

TOS: A Temporal Object-Oriented System

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In the areas of sciences, engineering and design, the entities experience both structural and state changes. Existing database models allow changes in the structure and state through the techniques of schema evolution and version management, respectively, but fail to capture and represent both of these changes together and at the same time. In this paper we formally introduce the Temporal Object-Oriented System (TOS) which allows simultaneous changes in both the structure and state of the objects. An object in TOS is called a temporal object (TO). An aggregation of different TOs of the system can give rise to a new object which is then referred to as a temporal complex object (TCO). Both temporal objects and temporal complex objects can replace and refresh their knowledge through a process called renovation. The paper also discusses the process of renovations for both TOs and TCOs and enumerate their temporal parameters (i.e., time-span, life-span and life-sequence). A query language for the TOS, called Temporal Object Query Language (TOQL), is also proposed which is a super-set of the relational query language SQL.