

Chips

- Integrated circuits consist of:
 - A small square or rectangular “die”, $< 1\text{mm}$ thick
 - Small die: $1.5\text{ mm} \times 1.5\text{ mm} \Rightarrow 2.25\text{ mm}^2$
 - Large die: $15\text{ mm} \times 15\text{ mm} \Rightarrow 225\text{ mm}^2$
 - Larger die sizes mean:
 - More logic, memory
 - Less volume
 - Less yield
- Dies are made from silicon (substrate)
 - Substrate provides mechanical support and electrical common point

VLSI design styles– An Introduction

By

K. Vasu

Senior Application Engineer

VLSI & EH group

Unistring Tech Solutions Pvt. Ltd

D10, 5th Floor, Eureka court, Beside Image hospitals, Ameerpet,
Hyderabad, ph:040-23732798, 09440318188

www.unistring.com

String Technologies

#309, Vederi complex, opp Dilshuk Nagar bus Depot, Dilshuk nagar, Hyderabad,
ph: 040 – 24151900

www.stringtechnologies.net

What is VLSI

- What is VLSI?
 - “Very Large Scale Integration”
 - Defines integration level
 - 1980s hold-over from outdated taxonomy for integration levels
 - Obviously influenced from frequency bands, i.e. HF, VHF, UHF
 - Sources disagree on what is measured (gates or transistors?)
- SSI – Small-Scale Integration ($0-10^2$)
- MSI – Medium-Scale Integration (10^2-10^3)
- LSI – Large-Scale Integration (10^3-10^5)
- VLSI – Very Large-Scale Integration (10^5-10^7)
- ULSI – Ultra Large-Scale Integration ($\geq 10^7$)

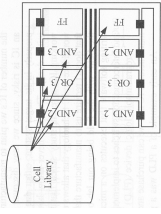
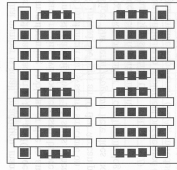
VLSI design Methodologies

- Full-Custom VLSI Design
- Semi-Custom VLSI Design

Standard cell based IC technology

Structured ASIC IC technology

Programmable Logic Device (PLD) IC technology

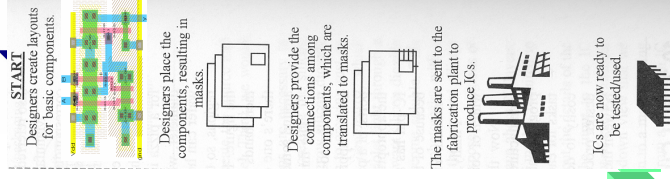
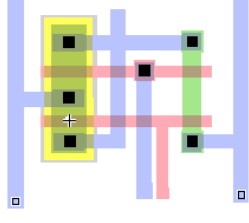


Issues in Full Custom design (continued ..)

- Best size, power, performance
- Hand design
- Physical design tools

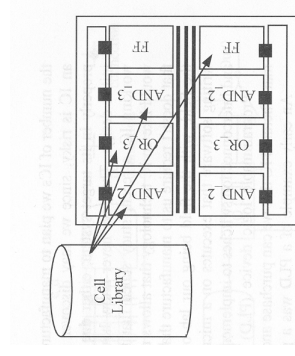
Issues in Full Custom design

- Placement
- Routing
- Sizing
- Design Rules



Semi-Custom standard cell based IC Technology

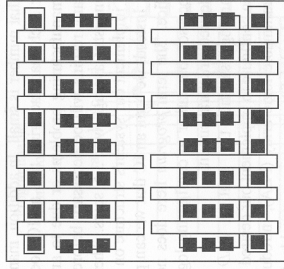
- Standard Cell
 - A library of pre-designed cell
 - Place and route
 - Integrate to yield final layout



Semi-Custom Gate Arrays Technology

•Gate Arrays

- Array of prefabricated gates
- “place” and route
- Higher density, faster time-to-market
- Does not integrate as well with full-custom

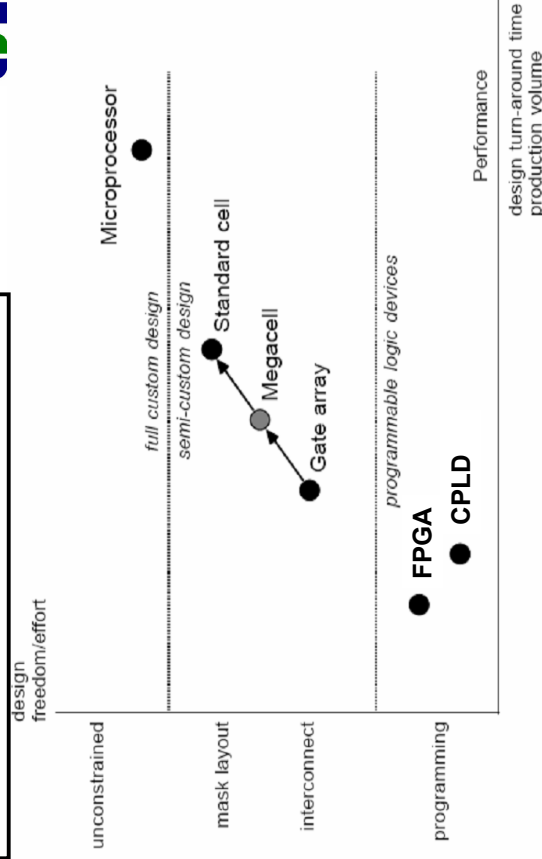


Semi-custom Programmable Logic Device (PLD) IC Technology

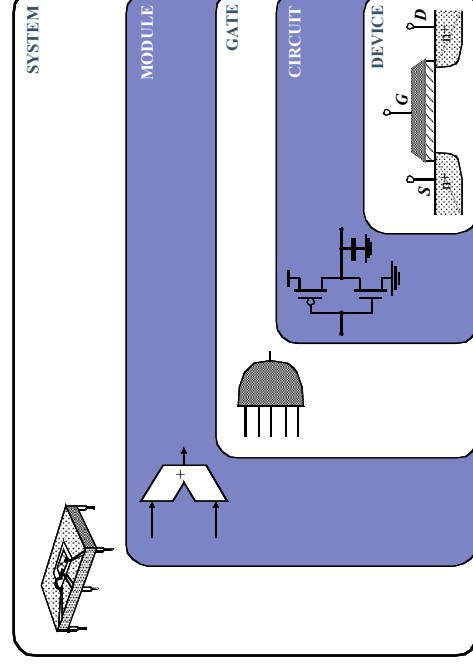
(1) Field Programmable Gate Arrays (FPGA)

- Medium granularity devices
 - Member of class of devices called Field Programmable Logic (FPL)
- ### (2) Complex Programmable Logic Devices (CPLD)
- Large granularity devices
 - Typically consists of 50 Simple Programmable Logic Devices (SPLD)

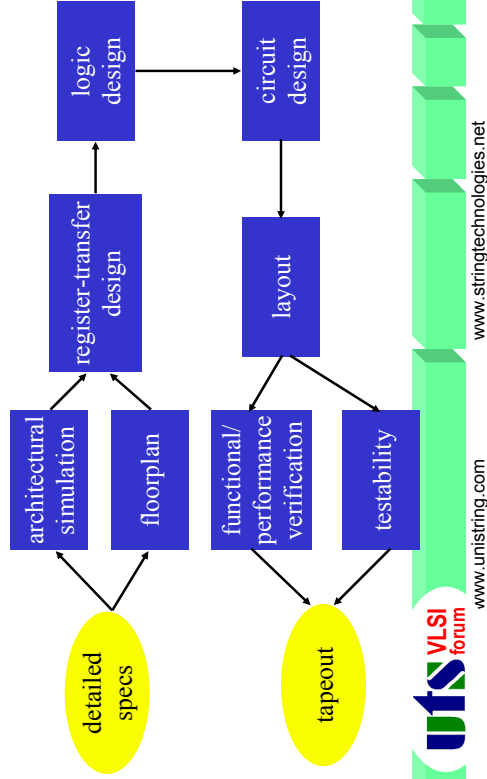
Full-custom Vs Semi-custom



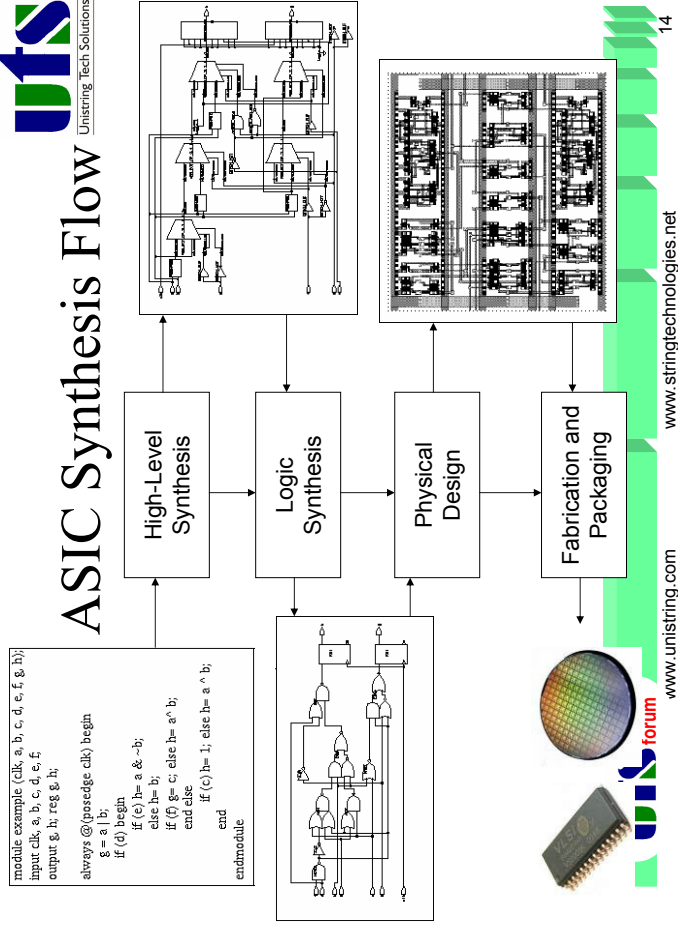
Design Abstraction Levels



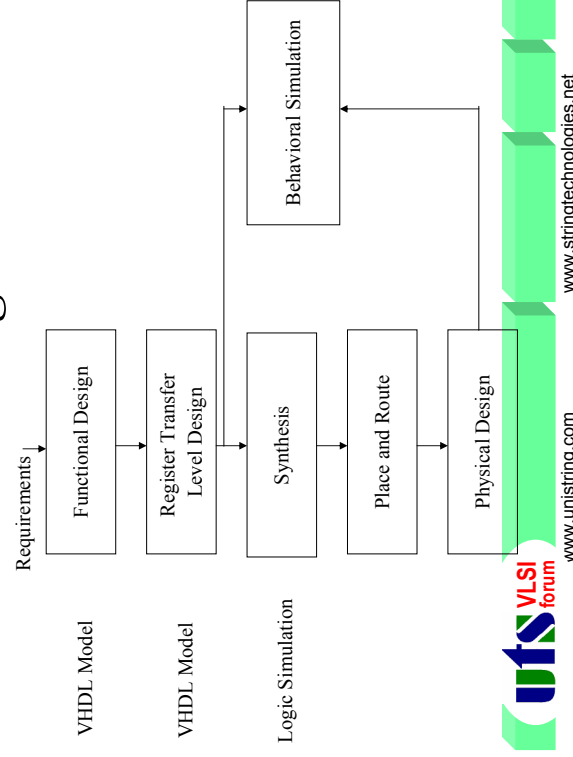
ASIC design flow



ASIC Synthesis Flow



FPGA Design Process



Thank you