Locking Internals – Part 1

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Agenda

- ACID Properties
- Database Consistency Issues
- Recovery Models
- Locking Basics
- Compatibility Matrix
- Demo

ACID

- Properties to make sure reliable transaction

- Passenger and Flight Journey

	Property	Owner
Atomic	Transaction is "all or nothing"	T-Log
Consistent	DB must be consistent before and after the Transaction irrespective of success or failure	T-Log & Constraints
Isolation	The intermediate state of a transaction is invisible to other transactions. Concurrent Transactions appear to be serialized.	Locks
Durable	when the transaction is committed, it stays committed	T-Log

Data Consistency Issues

1. Dirty Reads CH06 Dirty Read.sql
2. Lost Updates CH06 Lost Update Tran.sql
3. Non Repeatable Reads CH06 Non-Repeat Read.sql
4. Phantom Reads CH06 Phantom.sql

Scripts Downloaded From:
http://www.wrox.com/WileyCDA/WroxTitle/Professional-SQL-Server-2008-Internals-and-Troubleshooting.productCd-0470484284,descCd-DOWNLOAD.html

Dirty Read

T#2 Vidhya's Manager reads his salary as 90K

T#1 HR Updates his Salary From 80K to 90K & Cancel It

1

2

Name: Vidhya
EmpId:1001
Salary: 80K to 90K

Non Repeatable Read

2

T#2 Updates Rec #3

Rec#
1
2
3
4
5

T#1 Check1#

1

3

T#1 Check2#
Different Record s

Lost Update

T#1 Vidhya Transfers 10 K

1

50K + 10K

T#2 Vidhya's Wife Transfers 15K

50K + 15K

2

Bank: Manamma
AC Type: Joined Ac
Openg Balance: 50K

Phantom Rows

2

T#2 Inserts Rec #6

Rec#
1
2
3
4
5

T#1 Che 1#
Closing Balance =

1

3

T#1 Check2#
Closing Balance =

Isolation Levels

Consistency vs Concurrency

http://blogs.msdn.com/b/sqlcat/archive/2011/02/20/concurrency-series-basics-of-transaction-isolation-levels.aspx

Isolation	Dirty Reads	Lost Update	Nonrepeatable Reads	Phantom Reads
Read Uncommitted	Yes	Yes	Yes	Yes
Read Committed	No	Yes	Yes	Yes
Repeatable Read	No	No	No	Yes
Snapshot	No	No	No	No
Serializable	No	No	No	No

Reference: http://blog.sqlauthority.com/2011/03/04/sql-server-concurrancy-problems-and-their-relationship-with-isolation-level/

So

To perform reliable transaction, Data has to be Locked.

Question is

What type of Lock to be used?
How long to keep the lock?
When Lock to be released?
Who is managing this and How?

What can be locked?

Resource	Description
RID	Row identifier. Used to lock a single row within a Heap.
Key	Row lock within an index.
Page	8 kilobyte –(KB) data page or index page.
Extent?	Contiguous group of eight data pages or index pages.
Partition	Table Partition (HoBT)
Table	Entire table, including all data and indexes.
DB	Database.
Metadata,	Lock System metadata

http://msdn.microsoft.com/en-us/library/aa213039(v=sql.80).aspx

Querying Locks

sp_lock

select * from sys.dm_tran_locks

CH06 Blocking Script.sql

Scripts Downloaded From:
http://www.wrox.com/WileyCDA/WroxTitle/Professional-SQL-Server-2008-Internals-and-Troubleshooting.productCd-0470484284,descCd-DOWNLOAD.html

Common Lock Types

Lock	Name
S	Shared
U	Update
X	Exclusive
IS	Intent Share
IU	Intent Update
IX	Intent Exclusive
Sch-M	Schema Modification
Sch-S	Schema Stability

SIX	Shared Intent Exclusive
SIU	Shared Intent Update
UIX	Update Intent Exclusive
BU	Bulk Update

http://msdn.microsoft.com/en-

Lock Compatibility Matrix

	Existing granted mode					
Requested mode	**IS**	**S**	**U**	**IX**	**SIX**	**X**
Intent shared IS	Yes	Yes	Yes	Yes	Yes	No
Shared S	Yes	Yes	Yes	No	No	No
Update U	Yes	Yes	No	No	No	No
Intent exclusive IX	Yes	No	No	Yes	No	No
Shared with intent exclusive SIX	Yes	No	No	No	No	No
Exclusive X	No	No	No	No	No	No

http://msdn.microsoft.com/en-us/library/ms186396(v=sql.105).aspx

Lock Demo – Part 1

Locking_Demo.sql

Reference

- Wrox Professional SQL Server 2008 Internals and Performance Tuning
- MSDN