Lab 4: Experiments with OpenMP

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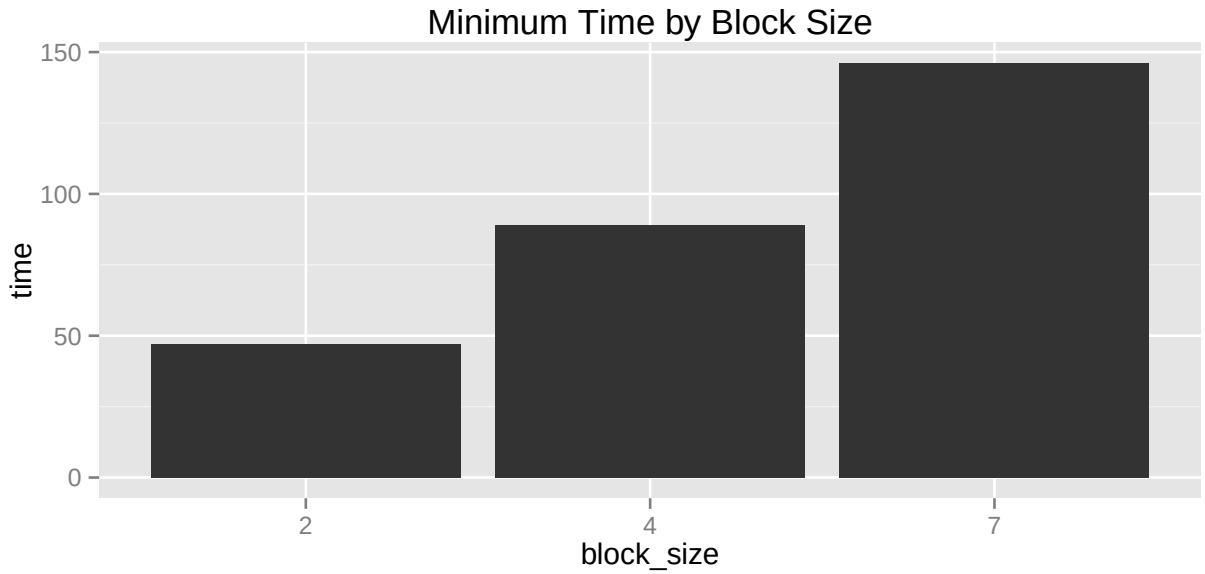
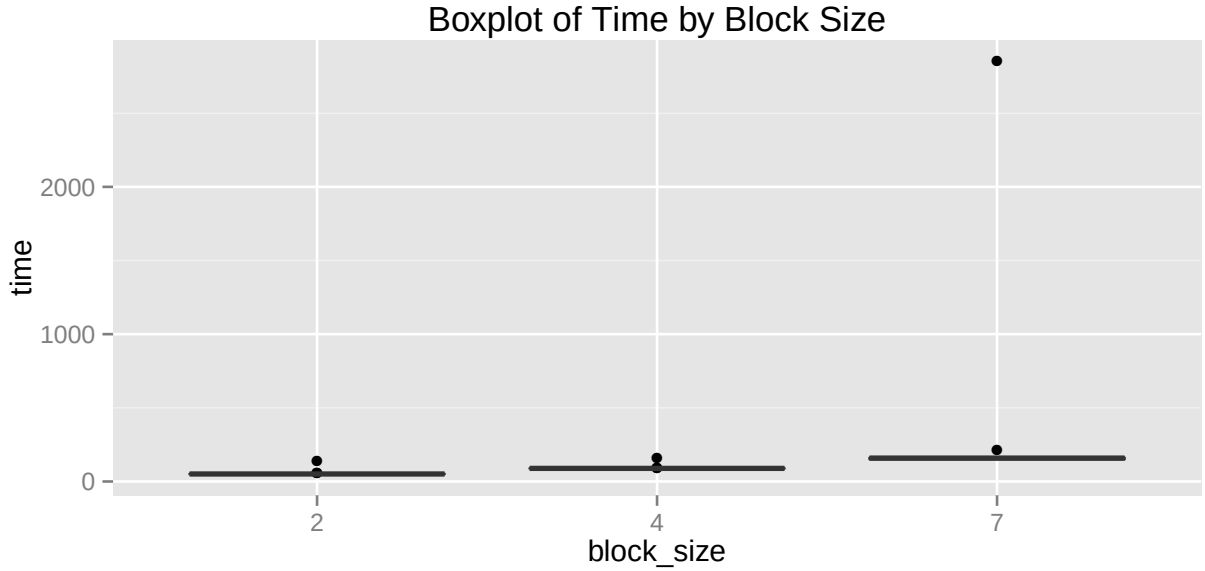
October 22, 2013

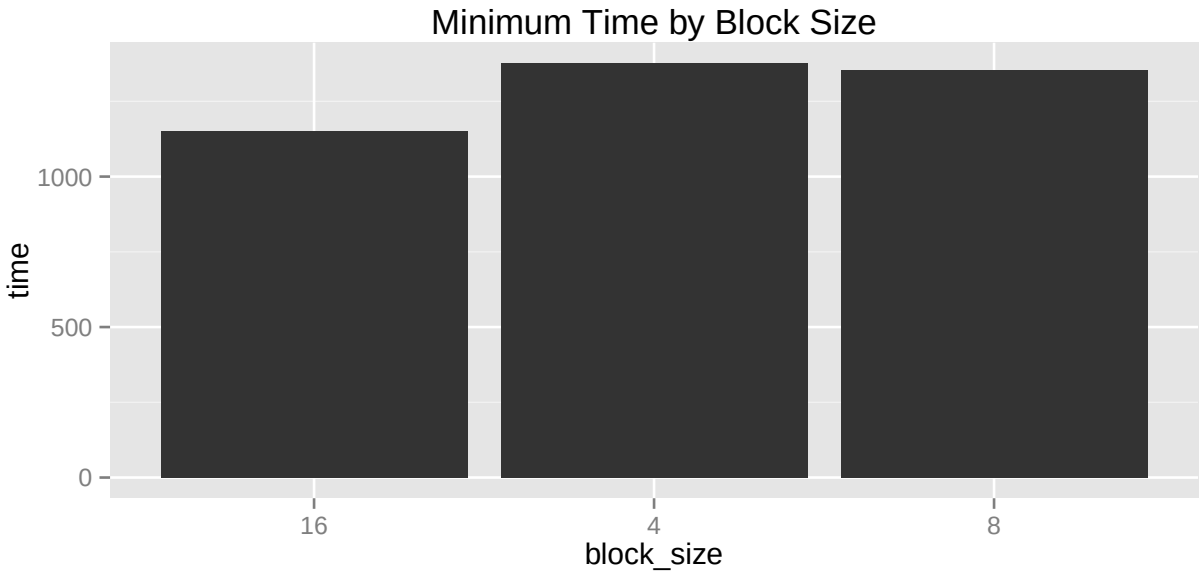
The Floyd's Algorithm experiment offered some interesting results. In the end, I believe that 2 threads offers the best performance (on my machine) with a Core i5 1.7ghz processor. The ANOVA experiment & Tukey's HSD test confirm that there is no significant difference between 2 & 4 and 4 & 7 threads, but there is a significant difference between 2 & 7 threads. The boxplot included also clearly shows the difference.

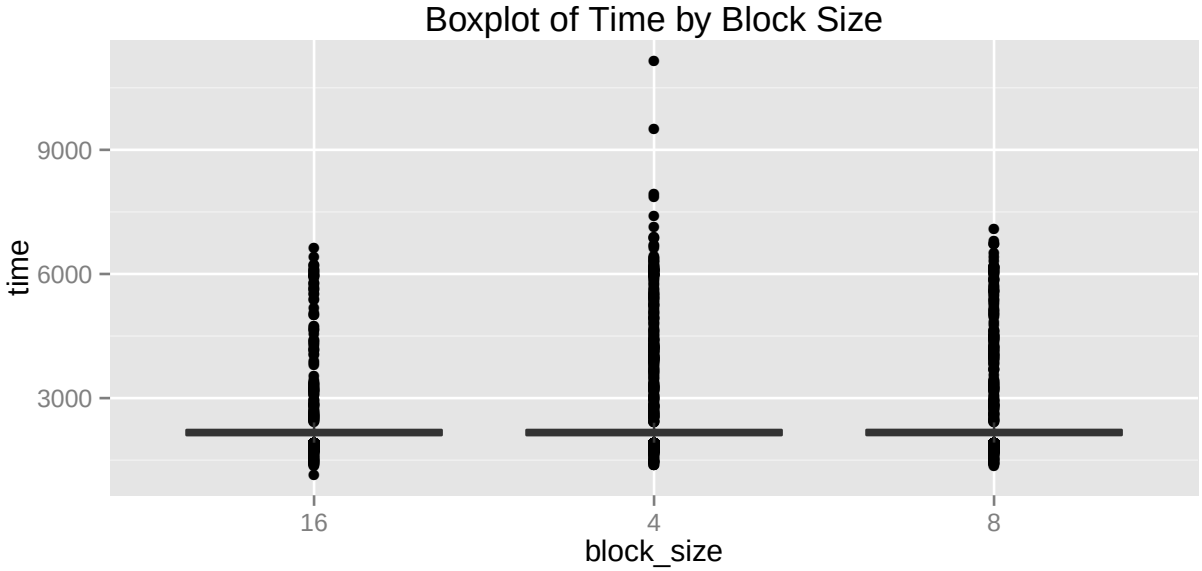
```
##             Df  Sum Sq Mean Sq F value Pr(>F)
## block_size   2  640800  320400    3.29  0.043 *
## Residuals   72 7010107   97363
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##   Tukey multiple comparisons of means
##     95% family-wise confidence level
##
## Fit: aov(formula = time ~ block_size, data = P4Floyd)
##
## $block_size
##       diff      lwr   upr  p adj
## 4-2  37.04 -174.166 248.2 0.9076
## 7-2 211.96    0.754 423.2 0.0490
## 7-4 174.92  -36.286 386.1 0.1240
```





In the case of the matrix example, I note that the minimum run time was achieved with 16 threads, and when I viewed a boxplot of the results for each I see that while each number of threads are all in a similar range with a similar μ value, that 16 threads has a smaller minimum and maximum run time value. The experiment was run 5,000 times per block size for OpenMP with the 16x16 matrices provided.


Minimum Time by Block Size
time
1000
500
0
16
4
8
block_size


Boxplot of Time by Block Size
time
9000
6000
3000
16
4
8
block_size