USING APPLICARE › APPLICATIONS

LAMA

Applicare 10.0 · Updated April 9, 2026 · logs · **Pending technical review**

LAMA is an API based performance data gathering and early warning system that is designed to help brokerage firms identify and address potential problems before they cause an outage. It collects data from the broker's trading systems and uses machine learning to identify patterns that could indicate a problem. If LAMA detects a potential problem, it will generate an alert so that the brokerage firm and exchange can take preventive corrective action. It is a cost-effective way to prevent outages and reduce the risk of financial losses.

NSE India has adopted LAMA and LAMA reporting is a requirement for brokerage firms.

The data sent from Applicare to LAMA represents a consolidated summary of all servers within the application, rather than details for individual servers.

You can access individual server data directly through the Applicare console. Applicare computes the average of this data and posts the aggregated result to LAMA.

It is important to note that data posting to LAMA occurs only while the controller is actively running.

Median formulae for all the metrics:

Median Calculation Formula

Let:

- T be the sorted list of throughput values.
- n be the number of values in T.
- $T[i]$ represents the i^{th} element in the sorted list.

The median T_{med} is calculated as:

1. **If n is odd**:

$$T_{med} = T\left(\frac{n+1}{2} - 1\right)$$

(Select the middle element from the sorted list.)

2. **If n is even**:

$$T_{med} = \frac{T\left(\frac{n}{2} - 1\right) + T\left(\frac{n}{2}\right)}{2}$$

(Take the average of the two middle elements.)

Hardware Metrics

1. CPU (%) - Machine CPU usage. Available in Enterprise -> Summary.

CPU Average = (Sum of CPU usage across all configured applications) / (Total number of configured applications).

```yaml
Example:
Configured Applications : Nopcom, Petstore
Nopcom CPU values in last 5 minutes -> 10,24,52,34,12
Petstore CPU values in last 5 minutes -> 1,5,20,7,15
CPU Average = (SUM of configured applications CPU) / (Total no. of configured applications CPU)
CPU Average = (10 + 24 + 52 + 34 + 12 + 1 + 5 + 20 + 7 + 15)/ (10)
CPU Average = 18
```

2. Memory (%) - Machine memory usage. Available in Enterprise -> Summary.

Memory Average = (Sum of memory usage across all configured applications) / (Total number of configured applications)

```yaml
Example:
Configured Applications : Nopcom, Petstore
Nopcom Memory values in last 5 minutes -> 45,32,52,60,47
Petstore Memory values in last 5 minutes -> 51,53,35,20,55
Memory Average = (SUM of configured applications Memory) / (Total no. of configured applications Memory)
Memory Average = (45 + 32 + 52 + 60 + 47 + 51 + 53 + 35 + 20 + 55)/ (10)
Memory Average = 45
```

3. Disk (%) - Machine disk usage. Available in Server Analayzer -> OS.

4. Uptime (in minutes) - Availability of the server in the machine for 5 minutes interval. Available in the Enterprise -> Summary.

Exchange DOC

Metric Data

Field Description	Key Name	Data Type	Frequency	Expected Value
CPU Utilization (in %)	cpu	Object	Every 5 min	Float (between 0-100, upto 2 decimals)
Memory Utilization (in %)	memory	Object	Every 5 min	Float (between 0-100, upto 2 decimals)
Disk Utilization (in %)	disk	Object	Every 5 min	Float (between 0-100, upto 2 decimals)
Uptime (in minutes)	uptime	Object	Every 5 min	Long value

Application Metrics

1. Request per second - Indicates the server's throughput. This metric can be found in Server Analyzer -> App Server.

2. Response Time (milliseconds) - Average Response Time - Reflects the server's average response time. You can find this metric in Server Analyzer -> App Server.

3. Trading Failure API count - Failure count of the trading API's. Available in Key Business Transactions Load Distribution.

4. Client Authentication Failure Auth - Failure count of the client authentication API's. Available in Key Business Transactions Load Distribution.

5. History request per second - Historical throughput of the server.

Available in Server Analyzer -> App Server.

6. Historical Response Time (milliseconds) - Represents the average response time of the server.

Available in Server Analyzer -> App Server.

1. Logic to implement the Historical Throughput (HST_THRGHPT) and Historical Latency (HST_LTNCY)

a. Everyday at 11:30 PM the last 24 hours throughput and latency (min, max, med and avg) values will be calculated and save it in a table. So this table will have every day details.

b. On every start of the day the last 21 days average data for the (min, max, med and avg) values are calculated and send the details to LAMA. By Default all the Saturday's and Sunday's data will be ignored in this 21 days data.

Example:

Day	Historical Throughput				Historical Latency				LAMA Data (21 days data)
	Min	Max	Med	Avg	Min	Max	Med	Avg	
1	100	500	125	326	1000	5000	1245	3567	Average of Day1
2	100	500	125	326	1000	5000	1245	3567	Average of Day 1 to 2
3	100	500	125	326	1000	5000	1245	3567	Average of Day 1 to 3
4	100	500	125	326	1000	5000	1245	3567	Average of Day 1 to 4
5	100	500	125	326	1000	5000	1245	3567	Average of Day 1 to 5
6	100	500	125	326	1000	5000	1245	3567	Average of Day 1 to 6
7	100	500	125	326	1000	5000	1245	3567	Average of Day 1 to 7
8	100	500	125	326	1000	5000	1245	3567	Average of Day 1 to 8
9	100	500	125	326	1000	5000	1245	3567	Average of Day 1 to 9
10	100	500	125	326	1000	5000	1245	3567	Average of Day 1 to 10
11	100	500	125	326	1000	5000	1245	3567	Average of Day 1 to 11
12	100	500	125	326	1000	5000	1245	3567	Average of Day 1 to 12
13	100	500	125	326	1000	5000	1245	3567	Average of Day 1 to 13
14	100	500	125	326	1000	5000	1245	3567	Average of Day 1 to 14
15	100	500	125	326	1000	5000	1245	3567	Average of Day 1 to 15
16	100	500	125	326	1000	5000	1245	3567	Average of Day 1 to 16
17	100	500	125	326	1000	5000	1245	3567	Average of Day 1 to 17
18	100	500	125	326	1000	5000	1245	3567	Average of Day 1 to 18
19	100	500	125	326	1000	5000	1245	3567	Average of Day 1 to 19
20	100	500	125	326	1000	5000	1245	3567	Average of Day 1 to 20

21	100	500	125	326	1000	5000	1245	3567	Average of Day 1 to 21
22	100	500	125	326	1000	5000	1245	3567	Average of Day 2 to 22
23	100	500	125	326	1000	5000	1245	3567	Average of Day 3 to 23
24	100	500	125	326	1000	5000	1245	3567	Average of Day 4 to 24
25	100	500	125	326	1000	5000	1245	3567	Average of Day 5 to 25
26	100	500	125	326	1000	5000	1245	3567	Average of Day 6 to 26
27	100	500	125	326	1000	5000	1245	3567	Average of Day 7 to 27
28	100	500	125	326	1000	5000	1245	3567	Average of Day 8 to 28
29	100	500	125	326	1000	5000	1245	3567	Average of Day 9 to 29
30	100	500	125	326	1000	5000	1245	3567	Average of Day 10 to 30
31	100	500	125	326	1000	5000	1245	3567	Average of Day 11 to 31
32	100	500	125	326	1000	5000	1245	3567	Average of Day 12 to 32
33	100	500	125	326	1000	5000	1245	3567	Average of Day 13 to 33

7. Log Monitoring - Error codes configured in the LAMA of the configured Applications. Available in Errors screen.

Exchange DOC

Metric Data

Field Description	Key Name	Data Type	Frequency	Expected Value
Log Monitoring (log messages for log levels Error, Fatal and Warning)	Log	String (2000)	Every 5 min	Timestamp, Server Name, Source Name, Log ID, Log Level, Description
Request/Second - throughput of E2E system	throughput	Object	Every 5 min	Min, Max, Avg & Median values
Response Time (in microseconds) – round trip time of E2E system	latency	Object	Every 5 min	Min, Max, Avg & Median values
Trading API Failure Count	failureTradeApi	Numeric	Every 5 min	Long value
Client Authentication Failure Count	failureAuthentication	Numeric	Every 5 min	Long value
Historical Requests/Second	historicalThroughput	Object	Start of Day	Min, Max, Avg & Median values
Historical Response Time (in microseconds)	historicalLatency	Object	Start of Day	Min, Max, Avg & Median values

Network Metrics

1. Bandwidth (%) - It is the average of both the input and output bandwidth utilization of the interface in the router.

```yaml
Configured Mbps = 1000 // 1Gbps  Default value

Input rate in bits / sec – (IfInOctects * 0.8) / 60;
Output rate in bits / sec – (IfOutOctects * 0.8) / 60;

Input Utilization:
Input Utilization (%) = ((Input Rates in bits/sec) / (Configured Mbps * 1000000)) * 100;

Output Utilization:
Output Utilization (%) = ((Output Rates in bits/sec) / (Configured Mbps * 1000000)) * 100;

Bandwidth Utilization = (Input Utilization (%) + Output Utilization (%)) / 2;

Example:
Configured Mbps – 300Mbps
Input Utilization (%) = (47575000 / (300 * 1000000)) * 100;
Input Utilization (%) = 15.86

Output Utilization (%) = (157305000 / (300 * 1000000)) * 100;
Output Utilization (%) = 52.44

Bandwidth Utilization = (15.86 + 52.44) / 2
Bandwidth Utilization (%) = 34.15
```

Important:

The above calculation is the average for a minute. Likewise for LAMA it will be the average for 5 minutes.

2. Packet error count - Sum of current Input and output error count of the interface in the router via SNMP.

ifinErrors

ifOutErrors

```text
Packet error count = (ifinErrors+ ifOutErrors)
```

Important:

The above calculation is the average for a minute. Likewise for LAMA it will be the average for 5 minutes.

Exchange DOC

Metric Data

Field Description	Key Name	Frequency	Data Type	Expected Value
Bandwidth Utilization (in %)	bandwidth	Every 5 min	Object	Float (between 0-100, upto 2 decimals)
Network Latency (in microseconds)	latency	Every 5 min	Object	Long value
Packet Error Count	packetCount	Every 5 min	Numeric	Long value
DNS Lookup Failure Count	lookupCount	Every 5 min	Numeric	Long value

Important:

The Exchanges have decided to deprecate the below-listed parameters. **Network Latency DNS Lookup Count**

Database Metrics

ORACLE DB

1. Replication status - Refers to the availability of the replication process, not the availability of the database itself.

```
TEXT
select process from v$managed_standby where process='<PROCESS_NAME>' fetch first 1 row only
```

Example:

PROCESS_NAME - **MRP0**

Here **MRP0** is the process which is doing the replication. If the process is active, the replication status will be "Up." If the process is not running, the status will be "Down."

2. Replication Queue size - Pending log sync count in the replication.

```
TEXT
SELECT MAX(A.SEQUENCE#) FROM V$ARCHIVED_LOG A,v$archive_dest_status b where (a.dest_id='1' or a.applied ='YES') and a.dest_id=b.dest_id group by b.destination,b.ERROR, a.dest_id, thread# order by a.thread#
```

Here it will give the list of SEQUENCE#. The SEQUENCE# will be sorted in the descending order and the difference of the first two values will be calculated as a queue size.

Example:

```
TEXT
Intital Result
86773
86632
86775

Result after sorting
86775
86773
86632

Queue Size = Value1 – Value2
Queue Size = 86775 – 86773
Queue Size = 2
```

3. Replication Bandwidth (%) - Bandwidth Utilization of the Database.

```
TEXT
select AVG(round((blocks*block_size/1024/1024)/((next_time-first_time)*86400),2)) as
bytesinMbps from v$archived_log where ((next_time-first_time)*86400<>0) and first_time
between to_date('FROM_DATE','YYYY/MM/DD HH24:MI:SS') and to_date('TO_DATE','YYYY/MM/DD
HH24:MI:SS') and dest_id=1
```

FROM_DATE and **TO_DATE** for every 1 minute interval.

Example:

FROM_DATE - 2024/05/02 16:13:00

TO_DATE - 2024/05/02 16:14:00

Important:

The calculation provided reflects a one-minute average. For LAMA, the average is computed over a five-minute period.

4. Replication Latency (milliseconds) - Time delay occurred on the data transfer.

```
TEXT
SELECT VALUE FROM V$DATAGUARD_STATS WHERE UPPER(NAME)='APPLY LAG'
```

MySQL DB

1. Replication status - Refers to the availability of the replication process, not the availability of the database itself.

For MySQL < 8.0.22

```
TEXT
SHOW SLAVE STATUS;
```

For MySQL ≥ 8.0.22

```
TEXT
SHOW REPLICA STATUS;
```

Logic

MySQL < 8.0.22

- **DB Status is UP** when:
  - Slave_IO_Running = `Yes`
  - Slave_SQL_Running = `Yes`
- **DB Status is DOWN** when:
  - Either of the above is not `Yes`

MySQL ≥ 8.0.22

- **DB Status is UP** when:
  - Replica_IO_Running = `Yes`
  - Replica_SQL_Running = `Yes`
- **DB Status is DOWN** when:
  - Either of the above is not `Yes`

2. Replication Queue size - Pending log sync count in the replication.

Logic

```
TEXT
MySQL < 8.0.22
Queue Size = Read_Master_Log_Pos – Exec_Master_Log_Pos

MySQL ≥ 8.0.22
Queue Size = Read_Source_Log_Pos – Exec_Source_Log_Pos
```

3. Replication Bandwidth (%) - Bandwidth Utilization of the Database.

```
TEXT
SHOW GLOBAL STATUS WHERE Variable_name IN ('Bytes_received', 'Bytes_sent');
```

Logic

Step 1: Delta Calculation

```
TEXT
Delta Bytes = Current Value – Previous Value
```

Step 2: Convert to Bits/sec

```
TEXT
Bandwidth (bps) = (Delta Bytes / Time Interval) * 8
```

Step 3: Utilization % for 1 Gbps

```
TEXT
Utilization (%) = (Bandwidth / 1000000000) * 100
```

4. Replication Latency (microseconds) - Time delay occurred on the data transfer.

Logic

```
TEXT
MySQL < 8.0.22
Latency = Seconds_Behind_Master * 1000000

MySQL ≥ 8.0.22
Latency = Seconds_Behind_Source * 1000000
```

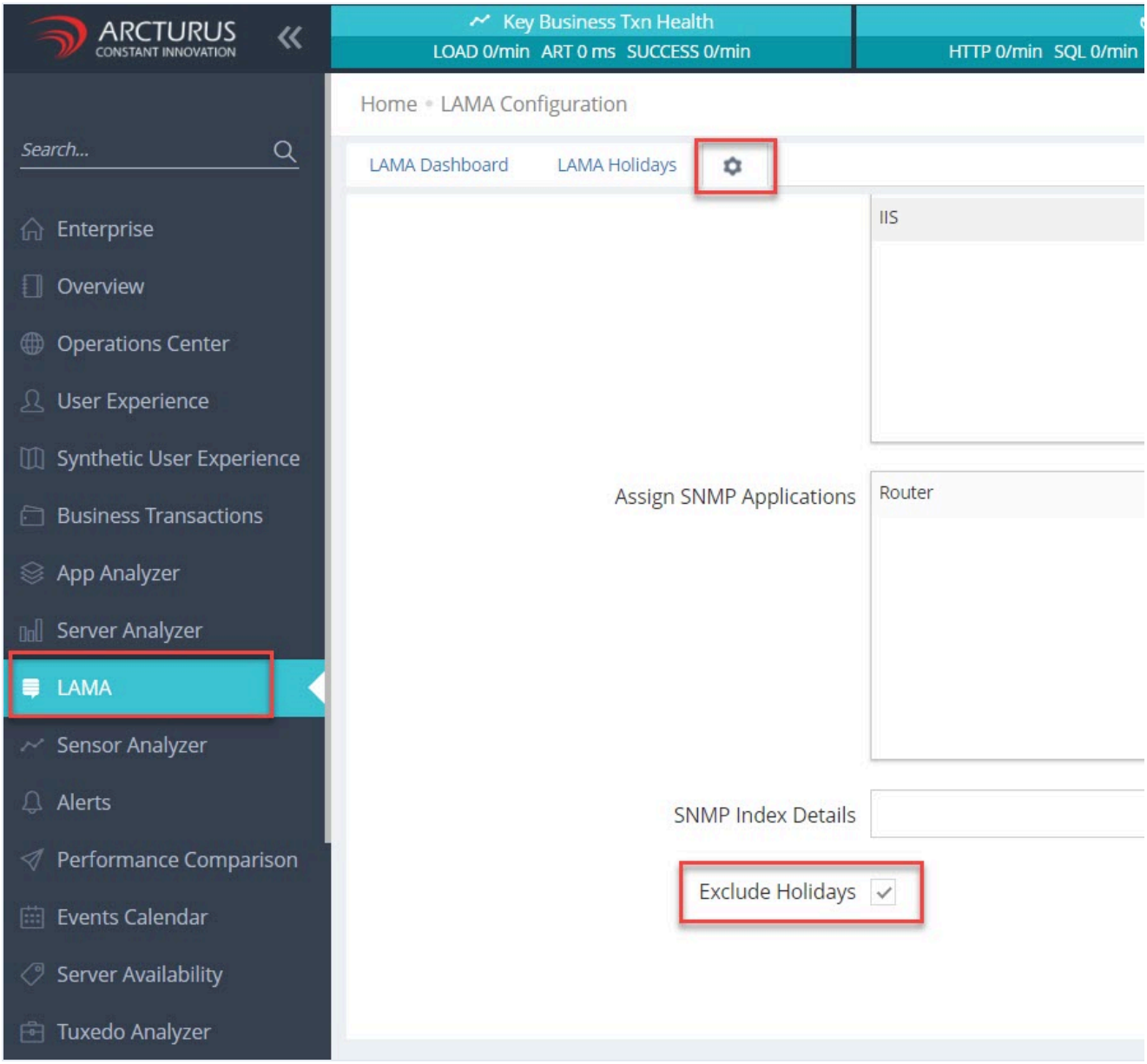
Exchange DOC

Metric Data

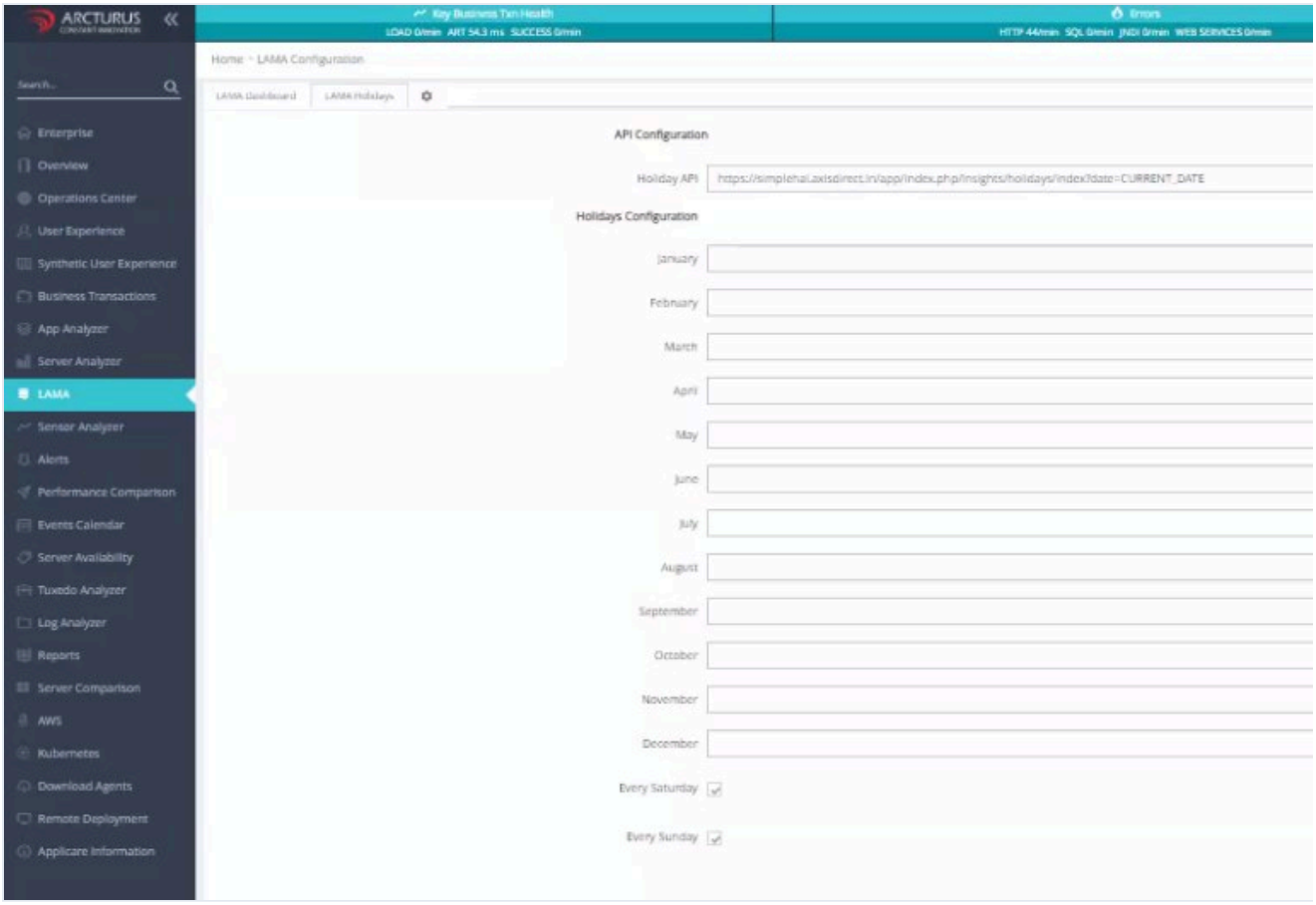
Field Description	Key Name	Frequency	Data Type	Expected Value
Replication Status (1=Up, 0= Down)	status	Every 5 min	Short	1
Replication Queue Size	qSize	Every 5 min	Object	Long value
Replication Bandwidth Utilization (in %)	bandwidth	Every 5 min	Object	Float (between 0-100, upto 2 decimals)
Replication Latency (in microseconds)	latency	Every 5 min	Object	Long value

LAMA Holiday Configuration

If the Exclude Holidays check box is checked in the **LAMA configuration** then both the data collection and data post will be skipped for LAMA based on the LAMA Holiday Configuration.



LAMA Holidays



Holiday API

The holiday will be checked in two conditions.

1. Holiday API is added in the LAMA Holidays screen

Every day after 12:00 AM the api will be triggered once and check whether that day is holiday or not. If yes then both the data collection and data post will be skipped on that day. Otherwise the data collection and data post will happen on that day.

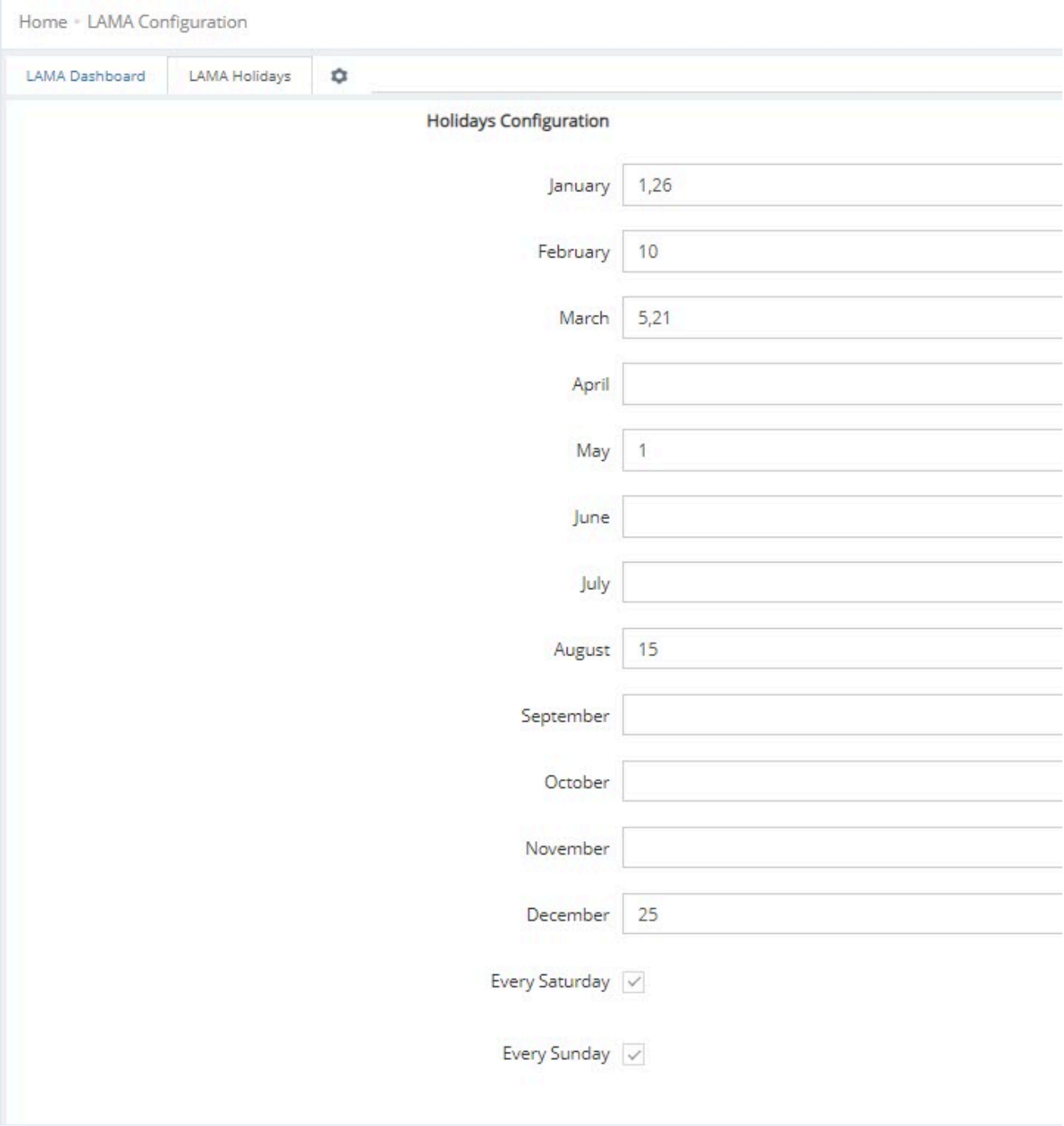


Note:

It is not mandatory to update the holidays in the LAMA Holidays screen. Because controller will automatically update the holiday details from that API. The holiday details will be updated only for that current day.

2. Holiday API is not added in the LAMA Holidays screen

The holiday condition will be fully evaluated based on the days configured in the LAMA Holidays screen.

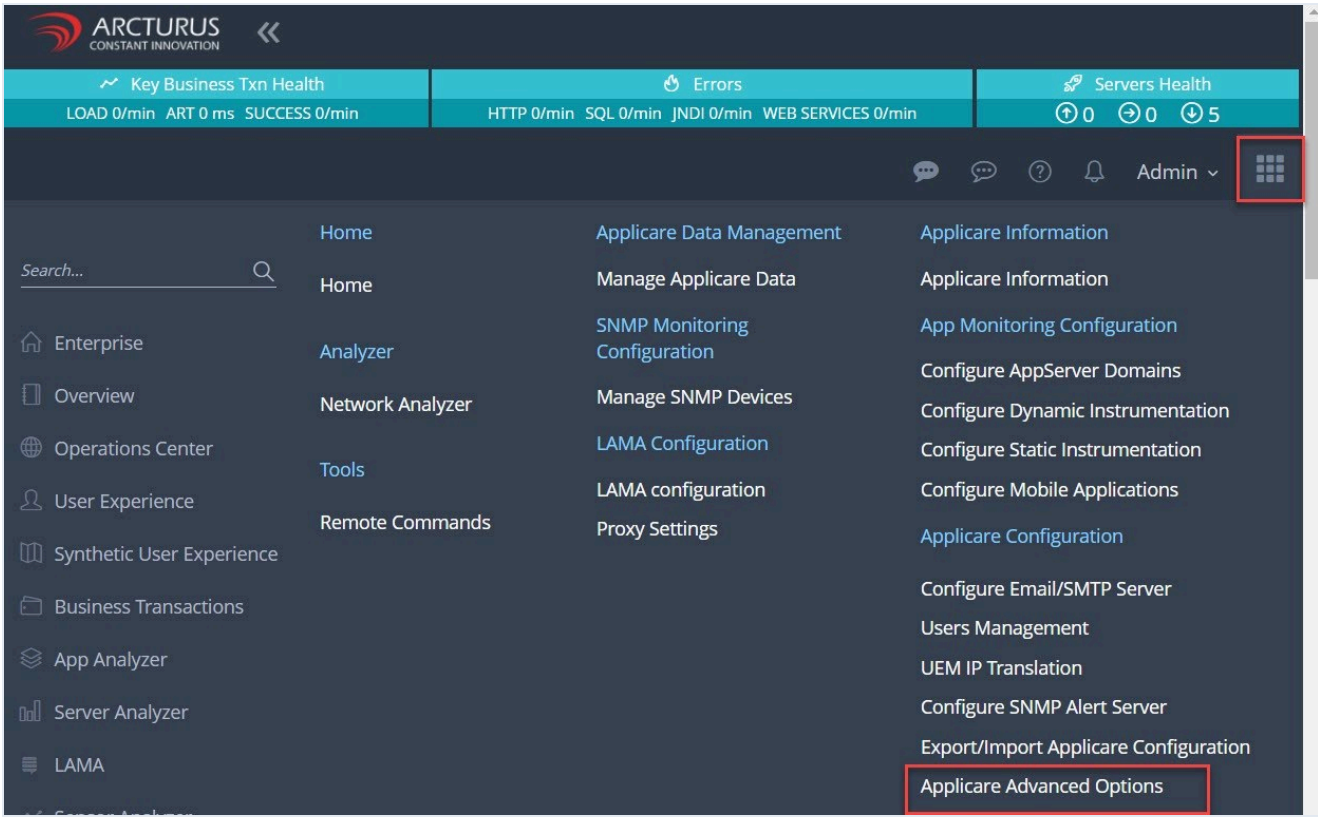


LAMA Logs

By default only **error logs** and the **API check log** for LAMA will be printed in the **ApplicareAdmin.log** file. The log file will be flushed once it reaches 10 MB.

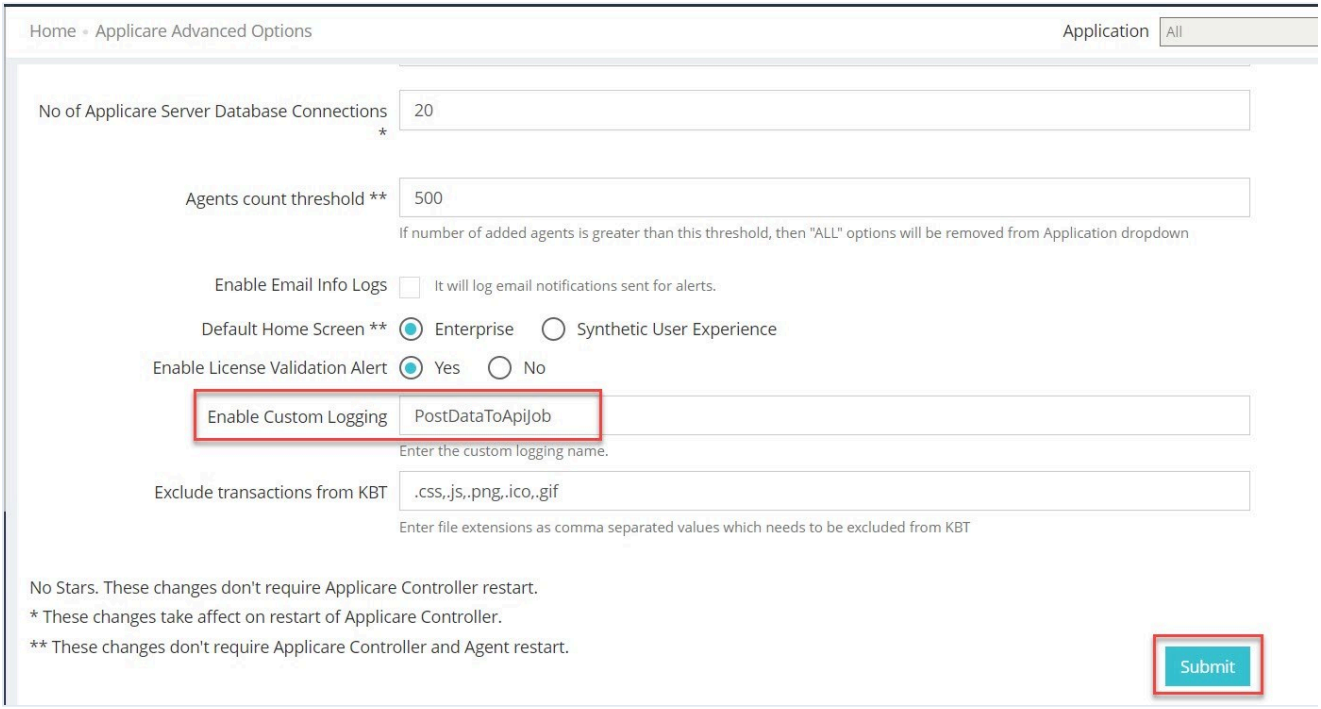
Steps to enable the success log for LAMA.

1. Go to **Applicare Advanced Options** menu.



2. Enter the value **PostDataToApiJob** in the **Enable Custom Logging** field.

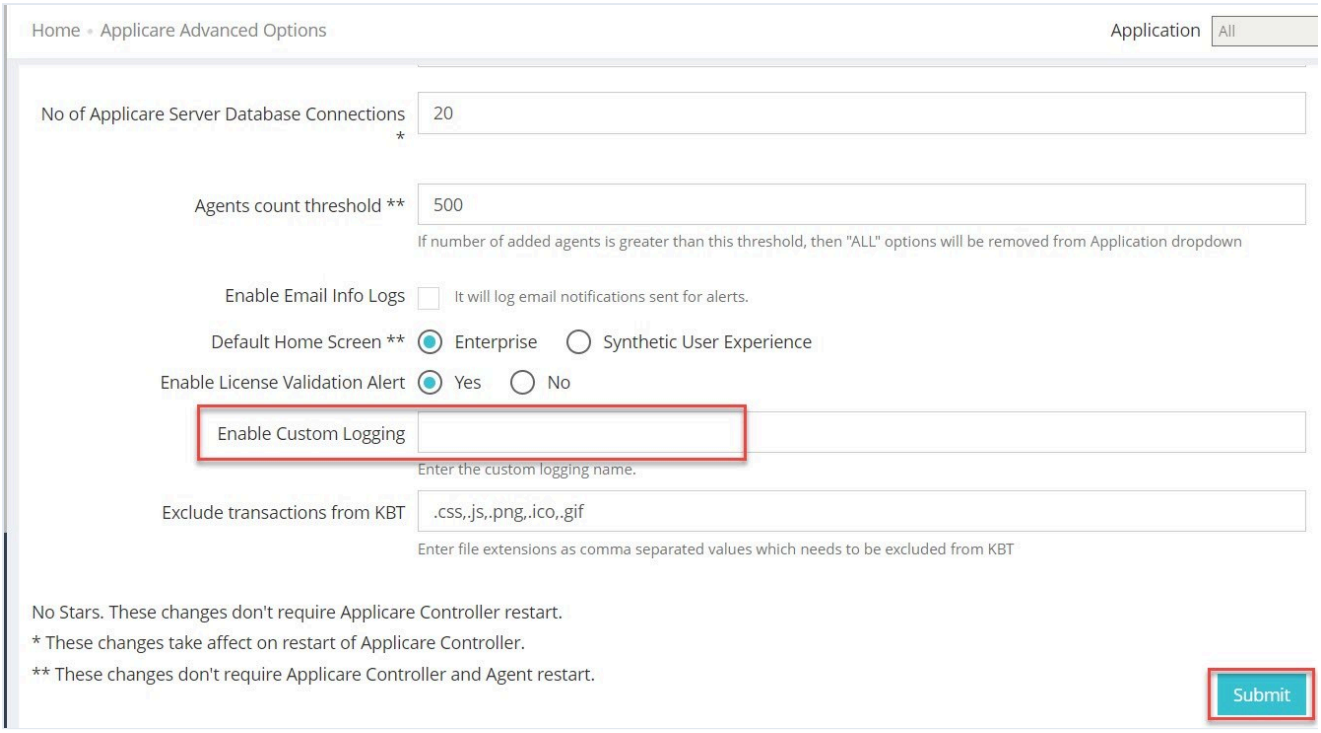
3. Click the **Submit** button to apply and save your changes.



Steps to disable the success log for LAMA.

1. Remove the **PostDataToApiJob** value from the **Enable Custom Logging** field.

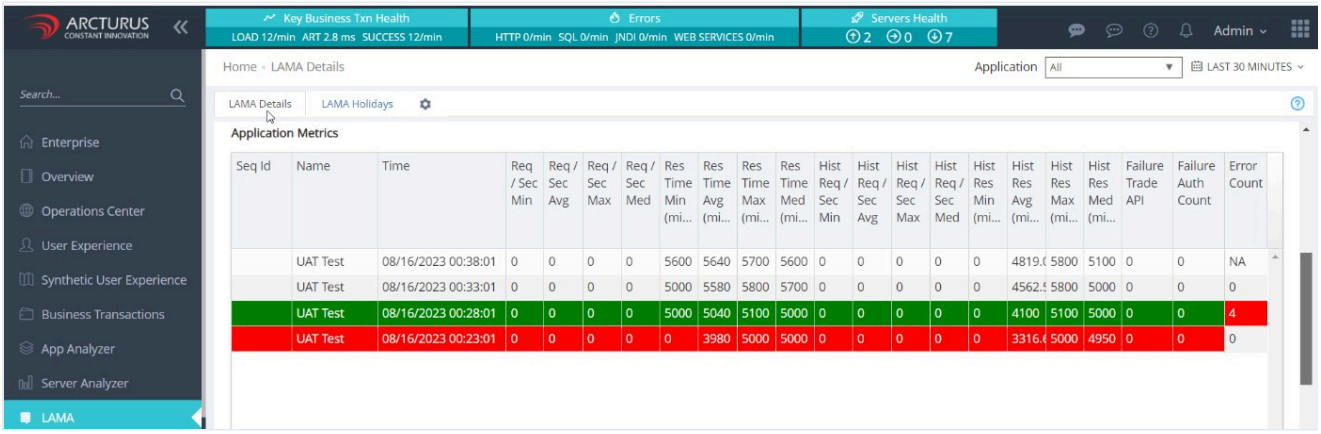
2. Click the **Submit** button to save the changes.



Important:

Controller restart is not required.

LAMA Details



Seq Id	Name	Time	Req / Sec Min	Req / Sec Avg	Req / Sec Max	Req / Sec Med	Res Time Min (mi...	Res Time Avg (mi...	Res Time Max (mi...	Res Time Med (mi...	Hist Req / Sec Min	Hist Req / Sec Avg	Hist Req / Sec Max	Hist Req / Sec Med	Hist Res Min (mi...	Hist Res Avg (mi...	Hist Res Max (mi...	Hist Res Med (mi...	Failure Trade API	Failure Auth Count	Error Count
	UAT Test	08/16/2023 00:38:01	0	0	0	0	5600	5640	5700	5600	0	0	0	0	0	4819.(	5800	5100	0	0	NA
	UAT Test	08/16/2023 00:33:01	0	0	0	0	5000	5580	5800	5700	0	0	0	0	0	4562.5	5800	5000	0	0	0
	UAT Test	08/16/2023 00:28:01	0	0	0	0	5000	5040	5100	5000	0	0	0	0	0	4100	5100	5000	0	0	4
	UAT Test	08/16/2023 00:23:01	0	0	0	0	0	3980	5000	5000	0	0	0	0	0	3316.(	5000	4950	0	0	0

Red color row - Data posting does not occur at regular intervals.

Green color row - Data posting begins occurring at regular intervals.

Error Count Column

1. **Red color** - If there was any errors posted to LAMA this column will be displayed in red color with the total error count. **Click that column to view the error details posted to LAMA**.
2. **No color** with **0** value - No errors have been posted to LAMA.
3. **No color** with **NA** value - No errors have been posted to LAMA.

Updated Metrics Details from the Exchange.

	A	B	C	D	E
1	Metric Type	Metric Key	Value Type	Metric Key Description	Expected Value
2	Application Sequence Mertric(ASM)	throughput(THRGHPT)	Request/Second - throughput of E2E system	It defines the number of requests passing through the application/system per second	Count
3		latency(LTNCY)	Response Time (in Milliseconds) – round trip time of E2E system	It defines the time taken for user to submit the request and receive the response of the request (New-Ack Latency)	Milliseconds
4		failureTradeApi(FLD_TRDAPI)	Trading API Failure Count	It refers to the number of failures while executing Trading API.	Count
5		failureAuthentication(FLD_ATH)	Client Authentication Failure Count	It refers to the number of authentication failures.	Count
6		historicalThroughput(HST_THRGHPT)	Historical Requests/Second	21 days summary of Throughput	Count
7		historicalLatency(HST_LTNCY)	Historical Response Time (in Milliseconds)	21 days summary of Response Time	Milliseconds
8	Hardware Sequence Metric(HSM)	cpu(CPU)	CPU Utilization (in %)	the percentage of available time spent is executing the tasks.	Percentage
9		memory(MEM)	Memory Utilization (in %)	the percent of available memory in use at a given moment.	Percentage
10		disk(DSK)	Disk Utilization (in %)	the percentage of available disk space in use at a given moment.	Percentage
11		uptime(UPTM)	Uptime (in minutes)	the time period for which the system has been active and running	Minutes
12	Database Sequence Metric(DSM)	status(status) (Threshold Not required, we only persist data)	Replication Status (1=Up, 0= Down)	Replication status determines the current state of an object being replicated. The replication status of a source object will return either 1=Up or 0=Down	Integer
13		qSize(QSIZE)	Replication Queue Size	It is the number of units/requests/packets waiting in a queue or present in a system.	Count
14		bandwidth(BNDWTH)	Replication Bandwidth Utilization (in %)	It refers to the amount of information that can be sent over a network connection at one time.	Percentage
15		latency(LTNCY)	Replication Latency (in Milliseconds)	Replication latency is the amount of time it takes for a transaction that occurs in the primary database to be applied to the replicate database.	Milliseconds
16	Network Sequence Metric(NSM)	bandwidth(BNDWTH)	Bandwidth Utilization (in %)	Bandwidth utilization refers to a computer network's capacity to transfer data between devices or over the internet in a specific amount of time.	Percentage
17		packetCount(PCKT_CT)	Packet Error Count	It defines the number of packets received with errors.	Count

Monitoring with Applicare