1605023

question – 1.1

explain the implications of storage to MMDBMS and Disk-based DBMS.

answer

MMDBMS

=> main memory is primary storage. So, its processing or operational speed is faster. But, in terms of cost per memory unit, it is costly. Real time storage application and high performance application (where cost can be compromised with) use MMDBMS.

Disk-based DBMS

=> disk is secondary storage and non-volatile unlike main memory. Its processing is slower due to fetching of data from disk to memory being time consuming. But, its cost per memory unit is relatively economic. Existing DBMS types lie in this category.

Ans.

Answer- 2.1

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i. linear ⟶ speed up = $\frac{10\,ms}{5\,ms}$ = 2 for 2x node. (linear)

ii. nonlinear/sublinear ⟶ speed up = $\frac{10\,ms}{4\,ms}$ = 2.5 for 3x node.

iii. nonlinear/sublinear ⟶ speed up = $\frac{10\,ms}{3\,ms}$ = 3.33 for 4x node

} (sublinear)

=) here, the speed-up is sublinear as the graph plotted against #resource is not a straight line. Ans.

graph

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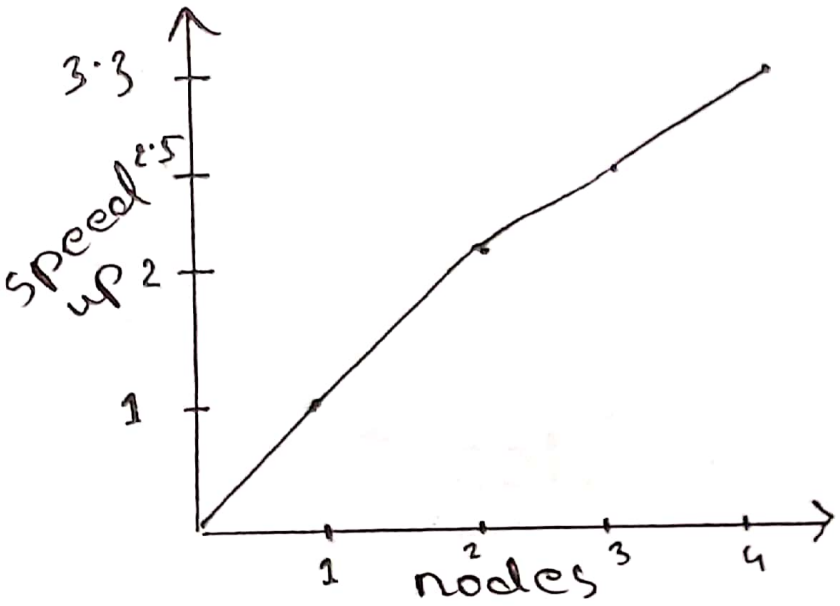

Ans.

answer – 2.2

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i. # node = 4 and problem size = 4p, time = 40 ms

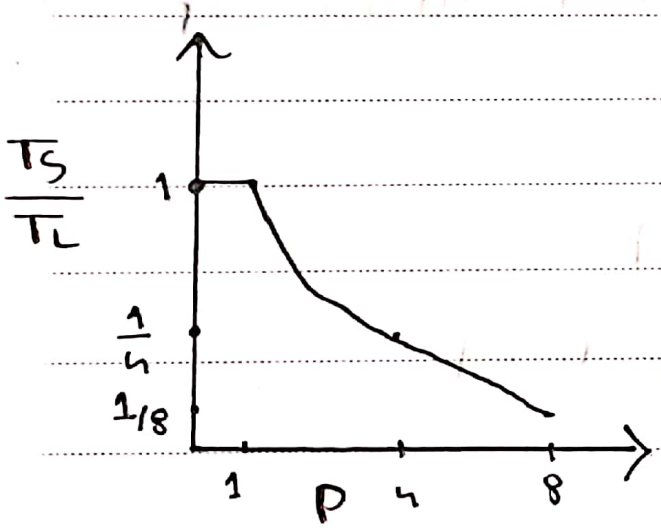
ii. # node = 8 and problem size = 8p, time = 80 ms

=> Intially, time = 10 ms for 1 node and p sized problem

Here, $\frac{T_S}{T_L} = \frac{10}{40} = \frac{1}{4}$ and $\frac{T_S}{T_L} = \frac{10}{80} = \frac{1}{8} \neq 1$.

So, scale-up graph is sublinear.

graph



- elapsed/response time increases despite increased number of nodes.

Ans.

answer - 2.3

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i. $p = 1 \longrightarrow$ speed-up $= \dfrac{1}{1/n} = n$

$\Rightarrow$ that is, we observe a linear speed-up.

ii. $p = 0 \longrightarrow$ speed-up $= \dfrac{1}{1 + \frac{0}{n}} = 1$

$\Rightarrow$ elased time is unchanged as no parallelism introduced.
(constant)
no speed-up

iii. $0 < p < 1 \longrightarrow$ speed-up $= \dfrac{1}{(1-p) + \frac{p}{n}}$

$\Rightarrow$ speed-up is sublinear as the denominator decreases with increase in node number.

Ans.

- no speed-up is neither linear nor sublinear.

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Date :

answer-2.4

i. $p = 1 \longrightarrow$ scale-up $= \dfrac{1}{1} = 1$

$\Rightarrow$ linear scale-up as $\dfrac{T_S}{T_L} = 1$.

ii. $p = 0 \longrightarrow$ scale-up $= \dfrac{1}{(1-0).n} = \dfrac{1}{n}$

$\Rightarrow$ sublinear scale-up as $\dfrac{T_S}{T_L} < 1$. (But, no extra node as task is done sequentially).

$\Rightarrow$ not actual scale-up because we can not leverage from introducing parallelism.

$\Rightarrow$ so, no scale-up as tasks have to be done in parallel.

Ans.

answer -3.1

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Bus

⊕ → simple and less wired architecture, cheap

⊖ → may introduce increased competition for resource (interference), single point of failure(main bus)

mesh

⊕ → reduced interference due to increased connectivity

⊖ → increased hop count introduces latency

⇒ better than Bus.

Hypercube

⊕ → in terms of scalability and performance, better.

⊖ → still each node has $\log_2 n$ neighbor so latency exists.

⇒ better than first two.
⇒ expensive

tree

⊕ → Scalabity is, that is. scaleup is maintained (near linear)

⊖ → ineresed cost, expensive.

⇒ better performance

Ans.

answer – 3·2

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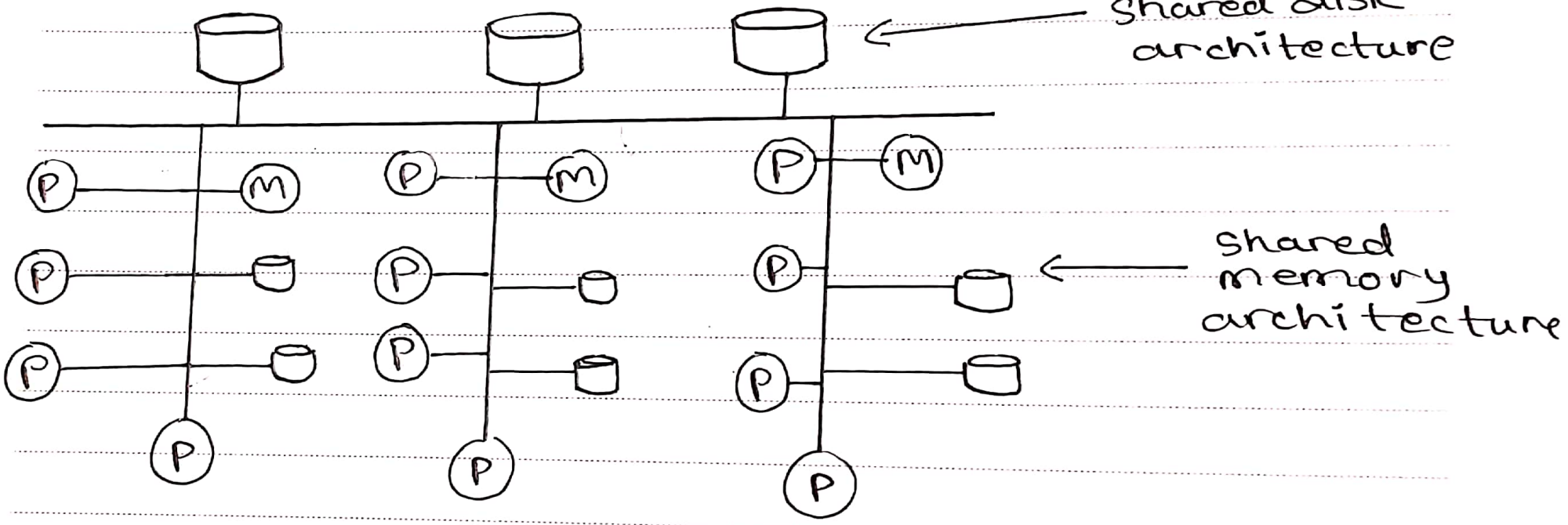

Ans.