Tutorial 2 Solutions

October 5, 2018

1. a) *Here we just assume that on average* 8% *of all DIMMs are affected by errors, which translates to an expected number of affected DIMMS of* $0.08 * D$ *when there are* D *DIMMs in total. The problem would then be to compute the expected value for the number of affected DIMMs for the given values.*

   Based on the numbers given we know that for the number of DIMMs D

   $$D = 100 * 8 = 800$$

   and thus the expected number of errors equals

   $$0.08 * N = 0.08 * 800 = 64.$$

   b) Based on the numbers given conclude that the expected number of errors equals

   $$0.004 * 1000 = 4.$$

2. Figure 1 shows power consumption as a function of CPU load for the two server architectures under the given assumptions.

   a) We need to compare the two options of a longer execution under reduced load and a shorter execution under higher load. Based on the values given we obtain

   $$\frac{(160\ W + 0.25 * (294\ W - 160\ W)) * 4\ h}{294\ W * 1\ h} = \frac{774\ Wh}{294\ Wh} \approx 2.63.$$

   b) As before, we obtain

   $$\frac{(118\ W + 0.25 * (265\ W - 118\ W)) * 4\ h}{265\ W * 1\ h} = \frac{619\ Wh}{265\ Wh} \approx 2.34.$$

   c) Based on the numbers above we obtain

   $$\frac{619\ Wh}{774\ Wh} \approx 0.80,$$

   which means that by running the optimized server instead of the standard one can offer approximately 20% energy saving.

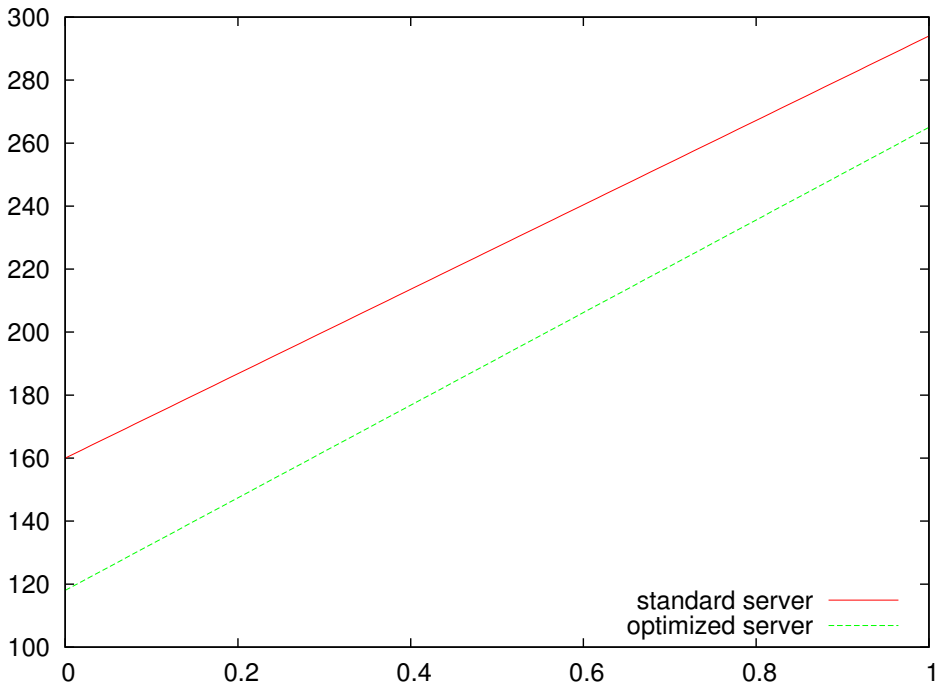

Figure 1: Power consumption versus load for the standard and for the optimized server.