cs144: Introduction to Computer Systems   Homework 1
Autumn 2024

Due Oct 9 11:59pm

Submit your answers by adding and committing one file with your answers into the `hw1` directory of your `CNETID-cs144-aut-24` svn repository.

The file should be named either `hw1.txt` for answers written in a plain ASCII text file, or PDF file, respectively. PDFs of scanned hand-written pages must be clearly legible, and must not exceed 5 megabytes. No other file formats, or filenames are acceptable, and no files besides `hw1.txt` will be graded. There is no need or benefit to including your name or CNetID in your HW filename. Not following directions may result in losing points.

(Q1) 10 points

Consider the following self-contained program:

```c
#include <stdio.h>

int main() {
  int foo;
  char endian;
  foo = 0;
  endian = 0;
  printf("hello world, from a %s-endian machine\n",
         endian ? "big" : "little");
  return endian;
}
```

Figure out what should be used in the assignments to `foo` and `endian` (instead of the current initializations to zero) for the program to correctly describe the endian-ness of the machine it is running on. The assignment to `foo` should be a constant, and the assignment to `endian` should be an expression involving `foo`. No other variables or lines of code are needed. Your program should not assume anything about word size.

Write your answer like:

```
foo =
endian =
```

To get full credit you need to explain your reasoning in one or two sentences: why does this code work?

(Q2) 14 points

The following values are stored at the indicated memory addresses and registers:

Address	Value	Register	Value
0x210	0xAB	%rax	0x210
0x218	0xBC	%rcx	0x220
0x220	0x09	%rdx	0x1
0x228	0x42	%rsi	0x8
0x230	0x54	%rdi	0x100

Assume that the Values occupy eight bytes of storage, but the endianness of storage is not specified. Each part of this question concerns one item in the following list of operands. For the operands, give the Value of the operand, and the addressing Mode used (copying from the "Name" column of Figure 3.3 in the textbook). If the facts given here don't provide sufficient information to answer the question unambiguously, for Value say "unknown", and for Mode give an explanation of what information is missing, without which there isn't an unambiguous answer. **Give all Values in hex** (unsigned), starting with "0x".

Part	Operand	Value	Mode
e.g.	%rax	0x210	Register
A.	(%rcx)		
B.	0x12(%rax)		
C.	560		
D.	(%rax,%rsi)		
E.	0x108(%rdi,%rdx,0x20)		
F.	$250		
G.	0x08(,%rsi,0x45)		

Note: For this homework, it is fine to use a calculator or some other program to aid with arithmetic.