



राष्ट्रीय प्रौद्योगिकी संस्थान पटना

National Institute of Technology Patna

Assignment 2 (Jul-Dec'21) Department: Computer Science and Engineering Session: 2021-22 Autumn'21 Sem
Programme: B.Tech.-CS-7th Sem Course Code: CS7479 Course: **Distributed Systems**

Maximum Marks: 10

Submission deadline: 12-Dec-2021, 17:30 hours

[Attempt all questions; Answer concisely only in blue/black ink; Use pencil for artwork; Assume any suitable data, if necessary]

[Single PDF file of your scanned assignment report is to be uploaded within deadline.]

[Mark, Course Outcome (CO) and Bloom's Level (BL) are mentioned on right-hand side of each question] [Rubrics are given after the questions]

Sl. No.	Questions	CO	BL
1.	Dropbox has discovered the secrets to perfect computers and networks. Their secrets are — (i) None of their servers crash and their network will never get partitioned. (ii) They somehow achieve 'instantaneous' message transmission through its SPECIAL network. Such network includes their servers and all client devices. Their promise — (i) all file changes to be immediately visible to each connected user; (ii) any user to be allowed access (READ or WRITE) of any file on any of their devices at any time.		
a.	Assuming their breakthrough in SPECIAL network is real, can they deliver these promises? Explain the answer with reference to the CAP theorem. (4) [Course outcome evaluated: CO-3(Understand/Explain)]	CO-3	Level-2
b.	Dropbox's SPECIAL network does not cover locality L, and clients in L must use normal Internet connections. To make these users happy there, Dropbox uses their normal mechanism of caching files on user devices. They deploy a mechanism to allow clients to access (READ or WRITE) those files. Their deployed mechanism can allow the client to have an exclusive lock on a file while handling the case where a client crashes forever. Name that deployed mechanism, and explain its working. (6) [Course outcome evaluated: CO-3(Understand/Explain)]	CO-3	Level-2

Rubric for (1.a):

Criteria	Levels of performance	Award
Correct cause-effect in explanation	▪ Answer has correct cause-effect logic, as per premise, in justifying promises of Dropbox, based on 3 dimensions of CAP theorem	2 marks
	▪ Answer shows premise omitted in explanation	1 mark
Clarity in writing	▪ Answer has clear explanations	2 marks
	▪ Clarity of explanations significantly deviating from CAP theorem	1 mark
Maximum marks		4 marks

Rubric for (1.b):

Criteria	Levels of performance	Award
Accuracy in explanation	▪ Answer has correct justification of all aspects of exclusive locking of cached files through cause-effect logic	4 marks
	▪ Answer justifies consistency in cause-effect logic, but omitted time aspect of exclusive locking	3 marks
	▪ Answer has mention of multiple aspects of exclusive locking, but cause-effect logic leads to inconsistency	2 marks
	▪ Answer has mention of only one aspect of exclusive locking, but cause-effect logic leads to inconsistency	1 mark
Clarity in writing	▪ Answer has clear explanation	2 marks
	▪ Clarity of explanations significantly deviating from locking	1 mark
Maximum marks		6 marks