CPE 431/531

Chapter 3 – Arithmetic for Computers

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3.1 Introduction

Bits are bits, what is important is how they are ________________.

- You may have an _______________.
- You may have a _________________(integer).
- You may have an ___________________(integer).
- You may have a ________________________.

3.5 Floating Point - Basics

- Floating-point numbers are represented in ___________notation
- Floating-point numbers use _______________representation.
- In general, floating-point numbers are of the form
- There is a tradeoff between ______ and ___________
  - More __ bits gives you more _________
  - More __ bits gives you more _____
- IEEE defines two types of floating-point numbers
  - Single Precision
  - Double Precision

3.5 Floating Point – More of the Story

IEEE 754 Floating Point Standard

- Adding a ______ to the exponent simplifies ________
- The leading one is _________
- Representation expanded

Example: Represent -0.75 in single and double precision

3.5 Floating Point – More Examples

Example: What decimal number is represented by this single precision float? 0x4493 AB00

3.6 Subword Parallelism

___________ systems originally used 8 bits to represent _____ and 8 bits to represent ___________.

Support for ________ led to 16 bits of information.

Subword items have been supported for a long time in _____ _________.

Graphics processing called for __________ on subword items.

Often the same operation is performed on _________ (_________) of data.

128 bit adders can handle (Data Level Parallelism)

__ ___ bit operands

__ ___ bit operands

__ ___ bit operands

__ ___ bit operands

__ ___ bit operands

3.9 Fallacies and Pitfalls

Pitfall: Floating-point addition is not _______________.

Because floating-point numbers are _________________ of real numbers and because computer arithmetic has _____________ ______________, associativity does not hold for floating-point numbers.

$x = -1.5_{10} \times 10^{38}$, $y = 1.5_{10} \times 10^{38}$, $z = 1.0$

Fallacy: Parallel execution strategies that work for ________ data types also work for ________________ data types.

Results may be __________ but not ___________.