Lab on Getting Started

1 Lab Outcomes

1. Become familiar in the use of CSE112 tool Emulator-for-ARM with java -jar emuARM jar
2. Become fluent in conversions among decimal, hexadecimal and octal numbers.
3. MiB v MB notation must read: https://en.wikipedia.org/wiki/Mebibyte

2 Tasks

1. This lab is worth 5%. Scoring is shown for 100.
2. Note that a 16-bit number written in octal will have the leading octal digit be either a 0 or 1, and the remaining octal digits will be in the 0 to 7 range.

2.1 Task: (4*10 points) Convert the following numbers.

1. Convert the following 16-bit binary numbers to decimal by hand:
    1. 1010 1011 1100 1101
    2. 1111 1110 1101 1100
    3. 0111 1101 1111 1000
    4. 0011 0000 0011 1001
2. Convert the following hexadecimal numbers to decimal by hand:
    1. a000
    2. 8a89
    3. 0190
    4. afcd
3. Convert the following hexadecimal numbers to octal by hand:
    1. a000
    2. 8a89
    3. 0190
    4. afcd
4. Convert the following 16-bit numbers to octal by hand
    1. 1010 1011 1100 1101
    2. 1111 1110 1101 1100
    3. 0111 1101 1111 1000

4. 0011 0000 0011 1001

2.2 Task: (10 + 10 points) Become familiar with java -jar ./emuARM jar

1. Download the emuARM jar from the link given below. [If it is spelled emuArm.jar rename it as emuARM.jar.] "EmuArm is an ARM ISA emulator. It can be used to write, execute, and debug programs written in the ARM and Thumb assembly languages. It has a graphical (GUI) mode as well as a command line (CLI) mode."
2. See slide #29 (Chapter 4). Copy the ARM assembly program into a text file using the EmuARM editor. This program counts the number of 1s in a 32 bit number stored in r1. Save the result in r4. Print it.
3. Explain how the above works.

2.3 Task: (10 + 30 points) Write two ARM Assembly Programs, Assemble and Run

1. See slide #35 (Chapter 4). Sum the numbers of array a[]. Find a way to initialize this array with values you choose. Print the sum.
2. Develop an example that invokes a procedure named P with three integer parameters. The procedure should add the first two and multiply it with the third. Invoke the procedure P with arguments 11, 22 and 33. Print the result returned by P.

3 Links

1. emuARM.jar Visit http://www.cse.iitd.ernet.in/~srsarangi/archbooksoft.html. Near the bottom of this page, the download link for EmuArm is present. 1. Read the http://www.cse.iitd.ernet.in/~srsarangi/files/software/emuarm/README.txt. For detailed information and EmuARM documentation, please refer to http://www.cse.iitd.ac.in/~srsarangi/files/software/emuarm/emuarm-manual.pdf
2. Slides of Chapter 4 http://www.cse.iitd.ernet.in/~srsarangi/files/bookppts/Chapter_04_ARM_Assembly.pptx

4 Turn In

1. Due date to be announced. Real Soon Now!
2. Submit a single doc file with all answers in it. Including any diagrams.

5 End

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