

VASAVI COLLEGE OF ENGINEERING (*Autonomous*), HYDERABAD
B.E. (I.T.) III Year I-Semester Main & Backlog Examinations, December-2017

Operating Systems

Time: 3 hours

Max. Marks: 70

Note: Answer ALL questions in Part-A and any FIVE from Part-B

Part-A (10 × 2 = 20 Marks)

1. Distinguish between Symmetric and Asymmetric Multiprocessing.
2. Describe the role of dispatcher in OS with respect to process management.
3. What is compaction (in the context of memory management)? Under what circumstances it is not possible?
4. Consider a logical address space of 16 pages with 512 words per page, mapped onto a physical memory of 8 frames. How many bits are required in the logical address and in the physical address?
5. Define Semaphore. State the applications of Semaphore in OS
6. Summarize the necessary conditions that would occur a deadlock
7. Suppose a disk drive has 300 cylinders, numbered 0 to 299. The current position of the drive is 90. The queue of the pending requests in FIFO order is 36, 79, 15, 120, 199, 270, 89, 170. Calculate the total number of cylinder movements using FCFS disk scheduling algorithm.
8. State the advantages of the variant of Linked Allocation that uses a FAT to chain together the blocks of a file?
9. How do LINUX protect its users and files?
10. Describe the booting process in windows 7 OS.

Part-B (5 × 10 = 50 Marks)

11. a) Define Operating System? Describe the services that an OS provides to its users. [4]
- b) Draw the Gantt charts that illustrate the execution of the following five processes using SJF and Preemptive Priority (smaller number implies a higher priority) scheduling algorithms. [4]

Process	Burst Time	Priority	Arrival Time
P ₁	8	3	0
P ₂	2	2	2
P ₃	1	1	1
P ₄	4	4	1
P ₅	6	2	1
- c) Compute the Turn-around Time and Waiting Time for each Process using above Scheduling Algorithms. [2]
12. a) Explain how paging supports Virtual Memory with neat diagram, explain how logical memory address is translated to physical memory address in Memory Management scheme. [5]
- b) Compute the number of page faults using LRU and Optimal page replacement algorithms for the page reference string of 1,2,3,4,1,2,5,1,2,3,5,1,4 with 3 page frames. [5]

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Hall Ticket Number:

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Code No. : 31505 S

VASAVI COLLEGE OF ENGINEERING (*Autonomous*), HYDERABAD
B.E. (I.T.) III Year I-Semester Supplementary Examinations, May/June-2017

Operating Systems

Time: 3 hours

Max. Marks: 70

Note: Answer ALL questions in Part-A and any FIVE from Part-B

Part-A (10 × 2 = 20 Marks)

1. Write the sequence of system calls to read data from one file and copy them into another file.
2. What is a dual mode of operation?
3. What is an aging problem? Give the solution.
4. What is the term busy waiting? How do you overcome it?
5. Define thrashing. Discuss the causes for thrashing.
6. What is a TLB? What are its uses?
7. List the key differences between physical and logical formatting of a disk.
8. Discuss the relative advantages and disadvantages of sector sparing and sector slipping.
9. Write about protection domains.
10. What is a virus? How do viruses work?

Part-B (5 × 10 = 50 Marks)

11. a) Classify the overall operating system functions. Describe these functions with regard to the file and process management. [5]
- b) Describe the differences between symmetric and asymmetric multiprocessing. What are the advantages and disadvantages of multiprocessor systems? [5]
12. a) Consider the following set of processes, with the length of the CPU burst time given in milli seconds. The processes are assumed to have arrived in the order P1, P2, P3, P4 and P5 all at time 0. [6]

Process Name	CPUBurstTime(mill.sec)	Priority
P1	10	3
P2	1	1
P3	2	3
P4	1	4
P5	5	2

Answer the following questions.

- i) Draw four gantt charts illustrating the execution of these processes using FCFS, SJF, Priority and RR (TQ = 2) algorithms.
- ii) What is the turnaround time of each process for each of the scheduling algorithms in part (a)?
- iii) What is the waiting time of each process for each of the scheduling algorithms in part (a)?
- b) What is a critical section problem? Explain about two process solution for critical section problem. [4]

Contd...2

13. a) What is an address binding? Discuss various address binding schemes of their advantages and disadvantages. [4]
- b) Consider the following page reference string: 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1. For a memory of three frames, find the number of page faults which would occur in the following page replacement algorithms.
i) FIFO Algorithm ii) Optimal Algorithm iii) LRU Algorithm. [6]
14. a) Describe the different file allocation techniques with a neat sketch, and also explain the merits and demerits. [4]
- b) Suppose that a disk drive has 2000 cylinders numbered from 0 to 1999. The drive is currently serving a request at cylinder 143 and the previous request was at cylinder 125. The queue of pending requests in FIFO order is: 86, 1470, 913, 1774, 948, 1509, 1022, 1750 and 130. Starting from the current head position, what is the total distance that the disk arm moves to satisfy all the pending requests for each of the following disk scheduling algorithms?
i) FCFS ii) SSTF iii) SCAN iv) LOOK [6]
15. a) Discuss the goals and principles of protection in a modern computer system. [4]
- b) List and discuss about various standard security attacks. [6]
16. a) Discuss various approaches of inter-process communication. Explain the strengths and weaknesses of these approaches. [5]
- b) What are the different operations of semaphore? Explain two types of semaphore mechanisms in detail. [5]
17. Write short notes on any *two* of the following:
a) Demand paging. [5]
b) Free space management. [5]
c) Worms. [5]

Hall Ticket Number:

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Code No. : 31524 S

VASAVI COLLEGE OF ENGINEERING (*Autonomous*), HYDERABAD
B.E. (IT) III Year I-Semester Supplementary Examinations, May/June-2018

Operating Systems

Time: 3 hours

Max. Marks: 70

Note: Answer ALL questions in Part-A and any FIVE from Part-B

Part-A (10 × 2 = 20 Marks)

1. Differentiate process and thread.
2. What is booting? What is the need of bootstrap program?
3. What is meant by memory fragmentation? And also write about the types of fragmentation.
4. Define thrashing. What are the causes for thrashing?
5. In a certain application the initial value of counting semaphore is 10. The following operations were completed on the semaphore in the given order 5P, 20P, 2V, 18P, 5V, 10P, 1V. The new value of counting semaphore is.
6. A system has 4 processes P1 through P4 and two resource types R1 and R2. It has 2 units of R1 and 3 units of R2.

Given that

P1 requests 2 units of R2 and 1 unit of R1.

P2 holds 2 units of R1 and 1 unit of R2.

P3 holds 1 unit of R2.

Show the resource graph for this state of the system. Is the system in deadlock and if so which processes are involved.

7. Distinguish between Seek time and Rotational latency.
8. Define mirroring? How this technique is used for improving the reliability of a disk?
9. In what circumstances is the system call sequence fork() and exec() must preferable.
10. Write down about Hardware Abstraction Layer.

Part-B (5 × 10 = 50 Marks)

11. a) Differentiate pre-emptive and non-pre-emptive scheduling algorithms with relative examples. [5]
- b) Define Process. Discuss about the process state diagram with a neat sketch. [5]
12. a) State the purpose of TLB. Describe the steps that were performed in translation of logical memory address to physical memory address with a neat sketch. [5]
- b) Given five memory partitions of 100 KB, 500 KB, 200 KB, 300 KB and 600 KB. (in order), how would each of the first-fit, best-fit, and worst-fit algorithms place processes of 212 KB, 417 KB, 112 KB, and 426 KB (in order)? Which algorithm makes the most efficient use of memory? [5]

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13. a) Define Critical Section Problem. Discuss about two process solution for critical section problem. [4]
- b) Consider the following snapshot of the system which consists of 5 processes p0 through p5 and 4 resources of type A, B, C and D. [6]

	Allocation Matrix.				Max. Matrix				Available Matrix			
	A	B	C	D	A	B	C	D	A	B	C	D
P0	1	1	1	2	3	2	3	2	2	1	4	3
P1	2	1	2	3	4	7	5	4				
P2	2	3	5	4	2	3	4	6				
P3	0	6	3	2	0	6	7	2				
P4	0	0	1	4	0	6	5	6				

Answer the following questions using Banker's algorithm.

- i) What is the content of need matrix?
 - ii) Is the system in safe state? Or not? If yes, write safe sequence.
 - iii) If a request from a process p1 arrives as (1, 5, 2, 3), can that request be granted immediately?
14. a) Consider a file system where a file can be deleted and its disk space reclaimed while links to that file still exist. What problems may occur if a new file is created in the same storage area or with the same absolute path name? How can these problems be avoided? [5]
- b) Consider a RAID Level 5 organization comprising five disks, with the parity for sets of four blocks on four disks stored on the fifth disk. How many blocks are accessed in order to perform the following? [5]
- i) A write of one block of data
 - ii) A write of seven continuous blocks of data.
15. a) How does NTFS handle data structure? How does NTFS recover from a system crash? What is guaranteed after a recovery takes place. [5]
- b) State the objectives of File management system. Describe the file system architecture in Linux. [5]
16. a) Why system calls? Explain system calls with regards to communication and process management. [5]
- b) Describe various Contiguous memory allocation techniques with an example. [5]
17. Write short notes on any *two* of the following:
- a) Reader's-Writer's problem using Semaphores. [5]
 - b) File allocation methods. [5]
 - c) Windows 7 Environmental Subsystem. [5]

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Code No. : 31505

VASAVI COLLEGE OF ENGINEERING (*Autonomous*), HYDERABAD
B.E. (I.T.) III Year I-Semester (Main) Examinations, Nov./Dec.-2016

Operating Systems

Time: 3 hours

Max. Marks: 70

Note: Answer ALL questions in Part-A and any FIVE from Part-B

Part-A (10 × 2 = 20 Marks)

- What is an Operating System? Mention the goals of Operating System.
- What is the purpose of command interpreter? Why is it usually separate from the kernel?
- Under what circumstances the preemptive schedulers may take scheduling decisions?
- Define Semaphore. Mention its importance in Operating System.
- Distinguish between internal fragmentation and external fragmentation.
- What is Belady's anomaly? Which page replacement algorithm suffers from Belady's anomaly?
- What is an i-node? Give the structure of Unix/Linux i-node.
- Define latency, transfer and seek time with respect to disk I/O.
- List the goals and principles of protection in a modern computer system.
- List the methods used by an OS to authenticate its users.

Part-B (5 × 10 = 50 Marks)

- a) What is a system call? Discuss about various types of system calls. [5]
- b) Distinguish between user level threads and kernel level threads. [5]
- a) What is a CPU scheduler? Compare and contrast between long term, short term and medium term schedulers. [5]
- b) Consider that there are five processes (P_0, P_1, P_2, P_3, P_4) with four types of resources (A, B, C, D). A snapshot of that system is (according to Banker's algorithm):

	Allocation A B C D	Max A B C D	Available A B C D
P_0	0 0 1 2	0 0 1 2	1 5 2 0
P_1	1 0 0 0	1 7 5 0	
P_2	1 3 5 4	2 3 5 6	
P_3	0 6 3 2	0 6 5 2	
P_4	0 0 1 4	0 6 5 6	

- i) What is the content of the matrix Need? [1]
- ii) Check whether the system is in a safe state? [2]
- iii) If a request from process P_1 arrives for (0, 4, 2, 0), can the request be granted immediately? [2]
- a) Compare paging with segmentation with respect to the amount of memory required by the address translation structures in order to convert virtual addresses to physical addresses. [6]
- b) What is a page fault? List the steps involved in handling a page fault. [4]

Contd...2

14. a) Consider a disk queue with I/O requests for the blocks on cylinders: **95, 181, 39, 123, 12, 124, 65, 68** and the disk head is initially at **57**. Compute the total number of head movement according to SSTF and C-Look disk scheduling algorithm. [6]
- b) What are the different principles that can be employed to improve the efficiency of I/O? [4]
15. a) What is an access matrix? Describe the methods of implementing access matrix. [6]
- b) List and discuss about the levels of security measures to be taken up to protect a system. [4]
16. a) Explain about Interprocess Communication techniques. [5]
- b) Describe the solution for Dining-Philosopher problem using monitors. [5]
17. Write short notes on any two of the following:
- a) Page frame allocation policies [5]
- b) RAID [5]
- c) Denial of Service attacks. [5]



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VASAVI COLLEGE OF ENGINEERING (*Autonomous*), HYDERABAD
B.E. (IT: CBCS) V-Semester Supplementary Examinations, May/June-2019

Operating Systems

Time: 3 hours

Max. Marks: 70

Note: Answer ALL questions in Part-A and any FIVE from Part-B

Part-A (10 × 2 = 20 Marks)

1. Differentiate between tightly coupled systems and loosely coupled systems
2. List out the data fields associated with Process Control block
3. Define Thrashing. Describe the effect of thrashing.
4. State the differences between External Fragmentation and Internal Fragmentation
5. Write down the solution constraints where the Critical-Section Problem must satisfy?
6. Describe the four necessary conditions that will hold a deadlock in a system.
7. Define the following terms:
 i) Seek time ii) Latency time
8. Define RAID. List out the RAID levels.
9. What are the main design goals of windows OS?
10. How many networking layers of software are there in Linux kernel? Name them.

Part-B (5 × 10 = 50 Marks)

- 11.a) Define the following terms in the context of CPU Scheduling: [4]
 i) Throughput ii) Turnaround time iii) Waiting time iv) Response time
- b) Consider the following processes with length of CPU burst time in milliseconds: [6]

Process	Burst time
P1	5
P2	10
P3	2
P4	1

The processes are assumed to have arrived in the order p1, p2, p3, p4, all at time zero.

 - i) Draw Gantt charts that illustrate the execution of these processes using the following scheduling algorithms: SJF and Round Robin (quantum=1)
 - ii) Calculate the turnaround time of each process for each of the scheduling algorithms in part a.
 - iii) Calculate the waiting time of each process for each of the scheduling algorithms in part a.
- 12.a) Assume that we have a demand-paged memory. The page table is held in registers. It takes 8 milliseconds to service a page fault if an empty frame is available or if the replaced page is not modified and 20 milliseconds if the replaced page is modified. Memory-access time is 100 nanoseconds. Assume that the page to be replaced is modified 70 percent of the time. What is the maximum acceptable page-fault rate for an effective access time of no more than 200 nanoseconds? [4]

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- 12.b) Consider the following page reference string: [6]
 1,2,3,4,2,1,5,6,2,1,2,3,7,6,3,2,1,2,3,6.
 How many page faults would occur for the following page replacement algorithms, assuming four frames? Remember that all the frames are initially empty, so your first unique pages will cost one fault each.
 i) FIFO ii) LRU iii) Optimal
- 13.a) A system has three types of resources R1, R2, R3 and their number of units are 3, 2, and 2 respectively. Four processes P1, P2, P3 and P4 are currently competing for these resources in the following manner: [4]
 i) P1 is holding one unit of R1 and is requesting for one unit of R2.
 ii) P2 is holding two units of R2 and is requesting for one unit of R1 and R3.
 iii) P3 is holding one unit of R1 and is requesting for one unit of R2.
 iv) P4 is holding two units of R3 and requesting for one unit of R1.
 Show that the system is in Deadlock free or not with a RAG, If deadlock occurred, write down the processes involved.
- b) Explain the solution for producer-consumer problem using monitor. [6]
- 14.a) Suppose a disk drive has 400 cylinders , numbered 0 to 399.The driver is currently serving a request at cylinder 143 and previous request was at cylinder 125 .The queue of pending request in FIFO order is: 86,147,312,91,177,48,309,222,175,130.
 Starting from the current head position what is the total distance in cylinders that the disk to satisfy all the pending request for each of the following disk scheduling algorithms?
 i) SSTF ii) SCAN iii) C-SCAN
- b) Explain different directory structures available in detail with a neat sketch. [5]
- 15.a) Describe the design principles of Linux operating system. [5]
- b) Discuss how the Process and Thread management is been handled in Windows-7 environment. [5]
- 16.a) Differentiate between process and a thread? Discuss the various states of process with the help of a process state transition diagram. [5]
- b) Define System call. Write the flow control when a system call is made by a process in user space? [5]
17. Answer any *two* of the following: [5]
- a) Explain deadlock avoidance using banker's algorithm in detail. [5]
- b) What is access matrix? Explain how protection is been done by access matrix? [5]
- c) Describe the booting process of windows system? [5]

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VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD
B.E. (IT) III Year I-Semester Backlog (Old) Examinations, December-2018

Time: 3 hours

Operating Systems

Max. Marks: 70

*Note: Answer ALL questions in Part-A and any FIVE from Part-B***Part-A ($10 \times 2 = 20$ Marks)**

1. List the services provided by the operating system.
2. Identify the problems a user of a Computer may face if there are no Operating Systems?
3. Distinguish Swap-in and Swap-out.
4. How many types of fragmentation are there? List them. Are they desirable?
5. Where do you need semaphores?
6. Describe Critical Section Problem.
7. Outline the layered structure of File System.
8. Discuss various file allocation methods.
9. List the system components of Windows 7.
10. Write down the design principles of Linux System.

Part-B ($5 \times 10 = 50$ Marks)

11. a) Compare and contrast the following CPU Scheduling algorithms. [5]
 RR, Priority with preemption, Priority without preemption.
- b) Consider the following set of processes, with the length of the CPU burst given in milliseconds: [5]

Process	Burst Time
P1	10
P2	1
P3	2
P4	1
P5	5

The processes are assumed to have arrived in the order P1,P2,P3,P4,P5 all at time 0.

Draw Gantt charts that illustrate the execution of these processes using the FCFS and SJF algorithms.

What is the turnaround time, waiting time, average waiting time, average turnaround time for each of the scheduling algorithms.

12. a) Explain optimal page replacement algorithm. [4]
- b) How many page faults occur for LFU page replacement algorithm for the following reference string with 3 page frames? [6]
 1,2,3,4,5,3,4,1,6,7,8,7,8,9,7,8,9,5,4,5,4,2.

Contd... 2

13. a) What is thrashing? Is it desirable? [4]
b) Describe the working of virtual memory. [6]
14. a) What is the role of Access Matrix in protection. [5]
b) Compare FCFS and SSTF disk scheduling algorithms. [5]
15. a) Discuss in detail about kernel modules in Linux System. [5]
b) Explain File System of Linux System. [5]
16. a) Define system call. Explain in detail about the process management system calls and file management system calls with examples. [5]
b) Describe Belady's anomaly. [5]
17. Answer any *two* of the following:
a) What are the conditions for a deadlock to occur? [5]
b) Compare LOOK and CLOOK disk scheduling algorithms. [5]
c) Explain CPU Scheduling in Linux System. [5]

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VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD
B.E. (IT: CBCS) V-Semester Main Examinations, December-2018

Operating Systems

Time: 3 hours

Max. Marks: 70

Note: Answer ALL questions in Part-A and any FIVE from Part-B

Q. No	Stem of the Question	M	L	CO	PO												
Part-A (10 × 2 = 20 Marks)																	
1.	Distinguish between user mode and kernel mode operations of the operating system?	2	2	1	1												
2.	List the benefits of multithreaded programming?	2	2	1	1												
3.	Describe dynamic loading and dynamic linking.	2	1	2	1												
4.	Why page sizes are always power of 2?	2	4	2	2												
5.	What is critical section problem? What are the requirements that a solution to critical section problem must satisfy?	2	2	3	1												
6.	Illustrate deadlock and starvation.	2	2	3	1												
7.	Outline the layered structure of the file system.	2	2	4	1												
8.	A disk has 26310 cylinders, 16 tracks and 63 sectors. The disk spins at 7200 rpm. Seek time between adjacent track is 1 ms. How long does it take to read the entire disk?	2	3	4	4												
9.	When a windows system hibernates, the system is powered off. Suppose you changed the CPU or the amount of RAM on a hibernating system. Do you think that would work? Why or Why not?	2	4	5	2												
10.	List the design principles of LINUX.	2	1	5	1												
Part-B (5 × 10 = 50 Marks)																	
11. a)	Show the flow control when a system call is made by a process in user space? Would it be possible for the user to develop a new command interpreter using the system-call interface provided by the operating system?	3	2	1	1												
b)	Distinguish between pre-emptive and non-pre-emptive scheduling techniques? Suppose the following jobs arrive for processing at the times indicated, each job will run the listed amount of time.	7	3	1	2												
	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Jobs</th><th>Arrival Time</th><th>Burst Time (in secs)</th></tr> </thead> <tbody> <tr> <td>1</td><td>0.0</td><td>8</td></tr> <tr> <td>2</td><td>0.4</td><td>4</td></tr> <tr> <td>3</td><td>1.0</td><td>1</td></tr> </tbody> </table>	Jobs	Arrival Time	Burst Time (in secs)	1	0.0	8	2	0.4	4	3	1.0	1				
Jobs	Arrival Time	Burst Time (in secs)															
1	0.0	8															
2	0.4	4															
3	1.0	1															
	Draw Gantt chart illustrating the execution of these jobs using the non-pre-emptive FCFS and SJF scheduling algorithms. Compute the average turnaround time and average waiting time of each job for above algorithms.																
12. a)	Distinguish between paging and segmentation with respect to how much memory the address translation structures require to convert virtual addresses to physical addresses.	4	4	2	1												

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b)	Consider the following page reference string: 1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6. How many page faults would occur for the following replacement algorithms, assuming one, two or seven frames? Remember all frames are initially empty, so your first unique pages will all cost one fault each. LRU replacement FIFO replacement Optimal replacement	6	3	2	2
13. a)	Race conditions are possible in many computer systems. Consider a banking system that maintains an account balance with two functions: Deposit (amount) and Withdraw (amount). These two functions are passed the amount that is to be deposited or withdrawn from the bank account balance. Assume that a husband and wife share a bank account. Concurrently the husband calls the Withdraw () function and the wife calls Deposit (). Describe how a race condition is possible and what might be done to prevent the race condition from occurring.	4	5	3	2
b)	What are semaphores? Differentiate between binary and counting semaphore? Give the solution to producer-consumer problem using semaphores	6	3	3	3
14. a)	Describe different directory structures available in detail with aid of a diagram?	5	1	4	1
b)	What is access matrix? Explain how protection is done by access matrix?	5	1	4	1
15. a)	Outline the system components of Windows 7 operating system and Briefly explain each component	5	2	5	1
b)	Explain in detail about network structure in Linux?	5	2	5	1
16. a)	Differentiate between a process and a thread? Discuss the various states of process with the help of a process state transition diagram.	5	1	1	2
b)	Given six memory partitions of 300 KB, 600 KB, 350 KB, 200 KB, 750 KB and 125 KB (in order), how would the first-fit, best-fit and worst-fit algorithms place process of size 115 KB, 500 KB, 358 KB, 200 KB and 375 KB (in order)? Rank the algorithms in terms of how efficiently they use memory and Identify whether any algorithm leads to internal fragmentation or external fragmentation.	5	3	2	2
17.	Answer any two of the following:				
a)	Explain deadlock avoidance using Banker's Algorithm in detail.	5	2	3	1
b)	Describe various approaches for the free space management with an example of each?	5	2	4	1
c)	List the aspects involved in the booting process of windows system?	5	2	5	2

M: Marks; L: Bloom's Taxonomy Level; CO: Course Outcome; PO: Programme Outcome

S. No.	Criteria for questions	Percentage
1	Fundamental knowledge (Level-1 & 2)	60
2	Knowledge on application and analysis (Level-3 & 4)	36
3	*Critical thinking and ability to design (Level-5 & 6) (*wherever applicable)	4

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