Results

NOTE: this is the SOLUTION to Quiz 1.

The correct answers are indicated for each question, with explanations as needed.

Dr. Manikas

Your Answers:

1 4 / 4 points

Classes of architectural parallelism include:

- [ ] Data-Level Parallelism (DLP)
- [ ] Task-Level Parallelism (TLP)
- [x] Thread-Level Parallelism
- [x] Instruction-Level Parallelism (ILP)

Feedback

General Feedback

- Classes of parallelism in applications:
  - Data-Level Parallelism (DLP)
  - Task-Level Parallelism (TLP)
- **Classes of architectural parallelism:**
  - Instruction-Level Parallelism (ILP)

– Thread-Level Parallelism

2 4 / 4 points

Classes of parallelism in applications include:

- [ ] Thread-Level Parallelism
- [ ] Instruction-Level Parallelism (ILP)
- [x] Task-Level Parallelism (TLP)
- [x] Data-Level Parallelism (DLP)

Feedback

General Feedback

- **Classes of parallelism in applications:**
  - Data-Level Parallelism (DLP)
  - Task-Level Parallelism (TLP)
- Classes of architectural parallelism:
  - Instruction-Level Parallelism (ILP)
  - Thread-Level Parallelism

3 4 / 4 points

Your design team wishes to manufacture a new microprocessor, with a codename of "Peruna". The chip has a die size of 400 mm^2. Your manufacturing facility makes wafers that are 500 mm in diameter. *How many Peruna dies can you get from one wafer?*

435

Feedback

General Feedback

$$DiesPerWafer = \frac{\pi[\frac{WaferDiameter}{2}]^2}{DieArea} - \frac{\pi(WaferDiameter)}{\sqrt{2(DieArea)}}$$

Plugging in our values, we get:

$$DiesPerWafer = \frac{\pi[\frac{500}{2}]^2}{400} - \frac{\pi(500)}{\sqrt{2(400)}}$$

$$DiesPerWafer = \pi[\frac{250^2}{400} - \frac{500}{\sqrt{800}}] = 138.572\pi$$

This rounds *down* to **435** dies per wafer, since we are interested in producing **complete** dies.

4

4 / 4 points

Your design team wishes to manufacture a new microprocessor, with a codename of "Mustang". The chip has a die size of 500 mm^2, with an estimated defect rate of 0.02/cm^2. Your manufacturing facility has process-complexity factor of 10, and we are assuming a wafer yield of 100%. *What is the* ***yield*** *for the Mustang chip?*

✓ 0.386

Feedback

General Feedback

Recall that we can calculate die yield using the following equation:

$$DieYield = \frac{WaferYield}{(1+(DefectsPerUnitArea)(DieArea))^N}$$

Then we have:

Wafer yield = 100% = 1

Defects per unit area = 0.02/cm^2

Die area = 500 mm^2

Process-complexity factor N = 10

Need to convert area so that units match: 1 cm = 10 mm, so (1 cm)^2 = (10 mm)^2, or 1 cm^2 = 100 mm^2

$$DefectsPerUnitArea = \frac{0.02}{cm^2}[\frac{cm^2}{100mm^2}] = \frac{0.02}{100mm^2}$$

Now we can plug everything into the equation:

$$DieYield = \frac{1}{(1+(\frac{0.02}{100})(500))^{10}} = \frac{1}{(1+0.1)^{10}} = 0.386$$

5

4 / 4 points

Your design team wishes to manufacture a new microprocessor, with a codename of “Maverick”. Your manufacturing facility can produce 1000 Maverick dies per wafer, with a die yield of 0.625. Each defect-free Maverick chip makes a profit of $10. *How much* ***profit*** *will you make on each wafer of Maverick chips ($)?*

6,250

Feedback

General Feedback

Profit = (dies per wafer)(die yield)(profit per defect-free chip)

We are given the number of complete dies per wafer is 1000. and the die yield is 0.625 (percentages of *defect-free* dies per wafer).

Thus the profit per wafer becomes (1000)(0.625)($10) = **$6250**