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REPORT:

TermAppISONFT: Orchestra Cross Test Resource Usage  
Summary

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Code Magus Limited (England reg. no. 4024745)  
Number 6, 69 Woodstock Road  
Oxford, OX2 6EY, United Kingdom  
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```
## Loading required package: lattice
##
## Attaching package: 'BSDA'
##
## The following object is masked from 'package:datasets':
##
##   Orange
##
##   : starts:   Mon Jan 24 09:20:59 2022
##
## The following files in ../Test_Summary_Comparisons/csv match pattern "Resource_S
##   File = Test_Resource_Summary_D20201207.csv
##   File = Test_Resource_Summary_D20201208.csv
##   File = Test_Resource_Summary_D20201209_2.csv
##   File = Test_Resource_Summary_D20201209.csv
##   File = Test_Resource_Summary_D20201216.csv
##   File = Test_Resource_Summary_D20210115.csv
##   File = Test_Resource_Summary_D20210510.csv
##   File = Test_Resource_Summary_D20210520.csv
##   File = Test_Resource_Summary_D20210628.csv
##   File = Test_Resource_Summary_D20210629.csv
##   File = Test_Resource_Summary_D20210716.csv
##   File = Test_Resource_Summary_D20210719.csv
##   File = Test_Resource_Summary_D20210722.csv
##   File = Test_Resource_Summary_D20210723.csv
##   File = Test_Resource_Summary_D20210727.csv
##   File = Test_Resource_Summary_D20210728.csv
##   File = Test_Resource_Summary_D20210802.csv
##   File = Test_Resource_Summary_D20211020.csv
##   File = Test_Resource_Summary_D20211101.csv
##   File = Test_Resource_Summary_D20211103.csv
##   File = Test_Resource_Summary_D20220105.csv
##   File = Test_Resource_Summary_D20220121.csv
##   File = Test_Resource_Summary_D20220122.csv
##   File = Test_Resource_Summary_D20201207.csv with 12 rows added to total making
##   File = Test_Resource_Summary_D20201208.csv with 12 rows added to total making
##   File = Test_Resource_Summary_D20201209_2.csv with 12 rows added to total making
##   File = Test_Resource_Summary_D20201209.csv with 12 rows added to total making
##   File = Test_Resource_Summary_D20201216.csv with 36 rows added to total making
##   File = Test_Resource_Summary_D20210115.csv with 12 rows added to total making
##   File = Test_Resource_Summary_D20210510.csv with 18 rows added to total making
##   File = Test_Resource_Summary_D20210520.csv with 18 rows added to total making
##   File = Test_Resource_Summary_D20210628.csv with 18 rows added to total making
##   File = Test_Resource_Summary_D20210629.csv with 18 rows added to total making
##   File = Test_Resource_Summary_D20210716.csv with 14 rows added to total making
##   File = Test_Resource_Summary_D20210719.csv with 14 rows added to total making
##   File = Test_Resource_Summary_D20210722.csv with 14 rows added to total making
##   File = Test_Resource_Summary_D20210723.csv with 14 rows added to total making
##   File = Test_Resource_Summary_D20210727.csv with 14 rows added to total making
##   File = Test_Resource_Summary_D20210728.csv with 14 rows added to total making
```

```
## File = Test_Resource_Summary_D20210802.csv with 14 rows added to total making
## File = Test_Resource_Summary_D20211020.csv with 12 rows added to total making
## File = Test_Resource_Summary_D20211101.csv with 12 rows added to total making
## File = Test_Resource_Summary_D20211103.csv with 18 rows added to total making
## File = Test_Resource_Summary_D20220105.csv with 18 rows added to total making
## File = Test_Resource_Summary_D20220121.csv with 18 rows added to total making
## File = Test_Resource_Summary_D20220122.csv with 18 rows added to total making
```

## 1 Introduction

There are two elements to this cross test resource usage comparison report. The first compares the current test sessions test(s) estimate of resource and measure for each server group to the corresponding pooled estimates of the resource and measure for that group. The second compares each of the tests current and earlier tests individually for each resource and measure for each server group.

For the pooled comparison, the resource usage data for each resource type and measure of each server group (as grouped by the corresponding server classification file) for the current test(s) (the last set of tests by date) are isolated as individual tests and compared to the corresponding pooled resource usage distribution using a Welch modified two-sample t-test (`tsum.test`) based on the distribution parameters. Each resource type and measure, the estimation of the background usage (*Bias*, or load independent resource usage), for that resource and measure for the current test(s) are compared to the estimated pooled background usage of that resource type and measure. In a similar way, the estimation of the usage rate (*Rate*, or load dependant resource usage, the measure of the cost in terms of the corresponding resource for a rate of one customer arrival per second). For the pooling, the previous test results are filtered so that only the tests for which there is some confidence in the corresponding coefficient estimate are included in the pool statistics. A set resource usage coefficient estimate is included in the pooling of the corresponding  $p$ -value does not exceed  $\alpha = 0.05$  (so that there is some confidence in the pooled coefficients). The *Bias* and *Rate* together with the actual customer arrival rate (*ArrivalRate*) give an estimation of the cost in terms of the resource being considered as  $TotalCost = Bias + ArrivalRate * Rate$ .

For each of the resource types and measures (Percent CPU Utilisation) and for each of the coefficient estimates (*Bias* and *Rate*), three `tsum.test`s are performed: One two-sided test to for differences in the corresponding distributions, and two one-sided tests, one to test for increases in the resource usage, and one to test for decreases in resource usage (of each of the current tests over pooled prior tests). These comparisons of the tests are ranked by the corresponding  $p$ -values. The items for which the  $p$ -value does not exceed the cut-off  $\alpha$  value (0.05) are high-lighted by reporting them in a ranked table. are included in the corresponding comparison table. Up to the first 15 are included in an accompanying box-plot as well.

This high-lighting is intended to quickly bring outliers or significant changes in resource usage to the readers attention, but the second part of the report includes a full cross test comparison of current and earlier tests each server group, resource and measure, for both *Bias* and *Rate*.

These summary results have been taken from the analysis sections of the individual NFT sessions. For the *Rate* coefficient, only those results which are considered significant in the response of the resource usage to the applied load are included. The *Bias* parameter is included wherever there was some significance in the estimated intercept value.

The coefficients are determined from linear models regressing the resource usage onto the throughput

observed. A model is generated for each server class in the server classification list for the specific project's server landscape. In each case, the resource usage is a measure of the resource usage, and these metrics are added up for all servers in the class. In addition, for the z/OS workload, the RMF measured CPU for each address space of interest is totalled and used as resource measure to regress onto the throughput observed (field R791TCPU of RMF record type 79 subtype one is used for this). A class is simply a group of servers intended to deliver the function to the application. The class name is intended to indicate the function provided (for example, TFIM\_CLIENT). For each linear model, two coefficients are estimated. The Bias/Intercept is an estimate of the background resource usage, which is independent of the load applied. This load could be unrelated or overhead workload on a shared server or overhead workload on dedicated servers. For dedicated servers, this value is expected to be reasonably small as it should only reflect the overhead in managing and monitoring the workload. For shared servers, the value should ideally be reasonably low, and where this is the case, this indicates a reasonably controlled test environment (making the shared server behave like a dedicated server for the test duration). Where there is workload on a shared server/servers unrelated to the system under test during a test, the additional workload may confound the estimation of the Rate coefficient, making the required resource usage over or understated.

The *Rate* is the coefficient on the achieved load. This is usually the session rate or customer arrival rate, measure in customer arrivals per second. Depending on the NFT setup, a session would do either a chain of application functions on behalf of a single business/user-level function or may do a single function or operation. This distinction usually correlates to simulating end-users (multiple calls/operations within a session) or single function/call/operation within a session (system to system or device to device calls). In either case, the Rate coefficient is the session arrival rate achieved.

The interpretation of the *Rate* coefficient is that it is the resource cost in (one of) the appropriate metric for the server type, and hence is the estimated cost in terms that metric of a single session per second (or customer arrival per second).

Coef	Description
Rate	Resource usage per customer arrival per second.
Bias	Load independent resource usage or background load

## 2 Server classification from application landscape

```
## The following files in landscape match pattern "Server_Classification.*csv":
##   File = CMLEcoSystem_Server_Classification.csv
##   File = CMLEcoSystem_Server_Classification.csv with 5 rows added to total make
```

Classification	Server	IP_Address	OSType	Description	Hardware_Support	Software_Support	Application_Support	SOURCE_FILE
LOAD	LOAD0	176.67.166.86	linux	CML EcoSystem	Patrick Hayward	Patrick Hayward	Patrick Hayward	CMLEcoSystem_Server_Classification.csv
LOAD	LOAD1	176.67.166.89	linux	CML EcoSystem	Patrick Hayward	Patrick Hayward	Patrick Hayward	CMLEcoSystem_Server_Classification.csv
MODEL	MODELAPP0	176.67.166.10	linux	CML EcoSystem	Patrick Hayward	Patrick Hayward	Patrick Hayward	CMLEcoSystem_Server_Classification.csv
MODEL	MODELAPP1	176.67.166.11	linux	CML EcoSystem	Patrick Hayward	Patrick Hayward	Patrick Hayward	CMLEcoSystem_Server_Classification.csv

Classification	Server	IP_Address	OSType	Description	Hardware_Support	Support_Support	Application_Support	SOURCE_FILE
NETWORK	NETWORK	109.123.111.17	Linux	CML EcoSystem	Patrick Hayward	Patrick Hayward	Patrick Hayward	CMLEcoSystem_Server_Classific

### 3 Comparison of current tests to pooled earlier tests

The last test date in the summary data is used to delimit the prior tests from the tests in the last test session. This section compares the resource usage for each resource type and measure for each server group to the corresponding pooled resource usage and measure for the server group. The current test(s) are the tests performed on 2022-01-22. Resource usage metrics are pooled only where the corresponding  $p$ -value is demonstrates some confidence in the estimated coefficient.

#### 3.1 Differences in resource usage

The following show the comparisons of the tests performed on 2022-01-22 as compared to the tests performed before this date. The tables are ranked in increasing order of the  $p$ -values from the corresponding Welch Modified Two-Sample t-Test (two.sided), starting from server group where the resource usage distribution differences are the greatest. Results are only shown for which the  $p$ -value is less than or equal to the cutoff value ( $\alpha = 0.05$ ).

##### 3.1.1 Test 1 - TermAppISO

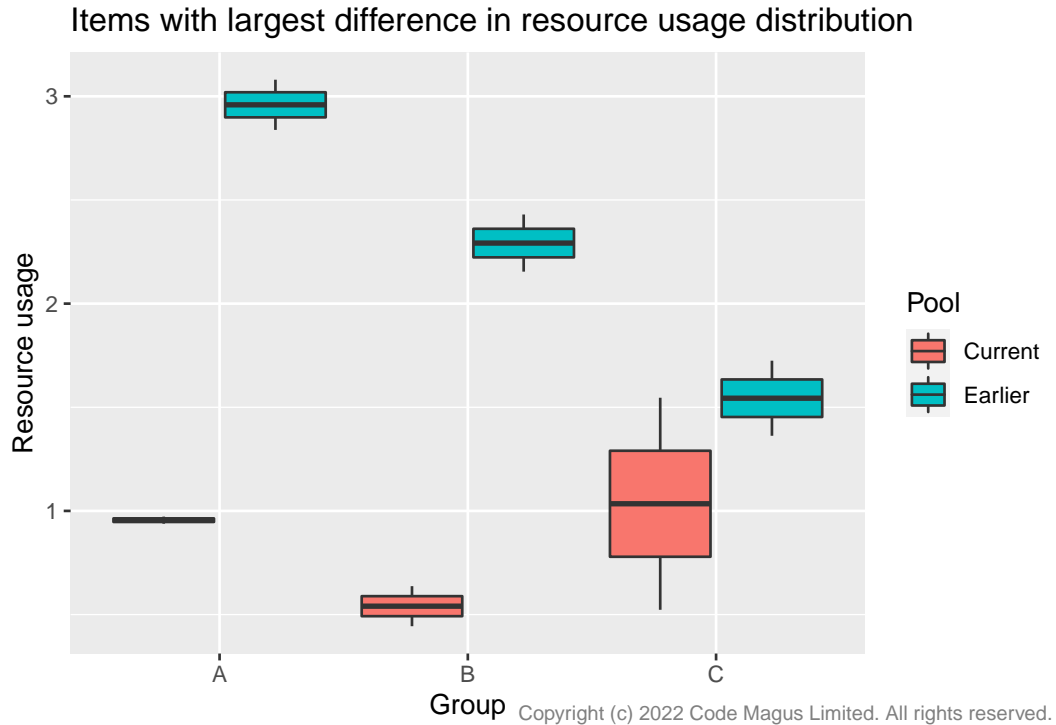
###### 3.1.1.1 Resource class: CPU

###### 3.1.1.1.1

The following compares the Rate coefficient for the CPU resource usage differences from the test started at 2022-01-22 23:12:01 to the tests from previous test sessions.

Class	Coef	Count	Metric	Units	Estimate	Std..Error	PrevCount	PrevEst	PrevSE	pvalue.d
LOAD	Rate	81	cpu.cpu.system.us	Percent single processor	0.955	0.009	1688	2.959	0.061	0
MODEL	Rate	81	cpu.cpu.system.us	Percent single processor	0.540	0.048	1590	2.292	0.069	0
NETWORK	Rate	81	cpu.cpu.system.us	Percent single processor	1.035	0.256	491	1.544	0.091	0

```
## Loading required package: grid
```

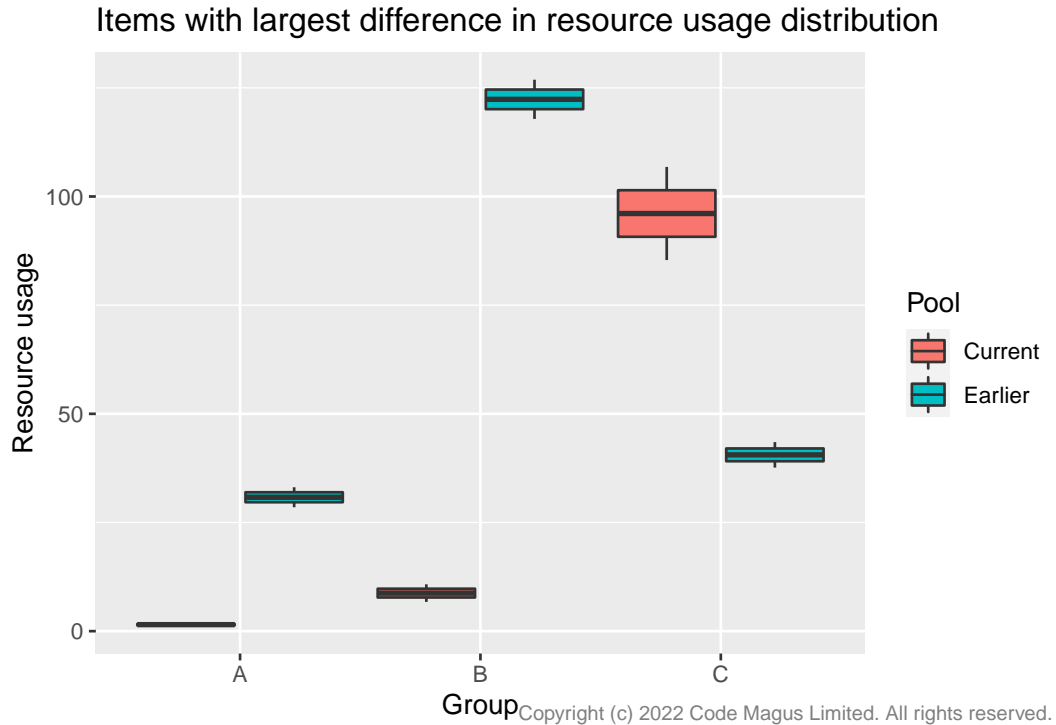


Key	Group
A	LOAD Rate Percent single processor CPU Usage
B	MODEL Rate Percent single processor CPU Usage
C	NETWORK Rate Percent single processor CPU Usage

### 3.1.1.1.2

The following compares the Bias coefficient for the CPU resource usage differences from the test started at 2022-01-22 23:12:01 to the tests from previous test sessions.

Class	Coef	Count	Metric	Units	Estimate	Std..Error	PrevCount	PrevEst	PrevSE	pvalue.d
LOAD	Bias	81	cpu.cpu.system.us	Percent single processor	1.498	0.180	1666	30.805	1.149	0
MODEL	Bias	81	cpu.cpu.system.us	Percent single processor	8.751	1.011	1688	122.353	2.257	0
NETWORK	Bias	81	cpu.cpu.system.us	Percent single processor	96.086	5.356	906	40.560	1.470	0



Key	Group
A	LOAD Bias Percent single processor CPU Usage
B	MODEL Bias Percent single processor CPU Usage
C	NETWORK Bias Percent single processor CPU Usage

### 3.1.1.2 Resource class: Network

#### 3.1.1.2.1

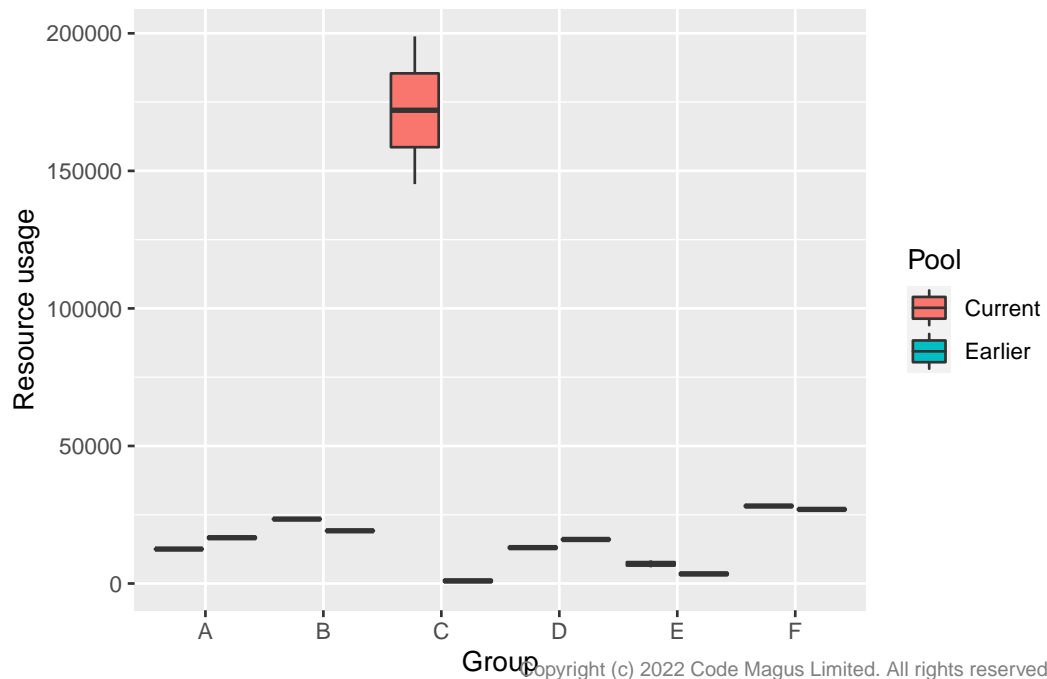
The following compares the Rate coefficient for the Network resource usage differences from the test started at 2022-01-22 23:12:01 to the tests from previous test sessions.

Class	Coef	Count	Metric	Units	Estimate	Std..Error	PrevCount	PrevEst	PrevSEM	pvalue.d
MODEL	Rate	81	recv	bits per second	12517.495	113.161	1610	16642.894	319.937	0
LOAD	Rate	81	recv	bits per second	23417.502	151.678	1688	19165.652	135.621	0
NETWORK	Rate	81	sent	bits per second	172032.924	13421.408	48	939.561	362.238	0
MODEL	Rate	81	sent	bits per second	13038.938	285.724	1461	16009.604	179.264	0
NETWORK	Rate	81	recv	bits per second	7152.579	633.570	289	3493.554	350.520	0



Class	Coef	Count	Metric	Units	Estimate	Std..Error	PrevCount	PrevEst	PrevSEM	pvalue.d
LOAD	Rate	81	sent	bits per second	28163.931	212.231	1688	26939.469	239.653	0

Items with largest difference in resource usage distribution



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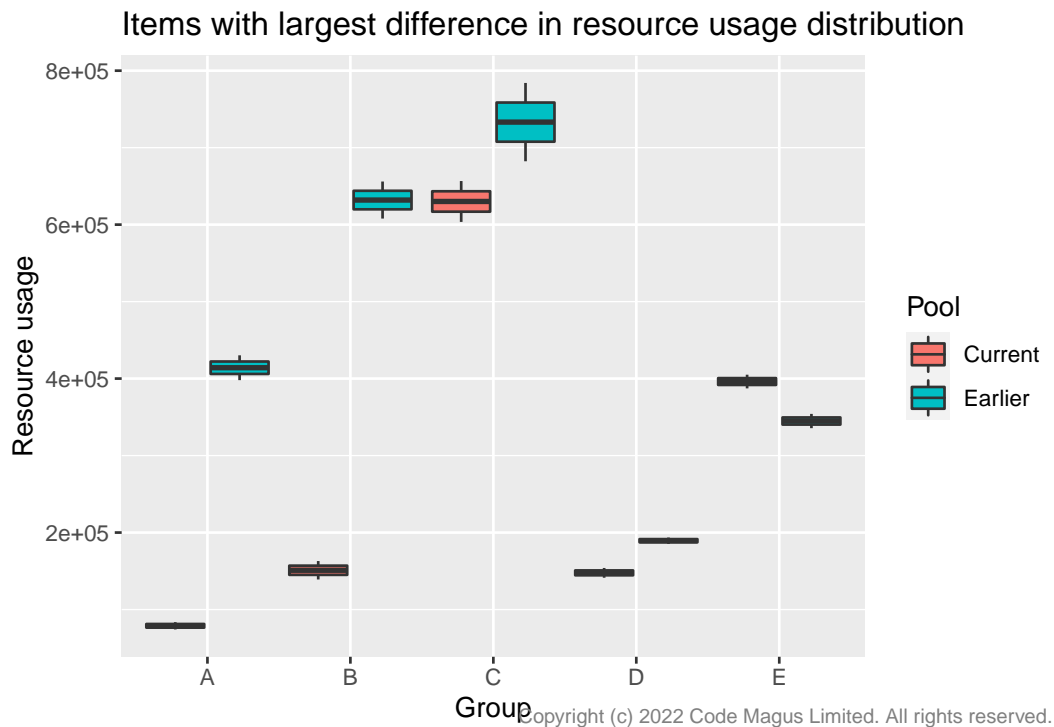
Key	Group
A	MODEL Rate bits per second Network Usage recv
B	LOAD Rate bits per second Network Usage recv
C	NETWORK Rate bits per second Network Usage sent
D	MODEL Rate bits per second Network Usage sent
E	NETWORK Rate bits per second Network Usage recv
F	LOAD Rate bits per second Network Usage sent

**3.1.1.2.2**

The following compares the Bias coefficient for the Network resource usage differences from the test started at 2022-01-22 23:12:01 to the tests from previous test sessions.

Class	Coef	Count	Metric	Units	Estimate	Std..Error	PrevCount	PrevEst	PrevSEM	pvalue.d
MODEL	Bias	81	recv	bits per second	78885.79	2369.895	1664	414114.1	8070.142	0
MODEL	Bias	81	sent	bits per second	151017.36	5983.815	1664	631932.3	12030.724	0

Class	Coef	Count	Metric	Units	Estimate	Std..Error	PrevCount	PrevEst	PrevSEM	pvalue.d
NETWORK	Bias	81	recv	bits per second	630081.82	13268.610	436	733168.8	25437.137	0
LOAD	Bias	81	recv	bits per second	147656.33	3176.535	1610	189422.3	2073.371	0
LOAD	Bias	81	sent	bits per second	396176.83	4444.663	1688	344886.9	4636.047	0



Key	Group
A	MODEL Bias bits per second Network Usage recv
B	MODEL Bias bits per second Network Usage sent
C	NETWORK Bias bits per second Network Usage recv
D	LOAD Bias bits per second Network Usage recv
E	LOAD Bias bits per second Network Usage sent

### 3.2 Increases in resource usage

The following show the comparisons of the tests performed on 2022-01-22 as compared to the tests performed before this date. The tables are ranked in increasing order of the  $p$ -values from the corresponding Welch Modified Two-Sample t-Test (greater), starting from server group where the resource usage distribution increases are the greatest. Results are only shown for which the  $p$ -value is

less than or equal to the cutoff value ( $\alpha = 0.05$ ).

### 3.2.1 Test 1 - TermAppISO

#### 3.2.1.1 Resource class: CPU

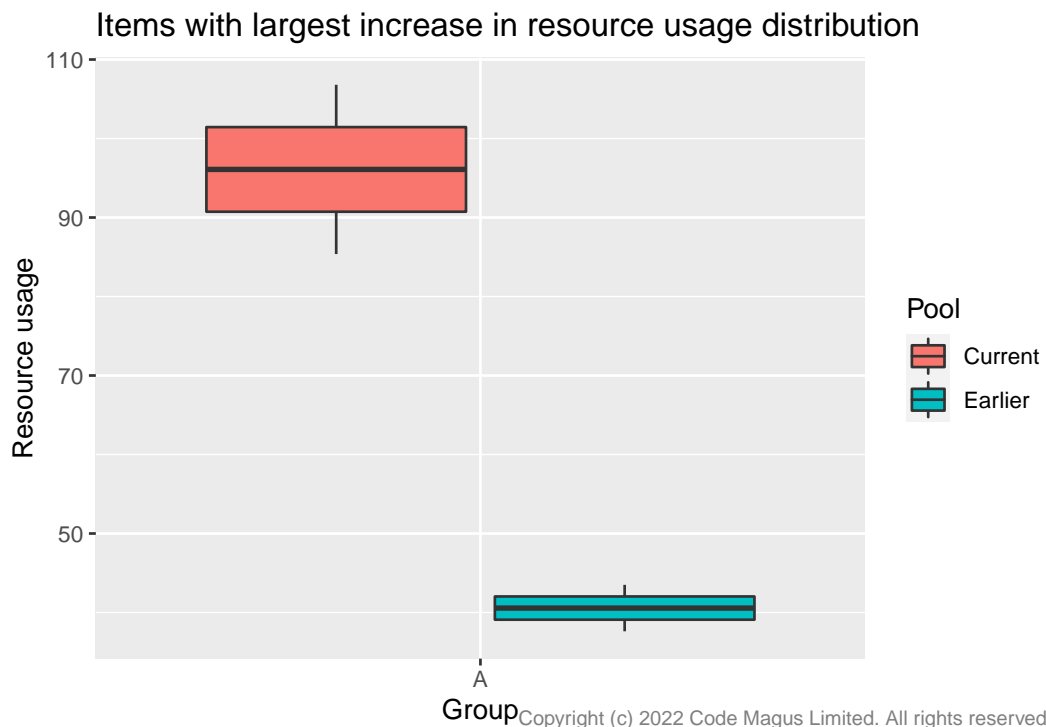
##### 3.2.1.1.1

There are no significant increases for the Rate coefficient for the test that started at CPU when compared to the 2022-01-22 23:12:01 resource usage from previous pooled test results.

##### 3.2.1.1.2

The following compares the Bias coefficient for the CPU resource usage increases from the test started at 2022-01-22 23:12:01 to the tests from previous test sessions.

Class	Coef	Count	Metric	Units	Estimate	Std..Error	PrevCoun	PrevEst	PrevSEM	pvalue.g
NETWORKs	81	cpu.cpu.system.us	Percent single processor		96.086	5.356	906	40.56	1.47	0



Key	Group
A	NETWORK Bias Percent single processor CPU Usage

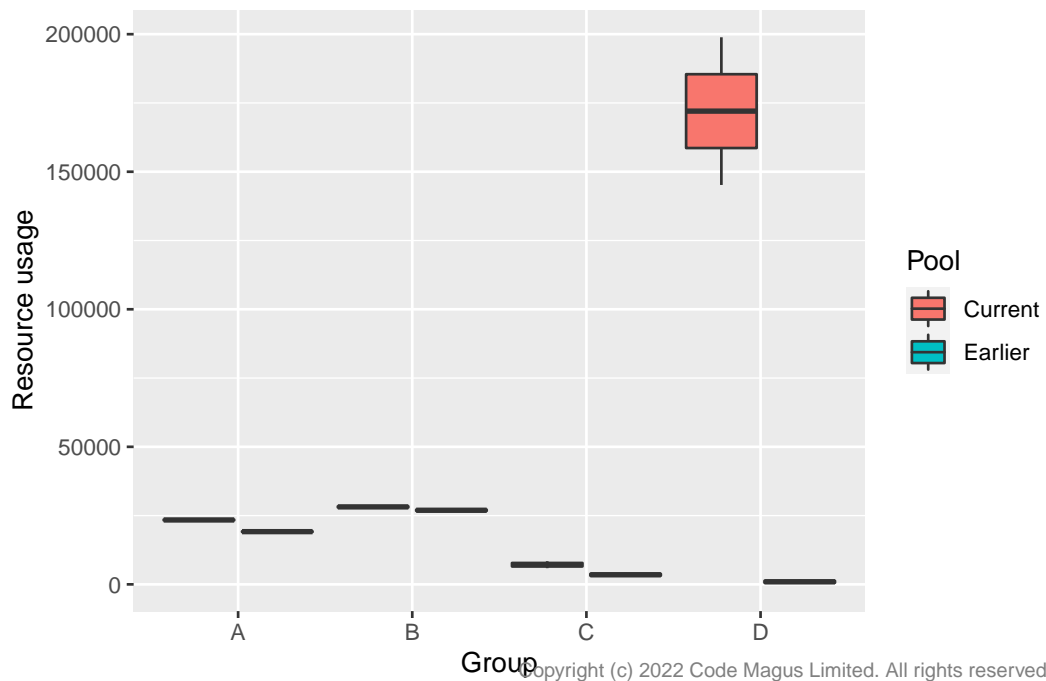
3.2.1.2 Resource class: Network

3.2.1.2.1

The following compares the Rate coefficient for the Network resource usage increases from the test started at 2022-01-22 23:12:01 to the tests from previous test sessions.

Class	Coef	Count	Metric	Units	Estimate	Std..Error	PrevCount	PrevEst	PrevSEM	pvalue.g
LOAD	Rate	81	recv	bits per second	23417.502	151.678	1688	19165.652	135.621	0
LOAD	Rate	81	sent	bits per second	28163.931	212.231	1688	26939.469	239.653	0
NETWORK	Rate	81	recv	bits per second	7152.579	633.570	289	3493.554	350.520	0
NETWORK	Rate	81	sent	bits per second	172032.924	13421.408	48	939.561	362.238	0

Items with largest increase in resource usage distribution

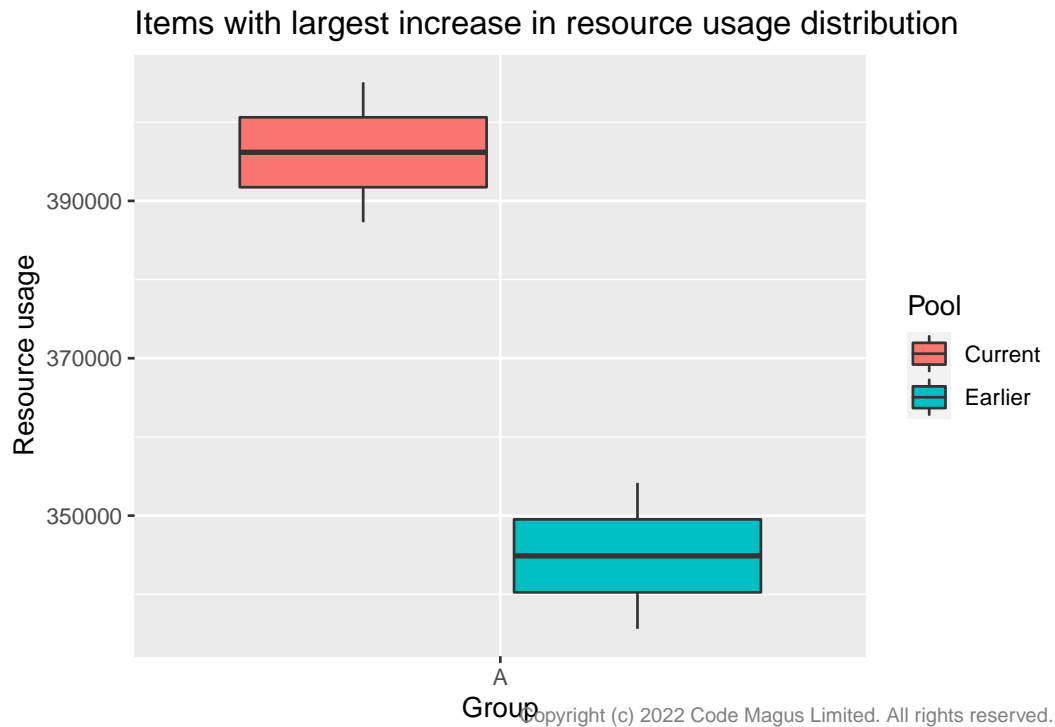


Key	Group
A	LOAD Rate bits per second Network Usage recv
B	LOAD Rate bits per second Network Usage sent
C	NETWORK Rate bits per second Network Usage recv
D	NETWORK Rate bits per second Network Usage sent

### 3.2.1.2.2

The following compares the Bias coefficient for the Network resource usage increases from the test started at 2022-01-22 23:12:01 to the tests from previous test sessions.

Class	Coef	Count	Metric	Units	Estimate	Std..Error	PrevCount	PrevEst	PrevSEM	pvalue.g
LOAD	Bias	81	sent	bits per second	396176.8	4444.663	1688	344886.9	4636.047	0



Key	Group
A	LOAD Bias bits per second Network Usage sent

### 3.3 Decreases in resource usage

The following show the comparisons of the tests performed on 2022-01-22 as compared to the tests performed before this date. The tables are ranked in increasing order of the  $p$ -values from the corresponding Welch Modified Two-Sample t-Test (less), starting from server group where the resource usage distribution decreases are the greatest. Results are only shown for which the  $p$ -value is less than or equal to the cutoff value ( $\alpha = 0.05$ ).

3.3.1 Test 1 - TermAppISO

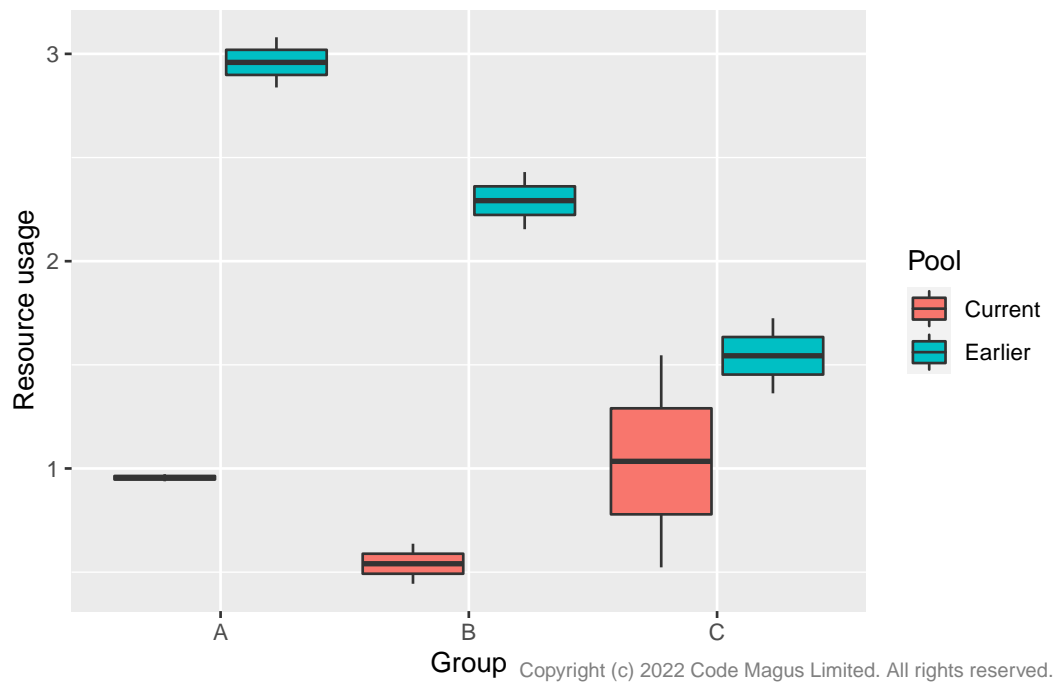
3.3.1.1 Resource class: CPU

3.3.1.1.1

The following compares the Rate coefficient for the CPU resource usage decreases from the test started at 2022-01-22 23:12:01 to the tests from previous test sessions.

Class	Coef	Count	Metric	Units	Estimate	Std..Error	PrevCount	PrevEst	PrevSE	pvalue.1
LOAD	Rate	81	cpu.cpu.system.us	Percent single processor	0.955	0.009	1688	2.959	0.061	0
MODEL	Rate	81	cpu.cpu.system.us	Percent single processor	0.540	0.048	1590	2.292	0.069	0
NETWORK	Rate	81	cpu.cpu.system.us	Percent single processor	1.035	0.256	491	1.544	0.091	0

Items with largest decrease in resource usage distribution



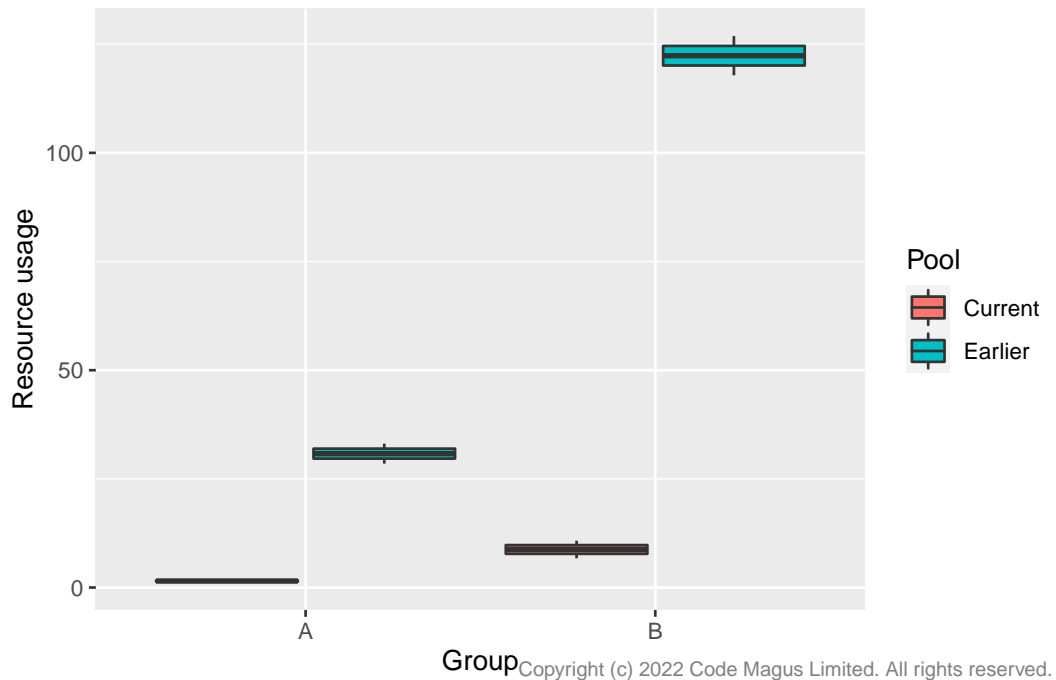
Key	Group
A	LOAD Rate Percent single processor CPU Usage
B	MODEL Rate Percent single processor CPU Usage
C	NETWORK Rate Percent single processor CPU Usage

3.3.1.1.2

The following compares the Bias coefficient for the CPU resource usage decreases from the test started at 2022-01-22 23:12:01 to the tests from previous test sessions.

Class	Coef	Count	Metric	Units	Estimate	Std..Error	PrevCount	PrevEst	PrevSEM	pvalue.1
LOAD Bias	81	cpu.cpu.system.us	Percent single processor		1.498	0.180	1666	30.805	1.149	0
MODE Bias	81	cpu.cpu.system.us	Percent single processor		8.751	1.011	1688	122.353	2.257	0

Items with largest decrease in resource usage distribution



Key	Group
A	LOAD Bias Percent single processor CPU Usage
B	MODEL Bias Percent single processor CPU Usage

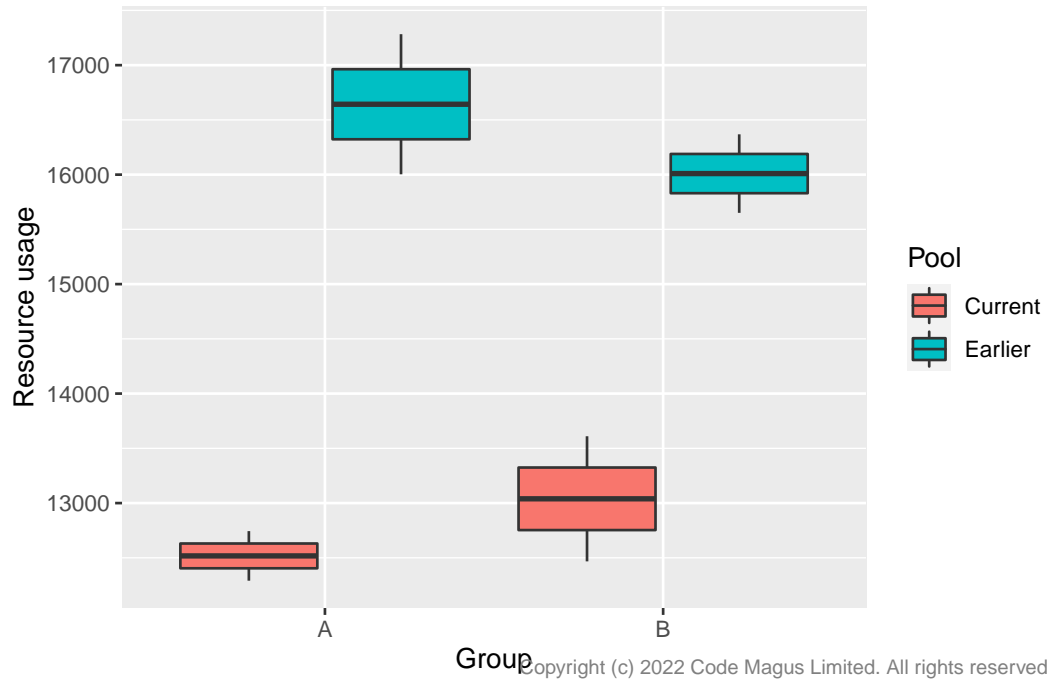
3.3.1.2 Resource class: Network

3.3.1.2.1

The following compares the Rate coefficient for the Network resource usage decreases from the test started at 2022-01-22 23:12:01 to the tests from previous test sessions.

Class	Coef	Count	Metric	Units	Estimate	Std..Error	PrevCount	PrevEst	PrevSEM	pvalue.1
MODELRate		81	recv	bits per second	12517.50	113.161	1610	16642.89	319.937	0
MODELRate		81	sent	bits per second	13038.94	285.724	1461	16009.60	179.264	0

Items with largest decrease in resource usage distribution



Key	Group
A	MODEL Rate bits per second Network Usage recv
B	MODEL Rate bits per second Network Usage sent

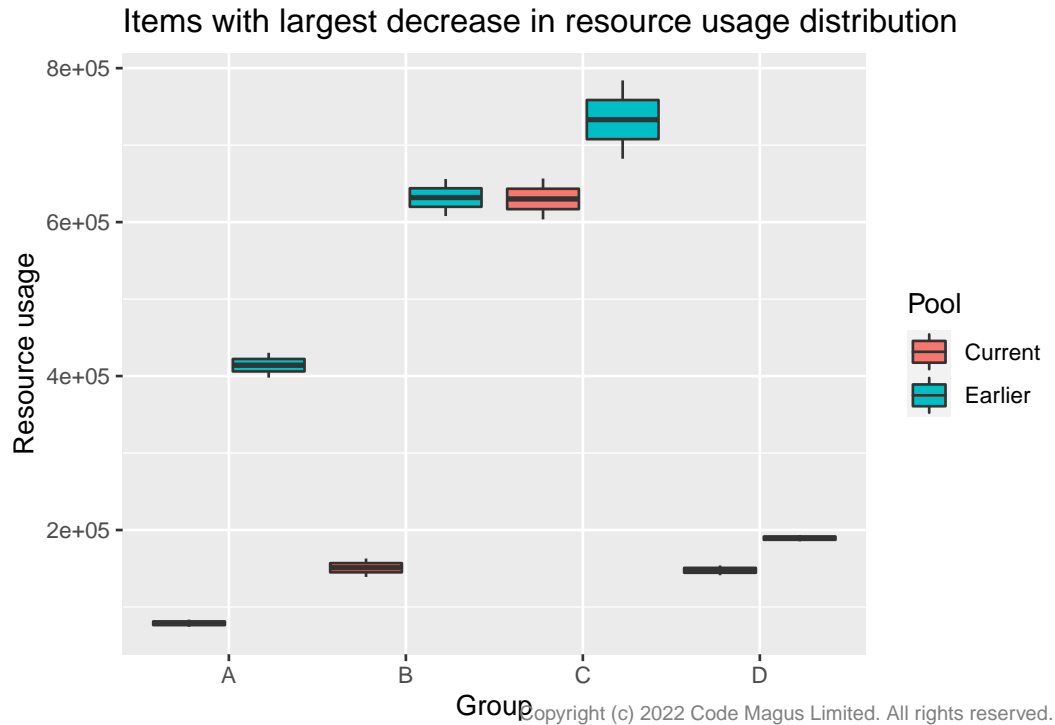
**3.3.1.2.2**

The following compares the Bias coefficient for the Network resource usage decreases from the test started at 2022-01-22 23:12:01 to the tests from previous test sessions.

Class	Coef	Count	Metric	Units	Estimate	Std..Error	PrevCount	PrevEst	PrevSEM	pvalue.1
MODEL Bias		81	recv	bits per second	78885.79	2369.895	1664	414114.1	8070.142	0
MODEL Bias		81	sent	bits per second	151017.36	5983.815	1664	631932.3	12030.724	0
NETWORK Bias		81	recv	bits per second	630081.82	13268.610	436	733168.8	25437.137	0



Class	Coef	Count	Metric	Units	Estimate	Std..Error	PrevCount	PrevEst	PrevSEM	pvalue.l
LOAD	Bias	81	recv	bits per second	147656.33	3176.535	1610	189422.3	2073.371	0



Key	Group
A	MODEL Bias bits per second Network Usage recv
B	MODEL Bias bits per second Network Usage sent
C	NETWORK Bias bits per second Network Usage recv
D	LOAD Bias bits per second Network Usage recv

## 4 Comparison of resource usage across tests

This section compares the resource usage between the NFT tests to date for each of the groups/servers in the classification list for which data has been collected.

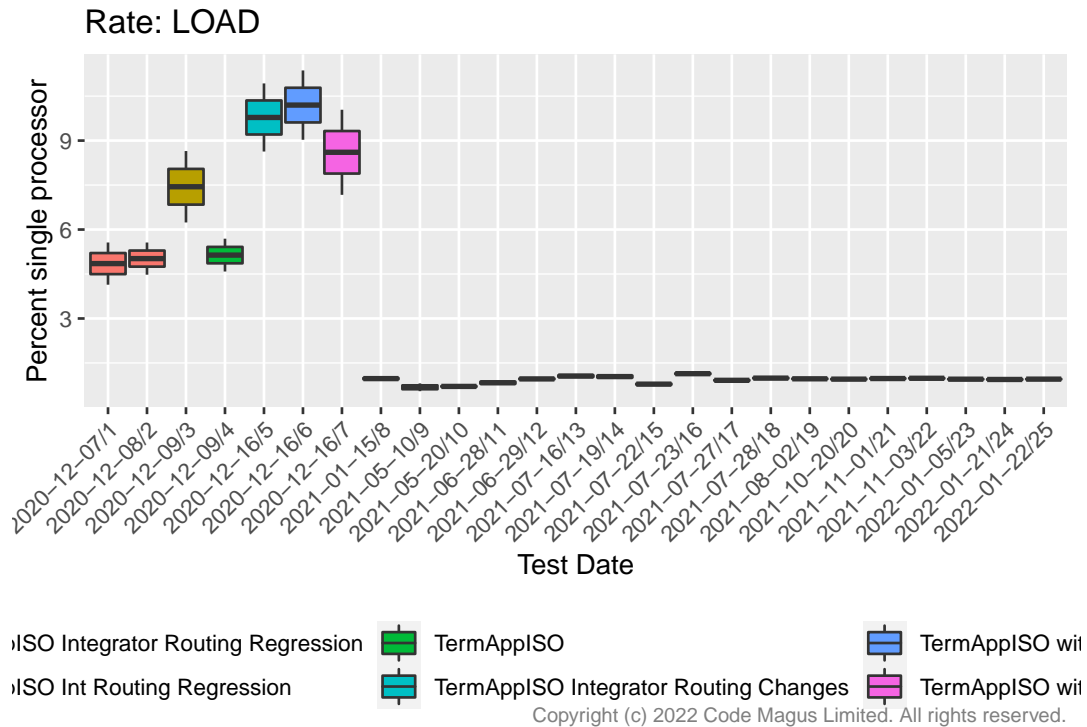
In the box-plots that follow, in each case, the centre is the estimated value of the coefficient calculated for the particular test. The lower edge of the box is the corresponding estimated value less the standard error, and the upper edge of the box is the corresponding estimated value plus the standard error. The minimum and maximum values are calculated by taking two times the standard error values in a similar manner.

#### 4.1 CPU Resource usage for LOAD by CPU Usage using `cpu.cpu.system.user` in Percent single processor

Server	OSType	Description
LOAD0	Linux	CML EcoSystem
LOAD1	Linux	CML EcoSystem

The following table shows the Rate coefficient values over the various tests performed. In this table the units of estimate are: Percent single processor.

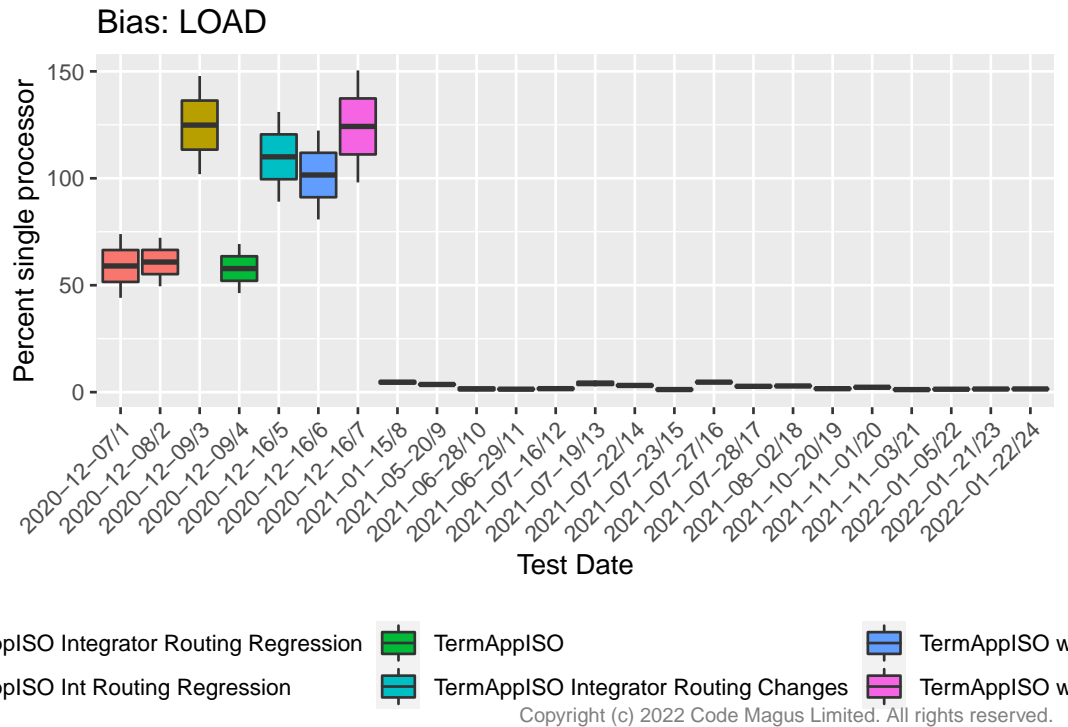
TestDate	Coef	Estimate	Std..Error	t.value	p.value	Test
2020-12-07	Rate	4.852	0.356	13.627	0	TermAppISO Integrator Routing Regression
2020-12-08	Rate	5.021	0.271	18.501	0	TermAppISO Integrator Routing Regression
2020-12-09	Rate	7.444	0.602	12.360	0	TermAppISO Int Routing Regression
2020-12-09	Rate	5.138	0.277	18.561	0	TermAppISO
2020-12-16	Rate	9.780	0.574	17.034	0	TermAppISO Integrator Routing Changes
2020-12-16	Rate	10.198	0.584	17.447	0	TermAppISO with 40 provider threads
2020-12-16	Rate	8.606	0.718	11.993	0	TermAppISO with 80 provider threads
2021-01-15	Rate	0.973	0.022	44.250	0	TermAppISO
2021-05-10	Rate	0.680	0.066	10.297	0	TermAppISO
2021-05-20	Rate	0.710	0.013	52.850	0	TermAppISO
2021-06-28	Rate	0.834	0.035	23.721	0	TermAppISO
2021-06-29	Rate	0.963	0.014	66.737	0	TermAppISO
2021-07-16	Rate	1.059	0.029	37.102	0	TermAppISO
2021-07-19	Rate	1.041	0.034	30.497	0	TermAppISO
2021-07-22	Rate	0.786	0.018	44.845	0	TermAppISO
2021-07-23	Rate	1.139	0.014	81.322	0	TermAppISO
2021-07-27	Rate	0.915	0.011	85.841	0	TermAppISO
2021-07-28	Rate	0.989	0.013	75.418	0	TermAppISO
2021-08-02	Rate	0.966	0.010	98.329	0	TermAppISO
2021-10-20	Rate	0.955	0.011	88.314	0	TermAppISO
2021-11-01	Rate	0.976	0.009	102.979	0	TermAppISO
2021-11-03	Rate	0.984	0.010	103.496	0	TermAppISO
2022-01-05	Rate	0.953	0.008	121.697	0	TermAppISO
2022-01-21	Rate	0.944	0.011	84.831	0	TermAppISO
2022-01-22	Rate	0.955	0.009	110.948	0	TermAppISO



The following table shows the Bias coefficient values over the various tests performed. In this table the units of estimate are: Percent single processor.

TestDate	Coef	Estimate	Std..Error	t.value	p.value	Test
2020-12-07	Bias	59.012	7.451	7.921	0.000	TermAppISO Integrator Routing Regression
2020-12-08	Bias	60.847	5.668	10.735	0.000	TermAppISO Integrator Routing Regression
2020-12-09	Bias	124.874	11.476	10.882	0.000	TermAppISO Int Routing Regression
2020-12-09	Bias	57.803	5.740	10.071	0.000	TermAppISO
2020-12-16	Bias	110.050	10.485	10.496	0.000	TermAppISO Integrator Routing Changes
2020-12-16	Bias	101.540	10.390	9.773	0.000	TermAppISO with 40 provider threads
2020-12-16	Bias	124.248	13.091	9.491	0.000	TermAppISO with 80 provider threads
2021-01-15	Bias	4.653	0.462	10.075	0.000	TermAppISO
2021-05-20	Bias	3.599	0.216	16.641	0.000	TermAppISO
2021-06-28	Bias	1.532	0.539	2.841	0.006	TermAppISO

TestDate	Coef	Estimate	Std..Error	t.value	p.value	Test
2021-06-29	Bias	1.399	0.205	6.822	0.000	TermAppISO
2021-07-16	Bias	1.648	0.283	5.824	0.000	TermAppISO
2021-07-19	Bias	4.109	0.698	5.884	0.000	TermAppISO
2021-07-22	Bias	3.138	0.269	11.687	0.000	TermAppISO
2021-07-23	Bias	1.224	0.295	4.150	0.000	TermAppISO
2021-07-27	Bias	4.675	0.229	20.451	0.000	TermAppISO
2021-07-28	Bias	2.737	0.279	9.813	0.000	TermAppISO
2021-08-02	Bias	2.891	0.206	14.055	0.000	TermAppISO
2021-10-20	Bias	1.636	0.223	7.322	0.000	TermAppISO
2021-11-01	Bias	2.289	0.201	11.393	0.000	TermAppISO
2021-11-03	Bias	1.197	0.201	5.946	0.000	TermAppISO
2022-01-05	Bias	1.373	0.168	8.190	0.000	TermAppISO
2022-01-21	Bias	1.465	0.235	6.244	0.000	TermAppISO
2022-01-22	Bias	1.498	0.180	8.305	0.000	TermAppISO



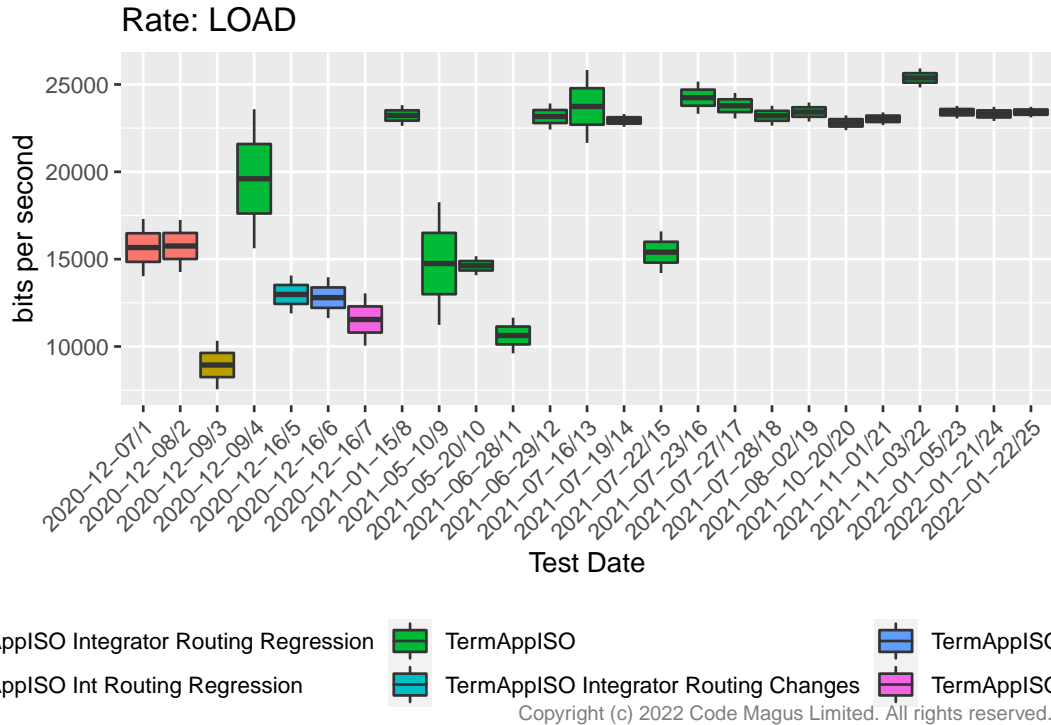
#### 4.2 Network Resource usage for LOAD by Network Usage recv using recv in bits per second

Server	OSType	Description
LOAD0	Linux	CML EcoSystem
LOAD1	Linux	CML EcoSystem

The following table shows the Rate coefficient values over the various tests performed. In this table the units of estimate are: bits per second.

TestDate	Coef	Estimate	Std..Error	t.value	p.value	Test
2020-12-07	Rate	15663.585	818.945	19.127	0	TermAppISO Integrator Routing Regression
2020-12-08	Rate	15753.089	745.948	21.118	0	TermAppISO Integrator Routing Regression
2020-12-09	Rate	8938.586	692.304	12.911	0	TermAppISO Int Routing Regression
2020-12-09	Rate	19602.564	1989.670	9.852	0	TermAppISO
2020-12-16	Rate	12978.364	542.369	23.929	0	TermAppISO Integrator Routing Changes

TestDate	Coef	Estimate	Std..Error	t.value	p.value	Test
2020-12-16	Rate	12795.930	585.131	21.868	0	TermAppISO with 40 provider threads
2020-12-16	Rate	11544.987	748.371	15.427	0	TermAppISO with 80 provider threads
2021-01-15	Rate	23224.409	297.261	78.128	0	TermAppISO
2021-05-10	Rate	14748.670	1755.623	8.401	0	TermAppISO
2021-05-20	Rate	14621.637	272.552	53.647	0	TermAppISO
2021-06-28	Rate	10629.033	511.557	20.778	0	TermAppISO
2021-06-29	Rate	23164.964	373.138	62.082	0	TermAppISO
2021-07-16	Rate	23741.774	1043.020	22.763	0	TermAppISO
2021-07-19	Rate	22942.579	183.455	125.058	0	TermAppISO
2021-07-22	Rate	15398.095	595.974	25.837	0	TermAppISO
2021-07-23	Rate	24244.471	460.658	52.630	0	TermAppISO
2021-07-27	Rate	23785.093	366.436	64.909	0	TermAppISO
2021-07-28	Rate	23208.786	285.686	81.239	0	TermAppISO
2021-08-02	Rate	23422.753	272.802	85.860	0	TermAppISO
2021-10-20	Rate	22804.935	212.156	107.491	0	TermAppISO
2021-11-01	Rate	23035.483	183.675	125.415	0	TermAppISO
2021-11-03	Rate	25373.841	272.503	93.114	0	TermAppISO
2022-01-05	Rate	23414.941	181.379	129.094	0	TermAppISO
2022-01-21	Rate	23313.936	202.695	115.020	0	TermAppISO
2022-01-22	Rate	23417.502	151.678	154.390	0	TermAppISO

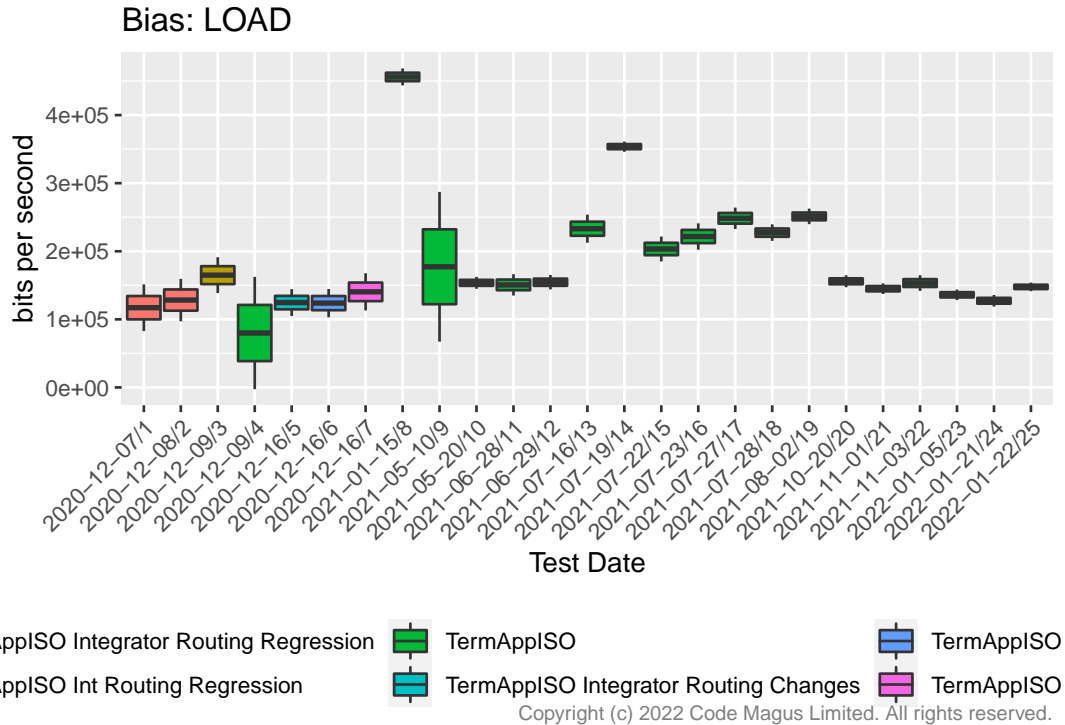


The following table shows the Bias coefficient values over the various tests performed. In this table the units of estimate are: bits per second.

TestDate	Coef	Estimate	Std..Error	t.value	p.value	Test
2020-12-07	Bias	117112.32	17136.631	6.834	0.000	TermAppISO Integrator Routing Regression
2020-12-08	Bias	128316.44	15580.341	8.236	0.000	TermAppISO Integrator Routing Regression
2020-12-09	Bias	164916.40	13191.587	12.502	0.000	TermAppISO Int Routing Regression
2020-12-09	Bias	79903.07	41255.594	1.937	0.056	TermAppISO
2020-12-16	Bias	124584.24	9904.489	12.579	0.000	TermAppISO Integrator Routing Changes
2020-12-16	Bias	123844.15	10400.926	11.907	0.000	TermAppISO with 40 provider threads
2020-12-16	Bias	140398.04	13653.452	10.283	0.000	TermAppISO with 80 provider threads
2021-01-15	Bias	456044.32	6245.241	73.023	0.000	TermAppISO
2021-05-10	Bias	177202.72	54997.316	3.222	0.004	TermAppISO
2021-05-20	Bias	153604.59	4390.310	34.987	0.000	TermAppISO

TestDate	Coef	Estimate	Std..Error	t.value	p.value	Test
2021-06-28	Bias	150601.54	7845.304	19.196	0.000	TermAppISO
2021-06-29	Bias	154516.43	5300.697	29.150	0.000	TermAppISO
2021-07-16	Bias	233115.34	10338.395	22.549	0.000	TermAppISO
2021-07-19	Bias	353663.23	3754.451	94.198	0.000	TermAppISO
2021-07-22	Bias	203343.05	9128.552	22.275	0.000	TermAppISO
2021-07-23	Bias	221648.78	9699.374	22.852	0.000	TermAppISO
2021-07-27	Bias	248432.92	7859.754	31.608	0.000	TermAppISO
2021-07-28	Bias	227386.46	6076.202	37.422	0.000	TermAppISO
2021-08-02	Bias	251195.35	5711.907	43.977	0.000	TermAppISO
2021-10-20	Bias	155883.03	4383.125	35.564	0.000	TermAppISO
2021-11-01	Bias	145018.86	3894.780	37.234	0.000	TermAppISO
2021-11-03	Bias	153313.30	5768.465	26.578	0.000	TermAppISO
2022-01-05	Bias	136028.79	3882.927	35.033	0.000	TermAppISO
2022-01-21	Bias	127287.48	4271.345	29.800	0.000	TermAppISO
2022-01-22	Bias	147656.33	3176.535	46.483	0.000	TermAppISO





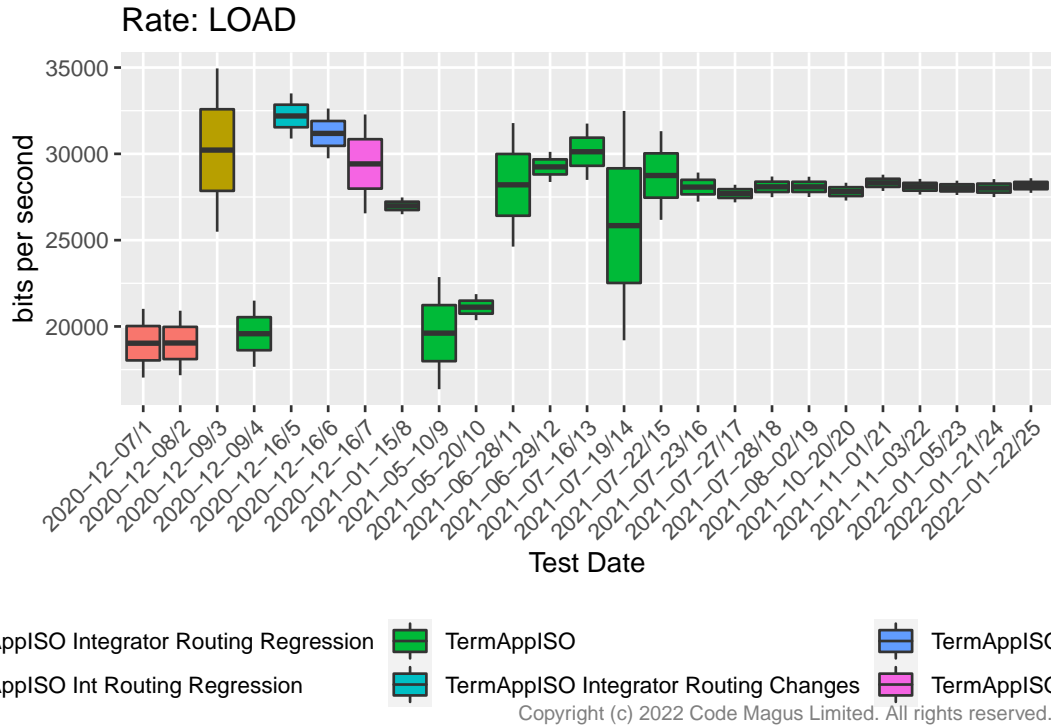
### 4.3 Network Resource usage for LOAD by Network Usage sent using sent in bits per second

Server	OSType	Description
LOAD0	Linux	CML EcoSystem
LOAD1	Linux	CML EcoSystem

The following table shows the Rate coefficient values over the various tests performed. In this table the units of estimate are: bits per second.

TestDate	Coef	Estimate	Std..Error	t.value	p.value	Test
2020-12-07	Rate	19028.66	995.145	19.121	0	TermAppISO Integrator Routing Regression
2020-12-08	Rate	19042.75	934.235	20.383	0	TermAppISO Integrator Routing Regression
2020-12-09	Rate	30219.17	2364.677	12.779	0	TermAppISO Int Routing Regression
2020-12-09	Rate	19579.56	958.369	20.430	0	TermAppISO
2020-12-16	Rate	32193.80	653.690	49.249	0	TermAppISO Integrator Routing Changes

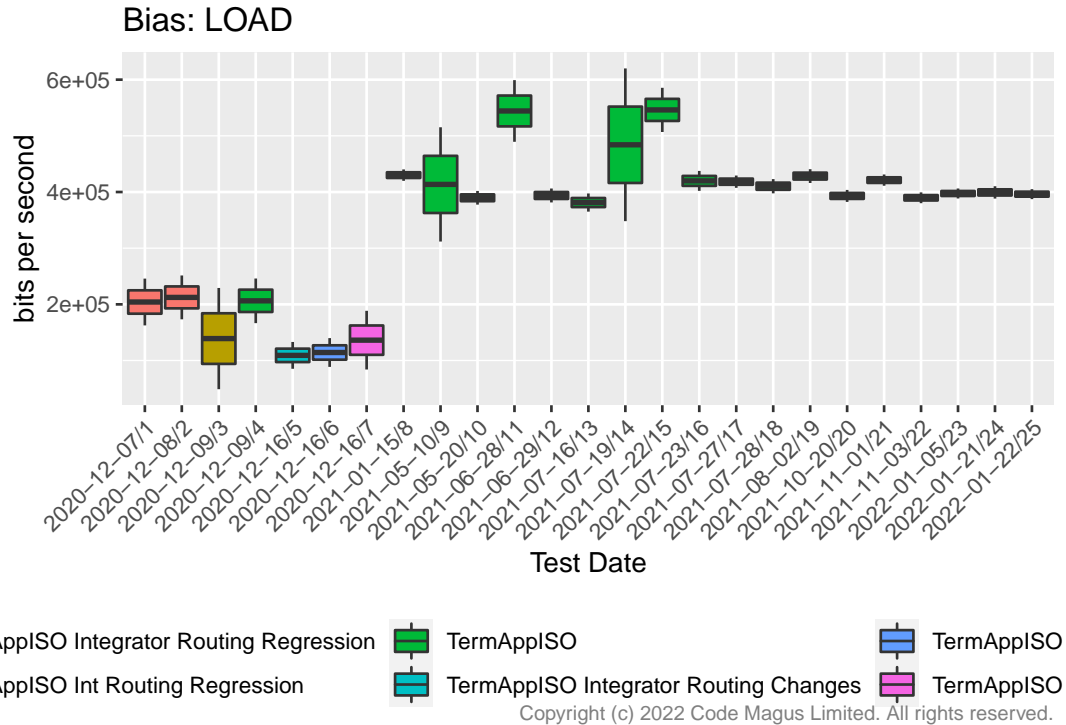
TestDate	Coef	Estimate	Std..Error	t.value	p.value	Test
2020-12-16	Rate	31183.83	720.365	43.289	0	TermAppISO with 40 provider threads
2020-12-16	Rate	29416.80	1431.859	20.544	0	TermAppISO with 80 provider threads
2021-01-15	Rate	26987.33	242.256	111.400	0	TermAppISO
2021-05-10	Rate	19612.35	1623.789	12.078	0	TermAppISO
2021-05-20	Rate	21117.29	377.348	55.962	0	TermAppISO
2021-06-28	Rate	28204.25	1788.951	15.766	0	TermAppISO
2021-06-29	Rate	29243.75	436.441	67.005	0	TermAppISO
2021-07-16	Rate	30122.86	815.291	36.947	0	TermAppISO
2021-07-19	Rate	25840.71	3321.221	7.780	0	TermAppISO
2021-07-22	Rate	28744.37	1284.023	22.386	0	TermAppISO
2021-07-23	Rate	28074.25	420.903	66.700	0	TermAppISO
2021-07-27	Rate	27699.57	255.067	108.597	0	TermAppISO
2021-07-28	Rate	28088.95	298.640	94.056	0	TermAppISO
2021-08-02	Rate	28087.85	293.675	95.643	0	TermAppISO
2021-10-20	Rate	27810.33	257.964	107.807	0	TermAppISO
2021-11-01	Rate	28320.92	236.122	119.942	0	TermAppISO
2021-11-03	Rate	28093.59	227.238	123.631	0	TermAppISO
2022-01-05	Rate	28030.38	207.718	134.944	0	TermAppISO
2022-01-21	Rate	28016.41	260.622	107.498	0	TermAppISO
2022-01-22	Rate	28163.93	212.231	132.704	0	TermAppISO



The following table shows the Bias coefficient values over the various tests performed. In this table the units of estimate are: bits per second.

TestDate	Coef	Estimate	Std..Error	t.value	p.value	Test
2020-12-07	Bias	204158.9	20823.674	9.804	0.000	TermAppISO Integrator Routing Regression
2020-12-08	Bias	212375.4	19513.027	10.884	0.000	TermAppISO Integrator Routing Regression
2020-12-09	Bias	139054.3	45057.989	3.086	0.003	TermAppISO Int Routing Regression
2020-12-09	Bias	206257.3	19871.668	10.379	0.000	TermAppISO
2020-12-16	Bias	109170.1	11937.368	9.145	0.000	TermAppISO Integrator Routing Changes
2020-12-16	Bias	114274.4	12804.747	8.924	0.000	TermAppISO with 40 provider threads
2020-12-16	Bias	136247.9	26123.167	5.216	0.000	TermAppISO with 80 provider threads
2021-01-15	Bias	430030.4	5089.620	84.492	0.000	TermAppISO
2021-05-10	Bias	413513.8	50867.430	8.129	0.000	TermAppISO
2021-05-20	Bias	389686.3	6078.379	64.110	0.000	TermAppISO

TestDate	Coef	Estimate	Std..Error	t.value	p.value	Test
2021-06-28	Bias	544271.4	27435.564	19.838	0.000	TermAppISO
2021-06-29	Bias	393824.0	6199.974	63.520	0.000	TermAppISO
2021-07-16	Bias	381222.7	8081.151	47.174	0.000	TermAppISO
2021-07-19	Bias	484032.6	67969.577	7.121	0.000	TermAppISO
2021-07-22	Bias	546152.8	19667.416	27.769	0.000	TermAppISO
2021-07-23	Bias	419787.0	8862.318	47.368	0.000	TermAppISO
2021-07-27	Bias	418372.5	5470.982	76.471	0.000	TermAppISO
2021-07-28	Bias	410292.8	6351.720	64.596	0.000	TermAppISO
2021-08-02	Bias	428311.1	6148.946	69.656	0.000	TermAppISO
2021-10-20	Bias	393043.2	5329.524	73.748	0.000	TermAppISO
2021-11-01	Bias	421157.6	5006.921	84.115	0.000	TermAppISO
2021-11-03	Bias	389673.9	4810.278	81.009	0.000	TermAppISO
2022-01-05	Bias	397363.6	4446.804	89.359	0.000	TermAppISO
2022-01-21	Bias	399252.5	5492.014	72.697	0.000	TermAppISO
2022-01-22	Bias	396176.8	4444.663	89.135	0.000	TermAppISO



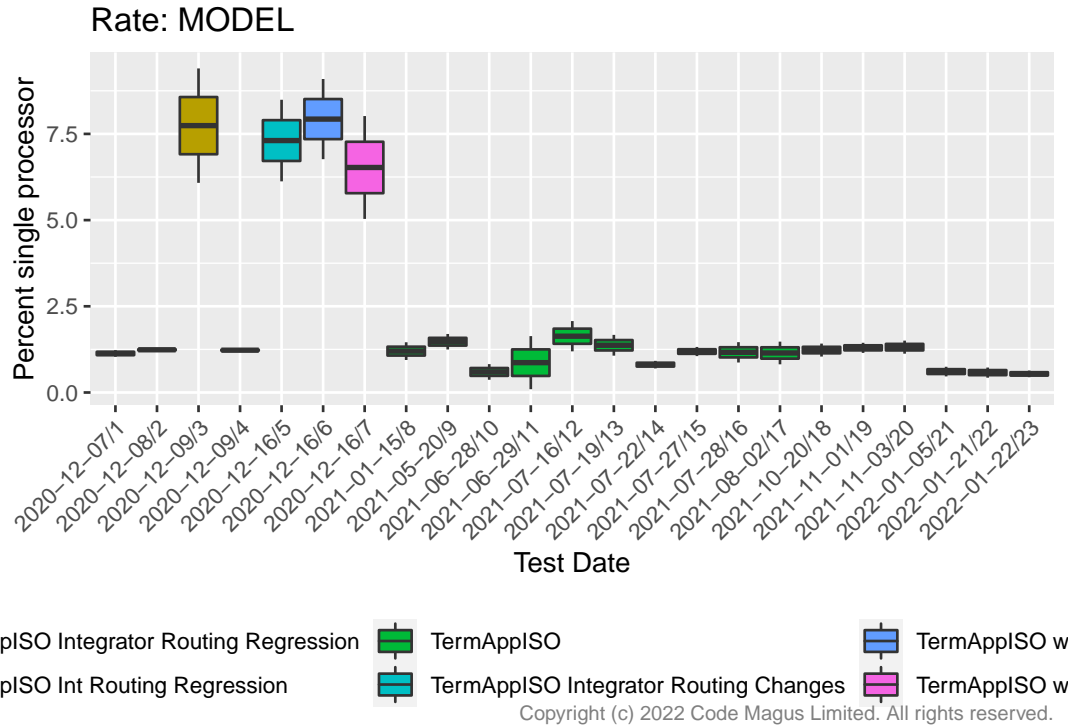
#### 4.4 CPU Resource usage for MODEL by CPU Usage using `cpu.cpu.system.user` in Percent single processor

Server	OSType	Description
MODELAPP0	Linux	CML EcoSystem
MODELAPP1	Linux	CML EcoSystem

The following table shows the Rate coefficient values over the various tests performed. In this table the units of estimate are: Percent single processor.

TestDate	Coef	Estimate	Std..Error	t.value	p.value	Test
2020-12-07	Rate	1.132	0.048	23.545	0.000	TermAppISO Integrator Routing Regression
2020-12-08	Rate	1.239	0.017	74.254	0.000	TermAppISO Integrator Routing Regression
2020-12-09	Rate	7.740	0.829	9.331	0.000	TermAppISO Int Routing Regression
2020-12-09	Rate	1.227	0.015	80.090	0.000	TermAppISO
2020-12-16	Rate	7.307	0.592	12.351	0.000	TermAppISO Integrator Routing Changes

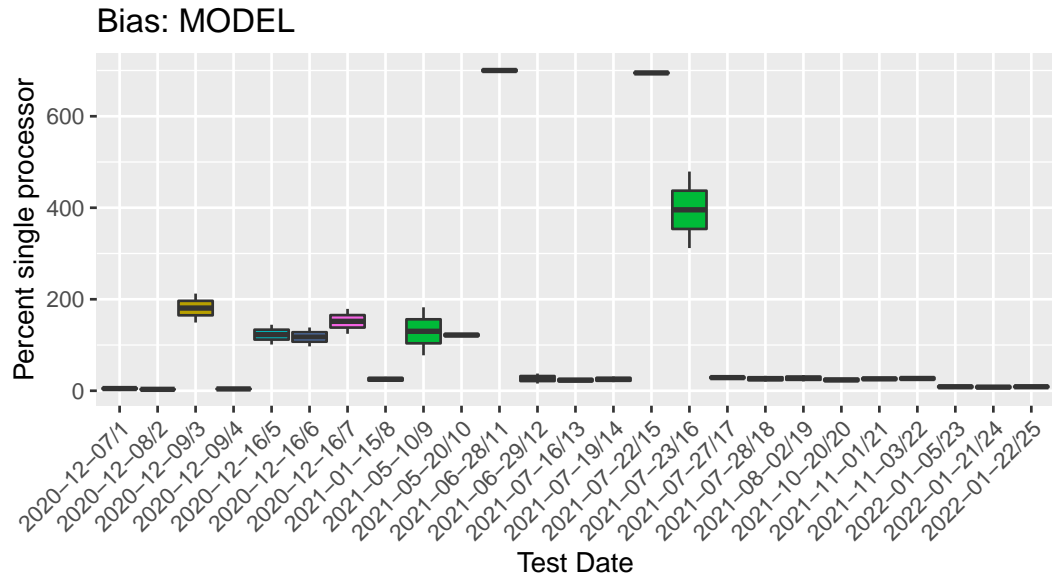
TestDate	Coef	Estimate	Std..Error	t.value	p.value	Test
2020-12-16	Rate	7.929	0.581	13.643	0.000	TermAppISO with 40 provider threads
2020-12-16	Rate	6.526	0.746	8.752	0.000	TermAppISO with 80 provider threads
2021-01-15	Rate	1.200	0.129	9.336	0.000	TermAppISO
2021-05-20	Rate	1.473	0.112	13.117	0.000	TermAppISO
2021-06-28	Rate	0.597	0.113	5.266	0.000	TermAppISO
2021-06-29	Rate	0.866	0.385	2.249	0.029	TermAppISO
2021-07-16	Rate	1.632	0.220	7.435	0.000	TermAppISO
2021-07-19	Rate	1.370	0.150	9.104	0.000	TermAppISO
2021-07-22	Rate	0.808	0.055	14.686	0.000	TermAppISO
2021-07-27	Rate	1.189	0.067	17.836	0.000	TermAppISO
2021-07-28	Rate	1.165	0.147	7.899	0.000	TermAppISO
2021-08-02	Rate	1.146	0.165	6.969	0.000	TermAppISO
2021-10-20	Rate	1.231	0.094	13.089	0.000	TermAppISO
2021-11-01	Rate	1.296	0.073	17.692	0.000	TermAppISO
2021-11-03	Rate	1.315	0.095	13.891	0.000	TermAppISO
2022-01-05	Rate	0.607	0.070	8.680	0.000	TermAppISO
2022-01-21	Rate	0.577	0.074	7.840	0.000	TermAppISO
2022-01-22	Rate	0.540	0.048	11.191	0.000	TermAppISO







The following table shows the Bias coefficient values over the various tests performed. In this table the units of estimate are: Percent single processor.

TestDate	Coef	Estimate	Std..Error	t.value	p.value	Test
2020-12-07	Bias	4.808	1.006	4.779	0	TermAppISO Integrator Routing Regression
2020-12-08	Bias	3.084	0.348	8.849	0	TermAppISO Integrator Routing Regression
2020-12-09	Bias	180.757	15.805	11.437	0	TermAppISO Int Routing Regression
2020-12-09	Bias	3.996	0.318	12.580	0	TermAppISO
2020-12-16	Bias	122.689	10.804	11.356	0	TermAppISO Integrator Routing Changes
2020-12-16	Bias	117.633	10.331	11.386	0	TermAppISO with 40 provider threads
2020-12-16	Bias	151.751	13.604	11.155	0	TermAppISO with 80 provider threads
2021-01-15	Bias	25.053	2.701	9.275	0	TermAppISO
2021-05-10	Bias	129.953	26.227	4.955	0	TermAppISO
2021-05-20	Bias	121.790	1.809	67.324	0	TermAppISO
2021-06-28	Bias	699.995	1.738	402.874	0	TermAppISO
2021-06-29	Bias	26.687	5.467	4.881	0	TermAppISO
2021-07-16	Bias	23.169	2.176	10.646	0	TermAppISO
2021-07-19	Bias	24.944	3.080	8.099	0	TermAppISO
2021-07-22	Bias	694.715	0.843	824.181	0	TermAppISO
2021-07-23	Bias	395.494	41.801	9.461	0	TermAppISO
2021-07-27	Bias	28.779	1.429	20.134	0	TermAppISO
2021-07-28	Bias	26.395	3.137	8.414	0	TermAppISO
2021-08-02	Bias	27.352	3.444	7.941	0	TermAppISO
2021-10-20	Bias	23.703	1.943	12.201	0	TermAppISO
2021-11-01	Bias	26.038	1.553	16.768	0	TermAppISO

TestDate	Coef	Estimate	Std..Error	t.value	p.value	Test
2021-11-03	Bias	26.841	2.004	13.393	0	TermAppISO
2022-01-05	Bias	8.719	1.497	5.825	0	TermAppISO
2022-01-21	Bias	7.962	1.550	5.136	0	TermAppISO
2022-01-22	Bias	8.751	1.011	8.653	0	TermAppISO



ipISO Integrator Routing Regression  TermAppISO  TermAppISO w  
 ipISO Int Routing Regression  TermAppISO Integrator Routing Changes  TermAppISO w

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#### 4.5 Network Resource usage for MODEL by Network Usage recv using recv in bits per second

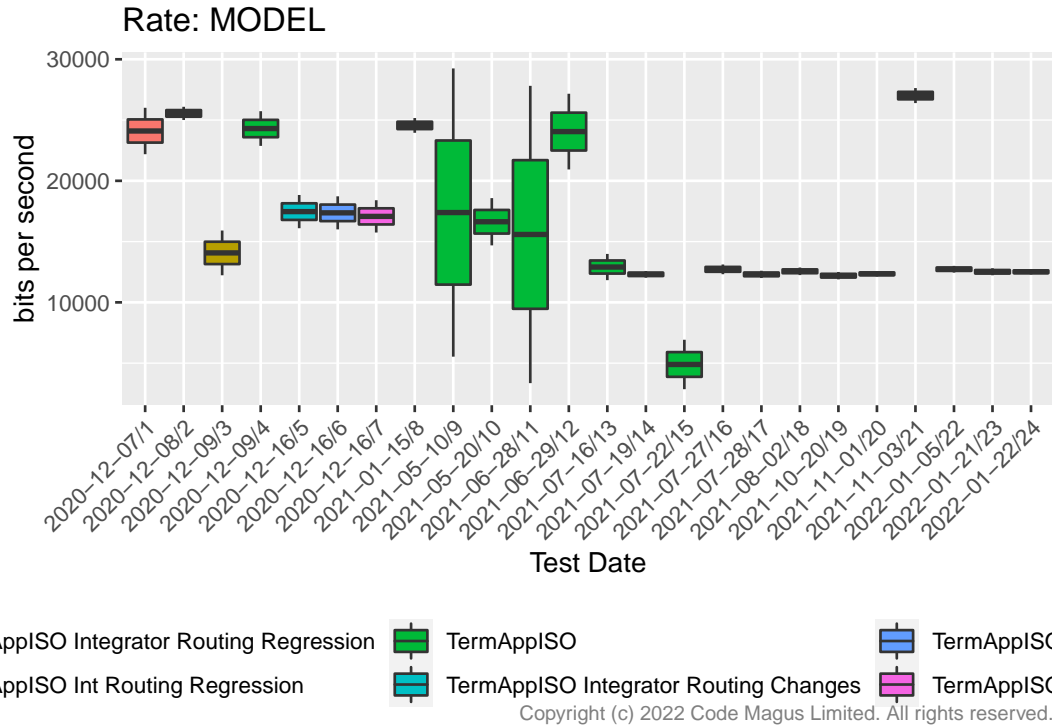
Server	OSType	Description
MODELAPP0	Linux	CML EcoSystem
MODELAPP1	Linux	CML EcoSystem

The following table shows the Rate coefficient values over the various tests performed. In this table the units of estimate are: bits per second.

TestDate	Coef	Estimate	Std..Error	t.value	p.value	Test
2020-12-07	Rate	24100.050	954.550	25.248	0.000	TermAppISO Integrator Routing Regression



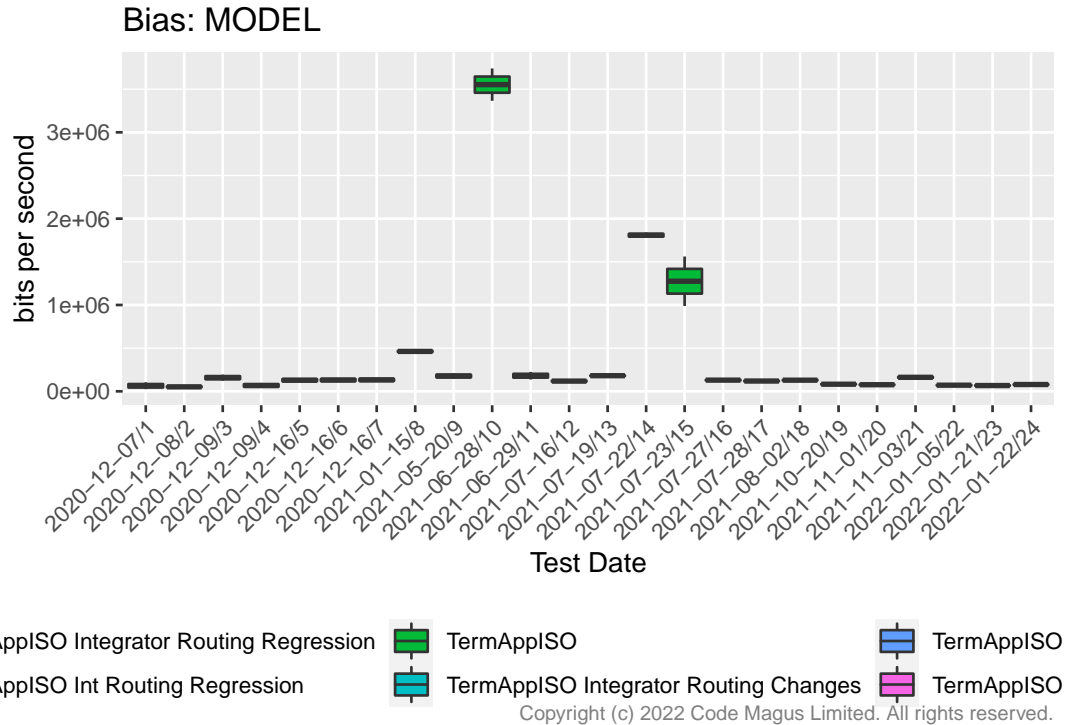
TestDate	Coef	Estimate	Std..Error	t.value	p.value	Test
2020-12-08	Rate	25548.990	271.665	94.046	0.000	TermAppISO Integrator Routing Regression
2020-12-09	Rate	14069.744	920.324	15.288	0.000	TermAppISO Int Routing Regression
2020-12-09	Rate	24302.467	713.257	34.073	0.000	TermAppISO
2020-12-16	Rate	17467.524	683.900	25.541	0.000	TermAppISO Integrator Routing Changes
2020-12-16	Rate	17365.660	680.340	25.525	0.000	TermAppISO with 40 provider threads
2020-12-16	Rate	17074.863	664.909	25.680	0.000	TermAppISO with 80 provider threads
2021-01-15	Rate	24560.174	304.261	80.721	0.000	TermAppISO
2021-05-10	Rate	17389.627	5929.025	2.933	0.008	TermAppISO
2021-05-20	Rate	16631.667	971.810	17.114	0.000	TermAppISO
2021-06-28	Rate	15585.305	6115.750	2.548	0.013	TermAppISO
2021-06-29	Rate	24051.354	1557.272	15.445	0.000	TermAppISO
2021-07-16	Rate	12907.062	539.876	23.907	0.000	TermAppISO
2021-07-19	Rate	12306.350	138.379	88.932	0.000	TermAppISO
2021-07-22	Rate	4888.864	1017.101	4.807	0.000	TermAppISO
2021-07-27	Rate	12716.180	200.060	63.562	0.000	TermAppISO
2021-07-28	Rate	12301.593	150.338	81.826	0.000	TermAppISO
2021-08-02	Rate	12555.650	156.231	80.366	0.000	TermAppISO
2021-10-20	Rate	12196.657	151.636	80.434	0.000	TermAppISO
2021-11-01	Rate	12349.415	110.632	111.626	0.000	TermAppISO
2021-11-03	Rate	27014.037	308.750	87.495	0.000	TermAppISO
2022-01-05	Rate	12727.093	137.665	92.449	0.000	TermAppISO
2022-01-21	Rate	12517.454	144.238	86.783	0.000	TermAppISO
2022-01-22	Rate	12517.495	113.161	110.616	0.000	TermAppISO



The following table shows the Bias coefficient values over the various tests performed. In this table the units of estimate are: bits per second.

TestDate	Coef	Estimate	Std..Error	t.value	p.value	Test
2020-12-07	Bias	64596.51	19974.205	3.234	0.002	TermAppISO Integrator Routing Regression
2020-12-08	Bias	52159.33	5674.160	9.192	0.000	TermAppISO Integrator Routing Regression
2020-12-09	Bias	158388.92	17536.412	9.032	0.000	TermAppISO Int Routing Regression
2020-12-09	Bias	67665.26	14789.314	4.575	0.000	TermAppISO
2020-12-16	Bias	128789.60	12489.057	10.312	0.000	TermAppISO Integrator Routing Changes
2020-12-16	Bias	130831.54	12093.291	10.819	0.000	TermAppISO with 40 provider threads
2020-12-16	Bias	132636.80	11969.911	11.081	0.000	TermAppISO with 80 provider threads
2021-01-15	Bias	462642.65	6392.297	72.375	0.000	TermAppISO
2021-05-20	Bias	177120.97	15654.052	11.315	0.000	TermAppISO
2021-06-28	Bias	3552601.09	93791.875	37.877	0.000	TermAppISO

TestDate	Coef	Estimate	Std..Error	t.value	p.value	Test
2021-06-29	Bias	180897.77	22122.205	8.177	0.000	TermAppISO
2021-07-16	Bias	118244.76	5351.244	22.097	0.000	TermAppISO
2021-07-19	Bias	180920.17	2831.954	63.885	0.000	TermAppISO
2021-07-22	Bias	1808374.69	15578.961	116.078	0.000	TermAppISO
2021-07-23	Bias	1275083.95	143254.541	8.901	0.000	TermAppISO
2021-07-27	Bias	129537.85	4238.183	30.564	0.000	TermAppISO
2021-07-28	Bias	119129.01	3197.513	37.257	0.000	TermAppISO
2021-08-02	Bias	129211.50	3271.163	39.500	0.000	TermAppISO
2021-10-20	Bias	82472.85	3132.791	26.326	0.000	TermAppISO
2021-11-01	Bias	76649.39	2345.929	32.673	0.000	TermAppISO
2021-11-03	Bias	162240.16	6535.773	24.823	0.000	TermAppISO
2022-01-05	Bias	71044.08	2947.120	24.106	0.000	TermAppISO
2022-01-21	Bias	67070.11	3039.485	22.066	0.000	TermAppISO
2022-01-22	Bias	78885.79	2369.895	33.287	0.000	TermAppISO



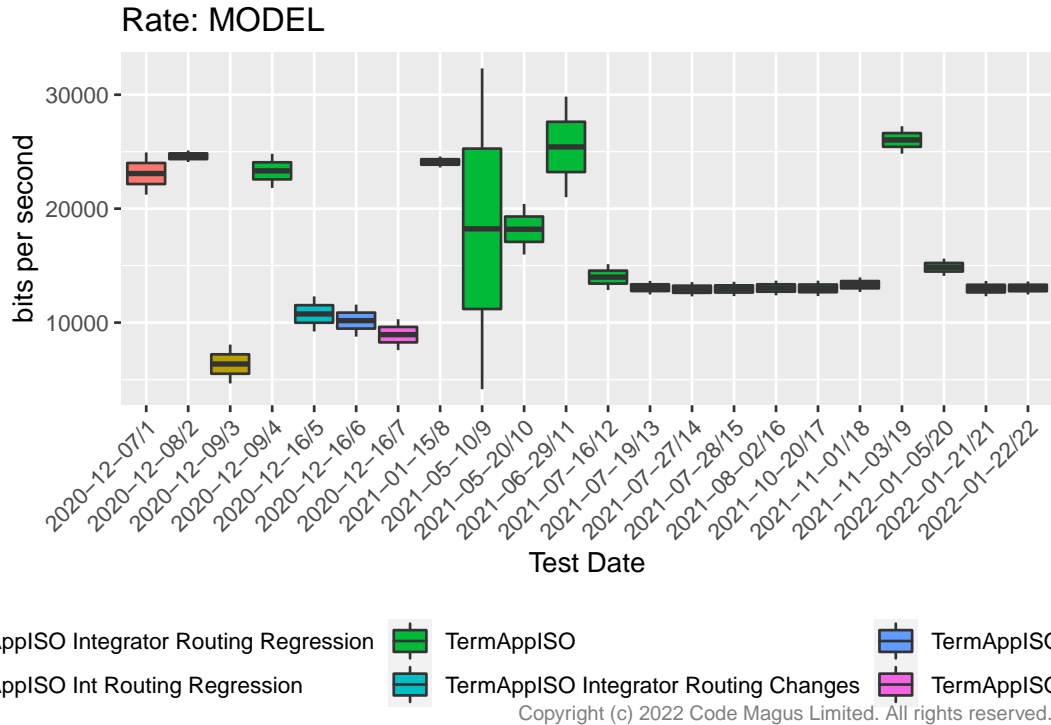
#### 4.6 Network Resource usage for MODEL by Network Usage sent using sent in bits per second

Server	OSType	Description
MODELAPP0	Linux	CML EcoSystem
MODELAPP1	Linux	CML EcoSystem

The following table shows the Rate coefficient values over the various tests performed. In this table the units of estimate are: bits per second.

TestDate	Coef	Estimate	Std..Error	t.value	p.value	Test
2020-12-07	Rate	23083.902	924.847	24.960	0.000	TermAppISO Integrator Routing Regression
2020-12-08	Rate	24600.259	251.866	97.672	0.000	TermAppISO Integrator Routing Regression
2020-12-09	Rate	6362.325	852.572	7.463	0.000	TermAppISO Int Routing Regression
2020-12-09	Rate	23318.892	749.322	31.120	0.000	TermAppISO
2020-12-16	Rate	10756.811	769.527	13.978	0.000	TermAppISO Integrator Routing Changes

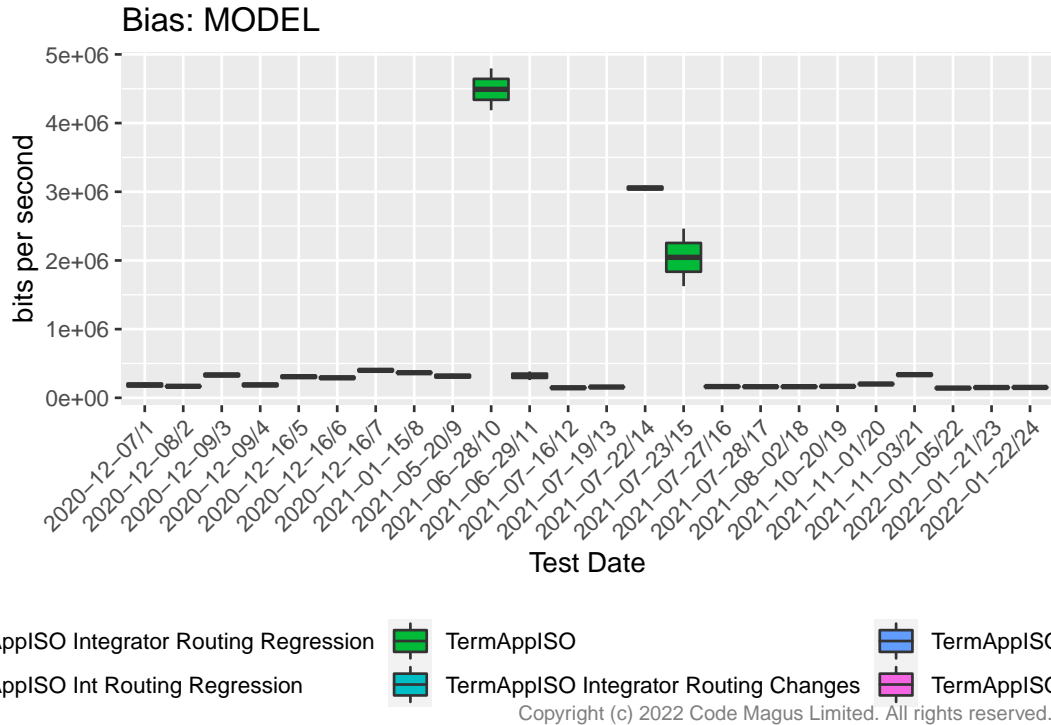
TestDate	Coef	Estimate	Std..Error	t.value	p.value	Test
2020-12-16	Rate	10172.372	701.912	14.492	0.000	TermAppISO with 40 provider threads
2020-12-16	Rate	8940.326	678.158	13.183	0.000	TermAppISO with 80 provider threads
2021-01-15	Rate	24097.187	241.131	99.934	0.000	TermAppISO
2021-05-10	Rate	18230.092	7038.605	2.590	0.018	TermAppISO
2021-05-20	Rate	18196.215	1111.117	16.377	0.000	TermAppISO
2021-06-29	Rate	25419.663	2207.053	11.517	0.000	TermAppISO
2021-07-16	Rate	13989.533	569.403	24.569	0.000	TermAppISO
2021-07-19	Rate	13062.866	297.431	43.919	0.000	TermAppISO
2021-07-27	Rate	12926.270	314.888	41.050	0.000	TermAppISO
2021-07-28	Rate	12952.805	316.605	40.912	0.000	TermAppISO
2021-08-02	Rate	13035.814	323.636	40.279	0.000	TermAppISO
2021-10-20	Rate	13004.281	338.117	38.461	0.000	TermAppISO
2021-11-01	Rate	13323.914	318.529	41.829	0.000	TermAppISO
2021-11-03	Rate	26029.614	603.093	43.160	0.000	TermAppISO
2022-01-05	Rate	14855.837	377.936	39.308	0.000	TermAppISO
2022-01-21	Rate	12984.010	335.359	38.717	0.000	TermAppISO
2022-01-22	Rate	13038.938	285.724	45.635	0.000	TermAppISO



The following table shows the Bias coefficient values over the various tests performed. In this table the units of estimate are: bits per second.

TestDate	Coef	Estimate	Std..Error	t.value	p.value	Test
2020-12-07	Bias	186452.2	19352.666	9.634	0	TermAppISO Integrator Routing Regression
2020-12-08	Bias	167394.2	5260.624	31.820	0	TermAppISO Integrator Routing Regression
2020-12-09	Bias	331861.2	16245.425	20.428	0	TermAppISO Int Routing Regression
2020-12-09	Bias	187742.4	15537.099	12.083	0	TermAppISO
2020-12-16	Bias	307108.4	14052.742	21.854	0	TermAppISO Integrator Routing Changes
2020-12-16	Bias	291049.7	12476.750	23.327	0	TermAppISO with 40 provider threads
2020-12-16	Bias	400012.4	12208.426	32.765	0	TermAppISO with 80 provider threads
2021-01-15	Bias	365642.3	5065.982	72.176	0	TermAppISO
2021-05-20	Bias	314872.1	17898.032	17.593	0	TermAppISO
2021-06-28	Bias	4491325.5	152240.008	29.502	0	TermAppISO

TestDate	Coef	Estimate	Std..Error	t.value	p.value	Test
2021-06-29	Bias	320788.4	31352.822	10.232	0	TermAppISO
2021-07-16	Bias	146356.9	5643.910	25.932	0	TermAppISO
2021-07-19	Bias	157004.9	6086.997	25.793	0	TermAppISO
2021-07-22	Bias	3053866.8	18802.581	162.417	0	TermAppISO
2021-07-23	Bias	2045037.6	209529.611	9.760	0	TermAppISO
2021-07-27	Bias	163493.5	6670.780	24.509	0	TermAppISO
2021-07-28	Bias	161652.7	6733.818	24.006	0	TermAppISO
2021-08-02	Bias	161834.7	6776.274	23.883	0	TermAppISO
2021-10-20	Bias	166418.5	6985.473	23.824	0	TermAppISO
2021-11-01	Bias	201005.7	6754.339	29.759	0	TermAppISO
2021-11-03	Bias	336918.1	12766.558	26.391	0	TermAppISO
2022-01-05	Bias	141478.7	8090.786	17.486	0	TermAppISO
2022-01-21	Bias	149527.6	7066.926	21.159	0	TermAppISO
2022-01-22	Bias	151017.4	5983.815	25.238	0	TermAppISO



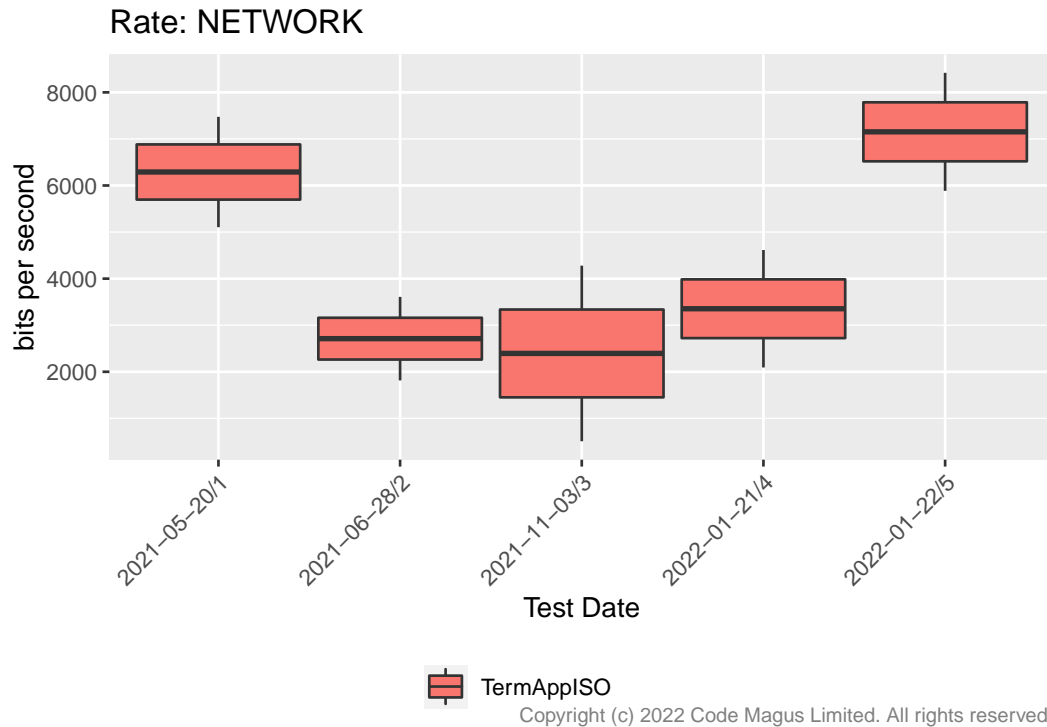
#### 4.7 Network Resource usage for NETWORK by Network Usage recv using recv in bits per second

Server	OSType	Description
NETWORK	Linux	CML EcoSystem

The following table shows the Rate coefficient values over the various tests performed. In this table the units of estimate are: bits per second.

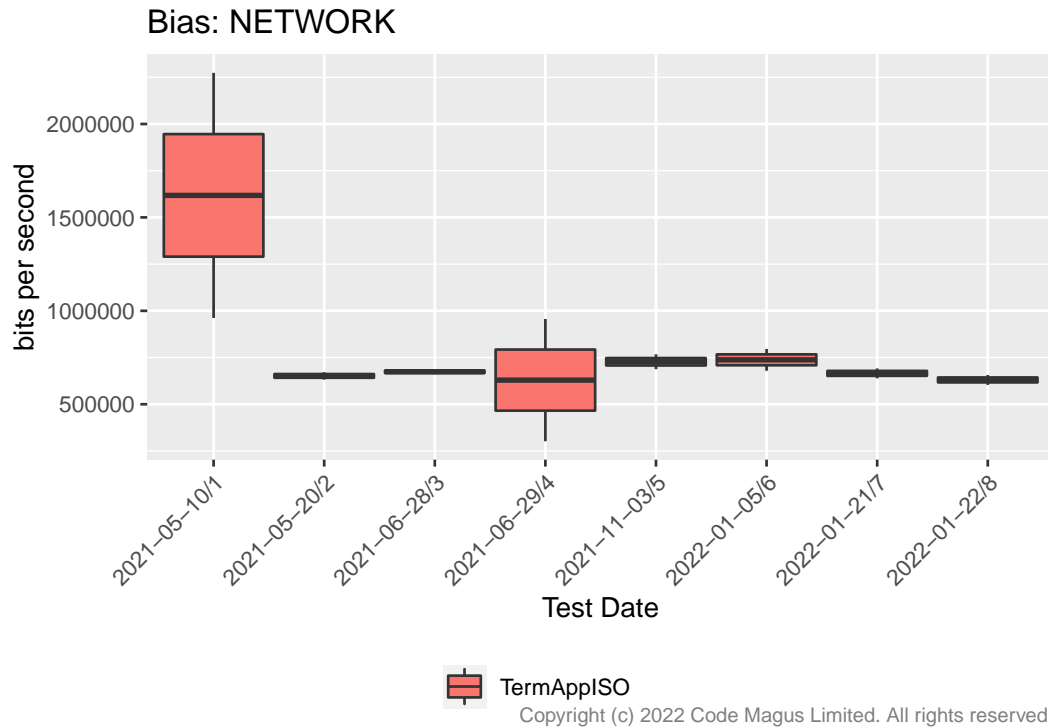
TestDate	Coef	Estimate	Std..Error	t.value	p.value	Test
2021-05-20	Rate	6289.748	592.594	10.614	0.000	TermAppISO
2021-06-28	Rate	2711.282	448.421	6.046	0.000	TermAppISO
2021-11-03	Rate	2393.903	942.795	2.539	0.013	TermAppISO
2022-01-21	Rate	3353.755	630.632	5.318	0.000	TermAppISO
2022-01-22	Rate	7152.579	633.570	11.289	0.000	TermAppISO





The following table shows the Bias coefficient values over the various tests performed. In this table the units of estimate are: bits per second.

TestDate	Coef	Estimate	Std..Error	t.value	p.value	Test
2021-05-10	Bias	1617885.6	328037.628	4.932	0	TermAppISO
2021-05-20	Bias	651687.7	9991.711	65.223	0	TermAppISO
2021-06-28	Bias	674006.3	6877.032	98.008	0	TermAppISO
2021-06-29	Bias	629183.3	163624.078	3.845	0	TermAppISO
2021-11-03	Bias	727386.9	19957.523	36.447	0	TermAppISO
2022-01-05	Bias	737716.5	29233.540	25.235	0	TermAppISO
2022-01-21	Bias	665248.1	13289.133	50.060	0	TermAppISO
2022-01-22	Bias	630081.8	13268.610	47.487	0	TermAppISO

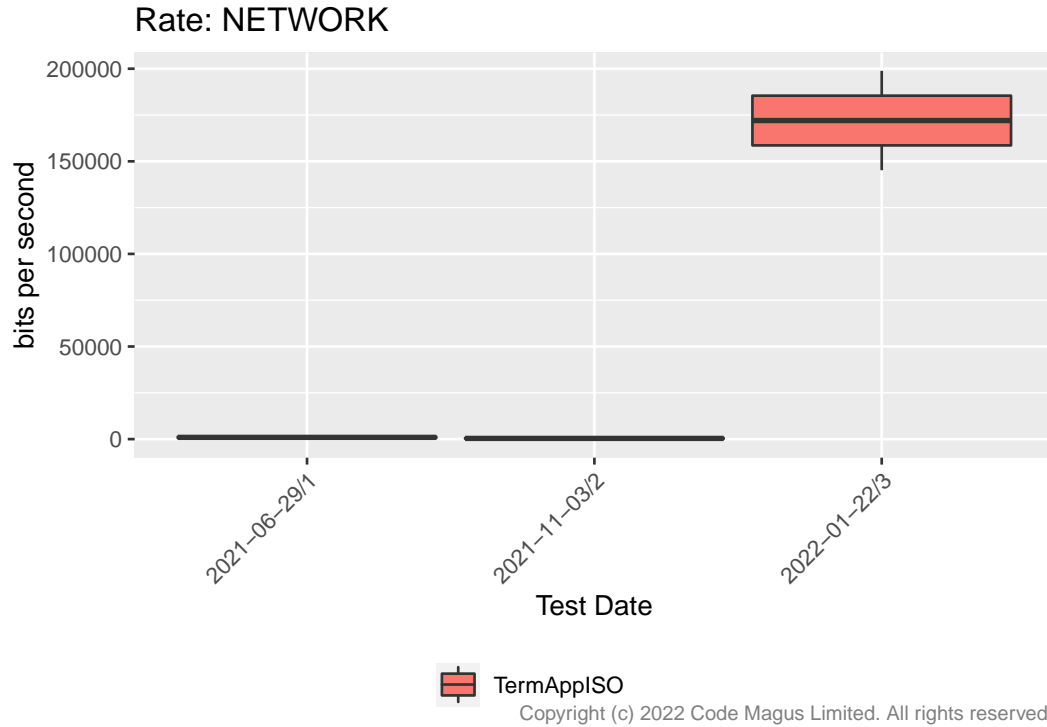


#### 4.8 Network Resource usage for NETWORK by Network Usage sent using sent in bits per second

Server	OSType	Description
NETWORK	Linux	CML EcoSystem

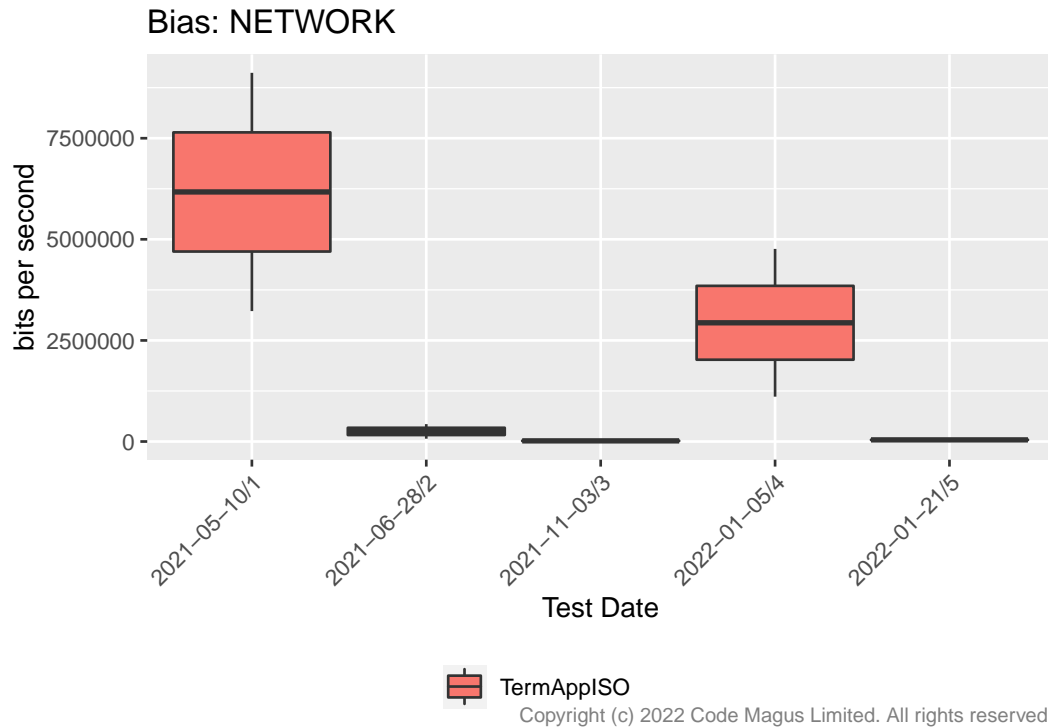
The following table shows the Rate coefficient values over the various tests performed. In this table the units of estimate are: bits per second.

TestDate	Coef	Estimate	Std..Error	t.value	p.value	Test
2021-06-29	Rate	939.561	362.238	2.594	0.013	TermAppISO
2021-11-03	Rate	378.615	225.632	1.678	0.097	TermAppISO
2022-01-22	Rate	172032.924	13421.408	12.818	0.000	TermAppISO



The following table shows the Bias coefficient values over the various tests performed. In this table the units of estimate are: bits per second.

TestDate	Coef	Estimate	Std..Error	t.value	p.value	Test
2021-05-10	Bias	6171231.41	1472966.735	4.190	0.000	TermAppISO
2021-06-28	Bias	250236.83	90104.114	2.777	0.007	TermAppISO
2021-11-03	Bias	16570.32	4776.275	3.469	0.001	TermAppISO
2022-01-05	Bias	2936120.85	913344.957	3.215	0.002	TermAppISO
2022-01-21	Bias	41029.98	3836.469	10.695	0.000	TermAppISO

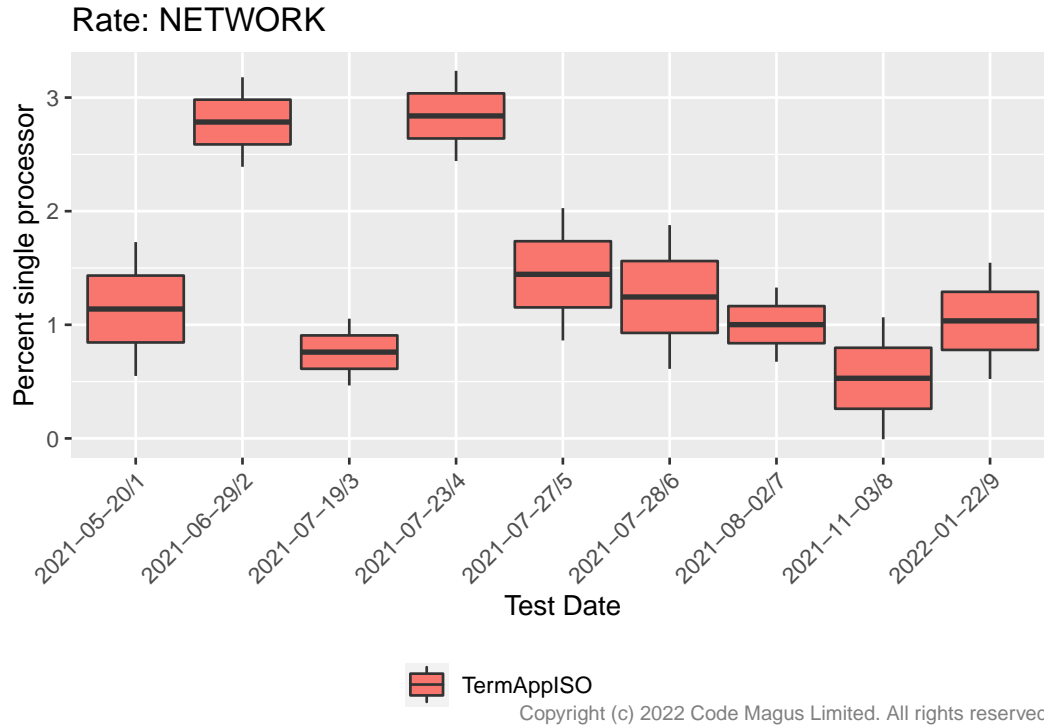


#### 4.9 CPU Resource usage for NETWORK by CPU Usage using `cpu.cpu.system.user` in Percent single processor

Server	OSType	Description
NETWORK	Linux	CML EcoSystem

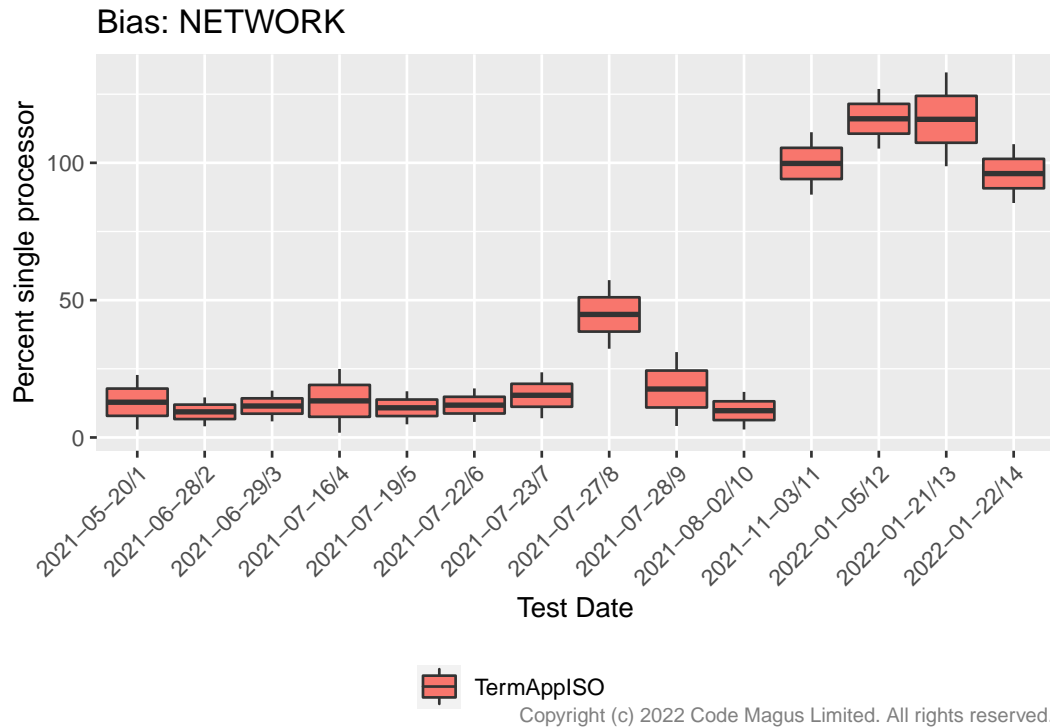
The following table shows the Rate coefficient values over the various tests performed. In this table the units of estimate are: Percent single processor.

TestDate	Coef	Estimate	Std..Error	t.value	p.value	Test
2021-05-20	Rate	1.139	0.294	3.868	0.000	TermAppISO
2021-06-29	Rate	2.785	0.197	14.135	0.000	TermAppISO
2021-07-19	Rate	0.760	0.147	5.171	0.000	TermAppISO
2021-07-23	Rate	2.838	0.198	14.300	0.000	TermAppISO
2021-07-27	Rate	1.444	0.291	4.960	0.000	TermAppISO
2021-07-28	Rate	1.245	0.316	3.936	0.000	TermAppISO
2021-08-02	Rate	1.001	0.163	6.131	0.000	TermAppISO
2021-11-03	Rate	0.529	0.268	1.972	0.052	TermAppISO
2022-01-22	Rate	1.035	0.256	4.045	0.000	TermAppISO



The following table shows the Bias coefficient values over the various tests performed. In this table the units of estimate are: Percent single processor.

TestDate	Coef	Estimate	Std..Error	t.value	p.value	Test
2021-05-20	Bias	12.834	4.965	2.585	0.012	TermAppISO
2021-06-28	Bias	9.329	2.628	3.550	0.001	TermAppISO
2021-06-29	Bias	11.455	2.799	4.093	0.000	TermAppISO
2021-07-16	Bias	13.326	5.802	2.297	0.029	TermAppISO
2021-07-19	Bias	10.806	3.007	3.594	0.001	TermAppISO
2021-07-22	Bias	11.766	3.047	3.862	0.000	TermAppISO
2021-07-23	Bias	15.364	4.179	3.676	0.000	TermAppISO
2021-07-27	Bias	44.797	6.247	7.171	0.000	TermAppISO
2021-07-28	Bias	17.637	6.727	2.622	0.011	TermAppISO
2021-08-02	Bias	9.752	3.419	2.852	0.006	TermAppISO
2021-11-03	Bias	99.776	5.681	17.564	0.000	TermAppISO
2022-01-05	Bias	116.041	5.426	21.387	0.000	TermAppISO
2022-01-21	Bias	115.843	8.540	13.565	0.000	TermAppISO
2022-01-22	Bias	96.086	5.356	17.940	0.000	TermAppISO



## 5 Session details

```

sessionInfo();

## R version 3.6.0 (2019-04-26)
## Platform: x86_64-redhat-linux-gnu (64-bit)
## Running under: CentOS Linux 7 (Core)
##
## Matrix products: default
## BLAS/LAPACK: /usr/lib64/R/lib/libRblas.so
##
## locale:
##  [1] LC_CTYPE=en_US.UTF-8      LC_NUMERIC=C
##  [3] LC_TIME=en_US.UTF-8      LC_COLLATE=en_US.UTF-8
##  [5] LC_MONETARY=en_US.UTF-8  LC_MESSAGES=en_US.UTF-8
##  [7] LC_PAPER=en_US.UTF-8     LC_NAME=C
##  [9] LC_ADDRESS=C              LC_TELEPHONE=C
## [11] LC_MEASUREMENT=en_US.UTF-8 LC_IDENTIFICATION=C
##
## attached base packages:
## [1] grid      stats    graphics grDevices utils    datasets methods
## [8] base
##

```

```
## other attached packages:
## [1] pander_0.6.3      doBy_4.6.7        cmlrutils_1.19   XML_3.98-1.20
## [5] scales_1.1.1      ggplot2_3.3.2    BSDA_1.2.0       lattice_0.20-38
##
## loaded via a namespace (and not attached):
## [1] Rcpp_1.0.7         highr_0.8         pillar_1.4.6     compiler_3.6.0
## [5] class_7.3-15      tools_3.6.0       digest_0.6.25    evaluate_0.14
## [9] lifecycle_0.2.0  tibble_3.0.3     gtable_0.3.0     pkgconfig_2.0.3
## [13] rlang_0.4.7       Matrix_1.2-17    yaml_2.2.1       xfun_0.17
## [17] e1071_1.7-4       withr_2.2.0       stringr_1.4.0    dplyr_1.0.2
## [21] knitr_1.30        generics_0.0.2   vctrs_0.3.2      tidyselect_1.1.0
## [25] glue_1.4.1        R6_2.4.1          rmarkdown_2.6    farver_2.0.3
## [29] tidyr_1.1.2       purrr_0.3.4      cmlbrandr_3.0    magrittr_1.5
## [33] backports_1.1.8  ellipsis_0.3.1   htmltools_0.5.0  MASS_7.3-51.4
## [37] colorspace_1.4-1 Deriv_4.0.1       labeling_0.3      stringi_1.5.3
## [41] munsell_0.5.0     broom_0.7.0      crayon_1.3.4
```