



TPC Express Benchmark™ IoT
Full Disclosure Report

TimechoDB 1.3.2.2
Based on Apache IoTDB

running on

Alibaba Cloud Elastic Compute Service

with

CentOS Stream 8 64-bit

TPCx-IoT Version	2.1.1
Report Edition	First
Report Submitted	July 24, 2024

First Edition – July 2024

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Therefore, the TPC Express Benchmark™ 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

Timecho conducted the TPC Express Benchmark™ IoT (TPCx-IoT) on a 2-node TimechoDB cluster with two-way replication, with each node deployed on a separate Alibaba Cloud Elastic Compute Service instance. The software used included TimechoDB 1.3.2.2. 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 2.1.1. The benchmark results are summarized below.

Configuration Summary



Sponsor	Cluster Nodes	Storage Software	Operating System
Timecho	Alibaba Cloud Elastic Compute Service Server	TimechoDB 1.3.2.2 based on Apache IoTDB	CentOS Stream 8 64-bit (Security Hardened)


TPC Express Benchmark™ IoT Metrics

Total System Cost(USD)	IoTps	USD/KIoTps	Avaliability Date
\$297,835.08	10,671,241.41	\$27.91	July 24, 2024

Executive Summary

The [Executive Summary](#) follows on the next several pages.


	TimechoDB 1.3.2.2 based on Apache IoTDB	TPCx-IoT 2.1.1	
		TPC Pricing 2.9.0 Report Date July 24,2024	
Total System Cost \$297,835.08 USD	TPCx-IoT Performance Metric 10,671,241.41 IoTps	Price/Performance \$27.91 USD/kIoTps	
Servers	Operating System	Other Software	Avaliability Date
ecs.g8a.48xlarge	CentOS Stream 8 64-bit	None	July 24, 2024
System Under Test Configuration Overview			
			
Server 1: 1 x ecs.g8a.48xlarge CentOS Stream 8 64-bit 192 vCPU Processor 768 GB Memory 10 x 900GB Enhanced SSD		Server 2: 1 x ecs.g8a.48xlarge CentOS Stream 8 64-bit 192 vCPU Processor 768 GB Memory 10 x 900GB Enhanced SSD	
Total Servers:		2 Alibaba Cloud ECSs -2x ecs.g8a.48xlarge	
Total Processors/Cores/Threads:		2/192/384	
Server Configuration:		2x TimechoDB Instances	
Processor:		1x ecs.g8a.48xlarge (AMD EPYC 9T24 96-Core Processor)	
Memory:		768GB	
Storage Device:		10x 900GB Alibaba Cloud ESSD	
Network Controller:		Bandwidth: 64 Gbps	
Connectivity:		Alibaba Cloud Elastic Compute Service	


	TimechoDB 1.3.2.2 based on Apache IoTDB	TPCx-IoT	2.1.1
		TPC Pricing	2.9.0
		Report Date July 24,2024	

Description	Part Number	Source	List Price (USD)	Qty	Extended Price (USD)	3 yr. Maint. Price (USD)
Licensed Compute Services						
Alibaba Cloud Elastic Compute Service		1	61,361.79	6	368,170.74	included
1-Year Plan Auto-renewal						
- Alibaba Cloud ECS Instance: ecs.g8a.48xlarge	ecs.g8a.48xlarge	1	included	2		
- 128GB ESSD System Disk		1	included	2		
- 900GB ESSD Data Disk		1	included	20		
- Private Network		1	included	1		
					Sub-Total	\$368,170.74 USD
Licensed Software Services						
CentOS Stream 8 64-bit		1	included	2		
3-Year TimechoDB 1.3.2.2 License (incl. 1-year 24*7 Support)		2	60,000	1	60,000	
1-Year TimechoDB 24*7 Support		2	12,000	2	24,000	
					Sub-Total	\$84,000 USD
Discounts*						
Alibaba Cloud ECS (37.36%)		1	(22,922.61)	6	(137,535.66)	
3-Year TimechoDB 1.3.2.2 License		2	(12,000)	1	(12,000)	
1-Year TimechoDB 24*7 Support		2	(2,400)	2	(4,800)	
					Sub-Total	(\$154,335.66 USD)
					Total	\$297,835.08 USD

<u>Price Sources:</u> 1) Alibaba Cloud, 2) Timecho * 37.36% OFF discount is directly applied for over 12 months subscription in all Alibaba Cloud regions. *20% OFF discount is based on list price for the deployment of small clusters of TimechoDB.	Three-Year Cost of Ownership:	\$297,835.08 USD	
		IoTps:	10,671,241.41
		USD/kIoTps:	\$27.91 USD/kIoTps

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.

	TimechoDB 1.3.2.2 based on Apache IoTDB	TPCx-IoT 2.1.1 TPC Pricing 2.9.0 Report Date July 24,2024
Numerical Quantities		
Scale Factor	21,000,000,000	
<hr/> Performance Run (Run1)		
Warmup Run Start Time	2024-07-03 17:57:48.000	
Warmup Run End Time	2024-07-03 18:30:45.000	
Warmup Run Elapsed Time	1,975.967	
Measured Run Start Time	2024-07-03 18:30:45.000	
Measured Run End Time	2024-07-03 19:03:20.000	
Measured Run Elapsed Time	1,954.347	
Performance Metric (IoTps)	10,745,277.07	
<hr/> Repeatability Run (Run2)		
Warmup Run Start Time	2024-07-03 19:21:41.000	
Warmup Run End Time	2024-07-03 19:55:49.000	
Warmup Run Elapsed Time	2,046.969	
Measured Run Start Time	2024-07-03 19:55:50.000	
Measured Run End Time	2024-07-03 20:28:38.000	
Measured Run Elapsed Time	1,967.906	
Performance Metric (IoTps)	10,671,241.41	

	<p align="center">TimechoDB 1.3.2.2 based on Apache IoTDB</p>	<p>TPCx-IoT 2.1.1 TPC Pricing 2.9.0 Report Date July 24,2024</p>
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Performance Run Report (Run1)

=====

TPCx-IoT Performance Metric (IoTps) Report

Test Run1 details Total Time For Warmup Run In Seconds = 1,975.967
 Test Run1 details Total Time In Seconds = 1,954.347
 Total Number of Records = 21,000,000,000

TPCx-IoT Performance Metric (IoTps): 10,745,277.07

=====


Repeatability Run Report (Run2)

=====

Test Run2 details Total Time For Warmup Run In Seconds = 2,046.969
 Test Run2 details Total Time In Seconds = 1,967.906
 Total Number of Records = 21,000,000,000

TPCx-IoT Performance Metric (IoTps): 10,671,241.41

=====

	<p align="center">TimechoDB 1.3.2.2 based on Apache IoTDB</p>	<p>TPCx-IoT 2.1.1 TPC Pricing 2.9.0 Report Date July 24,2024</p>
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Revision History

Date	Edition	Description
July 24, 2024	First	Initial Publication

Table of Contents

- Abstract 3
- Executive Summary 3
- Table of Contents 9
- Clause 0 Preamble 10
 - 0.1 TPC Express Benchmark™ IoT Overview 10
- Clause 1 General Items 11
 - 1.1 Test Sponsor 11
 - 1.2 Parameter Settings 11
 - 1.3 Configuration Diagrams 11
 - 1.3.1 Measured Configuration 12
 - 1.3.2 Priced Configuration 13
 - 1.4 Dataset Distribution 13
 - 1.5 Software Component Distribution 13
- Clause 2 Workload Related Items 14
 - 2.1 Hardware and Software Tunable Parameters 14
 - 2.2 Run Report 14
 - 2.3 Benchmark Kit Identification 15
 - 2.4 Benchmark Kit Changes 15
- Clause 3 Scale Factor and Metrics 16
 - 3.1 Scale Factor, Performance, Price-Performance 16
- Third-Party Price Quotes 17
 - Alibaba Cloud, Elastic Compute Service 17
 - Timecho, TimechoDB 3-Year Subscription 21
- Supporting File Index 22

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 Timecho Technology (Beijing) Co. Ltd.

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 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.

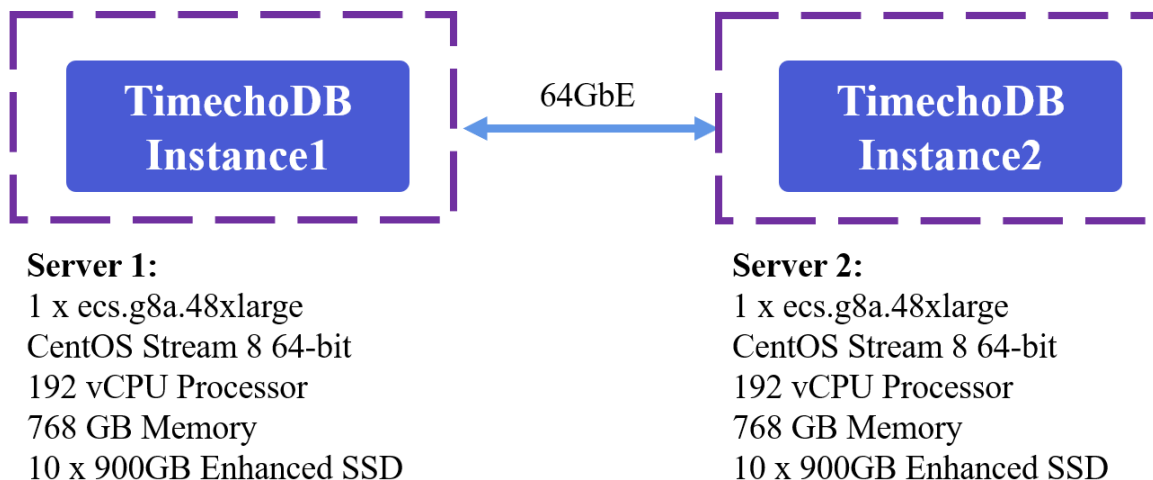


Figure 1-1 Measured Configuration

The measured configuration consisted of:

Total Nodes:	2
Total Processors/Cores/Threads:	2/192/384
Total Memory:	1,536GB
Total Number of Storage Devices:	20
Total Storage Capacity:	18,000GB
Connectivity:	2x Alibaba Cloud ECS Service (Bandwidth: 64Gbps)
Servers:	TimechoDB Instance
Processors/Cores/Threads:	1/96/192
Processor Model:	1x ecs.g8a.48xlarge(AMD EPYC 9T24 96-Core Processor)
Memory:	768GB
Storage Devices:	10x 900GB Alibaba Cloud ESSD
Network:	Bandwidth: 64Gbps

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	Storage	Disk Drive	Description of Content
1-2	System Storage	1x 128GB Alibaba Cloud ESSD	Operating System, Swap, Root, Temp
	Data Storage	10x 900GB Alibaba Cloud ESSD	TimechoDB Data

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	TimechoDB ConfigNode	TimechoDB DataNode
1	X	X
2	X	X

Table 1-2 Software Component Distribution Across Nodes

The storage system software used was TimechoDB 1.3.2.2.

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 the parameters used to configure the components involved in this benchmark

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.

Performance Run Report (Run1)	
=====	
TPCx-IoT Performance Metric (IoTps) Report	
Test Run1 details	Total Time For Warmup Run In Seconds = 1,975.967
Test Run1 details	Total Time In Seconds = 1,954.347
	Total Number of Records = 21,000,000,000
TPCx-IoT Performance Metric (IoTps): 10,745,277.07	
=====	
Repeatability Run Report (Run2)	
Test Run2 details	Total Time For Warmup Run In Seconds = 2,046.969
Test Run2 details	Total Time In Seconds = 1,967.906
	Total Number of Records = 21,000,000,000
TPCx-IoT Performance Metric (IoTps): 10,671,241.41	
=====	

2.3 Benchmark Kit Identification

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

TPCx-IoT Kit Version	2.1.1
----------------------	-------

File	MD5
TPC-IoT-master.sh	cc24620cfdee08290d771c5471a8d1ee
tpcx-iot/timechodb-binding/lib/core- 0.13.0-SNAPSHOT.jar	446b5d2220e9e4e79a9f47fa58c82b7e
IoT_cluster_validate_suite.sh	b2342754095f973ce27f43c28d3ca0ae

2.4 Benchmark Kit Changes

No modifications were made to the 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.

	Run1	Run2
Scale Factor	21,000,000,000	21,000,000,000
Measured Run Time (seconds)	1,954.347	1,967.906
IoTps	10,745,277.07	10,671,241.41

Run2 Price-Performance: 27.91 \$/kIoTps

Third-Party Price Quotes

Alibaba Cloud, Elastic Compute Service

Vendor

Alibaba Cloud, <https://www.alibabacloud.com/>

Quotation

The Elastic Compute Service (ECS) can be purchased directly on Alibaba Cloud at: https://www.alibabacloud.com/en/product/ecs?_p_lc=1

The server configuration is as detailed below:

Item	Configuration
ECS	China (Beijing) General-purpose Type g8a / ecs.g8a.48xlarge (192 vCPU 768 GiB) Image: CentOS Stream 8 64-bit (Security Hardened) System Disk: Enterprise SSD (ESSD) 128GiB, Release with Instance PL1 (up to 50,000 IOPS per disk) Data Disk (10 Disks): ESSD AutoPL Disk 900GiB, Release with Instance Pay-by-bandwidth 10Mbps

Notes:

The quote in the following screenshots represents 1-year subscription with auto-renewal.

The actual price of the product, offered by the official website, includes a 37.36% discount off the list price automatically.

The VAT rate of 6% applied for software services in China is included.

Billing Method Subscription Pay-as-you-go Preemptible Instance

Region
How to select a region
Note: After you create instances, you cannot change the regions of the instances. Instances in different regions cannot communicate with each other over the internal network. Select a region that is close to your users to reduce network latency and accelerate data transmission.

Network and Zone
How to select a zone
[Create VPC](#)

[Create vSwitch](#)
If you have ICP filing needs, exercise caution when you select zones. ICP filing is not available in the following zones of the current region: Zone I Zone L.

Instances & Images

Instance
How to select an instance type
Recently Used Instance Types **All Instance Types**

Filter Condition: 192 vCPU 768 GiB Search by instance type name I/O Optimized [View more specification parameters](#)

Architecture: x86 Arm-based GPU/FPGA/ASIC ECS Bare Metal Instance
 All Categories All Categories All Categories All Categories
 High-performance Computing All Categories

Instance Family	Instance Type	vCPUs	Memory	Supported Zones	Architecture	Reference Price
<input checked="" type="radio"/> General-purpose Type g8a	ecs.g8a.48xlarge	192 vCPU	768 GiB	21 Zones	x86-General	\$3640.75 USD/Month

Selected: General-purpose Type g8a, ecs.g8a.48xlarge with 192 vCPUs and 768 GiB of memory

Note: The selected instance is an AMD-based instance and cannot be changed to an Intel-based instance. To change the instance to an Intel-based instance, [submit a ticket](#).

Enable Jumbo Frames

Image
Recently Used Images **Public Images** Custom Images Shared Images Marketplace Images **REC** Community Images

Alibaba Cloud Linux	Anolis OS	Windows Server	SUSE Linux	Red Hat	Ubuntu	Debian
Fedora	OpenSUSE	Rocky Linux	CentOS Stream	AlmaLinux		

CentOS Stream 8 64-bit
 Free Security Hardening Load basic security components to ECS instances. The components provide security features such as website vulnerability check, cloud service configuration check, and unusual logon alerting. You can use Security Center to manage the features in a centralized manner.
 Auto-install eRDMA Driver It takes about 3 to 5 minutes to create the instance and install the ERI driver. The first time the instance starts, wait for 5 minutes and then check the installation status of the driver.
 Trusted System The trusted system checks and reports the integrity of components such as UEFI and GRUB in the system startup chain. It can also monitor the startup status of specified applications. [Learn More >](#)

[Image Characteristic](#) The image supports ecs-user as the default username. [Learn More >](#) [Show](#)

Storage

System Disk	Category	Size	Quantity	IOPS	Performance	Actions
-------------	----------	------	----------	------	-------------	---------

Enterprise SSD (... 128 GiB 1 8200 PL1 (Each PL1 ESSD can deliver u... Release with Instance Encryption

Cloud Disk Performance Disk performance varies based on the Cloud Disk category. [Learn about Cloud Disk performance metrics.](#)

Cloud Disk Capacity The total size of Cloud Disks that you can create is subject to a quota.

Data Disk + Add Data Disk (10/16)

Category	Size	Quantity	IOPS	Performance	Actions
Enterprise SSD (...	900 GiB	10	46800	PL1 (Each PL1 ESSD can deliver u...	<input checked="" type="checkbox"/> System-assigned Device Name <input checked="" type="checkbox"/> Release with Instance <input type="checkbox"/> Encryption Create from Snapshot

Snapshot Policy for System Disk Select an automatic snapshot policy [Create Automatic Snapshot Policy](#)

REC Policy for Data Disks Select an automatic snapshot policy

Snapshot Service Features Snapshots can be automatically created to periodically back up disk data and reduce the risk of data loss arising from various situ... [Show](#)

Note The selected automatic snapshot policies apply only to the disks that you create for the instances this time. For disks that are created after the instances are created, you must apply automatic snapshot policies separately.

NAS File System(Optional)

Bandwidths & Security Groups

Public IP Address Assign Public IPv4 Address
The system assigns an IP address. You can also use a more flexible EIP solution. For more information, see [Configure and associate an EIP](#).

Bandwidth Billing Method

Bandwidth 1 2 3 5 10 50 100 200 Mbps 10 Mbps

Mitigation Capacity Alibaba Cloud provides a DDoS mitigation capacity of up to 5 Gbit/s free of charge. [Learn More](#) > | [Improve Mitigation Capacity](#) >

Security Group Existing Security Group New Security Group

How to configure a security group

Security Group Name custom-security-group-20240724

Security Group Type [Comparison Between Basic and Advanced Security Groups](#)

Open IPv4 Ports/Protocols SSH (TCP:22) HTTP (TCP:80) HTTPS (TCP:443) RDP (TCP:3389) ICMP (IPv4)

Note If you select SSH (TCP:22), a security group rule that uses 0.0.0.0/0 as the source is added to allow inbound access from all IP addresses on port 22. After you create instances, we recommend that you modify the security group rule to allow inbound access only from specific IP addresses.

ENI Specify a vSwitch

IPv6 Specify a vSwitch.

ENI | IPv6(Optional)

Management

Logon Credential

Logon Username root ecs-user
The root account is the most privileged account of an operating system. You may face security risks if you use root as your logon username. We recommend that you use ecs-user instead. [Learn More](#)>

Key Pair Test

Tag + Add Tags (0/20)
How to design tags A tag is a case-sensitive key-value pair. The specified tags are added to all the instances and disks that you are creating.

Advanced Settings(Optional) Instance Name | Description | Hostname | Sequential Suffix | Instance RAM Role | Metadata Access Mode | User Data | Resource Group | Deployment

Quantity: 1

Duration: 1 Year

Auto-renewal: Enable Auto-renewal

Configuration Summary

Billing Method	Subscription	Region	China (Beijing)
Zone	Random	Network Type	VPC
VPC	Default VPC	vSwitch	Default vSwitch
Instance Type	General-purpose Type g8a / ecs.g8a.48xlarge (192 vCPU 768 GiB)	Image	CentOS Stream 8 64-bit(Security Hardened)
System Disk	Enterprise SSD (ESSD) 128GiB Release with Instance PL1 (up to 50,000 IOPS per disk)	Data Disk	10 Disks...
Public Bandwidth	Pay-by-bandwidth 10Mbps	Security Group	Default Security Group
Logon Credential	Key Pair - Test	Tag	No Tags Added
Instance Name	launch-advisor-20240724	Metadata Access Mode	Normal Mode and Security Hardening Mode

Instance Price: **\$38439.18USD** Add to Cart Create Order

Quantity: 1

Duration: 1 Year

Auto-renewal: Enable Auto-renewal

Configuration Summary

Billing Method	Subscription
Zone	Random
VPC	Default VPC
Instance Type	General-purpose Type g8a / ecs.g8a.48xlarge (192 vCPU 768 GiB)
System Disk	Enterprise SSD (ESSD) 128GiB Release with Instance PL1 (up to 50,000 IOPS per disk)
Public Bandwidth	Pay-by-bandwidth 10Mbps
Logon Credential	Key Pair - Test
Instance Name	launch-advisor-20240724

Expense Details

List Price	\$61361.79USD
Discounted Price	\$38439.18USD
Instance Type	\$23417.29USD
System Disk	\$199.76USD
Data Disk	\$1404.54USD
Data Disk	\$1404.54USD
Data Disk	\$1404.54USD
Data Disk	\$1404.54USD
Data Disk	\$1404.54USD
Data Disk	\$1404.54USD
Data Disk	\$1404.54USD
Data Disk	\$1404.54USD
Data Disk	\$1404.54USD
Data Disk	\$1404.54USD
Data Disk	\$1404.54USD
Data Disk	\$1404.54USD
Bandwidth	\$776.73USD
Total	\$38439.18USD

ECS Terms of Service | Product Terms of Service

Add to Cart Create Order

Timecho, TimechoDB 3-Year Subscription



Company Name	Quote No.:	PPxxxxxxxx
Contact Person	Date:	2024-07-01
E-Mail	Customer ID:	xxxxxxxx
Company Address	Contact:	xxxxxxxx
Zip code and City	E-Mail:	contact@timecho.com
	Telefon:	+86 (0) 10-62780978
		+49 (0) 711-81048763

Quote No. PPxxxxxxxx

Dear Sir or Madam,

Thank you for your inquiry. We offer our products and services exclusively under the following conditions. The offer is based on the data and requirements available at the time of the offer.

No.	Product	Qty	List Price	Supply Price	Total Price
01	TimechoDB v1.3.2.2 based on Apache IoTDB - 2-node Cluster with 2-way Replication - Timecho Monitoring Dashboard - Timecho Workbench - OpsKit (Cluster Management Tool) - 1-year Free Support	1	60,000	48,000	48,000 USD
02	Maintenance 1-year Support 24*7 inkl. remote troubleshooting, debug, updates, data migration tools, etc.	2	12,000	9,600	19,200 USD
Total:					67,200 USD

Notes:

- Quotation: TimechoDB Cluster Edition License (2 Nodes) and 3 years Maintenance.
- Maintenance: Free maintenance for 1 year after the contract, 20% of maintenance rate applied afterwards.
- Payment terms: Payment within 21 days from receipt of invoice without deductions.
- The VAT rate of 13% applied for software goods is included.
- Quotation validity period: 90 days from the date of quote.

Best regards,
Timecho Team

Supporting File Index

Clause	Description	Archive Pathname
Clause 1	Parameters and options used to configure and tune the SUT	/Clause1
Clause 2	Clause 2	/Clause2
Clause 3	System configuration details	/Clause3