CompArch

Design Metrics

- Energy

- Power

- Performance

- Security

- Cost

- Power Efficiency

- Reliability

- Focus on common case: overall speed increases even if specific speed decreases.

- Amdahl's Law: speedup $= \frac{1}{\text{sequential} + \frac{1 - \text{sequential}}{\text{speedup}_{\text{enhanced}}}}$

- Adding enhancements means lower transistor budget, more localised heat, slower clock freq, ... Might affect common case.

- $$\frac{1}{\text{performance}} = \frac{\text{time}}{\text{program}} = \frac{\text{instructions}}{\text{program}} \times \frac{\text{cycles}}{\text{instruction}} \times \frac{\text{time}}{\text{cycle}}$$

  - Instruction count is affected by the ISA and compiler tech.
  - CPI is affected by micro-architecture and ISA.
  - Cycle time is affected by circuit design and micro-architecture.