Lecture 1

- Form groups
- Odd weeks, no change to wednesday time
- Even weeks, though, only groups 1-3 come 3-4, groups 4-7 come 4-5
- Lecture slides were gone over and in this folder
- This is so fucking painful to sit through
- He is going over the non(?) credit homework and how to do them, really basic math

Lecture 2

- Equation sheet given out:

$Performance : \frac{1}{ExecutionTime}$

$ClockCycleTime : \frac{1}{ClockRate}$

$ExecutionTime1 : \frac{NumberofClockCycles}{ClockRate}$

$ExecutionTime2 : NumberofClockCycles * ClockCycleTime$

$NumberofClockCycles : NumberofInstructions * AverageCPI$

$ExecutionTime3 : \frac{NumberofInstructions*AverageCPI}{ClockRate}$

$ExecutionTime4 : NumberofInstructions * AverageCPI * ClockCycleTime$

$AverageCPI : \sum CPI_i * f_i, where i refers to instruction class i$

$SPECRatio : \frac{ReferenceTime}{ExecutionTime}$

$MIPSRating : \frac{ClockRate}{10^6 * AverageCPI}$

$MFLOPSRating : \frac{ClockRate}{10^6 * CPI_{FP}}$

Problem Solving

1.6

P	Clock	A	B	C	D
P1	2.5GHz	1	2	3	4
P2	3GHz	2	2	2	2

- Number of iterations $= 10^6$

- Frequency:

A	B	C	D
10	20	50	20
0.1	0.2	0.5	0.2

- Average CPI for P1 $= 1 * 0.1 + 2 * 0.2 + 3 * 0.5 + 3 * 0.2 = 2.6$
- Average CPI for P2 $= 2.0$
- Exec time of P1 $= \frac{2.6 * 10^6}{2.5 * 10^9} = 1.04ms$
- Exec time of P2 $= \frac{2.0 * 10^6}{3 * 10^9} = 0.67ms$
- Performance Ratio $= \frac{ExecTimeP1}{ExecTimeP2} = \frac{1.04}{0.67} = 1.532$
- P2 is 55.21 faster

1.7

Compiler	Number of Instructions	Exec Time
A	$1.0 * 10^9$	1.1 s
B	$1.2 * 10^9$	1.5 s

- Clock Cycle Time $=$ 1ns
- *Use E2*
- Use Execution Time 2 Formula
- $1.1 = 10^9 * CPI_A * 10^{-9}$
- $CPI_A = 1.1$
- $1.5 = 1.2*10^9 * CPI_B * 10^{-9}$
- $CPI_B = \frac{1.5}{1.2} = 1.25$
- *Use E1*
- $\frac{1.0*10^9*1.1}{ClockRate(P1)} = \frac{1.2*10^9*1.25}{ClockRate(P2)}$
- $\frac{ClockRate(P1)}{ClockRate(P2)} = 0.733$
- Clock Rate of P1 should be 26.7% slower

SPEC Ratio

- System Performance Evaluation C?

1.11

- SPEC CPU2006 Ref $=$ 9650 s
- Exec time $=$ 750 s
- Insreuction Count $= 2.389 * 10^{12}$

- $750 = 2.389 * 10^{12}$ * CPI * 0.333*10^{-9}
- SpecRation = $\frac{9650}{750 * whatevervalueisfromaboveIthink}$

1.116

- New 2
- Number of instructions = $2.389 * 10^{12} * 0.85$
- Execution Time = 700 s
- New Rate = 13.2
- $\frac{9650}{700} = 13.2$
- $700 = \frac{2.389 * 10^{12} * 0.85 * CPI}{4 * 10^{9}}$