

Parse Time: Hard vs Soft(er) : Variable-Load Environmer

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Background and Purpose

The purpose of this notepad is to simply compare the differences in parse times from hard and soft parsing based on the execution number of a unique SQL statement... in a variable-load environment. The load was massive soft parsing from other SQL statements, not the SQL the parse time was gathered from.

Experimental Data and Loading

Below is all the experimental data. The experiment was run on a Dell single six-core CPU, Oracle 11.2G. According to “`/proc/version`”: Linux version 2.6.32-300.3.1.el6uek.x86_64 (mockbuild@ca-build44.us.oracle.com) (gcc version 4.4.4 20100725 (Red Hat 4.4.4-13) (GCC)) #1 SMP Fri Dec 9 18:57:35 EST 2011.

For each similar yet unique 100 SQL statements, they were run 7 times (1st is the hard parse), AND this occurred at various lo intensities (labeled 3 to 13). The parse time was the only piece of data collected (cpu parse time and elapsed parse time). The data was collected from a trace file, not from the v\$ views.

Details are presented in the associated blog posting in late August of 2012. The no-Load experiment was blogged in early July 2012.

The load was a different SQL statement being repeated soft parsed; cursor created and repeatedly opened and closed. But data being fetched. This causes lots of mutex waits; “cursor: pin s”. In fact, once the load hit 7, the CPU subsystem was 100% utilized. But I captured the timing situation during the heaviest load (13); the “cursor: pins s” accounted for 99% of the wait time and 63% of the time when CPU consumption was included. This detail is included in the blog and is taken from OraPub’s OS script, rtpctx.sql.

The order of sample data simply the parse time in either only CPU or the total elapsed time (which includes CPU and Oracle w time).

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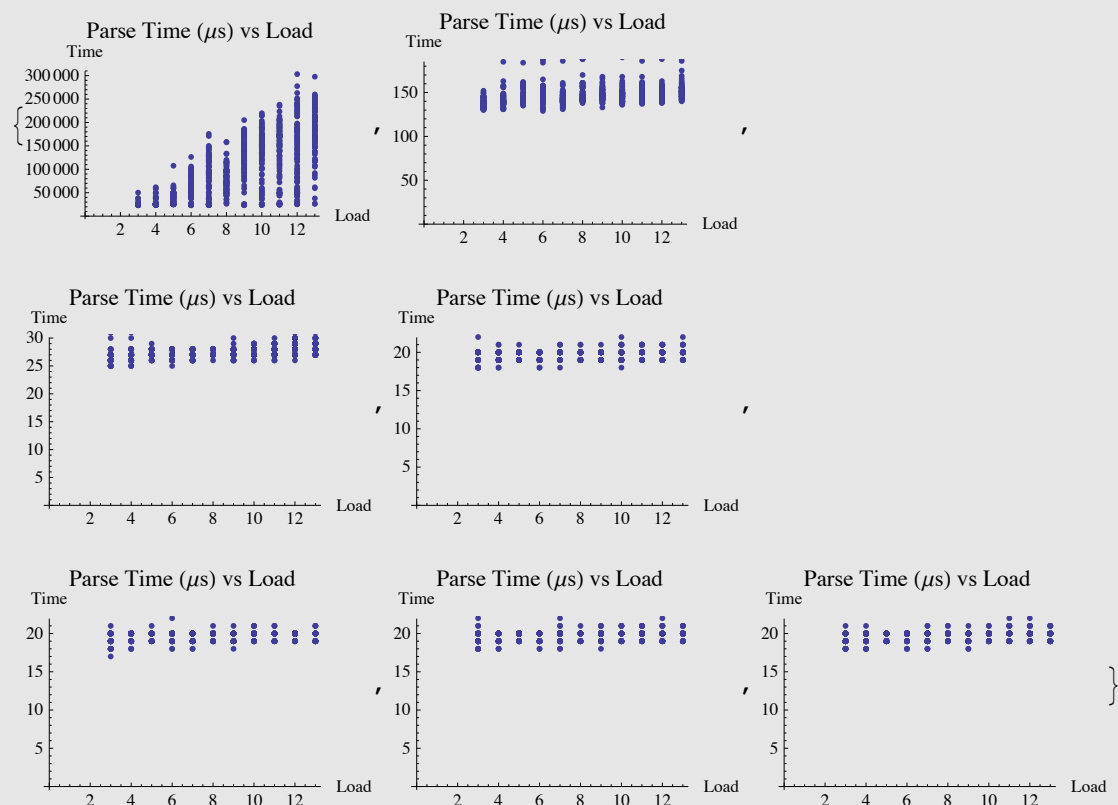
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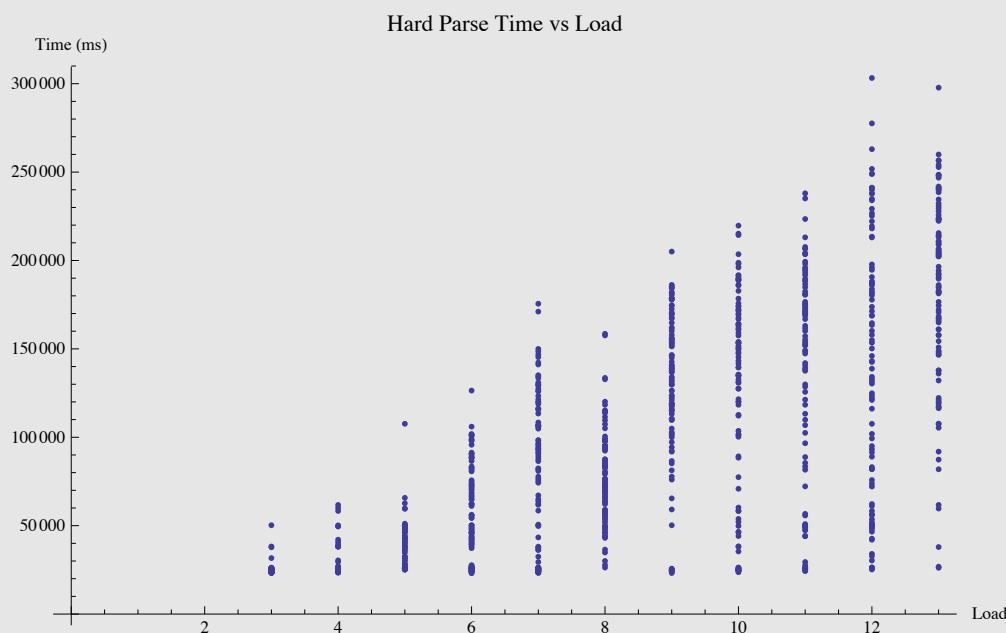

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Print["Execution Plots 1..7. At each load, 100 uniq/similar SQL stmts were run 7 times."];  
Table[  
  many = ListPlot[ssElp[i], PlotLabel -> "Parse Time ( $\mu$ s) vs Load",  
    AxesLabel -> {"Load", "Time"}, AxesOrigin -> {0, 0}];  
  Show[many]  
  , {i, 1, 7}]  
]  
ListPlot[ssElp[1], PlotLabel -> "Hard Parse Time vs Load",  
  AxesLabel -> {"Load", "Time (ms)"}, AxesOrigin -> {0, 0}]
```

Execution Plots 1..7. At each load, 100 uniq/similar SQL stmts were run 7 times.

Out[9]=



Out[10]=

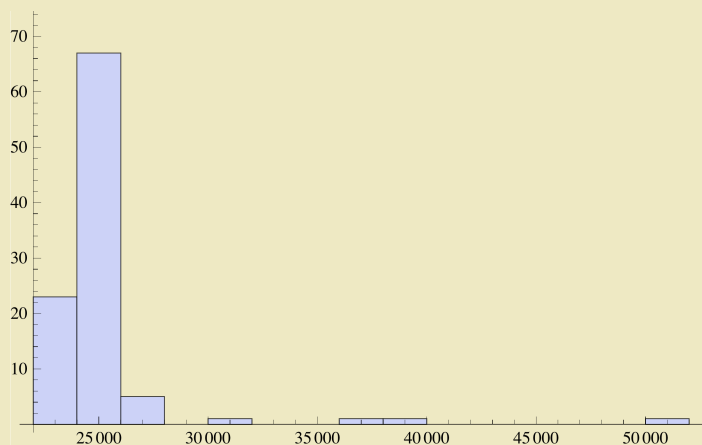


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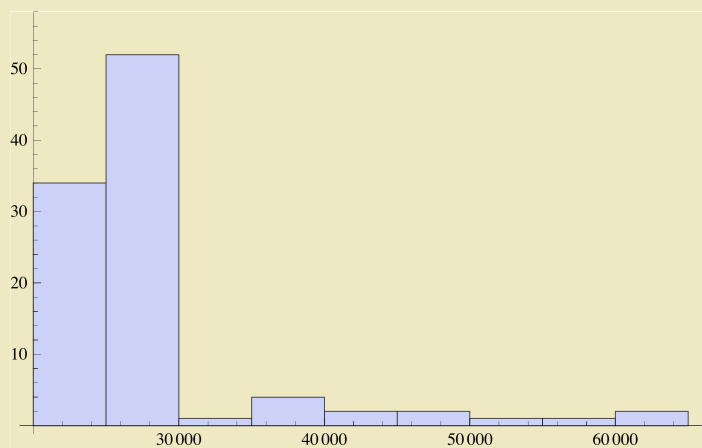
Table[
  Table[
    tempData = Select[ssElp[exec], #[[1]] == load &];
    histData =
      Table[
        tempData[[i]][[2]]
        , {i, 1, 99}
      ];
    histData;
    theMean = N[Mean[histData]];
    theMedian = N[Median[histData]];
    theDiffNum = theMean - theMedian;
    theDiffPct = 100 * N[theDiffNum / theMean];
    Print["Execution=", exec, " Load=", load, " PValue=", DistributionFitTest[histData], " Mean=",
      theMean, " Median=", theMedian, " Mean-Median=", theDiffNum, " Pct Diff=", theDiffPct];
    Print[Histogram[histData]];
    Print["-----"];
    If[exec == 1, execOneData[load] = histData;
      , {load, 3, 13}
    ]
  ]
  , {exec, 1, 7}
]
SmoothHistogram[{execOneData[3], execOneData[4], execOneData[5], execOneData[6]},
  PlotLabel -> "Hard Parse Time at Various Loads", AxesLabel -> {"Time ( $\mu$ s)", ""}, AxesOrigin -> {0, 0}]

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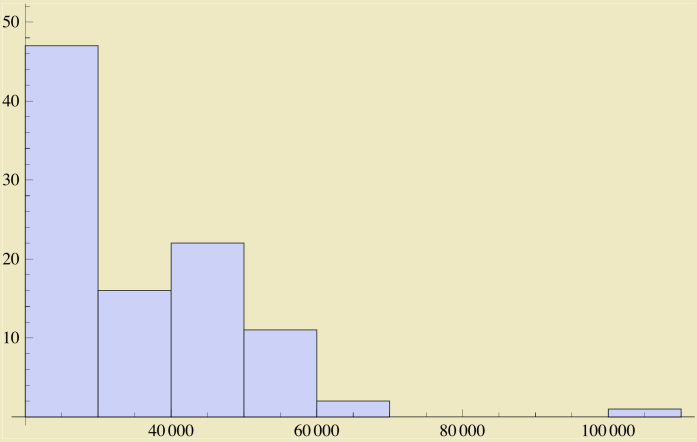
Execution=1 Load=3 PValue=0 Mean=25 163.9 Median=24 544. Mean-Median=619.859 Pct Diff=2.46329



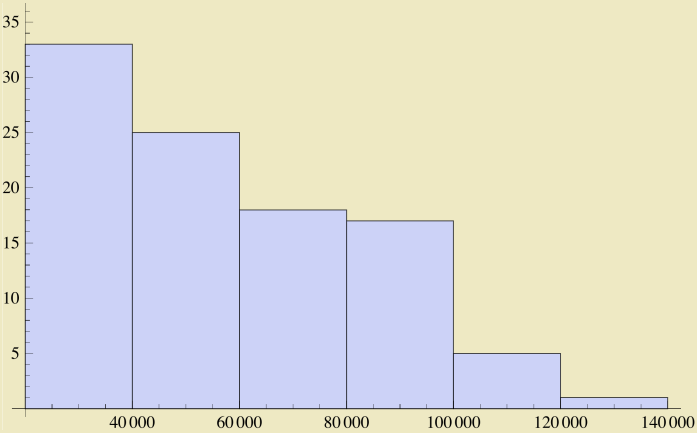
Execution=1 Load=4 PValue=0 Mean=27 964.7 Median=25 537. Mean-Median=2427.72 Pct Diff=8.68136



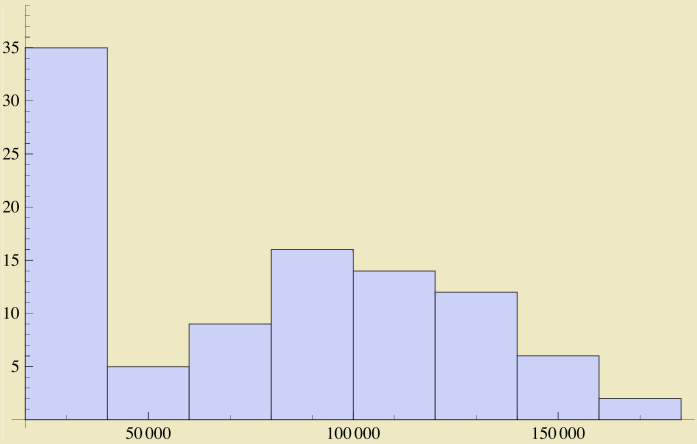
Execution=1 Load=5 PValue=0 Mean=36 391.9 Median=31 344. Mean-Median=5047.91 Pct Diff=13.871



Execution=1 Load=6 PValue=0.0000566192 Mean=55 319.3 Median=48 678. Mean-Median=6641.29 Pct Diff=12.0054

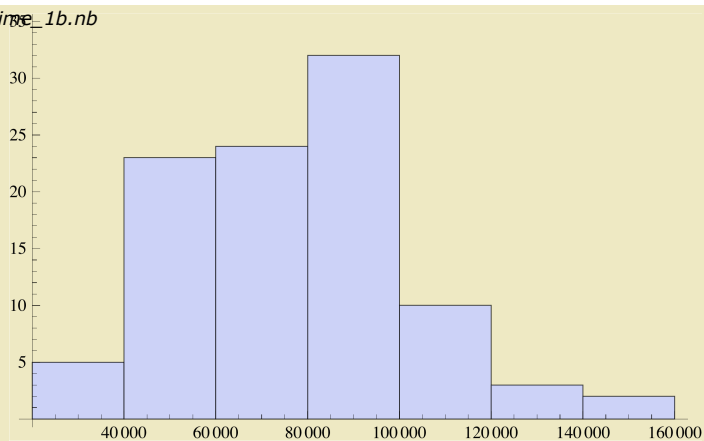


Execution=1 Load=7 PValue= 2.45098×10^{-6} Mean=76 892. Median=80 964. Mean-Median=- 4072.02 Pct Diff=- 5.29577

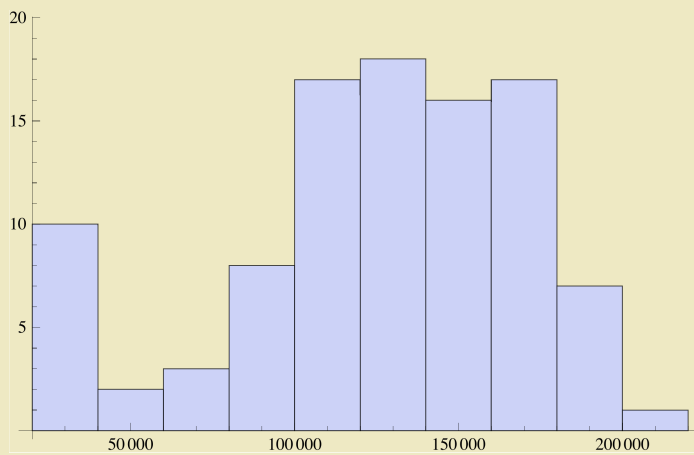


Execution=1 Load=8 PValue=0.533539 Mean=78 342.5 Median=76 382. Mean-Median=1960.52 Pct Diff=2.50249

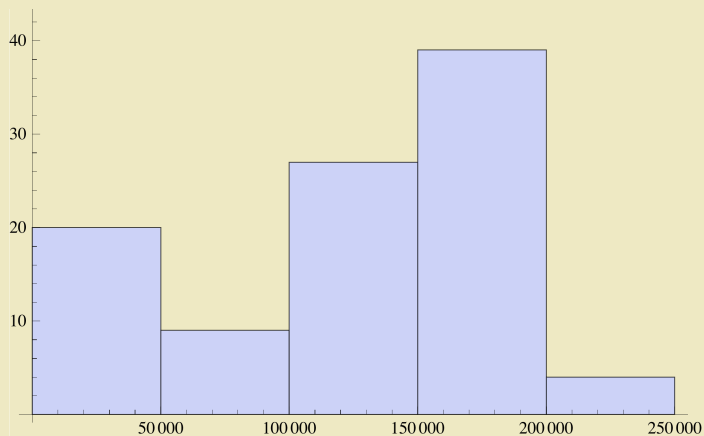
ParseTime-1b.nb



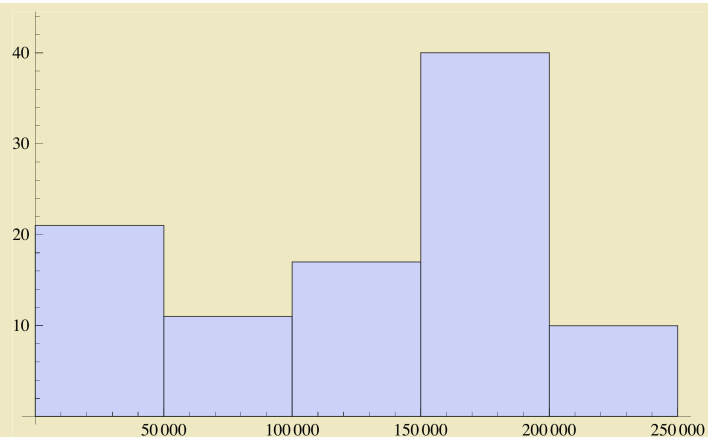
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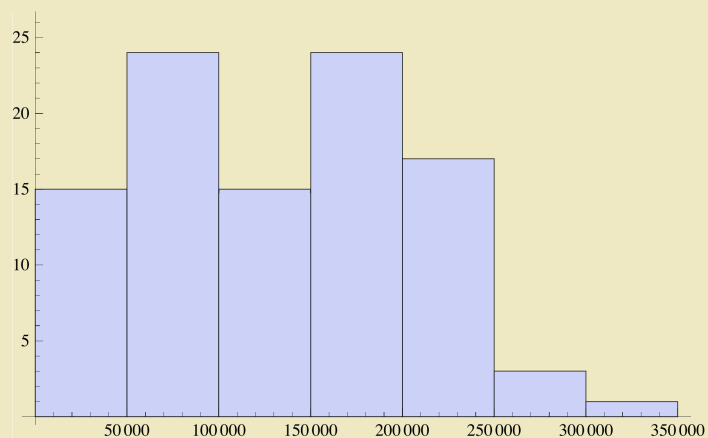
Execution=1 Load=10 PValue= 1.27313×10^{-6} Mean=123 959. Median=139 535. Mean-Median=-15 576. Pct Diff=-12.565



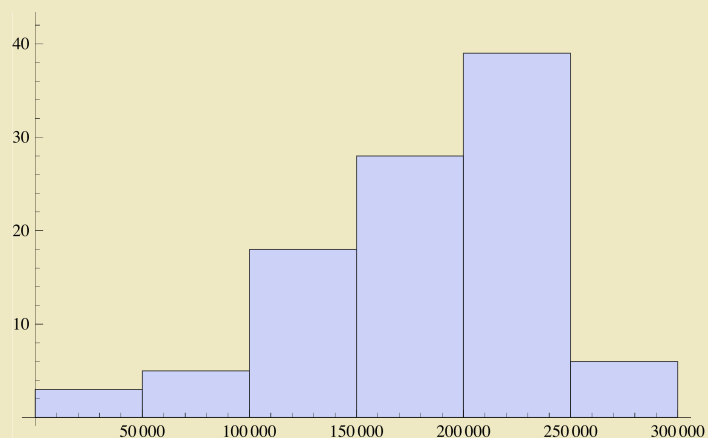
Execution=1 Load=11 PValue=0 Mean=129 576. Median=151 943. Mean-Median=-22 367.1 Pct Diff=-17.2618



Execution=1 Load=12 PValue=0.0009077 Mean=135 007. Median=134 199. Mean-Median=807.596 Pct Diff=0.59819

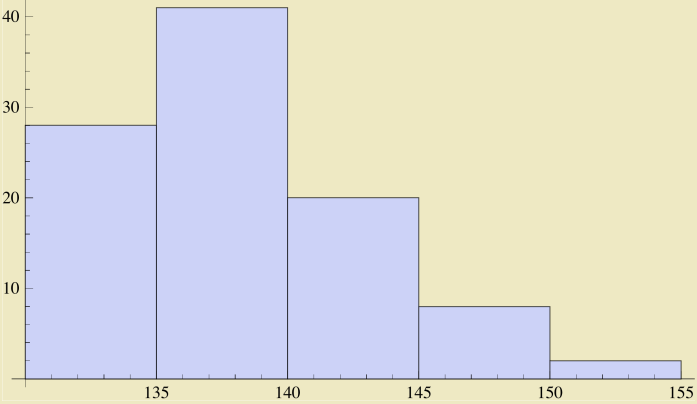


Execution=1 Load=13 PValue=0.00798122 Mean=181 015. Median=190 540. Mean-Median=-9524.76 Pct Diff=-5.26185

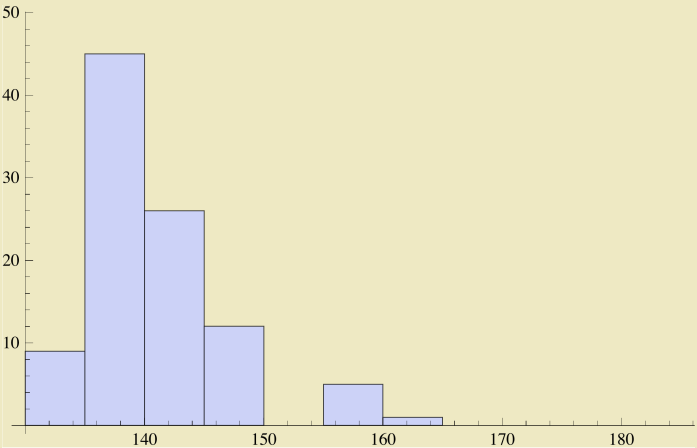


Execution=2 Load=3 PValue=0.0147209 Mean=137.828 Median=138. Mean-Median=-0.171717 Pct Diff=-0.124588

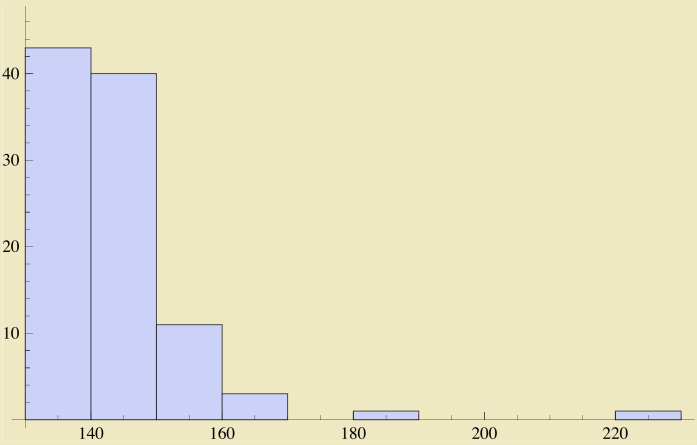
ParseTime_1b.nb



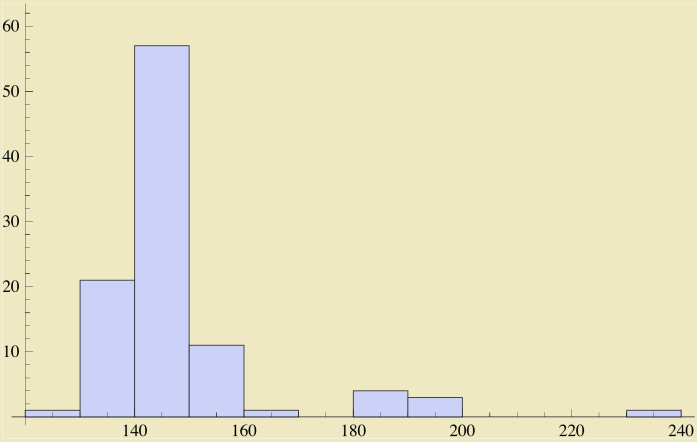
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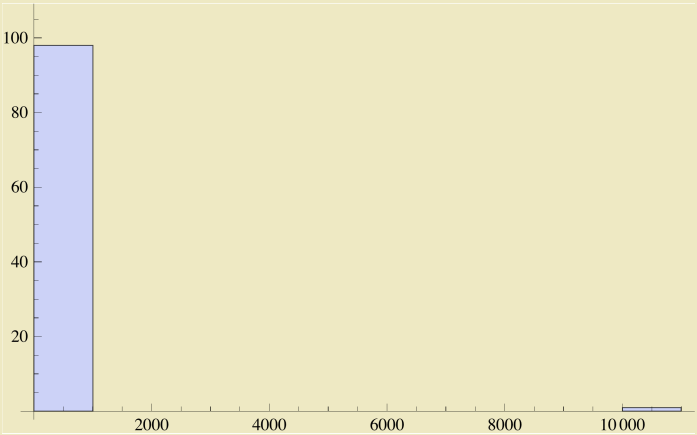
Execution=2 Load=5 PValue=0 Mean=144. Median=140. Mean-Median=4. Pct Diff=2.77778



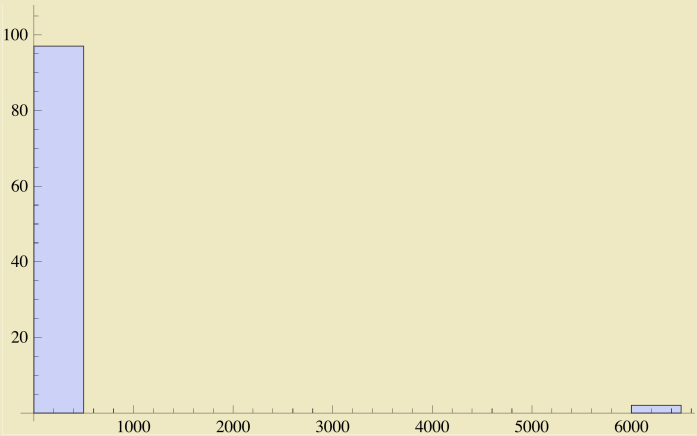
Execution=2 Load=6 PValue=0 Mean=147.333 Median=142. Mean-Median=5.33333 Pct Diff=3.61991



Execution=2 Load=7 PValue=0 Mean=245.869 Median=143. Mean-Median=102.869 Pct Diff=41.8389

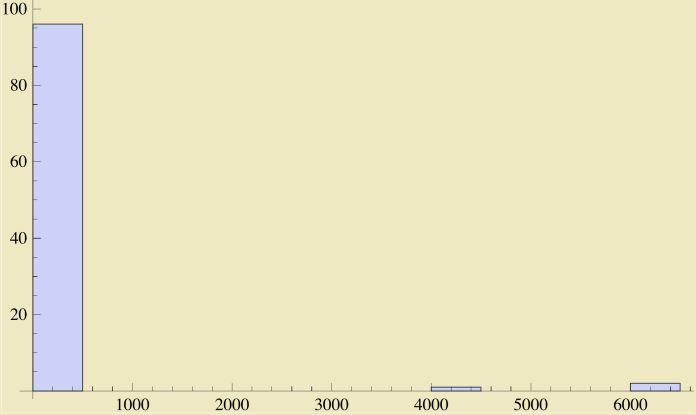


Execution=2 Load=8 PValue=0. Mean=272.98 Median=144. Mean-Median=128.98 Pct Diff=47.2488

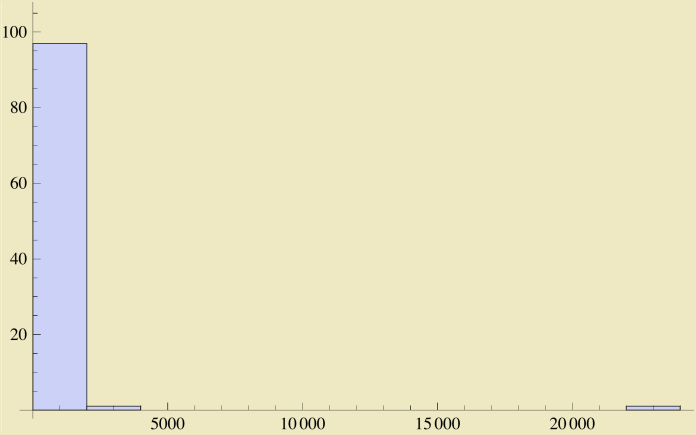


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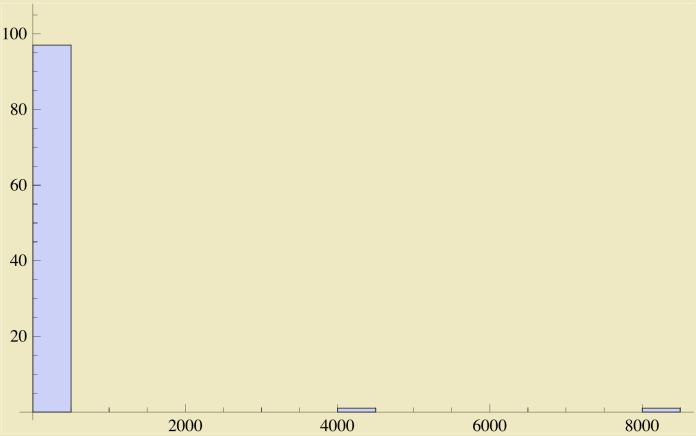
ParseTime_1b.nb



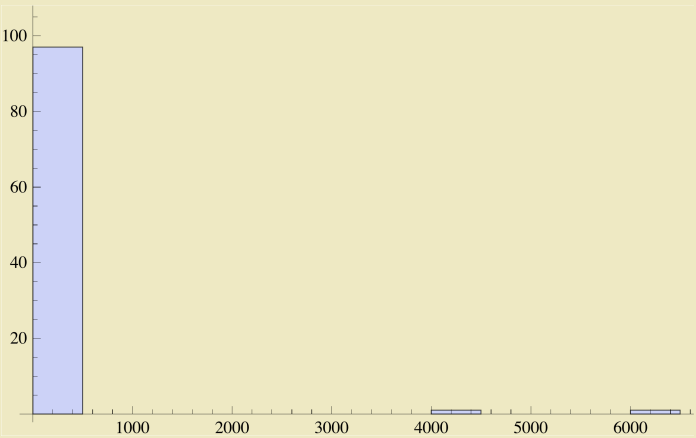
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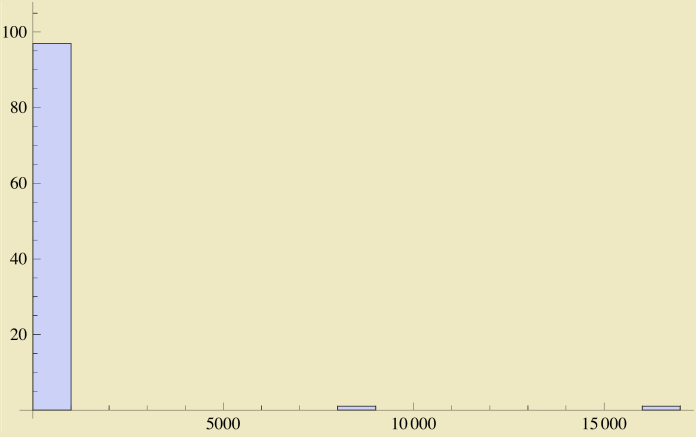
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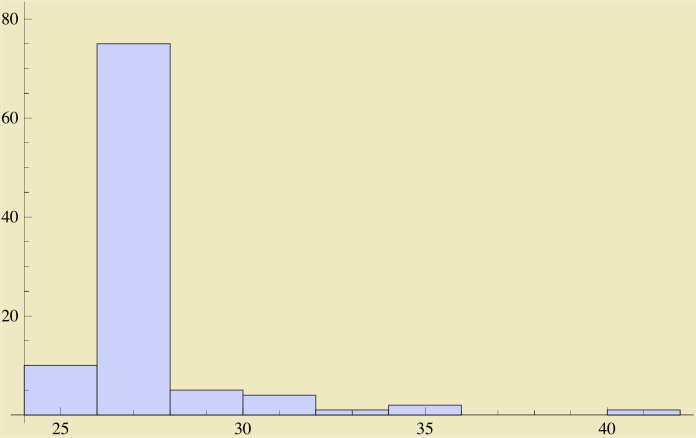
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Execution=2 Load=13 PValue=0 Mean=401.899 Median=152. Mean-Median=249.899 Pct Diff=62.1796

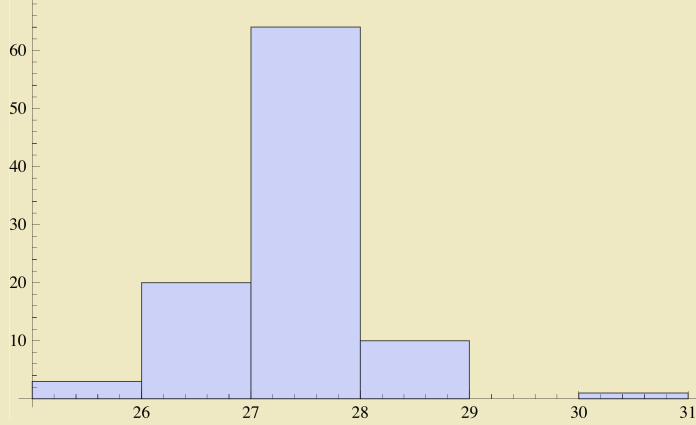


Execution=3 Load=3 PValue=0 Mean=27.0808 Median=26. Mean-Median=1.08081 Pct Diff=3.99105

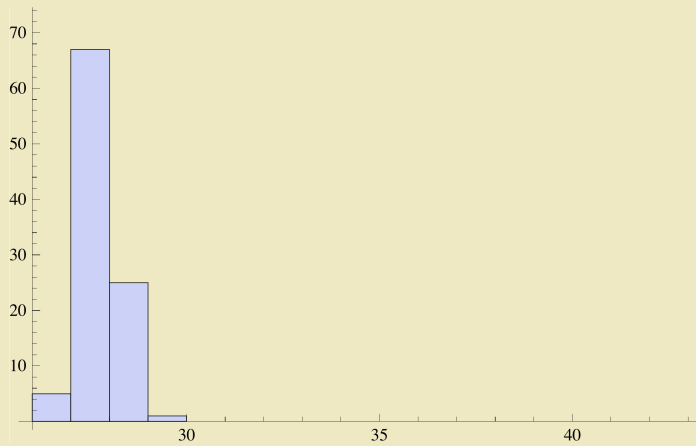


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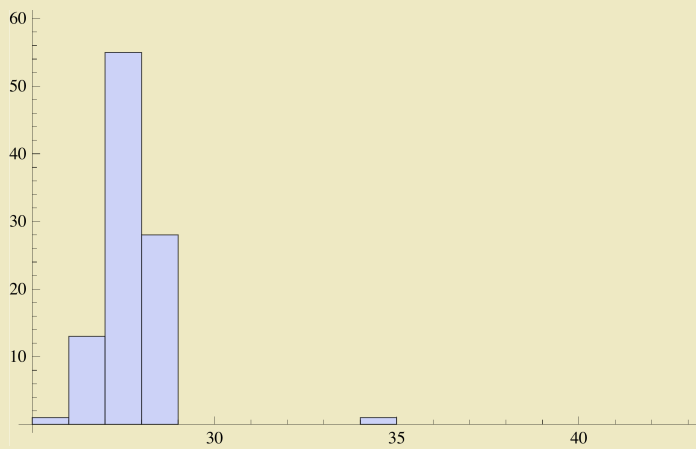
ParseTime_1b.nb



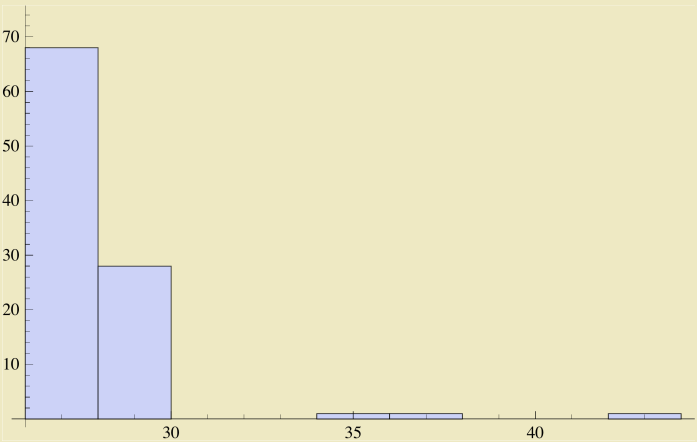
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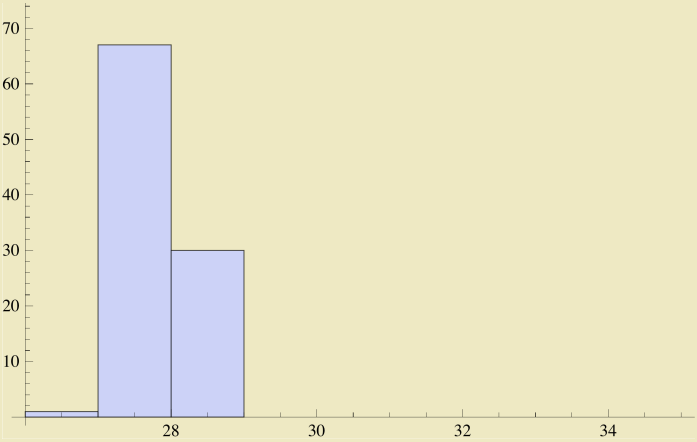
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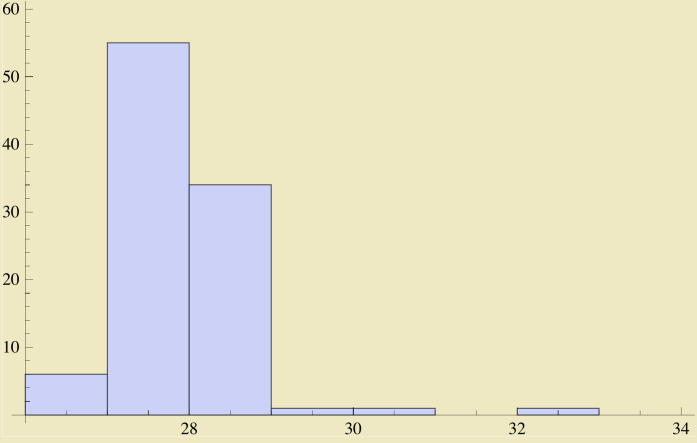
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Execution=3 Load=8 PValue=0 Mean=27.3737 Median=27. Mean-Median=0.373737 Pct Diff=1.36531

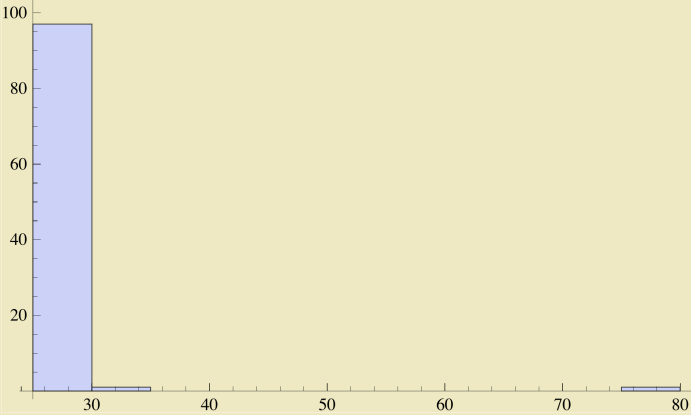


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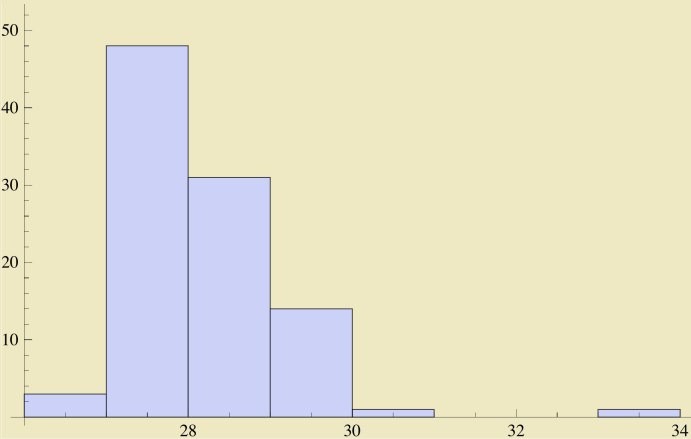


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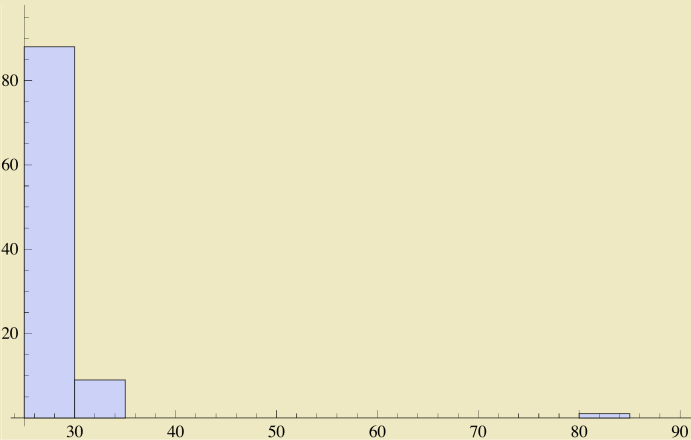
ParseTime 1b.nb



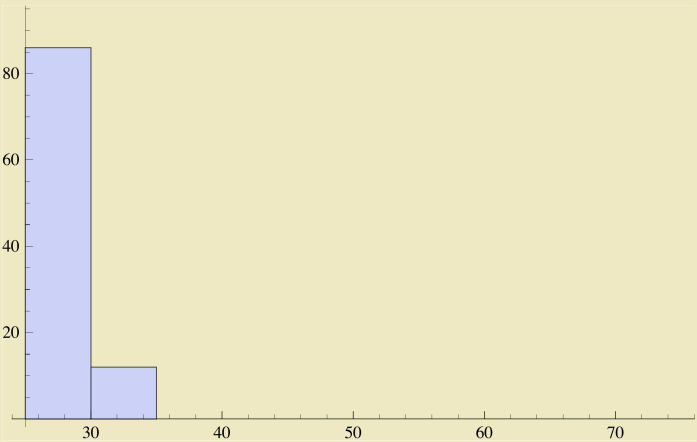
Execution=3 Load=11 PValue=0 Mean=27.7273 Median=27. Mean-Median=0.727273 Pct Diff=2.62295



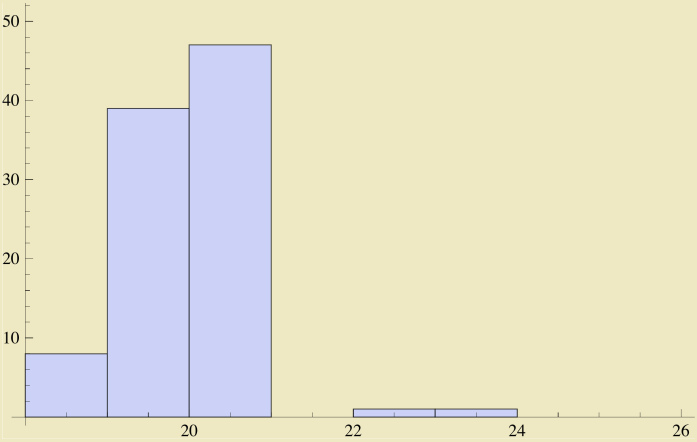
Execution=3 Load=12 PValue=0 Mean=29.0909 Median=28. Mean-Median=1.09091 Pct Diff=3.75



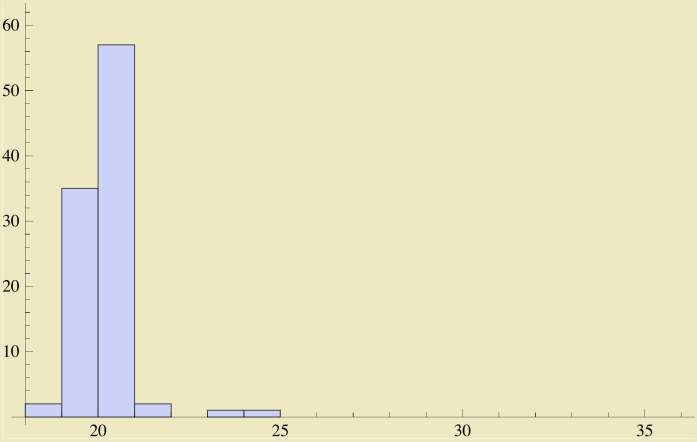
Execution=3 Load=13 PValue=0 Mean=28.6364 Median=28. Mean-Median=0.636364 Pct Diff=2.22222



Execution=4 Load=3 PValue=0 Mean=19.6768 Median=20. Mean-Median=-0.323232 Pct Diff=-1.64271

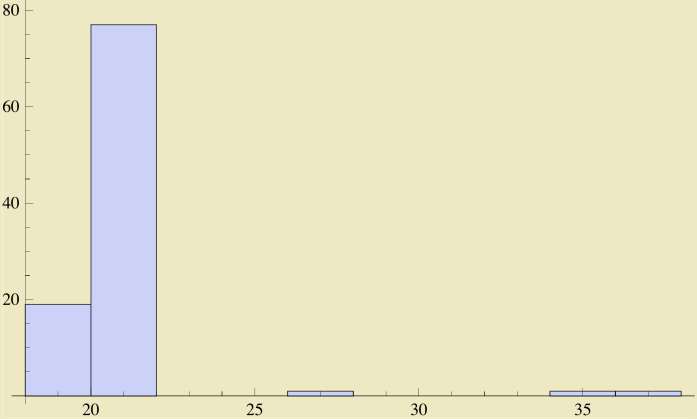


Execution=4 Load=4 PValue=0 Mean=19.8586 Median=20. Mean-Median=-0.141414 Pct Diff=-0.712106

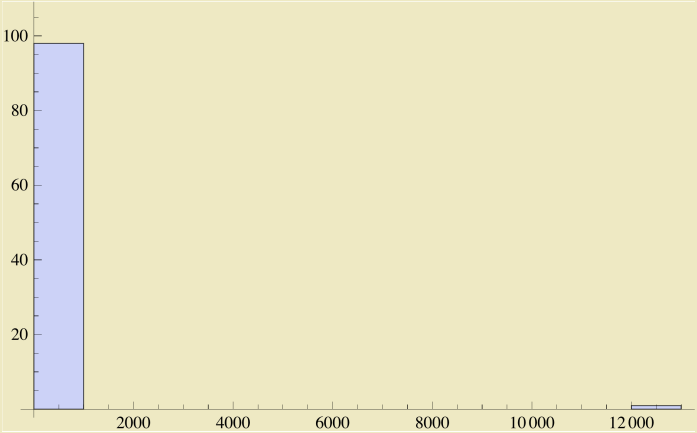


Execution=4 Load=5 PValue=0 Mean=20.202 Median=20. Mean-Median=0.20202 Pct Diff=1.

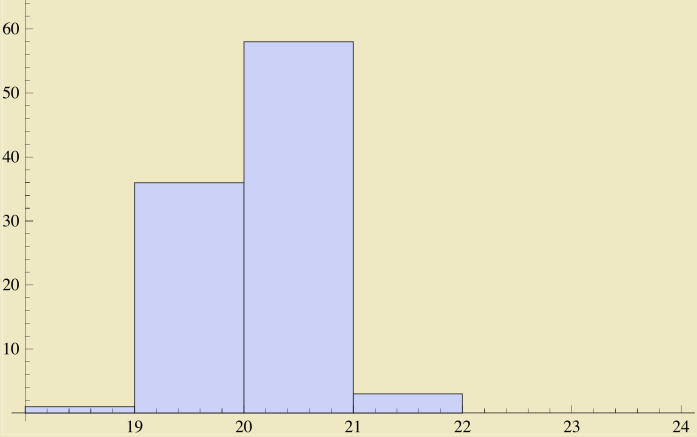
ParseTime 1b.nb



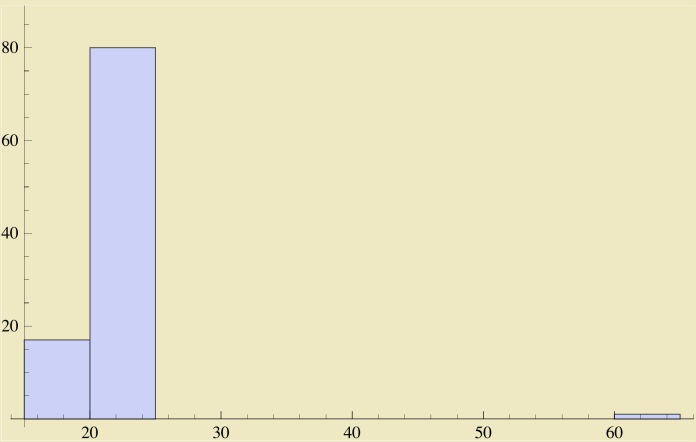
Execution=4 Load=6 PValue=0 Mean=141.899 Median=20. Mean-Median=121.899 Pct Diff=85.9055



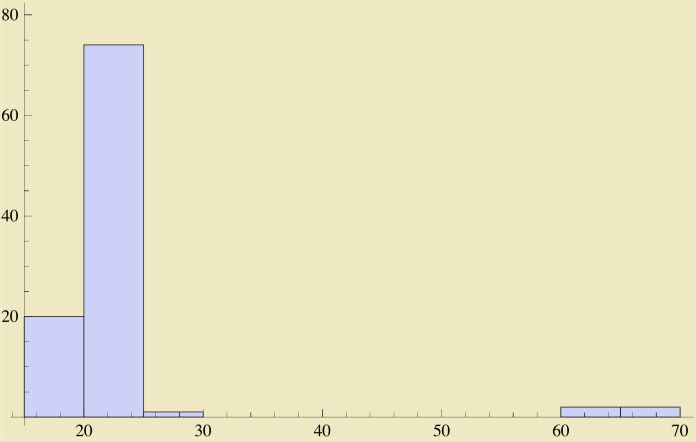
Execution=4 Load=7 PValue=0 Mean=19.6869 Median=20. Mean-Median=-0.313131 Pct Diff=-1.59056



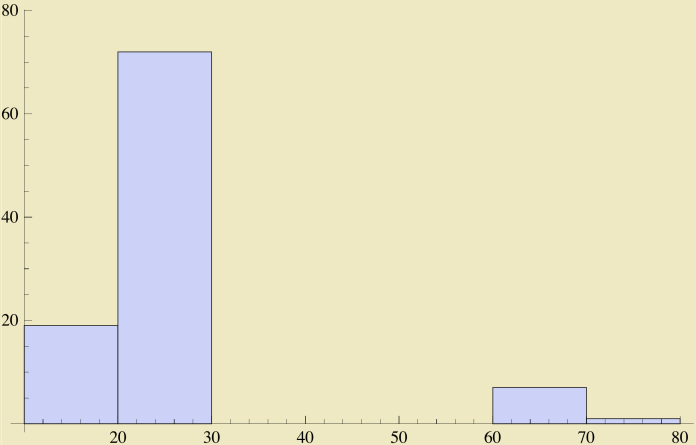
Execution=4 Load=8 PValue=0 Mean=20.7374 Median=20. Mean-Median=0.737374 Pct Diff=3.55577



Execution=4 Load=9 PValue=0 Mean=21.7273 Median=20. Mean-Median=1.72727 Pct Diff=7.94979

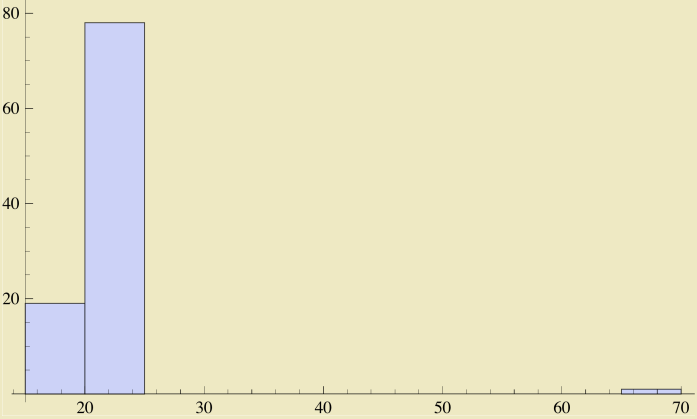


Execution=4 Load=10 PValue=0 Mean=23.6667 Median=20. Mean-Median=3.66667 Pct Diff=15.493

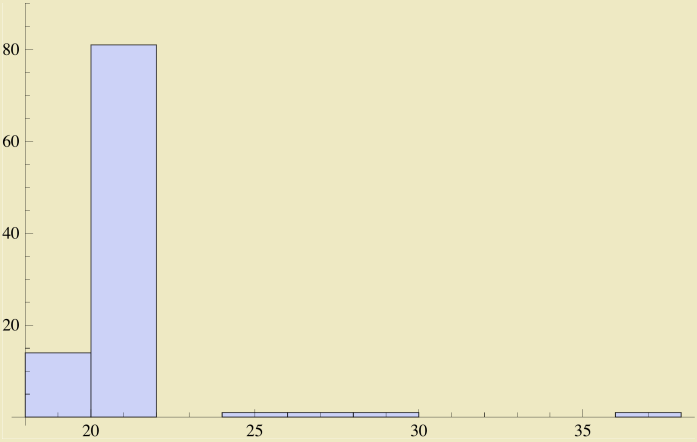


Execution=4 Load=11 PValue=0 Mean=20.8788 Median=20. Mean-Median=0.878788 Pct Diff=4.209

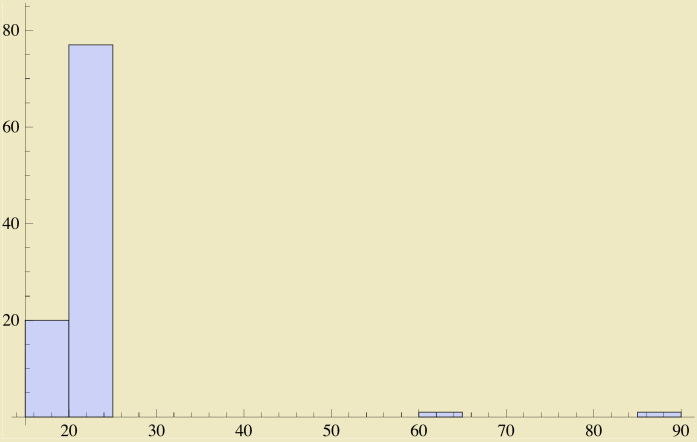
ParseTime_1b.nb



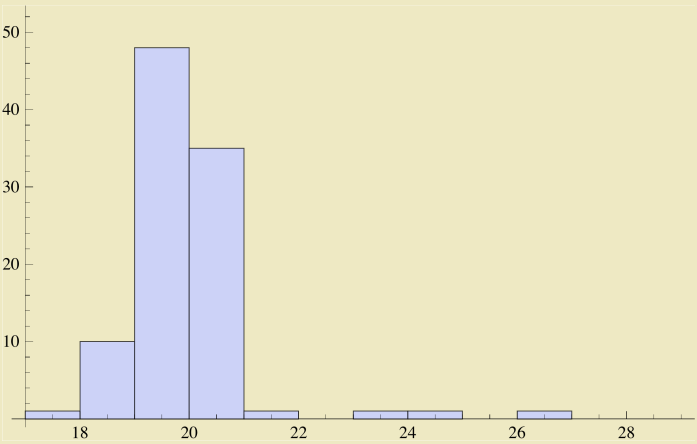
Execution=4 Load=12 PValue=0 Mean=20.2828 Median=20. Mean-Median=0.282828 Pct Diff=1.39442



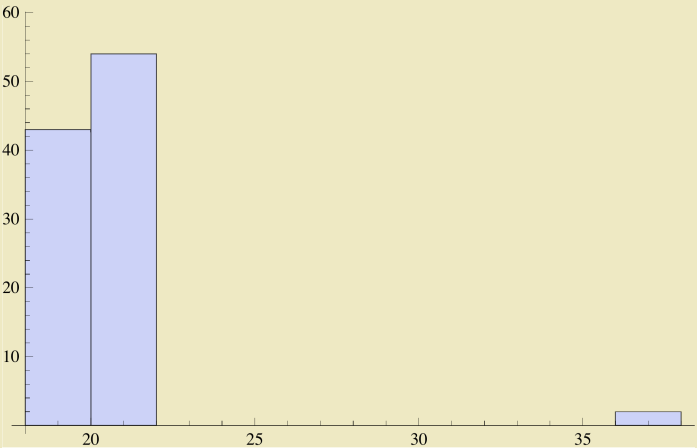
Execution=4 Load=13 PValue=0 Mean=20.9596 Median=20. Mean-Median=0.959596 Pct Diff=4.57831



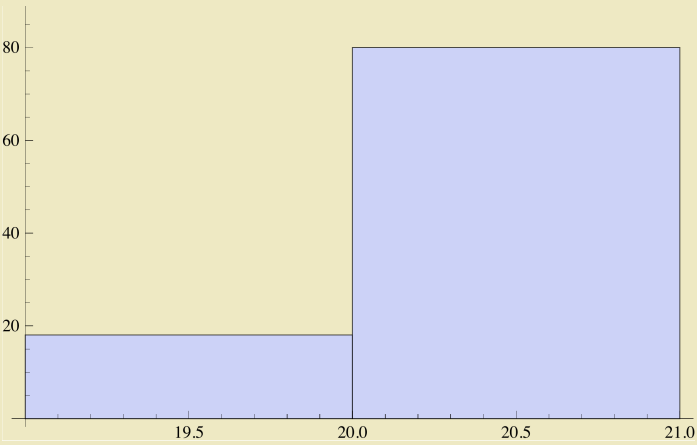
Execution=5 Load=3 PValue=0 Mean=19.5152 Median=19. Mean-Median=0.515152 Pct Diff=2.63975



Execution=5 Load=4 PValue=0 Mean=19.8687 Median=20. Mean-Median=-0.131313 Pct Diff=-0.660905

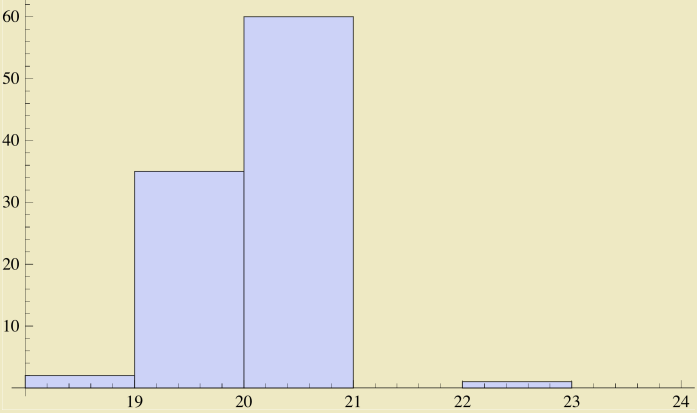


Execution=5 Load=5 PValue=0 Mean=19.8283 Median=20. Mean-Median=-0.171717 Pct Diff=-0.866021

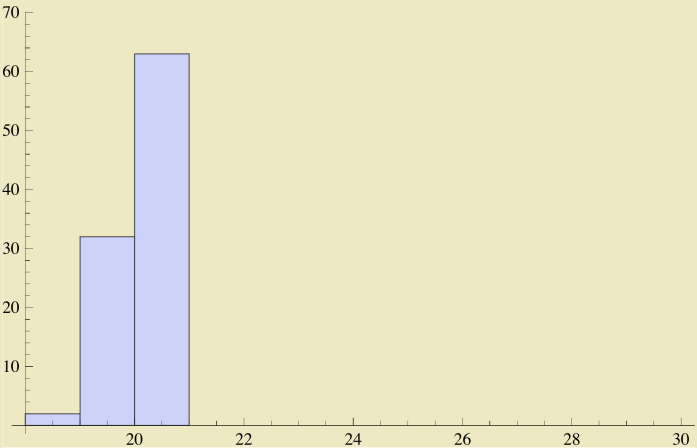


Execution=5 Load=6 PValue=0 Mean=19.6667 Median=20. Mean-Median=-0.333333 Pct Diff=-1.69492

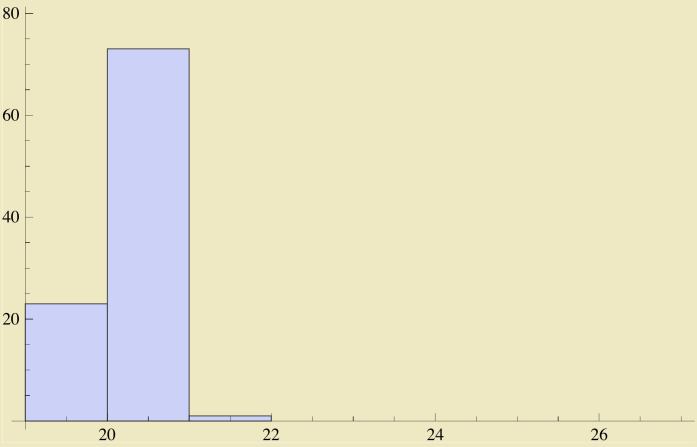
ParseTime_1b.nb



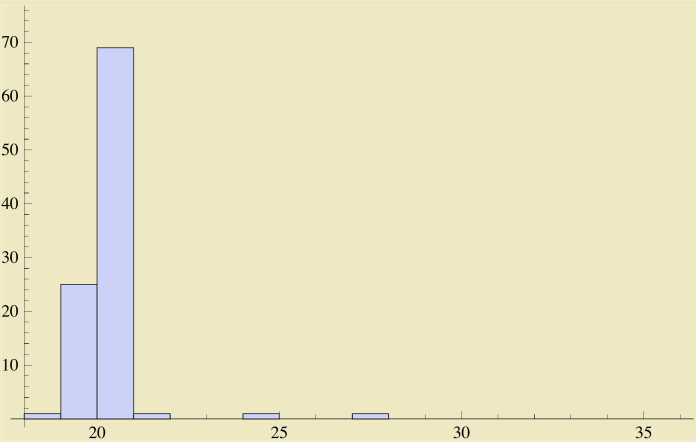
Execution=5 Load=7 PValue=0 Mean=19.8384 Median=20. Mean-Median=-0.161616 Pct Diff=-0.814664



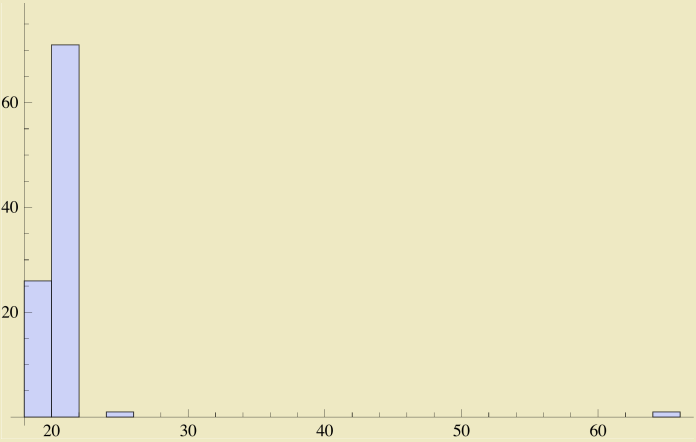
Execution=5 Load=8 PValue=0 Mean=19.9192 Median=20. Mean-Median=-0.0808081 Pct Diff=-0.40568



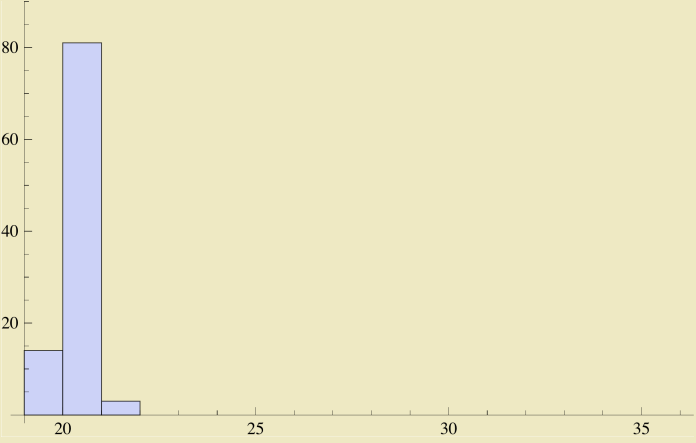
Execution=5 Load=9 PValue=0 Mean=20.0101 Median=20. Mean-Median=0.010101 Pct Diff=0.0504796



Execution=5 Load=10 PValue=0 Mean=20.2727 Median=20. Mean-Median=0.272727 Pct Diff=1.34529

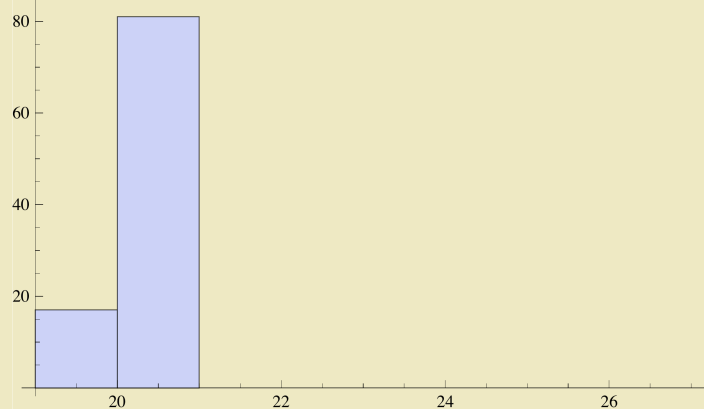


Execution=5 Load=11 PValue=0 Mean=20.0505 Median=20. Mean-Median=0.0505051 Pct Diff=0.251889

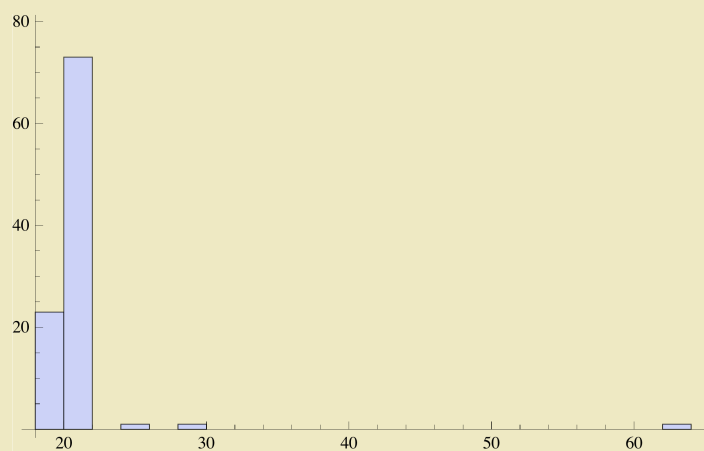


Execution=5 Load=12 PValue=0 Mean=19.899 Median=20. Mean-Median=-0.10101 Pct Diff=-0.507614

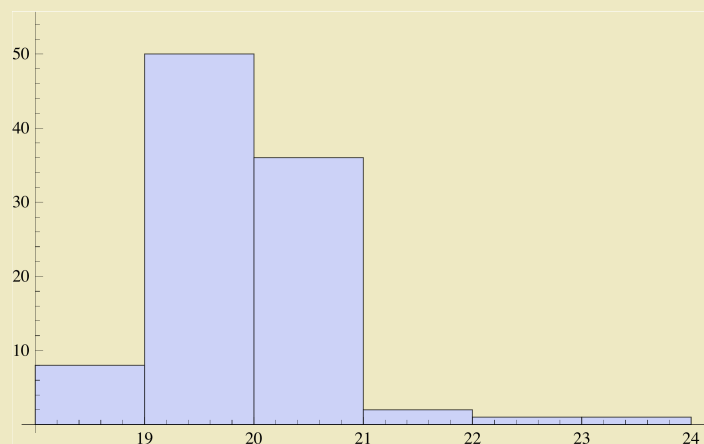
ParseTime 1b.nb



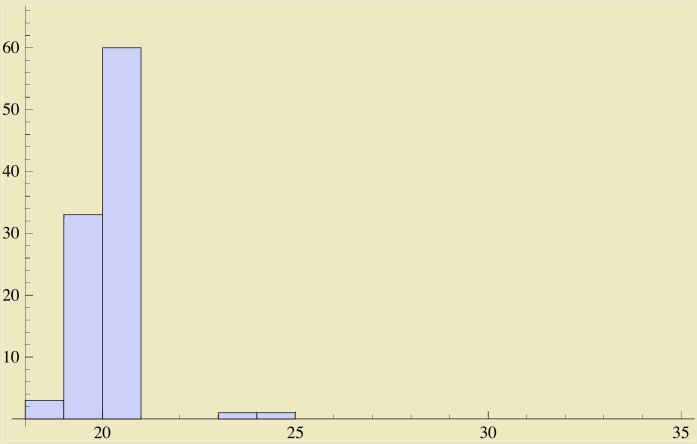
Execution=5 Load=13 PValue=0 Mean=20.3737 Median=20. Mean-Median=0.373737 Pct Diff=1.83441



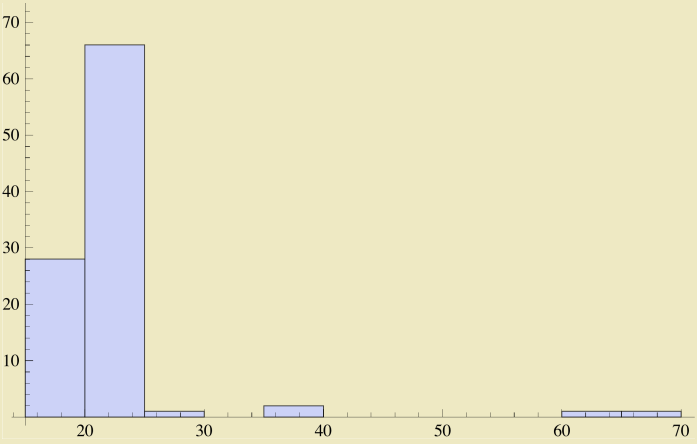
Execution=6 Load=3 PValue=0 Mean=19.4444 Median=19. Mean-Median=0.444444 Pct Diff=2.28571



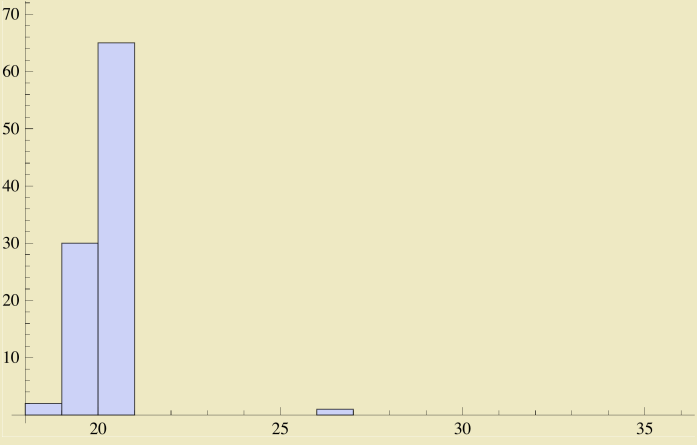
Execution=6 Load=4 PValue=0 Mean=19.8283 Median=20. Mean-Median=-0.171717 Pct Diff=-0.866021



Execution=6 Load=5 PValue=0 Mean=21.0404 Median=20. Mean-Median=1.0404 Pct Diff=4.94479

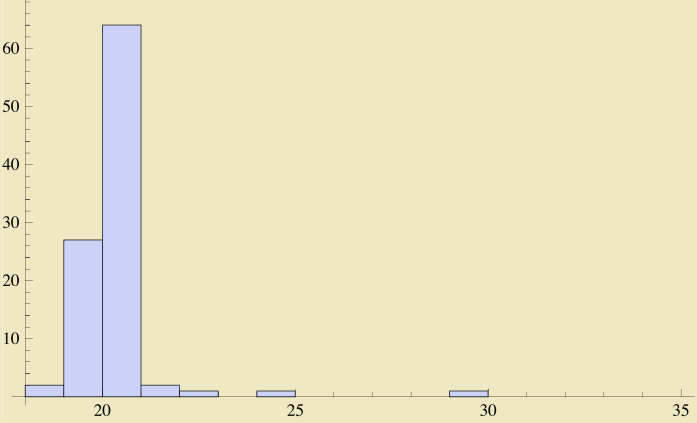


Execution=6 Load=6 PValue=0 Mean=19.8788 Median=20. Mean-Median=-0.121212 Pct Diff=-0.609756

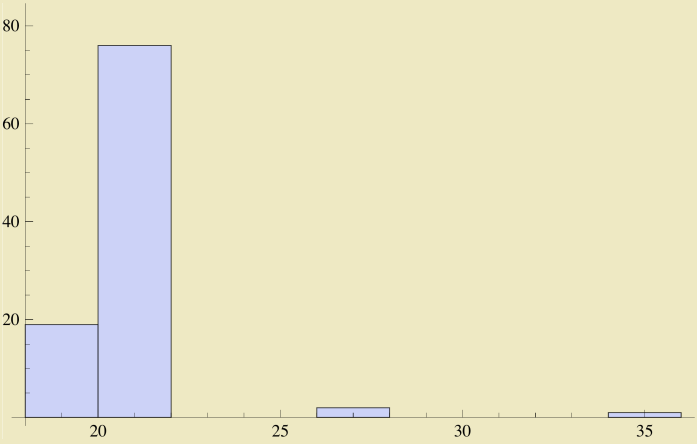


Execution=6 Load=7 PValue=0 Mean=20.0101 Median=20. Mean-Median=0.010101 Pct Diff=0.0504796

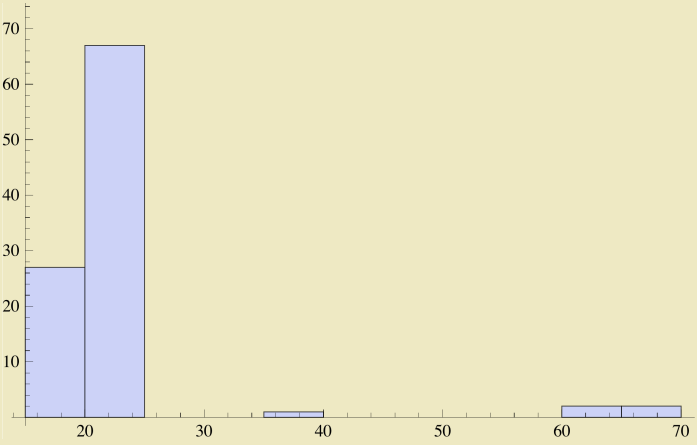
ParseTime_1b.nb



Execution=6 Load=8 PValue=0 Mean=20.2626 Median=20. Mean-Median=0.2626 Pct Diff=1.29611



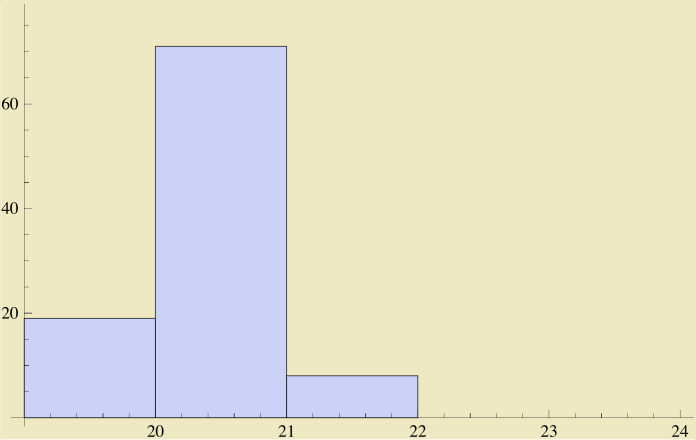
Execution=6 Load=9 PValue=0 Mean=21.8283 Median=20. Mean-Median=1.82828 Pct Diff=8.37575



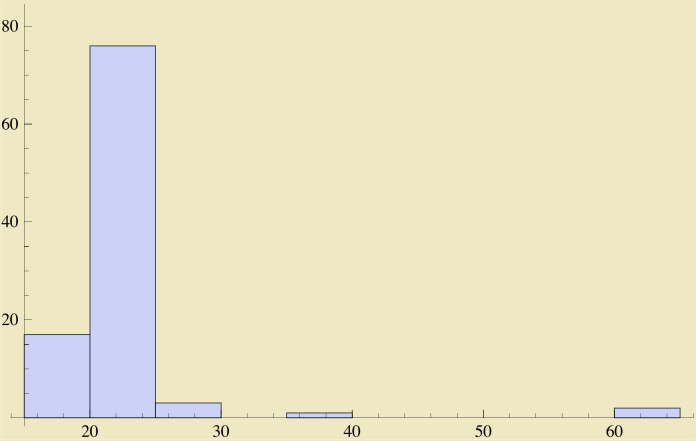
Execution=6 Load=10 PValue=0 Mean=20.3232 Median=20. Mean-Median=0.323232 Pct Diff=1.59046



Execution=6 Load=11 PValue=0 Mean=19.9293 Median=20. Mean-Median=-0.0707071 Pct Diff=-0.35479

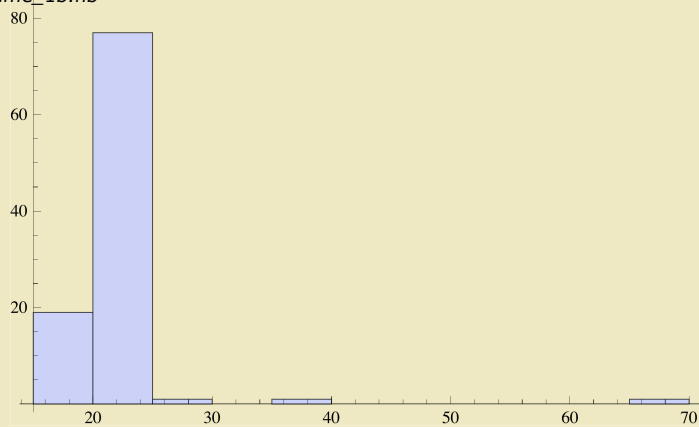


Execution=6 Load=12 PValue=0 Mean=21.1313 Median=20. Mean-Median=1.13131 Pct Diff=5.35373

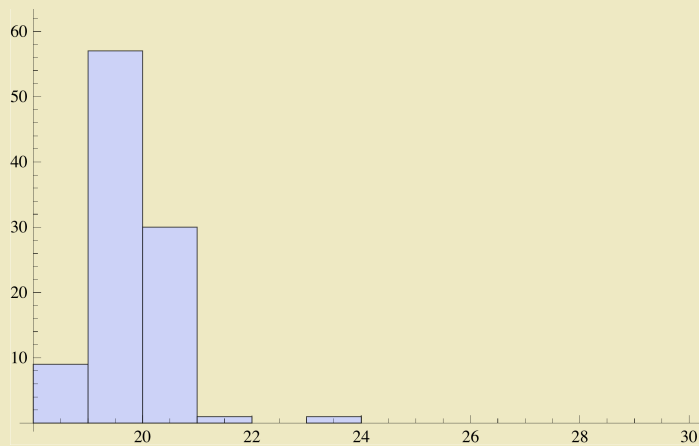


Execution=6 Load=13 PValue=0 Mean=20.6061 Median=20. Mean-Median=0.606061 Pct Diff=2.94118

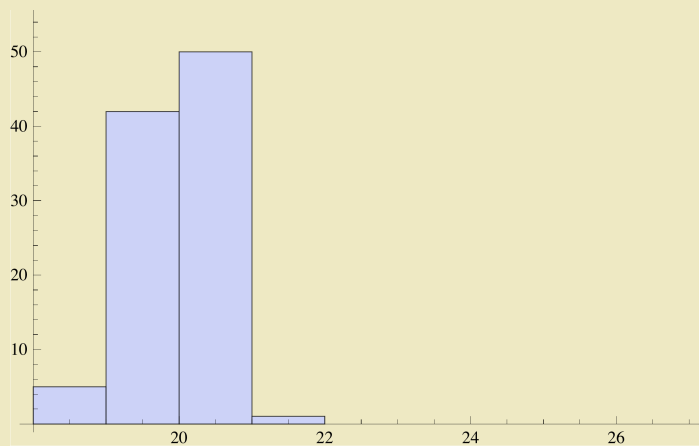
ParseTime_1b.nb



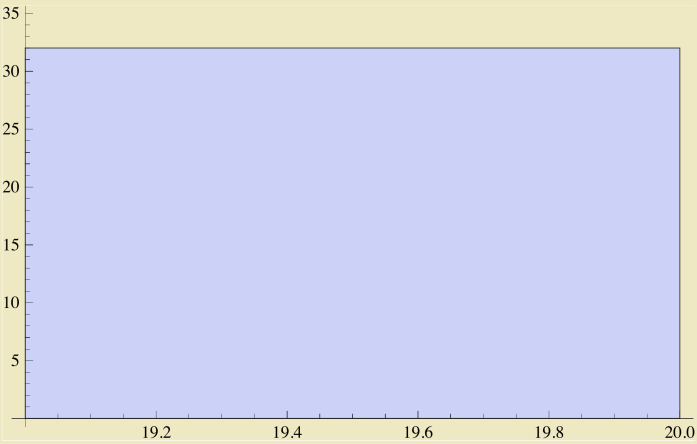
Execution=7 Load=3 PValue=0 Mean=19.3838 Median=19. Mean-Median=0.383838 Pct Diff=1.9802



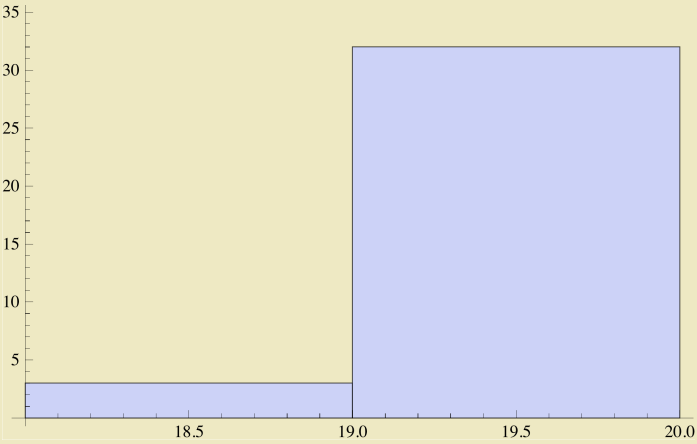
Execution=7 Load=4 PValue=0 Mean=19.5556 Median=20. Mean-Median=-0.444444 Pct Diff=-2.27273



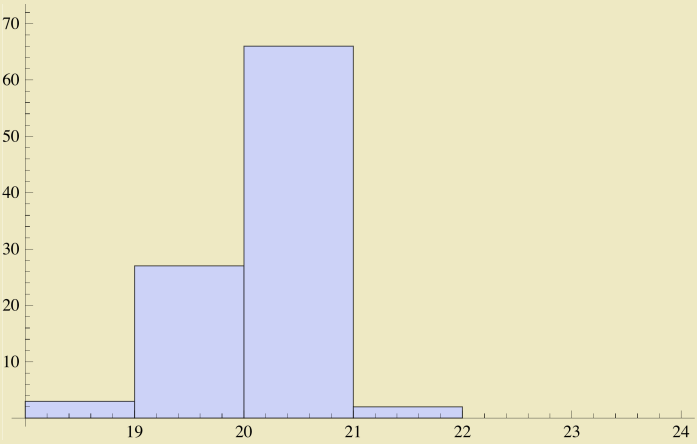
Execution=7 Load=5 PValue=0 Mean=19.6768 Median=20. Mean-Median=-0.323232 Pct Diff=-1.64271



Execution=7 Load=6 PValue=0 Mean=19.6162 Median=20. Mean-Median=-0.383838 Pct Diff=-1.95675

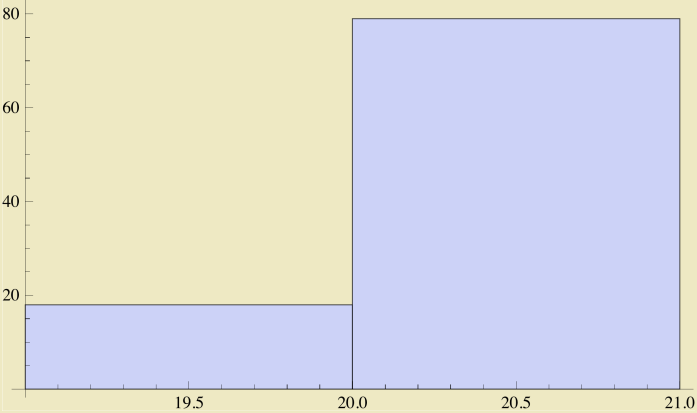


Execution=7 Load=7 PValue=0 Mean=19.7273 Median=20. Mean-Median=-0.272727 Pct Diff=-1.38249

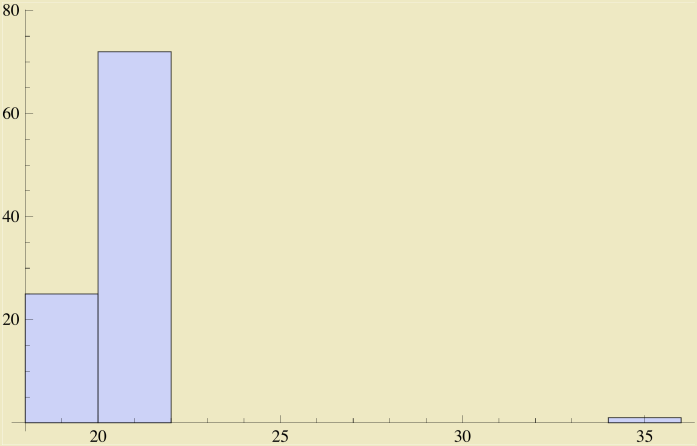


Execution=7 Load=8 PValue=0 Mean=19.8384 Median=20. Mean-Median=-0.161616 Pct Diff=-0.814664

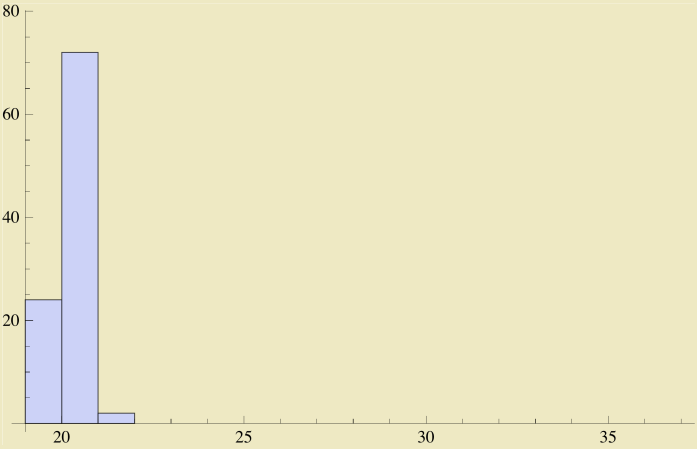
ParseTime_1b.nb



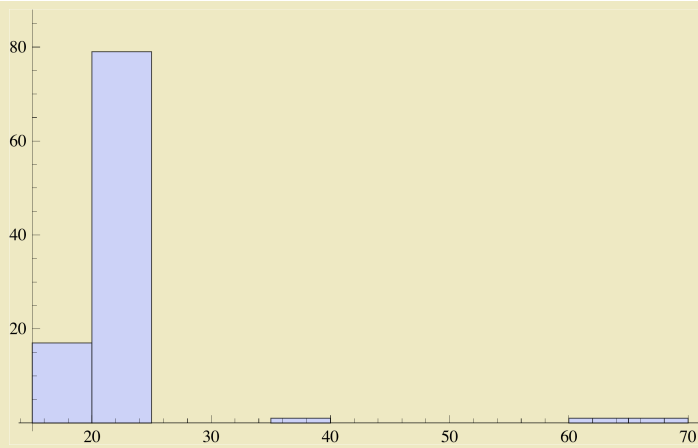
Execution=7 Load=9 PValue=0 Mean=20.0505 Median=20. Mean-Median=0.0505051 Pct Diff=0.251889



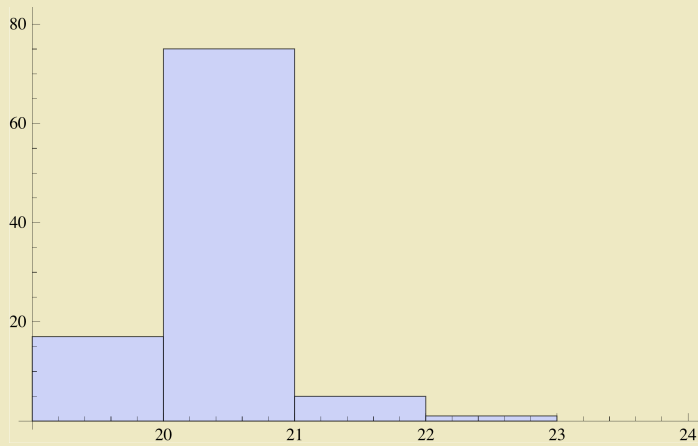
Execution=7 Load=10 PValue=0 Mean=19.9495 Median=20. Mean-Median=- 0.0505051 Pct Diff=- 0.253165



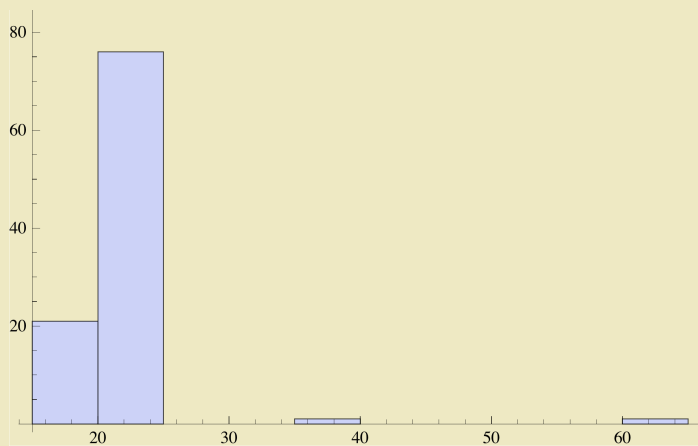
Execution=7 Load=11 PValue=0 Mean=21. Median=20. Mean-Median=1. Pct Diff=4.7619



Execution=7 Load=12 PValue=0 Mean=19.9394 Median=20. Mean-Median=-0.0606061 Pct Diff=-0.303951

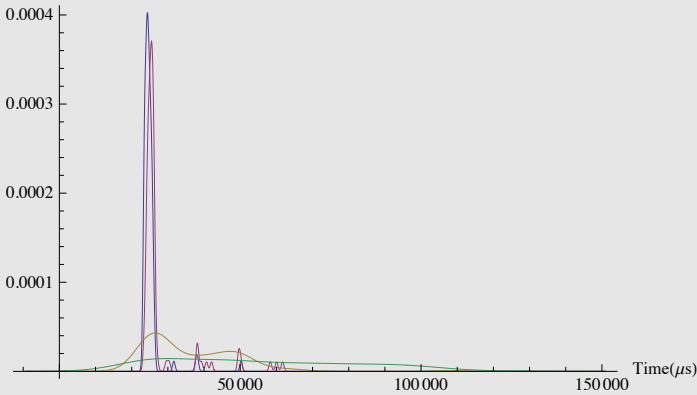


Execution=7 Load=13 PValue=0 Mean=20.4444 Median=20. Mean-Median=0.444444 Pct Diff=2.17391

[illegible]

Hard Parse Time at Various Loads

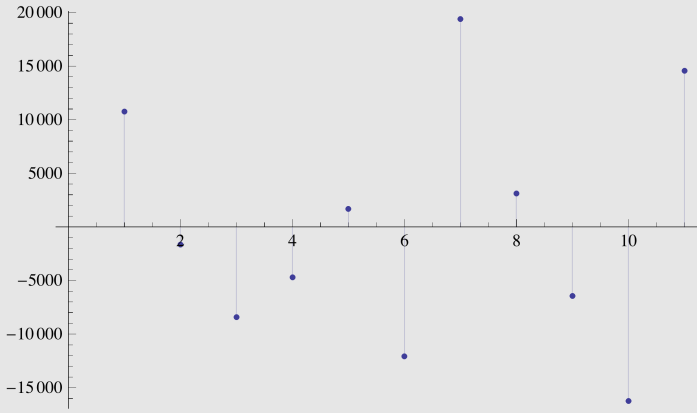
Out[12]=



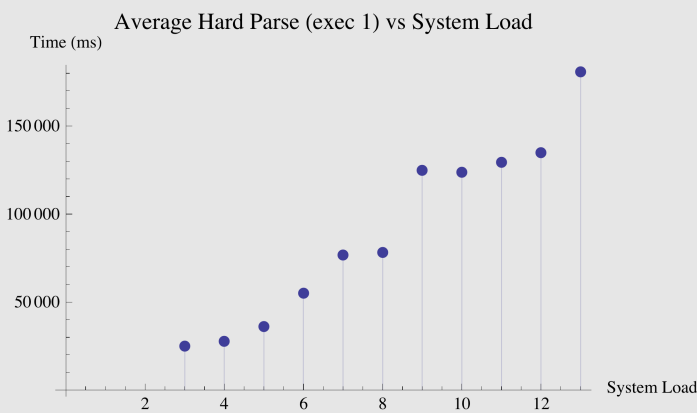
In[13]:=

```
meanData =  
  Table[  
    Table[  
      N[Mean[Select[ssElp[exec], #[[1]] == load &]]  
      , {load, 3, 13}  
    ],  
    {exec, 1, 1}  
  ];  
meanData = First[meanData];  
meanlm = LinearModelFit[meanData, x, x];  
Normal[meanlm];  
ListPlot[meanlm["FitResiduals"], Filling -> Axis, AxesOrigin -> {0, 0}]  
ListPlot[meanData, Filling -> Axis, PlotLabel -> "Average Hard Parse (exec 1) vs System Load",  
  AxesLabel -> {"System Load", "Time (ms)"}, PlotMarkers -> {Automatic, Small}, AxesOrigin -> {0, 0}]  
meanOne = ListPlot[meanData, PlotLabel -> "Average Hard Parse (exec 1) vs System Load",  
  AxesLabel -> {"System Load", "Time (ms)"}, PlotMarkers -> {Automatic, Small}, AxesOrigin -> {0, 0}];  
meanTwo = Plot[meanlm[x], {x, 3, 13}, AxesOrigin -> {0, 0}]  
Show[meanOne, meanTwo]
```

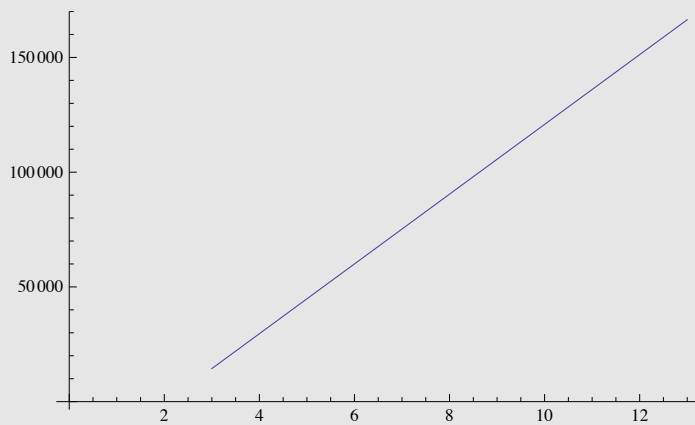
Out[17]=



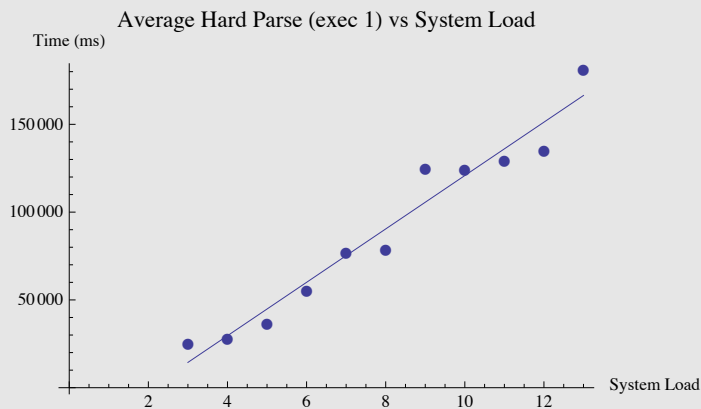
Out[18]=



Out[20]=



Out[21]=



In[22]:=

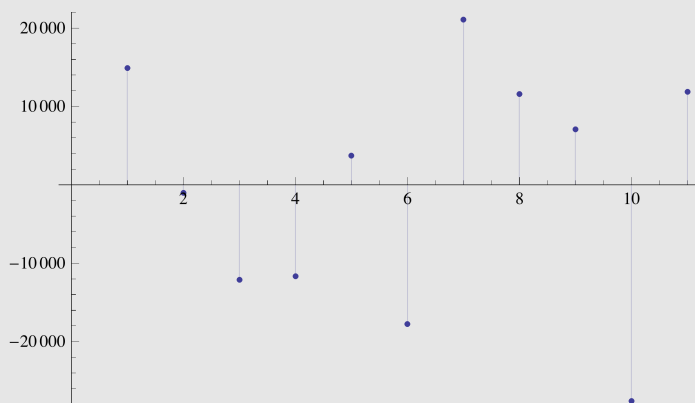
```

medianData =
  Table[
    Table[
      N[Median[Select[ssElp[exec], #[[1]] == load &]]],
      {load, 3, 13}
    ],
    {exec, 1, 1}
  ];
medianData = First[medianData];
medianlm = LinearModelFit[medianData, x, x];
Normal[medianlm];
ListPlot[medianlm["FitResiduals"], Filling -> Axis, AxesOrigin -> {0, 0}]

ListPlot[{meanData, medianData},
  PlotLabel -> "Mean (circle) and Median (square) Hard Parse\n(exec 1) vs System Load",
  AxesLabel -> {"System Load", "Time (ms)"}, PlotMarkers -> {Automatic, Small}, AxesOrigin -> {0, 0}]
medianOne = ListPlot[medianData, PlotLabel -> "Median Hard Parse (exec 1) vs System Load",
  AxesLabel -> {"System Load", "Time (ms)"}, PlotMarkers -> {Automatic, Small}, AxesOrigin -> {0, 0}];
medianTwo = Plot[medianlm[x], {x, 3, 13}, AxesOrigin -> {0, 0}]
Show[medianOne, medianTwo]

```

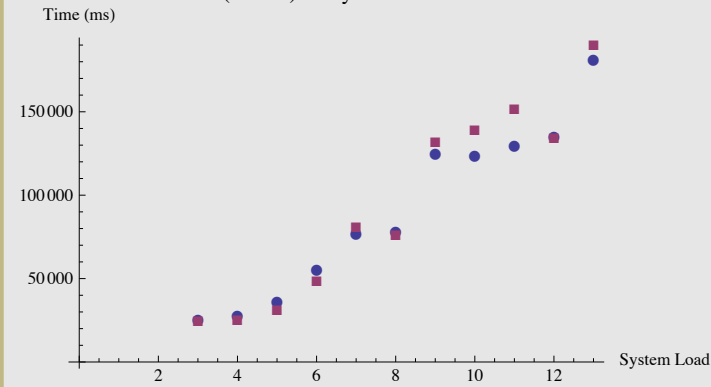
Out[26]=



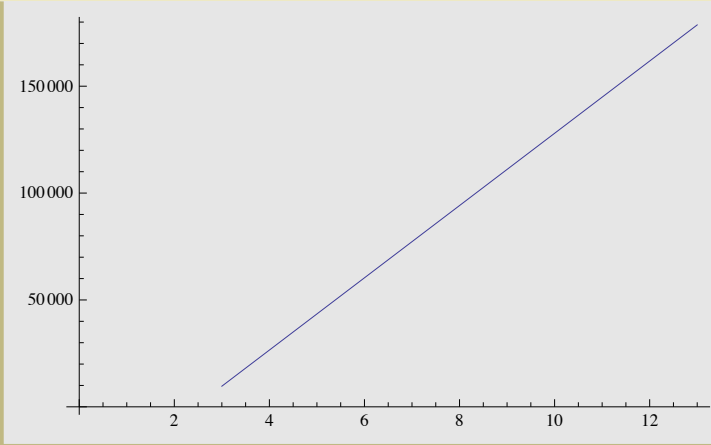
ParseTime_1b.nb

Out[27]=

Mean (circle) and Median (square) Hard Parse
(exec 1) vs System Load

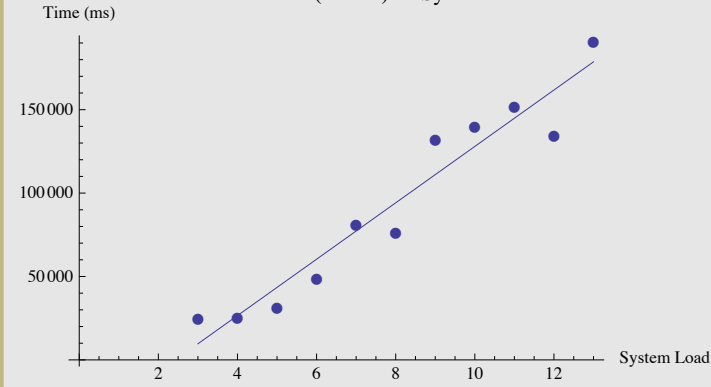


Out[29]=



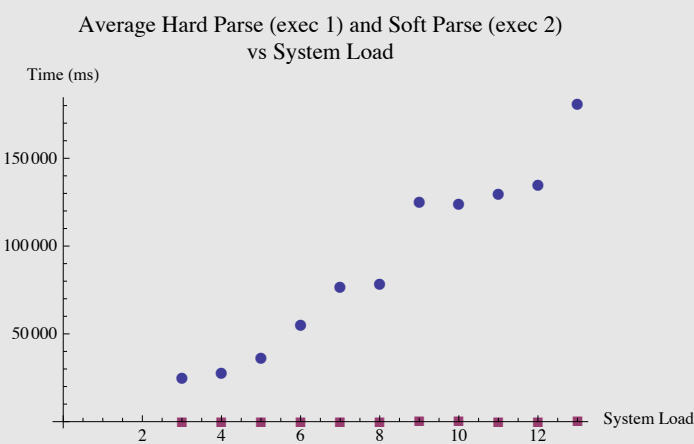
Out[30]=

Median Hard Parse (exec 1) vs System Load



```
data =
  Table[
    Table[
      N[Mean[Select[ssElp[exec], #[[1]] == load &]]
      , {load, 3, 13}
    ],
    {exec, 1, 2}
  ]
ListPlot[data, PlotLabel -> "Average Hard Parse (exec 1) and Soft Parse (exec 2)\nvs System Load",
  AxesLabel -> {"System Load", "Time (ms)"}, PlotMarkers -> {Automatic, Small}, AxesOrigin -> {0, 0}]
```

```
{{{3., 25 163.9}, {4., 27 964.7}, {5., 36 391.9}, {6., 55 319.3}, {7., 76 892.}, {8., 78 342.5},
  {9., 125 020.}, {10., 123 959.}, {11., 129 576.}, {12., 135 007.}, {13., 181 015.}},
{{3., 137.828}, {4., 141.03}, {5., 144.}, {6., 147.333}, {7., 245.869}, {8., 272.98},
  {9., 315.384}, {10., 427.354}, {11., 275.04}, {12., 257.303}, {13., 401.899}}}
```



ParseTime_1b.nb

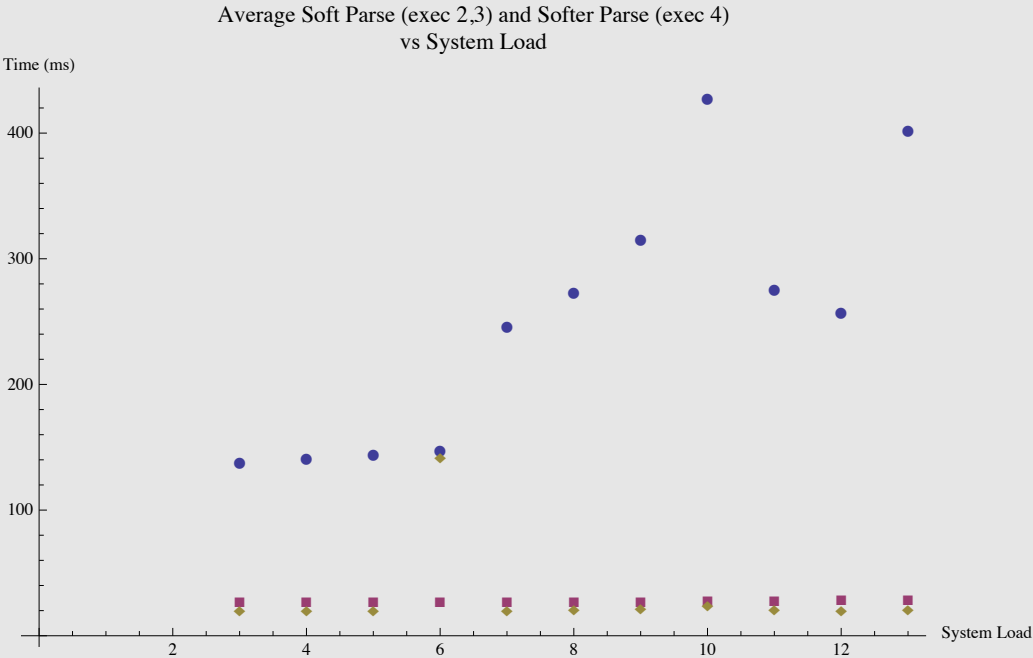
In[33]=

```
data =
  Table[
    Table[
      N[Mean[Select[ssElp[exec], #[[1]] == load &]]
      , {load, 3, 13}
    ],
    {exec, 2, 4}
  ]
ListPlot[data, PlotLabel -> "Average Soft Parse (exec 2,3) and Softer Parse (exec 4)\nvs System Load",
  AxesLabel -> {"System Load", "Time (ms)"}, PlotMarkers -> {Automatic, Small}, AxesOrigin -> {0, 0}]
```

Out[33]=

```
{{{3., 137.828}, {4., 141.03}, {5., 144.}, {6., 147.333}, {7., 245.869},
  {8., 272.98}, {9., 315.384}, {10., 427.354}, {11., 275.04}, {12., 257.303}, {13., 401.899}},
 {{3., 27.0808}, {4., 26.9091}, {5., 27.3838}, {6., 27.3636}, {7., 27.4949}, {8., 27.3737},
  {9., 27.4545}, {10., 28.0303}, {11., 27.7273}, {12., 29.0909}, {13., 28.6364}},
 {{3., 19.6768}, {4., 19.8586}, {5., 20.202}, {6., 141.899}, {7., 19.6869}, {8., 20.7374},
  {9., 21.7273}, {10., 23.6667}, {11., 20.8788}, {12., 20.2828}, {13., 20.9596}}}
```

Out[34]=



```

data =
  Table[
    Table[
      N[Mean[Select[ssElp[exec], #[[1]] == load &]]],
      {load, 3, 13}
    ],
    {exec, 3, 7}
  ]
ListPlot[data, PlotLabel → "Average Soft Parse (exec 3) and Softer Parse (exec 4..7)\nvs System Load",
  AxesLabel → {"System Load", "Time (μs)"}, PlotMarkers → {Automatic, Small}, AxesOrigin → {0, 0}]

```

Out[35]=

```

{{{3., 27.0808}, {4., 26.9091}, {5., 27.3838}, {6., 27.3636}, {7., 27.4949},
 {8., 27.3737}, {9., 27.4545}, {10., 28.0303}, {11., 27.7273}, {12., 29.0909}, {13., 28.6364}},
 {{3., 19.6768}, {4., 19.8586}, {5., 20.202}, {6., 141.899}, {7., 19.6869}, {8., 20.7374},
 {9., 21.7273}, {10., 23.6667}, {11., 20.8788}, {12., 20.2828}, {13., 20.9596}},
 {{3., 19.5152}, {4., 19.8687}, {5., 19.8283}, {6., 19.6667}, {7., 19.8384}, {8., 19.9192},
 {9., 20.0101}, {10., 20.2727}, {11., 20.0505}, {12., 19.899}, {13., 20.3737}},
 {{3., 19.4444}, {4., 19.8283}, {5., 21.0404}, {6., 19.8788}, {7., 20.0101}, {8., 20.2626},
 {9., 21.8283}, {10., 20.3232}, {11., 19.9293}, {12., 21.1313}, {13., 20.6061}},
 {{3., 19.3838}, {4., 19.5556}, {5., 19.6768}, {6., 19.6162}, {7., 19.7273}, {8., 19.8384},
 {9., 20.0505}, {10., 19.9495}, {11., 21.}, {12., 19.9394}, {13., 20.4444}}}

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Out[36]=

