

CS61C Summer 2014

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Exponent \rightarrow floating point = + add bias
float point \rightarrow exponent - - subtract bias
Anything = NaN = f
 $+ x(1 + frac) \times 2^{(exp - bias)}$

CALL
Linking branch = PC - relative (never relocate), ^{obsolete/external/data} need

.o \rightarrow .out
Combined several files into 1

Formulas

CPI = clock cycles per instruction. $CPI_{total} = CPI_{base} + avg \text{ number of cycles} \times \text{sum of cycles} \times \text{frequency}$

CPU time = Instructions \times CPI \times clock period time

AMAT:

(Average access time) = hit time + miss rate \times miss penalty

Memory stall cycles $\approx \frac{\text{accesses}}{\text{instructions}} \times MR \times MP$

Access cycle/sec

direct mapped = $2^{\text{bits offset}}$
set associative = look and find
fully associative = just buy bus

T1: 0 total bus power = total + tag
cache block
tag (rows)
dirty + valid
write back

next fit / best/achar hit

$$AMAT_L1 = HT_1 + MR_1 \times AMAT_L2$$
$$= HT_1 + MR_1 (HT_2 + MR_2 \times MP)$$

& mask/and all become 0 unless both 1s
| setter all become 1 unless both 0s
^ flip xor remainder become 1, else 0

MMU

r-type always 0 opcode (branch)

$i = j \& ja$ only $i = \text{not not for destination}$

caller saves every this but \$j
address detects sign direction







$$new_PC = PC = PC + 4 \times 4 \text{ times}$$

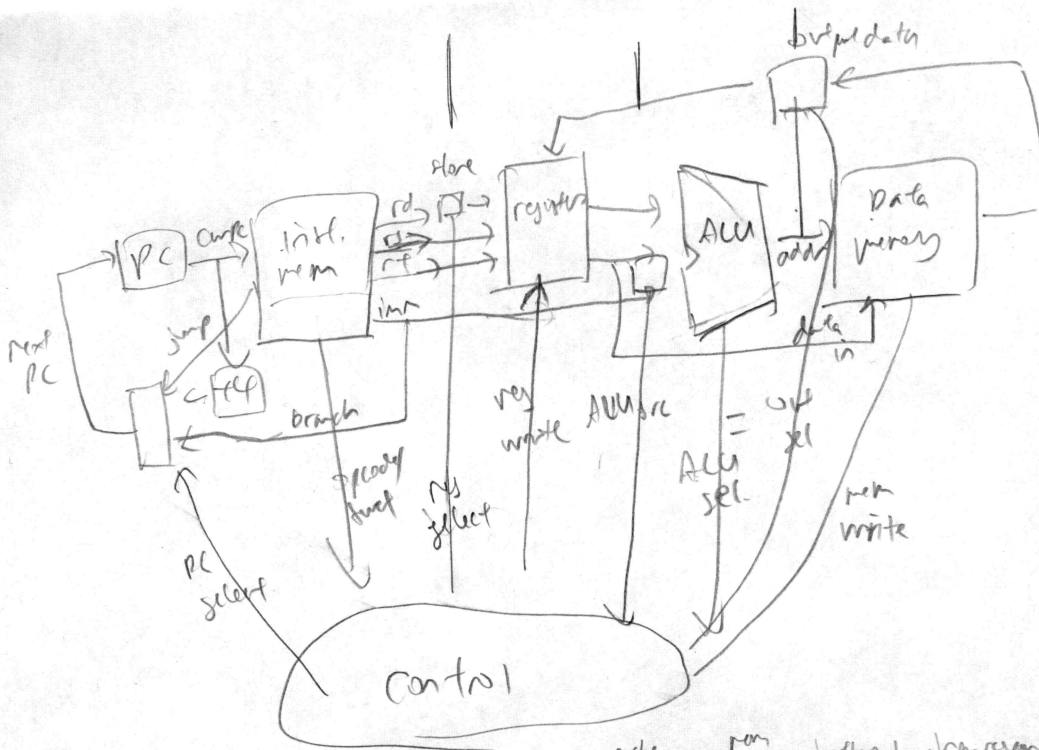
symbol table vs relocation table
ISA - extended

Hamming Code

parity = 2^n checks of # of 1s is even for every 2^n bits
SED = error detection +1
SEC = error correction +2

RAID

- RAID 0 - Data striping
- RAID 1 - Disk mirroring 
- RAID 2 - Bit striping / ECC disks 
- RAID 3 - Byte striping w/ parity disks 
- RAID 4 - Block striping w/ parity disks 
- RAID 5 - Block striping w/ interleaved parity 
- RAID 6 - Block striping w/ 2 interleaved parity disks 



1. Pipeline

Structural - same + some (read/write)
 Control - non-sequential / branch
 Data - data dependencies from earlier.

clock

clk - to - q. X reg, flip X / + logic
 pipeline = each half

Boolean Algebra

- $A + A = A$
- $A \cdot A = A$
- $A + AB = A$
- $(A + B)(A + \bar{B}) = A$
- $A + \bar{A}B = A + B$
- $A(\bar{A} + B) = AB$
- $(\overline{A + B}) = \bar{A}\bar{B}$
- $(\overline{AB}) = \bar{A} + \bar{B}$

MoESI =	cache update	mem update	others have copy?	Can respond to other's needs	Can read w/o change still
Modified	✓	X	X	✓ req	✓
Shared	✓	✓	X	✓ op	X
Exclusive shared	✓	?	?	X	X
Invalid	X	?	?	X	X

power = capacitance load x voltage² x switching frequency = $C \cdot V^2 \cdot f$