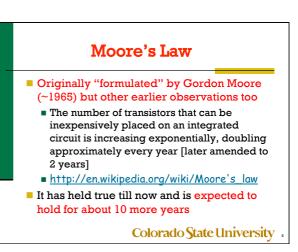


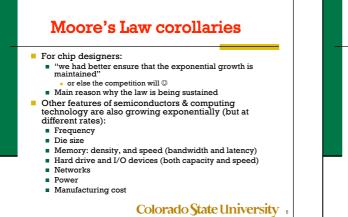
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What was brushed under the carpet in CS 270

- Combinational circuits are instantaneous
- Minimalist vs Efficient
 - LC-3 can execute any program
 - But does it do it efficiently?
- How fast can the machine go?
- How much power does it consume?
- What is the manufacturing cost?
 - Economies of scale

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Moore's law of expectations

- Better, faster, cheaper, lighter, ...
- We as computer scientists are providing the technology that is changing the world exponentially
- Hard challenges
- Exciting potential
- Always room to innovate if you stop learning you stagnate

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Exponential growth implies ...

When two quantities grow exponentially, but at different rates, their ratio also grows exponentially. Consider,

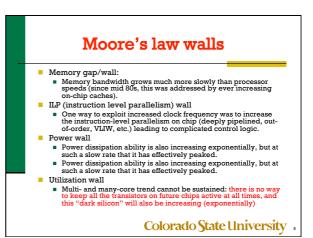
$$y_1 = a^x$$

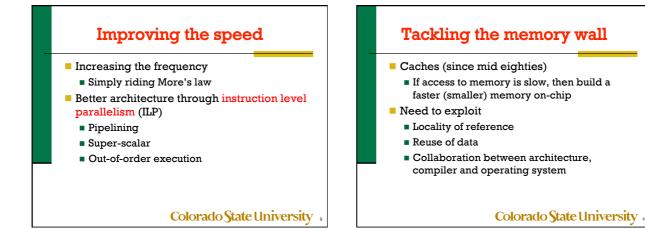
y =

and $y_2 = b^x$ for $a \ge b \ge 1$

$$\frac{y_1}{y_2} = \left(\frac{a}{b}\right)^x = \alpha^x \text{ for } \alpha \ge 1$$

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Tackling the power wall Increasing the frequency implies increasing the heat generated And that has to be dissipated (or else the chip will melt If you can't increase the frequency (raw speed) Add more processors (cores)

• "The processor is the new transistor" in Moore's law

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