
DATABASE

CSE3103 : Database

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Concurrent Executions

- Multiple transactions are allowed to run concurrently in the system.
- Advantages are:
  - **Increased processor and disk utilization**, leading to better transaction *throughput*
  - **Reduced average response time** for transactions: short transactions need not wait behind long ones.
- **Concurrency control schemes** – mechanisms to achieve isolation
  - That is, to control the interaction among the concurrent transactions in order to prevent them from destroying the consistency of the database

Schedules

- **Schedule** – a sequences of instructions that specify the chronological order in which instructions of concurrent transactions are executed
  - A schedule for a set of transactions must consist of all instructions of those transactions.
  - Must preserve the order in which the instructions appear in each individual transaction.
- A transaction that successfully completes its execution will have a **commit** instructions as the last statement
  - By default transaction assumed to execute commit instruction as its last step
- A transaction that fails to successfully complete its execution will have an **abort** instruction as the last statement

Schedule 1

- T_1 transfer \$50 from A to B, and
- T_2 transfer 10% of the balance from A to B.
- An example of a **serial** schedule in which T_1 is followed by T_2 :

T_1	T_2
read (A)	
$A := A - 50$	
write (A)	
read (B)	
$B := B + 50$	
write (B)	
commit	
	read (A)
	$temp := A * 0.1$
	$A := A - temp$
	write (A)
	read (B)
	$B := B + temp$
	write (B)
	commit

T1	T2
A=100	A=50
A=100-50	TEMP=50*10%=5
A=50	A=50-TEMP =45
B= 200	B= 250
B= 200+50	B= 250+5
B=250	B=255

After Schedule 1	
A = 45	B= 255

Schedule 2

- T_1 transfer \$50 from A to B, and
- T_2 transfer 10% of the balance from A to B.
- An example of a **serial** schedule in which T_2 is followed by T_1 :

T_1	T_2
	read (A)
	$temp$:= A * 0.1
	A := A - $temp$
	write (A)
	read (B)
	B := B + $temp$
	write (B)
	commit
read (A)	
A := A – 50	
write (A)	
read (B)	
B := B + 50	
write (B)	
commit	

After Schedule 1	
A = 45	B= 255

T1	T2
A=90	A=100
A=90-50	TEMP=100*10%=10
A=40	A=100-TEMP =90
B= 210	B= 200
B= 210+50	B= 200+10
B=260	B=210

After Schedule 2	
A = 40	B= 260

Schedule 3

- Let T_1 and T_2 be the transactions defined previously.
- The following schedule is not a serial schedule,
- but it is **equivalent** to Schedule 1.

T_1	T_2
read (A) $A := A - 50$ write (A)	
	read (A) $temp := A * 0.1$ $A := A - temp$ write (A)
read (B) $B := B + 50$ write (B) commit	
	read (B) $B := B + temp$ write (B) commit

Note -- In schedules 1, 2 and 3, the sum "A + B" is preserved.

After Schedule 1	
A = 45	B= 255

After Schedule 2	
A = 40	B= 260

T1	T2
A=100	A=50
A=100-50	TEMP=50*10%=5
A=50	A=50-TEMP =45
B= 200	B= 250
B= 200+50	B= 250+5
B=250	B=255

After Schedule 3	
A = 45	B= 255

Schedule 4

- Let T_1 and T_2 be the transactions defined previously.
- The following schedule is not a serial schedule,

Note -- In schedules 4 the sum "A + B" is not preserved.

T_1	T_2
read (A) $A := A - 50$	
	read (A) $temp := A * 0.1$ $A := A - temp$ write (A) read (B)
write (A) read (B) $B := B + 50$ write (B) commit	
	$B := B + temp$ write (B) commit

After Schedule 1	
A = 45	B= 255

After Schedule 2	
A = 40	B= 260

After Schedule 3	
A = 45	B= 255

T1	T2
A=100	A=100
A=100-50	TEMP=100*10%=10
A=50	A=100-TEMP =90
B= 200	B= 200
B= 200+50	B= 200+10
B=250	B=210

After Schedule 4	
A = 50	B= 210


DBMS
data
database
distributed
parallel
shared
system
Distributed
architecture
DBMSs
memory
network
processing
performance
systems
processors
access
centralized
DDBMS
nothing
multiple
sites
site
Parallel
processor
single
computer
disk
technology
applications
computers
require
physically
users
fragments
typically
may
major
local
sometimes
large
decentralized
provide
logically
stored
number
bottleneck
interconnection
Figure
organizational
administered
management
transparent
application
Shared
nodes
definition
development
logical
distinction
control
scalability
approach
improve
Database
within
machines
like
also
many
replicated
make
discuss
often
directly
computing
one
split
order
scalable
architectures
referred
operational
disks
islands
resources
remote
defined
controlled
based
Date
structure
incompatible
collection
provides
global
associated
least
used
partitioned
must
System
consists
way
per
makes
user
dis
Management
mode
capable
databases
communication
distribution
eliminates
reliability
across
fact
com
independently