

## VHDL 2BA4 Functional Design

- ▶ Functional design is based on:
  - ▶ Requirement specification
- ▶ Target implementation influences the design flow
  - ▶ CPU
  - ▶ ASIC (Application Specific Integrated Circuits)
  - ▶ FPGA (Field Programmable Gate Arrays)
- ▶ Requirements:
  - ▶ Operation, Performance, Interface, Cost, Size, Power dissipation...
- ▶ Functional design may be verified through simulation

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## VHDL 2BA4 Register Transfer Level Design (RTL)

- ▶ This step in the design flow transforms the high-level functional design into a description at the register level.
- ▶ The Register Transfer Level Design describes the design at the following level of abstraction:
  - ▶ Registers
  - ▶ Memory
  - ▶ Arithmetic Units
  - ▶ State Machines
- ▶ RTL designs are validated through simulation

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## VHDL 2BA4 Logic Design

- ▶ At this stage in the design flow the register level transfer design is compiled into logic design.
- ▶ Again the design may be verified through simulation.
- ▶ Please note:
  - ▶ Simulation may be used to guaranty that the design meets the specification.
  - ▶ The simulation in every step in the design flow allows for the interception of errors early in the design.

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## VHDL 2BA4 Circuit Design

- ▶ At this stage in the design flow the logic design is compiled into circuit design.
- ▶ The step is strongly influenced by the target implementation.
- ▶ Again the design may be verified through simulation specifically through:
  - ▶ Timing simulation
  - ▶ Circuit analysis.

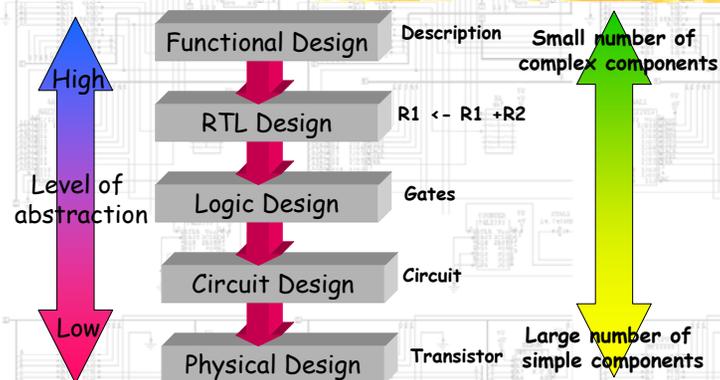
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## VHDL 2BA4 Physical Design

- ▶ In the final step in the design flow the circuit design determines the physical chip layout.
- ▶ Physical properties may be verified:
  - ▶ Chip area
  - ▶ Power dissipation
  - ▶ Clock frequency

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## VHDL 2BA4 Digital System Design Hierarchy



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## VHDL 2BA4 Hardware Description Languages

- ▶ Hardware Description Languages are used to:
  - ▶ Describe digital systems
  - ▶ Model digital systems
  - ▶ Design digital systems
- ▶ Hardware Description Languages:
  - ▶ VHDL, Verilog and more
- ▶ **VHDL**
  - ▶ **V**HSIC **H**ardware **D**escription **L**anguage
  - ▶ **V**HSIC
    - ▶ **V**ery **H**igh **S**peed **I**ntegrated **C**ircuit **L**anguage

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