

PANEL

Real-Time Databases

Chair:

Krithi Ramamritham (University of Massachusetts, USA)

Panelists:

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A real-time database is a database system where (at least some) transactions have explicit timing constraints such as deadlines. In such a system, transaction processing must satisfy not only the database consistency constraints, but also the timing constraints. Examples of real-time database systems occur in program trading in the stock market, radar tracking systems, and computer integrated manufacturing systems.

The overall design of a real-time database includes making an integrated set of decisions concerning the following issues: the structure and organization of the data and the database, the protocols and algorithms for concurrency control, recovery, communication, transaction scheduling, priority assignment, I/O scheduling, etc., the hard and soft nature of transaction deadlines, algorithms for query processing, and the semantics of the data and the properties of the transactions and how they effects requirements for consistency and correctness. These issues are highly related to each other and closely tied to the nature of the applications.

Typically, work on database has focused on query processing and database consistency, but not on meeting any time-constraints associated with data access. On the other hand, real-time systems research deals with task scheduling to guarantee responses within deadlines, but the researchers have largely ignored the problem of guaranteeing the consistency of shared data. Only recently have some papers been published concerning the integration of real-time scheduling with database consistency. To study real-time database systems, some new criteria are required which define correctness, unify timing and consistency constraints, specify proper metrics, and specify the properties of data objects and transactions.

This panel brings together a number of researchers with different perspectives. Specifically, they work in the areas of real-time databases, active databases, and traditional databases.

Some of the conceptual and practical questions that the panel will discuss and seek answers for are:

What is fundamentally different about real-time databases? Which aspects of conventional databases would (not) apply to real-time databases?

What are the sources of the time constraints in real-time databases? Where does a transaction derive its deadline from?

What type of consistency constraints apply to real-time databases? How do the requirements on the temporal consistency or temporal validity of data affect transaction management?

What is the relation between active databases and real-time databases?

What are the approaches necessary to process database queries with time constraints?

What types of techniques are required for concurrency control, commit processing, recovery, and transaction scheduling in real-time database systems?