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DESIGN & ANALYSIS OF ALGORITHM

CONTINUOS ASSESSMENT - III

1.

a) $n = 5$

faces = 5

vertices = $2n - 5$

$= 2(5) - 5$

$=$ 5 vertices

edges = $3n - 6$

$= 3(5) - 6$

$=$ 9 edges

b) ~~Formula~~ Fortune's algorithm is a sweep line algorithm for generating a Voronoi

b. Space Complexity by Voronoi:

* The Number of Voronoi vertices is $O(n)$ (i.e $2n-5$)
* The Number of Voronoi edges is $O(n)$ (i.e $3n-6$)
* Size of Voronoi Diagram is $O(n)$

Time complexity of Voronoi is $O(n \log n)$

* Fortune's algorithm is a sweep line algorithm for generating a Voronoi diagram from a set of points in a plane using $O(n \log n)$ and space is $O(n)$

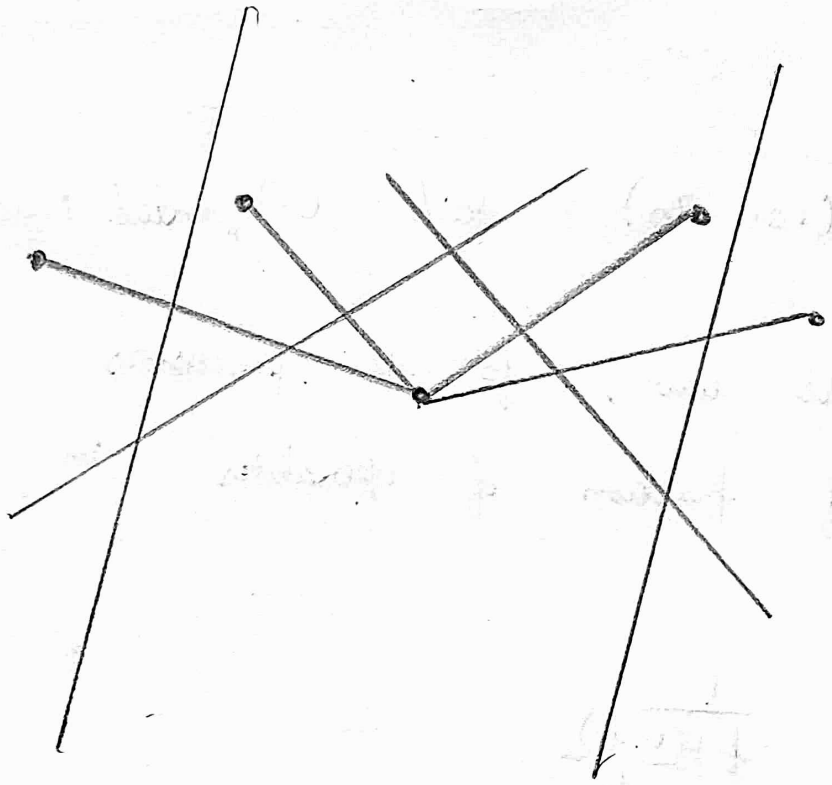
* The number of vertices, edges, faces of the 3d Voronoi - Diagram of n point can de as worst $O(n^2)$

* ~~The Naive~~ In Naive Algorithm point, the complexity is $O(n^2 \log n)$ i.e half plane of the points $p_j \neq p_i$

* The instrumental time complexity is $O(mn)$

* m is no. of levels and n is no. of sites and space complexity is $O(n)$

1c. for $n = 5$



2. Given $p = 12$

$f = (100 - 70) = 30\%$ (Sequential Fraction)

By Amdahl's law, for p processors and ~~fractions~~ of fraction of operations in sequential computation

a) $$\text{speedup} = \frac{1}{f + \frac{(1-f)}{p}}$$

max speed up when $p \to \infty$

Here max speedup $= \frac{1}{f} = \frac{1}{0.3}$

Speedup = 3.33

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b) Speedup for $p = 12$:

$$\Rightarrow \frac{1}{f + \frac{1-f}{p}} = \frac{1}{0.30 + \frac{0.70}{12}}$$

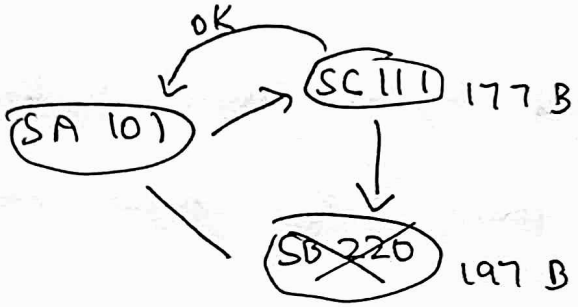
$$= \frac{1}{0.358}$$

$$\Rightarrow \boxed{2.79}$$

3. SA 101 → active

Let us assume SA 101 detects the failure (active)

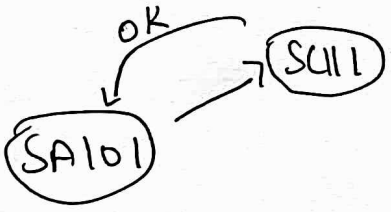
SA 101 sends message SC111 and SB 220



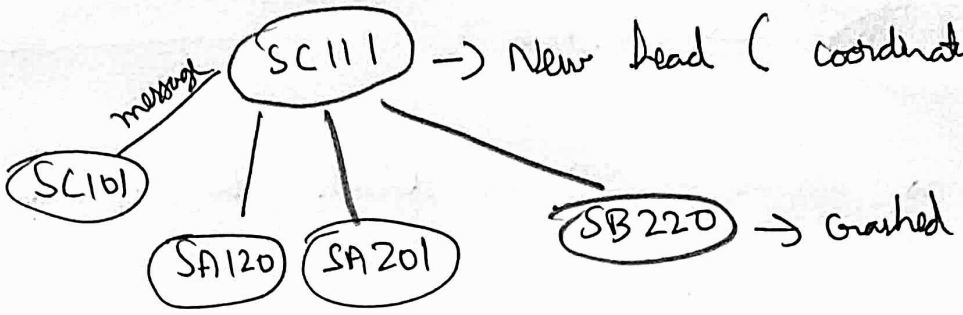
→ SB 220 is crashed

Id sends a reply to SC111

→ SC111 sends a response to SA101



→ SC111 becomes the leader and sends a message to all server



a) Worst Case :

* N-1 processes all together begin elections and sending messages to process with higher ids

message overheads = $O(N^2)$

* Turn around time is approximately 5 message transmission time

b) best case :

- N − 2 coordinator message are sent
- Turn around time is one message transmission time
- Time complexity : $O(n)$

* Bully Algorithm:

When a process finds the coordinator has failed, if it knows its id is the highest, it elects itself as a coordinator, then sends a coordinator a message to all processes with lower identifiers then itself.