Design Constraints Conceptual Model

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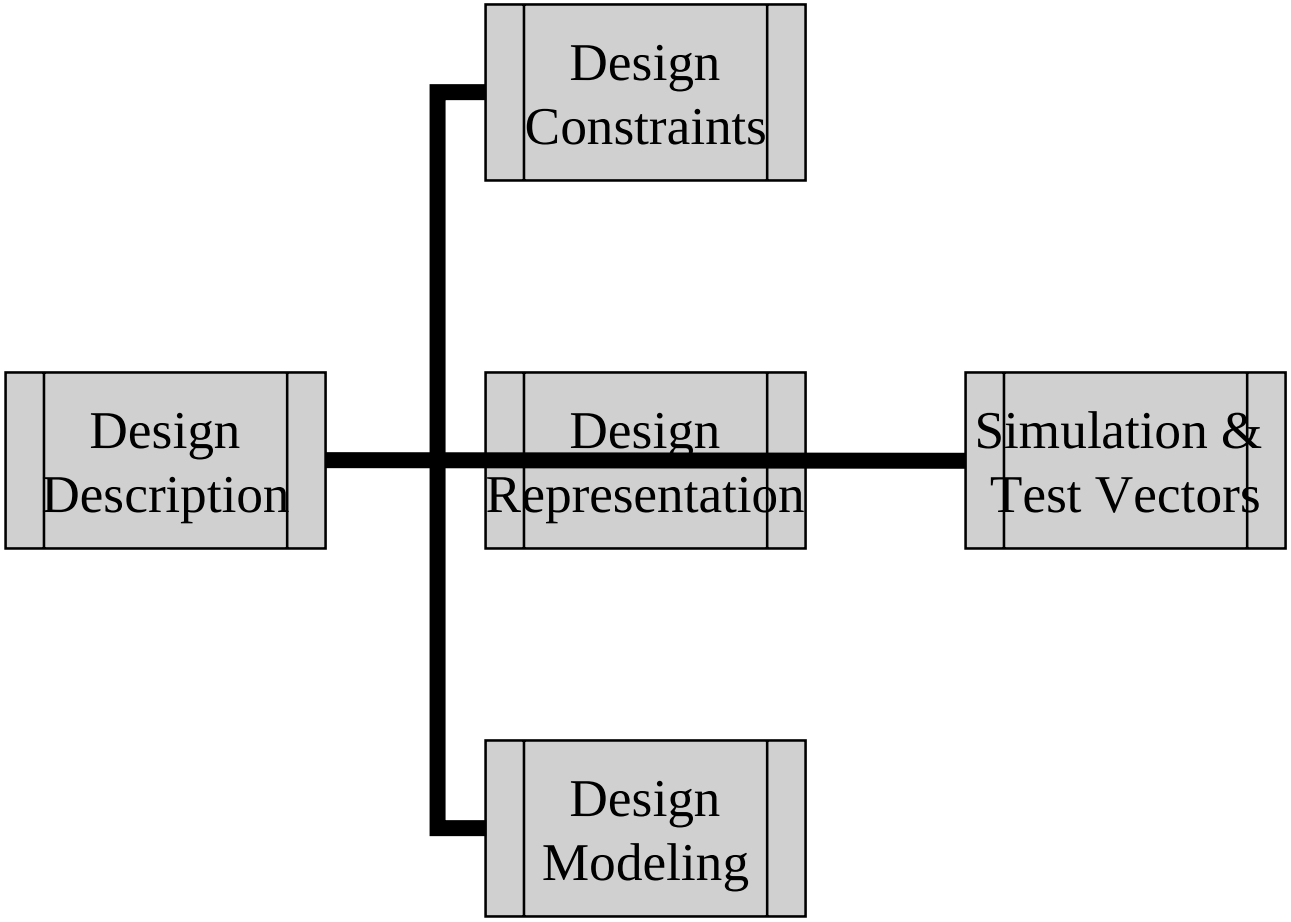
Outline

- Purpose of the Model
- Elements of Design Description
- Design Constraints Prescription Model
- Categories of Constraints
  - Commons -- inherited rules & constants
  - Budgets -- those propagating top-down
  - Assertions -- those surfacing bottom-up
  - Attributes -- symbolic properties
  - Parameters -- user direct inputs
- Refinement of Design Constraints
- Constraint Hierarchy Modeling
- Domain of Constraints

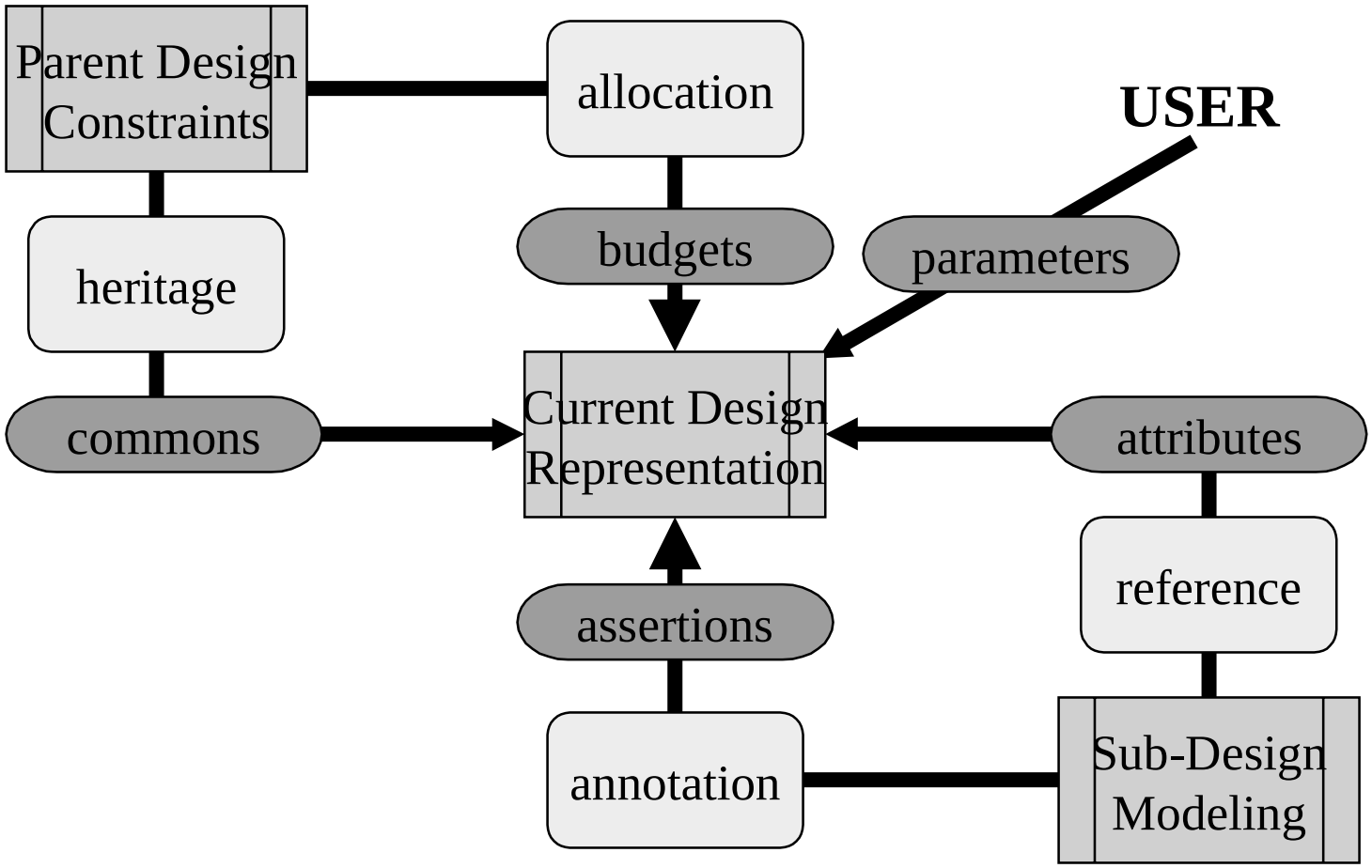
Purpose of the Model

- The attempt here is to:
  - visualize the essentials that capture the **designer's intent**
  - analyze the ways constraints are prescribed
  - explore an information model to categorize constraints
  - consolidate a common framework of working concepts
- The model does not mean to:
  - suggest the specific mechanisms to capture or transform design constraints
  - purpose schema for a repository database

Elements of Design Description



Design Constraints Prescription Model



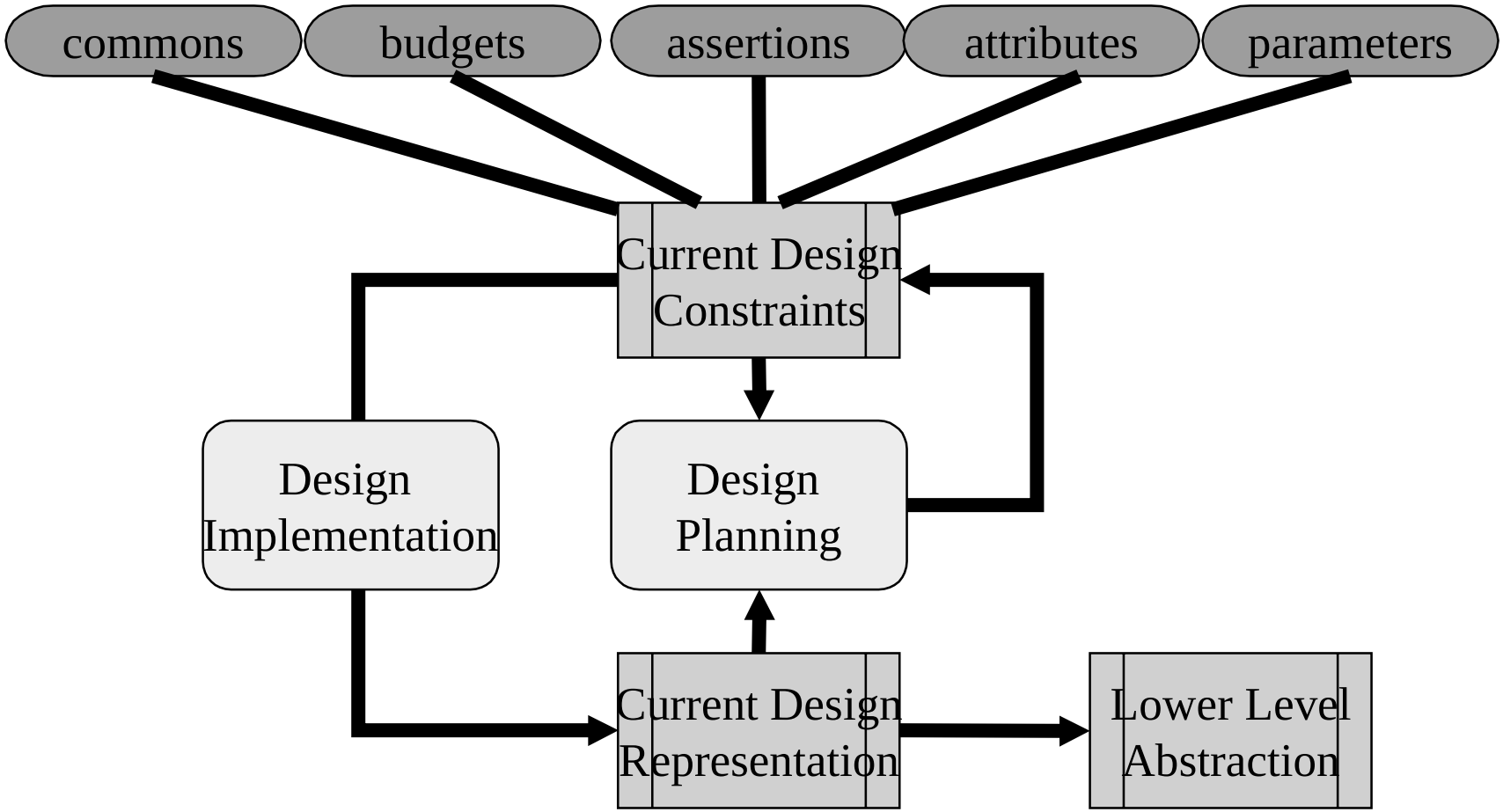
Categories of Constraints (1)

- Commons
  - Technology Constants and Rules
  - Operating Conditions
  - Global Signals
- Budgets
  - Timing, Area, and Power Budgets
  - Floorplan and Wiring Models
- Assertions
  - Clocking: skew, setup, hold, etc.
  - Local partial clocktree and power rings
  - Input arrival times, output delays, etc.
  - Signal Integrity

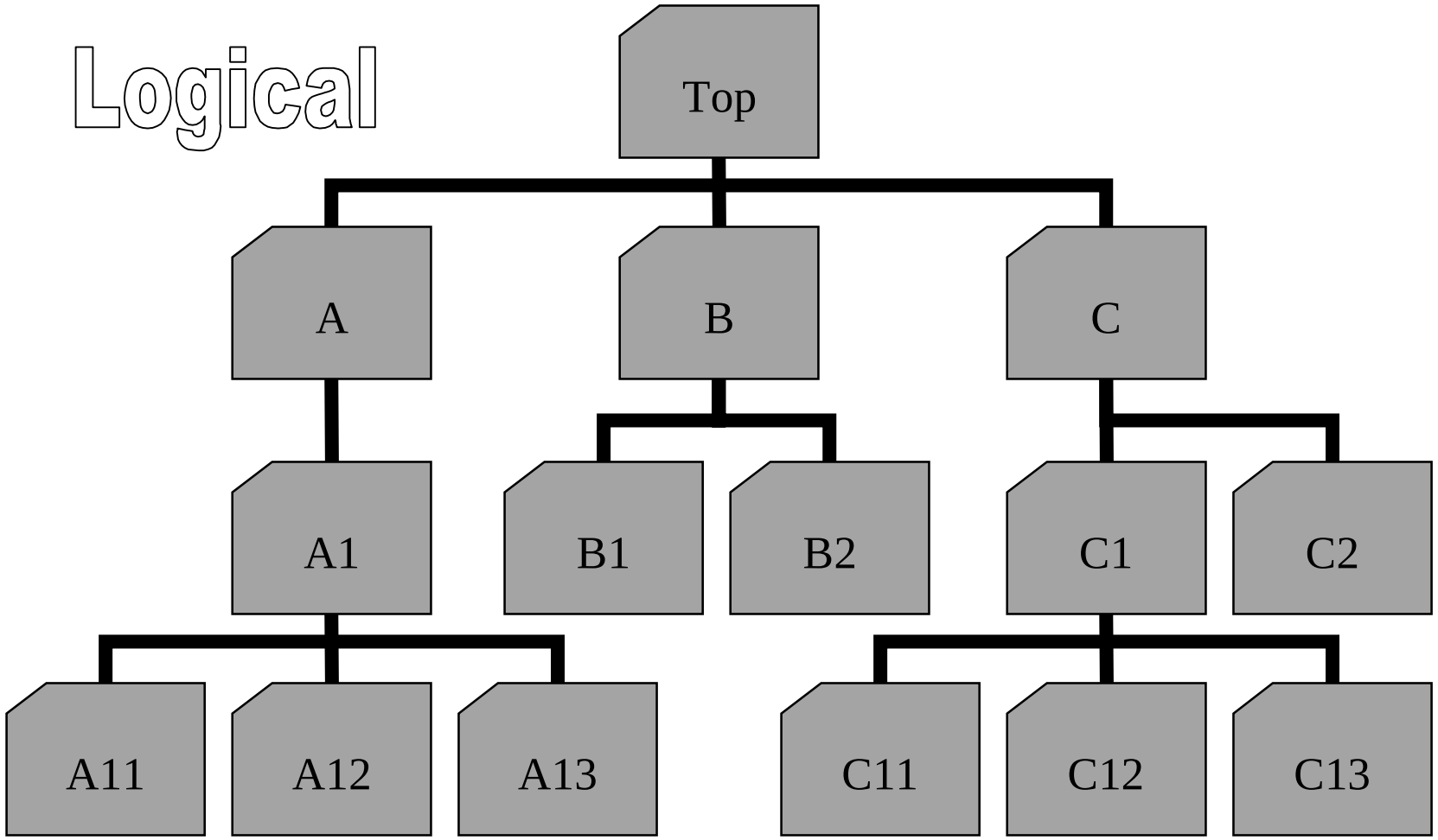
Categories of Constraints (2)

- Attributes
  - Physical: location, orientation, shape and blockage
  - Design for Test
  - Special conditions
    - Don’t care conditions
    - Mutually exclusive conditions
    - Infeasible states (false paths, feedback loops)
- Parameters
  - Logic Architecture
  - Boundary Conditions
  - Detailed implementation controls
  - File pointers: parasitics, scripts, detailed wiring, etc.

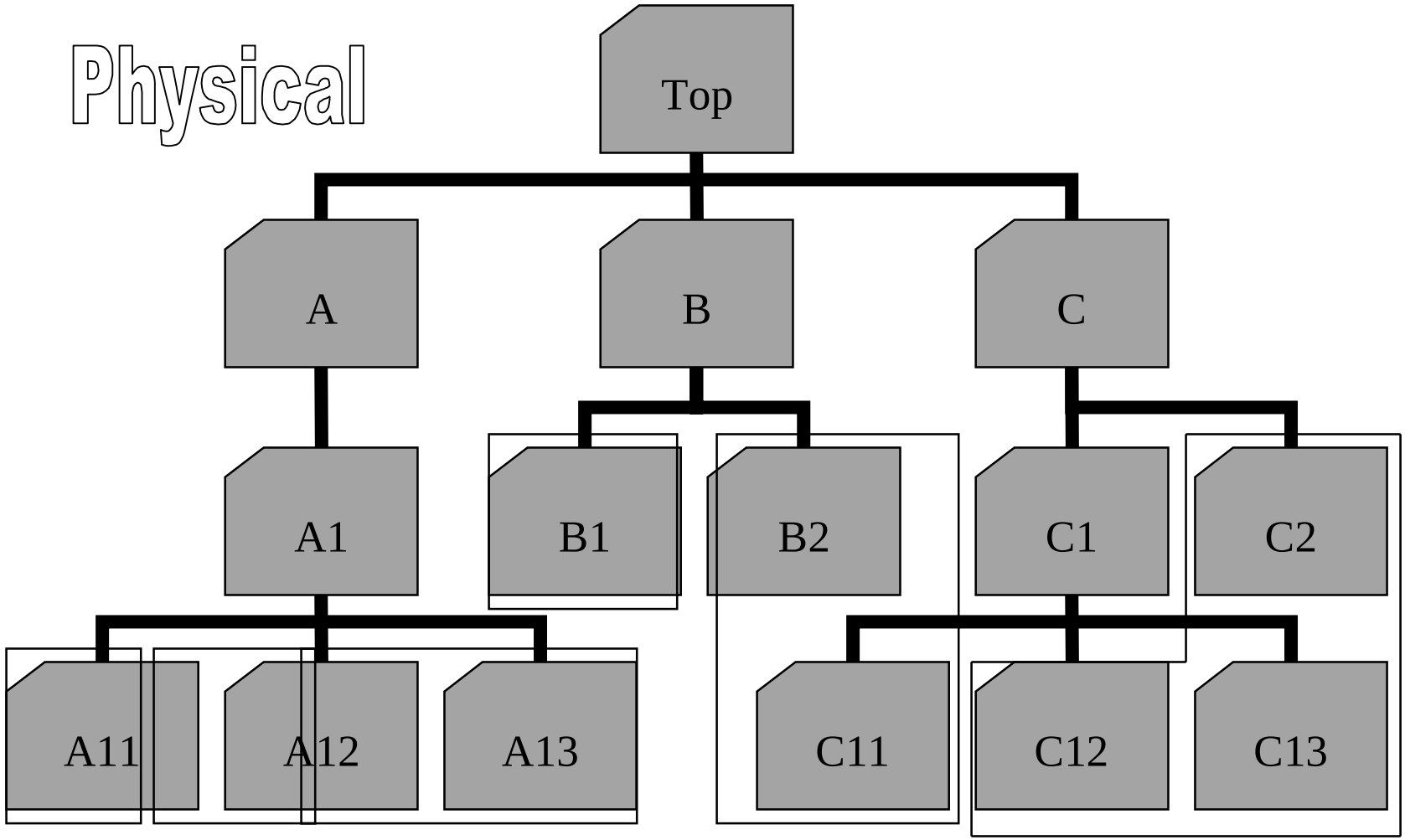
Refinement of Design Constraints



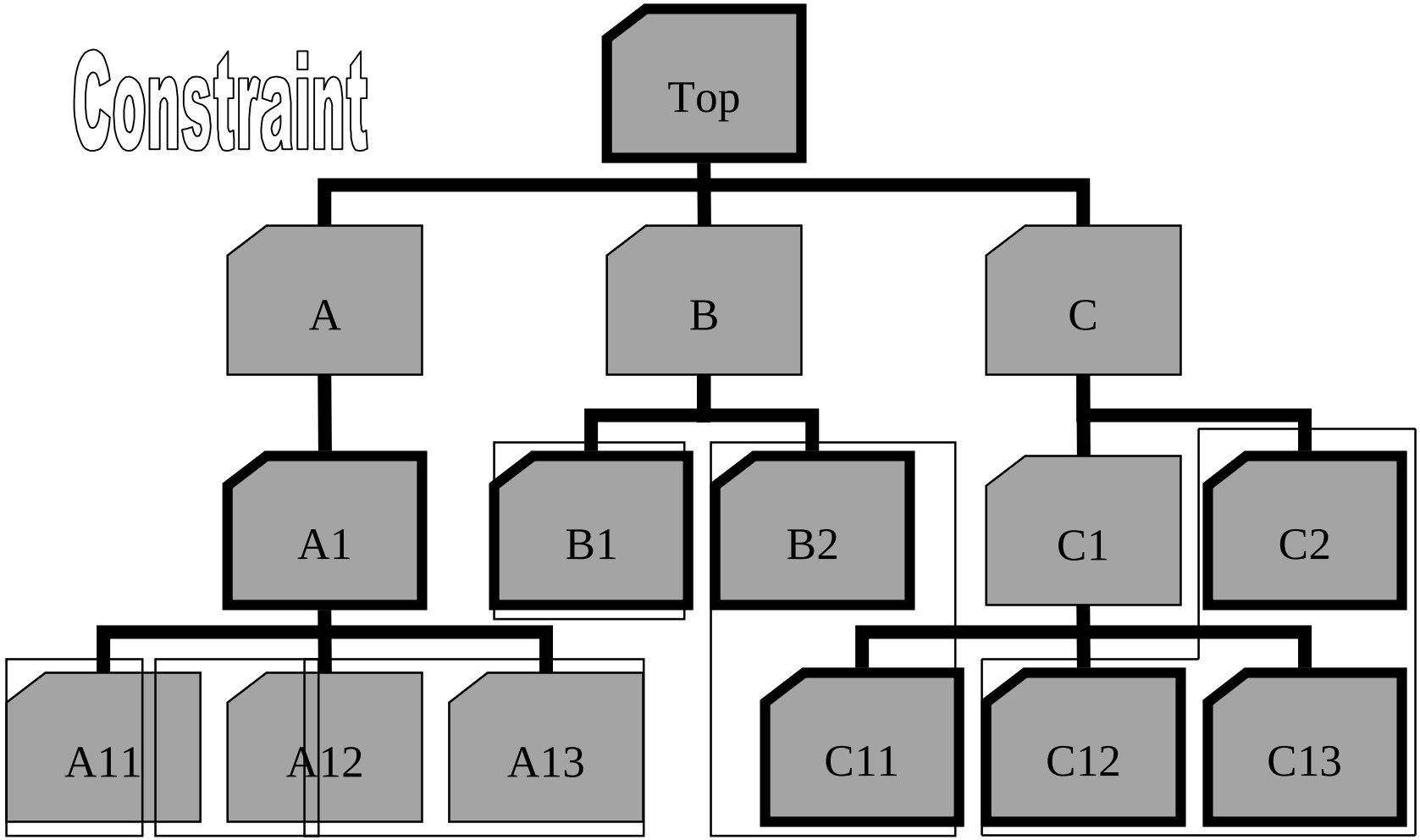
Constraint Hierarchy Modeling (1)



Constraint Hierarchy Modeling (2)



Constraint Hierarchy Modeling (3)



Domain of Constraints

- Timing
- Area
- Power
- Logic Architecture
- Clocking
- Test
- Signal Integrity
- Manufacturability
- Reliability
- Life Cycle