# Preface

This is the eighth edition of this text and since its inception there have been many changes in the coverage. The Intel architecture and the personal computer have proved to be resilient and ever improving technology with no end in sight. Over the years there have been many attempts at displacing this technology, but none have succeeded. What may not have been understood is that the hardware is relatively inexpensive, especially today, and software continues to become more expensive. Whether this is the best technology is a moot point. The software has caused it to survive and thrive and as time passes the assaults become fewer and weaker. The Intel architecture has truly become the standard to master.

In the beginning of this architecture we had a relatively primitive machine (8086/8088) that has evolved into a very powerful machine (Pentium Core2 with two cores). What the future holds is parallel processing (an 80 core version has been demonstrated by Intel) and somewhat higher clock frequencies and applications that communicate through light waves in place of wires. Even though I write of this wonderful technology I sometimes doubt my sanity since I first learned digital technology using vacuum tubes. I recall building my first decade counter using four dual triode vacuum tubes for the flip-flops, neon lamps as indicators, and a power supply voltage of 200 volts. I recall when the 7400 NAND gate first appeared for $19.95. I was amazed when the Intel 4004 appeared in 1971, a year after I started teaching digital electronics and computers. If you are relatively young, can you imagine what you will see in your lifetime in this incredible field?

I thank each and every one of you for your continued support. If you have any comments or suggestions, please do not hesitate to write because I do answer all my e-mail.

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You might also enjoy visiting my website at:

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**Chapter One**

1. Charles Babbage

3. Herman Hollerith

5. To decode the Enigma code during World Was II

7. Intel Corporation

9. Grace Hopper

11. 8080

13. 8086/8088

15. 4G bytes

17. 1995

19. 80486 through the Core2

21. Complex Instruction Set Computer

23. 1024

25. 1024

27. 1,000,000

29. 2G or 3G for 32-bit mode and currently 8G for 64-bit mode

31. 1G

33. Currently 1T byte using a 40-bit address

35. Protected memory or extended memory

37. An early operating system called the Disk Operating System

39. Video Electronics Standards Association

41. Universal Serial Bus

43. Extended Memory System

45. System Area

47. The BIOS controls the computer at its most basic level and provides for compatibility between computers.

49. The microprocessor is the controlling element in a computer system.

51. Address bus

53. The I/O read signal causes an I/O device to be read.

55. (a) defines a byte or bytes of memory (b) defines a quadword or quadwords of memory (c) defines a word or words of memory (d) defines a doubleword or doublewords of memory

57. (a) 13.25 (b) 57.1875 (c) 43.3125 (d) 7.0625

59. (a) 163.1875 (b) 297.75 (c) 172.859375 (d) 4011.1875 (e) 3000.05078125

61. (a) 0.101 0.5 0.A (b) 0.0000101 0.024 0.0A (c) 0.10100001 0.502 0.A1 (d) 0.11 0.6 0.C (e) 0.1111 0.74 0.F

63. (a) C2 (b) 10FD (c) BC (d) 10 (e) 8BA

65. (a) 0111 1111 (b) 0101 0100 (c) 0101 0001 (d) 1000 0000

67. (a) 46 52 4F 47, (b) 41 72 63, (c) 57 61 74 65 72, and (d) 57 65 6C 6C

69. The Unicode is the 16-bit alphanumeric code used with Windows

71. (a) 0010 0000 (b) 1111 0100 (c) 0110 0100 (d) 1010 0100

73. DB -34

75. (a) (b) (c)

12

34

A1

22

B1

00

77. DW 1234H

79. (a) –128 (b) 51 (c) –110 (d) –118

81. (a) 0 01111111 10000000000000000000000

(b) 1 10000010 01010100000000000000000

(c) 0 10000101 10010001000000000000000

(d) 1 10001001 00101100000000000000000