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Ex.3

HSL5 ex1.2

Exercise 1.2. For each of the following, state whether it is a safety or liveness property. Identify the bad or good thing of interest.

1. Patrons are served in the order they arrive.
2. Anything that can go wrong, will go wrong.
3. No one wants to die.
4. Two things are certain: death and taxes.
5. As soon as one is born, one starts dying.
6. If an interrupt occurs, then a message is printed within one second.
7. If an interrupt occurs, then a message is printed.
8. I will finish what Darth Vader has started.
9. The cost of living never decreases.
10. You can always tell a Harvard man.

1) Safety: **Bad** → Patrons are not served in the order they arrive.
thing not happening

2) Liveness: **Good** → It will go wrong eventually.
thing to happen

3) Safety: **Bad** → Someone not dying at all
thing not happening

4) Liveness: **Good**: Taxes and death
thing to happen

5) Liveness: **Good**: Eventually die.

6) Safety: **Bad** : An event that is not printed in 1 sec.
thing that won't happen

7) Safety: **Bad** : An event that is not printed.
thing that won't happen

8) Safety: **Bad** : Not finishing what DU had started.

9) Safety: **Bad** : Cost of living decreases.
thing that won't happen

10) Safety: **Bad** : Can't tell a Harvard man.
thing that won't happen

Ex. 4

$$Speedup(N) = \frac{1}{(1-p) + p/N}$$

$$\lim_{N \rightarrow \infty} \left(\frac{1}{40\% + \frac{60\%}{N}} \right)$$

$$\hookrightarrow 1/0,4 = 2,5 // \text{Overall speedup}$$

$$s = 30\% \quad s_n, \text{Speedup}$$

$$p = 70\% \quad n, \text{processes}$$

$$\frac{1}{(0,3/K + \frac{0,7}{n})} > 2 \cdot \frac{1}{0,3 + \frac{0,7}{n}}$$

$$1 > 2 \cdot \frac{\frac{0,3}{K} + \frac{0,7}{n}}{0,3 + \frac{0,7}{n}}$$

$$K \cdot (0,3 + \frac{0,7}{n}) > 0,6$$

$$K > \frac{0,6}{0,3 + \frac{0,7}{n}} //$$

$$\frac{0 \cdot 1}{\frac{(1-p)}{3} + \frac{p}{n}} = \frac{1}{\frac{1-p + \frac{p}{n}}{2}}$$

$$2 \cdot (1-p + \frac{p}{n}) = \frac{1-p}{3} + \frac{p}{n}$$

$$3 \cdot (2 - 2p + \frac{p}{n}) = 1-p$$

$$P = \frac{5}{5 - 3/n} //$$

Ex 5

Exercise 1.9. You have a choice between buying one uniprocessor that executes five zillion instructions per second or a 10-processor multiprocessor where each processor executes one zillion instructions per second. Using Amdahl's law, explain how you would decide which to buy for a particular application.

f_1 frequency of Processor

$$f_1 = 5 \text{ zillion}$$

$$f^1 = 5 \cdot f = \frac{1}{1-p + \frac{p}{n}} \cdot 1 \text{ zillion}$$

$$f^1 > 5 \text{ zillion} \Leftrightarrow 1 > 5 \cdot (1-p + \frac{p}{10})$$

$$0.2 > 1-p + \frac{p}{10}$$

✓

✓

$$0,2 > 1 - \frac{9P}{10}$$

$$\frac{9P}{10} > 0,8$$

$$9P > 8$$

$$P > \frac{8}{9} \equiv P > 88,88\%$$

Only get the 10-p multiprocessor

if the application is at least 88,88% parallelized.