The rectangle type is specialised to the square type by adding restrictions. Different kinds of specialisation may be distinguished: structural specialisation which extends the structure, semantic specialisation which strengthens type restrictions, pragmatic specialisation which allows a separation of the different usage of objects in contexts, operational specialisation which introduces additional operations, and hybrid specialisations. Identification and other properties of objects of the special type can be inherited from the more general one. Methods applicable to objects of the more general one should be applicable to corresponding more special objects or specialised as well. Exceptions can be modelled by specialisations. Specialisation allows developers to avoid null values and to hide details from non-authorised users.

Generalisation combines common features, attributes, or methods of types. It is based either on abstraction, on combination or on grouping. Generalisation often tends to be an abstraction in which a more general type is defined by extracting common properties of one or more types while suppressing the differences between the subtypes. The subtypes can be virtually clustered by or generalised to or combined by a view to a general type. The library’s holding type is a generalisation of the journal, book, preprint and PhD/Master thesis types. The occupation type is a generalisation of the lawyer, merchant, teacher and banker types. It is obtained by factoring out the commonalities among the specialisations. Structural combination typically assumes the existence of a unifiable identification of all types. The livestock type combines the different types of farming. Generalisation is represented by clusters of types. The cluster construct of the extended ER model represents common properties and abstractions. Identification of generalised objects is either inherited from the more special objects or built as an abstraction of the identification of the more special types. Generalisations often do not have their own methods.

CROSS REFERENCE
I. DATABASE FUNDAMENTALS
   a. Data models (including semantic data models)

REFERENCES