

EE3220 Assignment 1

1. Describe the instruction execution timing characteristic differences between non-pipeline and pipeline processors and state the reasons for these differences.
2. Use barrel shifter's shift operation to compute: $77 * R1$ and $101 * R1$
3. Given that: $R0 := 0x4000$, $R2 := 0x6$, $R3 := 0x2$; and the contents of a memory segment are shown below:

Address	Content			
	+0	+1	+2	+3
3FFC	76	8A	0F	11
4000	87	03	A4	F2
4004	09	B3	02	AF
4008	20	67	00	A6
400C	7A	09	7B	F1

Determine the contents of all the registers after executing the following instruction. **Verify your answers with the simulator.** (Note: each instruction is executed according to the given conditions as above.)

- i. LDR R1, [R0]
 - ii. LDRSH R1, [R0, R2]
 - iii. LDRB R1, [R0, #2]
 - iv. LDR R1, [R0, R3]!
 - v. LDRSB R1, [R0, R2]
 - vi. LDRSB R1, [R0], R2
4. Given that: $R1 := 0x7F108BA2$, $R0 := 0x4004$, **$R2 := 0x6$** . Determine the address and the content being written into; and the contents of all the registers if changes occur after executing the instruction given below.
 - i. STRSB R1, [R0, R2]
 - ii. STRB R1, [R0], R2
 - iii. STR R1, [R0, #2]!
 - iv. STRS R1, [R0, R2]!
 - v. STRH R1, [R0], #3
 - vi. STRSH R1, [R0], R2
 5. Given a data array DAT1 with N 16-bit signed data, write an assembly language program to sort the in ascending order.
 6. Write an assembly language program to multiply two 16-bit unsigned numbers using the principle of shifting and adding (see example below).

$$\begin{array}{r} 1011 \\ + \quad 101 \\ \hline 1011 \\ 0000 \\ 1011 \quad . \\ \hline 110111 \end{array}$$

8. Summarize the applications of different clock circuits in S3C44B0X.

For Questions 5 and 6, you MUST use simulator to verify your programs, otherwise they will NOT be graded. Capture the results shown in both the register and memory windows. The EmbestIDE software can be downloaded from my web link.