

Assignments in Computer Architecture

CS-480/585: Computer Architecture

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Textbooks for these Assignments:

MURDOCCA, MILES J.; & HEURING, VINCENT P. (2000). *Principles of Computer Architecture*. Upper Saddle River, NJ: Prentice-Hall, Inc. QA76.9.A73 M86 2000; 004.2'2—dc21; 99-046113; ISBN 0-201-43664-7.

HILL, MARK D.; JOUPPI, NORMAN P.; & SOHI, GURINDAR S., editors (2000). *Readings in Computer Architecture*. San Francisco, CA: Morgan Kaufmann Publishers. QA76.9.A73H55 2000; 004.2'2—dc21; 99-44480; ISBN 1-55860-539-8.

Assignment 1a:

READINGS (both CS-480 and CS-585): *Principles of Computer Architecture* (Murdocca & Heuring):

1. Chapter 1: *Introduction*
2. Appendix A: *Digital Logic*, sections A.1 through A.8 (pages 441 through 458); skip section A.4.1

READINGS (CS-585 only): *Readings in Computer Architecture* (Hill, Jouppi, & Souhi):

3. Article by Gordon Moore, pp. 56-59.
4. Article by Stanley Mazor, pp. 60-68.

PROBLEMS: On pages 493-494 of Murdocca & Heuring: do problems A.3, A.6, A.7, A.8, A.9, A.10, and A.11. These problems will not be collected. HOWEVER, be aware that these and similar problems are good prospects for inclusion on the Final Exam, so please be sure to do them

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conscientiously and to stay current on all problems. Send me an E-mail if you have trouble doing any of them, and I will endeavor to discuss it in class.

DELIVERABLE: Make up three multiple-choice questions. For CS-480 students, all three questions should be on the reading from Murdocca & Heuring, but for CS-585 students two of the questions should pertain to the readings from Hill, Jouppi, & Souhi. Each question must have at least four choices. The choices can include, if appropriate, an “all of the above” and a “none of the above”. Submit your questions in the form of an E-mail addressed to abzugcx@JMU.edu with the Subject header: either: “CS-480-Assignment-1a” or “CS-585-Assignment-1a”, as appropriate. The content of the assignment must appear in the body of the E-mail; do NOT send the assignment as an enclosure. NOTE: (1) that you must indicate for each question which of your answers you think is the right one, also (2) that your name must appear and you MUST have the proper subject header to get credit for the assignment; and also (3) that your assignment MUST include an Honor-Code declaration: “This work complies with the JMU Honor Code.”

Assignment 1b:

READINGS (both CS-480 and CS-585): *Principles of Computer Architecture* (Murdocca & Heuring):

1. Appendix A: *Digital Logic*, sections A.9 through A.15 (pages 441 through 492).

READINGS (CS-585 only): *Readings in Computer Architecture* (Hill, Jouppi, & Souhi):

2. Introduction to Chapter 1, pp. 1-15.

PROBLEMS: On pages 494-496 of Murdocca & Heuring: do problems A.12, A.13, A.14, A.15, A.18, and A.19. These problems will not be collected. HOWEVER, be aware that these and similar problems are good prospects for inclusion on the Final Exam, so please be sure to do them conscientiously and to stay current on all problems. Send me an E-mail if you have trouble doing any of them, and I will endeavor to discuss it in class.

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Assignment 2a:

READINGS (both CS-480 and CS-585): *Principles of Computer Architecture* (Murdocca & Heuring):

1. Chapter 2: *Data Representation*

READINGS (CS-585 only): *Readings in Computer Architecture* (Hill, Jouppi, & Souhi):

2. Section on Data Format (pages 21-24, and the figure on page 25) from the article by Amdahl *et al.* on the “Architecture of the IBM System/360”.

PROBLEMS: On pages 56-60 of Murdocca & Heuring: do problems 2.1, 2.7 through 2.16, and 2.22. These problems will not be collected. HOWEVER, be aware that these and similar problems are good prospects for inclusion on the Final Exam, so please be sure to do them conscientiously and to stay current on all problems. Send me an E-mail if you have trouble doing any of them, and I will endeavor to discuss it in class.

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Assignment 2b:

READINGS (both CS-480 and CS-585): *Principles of Computer Architecture* (Murdocca & Heuring):

1. Chapter 3: *Arithmetic*

READINGS (CS-585 only): *Readings in Computer Architecture* (Hill, Jouppi, & Souhi):

2. Sections on Integer Execution Units and on Floating Point Execution Units (pages 282-284) from the article by K.C. Yeager on “The MIPS R10000 Superscalar Microprocessor.”

PROBLEMS: On pages 95-98 of Murdocca & Heuring: do problems 3.1 through 3.6, 3.10, 3.12, 3.15, 3.18, and 3.19. These problems will not be collected. HOWEVER, be aware that these and similar problems are good prospects for inclusion on the Final Exam, so please be sure to do them conscientiously and to stay current on all problems. Send me an E-mail if you have trouble doing any of them, and I will endeavor to discuss it in class.

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Assignment 3a:

READINGS (both CS-480 and CS-585): *Principles of Computer Architecture* (Murdocca & Heuring):

1. Chapter 4: *The Instruction Set Architecture*

READINGS (CS-585 only): *Readings in Computer Architecture* (Hill, Jouppi, & Souhi):

2. Article by Anderson, Sparacio, and Tomasulo, pp. 185-201

PROBLEMS: On pages 146-150 of Murdocca & Heuring: do problems 4.1, 4.3(a), 4.4, 4.5, 4.6, 4.8, and 4.10. These problems will not be collected. HOWEVER, be aware that these and similar problems are good prospects for inclusion on the Final Exam, so please be sure to do them conscientiously and to stay current on all problems. Send me an E-mail if you have trouble doing any of them, and I will endeavor to discuss it in class.

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Assignment 3b:

READINGS (both CS-480 and CS-585): *Principles of Computer Architecture* (Murdocca & Heuring):

1. Chapter 5: *Languages and the Machine*

READINGS (CS-585 only): *Readings in Computer Architecture* (Hill, Jouppi, & Souhi):

2. Introduction to Chapter 3: *Instruction Sets*, pp. 111-117.
3. Article by William A. Wulf, pp. 119-125.
4. Article by George Radon, pp. 126-134.

PROBLEMS: On pages 186-188 of Murdocca & Heuring: do problems 5.1, 5.2, 5.3, 5.5, and 5.11. These problems will not be collected. HOWEVER, be aware that these and similar problems are good prospects for inclusion on the Final Exam, so please be sure to do them conscientiously and to stay current on all problems. Send me an E-mail if you have trouble doing any of them, and I will endeavor to discuss it in class.

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Assignment 4a:

READINGS (both CS-480 and CS-585): *Principles of Computer Architecture* (Murdocca & Heuring):

1. Chapter 6: *Datapath and Control*

READINGS (CS-585 only): *Readings in Computer Architecture* (Hill, Jouppi, & Souhi):

2. Introduction to Chapter 4, pp. 175-183.
3. Article by Patt, Wu, and Shebanow, pp. 238-243.
4. Article by Sohi and Vajapeyam, pp. 244-251.

PROBLEMS: On pages 235-242 of Murdocca & Heuring: do problems 6.2, 6.4, 6.5, 6.6, 6.7, and 6.21.

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Assignment 4b:

READINGS (both CS-480 and CS-585): *Principles of Computer Architecture* (Murdocca & Heuring):

1. Chapter 7: *Memory*

READINGS (CS-585 only): *Readings in Computer Architecture* (Hill, Jouppi, & Souhi):

2. Introduction to Chapter 6, pp. 363-369
3. Article by M.V. Wilkes, pp. 371-372.
4. Article by James R. Goodman, pp. 387-394.

PROBLEMS: On pages 294-295 of Murdocca & Heuring: do problems 7.3, 7.4, 7.9, and 7.10. These problems will not be collected. HOWEVER, be aware that these and similar problems are good prospects for inclusion on the Final Exam, so please be sure to do them conscientiously and to stay current on all problems. Send me an E-mail if you have trouble doing any of them, and I will endeavor to discuss it in class.

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Assignment 5a:

READINGS (both CS-480 and CS-585): *Principles of Computer Architecture* (Murdocca & Heuring):

1. Chapter 8: *Input and Output*.

READINGS (CS-585 only): *Readings in Computer Architecture* (Hill, Jouppi, & Souhi):

2. Introduction to Chapter 7, sections 7.1, 7.2, 7.3, and 7.5 on pages 443-449/
3. Article by Chris Ruemmler and John Wilkes, pp. 462-473.

PROBLEMS: On pages 342-344 of Murdocca & Heuring: do problems 8.4, 8.5, 8.6, 8.9, and 8.10. These problems will not be collected. HOWEVER, be aware that these and similar problems are good prospects for inclusion on the Final Exam, so please be sure to do them conscientiously and to stay current on all problems. Send me an E-mail if you have trouble doing any of them, and I will endeavor to discuss it in class.

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Assignment 5b:

READINGS (both CS-480 and CS-585): *Principles of Computer Architecture* (Murdocca & Heuring):

1. Chapter 10: *Trends in Computer Architecture*.

READINGS (CS-585 only): *Readings in Computer Architecture* (Hill, Jouppi, & Souhi):

2. Introductory material to Chapter 10, pages 643-648.
3. Article by Michael Slater, pp. 668-680.
4. Article by Albert Yu, pp. 681-688.

PROBLEMS: On pages 439-440 of Murdocca & Heuring: do problems 10.1 and 10.6. These problems will not be collected. HOWEVER, be aware that these and similar problems are good prospects for inclusion on the Final Exam, so please be sure to do them conscientiously and to stay current on all problems. Send me an E-mail if you have trouble doing any of them, and I will endeavor to discuss it in class.

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Assignment 6:

TERM PROJECT: The term project will discuss in detail several critical elements in the architecture of an historically important computer system. Historically important systems include:

- A. IBM System 360/370/390;
- B. DEC PDP-11;
- C. DEC VAX-11;
- D. Intel Pentium series
- E. IBM RISC/System 6000
- F. MIPS R10000
- G. IBM/Motorola/Apple PowerPC
- H. Intel IA-64
- I. Sun SPARC
- J. CDC Cyber Series
- K. Cray-1 and family

An acceptable alternative topic, not an historically important computer system:

- L. Measurement of performance of computer systems

Rules:

1. SELECT a small number of architecturally critical features of your system to discuss in detail. Do NOT try to cover the entire system shallowly.
2. Select a DIFFERENT system than the one you worked on for CS-350 or CS-511.
3. Graduate students will do individual projects; undergraduates will form two teams. The team report must include a statement specifying in detail what contribution was made to the project by each team member.
4. Request a topic via E-mail. Your message must have a Subject header: “CS-480 Topic Selection” or “CS-585: Topic Selection”, and should contain an ordered list of at least three topics. Topic assignments will be on the basis of First-Come First-Served.
5. Please refer to another document for further information on the [Term Project](#).
6. Please also refer to a document that describes [Errors Often Made by Students](#) in their term projects.