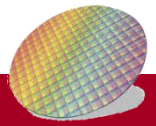
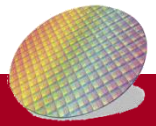
Verilog Basics
- Introduction



Outline

- Overview of Digital Design
  - Evolution of Computer-Aided Design
  - Traditional Design approaches
  - Advancements over the years

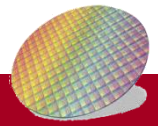
- Verilog
  - What is Verilog
  - Application Areas of Verilog
  - Basic Limitation of Verilog
  - Design Representation



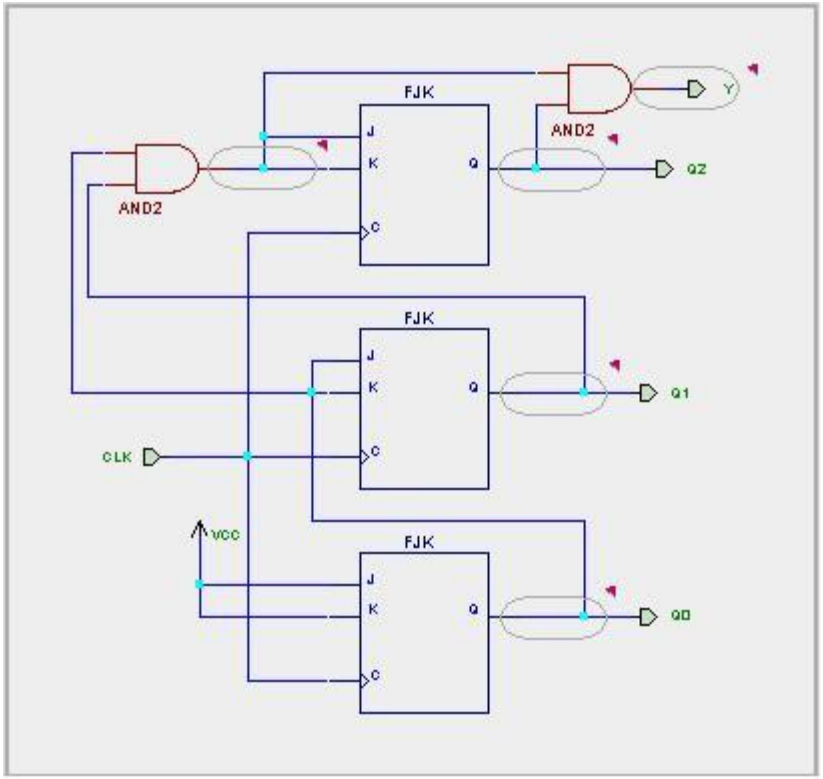
Evolution of VLSI Design

- Earlier digital circuits
  - Vacuum tube→ Transistors -> Integrated Circuits (ICs)
- Integrated Circuits (logic gates were placed on a single chip)
  - SSI → MSI → LSI →VLSI

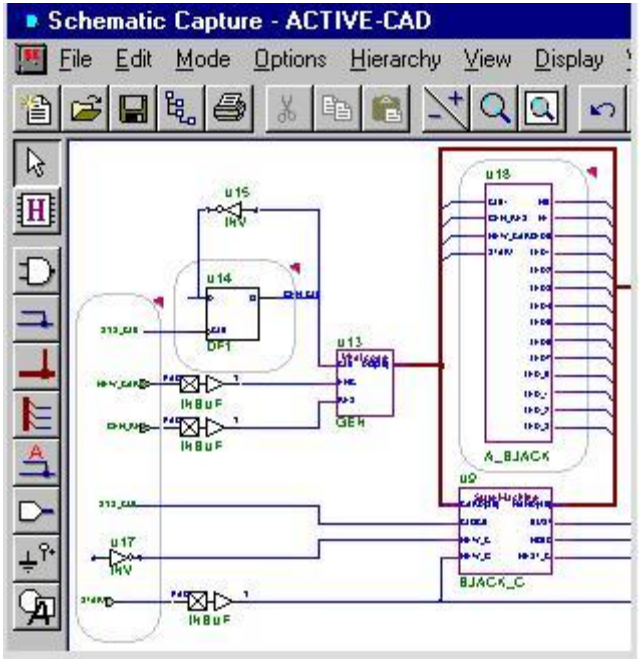
Integration Levels	
SSI:	10 gates
MSI:	1000 gates
LSI:	10,000 gates
VLSI:	> 10k gates



Traditional Design approaches

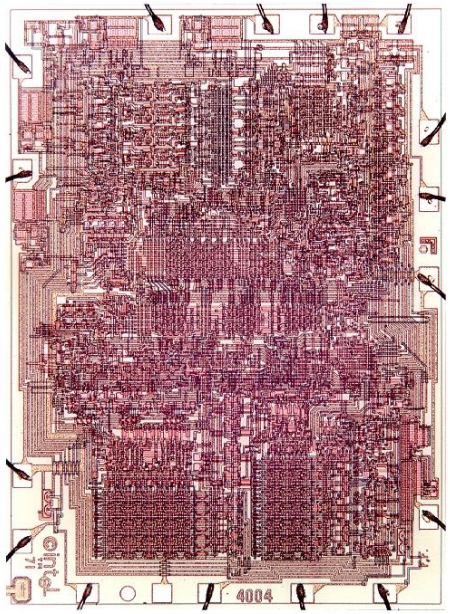


Gate Level Design

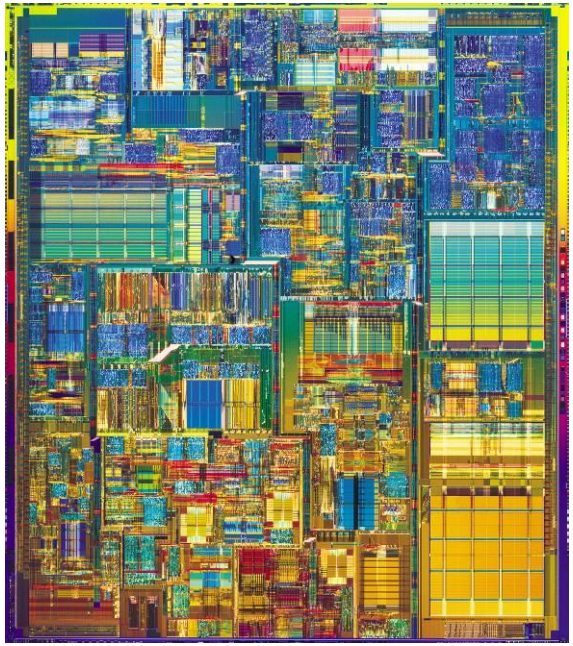


Schematic View

Advancements over the years



- © Intel 4004 Processor
- Introduced in 1971
- 2300 Transistors
- 108 KHz Clock



- © Intel P4 Processor
- Introduced in 2000
- 40 Million Transistors
- 1.5GHz Clock

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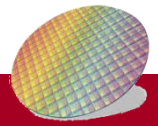
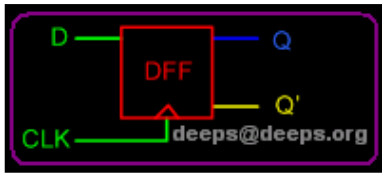


What is Verilog

- Hardware Description Language (HDL)
- Developed in 1984, standardized as IEEE 1364
- Version history:
  - Verilog-95
  - Verilog-2001
  - Verilog-2005
  - SystemVerilog 2009
- Used to describe a digital system, such as CPU, memory, or flip-flop

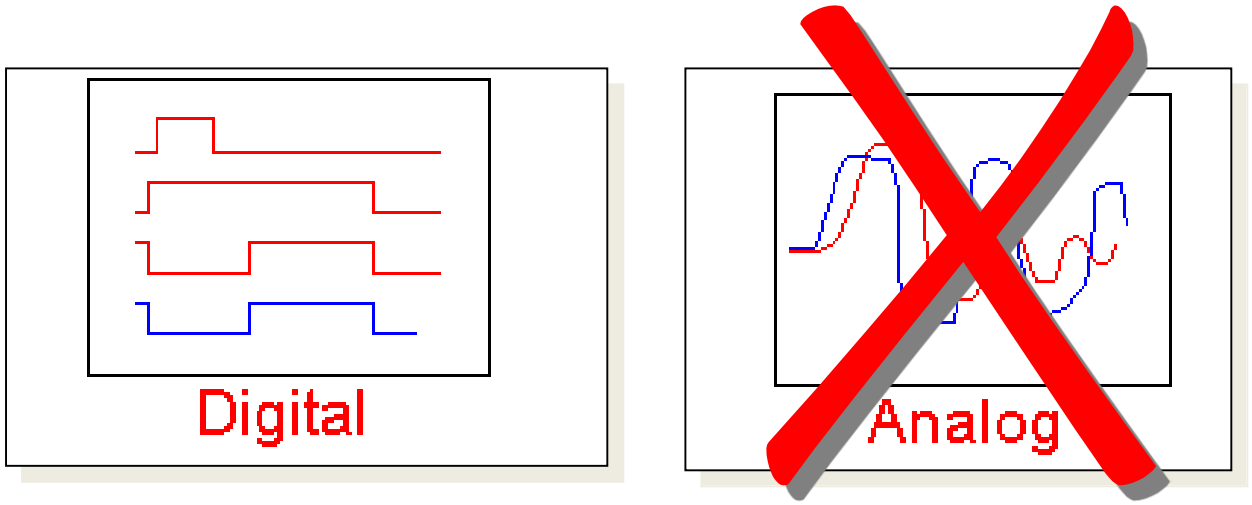



```
module d_ff ( d, clk, q, q_bar);
  input d ,clk;
  ouput q, q_bar;

  always @ (posedge clk)
  begin
    q <= d;
    q_bar <= !d;
  end
endmodule
```

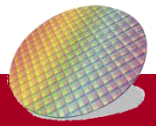
Basic Limitation of Verilog

Description of digital systems only



Resources

- VerilogHDL, A Guide to Digital Design and Synthesis, by Samir Palnitkar
- Verilog Tutorial - ASIC World
  - www.asic-world.com/verilog/veritut.html



Backup slides