Study Questions (Part 4)
Sunday March 31, 2019

Covering:

- ARM LDR and STR instructions encoding/decoding

As a good start, you need to answer the question at the end of Chapter 3 of the textbook (pages 224-227).

1. Question 3.24 at page 225: What is the meaning of each of the P, U, B, W, and L bits in the encoding of an ARM memory reference instruction?

2. Write only ONE ARM instruction that writes the value 0x12 in register r6.
   Encode this ARM assembly instruction to ARM machine language code.

3. Write only ONE ARM instruction that writes the value 0x124 in register r6.
   Encode this ARM assembly instruction to ARM machine language code.

4. Write only ONE ARM instruction that writes the value 0x1248 in register r6.
   Encode this ARM assembly instruction to ARM machine language code.

5. Encode the following ARM assembly instruction to ARM machine language code.
   `STREQ r1,[r2]`

6. Decode the following ARM machine language code to ARM assembly instruction.
   `0x05821000`

7. Encode the following ARM assembly instruction to ARM machine language code.
   `STRBNE r2,[r3,#0x911]`

8. Decode the following ARM machine language code to ARM assembly instruction.
   `0x15C32911`

9. Encode the following ARM assembly instruction to ARM machine language code.
   `STRCSB r2,[r3,#-0x911]`

10. Decode the following ARM machine language code to ARM assembly instruction.
    `0x25432911`

11. Encode the following ARM assembly instruction to ARM machine language code.
    `STRCC r3,[r4,r5]`

12. Decode the following ARM machine language code to ARM assembly instruction.
    `0x37843005`

13. Encode the following ARM assembly instruction to ARM machine language code.
    `STRBMI r4,[r5,r6,LSL #7]`

14. Decode the following ARM machine language code to ARM assembly instruction.
    `0x47C54386`

15. Encode the following ARM assembly instruction to ARM machine language code.
    `STRPLB r2,[r3,#0x911]!`

16. Decode the following ARM machine language code to ARM assembly instruction.
    `0x55E32911`

17. Encode the following ARM assembly instruction to ARM machine language code.
    `STRVS r3,[r4,r5]!`

18. Decode the following ARM machine language code to ARM assembly instruction.
    `0x67A43005`

19. Encode the following ARM assembly instruction to ARM machine language code.
    `STRBVC r4,[r5,r6,LSL #7]!`

20. Decode the following ARM machine language code to ARM assembly instruction.
    `0x77E54386`

21. Encode the following ARM assembly instruction to ARM machine language code.
    `STRBHI r2,[r3],#0x911`

22. Decode the following ARM machine language code to ARM assembly instruction.
    `0x84C32911`

23. Encode the following ARM assembly instruction to ARM machine language code.
    `STRLSB r2,[r3],#-0x911`

24. Decode the following ARM machine language code to ARM assembly instruction.
    `0x94432911`

25. Encode the following ARM assembly instruction to ARM machine language code.
    `STRGE r3,[r4],r5`

26. Decode the following ARM machine language code to ARM assembly instruction.
    `0xA6843005`

27. Encode the following ARM assembly instruction to ARM machine language code.
    `STRBLT r4,[r5],r6,LSL #7`

28. Decode the following ARM machine language code to ARM assembly instruction.
    `0xB6C54386`

29. Encode the following ARM assembly instruction to ARM machine language code.
    `LDRGT r1,[r2]`

30. Decode the following ARM machine language code to ARM assembly instruction.
    `0xC5921000`

31. Encode the following ARM assembly instruction to ARM machine language code.
    `LDRLEB r2,[r3,#0x911]`

32. Decode the following ARM machine language code to ARM assembly instruction.
    `0xD5D32911`

33. Encode the following ARM assembly instruction to ARM machine language code.
    `LDRB r2,[r3,#-0x911]`

34. Decode the following ARM machine language code to ARM assembly instruction.
    `0xE5532911`

35. Encode the following ARM assembly instruction to ARM machine language code.
    `LDRAL r3,[r4,r5]`

36. Decode the following ARM machine language code to ARM assembly instruction.
    `0xE7943005`

37. Encode the following ARM assembly instruction to ARM machine language code.
    `LDRBAL r4,[r5,r6,LSL #7]`

38. Decode the following ARM machine language code to ARM assembly instruction.
    `0xE7D54386`

39. Encode the following ARM assembly instruction to ARM machine language code.
    `LDRALB r2,[r3,#0x911]!`

40. Decode the following ARM machine language code to ARM assembly instruction.
    `0xE5F32911`

41. Encode the following ARM assembly instruction to ARM machine language code.
    `LDREQ r3,[r4,r5]!`

42. Decode the following ARM machine language code to ARM assembly instruction.
    `0x07B43005`

43. Encode the following ARM assembly instruction to ARM machine language code.
    `LDRNEB r4,[r5,r6,LSL #7]!`

44. Decode the following ARM machine language code to ARM assembly instruction.
    `0xE1F54386`

45. Encode the following ARM assembly instruction to ARM machine language code.
    `LDRBCS r2,[r3],#0x911`

46. Decode the following ARM machine language code to ARM assembly instruction.
    `0x24D32911`

47. Encode the following ARM assembly instruction to ARM machine language code.
    `LDRBCC r2,[r3],#-0x911`

48. Decode the following ARM machine language code to ARM assembly instruction.
    `0x34532911`

49. Encode the following ARM assembly instruction to ARM machine language code.
    `LDRMI r3,[r4],r5`

50. Decode the following ARM machine language code to ARM assembly instruction.
    `0x46943005`

51. Encode the following ARM assembly instruction to ARM machine language code.
    `LDRPLB r4,[r5],r6,LSL #7`

52. Decode the following ARM machine language code to ARM assembly instruction.
    `0x56D54386`

53. Encode the following ARM assembly program to ARM machine language codes.

```
    AREA Load, CODE, READONLY
    ENTRY
    LDR r0,=0x12345678
    LDR r1,=ABC
    ADR r2,ABC
ABC DCD 0xABCD
    END
```

54. Decode the following ARM machine language codes to ARM assembly program.

```
0xE59F0008
0xE59F1008
0xE24F2004
0x0000ABCD
0x12345678
0x0000000C
```