CIS 508 (Spring 2014) Assignment 1

Name: Yanan Xiao

Masdar Email: yxiao@masdar.ac.ae

Deadline: **30 Jan 2014, 11:59pm (Late submissions of assignments will not be marked)**

Submission Instructions:

1. Fill in this document
2. Save as a pdf file, with filename as "cis508-2014-asg1-[MasdarEmailUserID].pdf" (replace [MasdarEmailUserID] by your own Masdar Email User ID)
3. Send as an attachment to sidckchau@gmail.com, with email subject as "[CIS 508] Assignment 1 (2014)" before the above deadline

Questions:

Part 1:

Xen is a brainchild from computer laboratory, University of Cambridge (led by Ian Pratt). Xen realizes the idea of paravirtualization.

1. What is paravirtualization? What are the differences between paravirtualization and other former virtualization technology? (2 Marks)

Definition: Paravirtualization works by

2. Why the development of Xen is important in the context of operating systems? (2 Marks)

3. Xen was acquired by Citrix in 2007 for US$500M. Why did Citrix buy Xen? Based on the present observations, was the acquisition worthwhile? (2 Marks)

Part 2:

PlanetLab was conceived as a new breed of distributed computer systems.

4. Explain the concept of PlanetLab? Compare the similarities and differences between PlanetLab to other similar systems, like Emulab, Orbit, GENI (2 Marks)

5. What are the applications that can run on PlanetLab? Why are advantages for running those applications on PlanetLab?(2 Marks)

Part 3:

Consider three transactions (T1, T2, T3) as follows:

T1	T2	T3
ReadLock(B)	ReadLock(A)	ReadLock(B)
B_ = Read(B)	A' = Read(A)	B'' = Read(B)
B_ = B_ + 100	ReadLock(B)	WriteLock(A)
ReadLock(A)	B' = Read(B)	Write (A, 20)
A_ = Read(A)	Print(A' + B')	Print(B'')
A_ = A_ - 100	ReadUnlock(A)	WriteUnlock(A)
WriteLock(A)	ReadUnlock(B)	ReadUnlock(B)
Write(A, A_)		
WriteLock(B)		
Write(B, B_)		
WriteUnlock(A)		
WriteUnlock(B)		

We assume that
- Time is divided into discrete timeslots (e.g. t=1, 2, 3, ...).
- Each operation can be executed within one timeslot.
- Simultaneous operations from different transactions may be executed at the same timeslot, if not prevented by locking.
- However, unlocking operation cannot be executed simultaneously with other locking operations on the same data at the same timeslot.
- Also, WriteLock operation cannot be executed simultaneously with other locking/unlocking operations on the same data at the same timeslot.

6. Considering T1 and T2, give an instance of execution, such that T1 can be executed successfully, but T2 fails. And explain why T2 fails in the instance. (1 Mark)

7. Considering T1 and T2, give an instance of execution, such that both T1 and T2 can be executed successfully, using the minimal number of timeslots. (1 Mark)

8. Considering T1, T2 and T3, give an instance of execution, such that all T1, T2 and T3 can be executed successfully, using the minimal number of timeslots. (2 Marks)