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2007

## The adaptive serializable snapshot isolation protocol for managing database transactions

Yang Yang  
*University of Wollongong*

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# The Adaptive Serializable Snapshot Isolation Protocol for Managing Database Transactions

A thesis submitted in fulfillment of the  
requirements for the award of the degree

**Master of Computer Science by Research**

from

UNIVERSITY OF WOLLONGONG

by

**Yang Yang**

Computer Science Department  
February 2007

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by

Yang Yang

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*Dedicated to*

*My parents*

# Declaration

This is to certify that the work reported in this thesis was done by the author, unless specified otherwise, and that no part of it has been submitted in a thesis to any other university or similar institution.

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Yang Yang  
February 15, 2007

# Abstract

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In this thesis, concept of database concurrency control, computational models of database transaction, the correct criterias of concurrent execution of transactions and concurrency control algorithms such as two phase locking, serialization graph testing, Snapshot Isolation are reviewed. A graph based mechanism is proposed for preserving Snapshot Isolation protocol(SI) serializable at run-time. Firstly, we present Dynamic Managed Snapshot Isolation Serialization Graph(called DSISG). By using this mechanism, non-serializable transactions under Snapshot Isolation protocol can be detected at run-time. Secondly, in order to guarantee the effectivity of DSISG, a new model of database transaction(segmented transaction model) is proposed. Thirdly, an algorithm of managing a hierarchical structured acyclic graph is presented. The run-time characterizing of non-serializable transaction under Snapshot Isolation protocol will be more efficient when this hierachical graph structure is applied to DSISG. We also summarize the contributions of this thesis and formulate some open problems.



# Acknowledgments

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