Matthew R Munster
1/20/2015

COS 235 Homework #1 Chapter 2

10.) A benchmark program is run on a 40 MHz processor. The executed program consists of 100,000 instruction executions, with the following instruction mix and clock cycle count:

Instruction Type	Instruction Count	Cycles per Instruction
Integer Arithmetic	45,000	1
Data Transfer	32,000	2
Floating Point	15,000	2
Control Transfer	8,000	2

Determine the effective CPI, MIPS rate, and execution time for this program:

CPI Rate = (1*45+2*32 2*15+2*8)/100 = 1.55

MIPS Rate = 40MHz/(1.55*10^6) = 25.8

Execution Time = 100,000*1.55*(1/40) = 387.5

11.) Consider two different machines, with two different instruction sets, both of which have a clock rate of 200 MHz. The following measurements are recorded on the two machines running a given set of benchmark programs:

a.) Determine the effective CPI, MIPS rate, and execution time for each machine

b.) Comment on the results.

a.) Machine A:

CPI = (1*45+3*22+3*22+4*11)/100 = 2.21

MIPS = 200MHz/(2.21*10^6) = 9.95*10^-5

Execution Time = 18,000,000*2.21*(1/200) = 198900

b.) Machine B:

CPI = (1*42+2*33+4*8+3*16)/100 = 1.88

MIPS = 200MHz/(1.88*10^6) = 1.06*10^-4

Execution Time = 18,000,000*1.88/200 = 169200

The CPI and Execution Time in Machine A are higher than Machine B, but Machine B has a higher MIPS than Machine A.

12.) Early examples of CISC and RISC design are the VAX 11/780 and the IBM RS/6000, respectively. Using a typical benchmark program, the following machine characteristics result:

a.) What is the relative size of the instruction count of the machine code for this benchmark program running on the two machines?

The ratio between the two machines would be [x*18]/[12x*1] = 1.5

b.) What are the CPI values for the two machines?

Vax = 5MHz/1 MIPS = 5

RS/6000 = 25MHz/18 MIPS = 1.39

13.) Four benchmark programs are executed on three computers with the following results:
The table shows the execution time in seconds, with 100,000,000 instructions executed in each of the four programs. Calculate the MIPS values for each computer for each program then calculate the arithmetic and harmonic means assuming equal weights for the four programs, and rank the computers based on arithmetic mean and harmonic mean

The MIPS values are:

	Computer A	**Computer B**	**Computer C**
Program 1	100	10	5
Program 2	0.1	1	5
Program 3	0.2	0.1	2
Program 4	1	0.125	1

The Mean's and Ranks are:

	Arithmetic Mean	**Rank**	**Harmonic Mean**	**Rank**
Computer A	25.325	1	0.25	2
Computer B	2.8	3	0.21	3
Computer C	3.26	2	2.1	1

18.) The owner of a shop observes that on average 18 customers per hour arrive and there are typically 8 customers in the shop. What is the average length of time each customer spends in the shop?
If there are always 8 customers in the shop per hour and no more than 18 customers enter or leave the store within the same hour, then each customer averages about 26 minutes in the shop.

Syllabus Questions:

A.) Errata Sheet Attached

B.) Tania Rahman tania.rahman@maine.edu

C.) Office Hours and Phone Number:
Office : 339 Boardman Hall
Office Hours : TuTh 1-2 PM and by arrangement. Please reserve appointment times at http://geomarkowsky.com/wordpress/?page_id=611. Appointments must be made from a Gmail type of account such as an @maine.edu account.
Please make sure that the time zone setting on your account are set to the Eastern time zone. Details are on the website.
Phone : 207-581-3940

D.) TA Office Hours:
The teaching assistant is Tania Rahman <tania.rahman@maine.edu>. Her office hours are Thursday from 12:00-2:00 pm in room 206 Barrows Hall. She will also handle the recitation section on Thursdays at 2 PM in room 102 Murray Hall.

E.) The final examination will be held Thursday May 7, 2015 from 8 AM to 10 AM in 141 Bennett Hall

F.) My @maine.edu address

G.) The textbooks for the course are:
1. Computer Organization and Architecture 9th edition by William Stallings, 2013. Pearson, Boston.
2. The Elements of Computing Systems, by Noam Nisan and Shimon Schocken, 2005, MIT Press, Cambridge.

H.) The Grading Formula:
A 90 or above C 70 to 72
A- 85 to 89 C- 65 to 69
B+ 83 or 84 D+ 63 or 64
B 80 to 82 D 60 to 62
B- 75 to 79 D- 55 to 59
C+ 73 or 74 F 54 or below

I.) Academic dishonesty including cheating, plagiarism, and all forms of misrepresentation in academic work, is unacceptable at the University of Maine. As stated in the University of Maine's online "Student Handbook," plagiarism (the submission of another's work without appropriate attribution) and cheating are violations of the University of Maine Student Conduct Code. An instructor who has probable cause or reason to believe a student has cheated or plagiarized may act upon such evidence and report the case to the Department Chair.

J.) Yes you are required to report any reported sex discrimination

K.) If you want to talk in confidence to someone about an experience of sexual discrimination, please contact these resources:
For confidential resources on campus: Counseling Center: 207-581-1392 or Cutler Health Center: at 207-581-4000.
For confidential resources off campus: Rape Response Services: 1-800-310-0000 or Spruce Run: 1-800-863-9909.
Other resources: The resources listed below can offer support but may have to report the incident to others who can help:
For support services on campus: Office of Sexual Assault & Violence Prevention: 207-581-1406, Office of Community Standards: 207-581-1409, University of Maine Police: 207-581-4040 or 911. Or see the OSAVP website for a complete list of services at http://www.umaine.edu/osavp/

L.) If you have a disability for which you may be requesting an accommodation, contact Ann Smith, Director of Disabilities Services (121East Annex, 581-2319), as early as possible in the semester.

M.) #(207)581-3940 markov@maine.edu

N.) Professional Development opportunities are activities outside of school which a student can take part in to better themselves in their everyday lives. You can do up to 5 of these for the semester.

O.) There are 2 prelims

P.) I have used various forms of Unix such as Apple computers, Chrome OS, Xubuntu which is a form of linux, Raspbian which is linux for the RaspberryPi.

Q.) Yes I have used the terminal before on a few different devices

R.) There is 1 lecture on High Level Languages

S.) If I am falling behind, I should consult my academic advisors and yourself to fix the situation

T.) To make an appointment, I need to go to your wordpress site and sign up.

Errata File (September 2013)
Computer Organization and Architecture, Ninth Edition
William Stallings
(Prentice-Hall, ISBN 978-0-13-293633-X)

----------SYMBOLS USED----------
| ti = ith line from top; bi = ith line from bottom; Fi = Figure i |
| X -> Y = replace X with Y; Ti = Table i; Pi = Problem i |

---------- September LIST ----------

PAGE CORRECTION
168 F5.5: Abbreviation for Memory address register on left should be MAR
207 b5: SDD -> SSD
209 t5: SDD -> SSD

---------- February LIST ----------

---

127 b5: 2w -> 2w
b3: 2r -> 2r
132 t5: 2w -> 2w
174 t2—3: with a Hamming code of 0111 -> with a Hamming code of 0001
311 T9.1 3rd row,3rd column: 100
T9.2 1st row, 5th column: 1
373 Equation 11.3 should be $F = A B + BC$
395 t16 - t23, 4 times: A, B, and C -> C, B, and A
t17: least significant -> most significant
396 t2: interchange A and C
397 t3: A, B, and C -> C, B, and A
466 t8: 10.3 -> 12.3

A current version of this file, named Errata-COA9e-mmyy.pdf,
is available at https://www.box.com/shared/r7evm4jr0d
