

國立中央大學八十六學年度碩士班研究生入學試題卷

所別: 資訊工程研究所 不分組 科目: 系統程式 共 2 頁 第 1 頁

1. (3%) (a) What is the problem address constant ?
 (4%) (b) What kind of information should be provided by the assembler for the loader in order to solve the problem in (a) ?
 (4%) (c) What kind of information should the assembler generate for each external reference that will allow the loader to perform the required linking ?
 (3%) (d) How to guarantee the generation of unique labels within a macro expansion ?
2. (10%) The process in the UNIX system need a means of communication to exchange data or synchronize execution for completing the tasks in a required sequence. Please list five mechanisms in the UNIX system to perform interprocess communications.
3. (15%) A process In Memory is a process that is already resident in memory and can either be scheduled to run, or can be swapped out if blocked or has used up its time, or if memory is required to run a higher priority process. The following illustrates the scheduling of processes in a UNIX system and the sequence of operations performed through a scheduling cycle. Please finish the changes in the process states when Case 2 occurs.

Process id	In Memory	Swapped	Comments
pid 12 pid 17 pid 34 pid 43 pid 49	Running Ready-to-Run Sleeping (Blocked)	 Ready to Run Sleeping (Blocked)	 ;waiting for disk I/O ;waiting for disk I/O
Case 1: pid 12 is blocked, pid 34 is scheduled, and pid 43 unblocks			
pid 12 pid 17 pid 34 pid 43 pid 49	Sleeping (Blocked) Ready to Run Running Sleeping (Blocked)	 Ready-to-Run Sleeping (Blocked)	 ;executed system call ;swapped in ;scheduled to run ;I/O completed ;swapped out
Case 2: pid 34 executes a system call, pid 49 unblocks			
pid 12 pid 17 pid 34 pid 43 pid 49			

4. (16%) Given the following operating system tasks
 (a) interrupt processing (b) file processing (c) job scheduling (d) process scheduling (e) resource allocation (f) I/O supervision (g) memory management (h) protection
 Which of them are machine-dependent and which of them are machine-independent ?

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5. (10%) (a) Consider the following grammar with starting nonterminal $\langle S \rangle$

$\langle S \rangle \rightarrow a \langle A \rangle \langle B \rangle c$

$\langle S \rangle \rightarrow \epsilon$

$\langle A \rangle \rightarrow c \langle S \rangle \langle B \rangle$

$\langle A \rangle \rightarrow \langle A \rangle b$

$\langle B \rangle \rightarrow b \langle B \rangle$

$\langle B \rangle \rightarrow a$

Please construct the derivation tree of the expression $acabac$.

(5%) (b) What kind of string is generated by the following grammar

$A \rightarrow aA \mid bA \mid aB$

$B \rightarrow bC$

$C \rightarrow bD$

$D \rightarrow \epsilon$

6. (5%) (a) Please draw a figure to show the relationship between CPU utilization and the degree of multiprogramming in a virtual memory system and explain it briefly.

(5%) (b) Is it always true that giving a process more memory page frames will reduce the process' page faults? You must use an example to explain your answer.

7. (20%) Explain the following terms:

(a) busy waiting vs. blocking (b) binding vs. linking (c) open subroutine vs. subroutine

(d) multitasking vs. multithreading (e) Yacc vs. compiler