# TPC Express Benchmark™ IoT
# Full Disclosure Report

# **Machbase 5.7.3**

running on

# KTNF KR580S1 Servers

with

# CentOS Linux 7.6.1810

# Abstract

TTA conducted the TPC Express Benchmark™ IoT (TPCx-IoT) on the KTNF KR580S1. The software used included Machbase 5.7.3. This report provides full disclosure of the methodology and results. All testing was conducted in conformance with the requirements of the TPCx-IoT Standard Specification, Revision 2.0.0.

The benchmark results are summarized below.

## Configuration Summary

| Sponsor | Cluster Nodes | Storage Software | Operating System |
|---------|---------------|------------------|------------------|
| TTA | 1x KR580S1 (Master)<br>2x KR580S1 (Data) | Machbase 5.7.3 | CentOS Linux 7.6.1810 |

## TPC Express Benchmark™ IoT Metrics

| Total System Cost (USD) | IoTps | USD/kIoTps | Availability Date |
|-------------------------|-------|------------|-------------------|
| $344,548 | 1,043,276.60 | $330.26 | Currently Available |

# Executive Summary

The Executive Summary follows on the next several pages.

TPCx-IoT 2.0.0
Full Disclosure Report

TTA
Machbase 5.7.3

Report Date
April 2, 2021

| **TTA** | **Machbase 5.7.3** | TPCx-IoT | 2.0.0 |
| | | TPC Pricing | 2.4.0 |
| | | Report Date | April. 02, 2021 |

| Total System Cost | TPCx-IoT Performance Metric | Price/Performance |
|---|---|---|
| **$344,548 USD** | **1,043,276.60 IoTps** | **$330.26 USD/kIoTps** |

| Servers | Operating System | Other Software | Availability Date |
|---|---|---|---|
| KTNF KR580S1 | CentOS Linux 7.6.1810 | None | Currently Available |

### System Under Test Configuration Overview



**25/100Gb Ethernet Switch**

**Master Node**

**1 x KTNF KR580S1**
- 2 x Intel Xeon Gold 6140 2.30GHz
- 12 x 64GB (768GB) Memory
- 2 x 600GB SAS HDD
- 1 x 25Gb 2-Port Ethernet Adaptor

**Data Node**

**2 x KTNF KR580S1**
- 2 x Intel Xeon Gold 6140 2.30GHz
- 4 x 64GB (256GB) Memory
- 2 x 600GB SAS HDD
- 2 x 1.6TB NVMe SSD
- 1 x 25Gb 2-Port Ethernet Adaptor
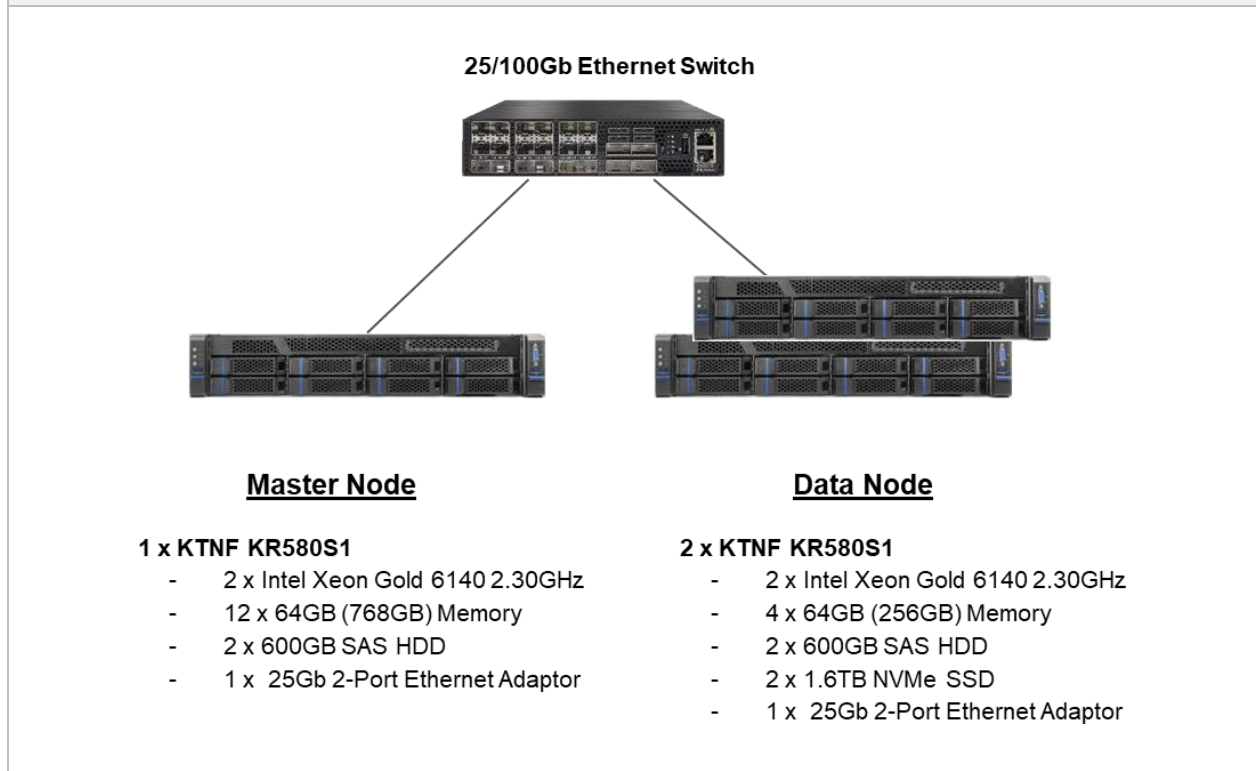
| Total Servers: | 3x KR580S1 | |
|---|---|---|
| Total Processors/Cores/Threads: | 6/108/216 | |

| Server Configuration: | 1x KR580S1 (Master): | 2x KR580S1 (Data): |
|---|---|---|
| Processor | 2x Intel® Xeon® Gold 6140 (2.30GHz, 18-core, 24.75 MB L3) | 2x Intel® Xeon® Gold 6140 (2.30GHz, 18-core, 24.75 MB L3) |
| Memory | 768 GiB | 256 GiB |
| Storage Controller | Broadcom MEGARAID SAS 9361-8i | Broadcom MEGARAID SAS 9361-8i |
| Storage Device | 2x 600 GB 10.5K RPM SAS HDD | 2x 600 GB 10.5K RPM SAS HDD 2x 1.6 TB NVMe SSD |
| Network Controller | Mellanox MCX4121A-ACAT 25G | Mellanox MCX4121A-ACAT 25G |
| Connectivity | Mellanox MSN2010-CB2F 10/25GbE and 100GbE Switch | |
| Total Rack Units: | (3x KTNF KR580S1) + (1x MSN201-CB2F) = (3x2) + (1x1) = 7 RU | |

TPCx-IoT 2.0.0
Full Disclosure Report

TTA
Machbase 5.7.3

Report Date
April 2, 2021

| | | TPCx-IoT | 2.0.0 |
|---|---|---|---|
| **TTA** | **Machbase 5.7.3** | TPC Pricing | 2.4.0 |
| | | Report Date | April. 02, 2021 |

| Description | Part Number | Source | List Price | Qty | Extended Price | 3-year Maint. Price |
|---|---|---|---|---|---|---|
| **Server Hardware** | | | | | | |
| **1 x Master Node – KTNF KR580S1** | KR580S1 | 1 | $ 31,610.00 | 1 | $ 31,610.00 | |
| KR580S1 Barebone | - | 1 | (included) | 1 | | |
| Intel Xeon Scalable Gold 6140 Processor | - | 1 | (included) | 2 | | |
| 64GB DDR4 2400 ECC RDIMM Memory | - | 1 | (included) | 12 | | |
| 600GB SAS HDD 10,500RPM | - | 1 | (included) | 2 | | |
| Broadcom MEGARAID SAS 9361-8i RAID Card (1GB Cache) | - | 1 | (included) | 1 | | |
| Mellanox MCX4121A-ACAT 25G Ethernet Adaptor | - | 1 | (included) | 1 | | |
| KTNF 27" Monitor | - | 1 | (included) | 1 | | |
| Trackball Mini Keyboard | - | 1 | (included) | 1 | | |
| Maintenance - 7x24x4 Care Pack (3-yrs) | - | 1 | (included) | 1 | | |
| **2 x Data Node – KTNF KR580S1** | KR580S1 | 1 | $ 23,830.00 | 2 | $ 47,660.00 | |
| KR580S1 Barebone | - | 1 | (included) | 1 | | |
| Intel Xeon Scalable Gold 6140 Processor | - | 1 | (included) | 2 | | |
| 64GB DDR4 2400 ECC RDIMM Memory | - | 1 | (included) | 4 | | |
| 600GB SAS HDD 10,500RPM | - | 1 | (included) | 2 | | |
| Broadcom MEGARAID SAS 9361-8i RAID Card (1GB Cache) | - | 1 | (included) | 1 | | |
| Intel P4610 1.6TB NVMe SSD | - | 1 | (included) | 2 | | |
| Mellanox MCX4121A-ACAT 25G Ethernet Adaptor | - | 1 | (included) | 1 | | |
| KTNF 27" Monitor | - | 1 | (included) | 1 | | |
| Trackball Mini Keyboard | - | 1 | (included) | 1 | | |
| Maintenance - 7x24x4 Care Pack (3-yrs) | - | 1 | (included) | 1 | | |
| **Server Hardware Sub Total** | | | | | **$ 79,270.00** | |
| | | | | | | |
| **Network** | | | | | | |
| **Mellanox MSN2010-CB2F 10/25GbE and 100GbE Switch** | MSN2010-CB2F | 2 | $ 9,567.00 | 1 | $ 9,567.00 | |
| Mellanox MCP2M00-A003E30L Passive Copper Cable ETH up to 25Gb/s SFP28 3m Black 30AWG CA-L | MCP2M00-A003E30L | 2 | $ 64.00 | 3 | $ 192.00 | |
| Mellanox SUP-SN2000-3S-4H Technical Support and Warranty - Silver 3 Year with 4 Hours On-Site Support for SN2000 Series Switch | SUP-SN2000-3S-4H | 2 | $ 2,475.00 | 1 | | $ 2,475.00 |
| **Network Sub Total** | | | | | **$ 9,759.00** | **$ 2,475.00** |
| | | | | | | |
| **Software** | | | | | | |
| rockPLACE CentOS Support Carepack - 3 Year 24x7, 4hr response | RSC-LSF3 | 3 | $ 1,538.00 | 3 | | $ 4,614.00 |
| Machbase v5.7.3 Cluster Edition (includes 1y 7x24x4 Technical Support) | - | 4 | $ 63,700.00 | 3 | $ 191,100.00 | |
| Machbase v5.7.3 Cluster Edition 7x24x4 Technical Support | - | 4 | $ 28,665.00 | 2 | | $ 57,330.00 |
| **Software Sub Total** | | | | | **$ 191,100.00** | **$ 61,944.00** |
| | | | | | | |
| **Total** | | | | | **$ 280,129.00** | **$ 64,419.00** |

| | |
|---|---|
| Pricing: 1 = KTNF Co. Ltd.; 2 = Mellanox Technologies, Ltd.; 3 = Rockplace Inc.; 4 = Machbase Inc. | **Three-Year Cost of Ownership:** **$344,548** |
| * Discount applies to all line items where Source = 4. | **IoTps:** **1,043,276.60** |
| **Audited by Doug Johnson, InfoSizing** | **USD/kIoTps:** **$330.26 USD** |

*Prices used in TPC benchmarks reflect the actual prices a customer would pay for a one-time purchase of the stated Line Items. Individually negotiated discounts are not permitted. Special prices based on assumptions about past or future purchases are not permitted. All discounts reflect standard pricing policies for the listed Line Items. For complete details, see the pricing section of the TPC Benchmark Standard. If you find that the stated prices are not available according to these terms, please inform the TPC at pricing@tpc.org. Thank you.*

| TTA | **Machbase 5.7.3** | TPCx-IoT | 2.0.0 |
| --- | --- | --- | --- |
| | | TPC Pricing | 2.4.0 |
| | | Report Date | April. 02, 2021 |

## Numerical Quantities

Scale Factor                                  2100000000

### Performance Run (Run2)

| | |
| --- | --- |
| Warmup Run Start Time | 2019-10-21 11:19:50.000 |
| Warmup Run End Time | 2019-10-21 11:54:10.000 |
| Warmup Run Elapsed Time | 2,059.186 |
| | |
| Measured Run Start Time | 2019-10-21 11:54:11.000 |
| Measured Run End Time | 2019-10-21 12:27:45.000 |
| Measured Run Elapsed Time | 2,012.889 |
| | |
| Performance Metric (IoTps) | **1,043,276.60** |

### Repeatability Run (Run1)

| | |
| --- | --- |
| Warmup Run Start Time | 2019-10-21 10:11:50.000 |
| Warmup Run End Time | 2019-10-21 10:45:29.000 |
| Warmup Run Elapsed Time | 2,017.764 |
| | |
| Measured Run Start Time | 2019-10-21 10:45:29.000 |
| Measured Run End Time | 2019-10-21 11:18:32.000 |
| Measured Run Elapsed Time | 1,982.044 |
| | |
| Performance Metric (IoTps) | 1,059,512.30 |

| TTA | **Machbase 5.7.3** | TPCx-IoT | 2.0.0 |
| --- | --- | --- | --- |
| | | TPC Pricing | 2.4.0 |
| | | Report Date | April. 02, 2021 |

## Performance Run Report (Run2)

```
===============================================
TPCx-IoT Performance Metric (IoTps) Report
Test Run2 details :     Total Time For Warmup Run In Seconds = 2,059.186
Test Run2 details :     Total Time In Seconds = 2,012.889
                        Total Number of Records = 2100000000

TPCx-IoT Performance Metric (IoTps): 1043276.6039


===============================================
```

## Repeatability Run Report (Run1)

```
===============================================
TPCx-IoT Performance Metric (IoTps) Report
Test Run1 details :     Total Time For Warmup Run In Seconds = 2,017.764
Test Run1 details :     Total Time In Seconds = 1,982.044
                        Total Number of Records = 2100000000

TPCx-IoT Performance Metric (IoTps): 1059512.3014


===============================================
```

Summary details of the run reports are show above. For the complete run reports, see the Supporting Files Archive.

| | | |
|---|---|---|
| **TTA** | **Machbase 5.7.3** | TPCx-IoT 2.0.0 |
| | | TPC Pricing 2.4.0 |
| | | Report Date April. 02, 2021 |

## Revision History

| Date | Edition | Description |
|---|---|---|
| November 4, 2019 | First | Initial Publication |
| April 2, 2021 | Second | Update Price Performance Metric |

TPCx-IoT 2.0.0
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# Table of Contents

# Clause 0  Preamble

## 0.1    TPC Express Benchmark™ IoT Overview

TPC Express Benchmark™ IoT (TPCx-IoT) was developed to provide an objective measure of hardware, operating system and commercial NoSQL database software distributions, and to provide the industry with verifiable performance, price-performance and availability metrics. The benchmark models a continuous system availability of 24 hours a day, 7 days a week.

Even though the modeled application is simple, the results are highly relevant to hardware and software dealing with IoT gateway systems in general. TPCx-IoT stresses both hardware and software including database APIs and network connections to the database. This workload can be used to assess a broad range of NoSQL databases. TPCx-IoT can be used to assess a range of NoSQL implementations in a technically rigorous and directly comparable and vendor-neutral manner. The metric effectively represents the total number of records that can be inserted into a NoSQL database per second while running queries against the database.

The TPCx-IoT kit is available from the TPC (See www.tpc.org/tpcx-iot for more information). Users must sign up and agree to the TPCx-IoT User Licensing Agreement (ULA) to download the kit. Re-distribution of the kit is prohibited. All related work (such as collaterals, papers, derivatives) must acknowledge the TPC and include TPCx-IoT copyright. The TPCx-IoT Kit includes: the TPCx-IoT Specification document, the TPCx-IoT Users Guide document, shell scripts to set up the benchmark environment and Java code to execute the benchmark load.

The purpose of TPC benchmarks is to provide relevant, objective performance data to industry users. To achieve that purpose, TPC benchmark specifications require that benchmark tests be implemented with systems, products, technologies and pricing that:

- Are generally available to users;
- Are relevant to the market segment that the individual TPC benchmark models or represents (e.g., TPCx- IoT models and represents a NoSQL database mimicking an IoT gateway system)
- Would plausibly be implemented by a significant number of users in the market segment the benchmark models or represents.

The use of new systems, products, technologies (hardware or software) and pricing is encouraged so long as they meet the requirements above. Specifically prohibited are benchmark systems, products, technologies or pricing (hereafter referred to as "implementations") whose primary purpose is performance optimization of TPC benchmark results without any corresponding applicability to real-world applications and environments. In other words, all "benchmark special" implementations that improve benchmark results but not real-world performance or pricing, are prohibited.

The rules for pricing are included in the TPC Pricing Specification. Further information is available at www.tpc.org.

# Clause 1 General Items

## 1.1   Test Sponsor

*A statement identifying the benchmark sponsor(s) and other participating companies must be provided.*

This benchmark was sponsored by Telecommunications Technology Association.

## 1.2   Parameter Settings

*Settings must be provided for all customer-tunable parameters and options which have been changed from the defaults found in actual products, including by not limited to:*

- *Configuration parameters and options for server, storage, network and other hardware component incorporated into the pricing structure;*

- *Configuration parameters and options for operating system and file system component incorporated into the pricing structure;*

- *Configuration parameters and options for any other software component incorporated into the pricing structure;*

- *Compiler optimization options.*

*Comment 1: In the event that some parameters and options are set multiple times, it must be easily discernible by an interested reader when the parameter or option was modified and what new value it received each time.*

*Comment 2: This requirement can be satisfied by providing a full list of all parameters and options, as long as all those that have been modified from their default values have been clearly identified and these parameters and options are only set once.*

The Supporting Files Archive contains the parameters and options used to configure the components involved in this benchmark.

## 1.3   Configuration Diagrams

*Diagrams of both measured and priced configurations must be provided, accompanied by a description of the differences.*

*This includes, but is not limited to:*

- *Total number of nodes used*

- *Total number and type of processors used/total number of cores used/total number of threads used (including sizes of L2 and L3 caches)*

- *Size of allocated memory, and any specific mapping/partitioning of memory unique to the test*

- *Number and type of disk units (and controllers, if applicable)*

- *Number of channels or bus connections to disk units, including their protocol type*

- *Number of LAN (for example, Ethernet) connections and speed for switches and other hardware components physically used in the test or are incorporated into the pricing structure*

- *Type and the run-time execution location of software components*

## 1.3.1  Measured Configuration

Figure 1-1 shows the measured configuration.

**25/100Gb  Ethernet Switch**



**Master Node**

**1 x KTNF  KR580S1**
-   2 x Intel Xeon Gold 6140 2.30GHz
-   12 x 64GB (768GB)  Memory
-   2 x 600GB SAS HDD
-   1 x 25Gb 2-Port Ethernet Adaptor

**Data Node**

**2 x KTNF  KR580S1**
-   2 x Intel Xeon Gold 6140 2.30GHz
-   4 x 64GB (256GB) Memory
-   2 x 600GB SAS HDD
-   2 x 1.6TB NVMe SSD
-   1 x 25Gb 2-Port Ethernet Adaptor
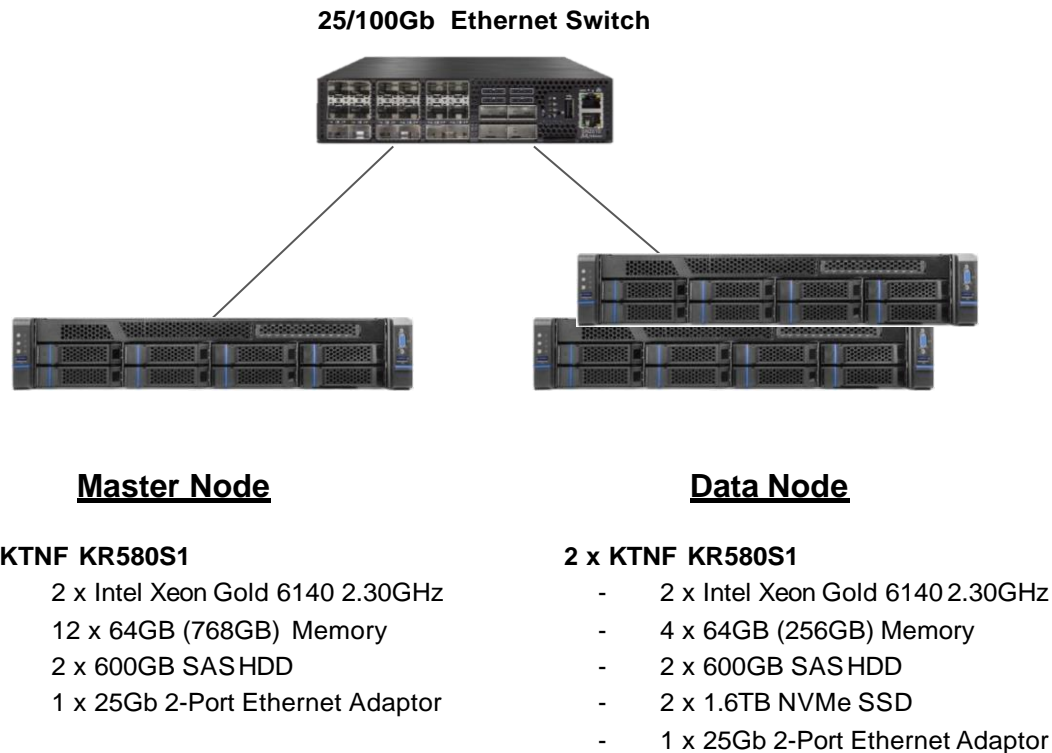
*Figure 1-1 Measured Configuration*

The measured configuration consisted of:

| | |
|---|---|
| Total Nodes: | 3 |
| Total Processors/Cores/Threads: | 6/108/216 |
| Total Memory: | 1.37 |
| Total Number of Storage Devices: | 10 |
| Total Storage Capacity | 10.00 |

| | | |
|---|---|---|
| Connectivity: | Mellanox MSN2010-CB2F 10/25GbE and 100GbE Switch | |
| Servers | 1x KR580S1 (Master): | 2x KR580S1 (Data): |
| Processors/Cores/Threads: | 2/36/72 | 2/36/72 |
| Processor Model: | 2x Intel® Xeon® Gold 6140 (2.30GHz, 18-core, 24.75 MB L3) | 2x Intel® Xeon® Gold 6140 (2.30GHz, 18-core, 24.75 MB L3) |
| Memory: | 768 GiB | 256 GiB |
| Storage Controller: | Broadcom MEGARAID SAS 9361-8i | Broadcom MEGARAID SAS 9361-8i |
| Storage Devices: | 2x 600 GB 10.5K RPM SAS HDD | 2x 600 GB 10.5K RPM SAS HDD 2x 1.6 TB NVMe SSD |
| Network Controller: | Mellanox MCX4121A-ACAT 25G | Mellanox MCX4121A-ACAT 25G |

The distribution of software components over server nodes is detailed in section 1.5.

## 1.3.2  Priced Configuration

There are no differences between the priced configuration and the measured configuration.

## 1.4    Dataset Distribution

*The distribution of dataset across all media must be explicitly described.*

Table 1-1 describes the distribution of the dataset across all storage media in the system.

| Server | Controller | Disk Drive | Description of Content |
|---|---|---|---|
| 1 | Megaraid SAS-3 3108 | 2 x SAS 600GB HDD | Machbase Broker, Operating System, Root, Swap |
| 2, 3 | Megaraid SAS-3 3108 U.2 PCIe Gen3 | 2 x SAS 600GB HDD 2 x 1.6TB NVMe SSD | Operating System, Root, Swap Machbase Data, coordinator |

*Table 1-1 Dataset Distribution Across Storage Media*

## 1.5    Software Component Distribution

*The distribution of various software components across the system must be explicitly described.*

Table describes the distribution of the software components across the system.

| Server | Broker | Coordinator | Warehouse |
|---|---|---|---|
| 1 | X | | |
| 2 | | X | X |
| 3 | | | X |

*Table 1-2 Software Component Distribution Across Nodes*

The storage system software used was Machbase 5.7.3.

# Clause 2 Workload Related Items

## 2.1    Hardware and Software Tunable Parameters
*Script or text used to set all hardware and software tunable parameters must be reported.*

The Supporting Files Archive contains all configuration scripts.

## 2.2    Run Report
*The run report generated by the TPCx-IoT Kit for Performance Run and Repeatability Run must be reported.*

The Supporting Files Archive contains the full run report. The following excerpts from the run report summarize the Performance Run and the Repeatability Run.

### Run Report for Run 1 (Repeatability Run)

```
==============================================
TPCx-IoT Performance Metric (IoTps) Report
Test Run 1 details :    Total Time For Warmup Run In Seconds = 2,017.764
Test Run 1 details :    Total Time In Seconds = 1,982.044
                        Total Number of Records = 2100000000

TPCx-IoT Performance Metric (IoTps): 1059512.3014

==============================================
```

### Run Report for Run 2 (Performance Run)

```
==============================================
TPCx-IoT Performance Metric (IoTps) Report
Test Run 2 details :    Total Time For Warmup Run In Seconds = 2,059.186
Test Run 2 details :    Total Time In Seconds = 2,012.889
                        Total Number of Records = 2100000000

TPCx-IoT Performance Metric (IoTps): 1043276.6039

==============================================
```

## 2.3    Benchmark Kit Identification

The version of the TPCx-IoT kit and checksums for key files are listed below.

| TPCx-IoT Kit Version | 1.0.4 |
|---|---|

| File | MD5 |
|---|---|
| TPC-IoT-master.sh | 1dbe4d963fa7321e3df244913b3ef4ae |
| tpcx-iot/lib/core-0.13.0-SNAPSHOT.jar | 7b8c3de667e60b96bd7611de0525ee65 |
| IoT_cluster_validate_suite.sh | 1d85705dc67fb3c767d7a1fe8775275f |

## 2.4    Benchmark Kit Changes

No modifications were made to TPC-provided kit.

# Clause 3 Scale Factor and Metrics

## 3.1    Scale Factor, Performance, Price-Performance

The metrics for Run 1 and Run 2 are summarized below.

|  | Run 1 | Run 2 |
|---|---|---|
| Scale Factor | 2100000000 | 2100000000 |
| Measured Run Time (seconds) | 1,982.044 | 2,012.889 |
| IoTps | 1,059,512.30 | 1,043,276.60 |

Run2 Price-Performance: 330.26 $/kIoTps.

# Letter of Attestation

*The auditor's agency name, address, phone number, and Attestation letter must be included in the full disclosure report. A statement should be included specifying who to contact in order to obtain further information regarding the audit process.*

This benchmark was audited by Doug Johnson, InfoSizing.

> www.sizing.com
> 63 Lourdes Drive
> Leominster, MA 10453
> 978-343-6562

This benchmark's Full Disclosure Report (FDR) can be downloaded from www.tpc.org.

A copy of the auditor's Letter of Attestation follows.

**InfoSizing**
The Right Metric For Sizing IT

**TPC**
Certified Auditor

Kihan Choi
Research Engineer
Telecommunications Technology Association (TTA)
Bundang-ro 47, Bundang-gu, Seongnam-city
Gyeonggi-do, 13591, Republic of Korea

October 31, 2019

I verified the TPC Express Benchmark™ IoT v1.0.4 performance of the following configuration:

Platform:              KTNF KR580S1 (3x KR580S1)
Operating System:      CentOS Linux 7.6.1810
Storage Software:      Machbase 5.7.3

The results were:

**Performance Metric**   **1,043,276.60 IoTps**
Run Elapsed Time         2,012.889 Seconds

| **Cluster** | **3x KTNF KR580S1, each with:** | | |
|---|---|---|---|
| CPUs | 2x Intel® Xeon® Gold 6140 (2.30 GHz, 18-core, 24.75 MB L3) | | |
| Memory | 768 GiB (Master node) | | |
| | 256 GiB (Data nodes) | | |
| Storage | Qty | Size | Type |
| | 2 | 600GB | 10.5K RPM SAS HDD (All nodes) |
| | 2 | 1.6TB | NVMe SSD (Data nodes) |

In my opinion, these performance results were produced in compliance with the TPC requirements for the benchmark.

The following verification items were given special attention:

- All TPC-provided components were verified to be v1.0.4
- No modifications were made to any of the Java code
- Any and all modifications to shell scripts were reviewed for compliance
- All checksums were validated for compliance
- The generated dataset was properly scaled to 2100000000 rows
- The dataset was protected with a minimum of two-way replication

63 Lourdes Dr. | Leominster, MA 01453 | 978-343-6562 | www.sizing.com

- The elapsed times for all phases and runs were correctly measured and reported
- The system pricing was verified for major components and maintenance
- The major pages from the FDR were verified for accuracy

Additional Audit Notes:

    None.

Respectfully Yours,

Doug Johnson, Certified TPC Auditor

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# Third-Party Price Quotes

## KTNF Co., Ltd

견 적 서

**KTNF**
KOREA TECHNOLOGY AND FUTURE

수　　신 : 한국정보통신기술협회
참　　조 : 최기한 선임 연구원님 (010-5110-7276)
귀사의 성공적인 사업을 진심으로 기원하며 아래와 같이 견적드립니다.

견 적 번 호 : 20191030-1
견　　　명 : TPCx-IoT 제출용

주식회사 케이티엔에프
서울시 강서구 마곡중앙 8로 3길 21
(마곡동, KTNF빌딩)
TEL : 02-865-5200, FAX : 02-3661-3377

**최종견적가(VAT포함):** 일금 구천이백칠십삼만 원정 (₩92,730,000)

견 적 일 자 : 2019년 10월 30일
견적 유효 기간 : 견적일로부터 90일 이내
납품 예정 일자 : 발주일로부터 4주일 이내
무상 보증 기간 : 3년
지 불 조 건 : 현금
견 적 담 당 : 김종법 부장 (Mobile : 010-8753-5644, jbkim@ktnf.co.kr)

| 등록번호 | 106-86-07697 |
| --- | --- |
| 대표이사 | 이 중 연 |
| 업　태 | 제　조 |
| 종　목 | 컴퓨터제조 |

(단위: 원, VAT별도)

| 구분 | 파트번호 Part Number | 규 격 Specification | 수량 Q'ty | 공급가 (원화) 단가 | 공급가 (원화) 합계 | 공급가 (달러) 단가 | 공급가 (달러) 합계 |
| --- | --- | --- | --- | --- | --- | --- | --- |
| | KR580S1 (18C 2.3GHz x2 / 256GB DDR4 / 600G SAS x2, 1.6TB NVMe SSD x2 / RAID CTRL / 2P 25G SFP+ (GBIC포함) x1, 2P 1G RJ-45 (Onboard) / 800W x2 / Rail / 모니터, 키보드, 마우스, Maintenance) | | 2 | ₩25,350,000 | ₩50,700,000 | $23,830.00 | $47,660.00 |
| 서버 1 | SYS | 2U-8bay, 3slots FH Riser x2, 800W x2, 2Port 1G RJ-45, Rail | 1 | | | | |
| | CPU | Intel Xeon Scalable Processor Gold 6140 (18Core 2.3GHz, 24.75MB, 140W) | 2 | | | | |
| | Memory | 64GB DDR4 ECC RDIMM memory | 4 | | | | |
| | HDD | 600GB 2.5" hot-swap SAS HDD | 2 | | | | |
| | RAID | Broadcom MEGARAID SASI 9361-8i RAID Controller, 1GB Cache | 1 | | | | |
| | SSD | Intel P4610 SSD (1.6TB, NVMe) | 2 | | | | |
| | NIC | Mellanox MCX4121A-ACAT 25G Ethernet Adapter | 1 | | | | |
| | Monitor | 27" Monitor | 1 | | | | |
| | Keyboard/mouse | Trackball Mini Keyboard | 1 | | | | |
| | Maintenance | 7x24x4 Care Pack (3year) | 1 | | | | |
| | KR580S1 (18C 2.3GHz x2 / 768GB DDR4 / 600G SAS x2 / RAID CTRL / 2P 25G SFP+ (GBIC포함) x1, 2P 1G RJ-45 (Onboard) / 800W x2 / Rail / 모니터, 키보드, 마우스 / Maintenance) | | 1 | ₩33,600,000 | ₩33,600,000 | $31,610.00 | $31,610.00 |
| 서버 2 | SYS | 2U-8bay, 3slots FH Riser x2, 800W x2, 2Port 1G RJ-45, Rail | 1 | | | | |
| | CPU | Intel Xeon Scalable Processor Gold 6140 (18Core 2.3GHz, 24.75MB, 140W) | 2 | | | | |
| | Memory | 64GB DDR4 2400 ECC RDIMM memory | 12 | | | | |
| | HDD | 600GB 2.5" hot-swap SAS HDD | 2 | | | | |
| | RAID | Broadcom MEGARAID SASI 9361-8i RAID Controller, 1GB Cache | 1 | | | | |
| | NIC | Mellanox MCX4121A-ACAT 25G Ethernet Adapter | 1 | | | | |
| | Monitor | 27" Monitor | 1 | | | | |
| | Keyboard/mouse | Trackball Mini Keyboard | 1 | | | | |
| | Maintenance | 7x24x4 Care Pack (3year) | 1 | | | | |
| 합계 | | | | | ₩84,300,000 | | $79,270.00 |

**Remarks**
1. 상기 제품은 대외무역법 제19조 제1항에 따라 전략물자에 해당되며, 해외수출시 대외무역법에 따라 전략물자 기술 수출입 통합고시에서 규정하는
   허가기관의 장으로부터 수출허가를 득하시기 바랍니다.
2. 본 제품을 제3자에게 양도 또는 재판매할 경우 해당 제3자에게 상기에 언급한 의무사항들을 사전에 충분히 고지하시기 바랍니다.

| 공급가 합계 | ₩ 84,300,000 |
| --- | --- |
| V A T | ₩ 8,430,000 |
| 공급가(VAT포함) | ₩ 92,730,000 |

## Mellanox Technologies, Ltd



TPCx-IoT 2.0.0
Full Disclosure Report

TTA
Machbase 5.7.3

Report Date
April 2, 2021

TPCx-IoT 2.0.0
Full Disclosure Report

TTA
Machbase 5.7.3

Report Date
April 2, 2021

## Rockplace Inc.

**rockPLACE**
(주)락플레이스 www.rockplace.co.kr

㈜락플레이스
135-120 서울시 강남구 신사동 634-10 윤당빌딩 3층 Tel.02)6251.7788  Fax.02)6251.6677

**rockPLACE, Inc.**
3F, Yundang bldg, 634-10, Shinsa-dong, Gangnam-gu,Seoul, Korea Tel : 822-6251-7788  Fax: 822-6251-6677

# 견 적 서

| REF No. | : 2019RP10-2303 | **TERMS AND CONDITION** | |
|---|---|---|---|
| DATE | : 2019. 10 23. | | |
| COMPANY | : TTA | 납   기 | : 발주후 4주이내 |
| ATTN | : 이 태 석 선임 연구원님 귀하 TEL   : 010-5110-6295 | 유지보수 | : 납품일로부터 3년 |
| Email | : nason927@tta.or.kr | 결제조건 | : 익월말 현금 |
| FROM | : ㈜ 락플레이스 정 경환 차장 TEL   : 010-4298-3447 | 유효기간 | : 견적일로부터 1개월 |

下記와 같이 見積합니다.

**㈜ 락플레이스**
**대표이사 서 동 식**

**ITEM DESCRIPTION**                                        ( VAT 별도, 단위 : $ )

| Part No. | D e s c r i p t i o n | 수량 | 소비자가 | 공급단가 | 공급합계 |
|---|---|---|---|---|---|
| 연간기술지원 | **연간 방문 기술지원 (옵션)** | | | | |
| RSC-LSF3 | rockPLACE Support Carepack - Linux Standard (3년) per Server<br>3 Year, 24x7, 4hr response<br>기술지원 대상 : Cent OS<br>이메일, 전화, 원격지원, 현장지원 서비스<br>  - Problem tracking/Emergency assistance<br>  - Update, Patch 작업 지원<br>  - 서비스, 시스템 환경, 네트워크 환경 설정 변경 지원<br>  - 인수 시험, 성능 시험, 비상 복구 훈련 지원<br>  - MRG Realtime 기술지원 포함 | 3 | 4,614 | 1,538 | 4,614 |
| | 소 계 금 액(Sub Total) | | | | 4,614 |

| | | |
|---|---|---|
| 합 계 | | 4,614 |
| 부가세(VAT) | | 461 |
| 합 계(부가세 포함, with VAT) | | 5,075 |

**Remarks**

1. **Cent OS**의 경우 벤더가 없는 커뮤니티 Linux로 L1,L2 레벨의 기술지원만 가능하며, 벤더(L3 레벨) 기술지원은 불가 합니다.
2. 발주 시에는 반드시 고객정보(엔드유저명, 담당자, 연락처, **Email**)가 있어야 합니다.
3. **OnSite** 방문지원이 필요하실 경우에는 케어팩을 구매하셔야 합니다.

## Machbase Inc.

# Quotation

| Doc. No. | : MACH-SALES-20191025-01 | | Business License | | 120-87-96403 | | |
|---|---|---|---|---|---|---|---|
| Date | : 2019-10-25 | | Company | | Machbase Inc. | CEO | Andrew Kim |
| To | : TTA | | BusinessTerritory | | Service, Business Service | ProductType | Software |
| CC | : Mr. Ki Han Choi | | Address | | Rn. 904, 273 Digital-ro, Guro-gu | | |
| Charge | : Director. Kwang Hoon Shim (+82-10-9910-8086) | | | | Seoul, Korea | | |
| | Here we quote as belows | | Tel. | | T : 02-2109-5607 | F : 02-2038-4607 | |
| Quote | 273,273 | | USD (VAT Incl.) | | | | |

| No. | Content | | List Price (USD/Node) | Unit Price (USD/Node) | Quantity (Node) | Supply Price (USD) | Tax. Incl. (USD) |
|---|---|---|---|---|---|---|---|
| 1 | Machbase Cluster Edition V5.7.3 | | 98,000 | 63,700 | 3 | 191,100 | 210,210 |
| | Machbase Run-Time License | | | | | | |
| | Machbase Time Series DBMS | | | | | | |
| | Machbase Client Developmet Kit | | | | | | |
| | Machbase Coordinator | | | | | | |
| | Machbase Broker | | | | | | |
| | Machbase Warehouse | | | | | | |
| | Machbase Web Admin | | | | | | |
| | Machbase Tag Analyzer | | | | | | |

| No. | Content | | Ref. Price (USD) | Maintenance Rate (%) | Total Period (Year) | Supply Price (USD) | Tax. Incl. (USD) |
|---|---|---|---|---|---|---|---|
| 2 | Maintenance | | 191,100 | 15% | 2.00 | 57,330 | 63,063 |
| | *Support & On-site Guide* | | | | | | |
| | Fault Handling | | | | | | |
| | API Connection | | | | | | |
| | Guide for Server & Node Configuration | | | | | | |
| | | | | | | | |
| | **Total** | | | | | 248,430 | 273,273 |

**<< REMARK >>**

.- Here is a quote for applying a Machbase time series database for TTA.

.- Quotation : Machbase Cluster Edition Run-Time License 3Nodes and 3 years Maintenance (1 Year for free)

.- Maintenance: Free maintenance for one year after the contract, 15% of maintenance rate applied afterwards.

.- Payment terms: Cash payment terms. (Within 90 days of issue of tax invoice)

.- Server installation condition: It is recommended to separate DB server and Storage server.

.- Installation : Cluster Edition - 7 Days, DB Table Guide is seperately guided with DB Professional Service.

.- Quotation validity period: 90 days from the date of quotation

**MACHBASE**

## Supporting File Index

| Clause | Description | Archive Pathname |
|---|---|---|
| Clause 1 | Parameters and options used to configure and tune the SUT | /Clause1 |
| Clause 2 | Configuration scripts and Run Report | /Clause2 |
| Clause 3 | System configuration details | /Clause3 |