

# **Time and Relational Theory:**

## *Temporal Databases in the Relational Model and SQL*

a technical presentation for DBAs, data architects,  
DBMS implementers, database application programmers,  
and other database professionals

Maintaining and processing historical data has become not just a goal but a reality for many organizations. As a consequence, the ability to deal properly with the time dimension in databases has become an increasingly important practical problem. And today's mainstream DBMS products are—at last, some might say—beginning to include features that are specifically designed to help with this important requirement (though it has to be said too that the support currently found in those products falls a long way short of the theoretical ideal). This presentation describes and explains that theoretical ideal—which, interestingly, is 100 percent consistent with the classical relational model—in depth. It also discusses in detail the temporal support to be found in the SQL standard (“SQL:2011”).

The presentation overall falls into three major parts. The first, “Laying the Foundations,” explains some of the basic problems of temporal databases (some of which are far from obvious, incidentally) and lays the groundwork for solving those problems. The second, “Building on the Foundations,” uses the material from the first part as a basis for addressing a variety of practical issues, including temporal database design, temporal integrity constraints, and temporal update operations. The final part, “SQL Support,” explains the pertinent features of the SQL standard in detail.

### **TOPICS**

- *Laying the Foundations*

What's the problem?  
Intervals and interval operators  
EXPAND and COLLAPSE  
PACK and UNPACK  
U\_ operators

- ***Building on the Foundations***

Database design I : Structure  
Database design II : Keys and related constraints  
Updates

- ***SQL Support***

Periods  
Database design  
Queries  
Updates  
System time  
Bitemporal tables  
Summary and assessment

***Duration:*** The presentation is divided into three sessions of approximately 1.5 hours each.

***Prerequisites:*** Attendees will be expected to be familiar with basic relational database concepts and the SQL language.