

## Lecture 1

### Basic Information

- Lectures are recorded
- Weekly labs start on 23/9
- Use the Ed discussion board

Marks Breakdown: - Labs: 25% (the lowest lab is dropped) - Midterms: 30% - Final: 45%

**Content** In specific cases, software does not perform as well as hardware due to overhead. Hardware designed specifically for a certain application is usually faster.

### Computations in Hardware

- Computation
- Adder
- Logic Gates
- Transistor
- Silicon

Layers of Abstraction

Abstraction can be used to hide complexity

Adder

An adder is made of logic gates, such as AND, OR, NOT, XOR, which are made out of transistors. When the voltage on the gate is high, the drain and source are connected, vice versa.

Transistors

Transistors are made on silicon chips, where the source and drain are bridged by a gate. The width of the gate is getting smaller and smaller (current state of the art: 14nm). A chip contains many transistors, e.g. 3 billion on an Intel 8-core.

Moore's law

The number of transistors per chip would grow exponentially, doubling ever 18-24 months. It has been reality since, slowing down only recently. - Intel struggled with 10nm - Global Foundries abandoned 7nm