

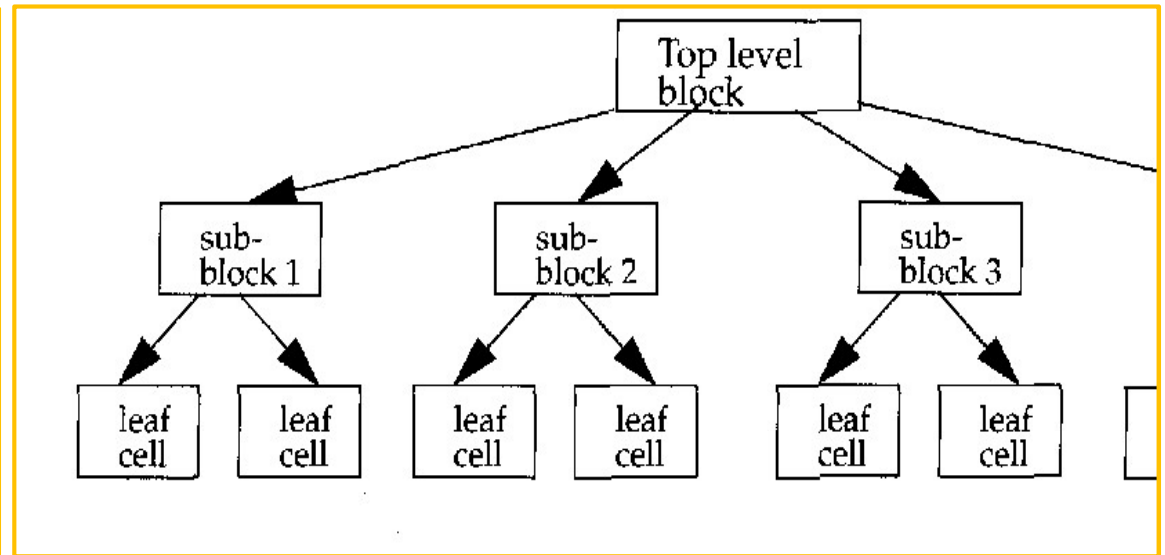


DESIGN METHODOLOGIES

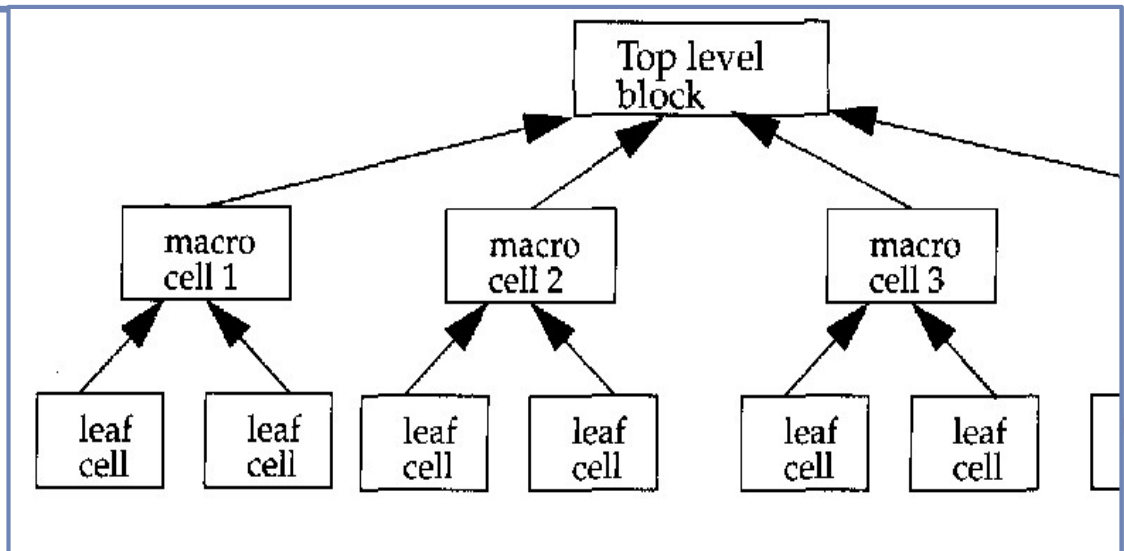
DESIGN METHODOLOGIES

There are two basic types of digital design methodologies: a top-down design methodology and a bottom-up design methodology

In a top-down design methodology, we define the top-level block and identify the sub-blocks necessary to build the top-level block. We further subdivide the sub-blocks until we come to leaf cells, which are the cells that cannot further be divided.

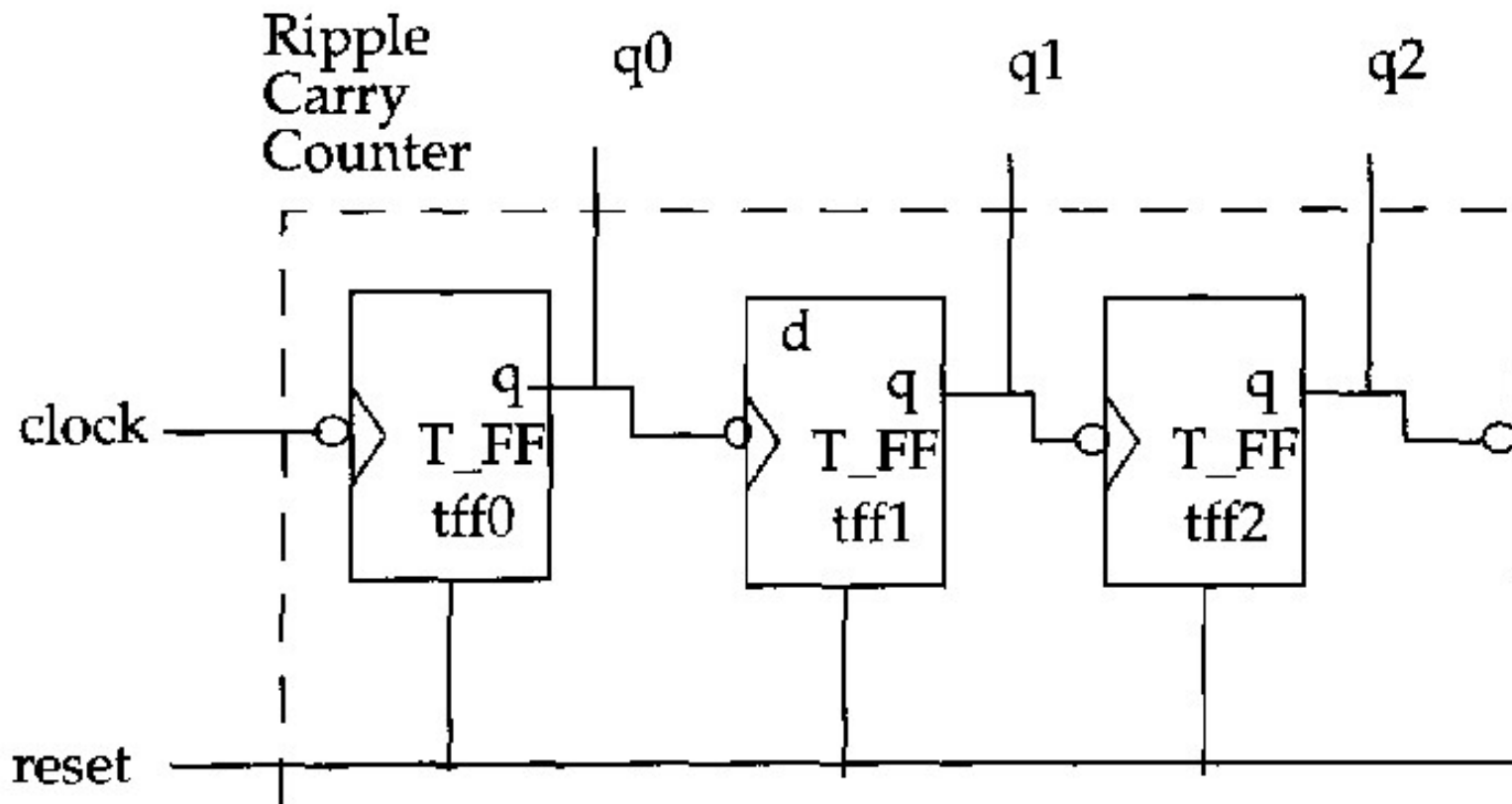


In a bottom-up design methodology, we first identify the building blocks that are available to us. We build bigger cells, using these building blocks. These cells are then used for higher-level blocks until we build the top-level block in the design



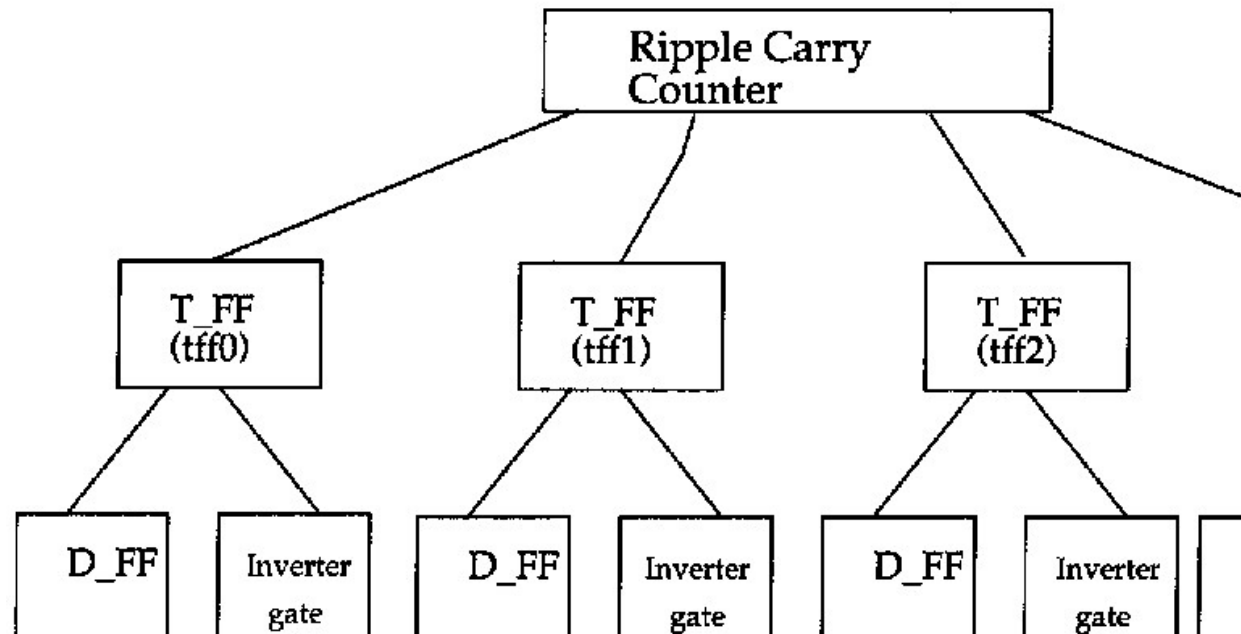
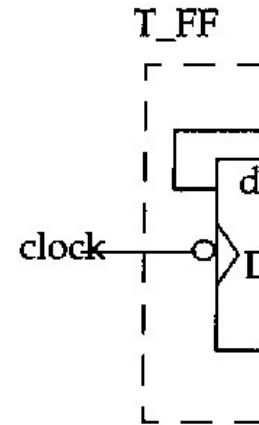
Design Methodologies

4-BIT RIPPLE CARRY COUNTER



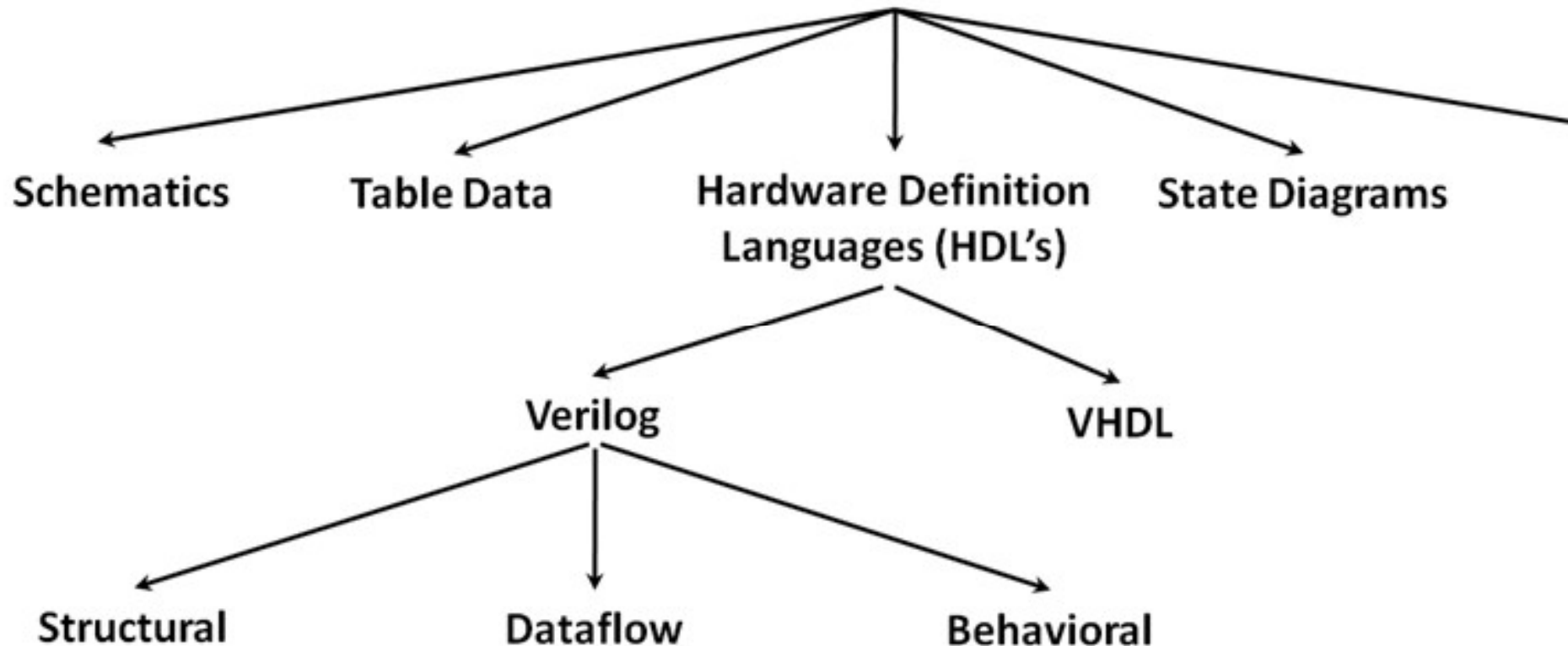
T-FLIPFLOP AND THE HIERARCHY

reset	q_n	q_{n+1}
1	1	0
1	0	0
0	0	1
0	1	0
0	0	0



Electronic Design & Automation (EDA) Tools

EDA Design Tool Suites — e.g. Xilinx, Altera, ModelSim



Instances of other modules (objects) are interconnected with wires. **Outputs are type "wire"**

Assign statements for implementation of combination logic. **Outputs are type "wire"**

Always blocks using the event operator (@) using higher level logic decision statements. **Outputs are type "reg"**

IMPORTANCE OF HDLS

- Retargeting to a new fabrication technology
- Functional verification earlier in the design cycle
- Textual concise representation of the design
 - Similar to computer programs
 - Easier to understand

POPULARITY OF VERILOG HDL

○ Verilog HDL

- General-purpose
- Easy to learn, easy to use
- Similar in syntax to C
- Allows different levels of abstraction and mixing them
- Supported by most popular logic synthesis tools
- Post-logic-synthesis simulation libraries by all fabrication vendors
- PLI to customize Verilog simulators to designers' needs