I.C.D.

Integrated Circuit Design

Iain McNally

$\approx$ 12 lectures

Koushik Maharatna

$\approx$ 12 lectures

Integrated Circuit Design

Iain McNally

- Content
  - Introduction
  - Overview of Technologies
  - Layout
  - Design Rules and Abstraction
  - Cell Design and Euler Paths
  - System Design using Standard Cells

  - Pass Transistor Circuits
  - Storage
  - PLAs

  - Wider View

Integrated Circuit Design

- Assessment

0%	Informal Coursework	(L-Edit Gate Layout)
100%	Examination	

- Books

  Digital Integrated Circuits
  Jan Rabaey
  Prentice-Hall

  Principles of CMOS VLSI Design
  A Circuits and Systems Perspective
  Neil Weste & David Harris
  Addison-Wesley 2004

- Notes & Resources

  `http://users.ecs.soton.ac.uk/bim/notes/icd`

History

1947 First Transistor
John Bardeen, Walter Brattain, and William Shockley (Bell Labs)

1952 Integrated Circuits Proposed
Geoffrey Dummer (Royal Radar Establishment) - *prototype failed...*

1958 First Integrated Circuit
Jack Kilby (Texas Instruments) - *Co-inventor*

1959 First Planar Integrated Circuit
Robert Noyce (Fairchild) - *Co-inventor*

1961 First Commercial ICs
Simple logic functions from TI and Fairchild

1965 Moore's Law
Gordon Moore (Fairchild) observes the trends in integration.

Moore's Law

Predicts exponential growth in the number of components per chip.

1965 - 1975 Doubling Every Year

In 1965 Gordon Moore observed that the number of components per chip had doubled every year since 1959 and predicted that the trend would continue through to 1975.

Moore describes his initial growth predictions as "ridiculously precise".

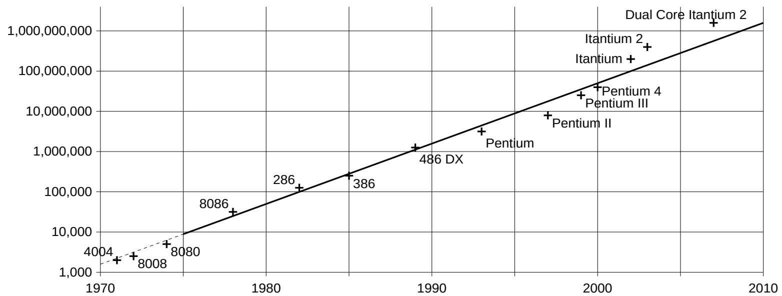
1975 - 2010 Doubling Every Two Years

In 1975 Moore revised growth predictions to doubling every two years.

Growth would now depend only on process improvements rather than on more efficient packing of components.

In 2000 he predicted that the growth would continue at the same rate for another 10-15 years before slowing due to physical limits.

Moore's Law at Intel[1]



[1]Intel was founded by Gordon Moore and Robert Noyce from Fairchild

Moore's Law; a Self-fulfilling Prophesy

The whole industry uses the Moore's Law curve to plan new fabrication facilities.

Slower - wasted investment

Must keep up with the Joneses[2].

Faster - too costly

Cost of capital equipment to build ICs doubles approximately every 4 years.

[2]or the Intels