Lecture Notes of Computer Architecture Studies

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Abstract

This lecture notes combines two classes, Digital Design and Computer Architecture, and (Advanced) Computer Architecture taught by Prof. Onur Mutlu at ETH Zurich.

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Lecture was almost all of motivations for cutting-edge computer architecture.

I liked a lot to read the classical article Moore (1965), yeah, the one that claims what was called later as Moore's law. I didn't know he did another interest predictions as home computers, mobile phones, etc.

§1.1 Numerical Representations

To change from decimal representation to a k-representation, we just need to divide the number by k until the quotient is zero. Then we take all the remainders backwards (from the latest to the first).

This is an **example** of emphasize and here a **bold text**.

§1.2 First Subsection

Table 1 is the first one.

Figure 1 is the first one.

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Table 1. First table.

Quadrant	**5 m**	**10 m**
Quadrant I	8.63%	9.11%
Quadrant II	5.63%	7.77%

Figure 1. First figure.

Definition 1.1. An **inner product** on V is a function that takes each ordered pair (u, v) of elements of V to a number $\langle u, v\rangle \in \mathbf{F}$ and has the following properties:

positivity

$$\langle v, v\rangle \geq 0 \text{ for all } v \in V;$$

definiteness

$$\langle v, v\rangle = 0 \text{ if and only if } v = 0;$$

additivity in first slot

$$\langle u + v, w\rangle = \langle u, w\rangle + \langle v, w\rangle \text{ for all } u, v, w \in V;$$

homogeneity in first slot

$$\langle \lambda u, v\rangle = \lambda\langle u, v\rangle \text{ for all } \lambda \in \mathbf{F} \text{ and all } u, v \in V;$$

conjugate symmetry

$$\langle u, v\rangle = \overline{\langle v, u\rangle} \text{ for all } u, v \in V.$$

- The **Euclidean inner product** on $\mathbf{F}^n$

$$\langle (w_1, \ldots, w_n), (z_1, \ldots, z_n) \rangle = w_1 \overline{z_1} + \cdots + w_n \overline{z_n};$$

- An inner product can be defined on the vector space of continuous real-valued functions on the interval $[-1, 1]$ by

$$\langle f, g \rangle = \int_{-1}^{1} f(x) g(x) \mathrm{d}x.$$

- The correlation function

$$(f \star g)[n] = \sum_m \overline{f[m]} g[m+n]$$

References

Moore, G. E. (1965). Cramming more components onto integrated circuits. *Electronics magazine*.