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# ENTERPRISE INTEGRITY

## Understanding Business Transactions: Part IV

does not apply. Clearly, a business transaction is atomic and consistent, but in a more general way than would be acceptable for logical transactions. Last month, I described the roles that atomicity and consistency play in ordinary business situations. This month we'll examine the business transaction equivalents of the isolation and durability.

Summarizing what we've learned, a business transaction represents an exchange between agents intended to achieve agreed-upon objectives. An implicit or explicit contractual commitment is implied, and agents can be systems or entities. Both business transaction execution and objectives can be complex and relatively abstract. With respect to business transactions, atomicity merely means that it's possible to determine whether the objectives have been met, and that any partial execution will not have unintended effects. Likewise, business transactions consistency conditions are much more likely to be context-sensitive than those typically applied to logical transactions, and context may shift during transaction execution. Both of these insights will be important when the new concept of collaborative transactions is introduced.

Within a business transaction, there may be good reasons to break the *isolation* property as usually interpreted. Unlike logical transactions, which assume logical independence is both possible and desired among concurrent transactions, business transactions often consist of steps that are shared with other transactions. A single business activity, for example, may contribute to multiple business transactions and thereby leverage resources. Concurrent business transactions thus require a high degree of collaboration. As a corollary to this assertion, it may be desirable for certain intermediate results to be visible outside of and survive a business transaction regardless of whether it succeeds or fails. This technique improves business efficiency, but may require elaborate exception processing and corrective procedures. It also requires consistency conditions (e.g., policies) that prevent activities and intermediate results from being shared inappropriately.

Some business transactions consist of multiple nested business transactions, called sub-transactions, and may involve multiple nesting levels. Nesting is a fundamental characteristic of business transactions. Sub-transactions may

In pursuing an understanding of business transaction over the last three months, we've been led to conclude that the usual interpretation of the ACID (Atomic, Consistent, Isolated, and Durable) properties is too simplistic and, seemingly,

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be executed by independent transaction participants. This situation is closely related to traditional, distributed transactions, for which the usual method of determining success or failure is a resource- and time-consuming procedure called two-phase commit. Two-phase commit requires all sub-transactions be completed successfully for the transaction to complete successfully. Unlike computerized distributed transactions designed for repetitive execution and robustness, the likelihood of failure of sub-transactions in a business transaction is often much higher. The consistency conditions may include decision procedures that determine which combinations of sub-transaction success and failure are desirable. These decision procedures may well involve a subjective or interactive element.

Conceptually, activities that produce surviving intermediate results can be modeled as implicit sub-transactions contributing to one or more composed business transactions. Any particular sub-transaction survives if and only if at least one of the composed business transactions to which it contributes also survives. Again, which composed transactions include which sub-transactions is determined by both logical requirements and consistency conditions that ensure an appropriate shared context. For example, the result of a monthly sales volume computation might be shared by concurrent transactions for both sales commissions and inventory management. Thus, the breaking of strict transaction isolation is controlled so that it does no harm so long as the shared work has produced a consistent result.

The *durability* property is normally satisfied by a permanent record of a transaction's final state. Unlike this physical interpretation, a business transaction requires permanent records sufficient for non-repudiation, reconciliation, and traceability. Every business transaction is an important business event. Participants must decide jointly whether or not execution was successful, and that decision must be final. Keeping track of which business transactions have begun and their outcome is a fundamental aspect of every business, made even more crucial by regulatory compliance (e.g., Sarbanes-Oxley).

The standard and familiar business terminology for this tracking requirement is *audit*. It is for this reason that I have justifiably taught that the beginning and end of every business transaction is a point of audit and that every business transaction provides a transformation between audit points. With this recognition, next month, we'll formalize the business transaction concept and relate it to logical transactions. Until we can do that, IT systems support *enterprise integrity* by accident, if at all. **bij**

### About the Author

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