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Solution for Exercise No. 5

Algorithms and Methods for Distributed Storage

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Exercise 7 *TCP Congestion Avoidance*

Consider the TCP congestion avoidance mechanism for 2 participants A and B. Assume that the additive increase is $x = x + 1$ and the multiplicative decrease is $x = x/2$.

The diagrams show the allocated bandwidth in percent. We use $x = x + 3$. The x-axis shows A's allocated bandwidth, the y-axis shows B's.

1. Draw vector diagrams (as shown in the lecture) for the following situations:

   (a) A uses AIMD and starts at 50% of the available bandwidth.
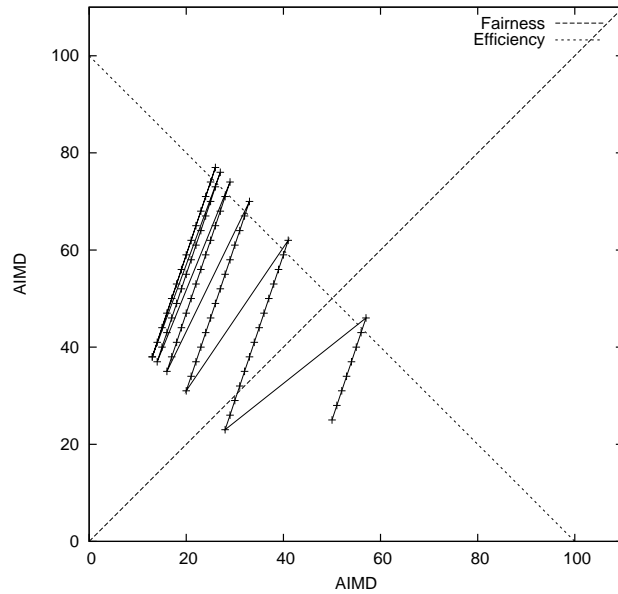   B uses AIAD and starts at 25%.
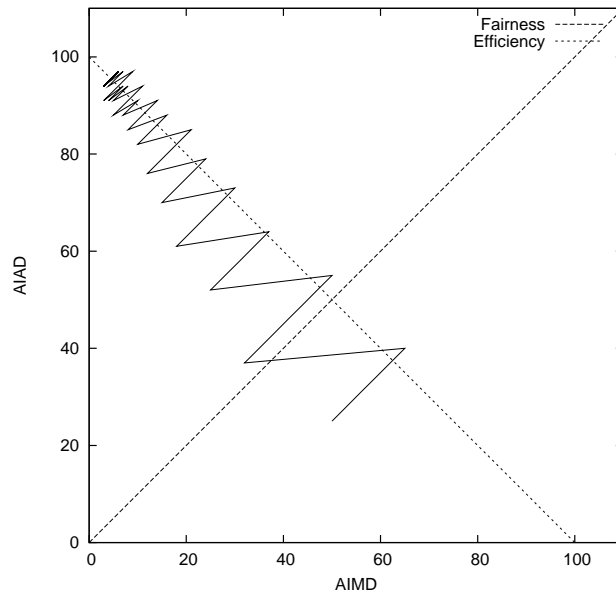
(b) A uses AIMD and starts again at 50%.
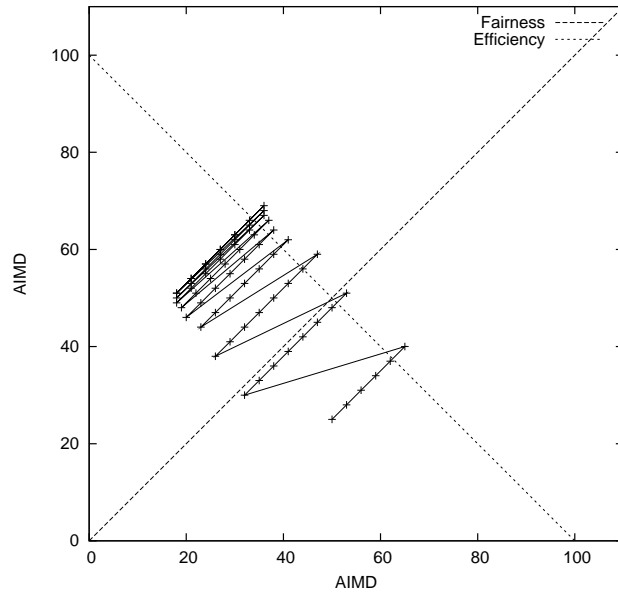B uses Slow Start, i.e. starting at $x = 1$ with an initial threshold of ∞.
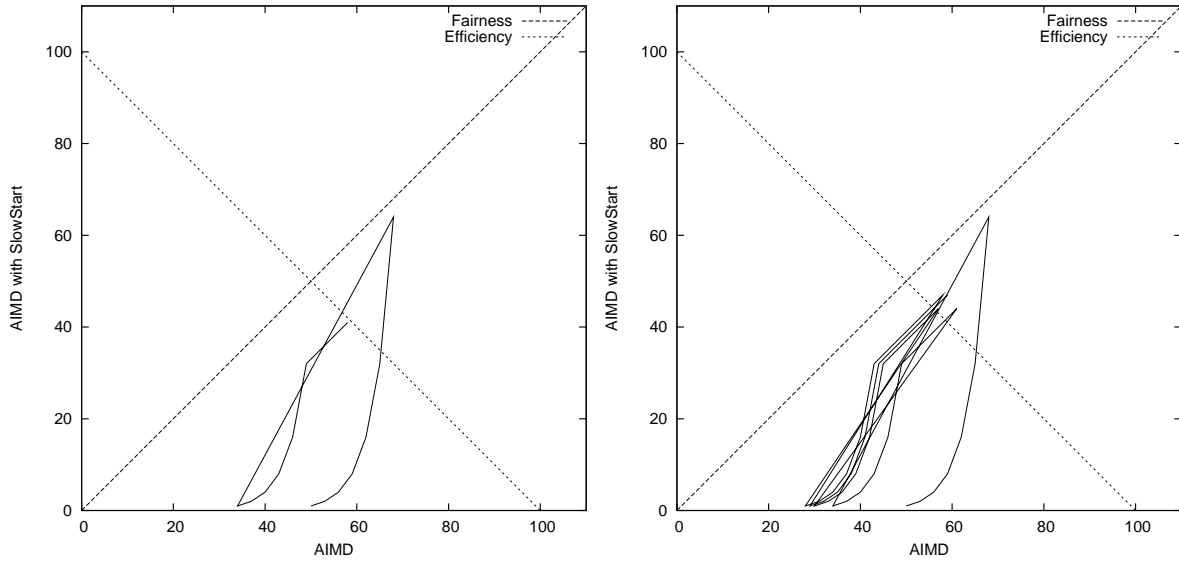
2. Assume both A and B use AIMD, but with different parameters:

(a) A uses $x = x + 1$ and B $x = x + c$ with $c > 1$ for the additive increase. The multiplicative decrease remains $x = x/2$.

(b) A uses $x = 0.5x$ and B $x = 0.75x$ for the multiplicative decrease. The additive increase remains $x = x + c$.

How does this affect the efficiency and the fairness?

In (a) and (b) the behavior of B is unfair. B can increase the efficiency in (b) by backing off less than 1/2.