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# Spatio-Temporal Object Relational for Biodiversity System (STORE-Biodi)

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## Summary

Spatio-temporal data model for biodiversity is growing importance to the biodiversity data management, forest and environment control. Spatio-temporal data models have received much attention in the database research community because of their practical importance and interesting challenges they pose. This paper is discussed upon the research activities of selecting, designing, implementing the data model. The paper can be divided by two major parts, first: discuss about biodiversity data model and secondly: spatio-temporal conceptual framework design of biodiversity data model for long terms stewardship of biodiversity information. In this paper our main objective to minimize the extension required in SQL language. This paper also focuses on the unified models of space and time using object-relation approach. In particular, we propose a conceptual object-relational spatial temporal data model based on Donna J. Peuquet's pyramid framework. Standard and user management queries are applied to test the model. After extensive testing, the data model performed admirably in managing biodiversity data.

**Keywords:** Spatio-temporal, Data model, biodiversity data, Object-relational, SQL.

## Introduction

After two decades of research, representation of space and time in databases and functional applications are still problematic [1]. This paper

presents a universal object-relational framework for spatial temporal data modeling. Spatial temporal data modeling aims to extend the existing data models to include space and time in order to better describe our dynamic real world.

Problem with previous data models is that spatial and temporal aspects of databases are modeled separately [2], [3]. Spatial database focuses on supporting geometries [4], while temporal databases focus on the past state [5]. But in many circumstances, such as environmental monitoring, resource management, transportation scheduling, etc, spatial and temporal attributes should be connected together. Many current systems can handle only one aspect of space and time. Spatial systems always fail to cater for many temporal aspects in a dynamic environment [6]. Though many researchers have found the necessity of integration of space and time in one environment, by far, little such work has been done.

Another problem is representation of data should be natural to human. The structures of space and time are identified as essential for the realization of cognitive systems [10]. According to Donna J. Peuquet and her group [11], models of spatial temporal data in geographical database representations must incorporate human cognitive principles. Human knowledge of the dynamic geographical world comprises of three different (and interrelated) subsystems that handle *what*, *where* and *when* aspects of object properties [8]. Object relational approach with its characteristic of inheritance and aggregation is