Exercise Session 8

Crash Recovery

8.1 Buffer Management and Recovery

a) Which of the ACID properties of transactions does the recovery manager enforce?

b) Explain the "steal / no steal" and "force / no force" strategies for buffer management.

c) What actions are required at restart, depending on the chosen buffer management strategy? Discuss the advantages and disadvantages of different strategies.

Strategy	**UNDO**	**REDO**
No Steal / Force		
Steal / Force		
No Steal / No Force		
Steal / No Force		

d) Describe the WAL Protocol. When, the latest, must "update log records" (incl. before/after images of changed data items) be written to stable storage?

8.2 Recovery Algorithms

a) What phases does the Restart procedure after a crash usually go through?

b) Discuss the difference between the Redo-Winners and Redo-History approach to developing Recovery algorithms.

c) Why is checkpointing needed? Describe the major types of checkpointing and the trade-offs that they achieve between 'performance during normal operation' and 'performance during restart'?

8.3 The ARIES Algorithm

Describe the ARIES Algorithm for Crash Recovery:

- What types of log records are used and what structures do they have?

- What management information is maintained in main memory?
- What is done during the Analysis, REDO and UNDO phases of the Restart procedure?
- How can pageLSRs be used to minimize the amount of work to be done at Restart?
- What are Compensation Log Records used for?
- How is checkpointing implemented?