TPC Express Benchmark™ IoT
Full Disclosure Report

Machbase 6.5.1
running on

Supermicro A+ Server 1114S-WN10RT
(with 4x H12SSW-NTR Nodes)

with

Red Hat Enterprise Linux Server Release 8.3

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Benchmark results are highly dependent upon workload, specific application requirements, and system design and implementation. Relative system performance will vary because of these and other factors. Therefore, the TPC Express Benchmark™ V should not be used as a substitute for a specific customer application benchmark when critical capacity planning and/or product evaluation decisions are contemplated.

All performance data contained in this report was obtained in a rigorously controlled environment. Results obtained in other operating environments may vary significantly. No warranty of system performance or price/performance is expressed or implied in this report.

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Abstract

TTA conducted the TPC Express Benchmark™ IoT (TPCx-IoT) on the Supermicro A+ Server 1114S-WN10RT with 4x H12SSW-NTR Nodes. The software used included Machbase 6.5.1. 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

<table>
<thead>
<tr>
<th>Sponsor</th>
<th>Cluster Nodes</th>
<th>Storage Software</th>
<th>Operating System</th>
</tr>
</thead>
<tbody>
<tr>
<td>TTA</td>
<td>Supermicro A+ Server 1114S-WN10RT</td>
<td>Machbase 6.5.1</td>
<td>Red Hat Enterprise Linux Release 8.3</td>
</tr>
</tbody>
</table>

TPC Express Benchmark™ IoT Metrics

<table>
<thead>
<tr>
<th>Total System Cost (USD)</th>
<th>IoTps</th>
<th>USD/kIoTps</th>
<th>Availability Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>$302,788</td>
<td>3,410,800.16</td>
<td>$88.78</td>
<td>Mar 16, 2021</td>
</tr>
</tbody>
</table>

Executive Summary

The Executive Summary follows on the next several pages.
## EXECUTIVE SUMMARY

**Machbase 6.5.1**

<table>
<thead>
<tr>
<th>Total System Cost</th>
<th>TPCx-IoT Performance Metric</th>
<th>Price/Performance</th>
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<tbody>
<tr>
<td>$302,788 USD</td>
<td>3,410,800.16 IoTps</td>
<td>$88.78 USD/kIoTps</td>
</tr>
</tbody>
</table>

**TPCx-IoT** 2.0.0  
**TPC Pricing** 2.6.0  
**Report Date** April 02, 2021

### System Under Test Configuration Overview

**Total Servers:** 4x Supermicro A+ Server 1114S-WN10RT  
(with 4x H12SSW-NTR Nodes)

**Total Processors/Cores/Threads:** 4/160/320

### Server Configuration:

- **Processor:**
  - 1x AMD EPYC 7713 (2.00GHz, 64-core, 256 MB L3)
  - 1x AMD EPYC 75F3 (2.95GHz, 32-core, 256 MB L3)

- **Memory:**
  - 1,024 GB
  - 512 GB

- **Storage Device:**
  - 1x 960GB NVMe M.2 PCIe SSD Gen3
  - 960GB NVMe M.2 PCIe SSD Gen4
  - 4x 7.68TB NVMe PCIe SSD Gen4

- **Network Controller:**
  - 1x Mellanox MT27800 Family 100Gbe
  - 1x Broadcom BCM57416 NetXtreme-E Dual-Media 10GbE

- **Connectivity:**
  - NVIDIA MSN2700 100GbE Switch

**Availability Date:** Mar 16, 2021

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**Report Date** April 02, 2021

**TTA**  
**Machbase 6.5.1**
## Machbase 6.5.1

**TPC-x IoT**: 2.0.0  
**TPC Pricing**: 2.6.0  
**Report Date**: April 02, 2021

### Server Hardware

<table>
<thead>
<tr>
<th>Description</th>
<th>Part Number</th>
<th>Source</th>
<th>List Price (USD)</th>
<th>Qty</th>
<th>Extended Price (USD)</th>
<th>3 yr. Maint. Price (USD)</th>
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</thead>
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<tr>
<td>Supermicro A+ Server 1145S-WN10RT</td>
<td>MBD-H12SSW-NTR</td>
<td>1</td>
<td>1,506.00</td>
<td>4</td>
<td>6,024.00</td>
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<tr>
<td>AMD EPYC 7713 64-Core Processor</td>
<td></td>
<td>1</td>
<td>5,070.00</td>
<td>1</td>
<td>5,070.00</td>
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<tr>
<td>AMD EPYC 75F3 32-Core Processor</td>
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<td>14,760.00</td>
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<td>Supermicro 64GB DDR4-3200(PC4-25600)</td>
<td>MEM-DR464L-HLO2-BR32</td>
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<td>277.00</td>
<td>40</td>
<td>11,080.00</td>
<td></td>
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<tr>
<td>Kioxia CD6 7.68TB NVMe PCIe 4x4</td>
<td>HDS-TUNO-KCD6XLUL768</td>
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<td>990.00</td>
<td>13</td>
<td>12,870.00</td>
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<tr>
<td>Mellanox Technologies MT27800 Family (ConnectX-5) Dual-port 100GbE card</td>
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<td>1</td>
<td>1,060.00</td>
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<tr>
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<td>2,000.00</td>
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<td>-</td>
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**Sub-Total**: 54,564.00  
**3 yr. Maint. Price**: 8,000.00

### Network

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<tbody>
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<td>MSN2700-CS2F</td>
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<td>1</td>
<td>33,003.00</td>
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<tr>
<td>Mellanox MCP1600-CO02E30 Passive Intel X86 100GbE QSFP28 1 Port 30AWG CA-N</td>
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<td></td>
<td></td>
<td></td>
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<td>Copper Cable Ethernet 100GbE QSF28 (w/ spares)</td>
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<td>Supermicro 64GB DDR4-3200(PC4-25600)</td>
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<tr>
<td>1. Black 30AWG CA-N</td>
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<tr>
<td>Silver 3 Year with 4 Hours On-Site Support for SN2000 Series Switch</td>
<td>SUP-SN2000-3S-4H</td>
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<td>1,981.00</td>
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**Sub-Total**: 33,513.00  
**3 yr. Maint. Price**: 1,981.00

### Software

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<tr>
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<td>1,299.00</td>
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<tr>
<td>(1Set = 4Node)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Machbase v6.5.1 Cluster Edition 7x24x4 Technical Support</td>
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**Sub-Total**: 170,000.00  
**3 yr. Maint. Price**: 66,588.00

### Infrastructure

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<th>3 yr. Maint. Price (USD)</th>
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<tr>
<td>HP EliteDisplay E190i 18.9-inch LED Backlit IPS Monitor (w/ spares)</td>
<td>E4U30A9AABA</td>
<td>6</td>
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<td>HP C2500 Desktop(Keyboard and Mouse) (w/ spares)</td>
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**Sub-Total**: 642.00  
**3 yr. Maint. Price**: -

### Discounts*

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<th>Extended Price (USD)</th>
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<td>(25,000.00)</td>
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<tr>
<td>Machbase v6.5.1 Cluster Edition 7x24x4 Technical Support</td>
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<td>(7,500.00)</td>
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**Sub-Total**: (25,500.00)  
**3 yr. Maint. Price**: (7,500.00)

**Total**: $233,719.00 USD  
**3 yr. Maint. Price**: $69,069.00 USD

---

### Price Source

2. NVIDIA Inc.  
3. Mellanox Technologies Inc.  
4. Red Hat Inc.  
5. Machbase Inc.  
6. Hewlett Packard Inc.

**Audited by Pre-Publication Board**

*All discounts are based on US list prices and for similar quantities and configurations. Discounts for similarly sized configurations will be similar to those quoted here, but may vary based on the components in the configuration.*

---

**Three-Year Cost of Ownership:** $302,788 USD  
**IoTps:** 3,410,800.16  
**USD/kIoTps:** $88.78 USD

---

*Prices used in TPC benchmarks must reflect the actual prices a customer would pay for purchase of the components in all regions specified in the result. Individually negotiated discounts are not permitted. Special prices based on assumptions about past or future purchases are not permitted. All discounts reflect standard pricing conventions for the listed components. For complete details, see the pricing section of the TPC benchmark specification. If you find that stated prices are not available according to these terms, please inform the TPC at pricing@tpc.org. Thank you.*

---

**TPC-x IoT**: 2.0.0  
**Full Disclosure Report**: Machbase 6.5.1  
**TPC Pricing**: 2.6.0  
**Report Date**: April 02, 2021
### Machbase 6.5.1

**Numerical Quantities**

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<th>Parameter</th>
<th>Value</th>
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<tbody>
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<td>Scale Factor</td>
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**Performance Run (Run2)**

<table>
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<tr>
<th>Parameter</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Warmup Run Start Time</td>
<td>2021-03-03 02:02:07.000</td>
</tr>
<tr>
<td>Warmup Run End Time</td>
<td>2021-03-03 02:32:50.000</td>
</tr>
<tr>
<td>Warmup Run Elapsed Time</td>
<td>1,841.657</td>
</tr>
<tr>
<td>Measured Run Start Time</td>
<td>2021-03-03 02:32:50.000</td>
</tr>
<tr>
<td>Measured Run End Time</td>
<td>2021-03-03 03:04:19.000</td>
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<tr>
<td>Measured Run Elapsed Time</td>
<td>1,888.120</td>
</tr>
</tbody>
</table>

**Performance Metric (IoTps)**

- **Run2**: 3,410,800.16

**Repeatability Run (Run1)**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warmup Run Start Time</td>
<td>2021-03-03 00:54:58.000</td>
</tr>
<tr>
<td>Warmup Run End Time</td>
<td>2021-03-03 01:25:02.000</td>
</tr>
<tr>
<td>Warmup Run Elapsed Time</td>
<td>1,802.580</td>
</tr>
<tr>
<td>Measured Run Start Time</td>
<td>2021-03-03 01:25:02.000</td>
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<tr>
<td>Measured Run End Time</td>
<td>2021-03-03 01:56:09.000</td>
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<tr>
<td>Measured Run Elapsed Time</td>
<td>1,866.829</td>
</tr>
</tbody>
</table>

**Performance Metric (IoTps)**

- **Run1**: 3,449,699.99

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**TPCx-IoT 2.0.0**
**Full Disclosure Report**

**Machbase 6.5.1**
**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 = 1,841.657
Test Run2 details : Total Time In Seconds = 1,888.120
Total Number of Records = 644000000

TPCx-IoT Performance Metric (IoTps): 3410800.1610
===============================================

Repeatability Run Report (Run1)

===============================================
TPCx-IoT Performance Metric (IoTps) Report
Test Run1 details : Total Time For Warmup Run In Seconds = 1,802.580
Test Run1 details : Total Time In Seconds = 1,866.829
Total Number of Records = 644000000

TPCx-IoT Performance Metric (IoTps): 3449699.9993
===============================================

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

**Machbase 6.5.1**

<table>
<thead>
<tr>
<th>TPCx-IoT</th>
<th>2.0.0</th>
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<tr>
<td>TPC Pricing</td>
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<td>Report Date</td>
<td>April 02, 2021</td>
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**Revision History**

<table>
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<tr>
<th>Date</th>
<th>Edition</th>
<th>Description</th>
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<tr>
<td>March 15, 2021</td>
<td>First</td>
<td>Initial Publication</td>
</tr>
<tr>
<td>April 2, 2021</td>
<td>Second</td>
<td>Update Price Performance Metric</td>
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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. Redistribution 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.

The measured configuration consisted of:

- Total Nodes: 4
- Total Processors/Core/Threads: 4/160/320
- Total Memory: 1.53TB
- Total Number of Storage Devices: 17
- Total Storage Capacity: 103.68TB

Connectivity: NVIDIA MSN2700 100GbE Switch

Servers
- Processor Model: 1x AMD EPYC 7713 (2.00GHz, 64-core, 256MB L3)
- Memory: 1,024GB
- Storage Devices: 1x 960GB NVMe M.2 PCIe SSD Gen3
- Network Controller: 1x Mellanox MT27800 Family 100GbE

1x Master Node
- 1 x AMD EPYC 7713 64-Core Processor
- 16 x 64GB (1.024GB) Memory
- 1 x 100GbE 2-Port Adaptor
- 10GbE 2-Port Adaptor
- 1 x 7.68TB NVMe PCIe 4x4 SSD
- 1 x 960GB NVMe M.2 PCIe SSD

3 x Data Nodes
- Processor Model: 1x AMD EPYC 75F3 32-Core Processor
- 8 x 64GB (512GB) Memory
- 1 x 100GbE 2-Port Adaptor
- 10GbE 2-Port Adaptor
- 4 x 7.68TB NVMe PCIe 4x4 SSD
- 1 x 960GB NVMe M.2 PCIe SSD

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.

<table>
<thead>
<tr>
<th>Server</th>
<th>Storage</th>
<th>Disk Drive</th>
<th>Description of Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>M.2 PCIe Gen3 PCIe Gen4</td>
<td>1 x 960GB NVMe SSD 1 x 7.68TB NVMe SSD</td>
<td>Machbase Broker, Operating System, Root, Swap</td>
</tr>
<tr>
<td>2-4</td>
<td>M.2 PCIe Gen3 PCIe Gen4</td>
<td>1 x 960GB NVMe SSD 4 x 7.68TB NVMe SSD</td>
<td>Operating System, Root, Swap Machbase Data, coordinator</td>
</tr>
</tbody>
</table>

*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.

<table>
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<tr>
<th>Server</th>
<th>Broker</th>
<th>Coordinator</th>
<th>Warehouse</th>
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<td>2</td>
<td></td>
<td>X</td>
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<tr>
<td>4</td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

*Table 1-2 Software Component Distribution Across Nodes*

The storage system software used was Machbase 6.5.1.
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 = 1,802.580  
Test Run 1 details : Total Time In Seconds = 1,866.829  
Total Number of Records = 6440000000

TPCx-IoT Performance Metric (IoTps): 3449699.9993

===============================================

Run Report for Run 2 (Performance Run)

===============================================
TPCx-IoT Performance Metric (IoTps) Report
Test Run 2 details : Total Time For Warmup Run In Seconds = 1,841.657  
Test Run 2 details : Total Time In Seconds = 1,888.120  
Total Number of Records = 6440000000

TPCx-IoT Performance Metric (IoTps): 3410800.1610

===============================================

TPCx-IoT 2.0.0  
Full Disclosure Report  
TTA Machbase 6.5.1  
Report Date April 2, 2021
2.3 Benchmark Kit Identification
The version of the TPCx-IoT kit and checksums for key files are listed below.

<table>
<thead>
<tr>
<th>File</th>
<th>MD5</th>
</tr>
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<tbody>
<tr>
<td>TPC-IoT-master.sh</td>
<td>aabeca02709f778295fced1891ce3f74f</td>
</tr>
<tr>
<td>tpcx-IoT/machbase-binding/lib/core-0.13.0-SNAPSHOT.jar</td>
<td>18b59e748a7026036e85e2e70ba45af5</td>
</tr>
<tr>
<td>IoT_cluster_validate_suite.sh</td>
<td>1d85705dc67fb3c767d7a1fe8775275f</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th></th>
<th>Run 1</th>
<th>Run 2</th>
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</thead>
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<tr>
<td>Scale Factor</td>
<td>6440000000</td>
<td>6440000000</td>
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<tr>
<td>Measured Run Time (seconds)</td>
<td>1.866.829</td>
<td>1.888.120</td>
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<tr>
<td>IoTps</td>
<td>3,449,699.99</td>
<td>3,410,800.16</td>
</tr>
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</table>

Run2 Price-Performance: 88.78 $/kIoTps
**Third-Party Price Quotes**

**Super Micro Computer Inc.**

---

### Quotation

**Sold To:**
ADVANCED MICRO DEVICES, INC (CA) DEBBIE CHRISTOPHER  
2485 AUGUSTINE DRIVE  
SANTA CLARA CA 95054-3002 USA

**Ship To:**
ADVANCED MICRO DEVICES, INC (CA) DEBBIE CHRISTOPHER  
2485 AUGUSTINE DRIVE  
SANTA CLARA CA 95054-3002 USA

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<th>Payment Terms</th>
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<td>11,080.00</td>
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<td>5Kta C80 7.6TB N/Me PCIe 4x 2.5&quot; 15mm SIE 1DWPD 8S23.B1.000 / BA992C</td>
<td>990.00</td>
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<td>12,780.00</td>
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*SUPERMICRO WILL NOT BE HELD RESPONSIBLE FOR ANY PRICE, COMPONENT AVAILABILITY, TYPOGRAPHICAL OR OTHER ERRORS IN ANY FORM OF COMMUNICATION INCLUDING QUOTATIONS. QUOTATIONS IN ANY FORM, PREPARED BY SUPERMICRO SHALL NOT CONSTITUTE A BINDING OFFER AND MAY BE CHANGED OR REVOKED AT ANY TIME. IT WILL BE SOLELY IN SUPERMICRO’S DISCRETION TO ACCEPT OR REJECT THE ORDER YOU PLACE.*

*INFORMATION INCLUDED IN THIS QUOTATION INCLUDING PRICING, COMPONENT DESCRIPTION, ETC., MADE OR SUPPLIED BY SUPERMICRO SHALL REMAIN SUPERMICRO’S PROPERTY AND YOU HEREBY AGREE THAT SUCH INFORMATION IS CONFIDENTIAL AND SHALL NOT BE DISCLOSED OR OTHERWISE USED WITHOUT SUPERMICRO’S EXPRESS PRIOR WRITTEN CONSENT. UNLESS OTHERWISE, YOU AS THE CUSTOMER, DULY EXECUTE ANOTHER VALID AGREEMENT APPLICABLE TO THIS PURCHASE WITH SUPERMICRO, OR UNLESS THE AUTHORIZED SUPERMICRO REPRESENTATIVE SPECIFIES IN WRITING, DIFFERENT OR ADDITIONAL TERMS FOR SPECIFIC PRODUCT OR SERVICES, THE TERMS AND CONDITIONS AVAILABLE AT HTTP://WWW.SUPERMICRO.COM/ABOUTPOLICIES/PRO SHALL GOVERN PURCHASES MADE HEREUNDER.*
NVIDIA Inc

NVIDIA MSN2700-CS2F Spectrum Based 100GbE 1U Open Ethernet Switch with Onyx 32 QSFP28 Ports 2 Power Supplies AC x86 CPU Standard Depth P2C Airflow Rail Kit RoHS6

MPN: MSN2700-CS2F

$33,093.00

NVIDIA MCP1600-C001E30N Direct Attach Copper Cable Ethernet 100GbE QSFP28 1m Black 30AWG CA-N

MPN: MCP1600-C001E30N

$45.00
Mellanox Technologies Inc.  

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<th>Total Price</th>
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<tr>
<td>Services and Support</td>
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| *Support or maintenance renewals for the same part number, service level and service period are available at the prices shown in this quotation*  
| SUP-SN2000-3S-4H Mellanox Technical Support and Warranty - Silver 3 Year with 4 Hours On-Site Support for SN2000 Series Switch | 1 | $1,981.00 | $1,981.00 |
| Total Services and Support          |          |             | $1,981.00   |
| Grand Total                         |          |             | $1,981.00   |

Optional Products are Not Included in this Quotation
Red Hat Inc.

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Subtotal: $15,588.00

[Continue shopping] [Continue to checkout]
### Quotation

**Doc. No.** MACH-SALES-2021033-05  
**Date** 2021-03-02  
**To** TTA

**CC** Mr. Seo Byoung Joon  
Stefan Song  
(+82-10-3440-1734)

**Address**  
10, Teheran-ro 20-gil, Gangnam-gu  
Seoul, Korea

**Tel.** T : 02-2109-5607  
F : 02-2038-4607

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**Total** 188,500  
207,350

---

*<< REMARK >>*

- Here is a quote for applying a Machbase time series database for TTA.
- Quotation: Machbase Cluster Edition Run-Time License 4 nodes (1set) 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 36 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 separately guided with DB Professional Service.
- Quotation validity period: 120 days from the date of quotation

---

**TPCx-IoT 2.0.0**  
**Full Disclosure Report**

**TTA**  
**Machbase 6.5.1**

**Report Date** April 2, 2021
## Supporting File Index

<table>
<thead>
<tr>
<th>Clause</th>
<th>Description</th>
<th>Archive Pathname</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clause 1</td>
<td>Parameters and options used to configure and tune the SUT</td>
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<tr>
<td>Clause 2</td>
<td>Configuration scripts and Run Report</td>
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</tr>
<tr>
<td>Clause 3</td>
<td>System configuration details</td>
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