

Open Data, Open Performance: The Future of Databases with Type III Architecture

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Fast data, 10y ago

- 1TB RAM, 128-core boxes
- Sending code to the data (stored procedures)
- Sharing by extracting data out of the big box
- Vendor lock-in: language, tools, storage



Fast data, now:

- Python, Pandas, Polars, RStudio, Spark, DuckDB
- Open data formats - Parquet
- Freedom to use data locally, local compute
- Leverage scalable, infinite and inexpensive storage infrastructure, such as S3, GCS, Azure Blob



Type III database

- Does not own data
- Does not force every workload through its APIs
- Does not force all logic to run in one place
- Language: **SQL**

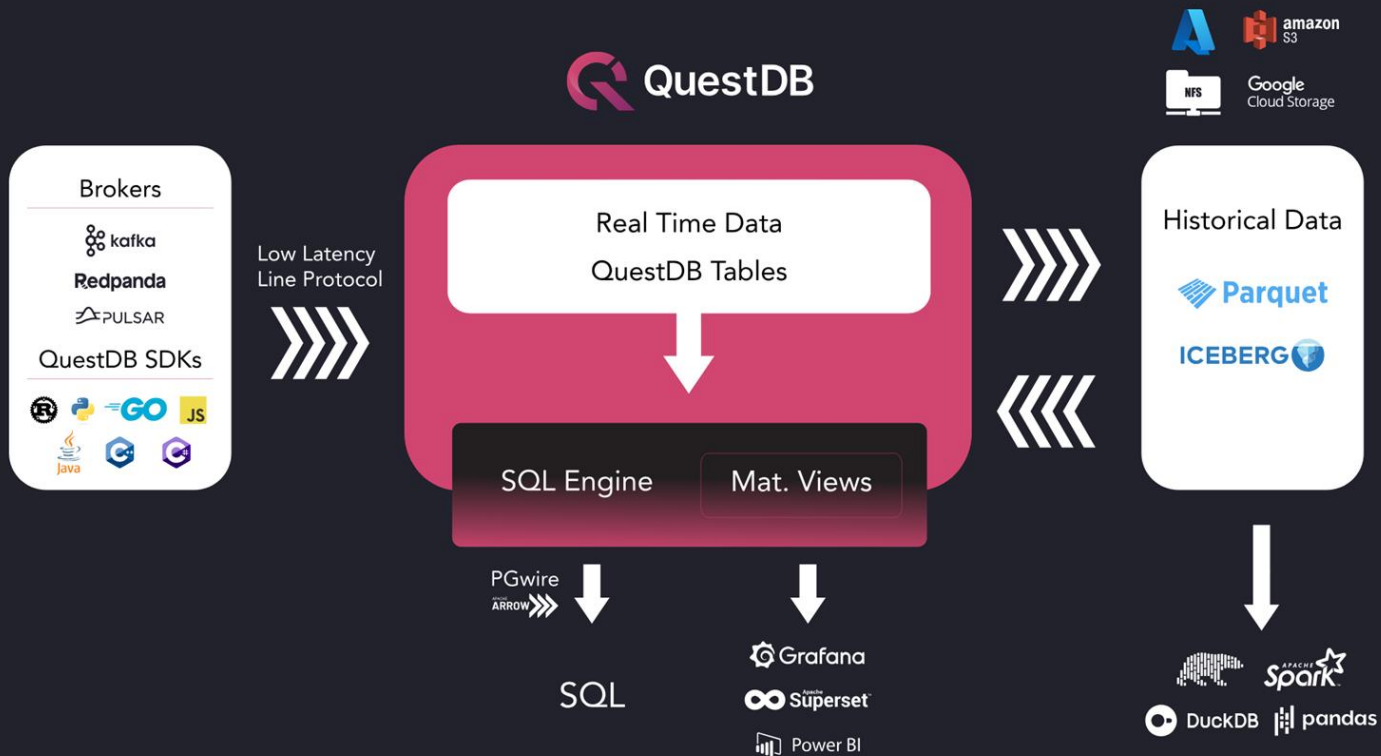


Type III database - Problems

- Object store is high latency, coarse-grained API storage, consistency issues
- Maintaining Parquet files on object store is clunky and high latency
- Querying Parquet optimally is complex



Introducing QuestDB



questdb Public Edit Pins Watch 135 Fork 1.1k Starred 14.3k

master 28 Branches 111 Tags Go to file Add file Code

	ideoma	test(core): test checkpoint create/restore with files hardlink copy ...	5fecfd · 18 hours ago	4,874 Commits
	.github	ci(build): invoke questdb.io build hook on release publish ...		2 weeks ago
	.idea	chore(core): remove jemalloc from no-jre build (#4488)		4 months ago
	artifacts	ci(core): release support pipeline to simplify the release a...		3 days ago
	benchmarks	perf(core): introduce static metadata cache (#4848)		3 days ago
	ci	test(core): test checkpoint create/restore with files hardli...		18 hours ago
	compat	build: 8.1.1 (#4928)		last week
	core	test(core): test checkpoint create/restore with files hardli...		18 hours ago
	examples	build: 8.1.1 (#4928)		last week
	i18n	chore(docs): Vietnamese README translation (#4358)		6 months ago
	pkg/am/marketplace	fix(sql): set default directory for read_parquet() and SQL ...		2 weeks ago
	utils	build: 8.1.1 (#4928)		last week
	win64svc	feat(core): configure to roll log files daily by default when ...		2 months ago
	.all-contributorsrc	chore(docs): Vietnamese README translation (#4358)		6 months ago
	.git-blame-ignore-revs	chore(build): git blame to ignore the reformatting commit ...		2 years ago
	.gitignore	chore(core): add rust language infrastructure (#4439)		5 months ago
	.gitmodules	feat(sql): new json_extract function to extract JSON fiel...		2 months ago
	CODEOWNERS	chore: switch to team-based codeowners (#1754)		3 years ago
	CODE_OF_CONDUCT.md	chore(docs): add Prettier formatting to project files (#1720)		3 years ago
	CONTRIBUTING.md	docs(core): add code formatting info to contributing guid...		2 years ago
	LICENSE.txt	fix: license changed to Apache 2.0. Fixed #80		5 years ago
	README.md	docs(core): update coinbase to oix in README.md (#489...		3 weeks ago

About

QuestDB is an open source time-series database for fast ingest and SQL queries

- questdb.io
- java
- iot
- postgres
- sql
- database
- big-data
- time-series
- analytics
- cpp
- grafana
- postgresql
- simd
- low-latency
- financial-analysis
- tsdb
- hacktoberfest
- time-series-database
- questdb

- Readme
- Apache-2.0 license
- Code of conduct
- Security policy
- Activity
- Custom properties
- 14.3k stars
- 135 watching
- 1.1k forks
- Report repository

Releases 85

8.1.1 (Latest) 2 weeks ago

+ 84 releases

Contributors 146

+ 132 contributors



Database Popularity

Rank			DBMS	Database Model	Nov 2024	
Nov 2024	Oct 2024	Nov 2023			Nov 2024	Nov 2023
1.	1.	1.	InfluxDB	Time Series, Multi-model	21.47	-7.55
2.	2.	2.	Kdb	Multi-model	7.06	-1.81
3.	3.	3.	Prometheus	Time Series	6.92	-0.90
4.	4.	5.	Graphite	Time Series	4.91	-0.31
5.	5.	4.	TimescaleDB	Time Series, Multi-model	3.68	-1.85
6.	6.	10.	QuestDB	Time Series, Multi-model	2.91	+0.89
7.	7.	7.	Apache Druid	Multi-model	2.70	-0.39
8.	8.	6.	DolphinDB	Multi-model	2.60	-1.40
9.	9.	8.	TDengine	Time Series, Multi-model	2.27	-0.57
10.	10.	11.	GridDB	Time Series, Multi-model	1.91	-0.08
11.	11.	9.	RRDtool	Time Series	1.70	-1.09
12.	12.	12.	OpenTSDB	Time Series	1.51	-0.36
13.	13.	13.	Fauna	Multi-model	1.43	-0.35
14.	14.	16.	Apache IoTDB	Time Series	1.41	+0.29
15.	15.	14.	VictoriaMetrics	Time Series	1.28	-0.20

QuestDB is the fastest growing Time Series database

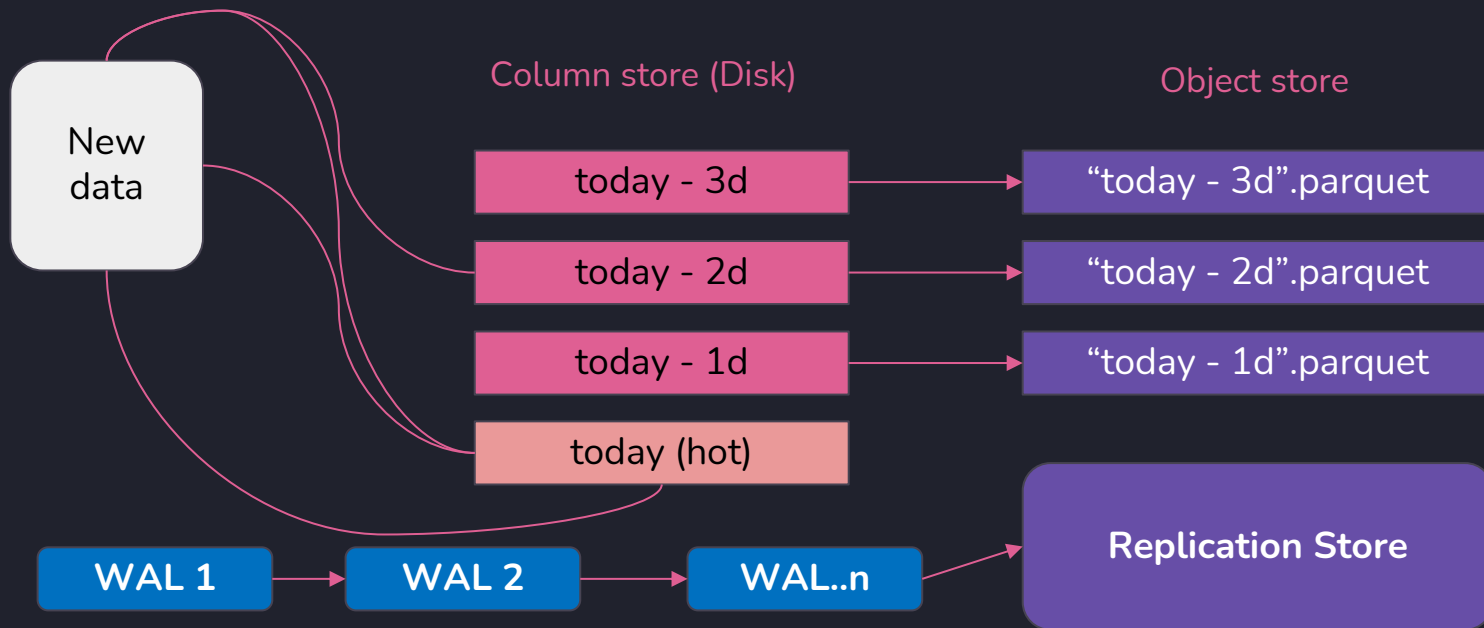


QuestDB - Data flow

- High performance, **low-latency ingress** sink. In-order, out-of-order, dedup, small batches, big batches
- Direct access to Parquet partitions on object store
- High performance data egress via **Apache Arrow**



Balancing hot + cold data: the data first mile



QuestDB - SQL engine

- Parallel, vectorized SQL execution, leverages JIT and data layout
- Low-latency SQL execution, for high-QPS applications
- Materialized views for OHLC and indicators (VWAP, MAVG)
- Spans multiple data formats and storages



Moving averages for Bitcoin price ⓘ Last 5 minutes

SHOW QUERY



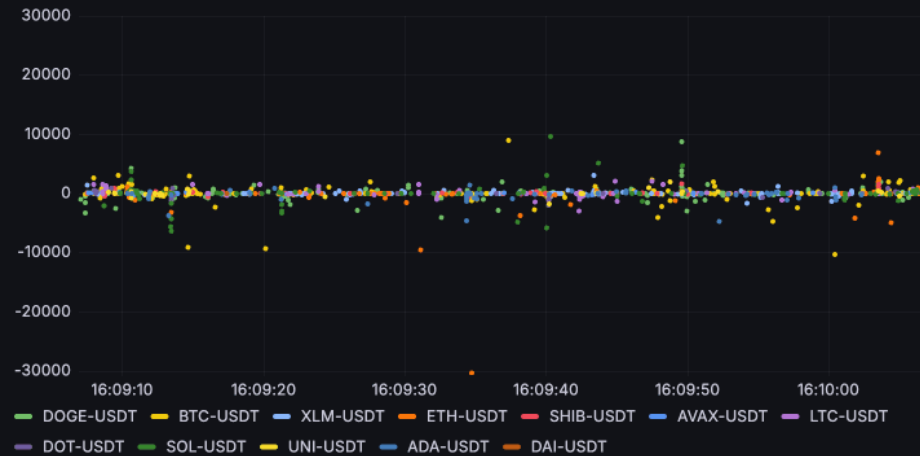
Bitcoin Candlestick Chart (OHLC) ⓘ Last 5 minutes

SHOW QUERY



Real-time trades ⓘ Last 1 minute

SHOW QUERY



Latest trades ⓘ Last 1 minute

SHOW QUERY

timestamp ↓	asset	counter	quantity	consideration	new
2024-11-16 16:13:58.736	ADA	USDT	-128	96.0	x
2024-11-16 16:13:58.736	ADA	USD	-128	96.0	x
2024-11-16 16:13:58.736	ADA	USDT	-159	119	x
2024-11-16 16:13:58.736	ADA	USD	-159	119	x
2024-11-16 16:13:58.388	DOGE	USDT	5103	-1862	x
2024-11-16 16:13:58.388	DOGE	USD	5103	-1862	x
2024-11-16 16:13:58.384	DOGE	USDT	2163	-789	x
2024-11-16 16:13:58.384	DOGE	USD	2163	-789	x
2024-11-16 16:13:58.266	SOL	USDT	5.79	-1242	x

QuestDB - Built for finance

- Optimised data re-sampling for charts, and mat views
- Coming soon - array data types to support Order Books
- Window functions for finance indicators
- ASOF joins optimised for data troubleshooting



Thousands of users, lots of which in Finance

Global banks



Laser Digital
NOMURA Group



Hedge funds

BREVAN HOWARD

WORLDQUANT.



WELWING
CAPITAL GROUP

Exchanges



BRAZILIAN
EXCHANGE
AND OTC



stock exchange

ASIANEXT

By SBI Digital Asset Holdings and SIX



ONE TRADING

Central banks



Banco de la República

We are the Central Bank of Colombia

Space

abl

space systems

Telco



Tech

yahoo!

Energy



BOSCH



Background about QuestDB

Team with decades of experience building low-latency trading software and large-scale databases



Fastest growing open source time-series database on Github

★ Starred 14.4k

Contributors 146

Raised funding from top US Venture Capital firms who invested in:



Check our live demo

Web Console + Example queries ▶ Run 🔍 Search docs

Tables

Filter...

- AAPL_orderbook
- ethblocks_json
- trades
- trips
- weather

SQL

```
1
2 /* This query finds each buy event, and joins with the most
3    recent sell event for the same symbol.
4    Note that we are filtering buys since 2024 and sells since
5    Dec 31st 2023. This is to make sure we always have a previous
6    sell row for each buy event */
7
8 WITH trade_buys AS (
9   SELECT timestamp, symbol, price, side
10  FROM trades
11  WHERE side = 'buy' AND timestamp IN '2024'
12 ), trade_sells AS (
13   SELECT timestamp, symbol, price, side
14  FROM trades
15  WHERE side = 'sell' AND timestamp > '2023-12-31'
16 )
17 SELECT * from trade_buys ASOF JOIN trade_sells ON (symbol);
```

Log [4:38:01 PM GMT+01:00] ✓ 239,442,009 rows in 384ms Execute: 281.98ms Network: 102.02ms Total: 384ms Count: 250.61ms Authentication: 680ns Compile: 2ms

239,442,009 rows

timestamp	symbol	price	side	timestamp1	symbol1	price1	side1
<small>timestamp</small>	<small>symbol</small>	<small>double</small>	<small>symbol</small>	<small>timestamp</small>	<small>symbol</small>	<small>double</small>	<small>symbol</small>
2024-01-01T00:00:00.314299Z	AVAX-USD	38.56	buy	2023-12-31T23:59:46.690587Z	AVAX-USD	38.51	sell
2024-01-01T00:00:00.314299Z	AVAX-USD	38.56	buy	2023-12-31T23:59:46.690587Z	AVAX-USD	38.51	sell
2024-01-01T00:00:00.315867Z	AVAX-USD	38.56	buy	2023-12-31T23:59:46.690587Z	AVAX-USD	38.51	sell
2024-01-01T00:00:00.315867Z	AVAX-USD	38.56	buy	2023-12-31T23:59:46.690587Z	AVAX-USD	38.51	sell

• Connected QuestDB 8.1.2

<https://demo.questdb.io/>

<https://github.com/questdb>

