Course Name: Computer Architecture Lab

Course Number and Section: **14:332:xxx:xx**

Experiment: [Experiment # [1] – Intro, git, and number representation]

Lab Instructor: Mengmei Ye

Date Performed: 9/14/2018

Date Submitted: 9/28/2018

Submitted by: [Hyunmin Choi #171008176]

Course Name: _____

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! Important: Please include this page in your report if the submission is a paper submission. For electronic submission (email or Sakai) please omit this page.

----------For Lab Instructor Use ONLY----------

GRADE: _____

COMMENTS:

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ECE Lab Report Structure

1. Purpose / Introduction / Overview – describe the problem and provide background information

2. Approach / Method – the approach took, how problems were solved

3. Results – present your data and analysis, experimental results, etc.

4. Conclusion / Summary – what was done and how it was done

Hyunmin Choi Lab1

1.1) a. #1710081176

0b10001110

$0\times2^0=0$
$1\times2^1=2$
$1\times2^2=4$
$1\times2^3=8$
$0\times2^4=0$
$0\times2^5=0$
$0\times2^6=0$
$1\times2^7=128$

\+ 142

8
16)142
128
14

0x8E

10 11 12 13 14 15
A B C D E F

0xC3BA

$10\times16^0=10$
$11\times16^1=176$
$3\times16^2=768$
$12\times16^3=49152$

\+ 50106

2 50106
25053 0
12526 1
6263 0
3131 1
1565 1
782 1
391 0
195 1
97 1
48 1
24 0
12 0
6 0
3 0
1 1

0b1100001110111010

81

2 81
40 1
20 0
10 0
5 0
2 1
1 0

0b1010001

5
16)81
80
1

0x51

0xBCA1

$2\times16^0=1$
$10\times16^1=160$
$12\times16^2=3072$
$11\times16^3=45056$

48289

2 48289
24144 1
12072 0
6036 0
3018 0
1509 0
754 1
377 0
188 1
94 0
47 0
23 1
11 1
5 1
2 1
1 0

0b1011110010100001

0

0x0
0b0

0b100100100

$0\times2^0=0$
$0\times2^1=0$
$1\times2^2=4$
$0\times2^3=0$
$0\times2^4=0$
$1\times2^5=32$
$0\times2^6=0$
$0\times2^7=0$
$1\times2^8=256$

\+ 292

18 R4
16)292
16
132
128
4
1 R2
16)18
16
2

0x124

42

2R10
16)42
32
10

0x2A

42
21 0
10 1
5 0
2 1
1 0

0b101010

0xBAC4

$4 \times 16^0 = 4$

$12 \times 16^1 = 192$

$10 \times 16^2 = 2560$

$11 \times 16^3 = 45056$

47812

2 47812

23906 0

11953 0

5976 1

2988 0

1494 0

747 0

373 1

186 1

93 0

46 1

23 0

11 1

5 1

2 1

1 0

0b1011101011000100

b)

$2^{14} =$ [redacted]

16Ki

$2^{43} = 2^3 \cdot 2^{40} = 8Ti$

$8^{23} = 2^3 \cdot 2^{20} = 8Mi$

$2^{58} = 2^8 \cdot 2^{50} = 256Pi$

$2^{64} = 2^4 \cdot 2^{60} = 16Ei$

$2^{42} = 2^2 \cdot 2^{40} = 4Ti$

c)

$2Ki = 2 \cdot 2^{10} = 2^{11}$

$512Pi = 2^9 \cdot 2^{50} = 2^{59}$

$256Ki = 2^8 \cdot 2^{10} = 2^{18}$

$32Gi = 2^5 \cdot 2^{30} = 2^{35}$

$64Mi = 2^6 \cdot 2^{20} = 2^{26}$

$8Ei = 2^3 \cdot 2^{60} = 2^{63}$

2.2)

1.

two's compliment

127

largest integer +1

128

Unsigned integer

255

largest integer +1

256

2.

two's compliment

-3 → 00000011 → 11111100 + 1 → 11111101

0 → 00000000

+3 → 11111101 → 00000010 + 1 → 00000011

unsigned

-3 → N/A

0 → 00000000

3 → 00000011

3. two's compliment

-42 → 00101010 → 11010101 + 1 → 11010110

42 → 00101010

unsigned integer

-42 → N/A

42 → 00101010

2.2)

4.

255

11111111

5.

42→00101010

-42→11010110

```
  1 1 1 1 1 1
  00101010  42
+ 11010110 -42
-----------
  00000000 ← 0
```

6.

Hex - Useful for programmer to use it as intermediate form between decimal and binary to send instructions, and data in much readable form

Binary - True machine code, which computers can only process before requiring to translate to either decimal or hex so that user can send instructions.

Decimal - normal representation of numbers, useful to display information at the end-user

3.1)

1)

0 → 1 bit

π → half-precision value - 11-bits, mathematically would be infinite

e → half-precision value - 11 bits, mathematically would be infinite

2. $2\,TiB \rightarrow 2 \cdot 2^{40}\,B$

$2^{41}\,B$

2^{41}

41-bit long address, addressed via bytes.

3. half-precision value - 11-bits, mathematically requires infinite bits since it is an irrational value