14 April 2020 11:57

2. Performance in Computer Systems

2.1 Computer system

- Personal computers (Desktops)
- Servers
- Embedded computers

2.2 Definitions

Performance?

Airplane	Passenger capacity	Cruising range (miles)	Cruising speed (m.p.h.)	Passenger throughput (passengers x m.p.h.)
Boeing 777	375	4630	610	228,750
Boeing 747	470	4150	610	286,700
BAC/Sud Concorde	132	4000	1350	178,200
Douglas DC-8-50	146	8720	544	79,424

FIGURE 1.13 The capacity, range, and speed for a number of commercial airplanes. The last column shows the rate at which the airplane transports passengers, which is the capacity times the cruising speed (ignoring range and takeoff and landing times).

Computers → Throughput
→ Response (execution) time

Example of response time vs. throughput

The following changes increase throughput, response time or both?

1. Replace the processor in a computer with a faster version
2. Add additional processors to a system that uses multiple processors for separate tasks

1. Response time is improved. but throughput as well!
2. Throughput is improved

Terminology – avoid "increase/decrease"
– use "improve"

Scenario 1

response time is improved.

Performance as execution (response) time

$$\text{Performance}_X = \frac{1}{\text{Execution time}_X}$$

$\text{Performance}_X > \text{Performance}_Y \Rightarrow \text{Execution time}_X < \text{Execution time}_Y$

Computer x is n times faster than Computer y

$$\frac{\text{Performance}_X}{\text{Performance}_Y} = n = \frac{\text{Execution time}_Y}{\text{Execution time}_X}$$

Example: Computer A runs a program in 10 seconds
Computer B runs the same program in 15 seconds

$$\frac{\text{Performance}_A}{\text{Performance}_B} = \frac{\text{Execution time}_B}{\text{Execution time}_A} = \frac{15\text{ sec}}{10\text{ sec}} = 1.5 \Rightarrow$$

Computer A is 1.5 times faster than Computer B