



Super Micro Computer, Inc

TPC Express Benchmark™ IoT
Full Disclosure Report
for
Supermicro A+ Server 2014TP-HTR
(TwinPro™ with 4x H12SST-PS Nodes)

Using

HBase 2.0.0 on
Cloudera Distribution for Apache Hadoop
Enterprise Edition 6.0.1
and
Red Hat Enterprise Linux Server Release 7.6

Second Edition -- April 02, 2021
(First Edition released on Aug 07, 2019)

First Edition - August 2019

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		Supermicro A+ Server 2014TP-HTR		TPCx-IoT: v2.0.0
				TPC-Pricing: v2.4.0
Total System Cost		TPCx-IoT Performance Metric		Price/Performance
138,580 USD		472,200.88 IoTps		\$293.48 USD \$/kIoTps
Number of Records	DBMS Software	Operating System	Other Software	Availability Date
832 Million	HBase 2.0.0 on Cloudera Distribution for Apache Hadoop 6.0.1	Red Hat Enterprise Linux Server Release 7.6	None	Aug 31, 2019
System Configuration				
1x Supermicro A+ Server 2014TP-HTR TwinPro™ with 4x H12SST-PS Nodes, each with: 1x AMD EPYC 7542 32-Core Processor 256 GB (8x 32GB RDIMM 3200MT/s Dual Rank) 1x 256GB M.2 PCIe Gen3 1x Mellanox Dual Port 25GbE SFP28 NIC 3x 1TB M.2 PCIe Gen3 (Data Nodes)				
		 Mellanox SN2410 Network Switch (48-port 25GbE + 8-port 100GbE)		
Total Number of Servers:		1x Supermicro A+ Server 2014TP-HTR (TwinPro™ with 4x H12SST-PS Nodes)		
Total Processors/Cores/Threads:		4/128/256		
Server Configuration (each)	Processors	1x AMD EPYC 7542 2.9GHz 32-Core		
	Memory	256GB		
	Storage Device	1x 256GB M.2 PCIe Gen3 (all nodes) 3x 1TB M.2 PCIe Gen3 (Data Nodes)		
	Network	1x Supermicro AOC-MH25G-m2S2T Dual Port 25GbE SFP28 NIC		
	Connectivity:	Mellanox SN2410 Network Switch		
Total Rack Units:		(2x2014TP-HTR) + (1xSN2410) = (2x1) + (1x1) = 3RU		



Supermicro A+ Server 2014TP-HTR

TPCx-IoT: v2.0.0

TPC-Pricing: v2.4.0

Report Date: April 02,2021

Description	Part Number	Qty	Unit Price	Extended Price	3 yr. Maint. Price
HARDWARE COMPONENTS					
Supermicro Super Server H12SST-PS - Rail, Power Cord (included)	AS -2014TP-HTR	1	\$2,941.00	\$2,941.00	
AMD EPYC™ 7542 2.9GHz/3.4GHz, 32C/64T 225W	PSE-ROM7542-0075	1	\$3,320.00	\$3,320.00	
SK hynix 32GB 2Rx4 PC4-3200 HMA84GR7CJR4N-XN	MEM-DR432L-HL01-ER32	1	\$141.20	\$141.20	
M.2 256GB TOSHIBA KXG50ZNV256G	HDS-TMN0-KXG50ZNV256G	1	\$45.50	\$45.50	
M.2 1TB TOSHIBA KXG50ZNV1T02	HDS-TMN0-KXG50ZNV1T02	1	\$138.00	\$138.00	
Mellanox Ethernet CX4LX 25GbE Network Adapter	AOC-MH25G-m2S2TM	1	\$249.90	\$249.90	
4-hour 7x24 On-site Service 3years	OS4HR3	1	\$1,888.30	\$1,888.30	\$1,888.30
Mellanox SN2410 Switch	MSN2410-CB2F	2	\$25,387.00	\$25,387.00	
Mellanox Tech Support and Warranty - Silver 3 years with 4 Hours On-Site Support for SN2000 Series Switch	SUP-SN2000-3S-4H	2	\$2,475.00	\$2,475.00	\$2,475.00
Mellanox MCP2M00-A001E30N Ethernet Passive Copper Cable 25GbE SFP28 1m Black 30AWG CA-N	MCP2M00-A001E30N	2	\$52.00	\$260.00	
12U Open Frame Server Rack - Adjustable Depth - 4-Post Data Rack	4POSTRACK12U	2	\$195.99	\$391.98	
NEMA 5-15P to IEC320 C15 14AWG 125V/15A	P515C15-15ABE-10	2	\$10.00	\$20.00	
24" LED Monitor		2	\$79.00	\$158.00	
Keyboard and Mouse		2	\$14.56	\$29.12	
Subtotal				\$49,109.55	\$4,363.30
HARDWARE COMPONENTS			Subtotal	\$49,109.55	\$4,363.30



Supermicro A+ Server 2014TP-HTR

TPCx-IoT: v2.0.0

TPC-Pricing: v2.4.0

Report Date: April 02,2021

Description	Part Number	Ke y	Unit Price	Q t y	Extended Price	3 yr. Maint. Price
SOFTWARE COMPONENTS						
Cloudera Enterprise Operational DB Edition, Node License, 24x7, 1YR		2	\$6,000.00	1 2		\$72,000.00
Red Hat Enterprise Linux 7.6, 3yr Premium Subscription		1	\$3,276.86	4		\$13,107.44
SOFTWARE COMPONENTS			Subtotal		\$0.00	\$85,107.44
Total					\$49,109.55	\$89,470.74

Pricing : 1 Supermicro (based upon total system cost as purchased by a regular customer)


Three-Year Cost of Ownership : \$138,580

IoTps : 472200.88

Pricing : 2 Obtained from third-party or online

\$ / kIoTps : \$293.48

Prices used in TPC benchmarks reflect the actual prices a customer would pay for a one-time purchase of the stated components. 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 components. For complete details, see the pricing sections of the TPC benchmark specifications. If you find that the stated prices are not available according to these terms, please inform the TPC at pricing@tpc.org.

	Supermicro A+ Server 2014TP-HTR	TPCx-IoT: v2.0.0
		TPC-Pricing: v2.4.0
		Report Date: April 02, 2021
Measurement Results for Performance Run		
Total Number of Records	832 Million	
Warmup Run - Start Time	2019-08-02 18:04:00	
Warmup Run - End Time	2019-08-02 18:38:41	
Warmup Run Elapsed Time in Seconds	2,079.425	
Measured Run Start Time	2019-08-02 18:38:41	
Measured Run End Time	2019-08-02 19:08:04	
Total Time In Seconds	1,761.962	
Measurement Results for Repeatability Run		
Total Number of Records	832 Million	
Warmup Run Start Time	2019-08-02 19:42:53	
Warmup Run End Time	2019-08-02 20:18:08	
Warmup Run Elapsed Time in Seconds	2,113.894	
Measured Run Start Time	2019-08-02 20:18:08	
Measured Run End Time	2019-08-02 20:47:00	
Total Time In Seconds	1,731.521	



**Supermicro A+ Server
2014TP-HTR**

TPCx-IoT: v2.0.0

TPC-Pricing: v2.4.0

Report Date: April 02, 2021

Run Report for Performance Run

=====
TPCx-IoT Performance Metric (IoTps) Report

Total Time For Warmup Run In Seconds = 2,079.425

Total Time In Seconds = 1,761.962

Total Number of Records = 832 Million

TPCx-IoT Performance Metric (IoTps): 472,200.8760

Run Report for Repeatability Run

=====
TPCx-IoT Performance Metric (IoTps) Report

Total Time For Warmup Run In Seconds = 2,113.894

Total Time In Seconds = 1,731.521

Total Number of Records = 832 Million

TPCx-IoT Performance Metric (IoTps): 480,502.4022

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Abstract

This document contains the methodology and results of the TPC Express Benchmark™ IoT (TPCx-IoT) test conducted in conformance with the requirements of the TPCx-IoT Standard Specification, Revision 1.0.3.

The test was conducted for a Scale Factor of 832 Million records with Supermicro A+ Server 2014TP-HTR with 4x H12SST-PS Nodes running HBase 2.0.0 on Cloudera Distribution for Apache Hadoop Edition 6.0.1 on Red Hat Enterprise Linux Server Release 7.6.

This benchmark is now submitted for the Peer Review Board consisting of members of the TPCx-IoT sub-committee.

Measured Configuration

Company Name	Cluster Node	Virtualization	Operating System
Super Micro Computer, Inc	Supermicro A+ Server 2014TP-HTR	Not Used	Red Hat Enterprise Linux Server Release 7.6

TPC Express Benchmark© IoT Metrics

Total System Cost	IoTps	Price/Performance	Availability Date
138,580 USD	472,200.88	\$293.48 USD	Aug 31, 2019

Preface

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. The 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. The 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: TPCx-IoT Specification document, TPCx-IoT Users Guide documentation, 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 Super Micro Computer, Inc.

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 contain 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 (e.g., 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.*

Measured Configuration:

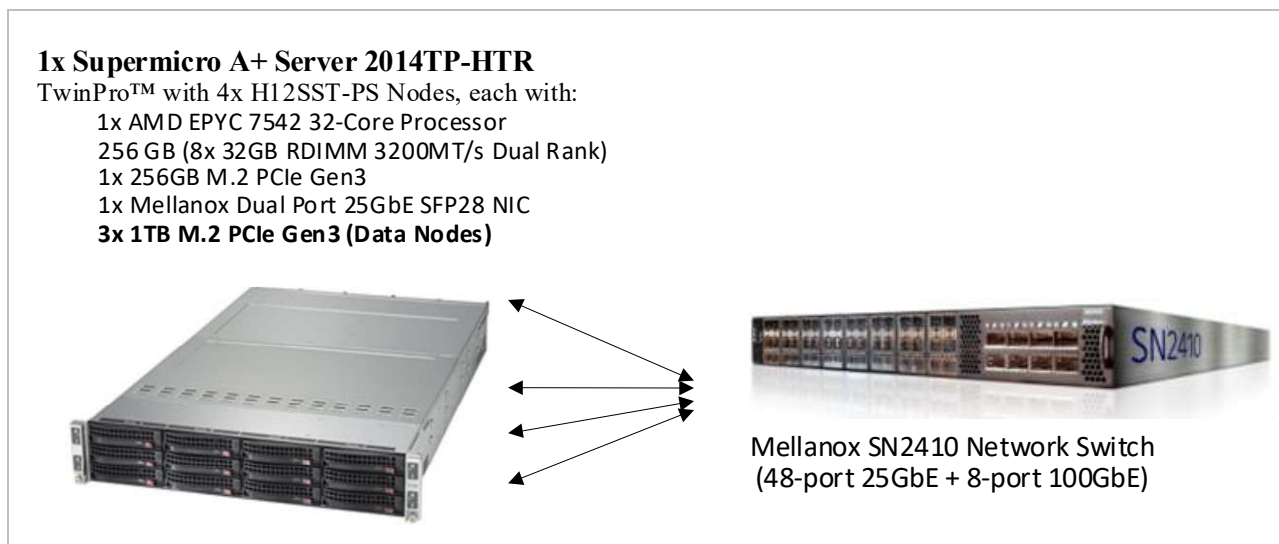


Figure 1-1 Measured Configuration

The measured configuration consisted of

- Total Nodes: 4
- Total Processor/Cores/Threads: 4/128/256
- Total Memory: 1.02TB
- Total Number of Storage Devices: 13
- Total Storage Capacity: 10 TB

Server nodes details:

- Supermicro A+ Server 2014TP-HTR, TwinPro™ with 4x H12SST-PS Nodes, each with:
 - Processors/Cores/Threads: 1/32/64
 - Processor Model: 1x AMD EPYC™ 7542 2.9GHz 32-core
 - Memory: 256GB (8 x 32GB RDIMM 3200MT/s Dual Rank)
 - Drives: 1x 256GB M.2 PCIe Gen3 (for all Servers)
3x 1TB M.2 PCIe Gen3 (for all Data Node Servers)
 - Network: 1x Supermicro AOC-MH25G-m2S2T Dual Port 25GbE SFP28 NIC

Priced Configuration:

There are no differences between the priced and measured configurations.

1.4 Dataset Distribution

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

Table 1.4 describes the distribution of the dataset across all media in the system.

Table 1.4: Dataset Distribution

Server Node	Storage	Disk Drive	Description of Content
1	M.2 PCIe Gen3	NVMe2n1	Operating System, Swap, Hadoop Master, Root, Temp
2-4	M.2 PCIe Gen3	NVMe0n1, NVMe1n1, NVMe3n1	Data, Temp

1.5 Software Components Distribution

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

Table 1.5 describes the distribution of the software components across the system.

Table 1.5: Software Component Distribution

Node	HDFS		HBase		YARN		Zoo Keeper
	NameNode	DataNode	Master	Region Server	Resource Manager	Node Manager	
1	X		X		X		X
2-3		X		X		X	X
4		X		X		X	

NoSQL Database version must be disclosed.

HBase -2.0.0 on Cloudera Distribution for Apache Hadoop 6.0.1

Clause 2: Workload Related Items

2.1 Hardware & Software Tunable

Script or text used to set for all hardware and software tunable parameters must be reported.

The Supporting File Archive contains all configuration scripts.

2.2 Run Report

The run report generated by TPCx-IoT benchmark kit must be reported.

The Supporting File Archive contains the full run report. Following are extracts from the run report that lists the performance summary for both runs.

Run Report for Performance Run

```
=====
TPCx-IoT Performance Metric (IoTps) Report

Total Time For Warmup Run In Seconds = 2,079.425
Total Time In Seconds = 1,761.962
Total Number of Records = 832 Million

TPCx-IoT Performance Metric (IoTps): 472,200.8760
=====
```

Run Report for Repeatability Run

```
=====
TPCx-IoT Performance Metric (IoTps) Report

Total Time For Warmup Run In Seconds = 2,113.894
Total Time In Seconds = 1,731.521
Total Number of Records = 832 Million

TPCx-IoT Performance Metric (IoTps): 480,502.4022
=====
```

2.3 Benchmark Kit Identification

Version number of TPCx-IoT kit and checksum for the jar file and master Programs must be reported.

Kit Version	1.0.3
24d1e8079cfdd240f266041bca0333b5	./TPC-IoT-master.sh
68379f9375c7b584fc3253dfe9c4f7a6	./tpcx-iot/lib/core-0.13.0-SNAPSHOT.jar
7bebf1e17d5c2b380df575fad160d7f8	./IoT_cluster_validate_suite.sh

2.4 Benchmark Kit changes

No Modifications were made to the TPC provided kit.

Clause 3: Scale Factors and Metrics

3.1 Total Run Time

	Run 1	Run 2
Total Run Time	1,761.962	1,731.521

3.2 Performance and Price Performance

The performance metric (IoTps) must be disclosed for Run1 and Run2. Price-performance metric (\$/IoTps) must be disclosed for the performance run.

	Run 1	Run 2
IoTps	472,200.88	480,502.40

\$/kIoTps	\$293.48
------------------	-----------------

3.3 System Configuration Information

Storage System Software	Operating System	Other Software	System Availability Date
	Red Hat Enterprise Linux Server Release 7.6		Aug 31, 2019

Cloudera 6.0.1	
Component	Package Version
Apache Hadoop	hadoop-3.0.0+cdh6.0.1
HBase	hbase-2.0.0+cdh6.0.1
YARN	yarn-3.0.0+cdh6.0.1
Zookeeper	zookeeper-3.4.5+cdh6.0.1

Supporting File Index

The following index outlines the information included in the supporting file archive.

Storage System Software	Operating System	System Availability Date
Clause 1	Parameters and options used to configure and tune the SUT	Supporting Files Archive/Clause1
Clause 2	Configuration Scripts and Run Report	Supporting Files Archive/Clause2
Clause 3	System Configuration Details	Supporting Files Archive/Clause3

Third party Price Quotes

Mellanox SN2410 Switch

The screenshot shows the Mellanox website's product page for the MSN2410-CB2F switch. The header includes the Mellanox logo, contact information (toll-free: 855-897-1098), and navigation links like 'Get a Quote' and 'CART 1'. The breadcrumb trail is: Home > Switches > Ethernet Switches > SN2000 > SN2410 > 100GbE > Mellanox MSN2410-CB2F Spectrum 25GbE/100GbE 1U O... The product title is 'Mellanox MSN2410-CB2F Spectrum 25GbE/100GbE 1U Open Ethernet Switch with Mellanox Onyx 48 SFP28 Ports 8 QSFP28 Ports 2 Power Supplies AC x86 Dual Core Short Depth P2C Airflow Rail Kit RoHS6'. The MSRP is \$25,387.00. The page also features a product image, a 'Need it fast?' note, and a 'Download MSN2410-CB2F' link.

The screenshot shows the Mellanox website's product page for technical support. The header is identical to the previous screenshot. The breadcrumb trail is: Home > Support and Services > Hardware Support > Ethernet Hardware Support > Ethernet Switch Support > SN2000 Switch Support > Mellanox SUP-SN2000-3S-4H Technical Support and Warr... The product title is 'Mellanox SUP-SN2000-3S-4H Technical Support and Warranty - Silver 3 Year with 4 Hours On-Site Support for SN2000 Series Switch'. The MSRP is \$2,475.00. The page features the Mellanox logo with the tagline 'Connect. Accelerate. Outperform.' and 'Add to Cart'/'Get a Quote' buttons.

Miscellaneous Items

The screenshot shows a web browser window displaying the Mellanox official store. The URL is <https://store.mellanox.com/products/mellanox-mcp2m00-a001e30n-passive-copper-cable-eth-up-to-25gb-s-sfp28-1m-black-30...>. The page features a blue header with the text "THE OFFICIAL STORE", a search bar, and a "Get a Quote" button. Below the header is a navigation menu with categories: ADAPTERS, INTERCONNECT, SWITCHES, CERTIFIED REFURBISHED, SUPPORT AND SERVICES, and CUSTOMER SERVICE. The breadcrumb trail reads: Home > Interconnect > Ethernet Cables > Direct Attach Copper Cables > 25GbE > Mellanox MCP2M00-A001E30N Ethernet Passive Copper Cable 25GbE SFP28 1... The main product area displays a "Ships same day" badge, the product title "Mellanox MCP2M00-A001E30N Ethernet Passive Copper Cable 25GbE SFP28 1m Black 30AWG CA-N", and the MPN "MCP2M00-A001E30N" with a "Condition: New" tag. On the left is an image of the cable. On the right, a table lists specifications: Availability (Ships same day), Price (\$52.00), Condition (New), Technology (Ethernet), Max Speed (25GbE), Material (Copper), Connector Type (SFP28), Passive/Active (Passive), Length (2.0m & under), ECCN (EAR99), and Product Brief (Download MCP2M00-A001E30N). To the right of the table are "Quantity" controls (set to 1), an "Add to Cart" button, and a "Get a Quote" button.


Availability:	Ships same day
Price:	\$52.00
Condition:	New
Technology:	Ethernet
Max Speed:	25GbE
Material:	Copper
Connector Type:	SFP28
Passive/Active:	Passive
Length:	2.0m & under
ECCN:	EAR99
Product Brief:	Download MCP2M00-A001E30N

← → ↻ https://www.fs.com/products/36113.html?currency=USD&paid=google_shopping&gclid=CjwKCAjwgqbpBRAREiwAF046Je8kWwdzTwSSWT_mJUTHy... ☆ 🍪 🌐

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


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StarTech.com 12U Open Frame Server Rack - Adjustable Depth - 4-Post Data Rack - w/ Casters/Levelers/Cable Management Hooks (4POSTRACK12U)
by StarTech
★★★★★ 123 customer reviews
| 46 answered questions
Amazon's Choice for "server rack"

Price: **\$195.99** ✓prime

Thank you for being a Prime member. Get \$80 off instantly: Pay \$115.99 upon approval for the Amazon Prime Rewards Visa Card.

Free Amazon tech support included

Size: **12U** Adjustable Posts Slide-Out

Style: **with Casters** No Casters

Roll over image to zoom in.

The screenshot shows an Amazon product page for a ViewSonic VA2055SA 20-inch 1080p LED monitor. The page includes the Amazon Prime logo, a search bar with "led monitor" entered, and the user's location set to Fremont, CA. The product title is "ViewSonic VA2055SA 20 Inch 1080p LED Monitor with VGA Input and Enhanced Viewing Comfort". The price is listed as \$79.00 with Prime benefits. A "prime now" banner offers \$15 off orders over \$35. The product image shows the monitor displaying the ViewSonic logo and a parrot graphic. The page also features a "Back to results" link, a "VIDEO" icon, and a list of related products on the left. The right side of the page contains product details, including customer reviews (207 reviews, 4.5 stars) and a "FREE Amazon tech support included" note.

The screenshot shows the Amazon website interface. At the top, the navigation bar includes the Amazon Prime logo, a search bar with the text "keyboard and mouse", and the Prime logo. Below the navigation bar, there is a banner for Amazon Fresh with a watermelon icon and the text "Save up to 40% on groceries". The main content area features a product listing for the "AmazonBasics USB Wired Computer Keyboard and Wired Mouse Bundle Pack". The product image shows a black keyboard and a black mouse. To the right of the image, the product title is displayed, followed by the brand name "AmazonBasics", a star rating of 4.5 stars, and the number of reviews "1,989 customer reviews". Below the reviews, there is a badge for "Amazon's Choice" for "keyboard and mouse". The price is listed as "\$14.56" with a Prime logo and the text "FREE One-Day & FREE Returns". A promotional message states: "Thank you for being a Prime member. Get \$80 off instantly: Pay \$0.00 upon approval for the Amazon Prime Rewards Visa Card." Below the price, there is a "Style" section with two options: "1-Pack" for "\$14.56" and "10-Pack" for "\$122.30", both with Prime logos.