What is VLSI?

Very Large Scale Integration (noun)

Very Large Scale Integrated (adjective)

example: VLSI Circuit

definition - 100s of thousands of transistors on a single integrated circuit (IC) or “chip”

Hitory of VLSI:

late 40s Transistor invented at Bell Labs

late 50s First IC (JK-FF by Jack Kilby at TI)

early 60s Small Scale Integration (SSI)
10s of transistors on a chip

late 60s Medium Scale Integratoin (MSI)
100s of transistors on a chip

early 70s Large Scale Integration (LSI)
1000s of transistor on a chip

early 80s VLSI 10,000s of transistors on a chip (later 100,000s & now 1,000,000s)

Ultra LSI is sometimes used for 1,000,000s

VLSI Implementation Media

Media requiring fabrication:

Full Custom - design and physical layout at transistor level

Standard Cell (aka Semi-Custom) - design and physical layout at gate/flip-flop level

Gate Array - design and physical layout at gate level (like standard cell but with some prefabrication of wafer)

Prefabricated media:

Field Programmable Gate Arrays (FPGAs) - design at gate/flip-flop or register transfer level

Complex Programmable Logic Devices (CPLDs) - design at gate/flip-flop or register transfer level

Programmable Logic Devices (PLDs) - design at gate/flip-flop level

System-on-Chip (SoC) may incorporate several of these implementation media on a single chip

Advantages of VLSI

(*when compared to of-the-shelf SSI/MSI/LSI*)

smaller size

lower cost

lower power

higher reliability

more functionality

Disadvantages of VLSI

(*when compared to pre-fabricated media like FPGAs*)

long design and fabrication time

higher risk to project