UNIVERSITI SAINS MALAYSIA

First Semester Examination
2014/2015 Academic Session

December 2014/January 2015

CST232 – Operating Systems
[Sistem Pengendalian]

Duration : 2 hours
[Masa : 2 jam]

INSTRUCTIONS TO CANDIDATE:
[ARAHAN KEPADA CALON:]

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

  *[Sila pastikan bahawa kertas peperiksaan ini mengandungi **EMPAT** soalan di dalam **TUJUH** 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.]

- In the event of any discrepancies, the English version shall be used.

  [Sekiranya terdapat sebarang percanggahan pada soalan peperiksaan, versi bahasa Inggeris hendaklah diguna pakai.]

1. (a) List the essential managers of an operating system and explain the tasks that each manager must perform.

(4/100)

(b) Explain the fundamental differences between interactive and real-time operating systems.

(4/100)

(c) Define the following terms: Program, Process, Thread, and Multiprogramming.

(4/100)

(d) List the types of memory allocation schemes and state the advantages and disadvantages of each of them.

(6/100)

(e) As a job moves through the system, it can be in one of five states. List the all the possible states and explain how the transition from one state to another is initiated either by the Job Scheduler (JS) or the Process Scheduler (PS).

(3/100)

(f) Explain **two** (**2**) of the events that cause interrupts and state **four** (**4**) of the interrupt types in the context of process management.

(4/100)

2. (a) Describe briefly the available process scheduling algorithms.

(12/100)

(b) Explain the conditions under which a deadlock occurs.

(2/100)

(c) Explain what starvation is, and describe its effect on the system compared to deadlock.

(2/100)

(d) What is parallel processing? Explain the benefits and major challenges in parallel processing.

(4/100)

(e) What are the typical configurations for multiprocessing, and what is the main feature of each configuration?

(3/100)

(f) List the advantages and disadvantages of Test-and-Set locking mechanism developed for process synchronization

(2/100)

3. (a) What are the differences between optical disk and magnetic disk?

(5/100)

(b) Given the following characteristics for a disk pack with 10 platters yielding 18 recordable surfaces: rotational speed = 10 ms, transfer rate = 0.1 ms/track, density per track = 19,000 bytes, number of records to be stored = 200,000 records, size of each record = 160 bytes, block size = 10 logical records, number of tracks per surface = 500. Calculate:

(i) Number of blocks per track.

(ii) Waste of space per track.

(iii) Number of tracks required to store the entire file.

(iv) Time to write all of the blocks (use rotational speed; ignore the time it takes to move to the next track).

(v) What would be the answer to (iv) if the time taken to move to the next track is 5 ms?

(20/100)

4. (a) List and explain the responsibilities of File Manager.

(5/100)

(b) Please refer to the file allocation table below.

1	2 File 1	3	4 File 1	5	6 File 3	7 File 2	8	9	10 File 3
11 File 2	12	13	14 File 2	15	16 File 1	17	18	19	20
21	22	23 File 2	24	25 File 2	26	27 File 2	28	29 File 2	30 File 1
31 File 1	32	33	34 File 1	35	36 File 3	37 File 3	38	39	40
41	42 File 1	43	44 File 2	45 File 1	46	47	48 File 3	49	50 File 2
51 File 3	52 File 2	53	54	55 File 2	56	57 File 1	58	59 File 3	60
61	62	63 File 1	64	65	66	67	68	69 File 1	70
71	72 File 1	73	74	75	76 File 2	77	78	79	80 File 2
81 File 1	82	83	84 File 1	85	86	87	88	89 File 2	90 File 3
91	92 File 2	93	94	95 File 3	96	97 File 1	98	99	100

(i) Based on the file allocation table shown in diagram above, create the index table for File 1, File 2 and File 3.

(ii) In your opinion, how does this allocation affect the performance of the disk when a file is accessed by the operating system and what can be done to improve the performance?

(11/100)

(c) What are the key properties of survivable systems?

(4/100)

(d) Explain the difference between DoS, DDoS and Botnet.

(5/100)

1. (a) Senaraikan pengurus penting sistem pengendalian dan terangkan tugas yang dilakukan oleh setiap pengurus ini.

(4/100)

(b) Terangkan perbezaan asas antara sistem pengendalian interaktif dan masa-nyata.

(4/100)

(c) Takrifkan terma-terma berikut: Program, Proses, Benang, dan Berbilang-pengaturcaraan.

(4/100)

(d) Senaraikan skim peruntukan ingatan dan nyatakan kekurangan skim Pemetakan Tetap.

(6/100)

(e) Apabila suatu tugas melalui sistem, ia boleh berada dalam salah satu daripada lima keadaan. Terangkan bagaimana peralihan dari satu keaadan ke keadaan lain dimulakan, sama ada oleh Penjadual Kerja atau Penjadual Proses.

(3/100)

(f) Terangkan **dua (2)** peristiwa yang menyebabkan sampukan dan **empat (4)** jenis sampukan dalam konteks pengurusan proses.

(4/100)

2. (a) Senarai dan terangkan secara ringkas algoritma-algoritma penjadualan proses yang sedia-ada.

(4/100)

(b) Terangkan keadaan di mana berlakunya kebuntuan.

(2/100)

(c) Terangkan apa yang dimaksudkan dengan kebuluran, dan apakah kesannya berbanding dengan kebuntuan?

(2/100)

(d) Apa yang dimaksudkan dengan pemprosesan selari? Terangkan kebaikan dan cabaran utama dalam pemprosesan selari.

(4/100)

(e) Apakah konfigurasi-konfigurasi umum untuk multipemprosesan, dan apakah ciri utama setiap konfigurasi tersebut?

(3/100)

(f) Senaraikan kelebihan dan kekurangan mekanisme penguncian Uji-dan-Set yang dibangunkan untuk penyelarasan proses.

(2/100)

3. (a) Apakah perbezaan di antara cakera optik dan cakera magnet?

(5/100)

(b) Diberikan ciri-ciri berikut untuk pek cakera dengan 10 piring yang menghasilkan 18 permukaan rakam: kelajuan putaran = 10 ms, kadar pindahan = 0.1 ms, kepadatan trek setiap nombor trek = 19,000 bait, rekod untuk disimpan = 200,000 rekod, saiz setiap rekod = 160 bait, saiz blok = 10, rekod logik, bilangan trek setiap permukaan = 500. Hitung:

(i) Bilangan blok setiap trek.

(ii) Pembaziran setiap trek.

(iii) Bilangan trek yang diperlukan untuk menyimpan keseluruhan fail tersebut.

(iv) Masa untuk menulis keseluruhan blok (gunakan kelajuan rotasi, abaikan masa yang diperlukan untuk bergerak ke trek seterusnya).

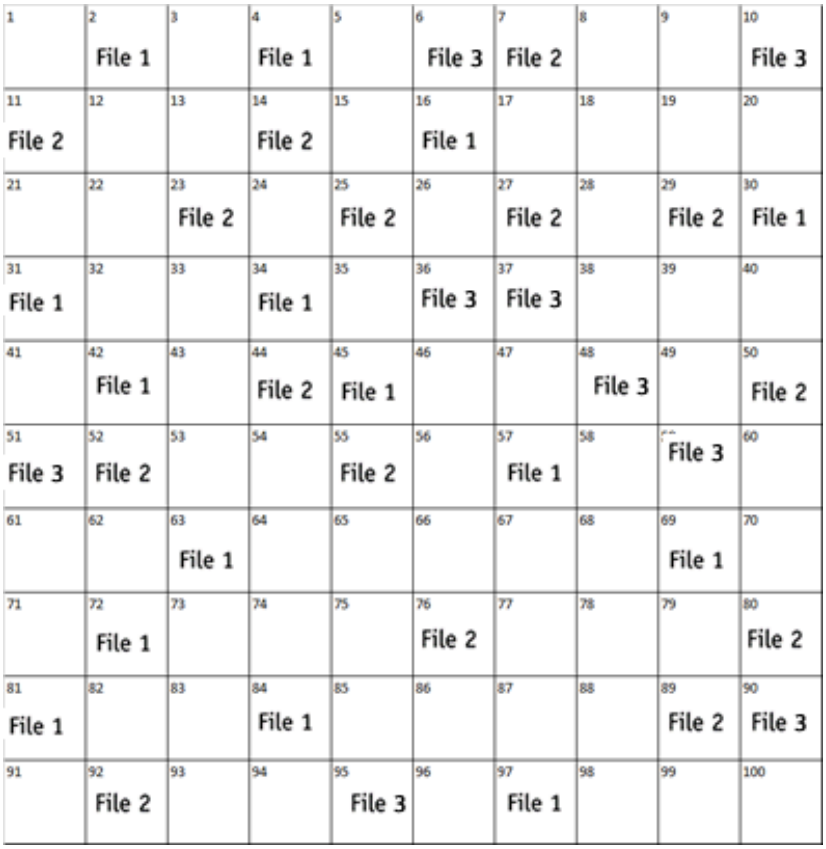
(v) Apakah jawapan kepada (iv) sekiranya masa yang diambil untuk bergerak ke trek seterusnya adalah 5 ms?

(20/100)

4. (a) Senarai dan terangkan tanggungjawab Pengurus Fail.

(5/100)

(b) Sila rujuk kepada jadual peruntukan fail di bawah.



1	2 File 1	3	4 File 1	5	6 File 3	7 File 2	8	9	10 File 3
11 File 2	12	13	14 File 2	15	16 File 1	17	18	19	20
21	22	23 File 2	24	25 File 2	26	27 File 2	28	29 File 2	30 File 1
31 File 1	32	33	34 File 1	35	36 File 3	37 File 3	38	39	40
41	42 File 1	43	44 File 2	45 File 1	46	47	48 File 3	49	50 File 2
51 File 3	52 File 2	53	54	55 File 2	56	57 File 1	58	59 File 3	60
61	62	63 File 1	64	65	66	67	68	69 File 1	70
71	72 File 1	73	74	75	76 File 2	77	78	79	80 File 2
81 File 1	82	83	84 File 1	85	86	87	88	89 File 2	90 File 3
91	92 File 2	93	94	95 File 3	96	97 File 1	98	99	100

(i) Berdasarkan jadual peruntukan fail seperti yang ditunjukkan dalam gambar rajah di atas, bina jadual indeks bagi File 1, File 2 and File 3.

(ii) Pada pendapat anda, bagaimana peruntukan fail ini memberi kesan kepada prestasi cakera ketika fail dicapai oleh sistem pengendalian dan apa yang boleh dilakukan untuk memperbaiki prestasi tersebut?

(11/100)

(c) Apakah ciri-ciri utama sistem berkemandirian?

(4/100)

(d) Terangkan perbezaan antara DoS, DDoS dan Botnet.

(5/100)