
UNIVERSITI SAINS MALAYSIA

Second Semester Examination
[Peperiksaan Semester Kedua]

Academic Session 2007/2008
[Sidang Akademik 2007/2008]

April 2008

CMT321 – Management & Engineering of Databases
[Pengurusan & Kejuruteraan Pangkalan Data]

CMT312 – Management of Databases
[Pengurusan Pangkalan Data]

Duration : 2 hours
[Masa : 2 jam]

INSTRUCTIONS TO CANDIDATE:
[ARAHAN KEPADA CALON:]

- Please ensure that this examination paper contains **THREE** questions in **FIVE** printed pages before you begin the examination.

*[Sila pastikan bahawa kertas peperiksaan ini mengandungi **TIGA** soalan di dalam **LIMA** muka surat yang bercetak sebelum anda memulakan peperiksaan ini.]*

- Answer **ALL** questions.

*[Jawab **SEMUA** soalan.]*

- You may answer the questions either in English or in Bahasa Malaysia.

[Anda dibenarkan menjawab soalan sama ada dalam Bahasa Inggeris atau Bahasa Malaysia.]

1. (a) Transactions should possess ACID properties and these properties should be enforced by concurrency and recovery methods of the DBMS. Explain briefly each of these properties. (8/100)
- (b) Discuss how timestamp ordering algorithm can be used to control concurrent execution of schedules. (10/100)
- (c) (i) What is the purpose of using a precedence graph? Explain briefly. (4/100)
- (ii) Draw a precedence graph for the following schedule:

T1	T2	T3
read_item(A);	A:= A+5; write_item(A); Commit;	
A:= A-10; write_item(A); Commit;		A:= A+8; write_item(A); Commit;

What can you conclude from the graph?

(15/100)

2. (a) What is role-based access control? In what ways is it superior to Discretionary Access Control? Explain briefly. (6/100)
- (b) Give an example of situation where each of the following security mechanisms is useful:
- (i) Mandatory Access Control
- (ii) Public Key Encryption (8/100)

- (c) Consider the following log entries for recovery in ARIES algorithm:

LSN	Last_LSN	Transaction_ID	Type	Page_ID
10	9	T20	update	C
11	9	T25	update	B
12	10	T20	commit	
13	begin checkpoint			
14	end checkpoint			
15	9	T30	update	A
16	11	T25	update	C
17	16	T25	commit	

- (i) Identify the **three (3)** phases in ARIES recovery algorithm.
- (ii) Identify the contents of transaction table and dirty page table after ANALYSIS phase has been completed.
(15/100)
3. (a) What are the typical functionalities of a data warehouse? Explain briefly **three (3)** of these functionalities.
(9/100)
- (b) Describe the types of knowledge that can be discovered during data mining.
(10/100)
- (c) Consider the following magazine publishing company:

The company publishes one regional magazine in each of the following regions: North, East, West, and South. This company has 300,000 customers (subscribers) throughout the four regions listed above. On the first of each month, an annual subscription INVOICE is printed and sent to each customer whose subscription is due for renewal. The INVOICE entity contains a REGION attribute to indicate the region in which customer resides:

```
CUSTOMER(CUS_ID, CUS_NAME, CUS_ADDRESS, CUS_CITY, CUS_ZIP, CUS_SUBSDATE)
INVOICE(INV_NUM, INV_REGION, CUS_ID, INV_DATE, INV_TOTAL)
```

The company decided that it is time to decentralize the management of subscriptions into the four regional subsidiaries. Each subscription site will handle its own customers and invoice data. The management at company headquarters (assume that it is in Central region) will have access to customer and invoice data to generate annual reports and to issue ad hoc queries.

Given this requirement, how must you partition the database? Explain in terms of the design that need to be done for the data in this case. (You may use diagrams to support your answer.)

(15/100)

KERTAS SOALAN DALAM VERSI BAHASA MALAYSIA

[CMT321/CMT312]

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1. (a) Urus niaga patut mempunyai sifat ACID and sifat ini perlu dikuatkuasakan oleh kaedah keserempakan dan pemulihan DBMS. Terangkan secara ringkas setiap satu sifat ini.

(8/100)

- (b) Bincangkan bagaimana algoritma tertib setem masa boleh digunakan untuk mengawal perlaksanaan serempak skedul.

(10/100)

- (c) (i) Apakah tujuan menggunakan graf duluan? Terangkan secara ringkas.

(4/100)

- (ii) Lakar graf duluan untuk skedul berikut:

T1	T2	T3
read_item(A);	A:= A+5; write_item(A); Commit;	
A:= A-10; write_item(A); Commit;		A:= A+8; write_item(A); Commit;

Apakah yang boleh anda simpulkan dari graf ini?

(15/100)

2. (a) Apakah kawalan capaian berasaskan-peranan? Dalam bentuk apakah ia lebih baik dari Kawalan Capaian Budibicara? Terangkan secara ringkas.

(6/100)

- (b) Beri contoh situasi di mana setiap mekanisma keselamatan berikut berguna:

(i) Kawalan Capaian Mandatori

(ii) Enkripsi Kunci Umum

(8/100)

(c) Pertimbangkan kemasukan log berikut untuk pemulihan dalam algoritma ARIES:

LSN	Last_LSN	Transaction_ID	Type	Page_ID
10	9	T20	update	C
11	9	T25	update	B
12	10	T20	commit	
13	begin checkpoint			
14	end checkpoint			
15	9	T30	update	A
16	11	T25	update	C
17	16	T25	commit	

(i) Kenal pasti **tiga (3)** fasa dalam algoritma pemulihan ARIES.

(ii) Kenal pasti kandungan jadual urus niaga dan jadual halaman kotor selepas fasa ANALISIS selesai dijalankan.

(15/100)

3. (a) Apakah kefungsian lazim gudang data? Terangkan secara ringkas **tiga (3)** kefungsian ini.

(9/100)

(b) Terangkan jenis-jenis pengetahuan yang boleh ditemui semasa pelombongan data.

(10/100)

(c) Pertimbangkan syarikat percetakan majalah berikut:

Syarikat ini mencetak satu majalah kawasan untuk setiap kawasan berikut: Utara, Timur, Barat dan Selatan. Syarikat ini mempunyai 300,000 pelanggan yang merangkumi keempat-empat kawasan yang tersenarai di atas. Pada satu haribulan setiap bulan, INVOICE langgan tahunan akan dicetak dan dihantar kepada setiap pelanggan yang langganannya perlu diperbaharui. Entiti INVOICE mengandungi atribut REGION untuk menandakan kawasan di mana pelanggan tinggal:

CUSTOMER(CUS_ID, CUS_NAME, CUS_ADDRESS, CUS_CITY, CUS_ZIP, CUS_SUBSDATE)
 INVOICE(INV_NUM, INV_REGION, CUS_ID, INV_DATE, INV_TOTAL)

Syarikat ini mengambil keputusan sudah sampai masanya untuk menyahpusatkan pengurusan langgan kepada empat subsidiari kawasan. Setiap tapak langgan akan mengendalikan data pelanggan dan invois masing-masing. Pihak pengurusan di ibu pejabat syarikat (andaikan ia terletak di kawasan Tengah) akan mencapai data pelanggan dan invois untuk menjana laporan tahunan dan mengeluarkan pertanyaan-pertanyaan ad hoc.

Diberi keperluan seperti di atas, bagaimana mesti anda petakkan pangkalan data ini? Terangkan dari segi reka bentuk yang perlu dilakukan untuk data dalam kes ini. (Anda boleh menggunakan gambar rajah untuk menyokong jawapan anda).

(15/100)

