

<p>نام درس: سیستم عاملهای پیشرفته نیمسال اول 87-88 استاد درس: دکتر رسول جلیلی صفحه: 1</p>	<p>باسمه تعالی تمرین سری اول 87/07/28 موعد تحویل: 87/08/10 (تا ساعت 23:59)</p>	 <p>دانشگاه صنعتی شریف دانشکده مهندسی کامپیوتر</p>
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نکات قابل توجه:

- پاسخ‌های خود را در صورت امکان به صورت الکترونیکی به آدرس Mahrooghi@ce.sharif.edu با عنوان [OS2:Assignment01]-StdID ارسال نمایید.
- حل تمرین‌های درس باید به صورت فردی انجام پذیرد.
- به پاسخ‌هایی که رونوشت یکدیگر باشند، هیچ نمره‌ای تعلق نمی‌گیرد.
- در صورت تأخیر در ارسال پاسخ، به ازای هر روز 25٪ نمره کل تمرین، کسر می‌گردد.

Chapter 1

1. Explain what is meant by transparency, and give examples of different types of transparency. Why it is not always a good idea to aim at implementing the highest degree of transparency possible?
2. Describe what is exactly meant by scalable systems. Scalability can be achieved by applying different techniques. What are these techniques?
3. A multicomputer with 256 CPUs is organized as a $16 * 16$ grid. What is the worst-case delay (in hops) that a message might have to take?
4. An experimental file server is up $3/4$ of the time and down $1/4$ of the time, due to bugs. How many times does this filer server have to be replicated to give an availability of at least 99 percent?
5. Consider a chain of process P_1, P_2, \dots, P_n implementing a multi-tiered client-server architecture. Process P_i is client of process P_{i+1} , and P_i will return a reply to P_{i-1} only after receiving a replay from P_{i+1} . What are the main problems with this organization when taking a look at the request-reply performance of process P_1 .
6. You can create a distributed application by, for example, partitioning the data (and storing each partition on a different server) or replicating the data (and storing each replicate on a different server). Both solutions have their advantages and disadvantages. What kinds? The aspects to be considered are availability, reliability, performance, and scalability. Use the internet directory system DNS as an example. The baseline in the evaluation is a traditional centralized system.
7. Using the textbook, enhance the table 1-24 of Tanenbaum to cover more systems ranging from multiprocessor architectures to enterprise computing systems. For additional rows, ask yourself for example the following questions:
 - In the system, is it fundamental to have a shared clock?
 - Is a shared time essential? How accurate is should be?
 - Is there a shared memory? Where? How is it used?
 - How fast is the communication channel? How error-prone?
 - Are all decisions local? Distributed?



Chapter 2

1. Why are transport-level communication services often inappropriate for building distributed applications?
2. C has a construction called a union, in which a field of a record (called a struct in C) can hold any one of several alternatives. At run time, there is no sure-fire way to tell which one is in there. Does this feature of C have any implications for remote procedure call? Explain your answer.
3. Some implementations of distributed-object middleware systems are entirely based on dynamic method invocations. Even static invocations are compiled to dynamic ones. What is the benefit of this approach?
4. With persistent communication, a receiver generally has its own local buffer where messages can be stored when the receiver is not executing. To create such buffer, we may need to specify its size. Give an argument why this is preferable, as well as against the specification of the size.
5. Suppose that you could make use of only transient asynchronous communication primitives, including only an asynchronous receive primitive. How would you implement primitives for transient synchronous communication?

States in Distributed Systems

1. A bulletin board has been replicated on three servers P1, P2, P3. Each member of the group has access to a local replicate of the board. The message passing system then forwards each message to all replicates. The transfer times vary considerably, and the messages do not necessarily arrive in the order they have been sent, but they have to fulfill the causal ordering.
 - a) Explain to the end user what "causal ordering" means.
 - b) Explain why causal ordering is considered to be too pessimistic.
 - b) How can you implement "causal ordering" using vector clocks?

Describe the idea and explain why it works.
 - c) The vector clocks of the replicas happen to be (5,2,8), (4,5,6) and (4,5,8). Three users, each at his/her own bulletin board, decide to add a comment to the bulletin board. Simulate the subsequent behavior of the system.
2. Determine the vector clock of each process P0, P1, P2 in figure 1 upon occurrence of each event (P0 is the monitor). Furthermore, describe the relations between the events in figure 2 using one of the following relations; \rightarrow , \leftarrow , \nrightarrow , \parallel :
 - I. f and j
 - II. a and m
 - III. c and j
 - IV. k and e
 - V. j and k

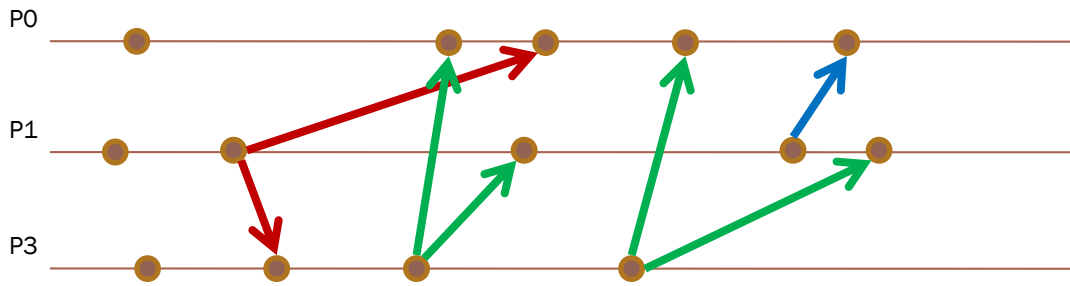


Figure 1

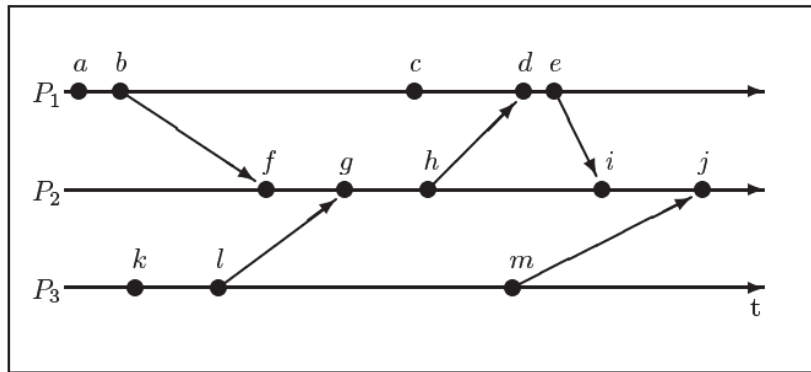


Figure 2

موفق باشید