VLSI Design Cycle

VLSI DESIGN CYCLE

- What we want? What they want?
  - We/They provide System Specificat
  - We/They respond with chips!
  - Either way:
    - Process manually
    - Automation
  - More Logical: Manual and Automation

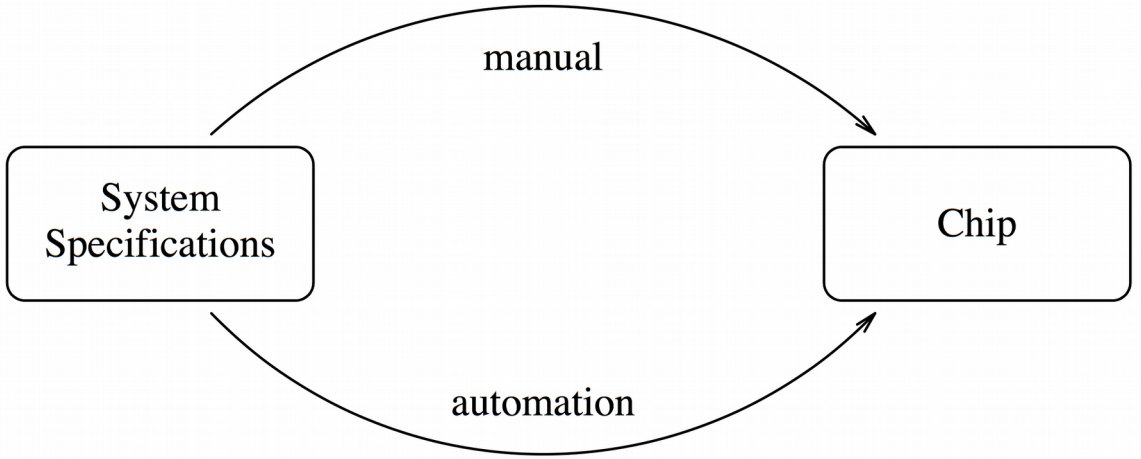
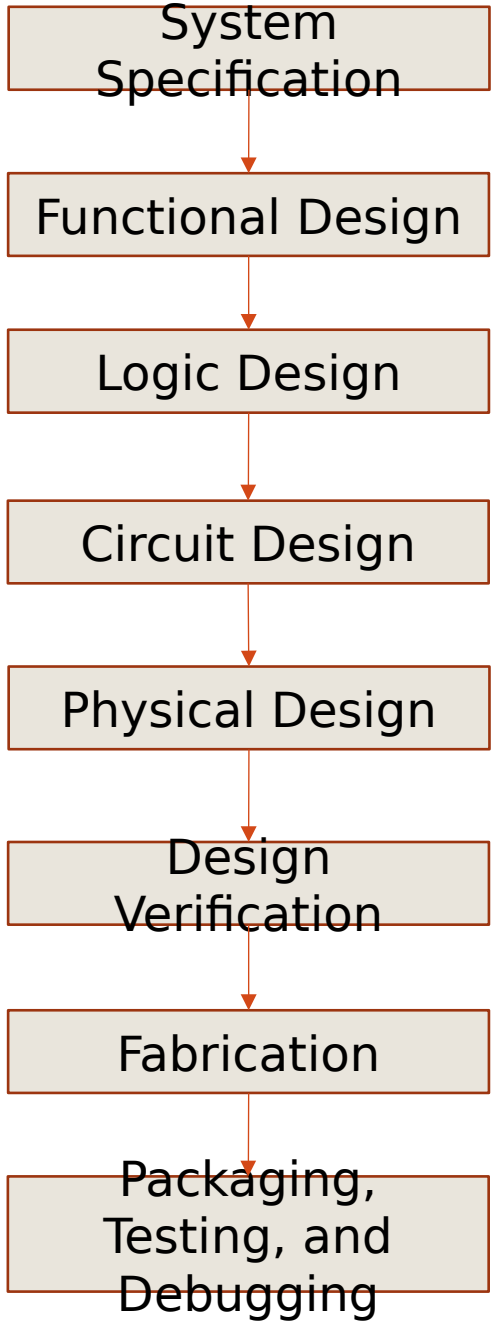


Figure: Design Objective

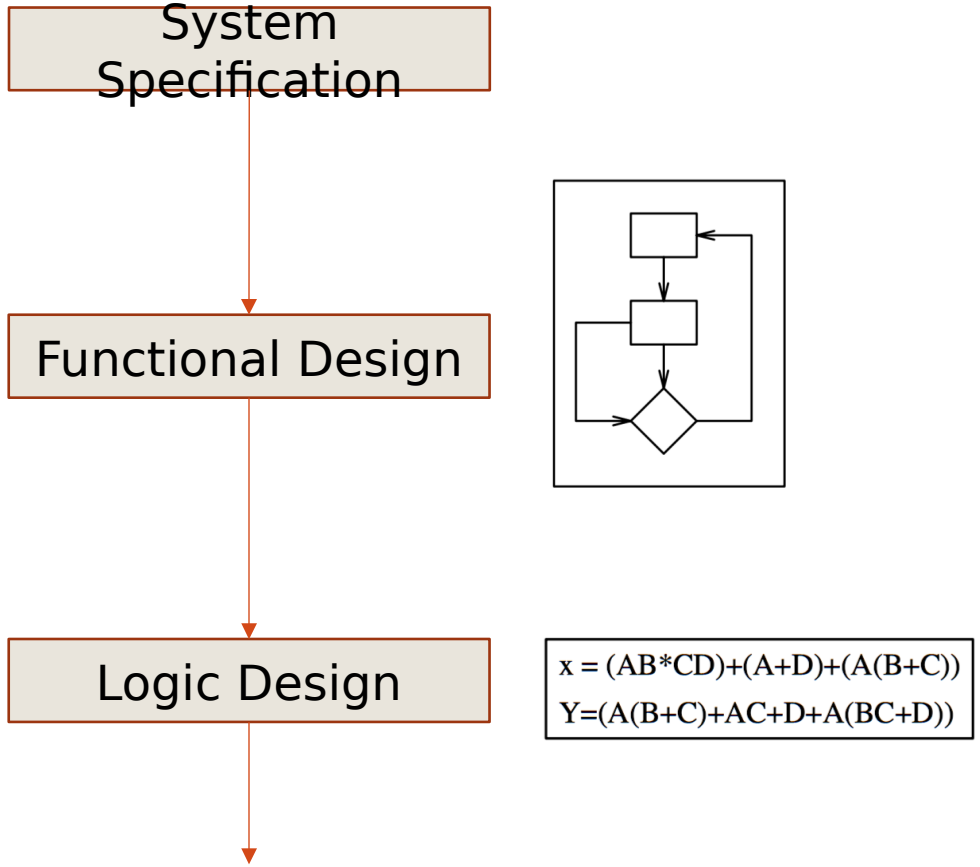
VLSI DESIGN CYCLE

- Steps of design cycle
  1. System Specification
  2. Functional Design
  3. Logic Design
  4. Circuit Design
  5. Physical Design
  6. Design Verification
  7. Fabrication
  8. Packaging, Testing, and Debugging



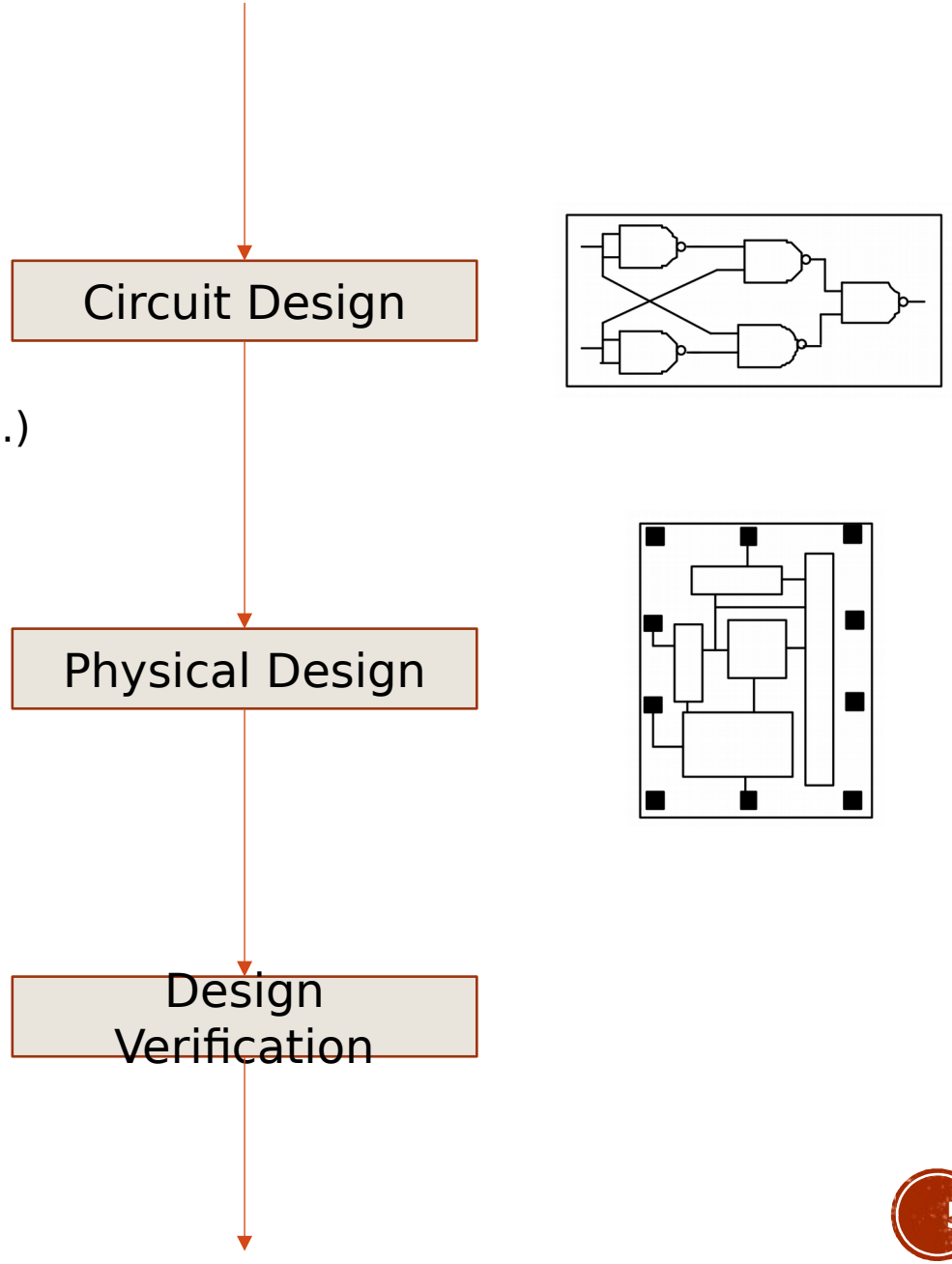
VLSI DESIGN CYCLE

- System Specification
  - first step
  - high level representation
  - performance, functionality, and physical dimensions
  - fabrication technology and design techniques
  - market requirements, technology and economical viability
- Functional Design
  - functional units of the system are identified
  - timing diagram or other relationships between units
- Logical Design
  - control flow, word widths, register allocation
  - arithmetic operations, and logic operations
  - boolean expressions and timing information
  - simulated and tested to verify its correctness



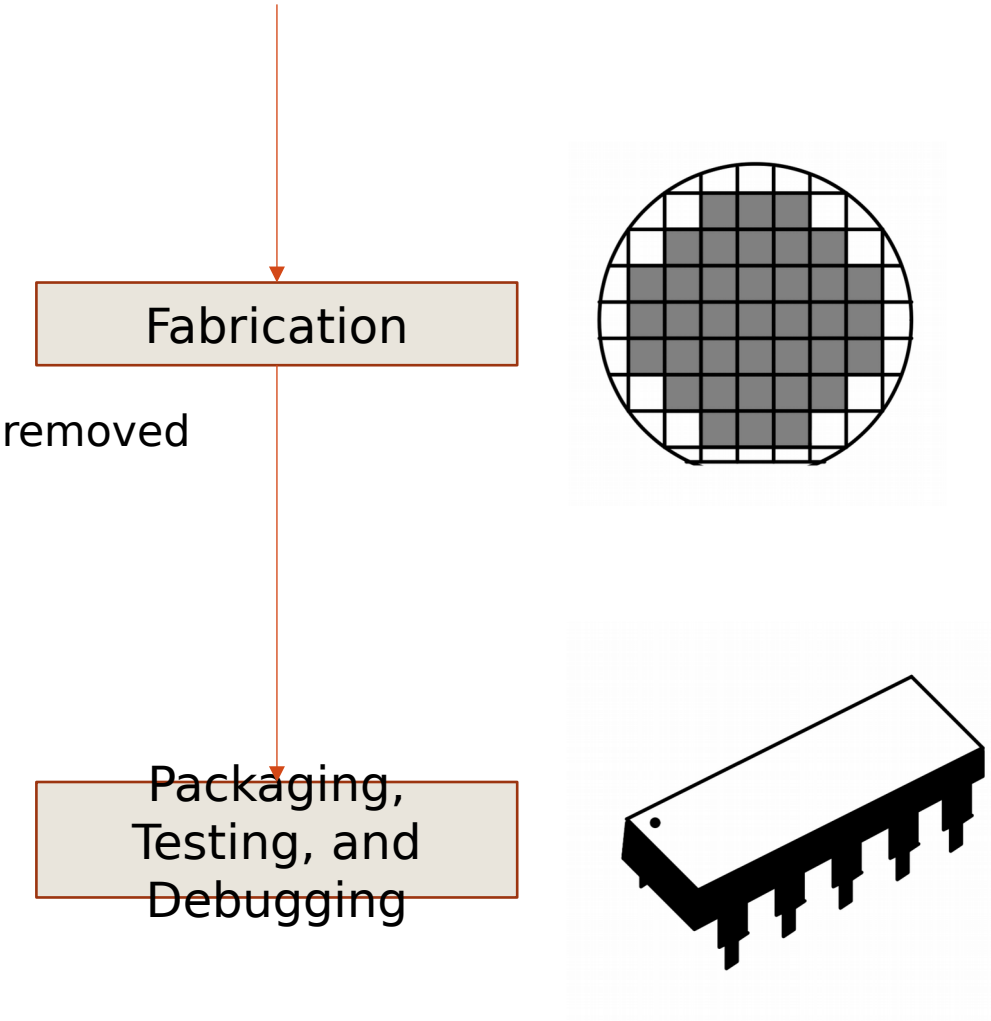
VLSI DESIGN CYCLE

- Circuit Design
  - circuit representation based on the logic design
  - simulation is used to verify the correctness
  - interconnection between elements (gates, transistors, …)
- Physical Design
  - circuit representation to geometric representation
  - geometric representation of a circuit is called a layout
  - very complex process
  - it is usually broken down into various sub-steps
  - can be completely or partially automated
- Design Verification
  - verify the completed design with tools
  - go back to previous steps if needed



VLSI DESIGN CYCLE

- Fabrication
  - layout data is converted into photo-lithographic masks
  - silicon crystals are grown and sliced to produce wafers
  - certain materials need to be deposited, diffused or even removed
  - before mass production, a prototype is made and tested
- Packaging, Testing and Debugging
  - each chip is then packaged and tested
  - different types of packaging (DIP, PGA, BGA, …)
  - ready for sale



REFERENCE

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