

# ECED3403 – Assignment 5

Grace Yu

B00902046

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## 1. Testing

### 1. CEX evaluates to TRUE

**Purpose:** Checks for successful implementation of CEX's TRUE evaluation.

**Configuration:** The below xme file is loaded into the emulator. CEX is evaluated with the condition EQ and the zero flag set. CEX has 2 true instructions and 2 false instructions. Because the code structure is the same, this test will be valid for all conditions.

```
X-Makina Assembler - Version XM-23P Single Pass+ Assembler - Release 24.04.17
Input file name: cex.txt
Time of assembly: Sun 4 Aug 2024 13:41:41
1                                     org #1000
2             MAIN
3     1000    4DA2             setcc    z
4     1002    5012             cex      eq,$2,$2
5     1004    6088             movl     #11,R0
6     1006    6089             movl     #11,R1
7     1008    6110             movl     #22,R0
8     100A    6111             movl     #22,R1
9                                     DONE
10    100C    3FFF             bra      DONE
11                                     end MAIN
Successful completion of assembly - 1P
```

Expected Results:	Actual Results:
The two true instructions should be executed, while the two false instructions should be ignored. R0 and R1 should be set to 0011.	<div>R0: 0011 R1: 0011 R2: 0000 R3: 0000 R4 (BP): 0000 R5 (LR): 0000 R6 (SP): 0000 R7 (PC): 100C</div>

**Pass/Fail:** PASS

## 2. CEX evaluates to FALSE

**Purpose:** Checks for successful implementation of CEX's FALSE evaluation.

**Configuration:** The below xme file is loaded into the emulator. CEX is evaluated with the condition EQ and the zero flag cleared. CEX has 2 true instructions and 2 false instructions. Because the code structure is the same, this test will be valid for all conditions.

```
X-Makina Assembler - Version XM-23P Single Pass+ Assembler - Release 24.04.17
Input file name: cex.txt
Time of assembly: Sun 4 Aug 2024 15:56:21
1                                     org #1000
2                                     MAIN
3      1000      4DC2      clrcc      z
4      1002      5012      cex        eq,$2,$2
5      1004      6088      movl       #11,R0
6      1006      6089      movl       #11,R1
7      1008      6110      movl       #22,R0
8      100A      6111      movl       #22,R1
9                                     DONE
10     100C      3FFF      bra        DONE
11                                     end MAIN
Successful completion of assembly - 1P
```

Expected Results:	Actual Results:
The two true instructions should be ignored, while the two false instructions should be executed. R0 and R1 should be set to 0022.	R0: 0022 R1: 0022 R2: 0000 R3: 0000 R4 (BP): 0000 R5 (LR): 0000 R6 (SP): 0000 R7 (PC): 100C

**Pass/Fail:** PASS

## 3. CEX evaluates with 0 TRUE instructions

**Purpose:** Checks for CEX executing TRUE instructions with no FALSE instructions.

**Configuration:** The below xme file is loaded into the emulator. CEX is evaluated with the condition EQ and the zero flag set. CEX has 0 true instructions and 2 false instructions.

```
X-Makina Assembler - Version XM-23P Single Pass+ Assembler - Release 24.04.17
Input file name: cex.txt
Time of assembly: Sun 4 Aug 2024 16:53:33
1                                     org #1000
2                                     MAIN
3      1000      4DA2      setcc      z
4      1002      5002      cex        eq,$0,$2
5      1004      6088      movl       #11,R0
6      1006      6089      movl       #11,R1
7      1008      608A      movl       #11,R2
8      100A      6113      movl       #22,R3
9                                     DONE
10     100C      3FFF      bra        DONE
11                                     end MAIN
Successful completion of assembly - 1P
```

Expected Results:	Actual Results:
<ul style="list-style-type: none"> <li>The emulator should change the 0 number of true instructions to 1, like in Dr. Hughes' emulator. This is because CEX cannot execute with 0 true instructions.</li> <li>The first instruction setting R0 to 0x0011 should execute. The two following instructions setting R1 and R2 to 0x0011, should be ignored.</li> <li>The instruction after the two false instructions, setting R3 to 0x0022, should execute.</li> </ul>	<pre> R0: 0011 R1: 0000 R2: 0000 R3: 0022 R4 (BP): 0000 R5 (LR): 0000 R6 (SP): 0000 R7 (PC): 100C </pre>

Pass/Fail: PASS

#### 4. CEX evaluates with 0 FALSE instructions

**Purpose:** Checks for CEX executing TRUE instructions with no FALSE instructions.

**Configuration:** The below xme file is loaded into the emulator. CEX is evaluated with the condition EQ and the zero flag cleared. CEX has 2 true instructions and 0 false instructions.

```

X-Makina Assembler - Version XM-23P Single Pass+ Assembler - Release 24.04.17
Input file name: cex.txt
Time of assembly: Sun 4 Aug 2024 16:37:31
1          org #1000
2          MAIN
3      1000      4DA2      setcc      z
4      1002      5010      cex        eq,$2,$0
5      1004      6088      movl       #11,R0
6      1006      6089      movl       #11,R1
7      1008      6112      movl       #22,R2
8          DONE
9      100A      3FFF      bra        DONE
10         end MAIN
Successful completion of assembly - 1P

```

Expected Results:	Actual Results:
<ul style="list-style-type: none"> <li>The two true instructions should be executed.</li> <li>The next instruction setting R3 to 0x0022 should execute as well, because there is 0 number of false instructions for CEX.</li> </ul>	<pre> R0: 0011 R1: 0011 R2: 0022 R3: 0000 R4 (BP): 0000 R5 (LR): 0000 R6 (SP): 0000 R7 (PC): 100A </pre>

Pass/Fail: PASS

#### 5. CEX evaluates with 0 FALSE instructions

**Purpose:** Checks for CEX executing TRUE instructions with no FALSE instructions.

**Configuration:** The below xme file is loaded into the emulator. CEX is evaluated with the condition EQ and the zero flag cleared. CEX has 2 true instructions and 0 false instructions.

```
X-Makina Assembler - Version XM-23P Single Pass+ Assembler - Release 24.04.17
Input file name: cex.txt
Time of assembly: Sun 4 Aug 2024 16:37:31
1                               org #1000
2                               MAIN
3      1000      4DA2      setcc  z
4      1002      5010      cex    eq,$2,$0
5      1004      6088      movl   #11,R0
6      1006      6089      movl   #11,R1
7      1008      6112      movl   #22,R2
8                               DONE
9      100A      3FFF      bra     DONE
10                               end MAIN
Successful completion of assembly - 1P
```

Expected Results:	Actual Results:
<ul style="list-style-type: none"> <li>The two true instructions should be executed.</li> <li>The next instruction setting R3 to 0x0022 should execute as well, because there is 0 number of false instructions for CEX.</li> </ul>	<pre>R0: 0011 R1: 0011 R2: 0022 R3: 0000 R4 (BP): 0000 R5 (LR): 0000 R6 (SP): 0000 R7 (PC): 100A</pre>

**Pass/Fail:** PASS

## 6. CEX is removed when branching occurs

**Purpose:** Checks for CEX executing TRUE instructions with no FALSE instructions.

**Configuration:** The below xme file is loaded into the emulator. CEX is evaluated with the condition EQ and the zero flag set. CEX has 2 true instructions and 2 false instructions. One of the true instructions is BL.

```
X-Makina Assembler - Version XM-23P Single Pass+ Assembler - Release 24.04.17
Input file name: cex.txt
Time of assembly: Sun 4 Aug 2024 17:13:25
1                               org #1000
2                               MAIN
3      1000      4DA2      setcc  z
4      1002      5012      cex    eq,$2,$2
5      1004      6088      movl   #11,R0
6      1006      0002      bl      SETR1
7      1008      608A      movl   #11,R2
8      100A      6113      movl   #22,R3
9                               SETR1
10     100C      6089      movl   #11,R1
11     100E      4C2F      mov     R5,R7
12                               DONE
13     1010      3FFF      bra     DONE
14                               end MAIN
Successful completion of assembly - 2P
```

Expected Results:	Actual Results:
<ul style="list-style-type: none"> <li>During CEX's true instruction, R0 is set to 0x0011.</li> <li>When BL occurs successfully, CEX is turned off. At the branch, R1 is set to 0x0011. LR is restored to PC.</li> <li>The CEX's false instructions, which would be ignored if branching did not occur, will be executed. This will set R2 to 0x0011 and R3 to 0x0022.</li> </ul>	<pre> R0: 0011 R1: 0011 R2: 0011 R3: 0022 R4 (BP): 0000 R5 (LR): 1008 R6 (SP): 0000 R7 (PC): 100C </pre>

**Pass/Fail:** PASS

## 7. CEX persists when branching does not occur

**Purpose:** Checks for CEX executing TRUE instructions with no FALSE instructions.

**Configuration:** The below xme file is loaded into the emulator. CEX is evaluated with the condition EQ and the zero flag cleared. CEX has 2 true instructions and 0 false instructions. One of the true instructions is BN.

```

X-Makina Assembler - Version XM-23P Single Pass+ Assembler - Release 24.04.17
Input file name: cex.txt
Time of assembly: Sun 4 Aug 2024 17:23:03
1      org #1000
2      MAIN
3      1000 4DA2      setcc z
4      1002 5012      cex  eq,$2,$2
5      1004 6088      movl #11,R0
6      1006 3002      bn  DONE
7      1008 608A      movl #11,R2
8      100A 6113      movl #22,R3
9      DONE
10     100C 3FFF      bra  DONE
11     end MAIN
Successful completion of assembly - 2P

```

Expected Results:	Actual Results:
<ul style="list-style-type: none"> <li>During CEX's true instruction, R0 is set to 0x0011.</li> <li>When BN does not occur, CEX persists.</li> <li>The CEX's false instructions, which would be ignored if branching did not occur, will continue to not be executed. This will leave R2 and R3 to 0x0000.</li> </ul>	<pre> R0: 0011 R1: 0000 R2: 0000 R3: 0000 R4 (BP): 0000 R5 (LR): 0000 R6 (SP): 0000 R7 (PC): 100C </pre>