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CHAP 2: METRIC OF PERFORMANCE

What is Performance Metric?

The things are interesting and useful to determine performance

The basic in Computer System:

- A **count** of how many times an event occurs
- The **duration** of some time interval
- The **size** of some parameter

Principles of Good Performance Metric

All Performance Metric satisfy all the absolute requirement

1. **Linearity:**
Double the metric will double the performance
2. **Reliability:** Accurate and concistence. e.g WIPS (reliable), MIPS (unreliable)
3. **Repeatability:** same value on repeating measurement
4. **Easiness of Measurement:** correct metric easy to measure
5. **Consistency:** same in different configuration
6. **Independence :** Not influenced by others

Processor and System Performance Metric

- Clock rate (MHz) , nonlinear and unreliable
- MIPS (millions of instructions executed per second)

$$MIPS = \frac{n}{t_e \times 10^6}$$

easy to measure, repeatable, independent but not in other characteristic. Case Branch Instruction

- MFLOPS (million of floating point operation executed per second)

$$MFLOPS = \frac{f}{t_e \times 10^6}$$

case: cray vector computer syst. Unreliable, inconsistent

Processor and System Performance Metric

- SPEC: System Performance Evaluation Cooperative Standardized Methodology:
 - Measure the time required to execute
 - Divide the time with time standard (normalization)
 - Average with geometric mean
- QUIPS (Quality of the Solution)
Linier, repeatable, Independent
- Execution Time
- Mean and End Metric

Other Performance Metric

- Response Time
- Throughput
- Speedup and relative change

$$\text{Speedup of system 2 w.r.t. system 1} = S_{2,1} = \frac{R_2}{R_1} = \frac{D/T_2}{D/T_1} = \frac{T_1}{T_2}.$$

Contoh: Hitung metrik speedup dan perubahan relatif mengacu ke sistem 1

Sistem x	Waktu Eksekusi T_x	Speedup $S_{x,1}$	Perubahan Relatif $\Delta_{x,1}$ (%)
1	480		
2	360		
3	540		
4	210		

Contoh: Hitung metrik speedup dan perubahan relatif mengacu ke sistem 1

Sistem x	Waktu Eksekusi T_x	Speedup $S_{x,1}$	Perubahan Relatif $\Delta_{x,1}$ (%)
1	480	1	0
2	360	1,33	+ 33
3	540	0,89	- 11
4	210	2,29	+ 129