Synthesis Guidelines
Macro Synthesis Strategy

- **Strategy**
  - Top down for designs < 100K gates
    - simpler
  - Bottom up for designs > 100K gates
    - Faster run time

- **Timing constraints**
  - Key to successful synthesis and physical design
  - Start as the part of specification and reviewed regularly
  - Including
    - Clock definition
    - Setup time for macro synchronous input
    - Clock to output delay for macro synchronous output
    - Input/output delay for all combinational path
    - Input driving and output loading
    - Operating conditions
Subblock Synthesis Strategy

- Similar guidelines as macro synthesis strategy
- Start **preliminary synthesis ASAP**
  - Identify and fix timing problems early
  - Modify or restructure the RTL according
  - Target: within 10 ~ 20% of the final timing budget
Synthesis Process

• Subblock level
  – Complete each subblock using specified timing
  – Perform characterization for each block
  – Refine the constraints and resynthesize
  – Iterate if required

• Macro level
  – Top down
    • Perform characterization on macro using top level constraints
    • Incremental compile
  – Bottom up
    • Compile each subblocks using timing budget
    • Perform characterization on macro using top level constraints
    • Incremental compile

• Preserve clock and reset networks
  – Set infinite driving strength
Synthesis Related Checking

• Before synthesis
  – Run linter
    • Unintentional latch, non-synthesizable RTL, incomplete sensitivity list, …
  – Syntax checking of synthesis script
  – Elaboration checking
    • Types of inferred sequential elements, resource allocations

• After synthesis
  – Combinational loop checking
  – Latch checking
  – Design rule violation checking
  – Testability checking
  – Equivalence checking
    • Check equivalence between RTL and synthesized netlist
Coding Guidelines for Synthesis Scripts

• Header
• Comments
• Under revision control system
• No hard-coded numbers and path
  – Variables used in the body and values set at the top
• As simple as possible
• Common comments reside in a single setup file
  – Library path, search path…
• Thorough test of scripts for parameterized soft macros