

**TRANSACTION EXECUTION DEPENDENCIES IN A
MULTIDATABASE ENVIRONMENT**

BY

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To Kamal with love...

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ABSTRACT

Advanced transaction models have been the focus of research in the area of transaction management. Examples of advanced transaction models include nested, multilevel, flex transactions, *etc.* However, these models have their own shortcomings that can be summarized as follows:

- Absence of a mechanism to specify and provide proper global integrity constraints (dependencies) that determines the effects on global atomicity.
- Unsuitability of certain transaction models in multidatabase environments. For example, ConTract model was developed for cooperative environments and are thus not suitable for multidatabase environments.
- A means to characterize the amount of local autonomy affected. For instance, Sagas do not address characterization of local autonomy.
- A mechanism to utilize the application semantics and execution dependencies. For example, nested transactions do not explicitly address the use of semantics.
- A provision to support multiple transaction execution alternatives. Sagas and ConTract are examples of those models that do not provide support for functionally equivalent transactions.
- Scalability to Internet environments running advanced database applications. Most of the transaction models presented in the literature do not address the scalability issues.

This thesis presents a novel, and Internet-scalable implementation of a nested transaction model that describes the pragmatic components required to remedy the above shortcomings in the form of an abstract model. It shows that utilizing application semantics and revealing partial results in an open nested, multidatabase transaction environment aids in characterizing the dependencies among the child transactions. An interface mechanism to characterize the level of autonomy at the underlying systems is provided. Support for multiple transaction execution alternatives is also provided.