

# 1. Swap Bits

- Write a program using the instruction set for the educational CPU that swaps the even and odd bits of a 8 bit integer.
- Integer is in \$1000
- New integer should be in \$1001

**%01101101 → %10011110**

**\$8D → \$9E**

## 2. Reorder Bit Groups

- Write a program using the instruction set for the educational CPU that changes the order of 2 bit groups in a 8 bit integer according to following rules:
  - 1st group instead of 4th group
  - 2nd group instead of 3rd group
  - 3rd group instead of 1st group
  - 4th group instead of 2nd group

%abcdefgh → %efghcdab

### 3. Create Interval

- Write a program using the instruction set for the educational CPU that creates an interval of bytes in the memory space.
- Start of the memory block in \$1000-\$1001
- End of the memory block is in \$1002-\$1003
- Start of the interval is in \$1020-\$1021
- Length of the interval is in \$1022-\$1023

# 4. Sum Arrays

(Midterm 2007)

- There are two arrays in the memory starting from addresses \$1000 (Array A) and \$1700 (Array B) containing 8 bit integers in two's complement arithmetic.
- Two arrays have the same size ( $n$ ) that is stored in \$3000 (Max. 255).
- Write a program that sums the integers in the same index and stores as a new array (of size  $2n$ ) starting from \$3700.

## 5. Array Statistics

- Write a program that calculates the sum of the positive integers, sum of the negative integers, greatest value and its index of an array containing 8 bit integers in two's complement arithmetic.
- Start address of the array is in \$2000-\$2001
- End address of the array is in \$2002-\$2002

## 6. Register and Memory Values

(Midterm 2007)

- Fill the values of registers and memory rows in the table below for each step.

Memory Address	Machine Language	Assembler Language
0010	20 05 10 00	BAŞLA YÜK SK,\$1000
0014	00 80 00 01	YÜK A,<SK+00>+\$01
0018	00 61 00	YÜK B,<SK+00>
001B	5C 01	KAR A,B
001D	83 05	DEB FWD1
001F	43 01	TOP A,B
0021	89 0D	DTV FWD2
0023	C3	END KES
0024	45 01	FWD1 ÇIK A,B
0026	01 20 10 02	YAZ A,\$1002
002A	01 21 10 03	YAZ B,\$1003
002E	80 F3	DAL END
0030	01 20 10 03	FWD2 YAZ A,\$1003
0034	01 21 10 02	YAZ B,\$1002
0038	80 E9	DAL END

[illegible]

# 7. Code Analysis

(Midterm 2008)

- Given the program written with the instruction set for the educational CPU and some memory rows with their contents before the execution of the program.
  - a. Fill in the gaps in the program flow
  - b. What would be the contents of the accumulator A, accumulator B and the same memory space at the end of the execution?

# 7. Code Analysis

(Midterm 2008)

0010	20	05	0F	FF	BAŞLA	BAŞ	\$0010
0014	20	02	10	FF		YÜK	SK, \$0FFF
0018	4B	41				YÜK	CD, \$10FF
001A	70	45			CEVRIM	SİL	B
001C	70	42				ART	SK
001E	00	60	00			ART	CD
0021	1C	00	FF			YÜK	A, <SK+0>
0024	81	--	(b)			KAR	A, -- (a)
0026	01	40				DEE	BITTI
0028	50	41				YAZ	A, -- (c)
002A	80	EE				ART	B
002C	01	21	00	40	BITTI	DAL	-- (d)
0030	C3					YAZ	B, \$0040
						KES	

0040	00
:	:
0FFF	FF
1000	46
1001	55
1002	82
1003	A5
1004	FF
:	:
10FF	FF
1100	AA
1101	FF
1102	AA
1103	55
1104	FF
1105	62



# 8. Create Sub-Array

(Midterm 2008)

- There is an array in memory that contains at most 255 **unsigned** integers. Create an array that contains integers from this array that are smaller than a threshold and calculate its size.
- Array starts from \$1000 and its size is in \$0FFF
- Threshold value is in \$0FFE
- Sub-array should start from \$1100 and its size should be in \$10FF