```
Call:
lm(formula = TotalTime ~ TotalL3Miss + TotalINST + AvgL3Miss +
    AvgINST + MAR + AvgUserSpaceUtil + AvgMemoryUsed + AvgPageDirty +
    AvgROCL3Miss + AvgROCPageDirty + TotalPageDirty + MAR:AvgMemoryUsed,
    data = cpu_data_set)

Residuals:
    Min      1Q  Median      3Q     Max
-5.7939 -0.8200  0.0606  0.8013 13.5336

Coefficients:
                  Estimate Std. Error t value Pr(>|t|)
(Intercept)       2.431e+01  2.140e+00  11.360  < 2e-16 ***
TotalL3Miss      -5.665e-06  7.315e-07  -7.745 5.87e-13 ***
TotalINST        -4.706e-03  6.866e-04  -6.854 1.01e-10 ***
AvgL3Miss         1.457e-07  1.797e-08   8.110 6.53e-14 ***
AvgINST           1.194e-04  1.577e-05   7.573 1.63e-12 ***
MAR               8.745e-03  1.711e-03   5.113 7.82e-07 ***
AvgUserSpaceUtil  6.133e-02  7.027e-02   0.873  0.38391
AvgMemoryUsed     3.578e-07  4.972e-08   7.195 1.46e-11 ***
AvgPageDirty     -1.134e-01  3.551e-02  -3.194  0.00165 **
AvgROCL3Miss     -8.795e+00  9.497e+00  -0.926  0.35558
AvgROCPageDirty  -9.293e+01  9.902e+01  -0.938  0.34923
TotalPageDirty    3.418e-02  1.075e-02   3.181  0.00172 **
MAR:AvgMemoryUsed -2.569e-10  5.103e-11  -5.033 1.13e-06 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 1.758 on 187 degrees of freedom
Multiple R-squared:  0.9995,    Adjusted R-squared:  0.9995
F-statistic: 3.121e+04 on 12 and 187 DF,  p-value: < 2.2e-16


Call:
lm(formula = TotalTime ~ TotalL3Miss + TotalINST + AvgL3Miss +
    AvgINST + MAR + AvgUserSpaceUtil + AvgMemoryUsed + AvgPageDirty +
    AvgROCL3Miss + AvgROCPageDirty + TotalPageDirty + MAR:AvgMemoryUsed,
    data = memory_data_set)

Residuals:
    Min      1Q  Median      3Q     Max
-171.260   -6.272    0.418    7.833  106.255

Coefficients:
                  Estimate Std. Error t value Pr(>|t|)
(Intercept)       2.229e+01  1.531e+01   1.456 0.147146
TotalL3Miss      -1.676e-05  5.257e-06  -3.188 0.001686 **
TotalINST        -2.505e-02  6.863e-03  -3.650 0.000341 ***
AvgL3Miss         4.624e-08  4.125e-09  11.209  < 2e-16 ***
AvgINST           1.069e-04  1.072e-05   9.979  < 2e-16 ***
MAR               1.508e-02  6.509e-03   2.317 0.021583 *
AvgUserSpaceUtil  3.924e+00  7.307e-01   5.371 2.35e-07 ***
AvgMemoryUsed     1.119e-08  4.085e-07   0.027 0.978172
AvgPageDirty      1.455e-01  6.382e-01   0.228 0.819943
AvgROCL3Miss      6.038e+02  1.980e+02   3.049 0.002632 **
AvgROCPageDirty  -3.741e+02  2.328e+03  -0.161 0.872479
TotalPageDirty    6.080e-01  7.191e-02   8.455 8.40e-15 ***
MAR:AvgMemoryUsed -7.961e-11  2.471e-10  -0.322 0.747708
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 21.37 on 184 degrees of freedom
  (3 observations deleted due to missingness)
Multiple R-squared:  0.9951,    Adjusted R-squared:  0.9947
F-statistic:  3086 on 12 and 184 DF,  p-value: < 2.2e-16


Call:
lm(formula = TotalTime ~ AvgUserSpaceUtil + AvgMemoryUsed + AvgPageDirty +
    AvgROCPageDirty + TotalPageDirty, data = vm_cpu_data_set)

Residuals:
    Min      1Q  Median      3Q     Max
-78.151  -6.515   1.753   9.656  75.333

Coefficients:
                  Estimate Std. Error t value Pr(>|t|)
(Intercept)       2.603e+01  7.291e+00   3.570  0.00045 ***
```

```
AvgUserSpaceUtil  1.643e-01  1.367e-01   1.202  0.23096
AvgMemoryUsed     5.462e-07  1.890e-07   2.891  0.00428 **
AvgPageDirty     -4.678e+00  7.785e-02 -60.085  < 2e-16 ***
AvgROCPageDirty  -2.213e+03  9.188e+02  -2.409  0.01695 *
TotalPageDirty    1.416e+00  2.345e-02  60.402  < 2e-16 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 16.96 on 194 degrees of freedom
Multiple R-squared:  0.9519,       Adjusted R-squared:  0.9506
F-statistic: 767.1 on 5 and 194 DF,  p-value: < 2.2e-16


Call:
lm(formula = TotalTime ~ AvgUserSpaceUtil + AvgMemoryUsed + AvgPageDirty +
    AvgROCPageDirty + TotalPageDirty, data = vm_memory_data_set)

Residuals:
     Min       1Q   Median       3Q      Max
-147.792   -9.949    1.528   13.034  120.553

Coefficients:
                 Estimate Std. Error t value Pr(>|t|)
(Intercept)     -5.930e+01  1.846e+01  -3.212  0.00155 **
AvgUserSpaceUtil  3.118e-01  3.641e-01   0.856  0.39290
AvgMemoryUsed    -9.667e-07  4.279e-07  -2.259  0.02498 *
AvgPageDirty      1.859e+00  8.530e-01   2.179  0.03054 *
AvgROCPageDirty  -1.392e+03  3.270e+03  -0.426  0.67081
TotalPageDirty    1.531e+00  1.533e-02  99.867  < 2e-16 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 30.21 on 191 degrees of freedom
  (3 observations deleted due to missingness)
Multiple R-squared:  0.9897,       Adjusted R-squared:  0.9895
F-statistic:  3685 on 5 and 191 DF,  p-value: < 2.2e-16


Call:
lm(formula = cpu_data_set$TotalTime ~ cpu_data_set$TotalL3Miss +
    cpu_data_set$TotalINST + cpu_data_set$AvgL3Miss + cpu_data_set$AvgINST +
    cpu_data_set$MAR + cpu_data_set$AvgUserSpaceUtil + cpu_data_set$AvgMemoryUsed +
    cpu_data_set$AvgPageDirty + cpu_data_set$AvgROCL3Miss + cpu_data_set$AvgROCPageDirty +
    cpu_data_set$TotalPageDirty + cpu_data_set$MAR:cpu_data_set$AvgMemoryUsed +
    vm_cpu_data_set$AvgUserSpaceUtil + vm_cpu_data_set$AvgMemoryUsed +
    vm_cpu_data_set$AvgPageDirty + vm_cpu_data_set$AvgROCPageDirty +
    vm_cpu_data_set$TotalPageDirty)

Residuals:
    Min      1Q  Median      3Q     Max
-5.7939 -0.8200  0.0606  0.8013 13.5336

Coefficients: (5 not defined because of singularities)
                                             Estimate Std. Error t value Pr(>|t|)
(Intercept)                                 2.431e+01  2.140e+00  11.360  < 2e-16 ***
cpu_data_set$TotalL3Miss                   -5.665e-06  7.315e-07  -7.745 5.87e-13 ***
cpu_data_set$TotalINST                     -4.706e-03  6.866e-04  -6.854 1.01e-10 ***
cpu_data_set$AvgL3Miss                      1.457e-07  1.797e-08   8.110 6.53e-14 ***
cpu_data_set$AvgINST                        1.194e-04  1.577e-05   7.573 1.63e-12 ***
cpu_data_set$MAR                            8.745e-03  1.711e-03   5.113 7.82e-07 ***
cpu_data_set$AvgUserSpaceUtil               6.133e-02  7.027e-02   0.873  0.38391
cpu_data_set$AvgMemoryUsed                  3.578e-07  4.972e-08   7.195 1.46e-11 ***
cpu_data_set$AvgPageDirty                  -1.134e-01  3.551e-02  -3.194  0.00165 **
cpu_data_set$AvgROCL3Miss                  -8.795e+00  9.497e+00  -0.926  0.35558
cpu_data_set$AvgROCPageDirty               -9.293e+01  9.902e+01  -0.938  0.34923
cpu_data_set$TotalPageDirty                 3.418e-02  1.075e-02   3.181  0.00172 **
vm_cpu_data_set$AvgUserSpaceUtil                   NA         NA      NA       NA
vm_cpu_data_set$AvgMemoryUsed                      NA         NA      NA       NA
vm_cpu_data_set$AvgPageDirty                       NA         NA      NA       NA
vm_cpu_data_set$AvgROCPageDirty                    NA         NA      NA       NA
vm_cpu_data_set$TotalPageDirty                     NA         NA      NA       NA
cpu_data_set$MAR:cpu_data_set$AvgMemoryUsed -2.569e-10  5.103e-11  -5.033 1.13e-06 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 1.758 on 187 degrees of freedom
Multiple R-squared:  0.9995,       Adjusted R-squared:  0.9995
F-statistic: 3.121e+04 on 12 and 187 DF,  p-value: < 2.2e-16
```

```
Call:
lm(formula = memory_data_set$TotalTime ~ memory_data_set$TotalL3Miss +
    memory_data_set$TotalINST + memory_data_set$AvgL3Miss + memory_data_set$AvgINST +
    memory_data_set$MAR + memory_data_set$AvgUserSpaceUtil +
    memory_data_set$AvgMemoryUsed + memory_data_set$AvgPageDirty +
    memory_data_set$AvgROCL3Miss + memory_data_set$AvgROCPageDirty +
    memory_data_set$TotalPageDirty + memory_data_set$MAR:memory_data_set$AvgMemoryUsed +
    vm_memory_data_set$AvgUserSpaceUtil + vm_memory_data_set$AvgMemoryUsed +
    vm_memory_data_set$AvgPageDirty + vm_memory_data_set$AvgROCPageDirty +
    vm_memory_data_set$TotalPageDirty)

Residuals:
     Min       1Q   Median       3Q      Max
-171.260   -6.272    0.418    7.833  106.255

Coefficients: (5 not defined because of singularities)
                                                    Estimate Std. Error t value Pr(>|t|)
(Intercept)                                        2.229e+01  1.531e+01   1.456 0.147146
memory_data_set$TotalL3Miss                       -1.676e-05  5.257e-06  -3.188 0.001686 **
memory_data_set$TotalINST                         -2.505e-02  6.863e-03  -3.650 0.000341 ***
memory_data_set$AvgL3Miss                          4.624e-08  4.125e-09  11.209  < 2e-16 ***
memory_data_set$AvgINST                            1.069e-04  1.072e-05   9.979  < 2e-16 ***
memory_data_set$MAR                                1.508e-02  6.509e-03   2.317 0.021583 *
memory_data_set$AvgUserSpaceUtil                   3.924e+00  7.307e-01   5.371 2.35e-07 ***
memory_data_set$AvgMemoryUsed                      1.119e-08  4.085e-07   0.027 0.978172
memory_data_set$AvgPageDirty                       1.455e-01  6.382e-01   0.228 0.819943
memory_data_set$AvgROCL3Miss                       6.038e+02  1.980e+02   3.049 0.002632 **
memory_data_set$AvgROCPageDirty                   -3.741e+02  2.328e+03  -0.161 0.872479
memory_data_set$TotalPageDirty                     6.080e-01  7.191e-02   8.455 8.40e-15 ***
vm_memory_data_set$AvgUserSpaceUtil                       NA         NA      NA       NA
vm_memory_data_set$AvgMemoryUsed                          NA         NA      NA       NA
vm_memory_data_set$AvgPageDirty                           NA         NA      NA       NA
vm_memory_data_set$AvgROCPageDirty                        NA         NA      NA       NA
vm_memory_data_set$TotalPageDirty                         NA         NA      NA       NA
memory_data_set$MAR:memory_data_set$AvgMemoryUsed -7.961e-11  2.471e-10  -0.322 0.747708
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

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```
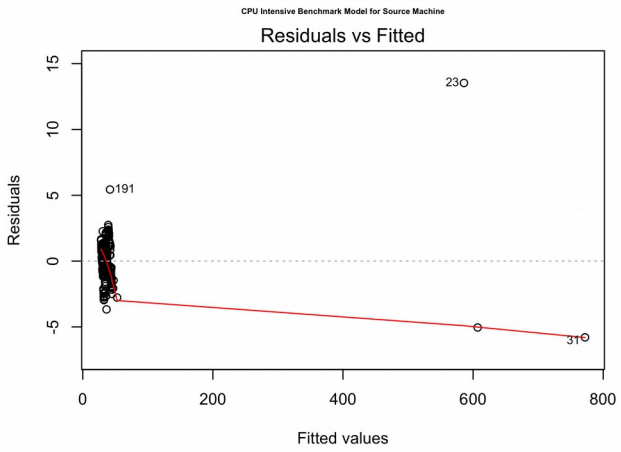
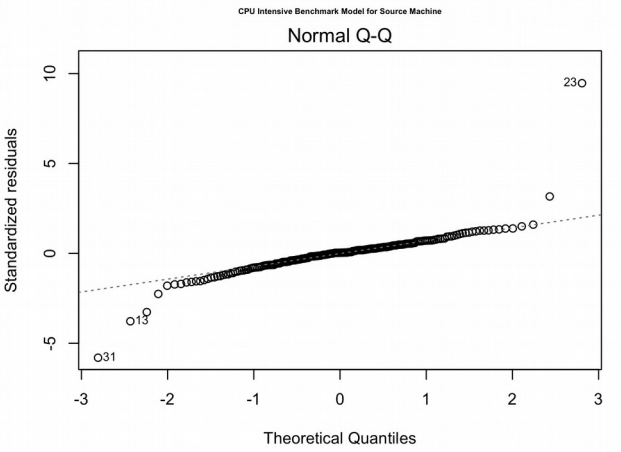
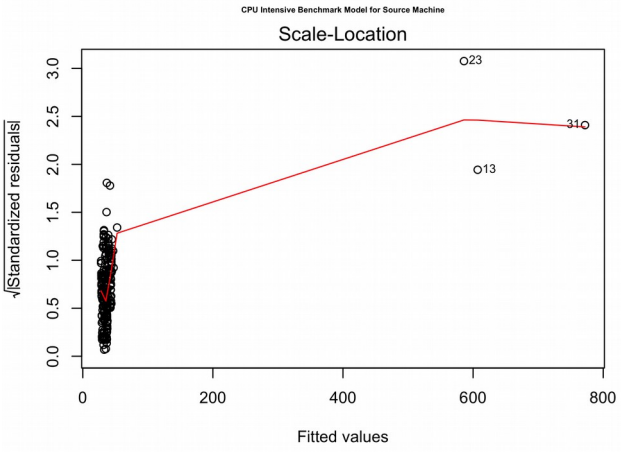
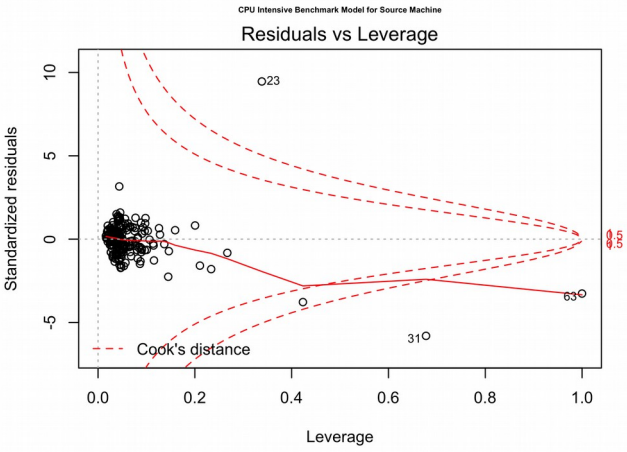
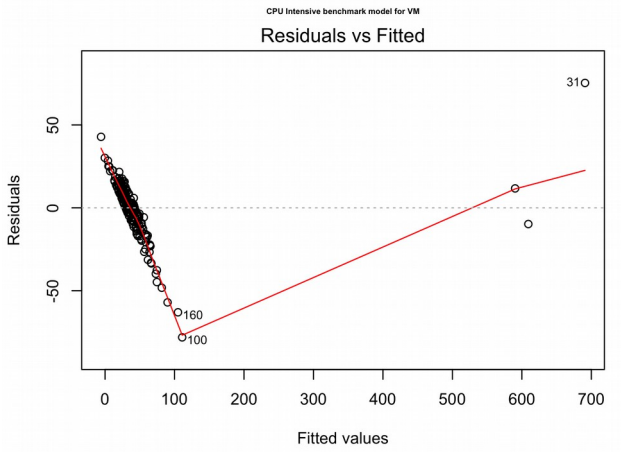
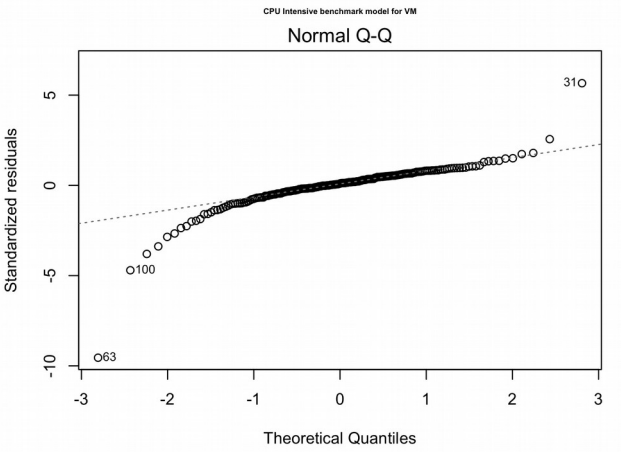


CPU Intensive Benchmark Model for Source Machine
Residuals vs Fitted
Residuals
Fitted values
23
191
31

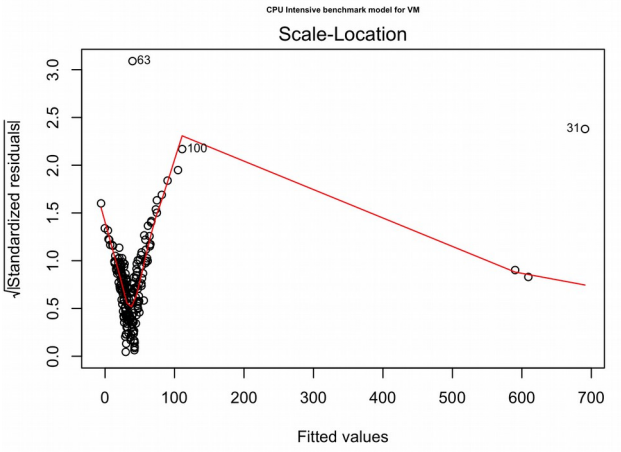

CPU Intensive Benchmark Model for Source Machine
Normal Q-Q
Standardized residuals
Theoretical Quantiles
23
13
31

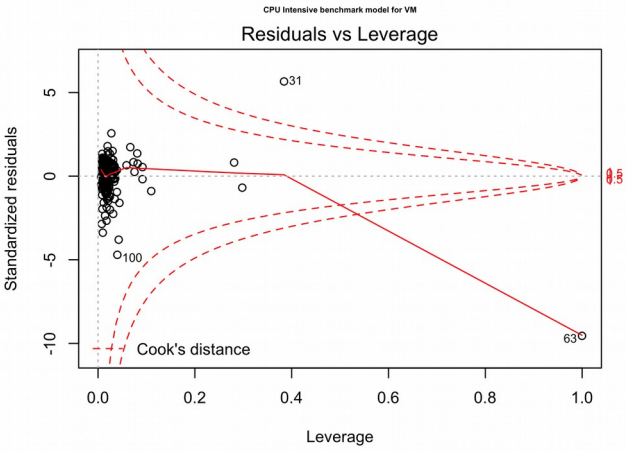

CPU Intensive Benchmark Model for Source Machine
Scale-Location
√|Standardized residuals|
Fitted values
23
31
13

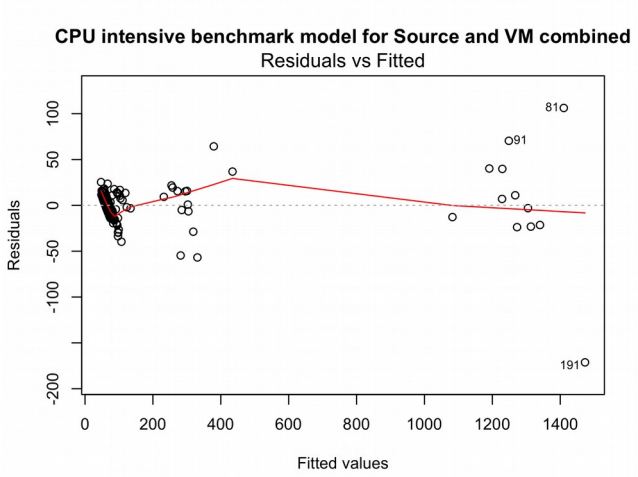

CPU Intensive Benchmark Model for Source Machine
Residuals vs Leverage
Standardized residuals
Leverage
Cook's distance
23
63
31

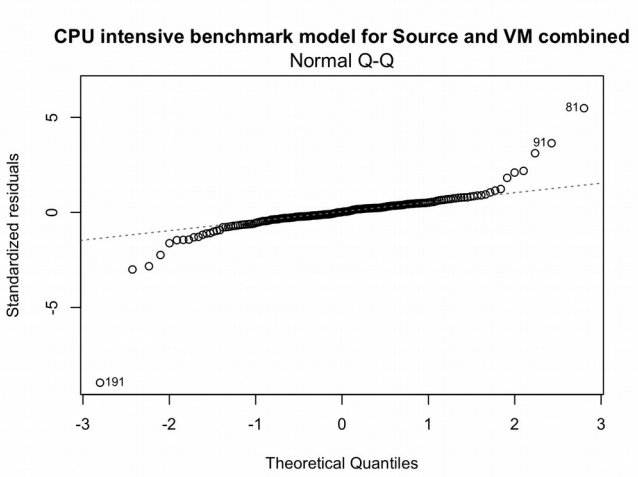

CPU Intensive benchmark model for VM
Residuals vs Fitted
Residuals
Fitted values
31
160
100

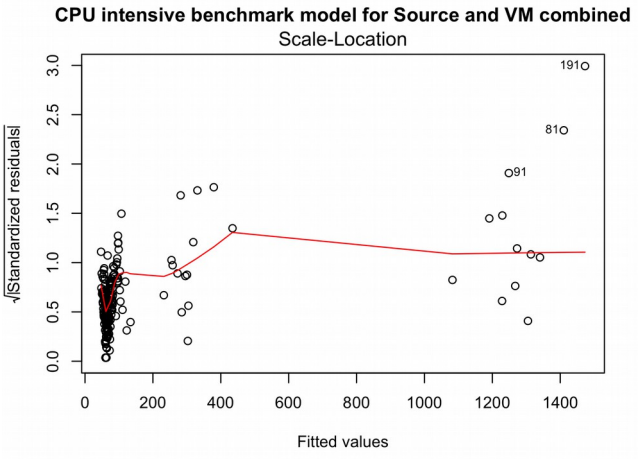

CPU Intensive benchmark model for VM
Normal Q-Q
Standardized residuals
Theoretical Quantiles
31
100
63

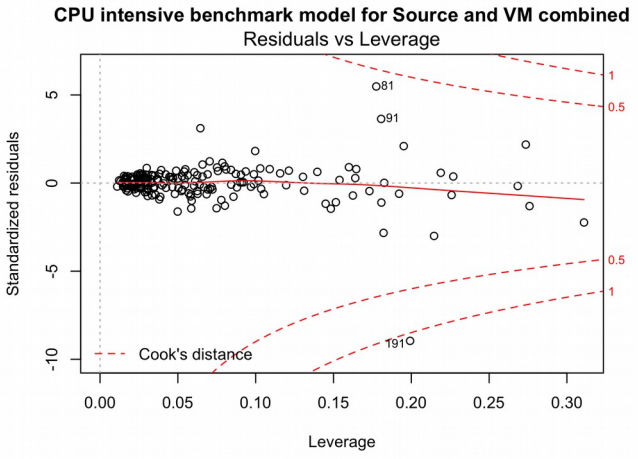

CPU Intensive benchmark model for VM
Scale-Location
√|Standardized residuals|
Fitted values
63
100
31

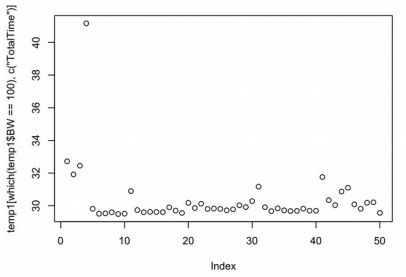

CPU Intensive benchmark model for VM
Residuals vs Leverage
Standardized residuals
Leverage
31
100
63
Cook's distance

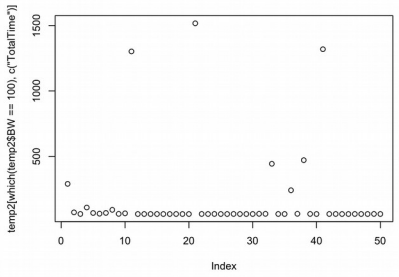

CPU intensive benchmark model for Source and VM combined
Residuals vs Fitted
Residuals
Fitted values
81
91
191

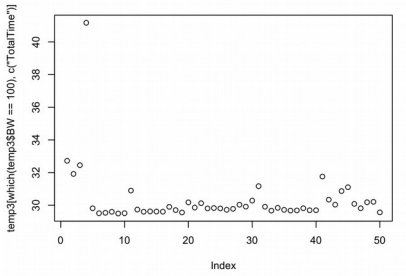

CPU intensive benchmark model for Source and VM combined
Normal Q-Q
Standardized residuals
Theoretical Quantiles
81
91
191

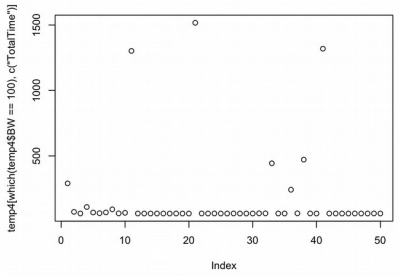

CPU intensive benchmark model for Source and VM combined
Scale-Location
√|Standardized residuals|
Fitted values
191
81
91


CPU intensive benchmark model for Source and VM combined
Residuals vs Leverage
Standardized residuals
Leverage
Cook's distance
81
91
191
1
0.5
0.5
1

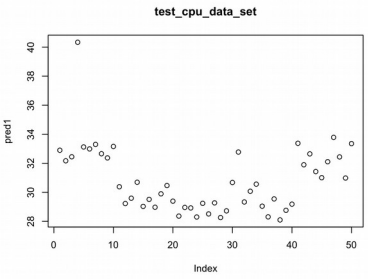


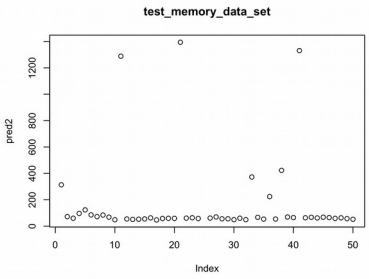


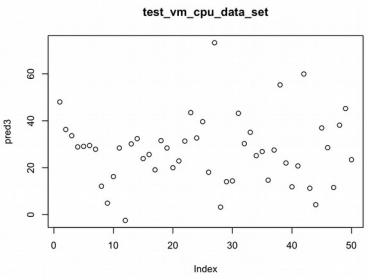


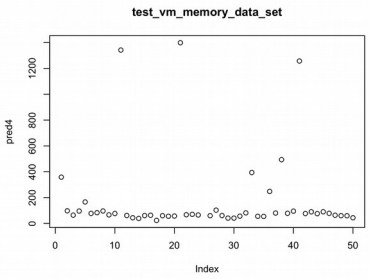


Actual Data

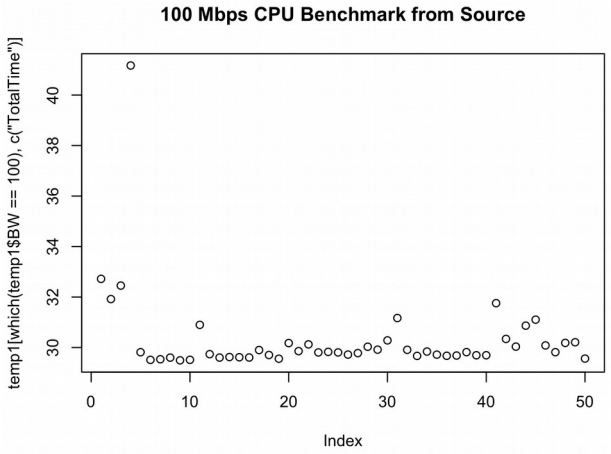


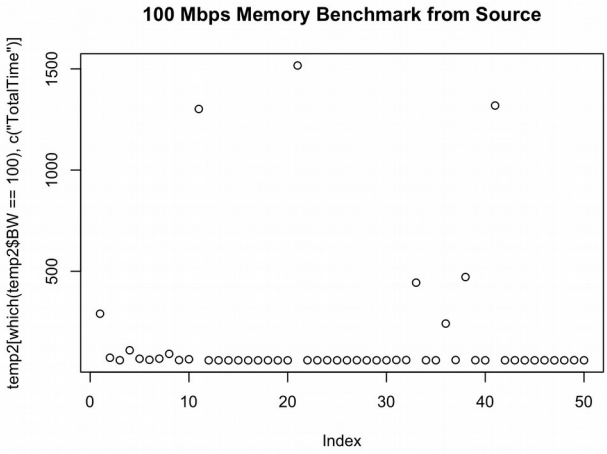


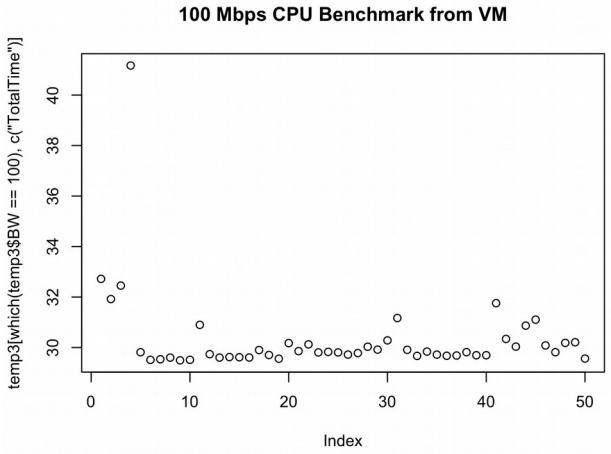


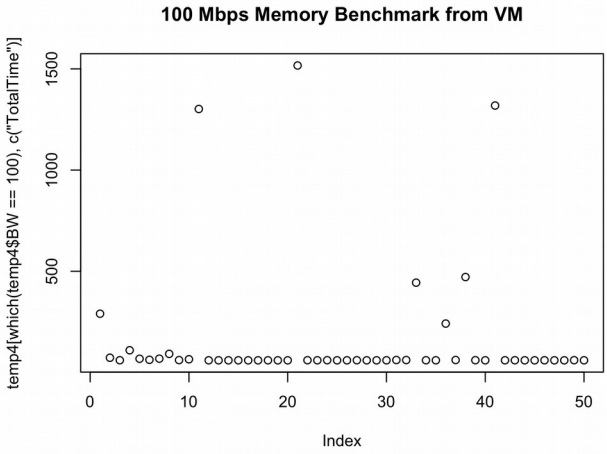


Predicted Data









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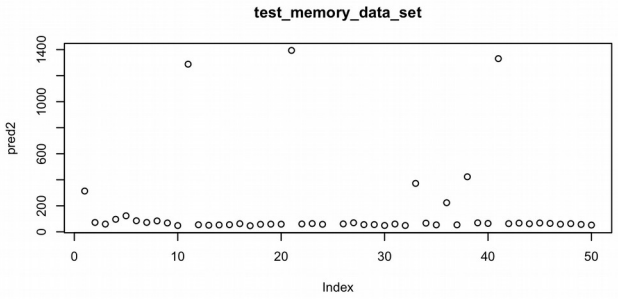
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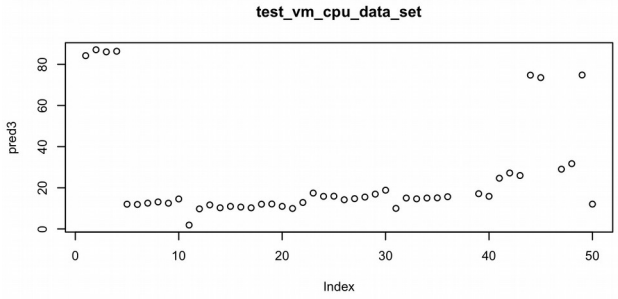
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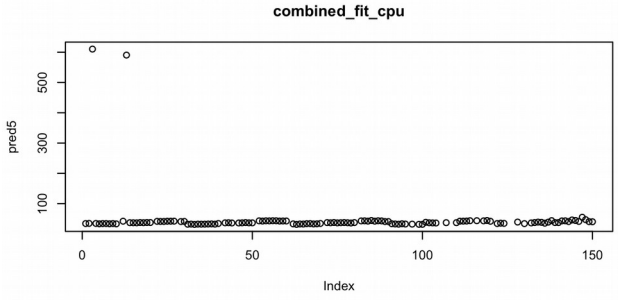
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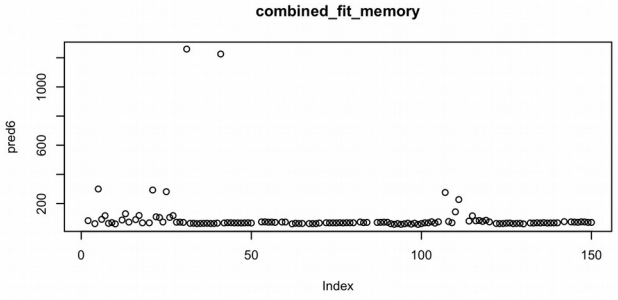
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