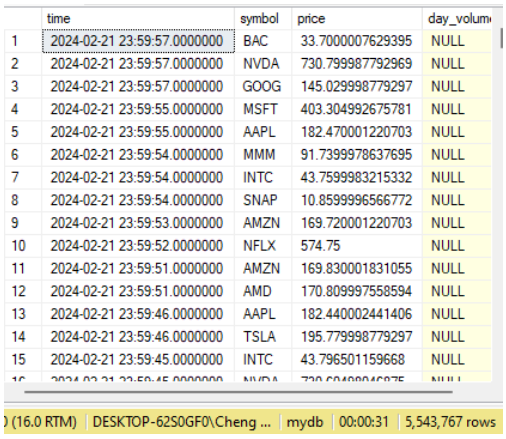
Preliminary Result of MSSQL database and PostgreSQL + TimescaleDB performance comparisons

SQL query:	SELECT * FROM stocks_real_time;		
Database	MSSQL	PostgreSQL + Timescale	Performance difference
Query time (5 Millions rows) Average of 10 trials	43.6 seconds +/- 12 seconds	3.302 seconds +/- 1.5 seconds	92% time reduction
Storage Usage	762 MB	61 Mb	92% size reduction

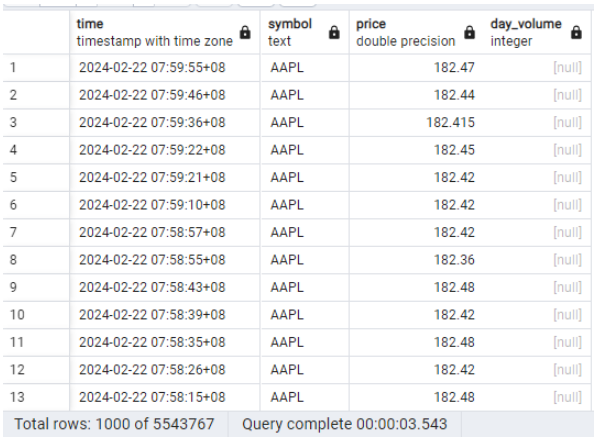
MSSQL



	time	symbol	price	day_volum
1	2024-02-21 23:59:57.0000000	BAC	33.7000007629395	NULL
2	2024-02-21 23:59:57.0000000	NVDA	730.799987792969	NULL
3	2024-02-21 23:59:57.0000000	GOOG	145.029998779297	NULL
4	2024-02-21 23:59:55.0000000	MSFT	403.304992675781	NULL
5	2024-02-21 23:59:55.0000000	AAPL	182.470001220703	NULL
6	2024-02-21 23:59:54.0000000	MMM	91.7399978637695	NULL
7	2024-02-21 23:59:54.0000000	INTC	43.7599983215332	NULL
8	2024-02-21 23:59:54.0000000	SNAP	10.8599996566772	NULL
9	2024-02-21 23:59:53.0000000	AMZN	169.720001220703	NULL
10	2024-02-21 23:59:52.0000000	NFLX	574.75	NULL
11	2024-02-21 23:59:51.0000000	AMZN	169.830001831055	NULL
12	2024-02-21 23:59:51.0000000	AMD	170.809997558594	NULL
13	2024-02-21 23:59:46.0000000	AAPL	182.440002441406	NULL
14	2024-02-21 23:59:46.0000000	TSLA	195.779998779297	NULL
15	2024-02-21 23:59:45.0000000	INTC	43.796501159668	NULL

(16.0 RTM) | DESKTOP-62S0GF0\Cheng ... | mydb | 00:00:31 | 5,543,767 rows

PostgreSQL + TimescaleDB



	time timestamp with time zone	symbol text	price double precision	day_volume integer
1	2024-02-22 07:59:55+08	AAPL	182.47	[null]
2	2024-02-22 07:59:46+08	AAPL	182.44	[null]
3	2024-02-22 07:59:36+08	AAPL	182.415	[null]
4	2024-02-22 07:59:22+08	AAPL	182.45	[null]
5	2024-02-22 07:59:21+08	AAPL	182.42	[null]
6	2024-02-22 07:59:10+08	AAPL	182.42	[null]
7	2024-02-22 07:58:57+08	AAPL	182.42	[null]
8	2024-02-22 07:58:55+08	AAPL	182.36	[null]
9	2024-02-22 07:58:43+08	AAPL	182.48	[null]
10	2024-02-22 07:58:39+08	AAPL	182.42	[null]
11	2024-02-22 07:58:35+08	AAPL	182.48	[null]
12	2024-02-22 07:58:26+08	AAPL	182.42	[null]
13	2024-02-22 07:58:15+08	AAPL	182.48	[null]

Total rows: 1000 of 5543767 | Query complete 00:00:03.543

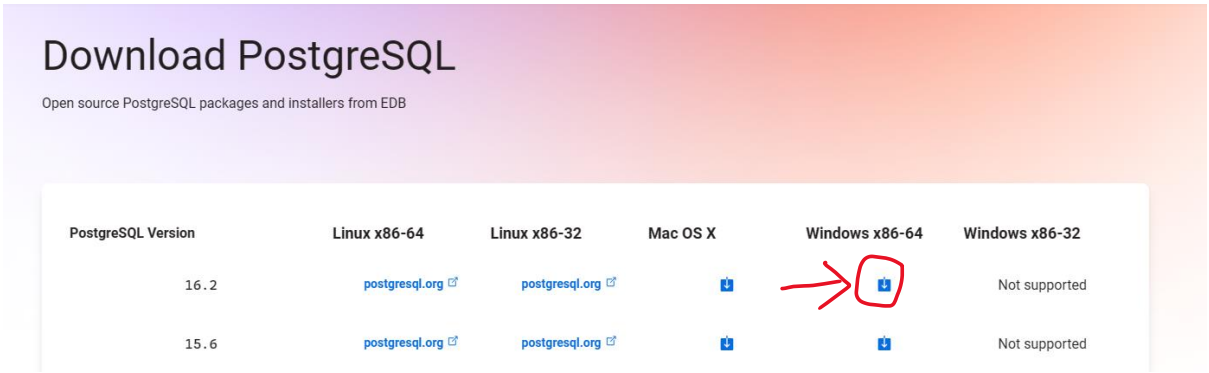
Tested on:
Windows Laptop
Processor 11th Gen Intel(R) Core(TM) i7-1165G7 @ 2.80GHz 1.69 GHz
Installed RAM 16.0 GB (15.7 GB usable)
System type 64-bit operating system, x64-based processor

Instruction on how to install PostgreSQL with TimescaleDB and migration from MSSQL to PostgreSQL

1. Installing the PostgreSQL application in Windows:

1. Using terminal
   - winget install postgresql.postgresql
   - winget install postgresql.pgadmin

2. Using Installer
   - Visit Community DL Page (enterprisedb.com) website and download the PostgreSQL version 16 for Windows x86-64



2. Download TimescaleDB

1. https://github.com/timescale/timescaledb/releases/download/2.13.1/timescaledb-postgresql-16-windows-amd64.zip
2. Install timescaleDB
3. Execute setup.exe file with administration access.
4. Enter “y” for all the questions
5. Restart PC

3. Create database and setup timescaleDB in PostgreSQL

- psql -U postgres
- create database <database name>
- \c <database name>
- CREATE EXTENSION IF NOT EXISTES timescaledb;
- \dx
- \q

4. Modify the PostgreSQL postgresql.conf configuration file

1. Change:
   listen_address = 'localhost'
   To:
   listen_address = '*'
2. Save the file.

5. Modify the PostgreSQL pg_hba.conf configuration file:

1. Change:
   host all all 127.0.0.1/32 scram-sha-256
   To:
   host all all 0.0.0.0/0 trust
2. Restart PC

6. Setup ignition with PostgreSQL database

1. Configure a new database connection to Postgres DB using previously defined credentials.
2. Ignition Gateway > Config > DATABASES > Connections > Create new Database Connection > PostgreSQL > Next
   - Name = TIMESCALEDB
   - JDBC Driver = PostgreSQL's
   - Connect URL = jdbc:postgresql://:5432/<database bane>
   - Username = postgres
   - Password = password
3. The rest of the settings are left as default. Click the “Create New Database Connection” button. Verify created connection status is valid.
4. Configure tag history provider
   - Ignition Gateway > Config > TAGS > History > TIMESCALEDB > edit
   - **Important**! The “**Data Partitioning**” & the “**Data Pruning**” settings **must be disabled**!

7. Migrate data from MSSQL database to PostgreSQL database.

1. Generate script from MSSQL for schema.
2. Dump tables.
3. Load SQL script to postgresql
4. Convert table to hypertable
   - SELECT create_hypertable('<table_name>', by_range('time'));
5. Indexing
   - CREATE INDEX ON conditions(time, <column_name>) WITH (timescaledb.transaction_per_chunk);
6. Add compression policy.

```
ALTER TABLE <table_name>
SET (
  timescaledb.compress,
  timescaledb.compress_segmentby='<column_name>',
  timescaledb.compress_orderby='time DESC'
);

SELECT compress_chunk(c) from show_chunks('<table_name>') c;

SELECT add_compression_policy('<table_name>', INTERVAL '8 days');
```

7. Load dumped data.

8. From ignition, set the storage provider to the newly setup PostgreSQL database.