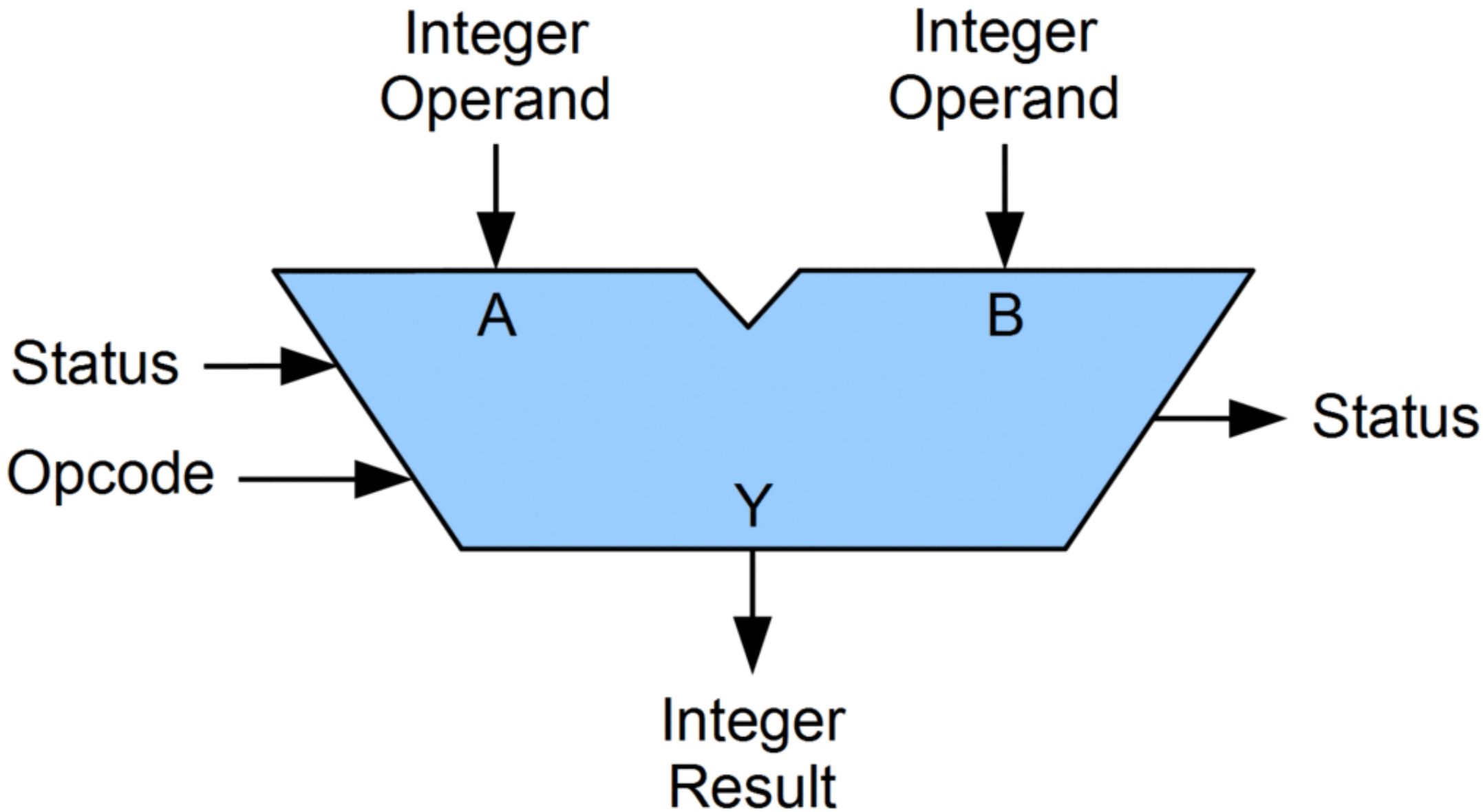
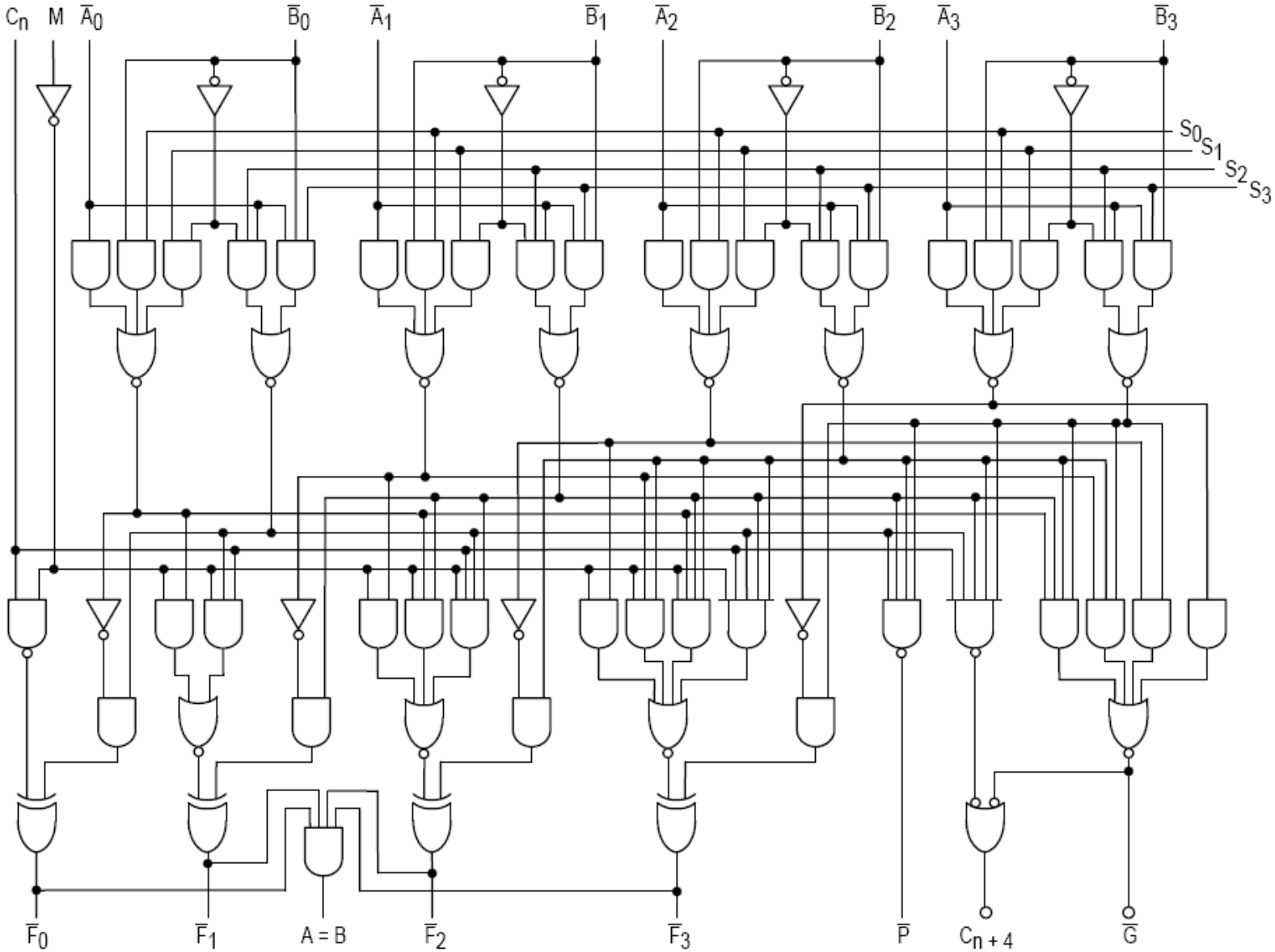
Arithmetic Logical Unit

Kukarcev KS, 4167

What is it?

- ALU (arithmetic unit block) – a fundamental building block of many computer curcuits.
- CPU, FPU, GPU.
- carries out arithmetic and logic operations on the operands in computer instruction words.
- Was proposed by John von Neumann in 1945

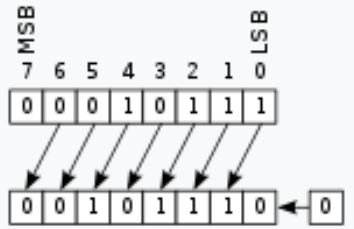
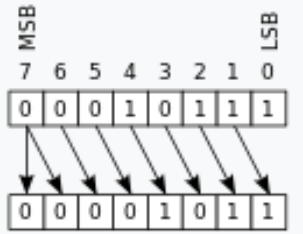
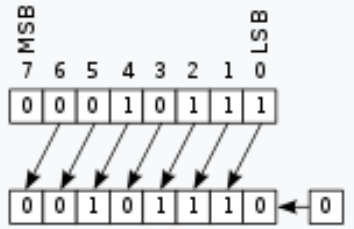
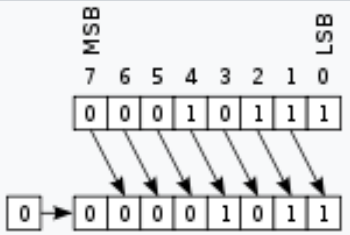
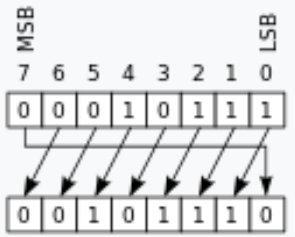
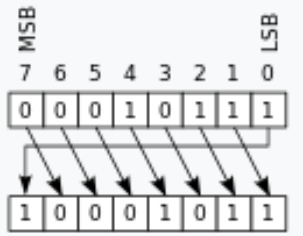
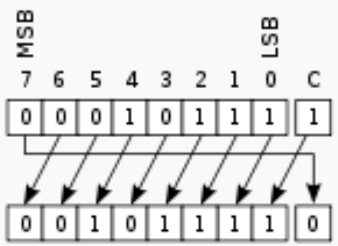
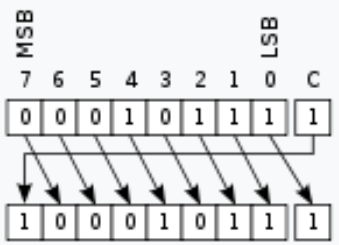

Integer
Operand
Integer
Operand
A
B
Status
Opcode
Y
Status
Integer
Result



4-bit ALU by Texas Instruments

Logic L4C381GC-40

Bit shift examples for an eight-bit ALU

Type	Left	Right
Arithmetic shift		
Logical shift		
Rotate		
Rotate through carry		

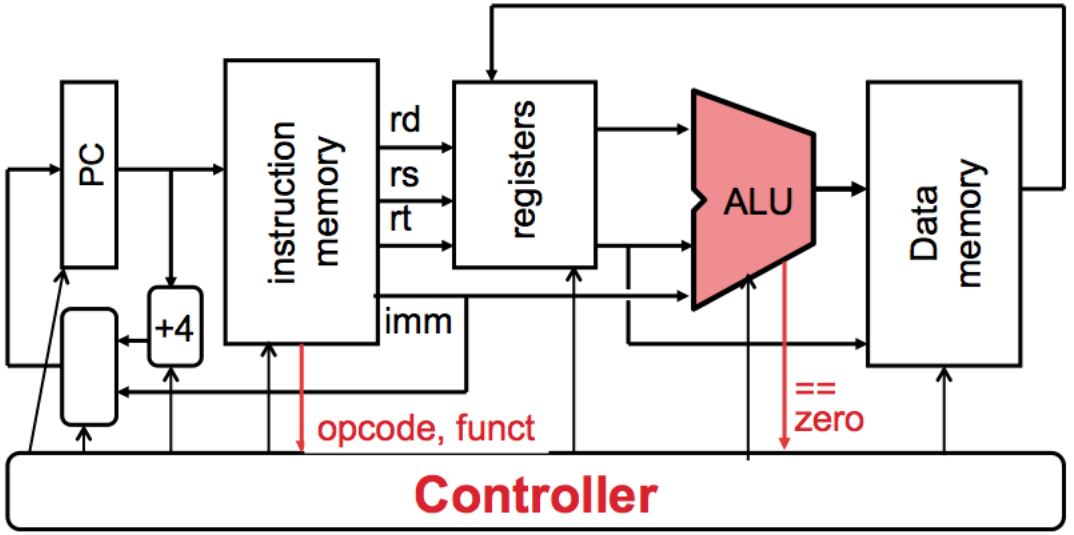
Routines

- Logical Operations: AND, OR, NOT, XOR, NOR, NAND, etc.
- Bit-Shifting Operations
- Arithmetic Operations: +, -.

Multiplication and division are implemented by “+” and “–” respectevly,

Application

- Multiple-precision arithmetic
- Complex operations



Summary

- ALU can perform many function
- ALU chips can be combined together to form larger ALU chips
- ALU's form the basis of datapaths
- Connected to RAM as control paths

Thanks for your attention