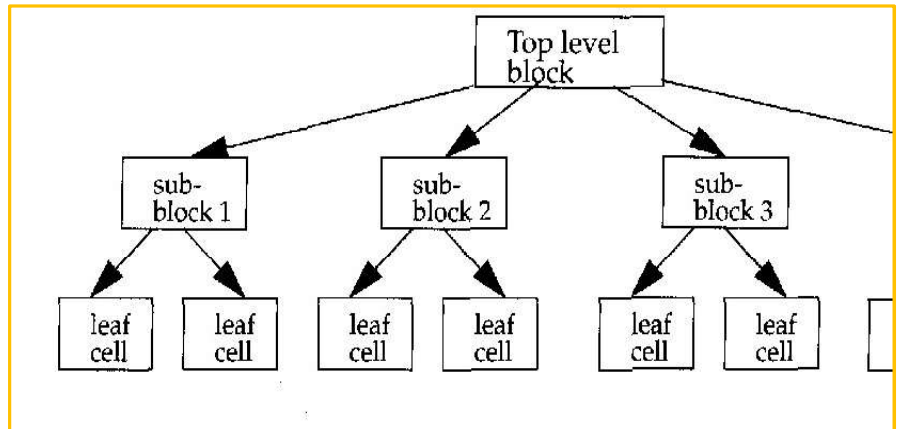


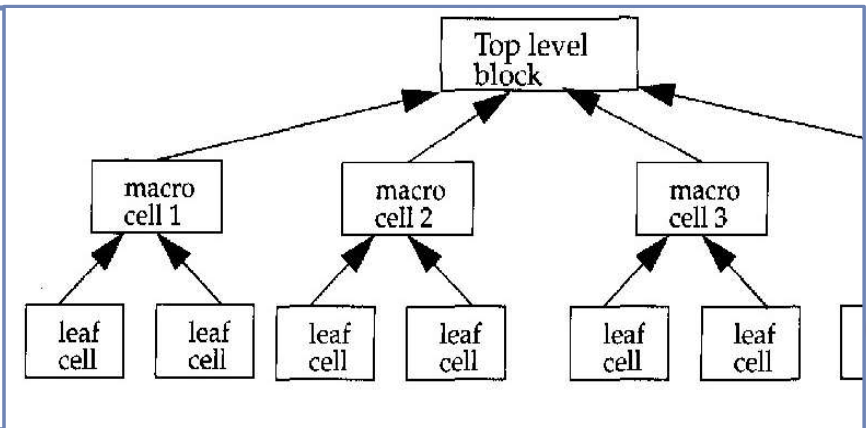
# DESIGN METHODOLOGIES

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.

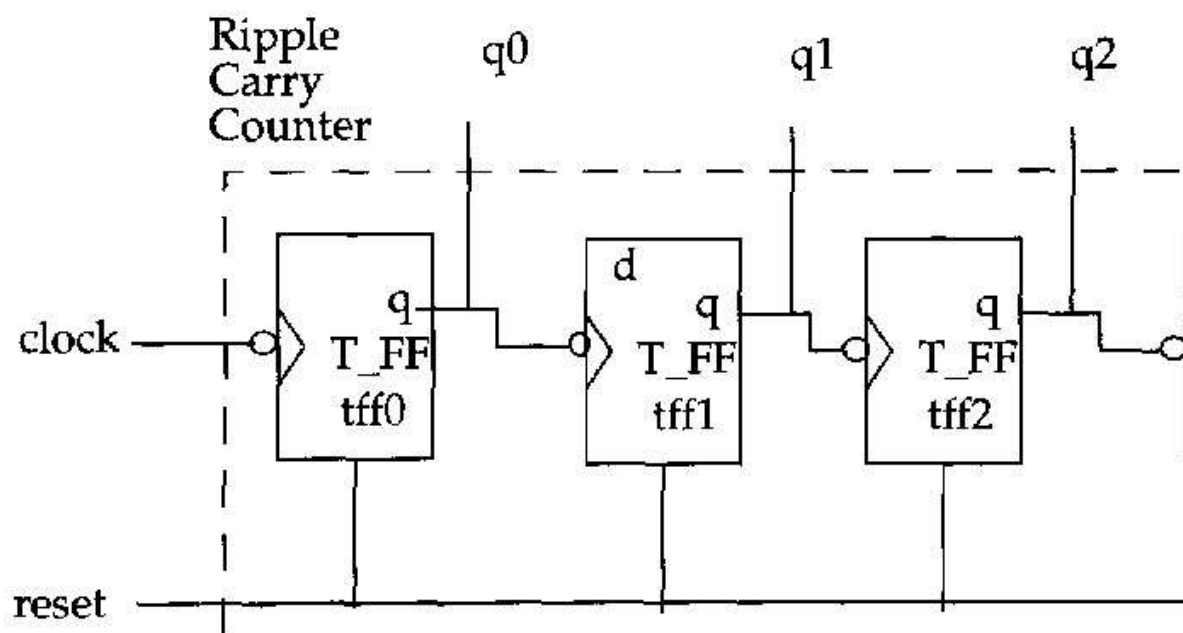


In a bottom-up design methodology, we first identify the building blocks that are available to us. We build bigger cells, using these building blocks. These cells are then used for higher-level blocks until we build the top-level block in the design



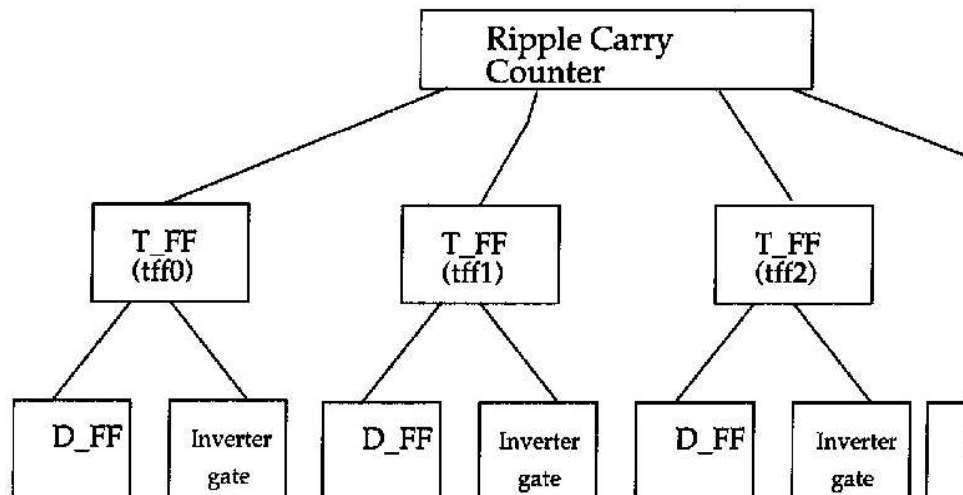
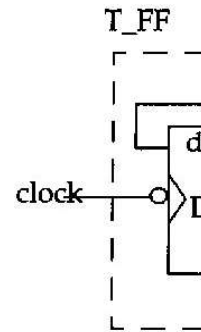
# Design Methodologies

## 4-BIT RIPPLE CARRY COUNTER



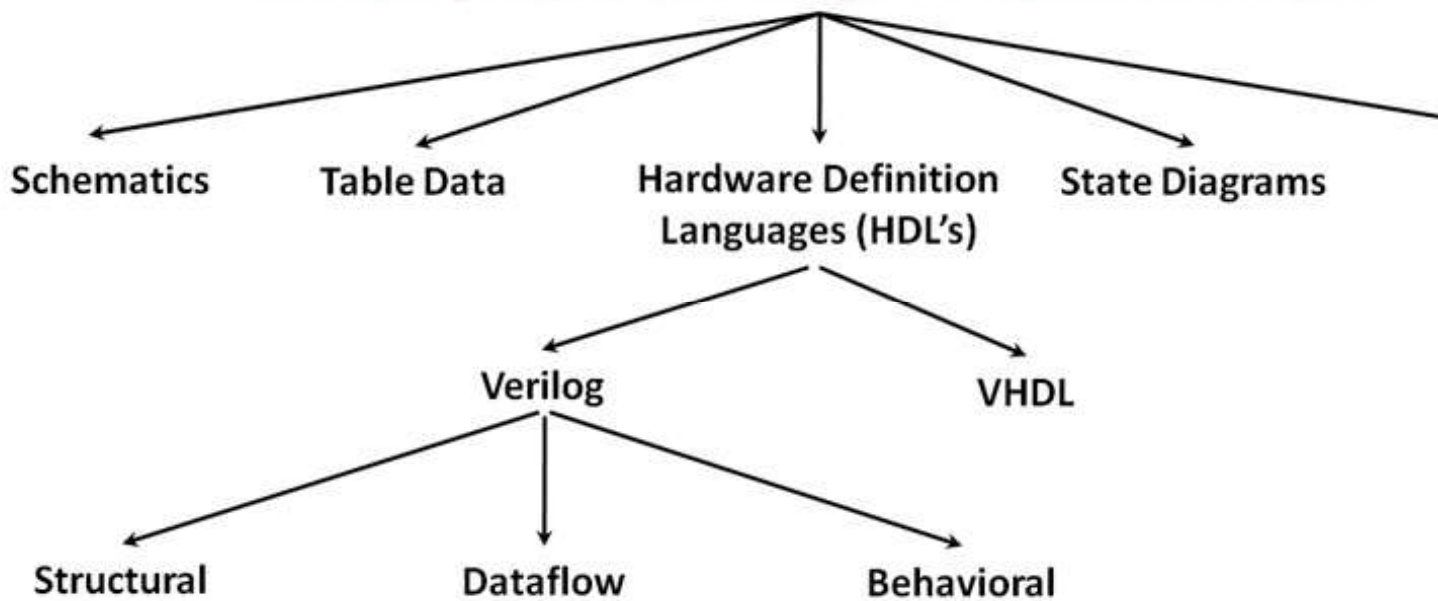
# T-FLIPFLOP AND THE HIERARCHY

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) T

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