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Why is RPi4 so much faster than FRDM-KL25Z?

- Clock speed. 1.8 GHz vs 48 MHz
- RAM size — Virtual Memory
  speed — fast enough? 32 bits at 1.8 GHz
- Multicore — 4 cores

(— Looser constraints)

- Graphics Processor
- Better Instructions
- Better μArch. (Implementation)

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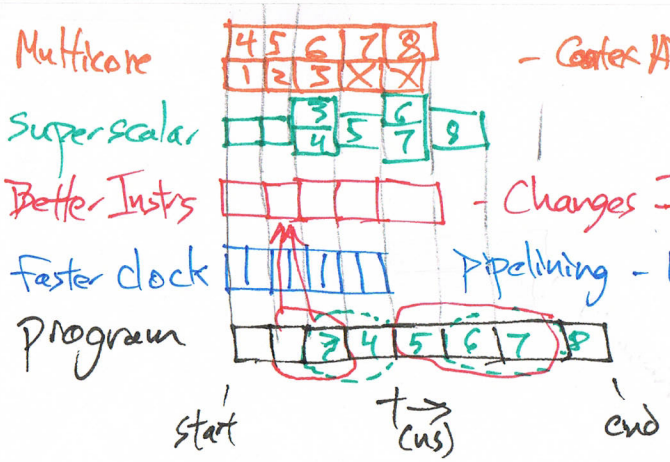
3/23/21 A



- Cortex A72 - 4 cores

- Changes ISA → Change program, compiler

pipelining - 16 pipestages, 1.5 GHz vs 48 MHz

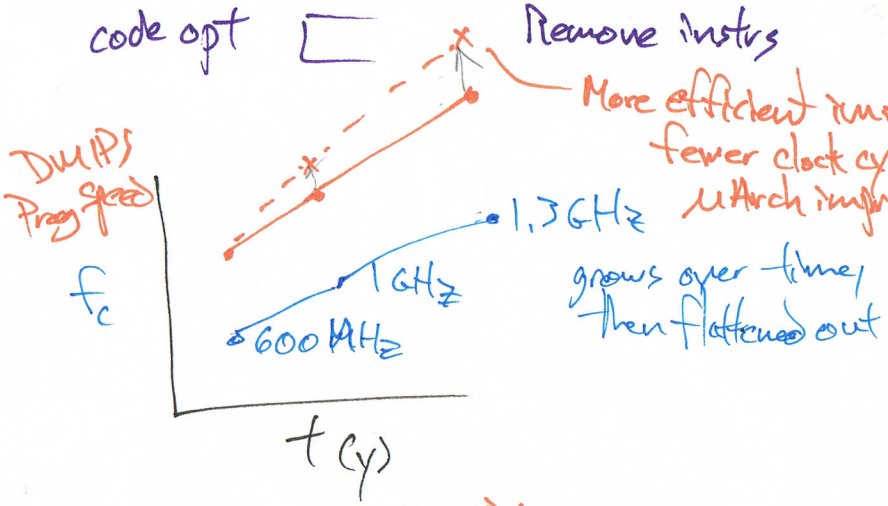
$\frac{16}{2} = 8$

$\frac{16}{48\,MHz} = \frac{1}{24\,MHz} = 42\,ns$

2 stage

$\frac{1.5\,GHz}{48\,MHz} \approx \frac{1.5\,GHz}{0.05\,GHz} = 30$

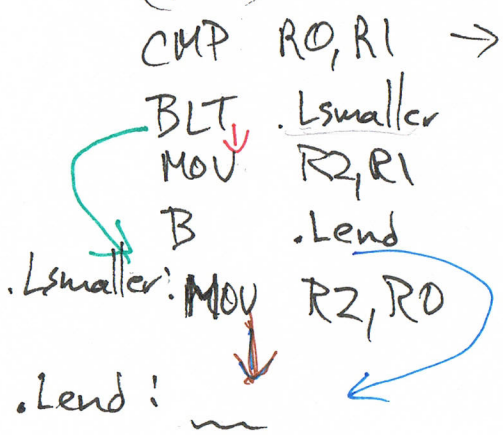
$\frac{16}{1.6\,GHz} = 10\,ns$

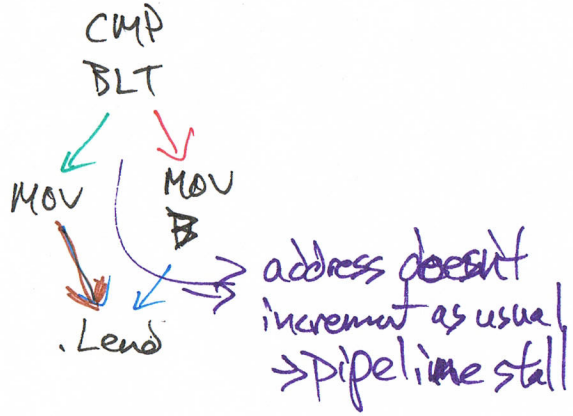


$\frac{DMIPS}{f_{clock}}$ Removes clock scaling impact

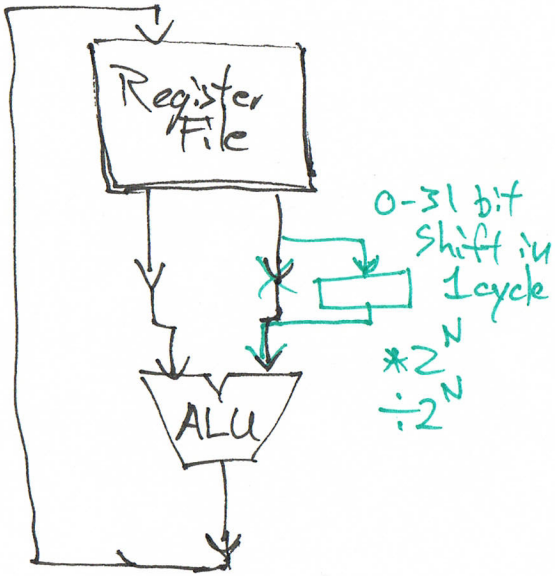
(Min)

```
CMP  R0,R1   -> Z, N, V, C
BLT  .Lsmaller   ; if R0<R1
MOV  R2,R1
B    .Lend
.Lsmaller: MOV  R2,R0
.Lend:
```



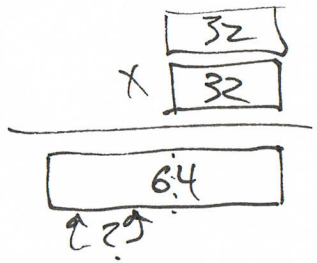


Barrel Shifter

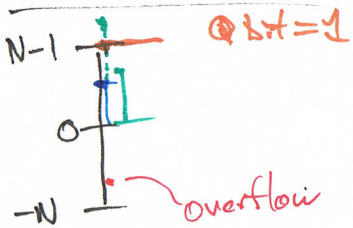



```
CMP    R0,R1
MOVGE  R2,R1   X
MOVLT  R2,R0
```

Multiply



Saturated Math



Bit Field