06/09/2021 | CSPC-31: Comp Arch | 106119100
Rajneesh Pandey

CT-01

Question (1)

1) a)

we generally measure program execution time from program initiation at presesentation of some input to termination at the delivery of the last output.

- worst-case execution time (WCET)
- Best case execution time (BCET)
- Average-case execution time

(b) The maximum number of pipeline stages is limited by pipeline hazards, sequencing overhead, and cost.

Longer pipelines introduce more dependencies

Some of the dependencies can be solved by forwarding but others require stalls. which increase CPI.

Also, it is depends upon subdivision stages.

Question (3):

a) Using Amdahl's law the following equation can be used:

$$\text{Speedup}_{overall} = 1 \Big/ \left((1 - \text{Fraction}_{enhanced}) + \left(\frac{F_{enhanced}}{\text{Speedup}_{enhanced}} \right) \right) = 2$$

so,

calculating fraction enhanced)

$$F_{enhanced} = \text{Speedup}_{overall} * S_{enhanced} - S_{enhanced} \Big/ S_{overall} * S_{enha}$$

$$= (2 \times 15 - 15) / (2 \times 15 - 2)$$

$$= \frac{15}{28} = 0.5357.$$

Therefore, the percentage vectorization needed to gain a speedup of 2 is 53.57%

(b) % of time in new execution spent of encryption operation.

$$= \frac{\left(\frac{0.535}{15} \right)}{(1 - 0.535) + \left(\frac{0.5357}{15} \right)} = \frac{0.00357}{(0.4643) + (0.0035)}$$

$$= 0.071424$$

$$= 7.14\%$$

Question (4)

(a) Speedup for N processor. if 65%
is parallelized.

so,

$$\text{speed up} = \frac{1}{0.35 + \frac{0.65}{N}}$$

(b) Speedup with processors.
with original execution time is.

$$\frac{1}{0.35 + 6 \times 0.004 + \frac{0.35}{6}} = 2.07325$$

Question ⑥

5) (a)

computing the speed up obtained from the fast mode we must work out the execution time without enhancement. we know that the accelerated execution time consisted of two halves :

unaccelerated phase (60%) & accelerated phase. (40%)

without enhancement, the unaccelerated phase would have taken 60%, but accelerated take 15 times more. 600% : (40X15)%.

So,
relative time of execution without enhancement

$\boxed{(60 + 600)\% = (660)\%}$

Thus.
overall speed up $= \dfrac{\text{execution time}_{unacc}}{\text{execution time}_{acc}} = \dfrac{660\%}{100\%}$

$\boxed{\text{Speedup}_{overall} = 6.6}$

5)

b)

To find the peucentage of ouiginal execution time which was accelerated, we plug the Amdahl's Law.

$$fraction_{vactorized} = \frac{Speedup_{overall} \times speedup_{acc} - speedup_{acc}}{Speedup_{overall} \times speedup_{acc} - speedup_{overall}}$$

$$= \frac{6.6 \times 15 - 15}{6.6 \times 15 - 6.6}$$

$$fraction_{vactorized} = \frac{84}{92.42} = 0.9088$$

$$= 90.88\%$$

Question (2)

2) a)

Die yeild of Phoenix clip:

faumulal:

$$\text{Die yeild} = \text{wafer yield} \times \frac{1}{\left(1 + \text{Defects per unit area} \times \text{Die area}\right)^{N}}$$

Assume

wafer yeild is 100% or 1.

Die area = 200 mm² or 2 cm²

Defects per unit aue = 0.04

N = 14.

$$\text{Die yeild} = 1 \times \frac{1}{(1 + (2 \times 0.04))^{14}}$$

$$= \frac{1}{2.94} = 0.34$$

Thus, the die yeild of pheonix clip is.

$\boxed{0.34}$

2)
b)
Pheonix is made-up in an old plant and in a lauger technology.

As the plants get old, Pheonix process get tuned and defect-rate gets decreased