420 ICE 3

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October 2024

Question 1

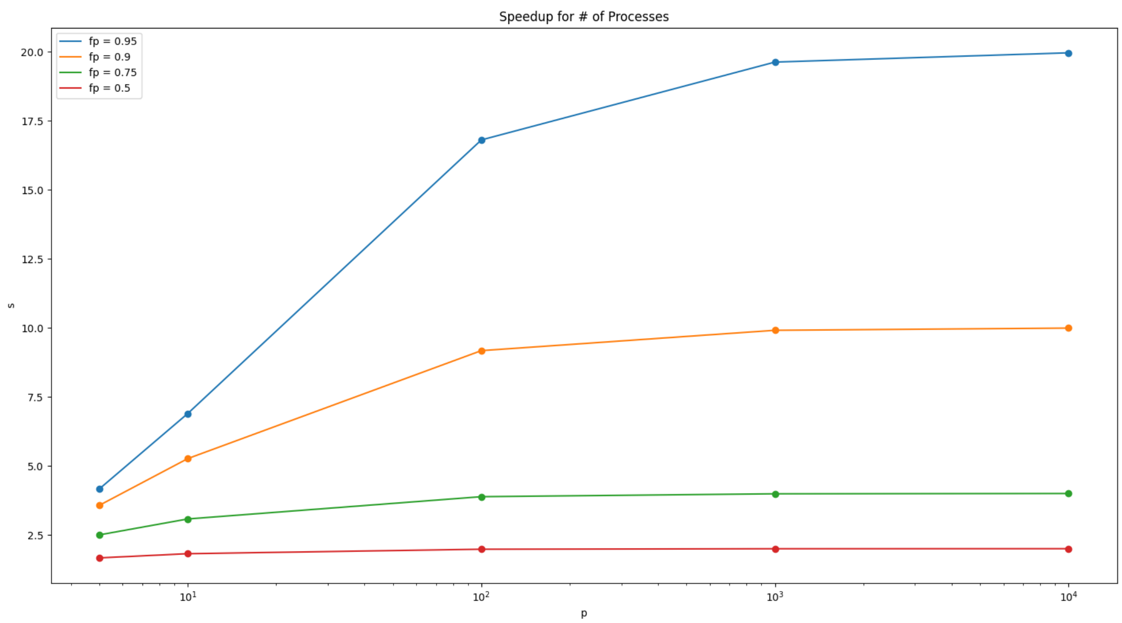

Figure 1: Process Speed Ups

Question 2

2.1 Serial Runtime

2.1.1 Speedup

The formula using Amdahls formula we know that speedup represented as S_p

$$S_p = \frac{T_1}{T_p}$$

Since $T_1 = .98$, $p = 1$ and $T_p = .98$

$$S_p = \frac{.98}{.98}$$

$$S_p = 1$$

2.1.2 Efficiency

$$E_p = \frac{S_p}{p}$$

Since we know $S_p = 1$

$$E_p = \frac{1}{1}$$

$$E_p = 1$$

2.1.3 Parallel Percentage

In this case we have a special case

Since we know using Amdahls Law that

$$S_p = 1 + (p-1)f_p$$

$$S_p - 1 = (p-1)f_p$$

$$\frac{S_p - 1}{p - 1} = f_p$$

And since we know the left side values we can input them getting

$$\frac{1-1}{1-1} = f_p$$

$$\frac{0}{0} = f_p$$

Which is indeterminant However using logic we know that since there is only 1 processor running everything in serial we know 100% of program is Sequential and using Part of Amdahl Law we know

$$f_s + f_p = 1$$

$$1 + f_p = 1$$

$$f_p = 0$$

Therefore 0% of program is parallel

2.1.4 Sequential Percentage

Using previous reasoning we know that 100% of program is sequential

2.2 2 Core Runtime

2.2.1 Speedup

The formula using Amdahls formula we know that speedup represented as S_p

$$S_p = \frac{T_1}{T_p}$$

Since $T_1 = .98$, $p = 2$ and $T_p = .50$

$$S_p = \frac{.98}{.50}$$

$$S_p = 1.96$$

2.2.2 Efficiency

$$E_p = \frac{S_p}{p}$$

Since we know $S_p = 1.96$

$$E_p = \frac{1.96}{2}$$

$$E_p = .98$$

2.2.3 Parallel Percentage

Since we know using Amdahls Law that

$$S_p = 1 + (p-1)f_p$$

$$S_p - 1 = (p-1)f_p$$

$$\frac{S_p - 1}{p-1} = f_p$$

And since we know the left side values we can input them getting

$$\frac{1.96 - 1}{2-1} = f_p$$

$$\frac{.96}{1} = f_p$$

$$.96 = f_p$$

Therefore 96% of program is parallel

2.2.4 Sequential Percentage

96% of program is Parallel and using Part of Amdahl Law we know

$$f_s + f_p = 1$$

$$f_s + .96 = 1$$

$$f_p = .04$$

Therefore 4% of program is Sequential

2.3 8 Core Runtime

2.3.1 Speedup

The formula using Amdahls formula we know that speedup represented as S_p

$$S_p = \frac{T_1}{T_p}$$

Since $T_1 = .98$, $p = 8$ and $T_p = .25$

$$S_p = \frac{.98}{.25}$$

$$S_p = 3.92$$

2.3.2 Efficiency

$$E_p = \frac{S_p}{p}$$

Since we know $S_p = 1.96$

$$E_p = \frac{3.92}{8}$$

$$E_p = .49$$

2.3.3 Parallel Percentage

Since we know using Amdahls Law that

$$S_p = 1 + (p-1)f_p$$

$$S_p - 1 = (p-1)f_p$$

$$\frac{S_p - 1}{p-1} = f_p$$

And since we know the left side values we can input them getting

$$\frac{3.92 - 1}{8 - 1} = f_p$$

$$\frac{2.92}{7} = f_p$$

$$.42 = f_p$$

Therefore 42% of program is parallel

2.3.4 Sequential Percentage

96% of program is Parallel and using Part of Amdahl Law we know

$$f_s + f_p = 1$$

$$f_s + .42 = 1$$

$$f_p = .58$$

Therefore 58% of program is Sequential