



**UNIVERSITI PUTRA MALAYSIA**

**DATA CACHING FRAMEWORK AND STRATEGIES FOR INTEGRITY  
CONSTRAINT CHECKING IN MOBILE DATABASE SYSTEM**

**ZARINA DZOLKHIFLI**

**FSKTM 2012 9**

**DATA CACHING FRAMEWORK AND STRATEGIES FOR INTEGRITY  
CONSTRAINT CHECKING IN MOBILE DATABASE SYSTEM**

By

**ZARINA DZOLKHIFLI**

**Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in  
Fulfillment of the Requirements for the Degree of Master of Science**

**July 2012**

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

*To my loving parents Mama and Abah  
To my loving parent in laws Ibu and Ayah  
To my lovely brothers and sisters  
And especially to my beloved husband 'Abang' and son*

*Zarina*

Abstract of thesis presented to Senate of Universiti Putra Malaysia in fulfillment of the requirement for the degree of Master of Science

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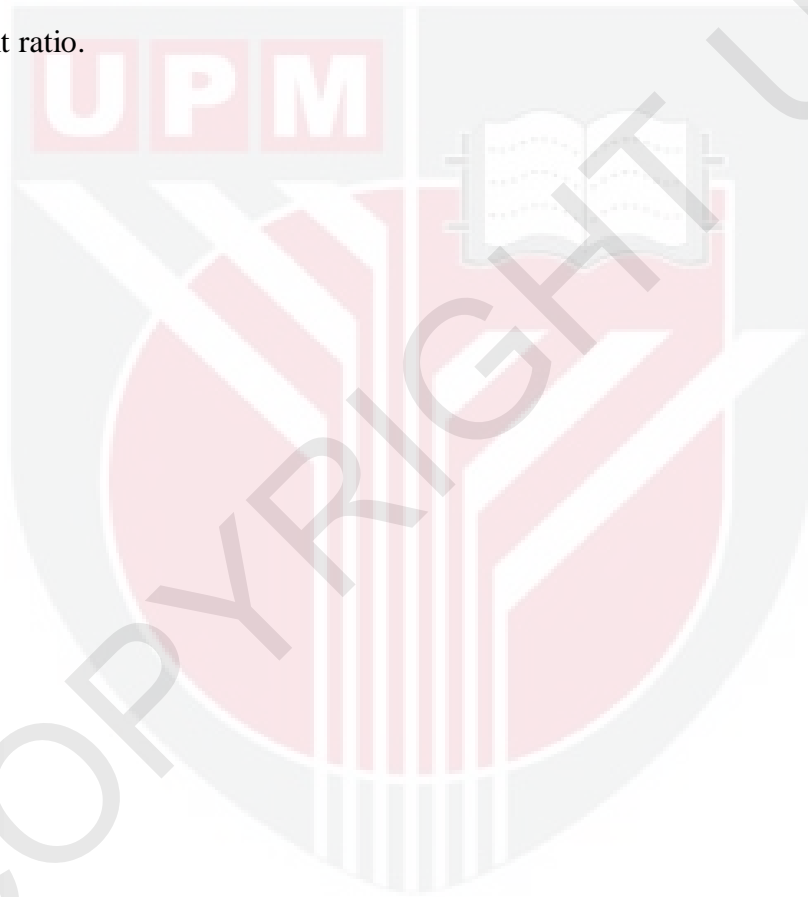
**July 2012**

**Chairman : Associate Professor Hamidah Ibrahim, PhD**

**Faculty : Computer Science and Information Technology**

In a mobile environment, due to the various constraints inherited from limitations of wireless communication and mobile devices, checking for integrity constraints to maintain the consistent state of mobile databases is an important issue that needs to be addressed. Due to limited storage capabilities, a mobile host is not capable of storing all data items in the network, thus it must share some data item with a database in the fixed network. Data caching technique is used to cache frequently accessed data from the base station into mobile hosts. By caching the needed data items, it allows the mobile host to continue processing without worrying about disconnection. The main aim of this research is to propose a framework of data caching for the purpose of checking integrity constraints in a mobile environment. Four caching strategies have been proposed, namely: Blind Strategy (BS), Quantifier Strategy (QS), Strict Strategy (SS), and Relax Strategy (RS) which are embedded in the proposed framework. The BS strategy blindly caches data items into mobile host while the QS strategy caches data items based on the quantifier of the integrity test. The SS and RS strategies analyze the relationships

between integrity tests in identifying the data items to be cached. These four strategies adopted the simplified form of integrity tests, which are sufficient and complete tests. The RS and SS strategies improve the checking mechanism by not only preventing delays during the process of checking constraints and performing the update but also reducing the amount of data items to be cached. The result shows that both the strategies managed to cache small amount of data items and at the same time achieved nearly 100% of hit ratio.



Abstrak tesis yang dikemukakan kepada senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master of Sains

**RANGKA KERJA DAN STRATEGI MEMPARA DATA UNTUK SEMAKAN KEKANGAN INTEGRITI DALAM SISTEM PANGKALAN DATA BERGERAK**

Oleh

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**Julai 2012**

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Dalam persekitaran data bergerak, disebabkan pelbagai kekangan diwarisi daripada keterbatasan komunikasi tanpa wayar dan peranti bergerak, semakan kekangan integriti bagi memelihara keadaan konsisten pangkalan data bergerak adalah isu penting yang perlu dititik beratkan. Disebabkan keupayaan storan yang terbatas, hos bergerak tidak berupaya untuk menyimpan kesemua item data di dalam rangkaian, maka ia mesti berkongsi beberapa item data dengan suatu pangkalan data di dalam rangkaian tetap. Teknik mempara (*caching*) data digunakan untuk para (*cache*) data yang kerap dicapai daripada stesen pangkalan ke dalam hos bergerak. Dengan mempara item data yang diperlukan, ia membenarkan hos bergerak meneruskan pemprosesan tanpa kluatir tentang pemutusan talian. Matlamat utama penyelidikan ini adalah untuk mencadangkan satu rangka kerja para data bagi tujuan menyemak kekangan integriti di dalam persekitaran bergerak. Empat strategi para data telah dicadangkan, iaitu: Buta Strategi (BS), Pengkuantiti Strategi (QS), Tegas Strategi (SS), dan Santai Strategi (RS) yang dibenam ke dalam rangka kerja yang dicadangkan. Strategi BS para data secara buta-tuli

ke dalam hos bergerak dan strategi QS *cache* item data berdasarkan pengkuantiti ujian integriti. Strategi SS dan RS menganalisa perhubungan antara ujian integriti dalam mengenal pasti item data untuk di para. Keempat-empat strategi ini mengadaptasi bentuk mudah ujian integriti iaitu ujian kecukupan dan lengkap. Strategi RS dan SS meningkatkan mekanisma semakan bukan hanya dengan mengelak kelewatan semasa proses menyemak kekangan dan melaksanakan pengemaskinian tetapi juga mengurangkan jumlah item data untuk di para. Hasil keputusan menunjukkan bahawa kedua-dua strategi berupaya untuk para jumlah item data yang kecil dan pada masa yang sama mencapai hampir 100% kadar nisbah ketukan.

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**Zarina Dzolrhifli**

July 2012



I certify that a Thesis Examination Committee has met on 9/7/2012 to conduct the final examination of Zarina binti Dzolkhifli on her thesis entitled "**Data Caching Framework and Strategies for Integrity Constraint Checking in Mobile Database System** " in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1998. The Committee recommends that the student be awarded the Master of Science.

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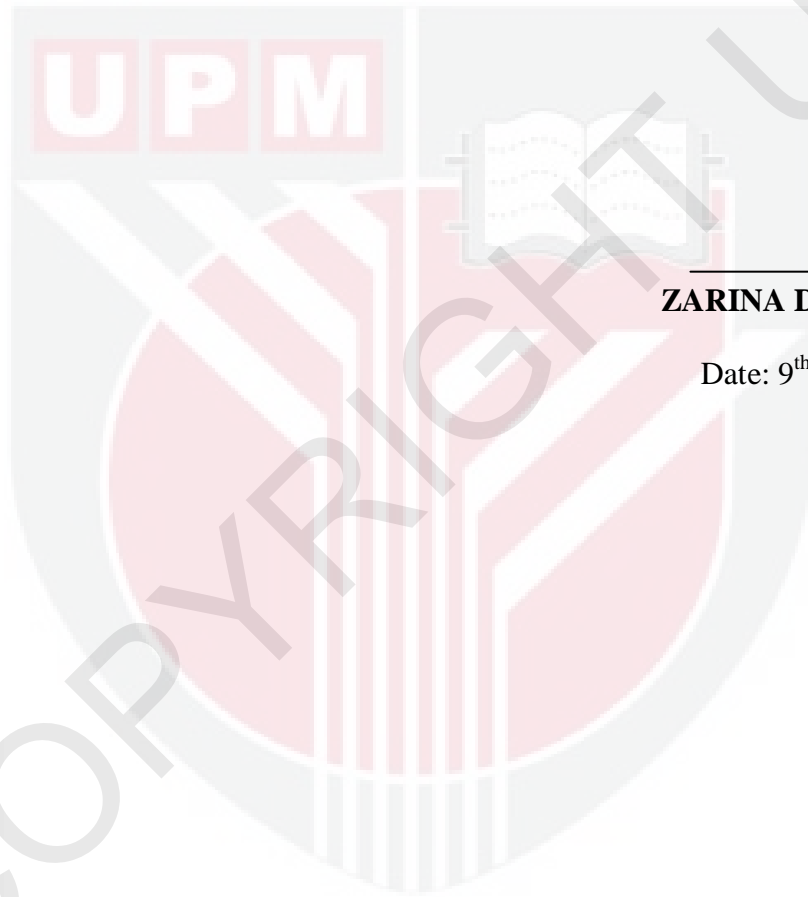
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## DECLARATION

I declare that the thesis is my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously and is not concurrently, submitted for any other degree at Universiti Putra Malaysia or other institutions.



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**ZARINA DZOLKHIFLI**

Date: 9<sup>th</sup> July 2012

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