R Exchange 2026 × TE TAI ŌHANGA THE TREASURY

Taxmate

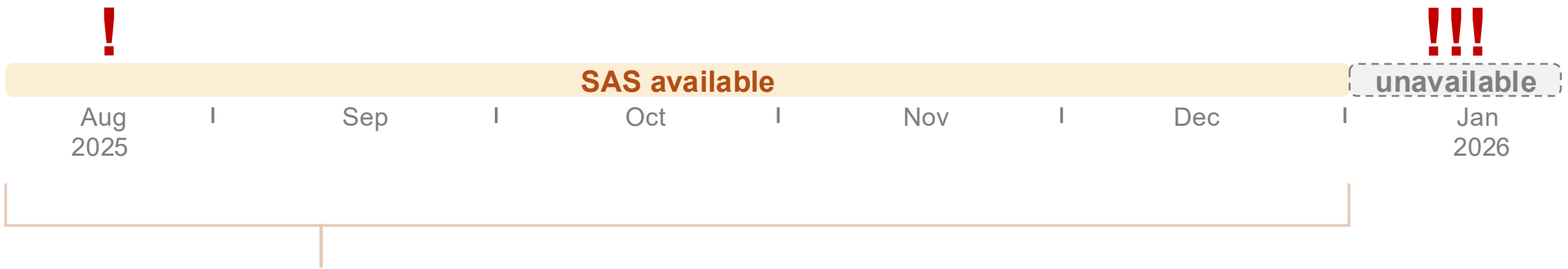
An R-Based Solution to Streamline Treasury Processes

Yang Hu

SAS was used for tax-related work at the Treasury for decades.
(a commercial software)

In August 2025, we were informed that:

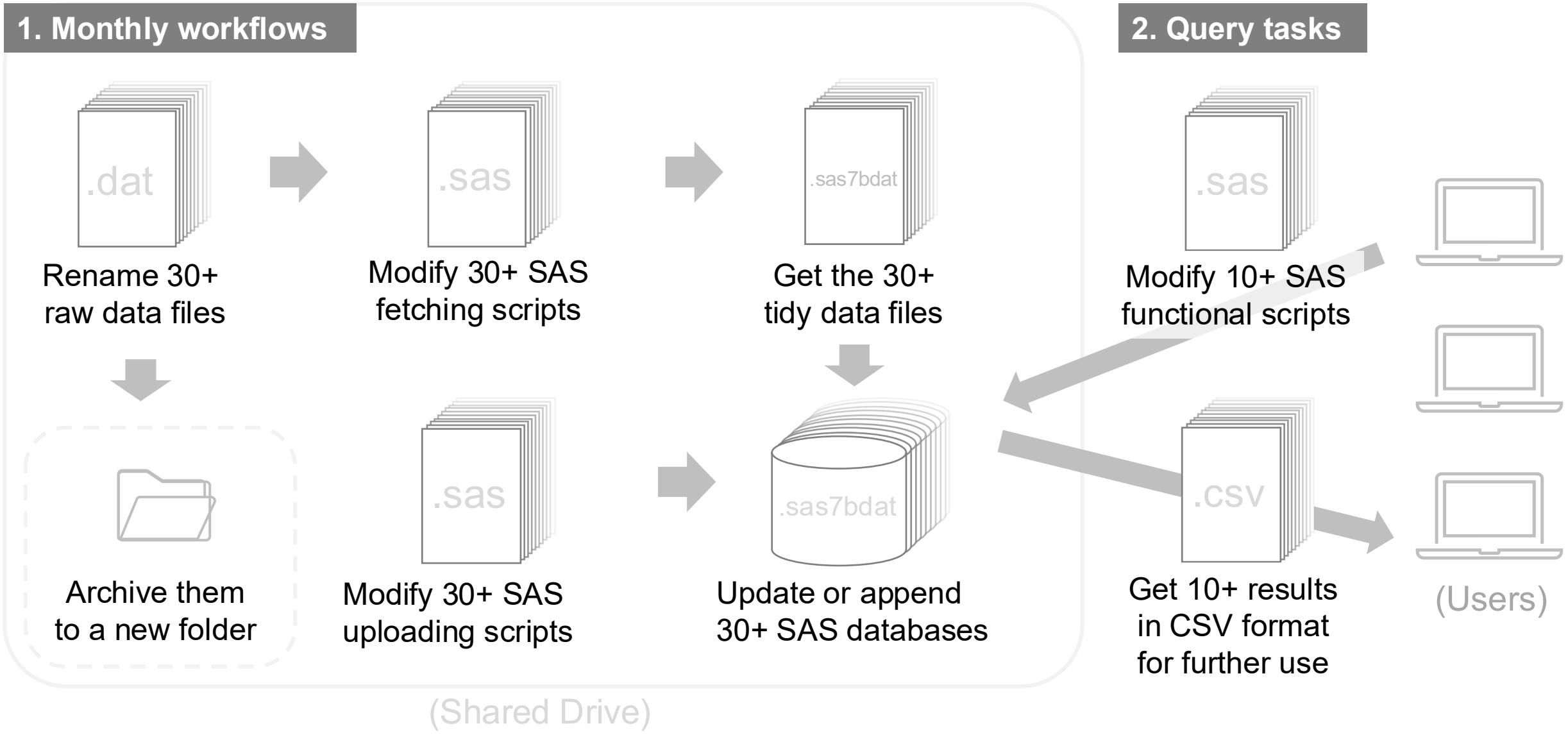
- The licence would **expire** at the end of the year (December 31st).
- From 2026 onwards, the yearly licence fee would have **tripled**.



Given the **short window**, a tough decision had to be made:

- **Accept the new quote**, or
- **Explore an alternative**.

Internal evaluation shows that SAS was used for **two specific types of work**:



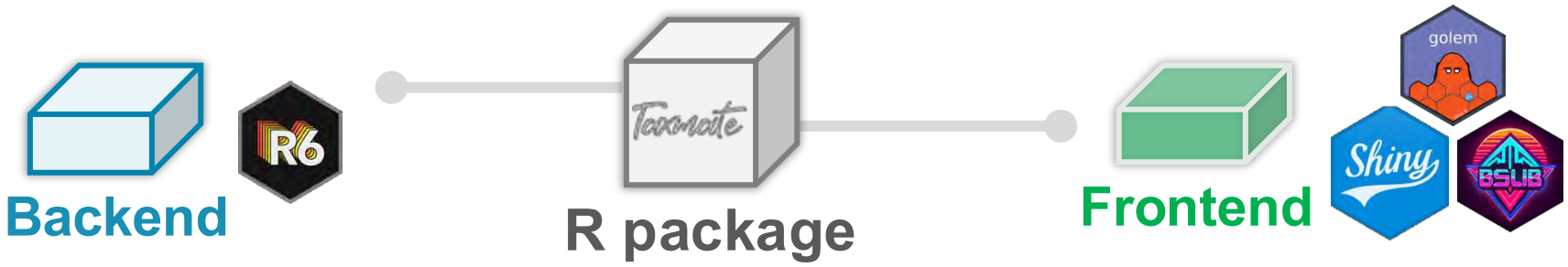
SAS is used as a **tool** rather than a **platform**; this suggests an alternative is feasible:

- Use **DuckDB** as the database

OLAP database
(**O**nline **A**nalytical **P**rocessing)

- ✓ Fast for analytics
- ✓ Efficient storage
- ✓ Handle data larger than memory

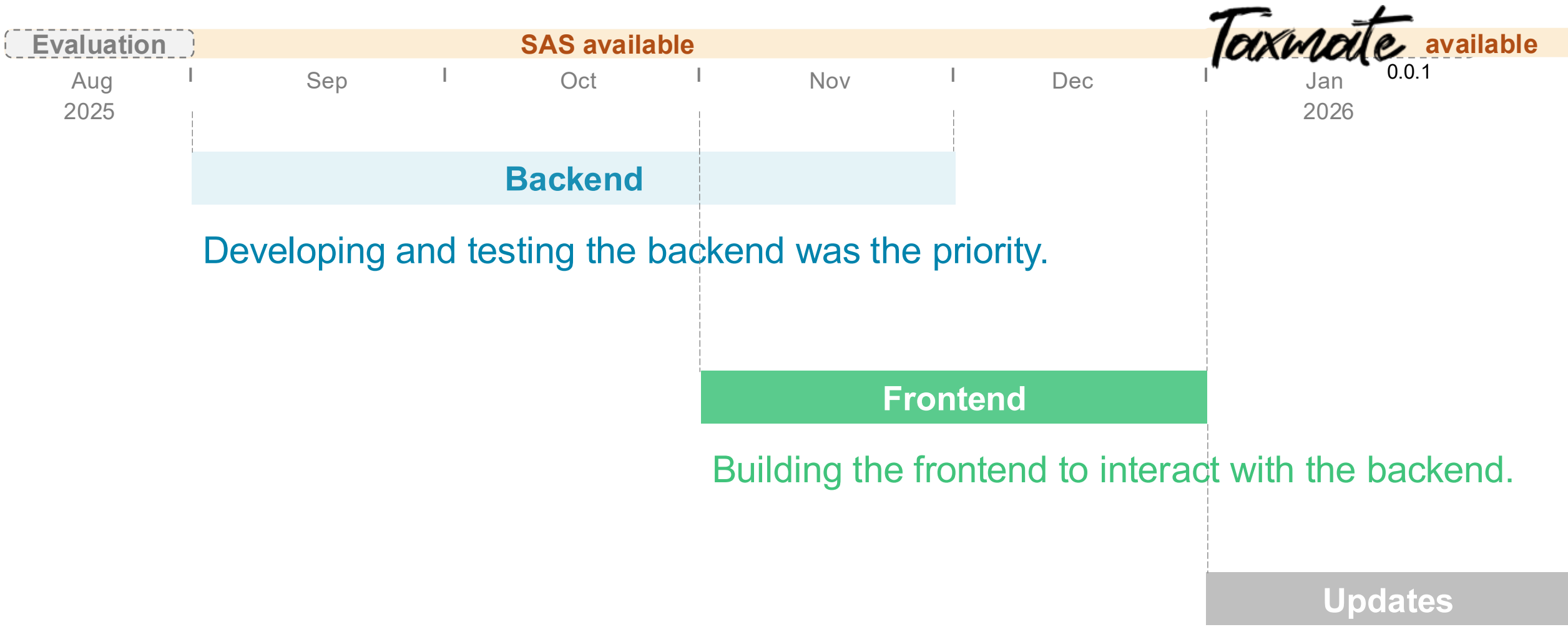
- Build an **R package** backend structured using the **R6** system



Backend **R package** **Frontend**

- Develop the **Shiny** app frontend using the **golem** framework with **Bootstrap 5**

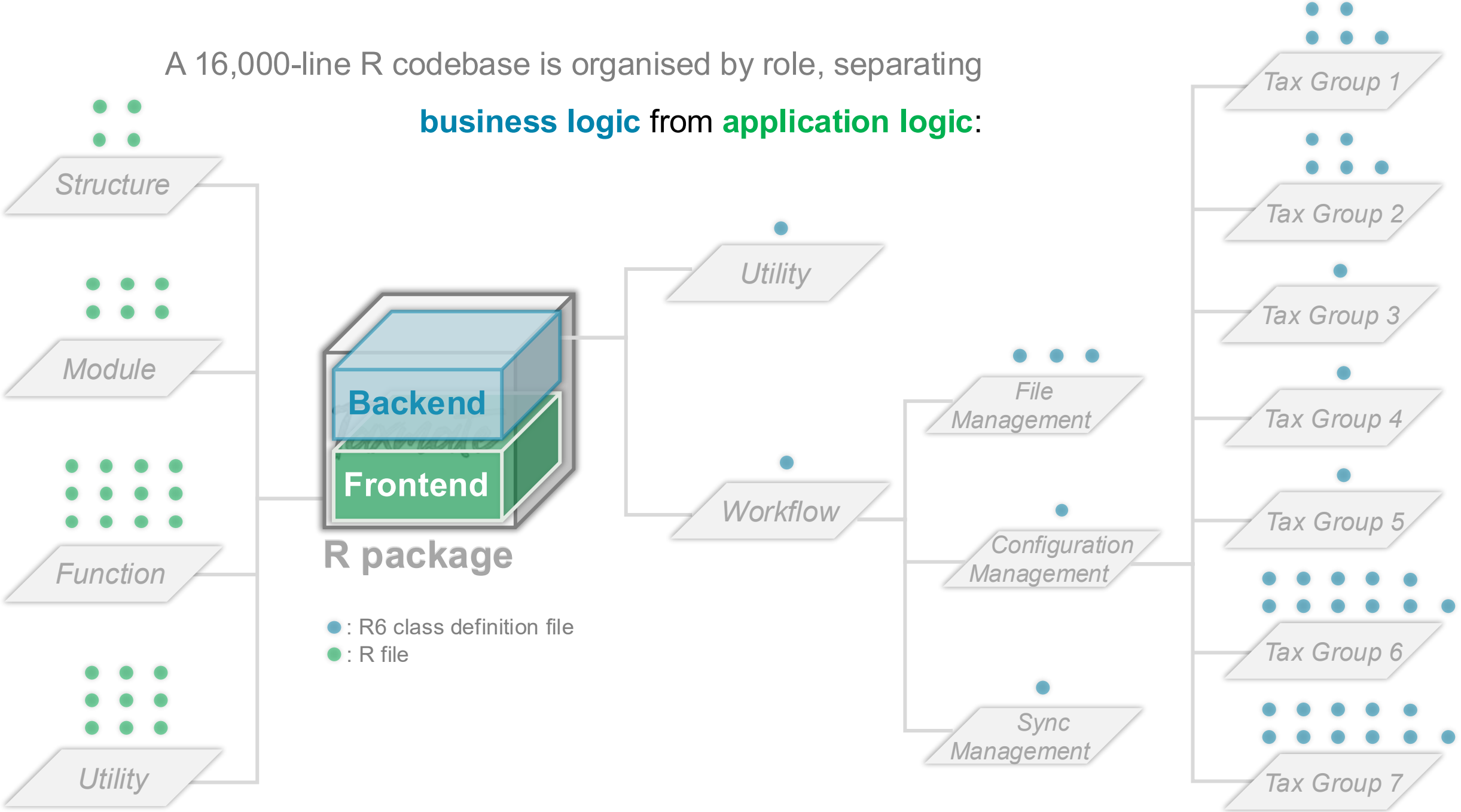
However, the **development time** is very limited:

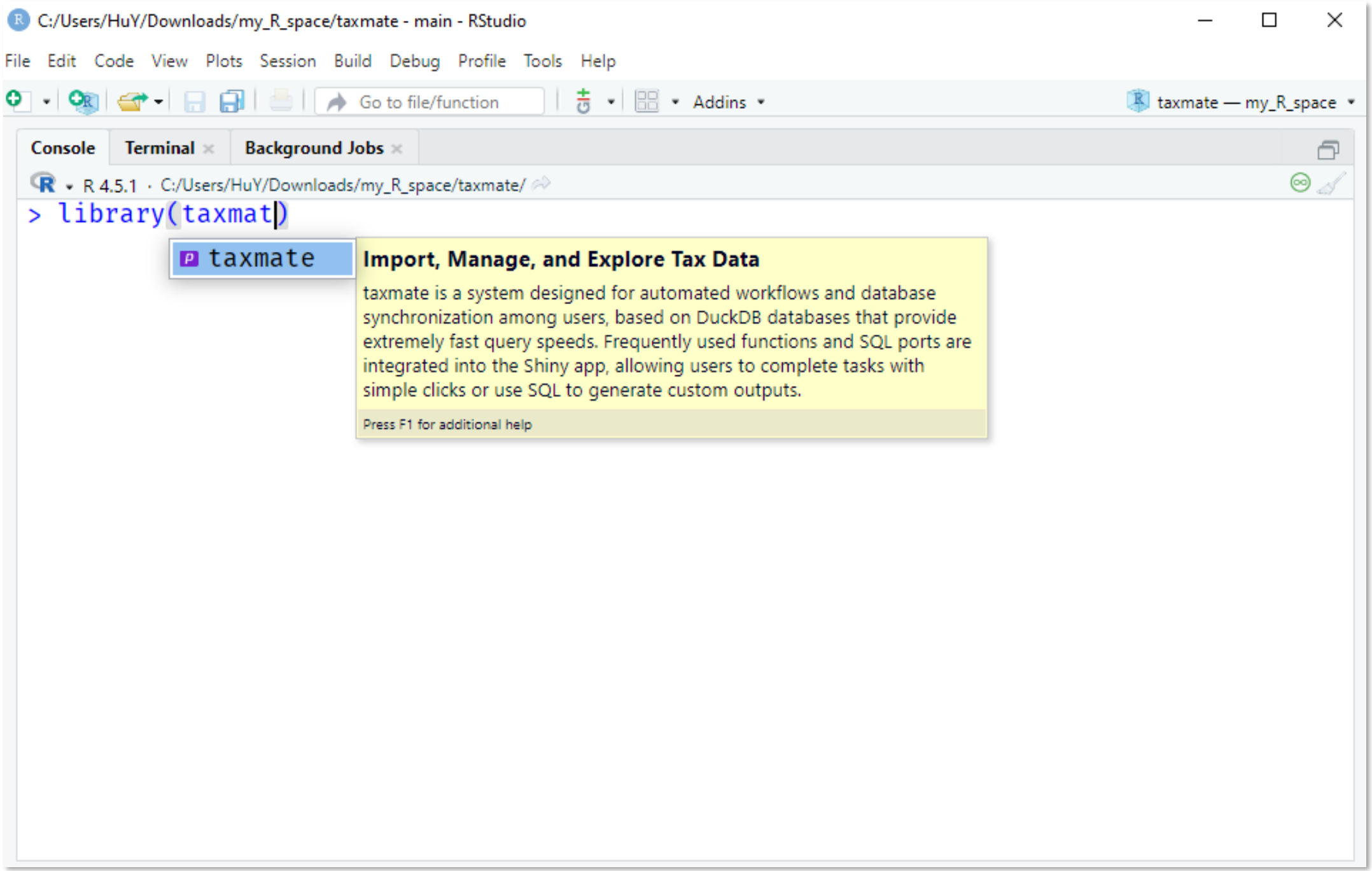


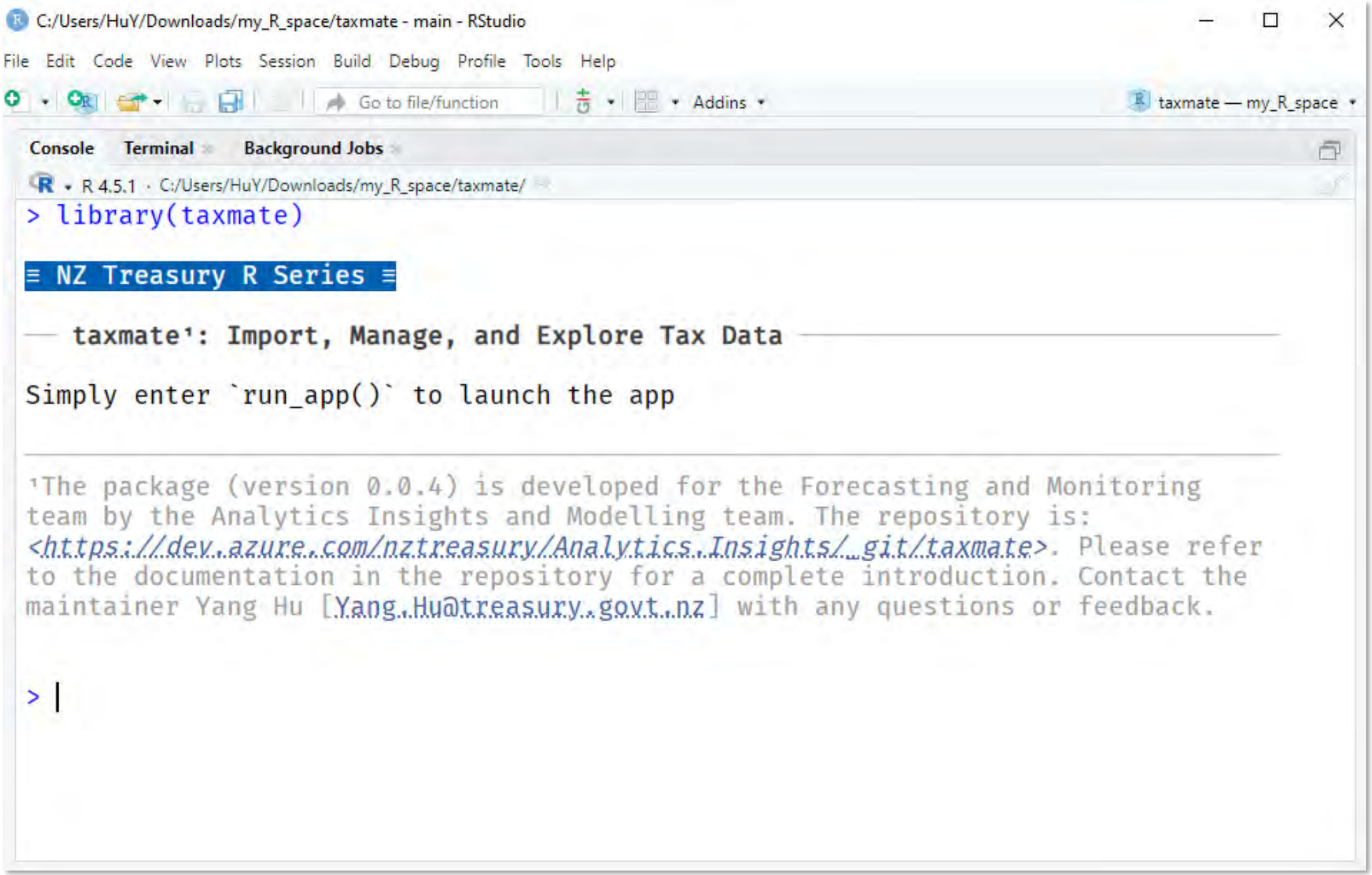
More functionality will be made available through package updates.

A 16,000-line R codebase is organised by role, separating

business logic from **application logic**:




C:/Users/HuY/Downloads/my_R_space/taxmate - main - RStudio
File Edit Code View Plots Session Build Debug Profile Tools Help
Go to file/function
Addins
taxmate — my_R_space
Console
Terminal
Background Jobs
R 4.5.1 · C:/Users/HuY/Downloads/my_R_space/taxmate/
> library(taxmat)
taxmate
Import, Manage, and Explore Tax Data
taxmate is a system designed for automated workflows and database synchronization among users, based on DuckDB databases that provide extremely fast query speeds. Frequently used functions and SQL ports are integrated into the Shiny app, allowing users to complete tasks with simple clicks or use SQL to generate custom outputs.
Press F1 for additional help


C:/Users/HuY/Downloads/my_R_space/taxmate - main - RStudio
File Edit Code View Plots Session Build Debug Profile Tools Help
Go to file/function
Addins
taxmate — my_R_space
Console Terminal Background Jobs
R 4.5.1 · C:/Users/HuY/Downloads/my_R_space/taxmate/
> library(taxmate)
≡ NZ Treasury R Series ≡
taxmate¹: Import, Manage, and Explore Tax Data
Simply enter `run_app()` to launch the app
¹The package (version 0.0.4) is developed for the Forecasting and Monitoring team by the Analytics Insights and Modelling team. The repository is: <https://dev.azure.com/nztreasury/Analytics.Insights/_git/taxmate>. Please refer to the documentation in the repository for a complete introduction. Contact the maintainer Yang Hu [Yang.Hu@treasury.govt.nz] with any questions or feedback.
>

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127.0.0.1:3830

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Taxmate 0.0.4

G'day!

Workflow Automation

It renames new IRD files, extracts data, updates `DuckDB`, archives used files by year and month, and keeps the `Received` folder tidy.

No more sweaty manual work — it's all done with one click. Sit back with a coffee (or hojicha), watch the progress bar, and focus on what truly matters.

DuckDB Execution Engine

DuckDB is an in-process SQL database management system designed for fast analytical queries on large datasets.

Its parallel execution can process larger-than-memory workloads, allowing tax data to be queried at blazing-fast speeds.

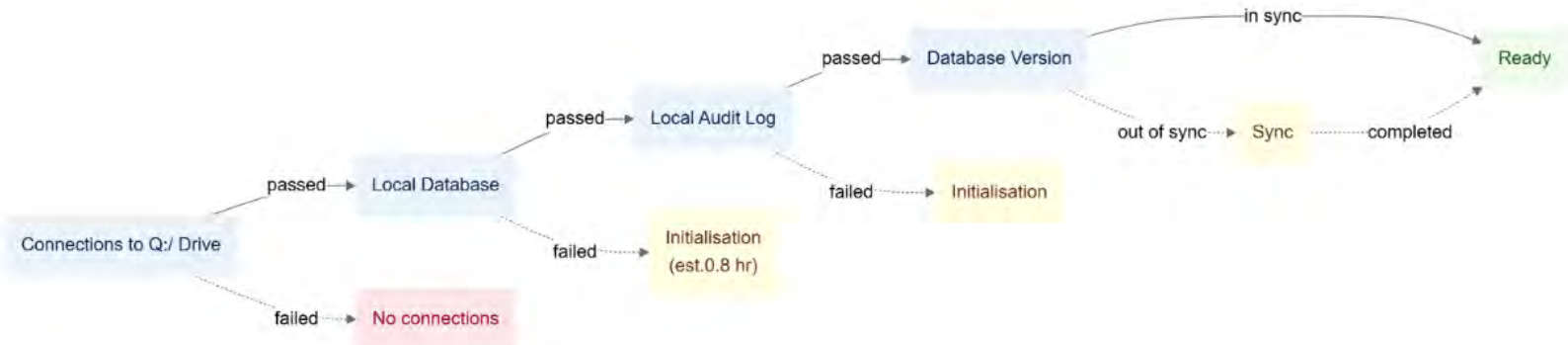
Decentralised Framework

Databases sit securely on each mate's laptop, while monthly snapshots and the audit log stay on the shared drive for optimal performance.

New files update the mate's local database who starts the automation, and the latest snapshot syncs for everyone else to keep databases aligned.

Pre-launch Checks

- First time using `{taxmate}`? Don't worry, `{taxmate}` will sort it out.[1]
- Every time you press the start button, the backend checks that the local database, audit log, and snapshots are ready.
- Please keep R and the app open, avoid locking your screen, and wait until everything is done.



[1] Depending on the speed of the shared `Q:/` drive, this may take up to an hour. You may need to start the app a few times to complete setup.

Start

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127.0.0.1:4816

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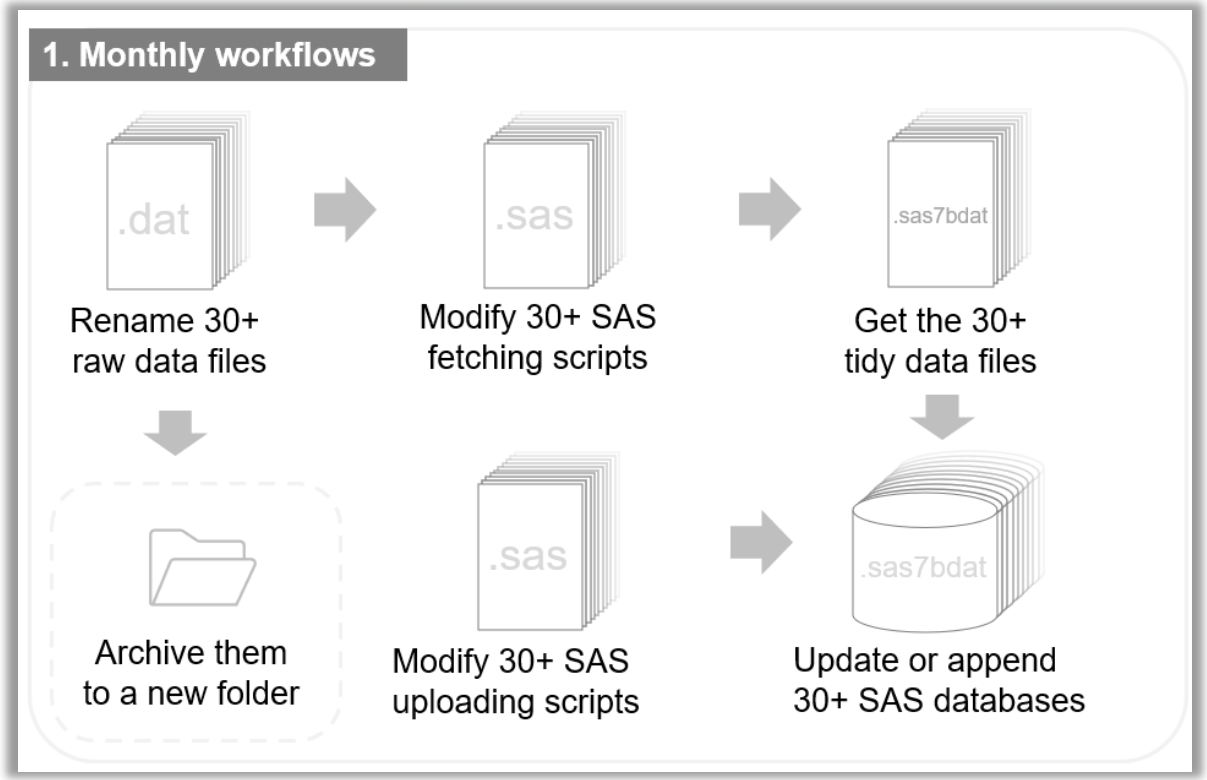
Taxmate 0.0.2

Tasks | Queries

Corporate Tax Annual Returns Summary (2019 onwards) | 2025 | Hide raw names | Rounded values | Run

Est. time: <3s

IR4



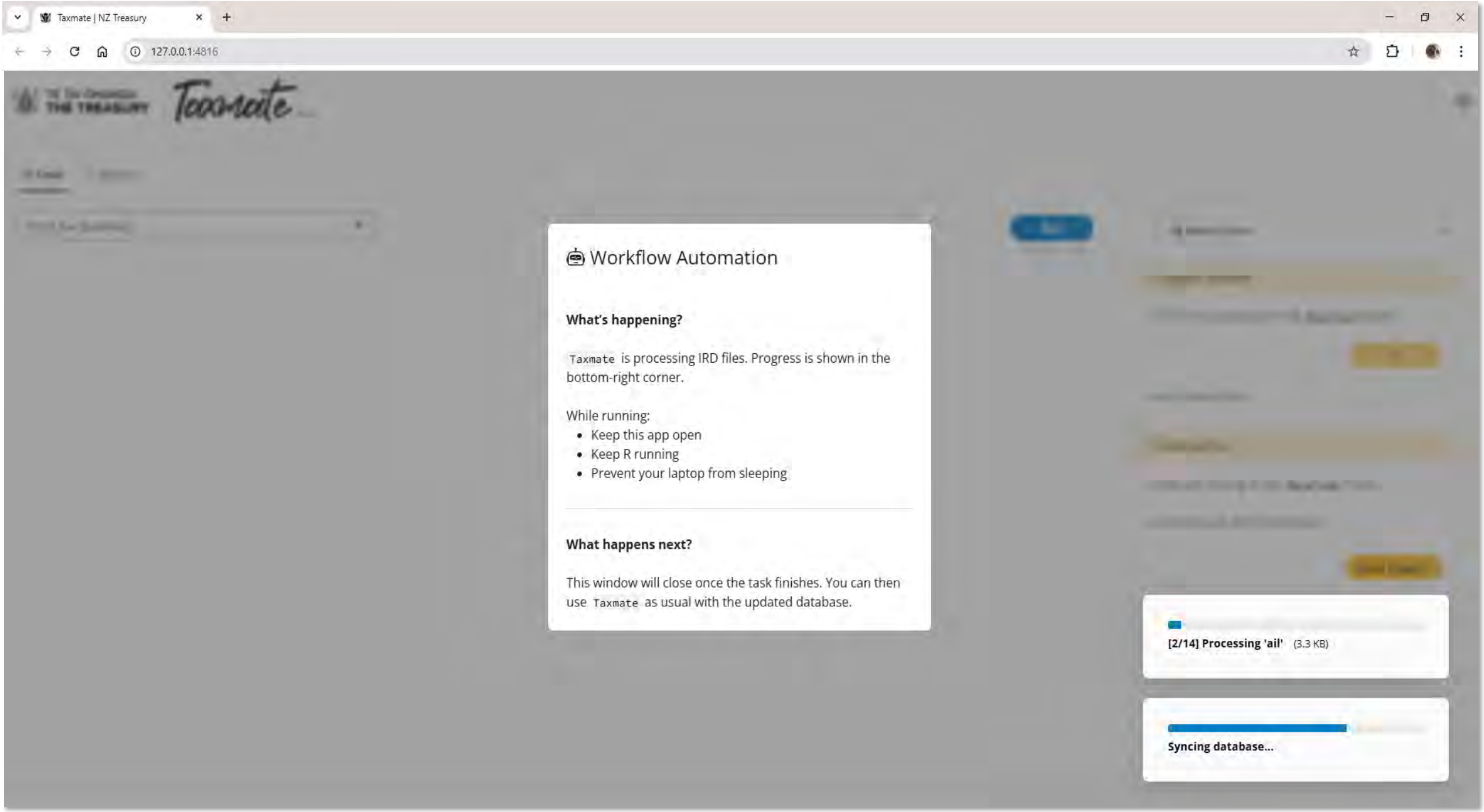
New IR Data

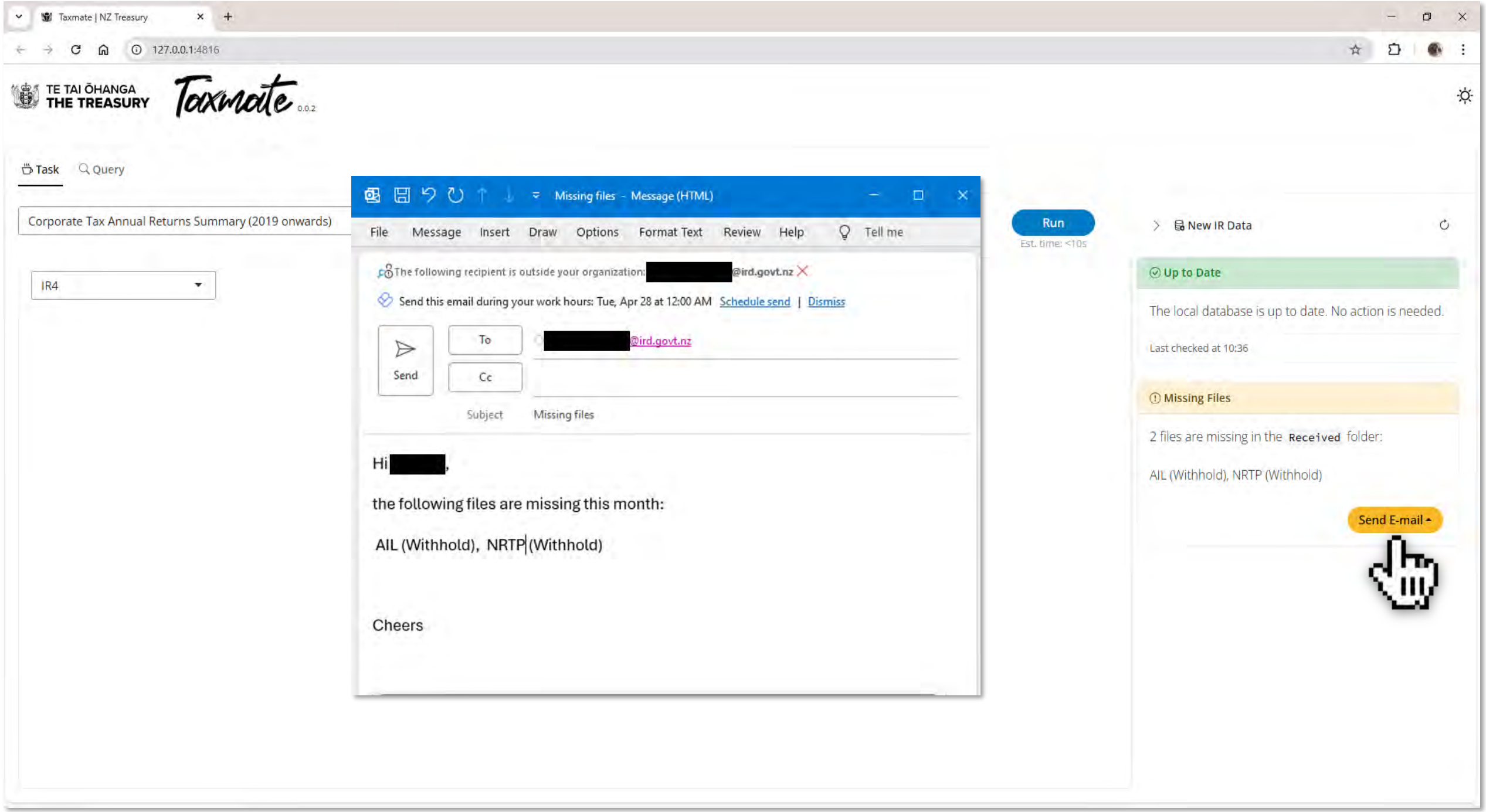
Update Available

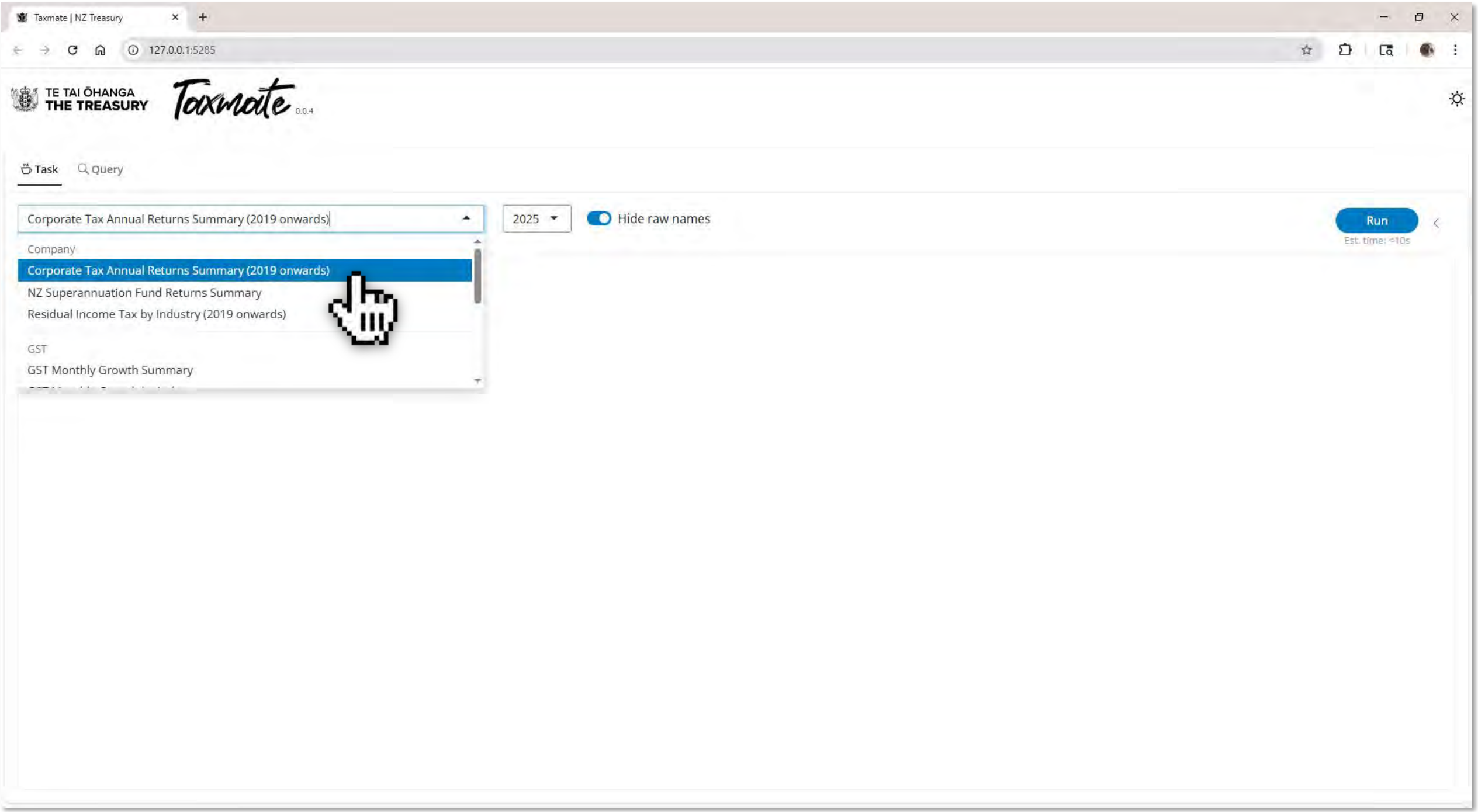
35 new files detected in the `Received` folder.

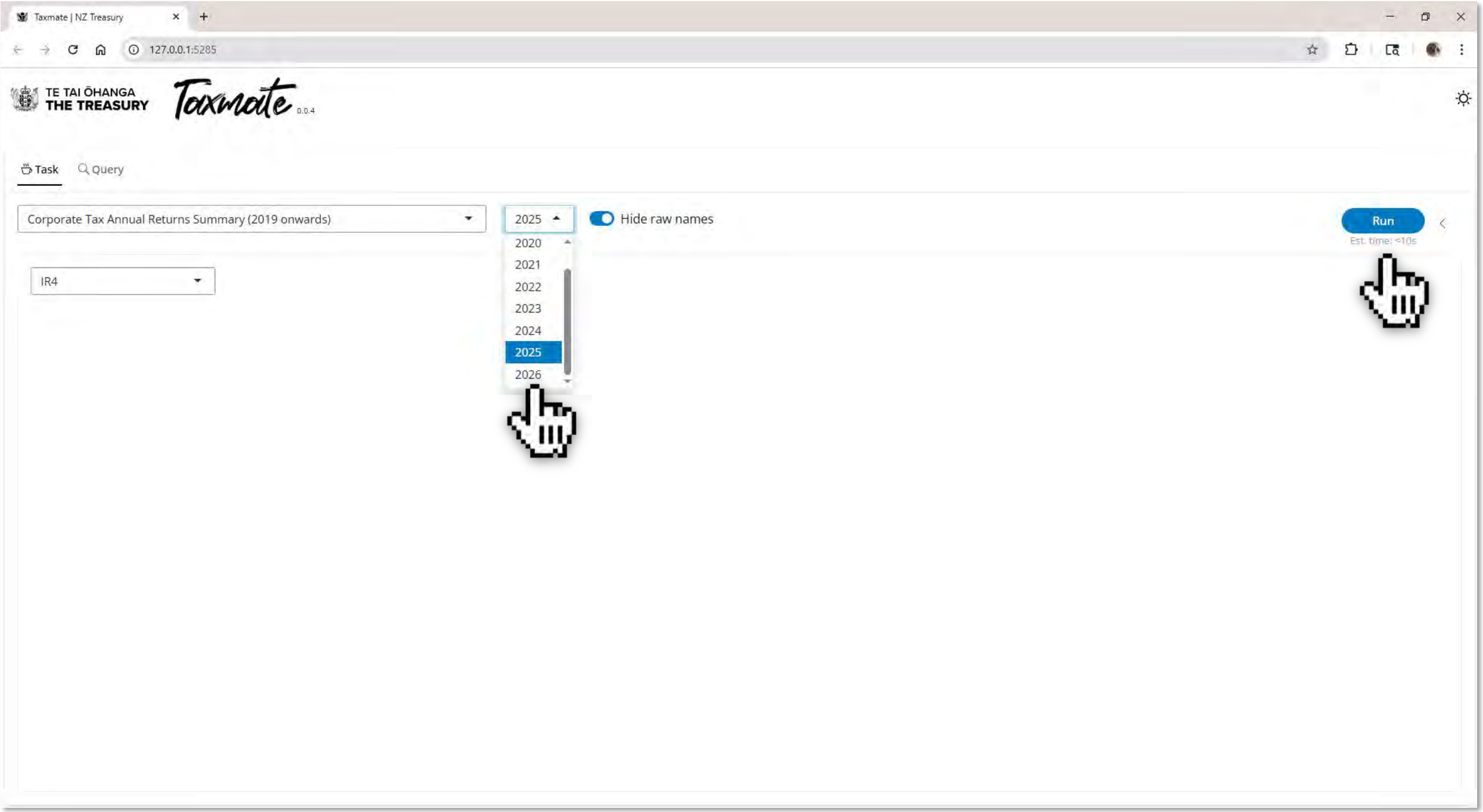
Process

Last checked at 09:29


Taxmate | NZ Treasury
127.0.0.1:4816
Workflow Automation
What's happening?
Taxmate is processing IRD files. Progress is shown in the bottom-right corner.
While running:
Keep this app open
Keep R running
Prevent your laptop from sleeping
What happens next?
This window will close once the task finishes. You can then use Taxmate as usual with the updated database.
[2/14] Processing 'ail' (3.3 KB)
Syncing database...


Taxmate | NZ Treasury
127.0.0.1:4816
TE TAI ŌHANGA
THE TREASURY
Taxmate 0.0.2
Task
Query
Corporate Tax Annual Returns Summary (2019 onwards)
IR4
Missing files - Message (HTML)
File Message Insert Draw Options Format Text Review Help Tell me
The following recipient is outside your organization: [redacted]@ird.govt.nz
Send this email during your work hours: Tue, Apr 28 at 12:00 AM Schedule send | Dismiss
Send
To
[redacted]@ird.govt.nz
Cc
Subject
Missing files
Hi [redacted],
the following files are missing this month:
AIL (Withhold), NRTP (Withhold)
Cheers
Run
Est. time: <10s
New IR Data
Up to Date
The local database is up to date. No action is needed.
Last checked at 10:36
Missing Files
2 files are missing in the Received folder:
AIL (Withhold), NRTP (Withhold)
Send E-mail


Taxmate | NZ Treasury
127.0.0.1:5285
TE TAI ŌHANGA
THE TREASURY
Taxmate 0.0.4
Task
Query
Corporate Tax Annual Returns Summary (2019 onwards)
2025
Hide raw names
Run
Est. time: <10s
Company
Corporate Tax Annual Returns Summary (2019 onwards)
NZ Superannuation Fund Returns Summary
Residual Income Tax by Industry (2019 onwards)
GST
GST Monthly Growth Summary


Taxmate | NZ Treasury
127.0.0.1:5285
TE TAI ŌHANGA
THE TREASURY
Taxmate 0.0.4
Task
Query
Corporate Tax Annual Returns Summary (2019 onwards)
2025
Hide raw names
Run
Est. time: <10s
IR4
2020
2021
2022
2023
2024
2025
2026

Taxmate | NZ Treasury

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Taxmate 0.0.4

Task | Query

Corporate Tax Annual Returns Summary (2019 onwards) | 2025 | Hide raw names | Run | Download

Time taken: 2s

IR4

Preview output

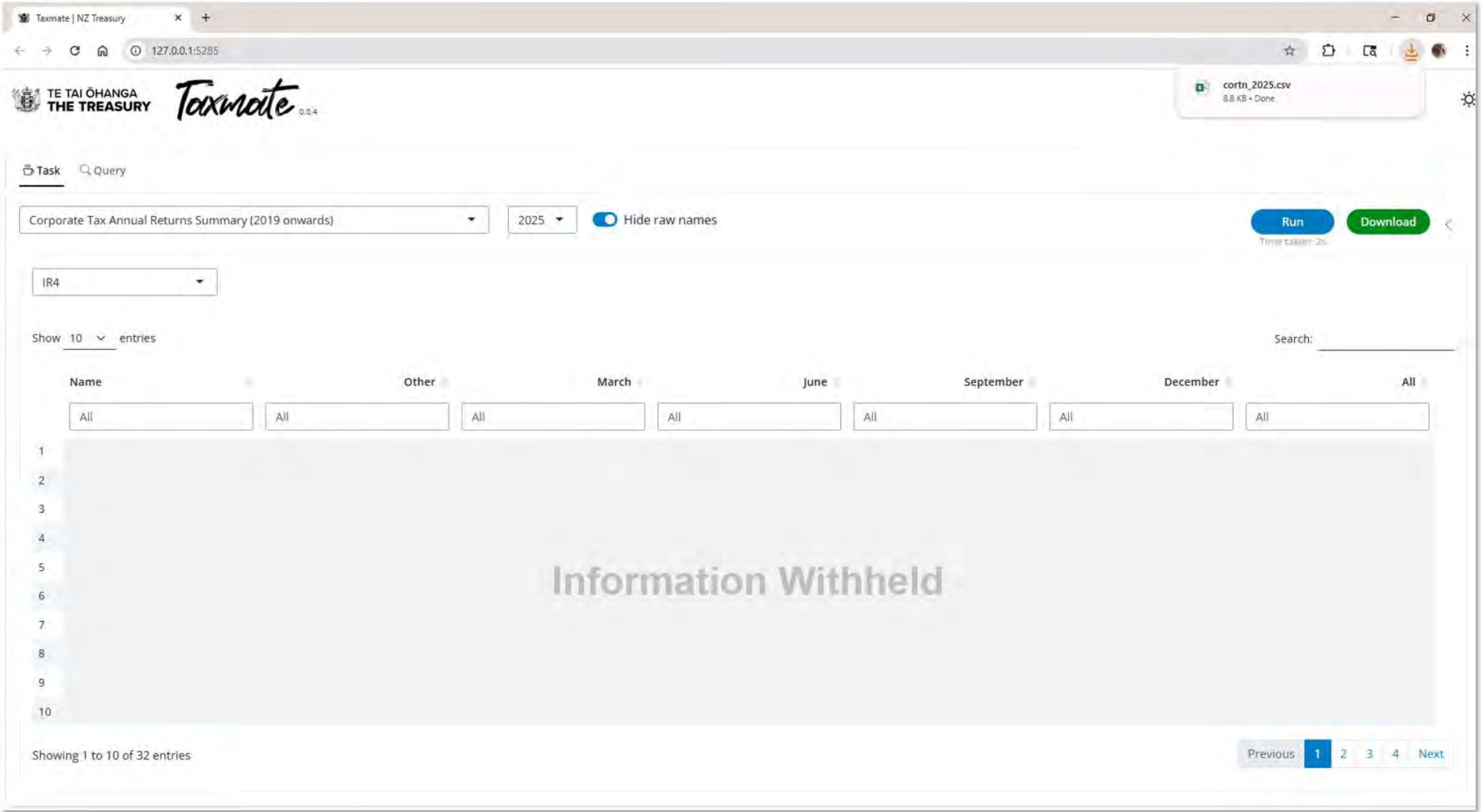
Show 10 entries | Search:

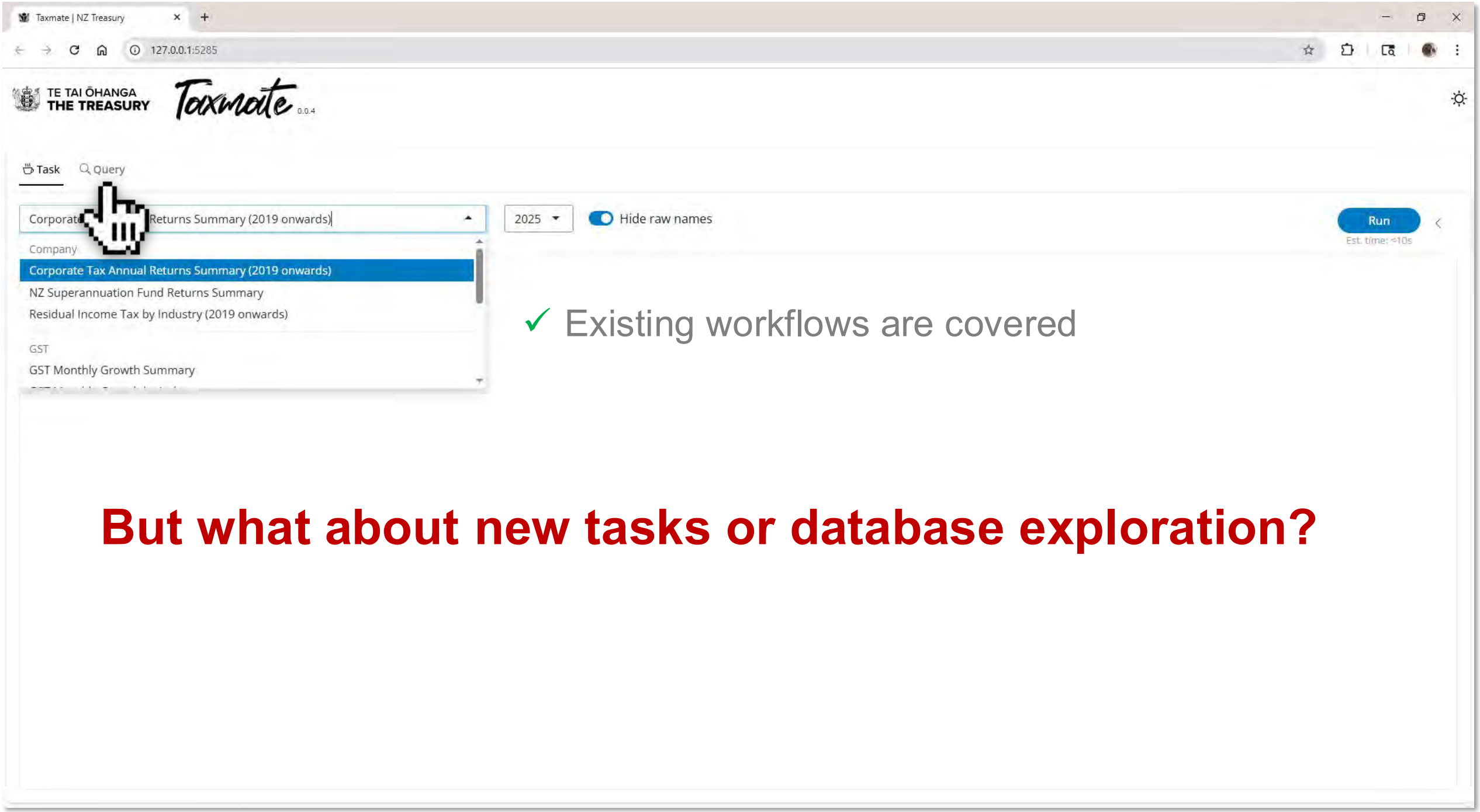
	Name	Other	March	June	September	December	All
	All	All	All	All	All	All	All
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							

Information Withheld

Showing 1 to 10 of 32 entries

Previous 1 2 3 4 Next


Taxmate | NZ Treasury
127.0.0.1:5285
cortn_2025.csv
8.8 KB • Done
TE TAI ŌHANGA
THE TREASURY
Taxmate 0.0.4
Task
Query
Corporate Tax Annual Returns Summary (2019 onwards)
2025
Hide raw names
Run
Download
Time taken: 2s
IR4
Show 10 entries
Search:
Name
Other
March
June
September
December
All
Information Withheld
Showing 1 to 10 of 32 entries
Previous
1
2
3
4
Next


Taxmate | NZ Treasury
127.0.0.1:5285
TE TAI ŌHANGA
THE TREASURY
Taxmate 0.0.4
Task
Query
Corporate Returns Summary (2019 onwards)
2025
Hide raw names
Run
Est. time: <10s
Company
Corporate Tax Annual Returns Summary (2019 onwards)
NZ Superannuation Fund Returns Summary
Residual Income Tax by Industry (2019 onwards)
GST
GST Monthly Growth Summary
✓ Existing workflows are covered
But what about new tasks or database exploration?

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Task | Query

Database

aim

Table

aim

Run

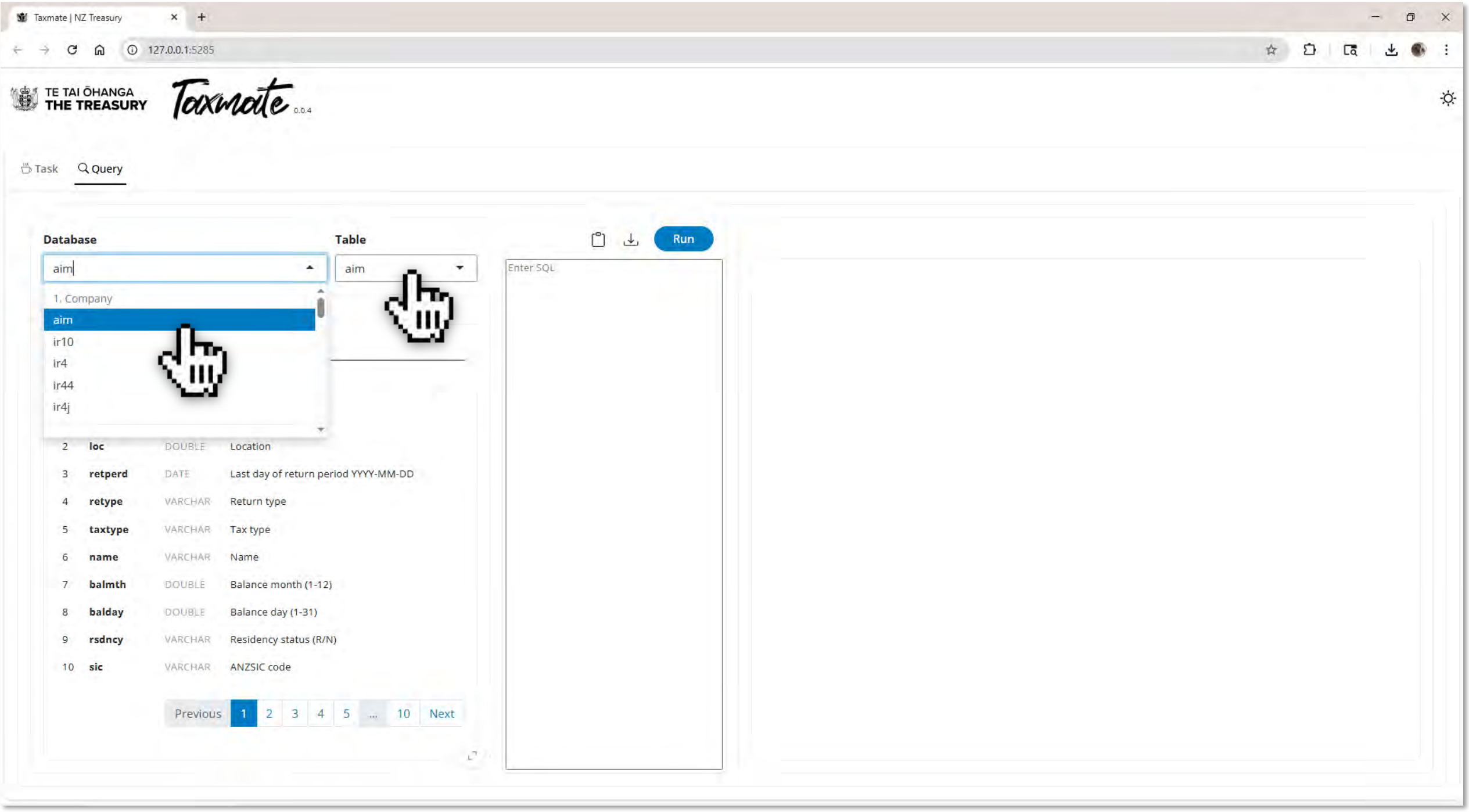
Enter SQL

Column

Show 10 entries Search:

	Variable	Type	Description
1	**ird**	VARCHAR	IRD number
2	**loc**	DOUBLE	Location
3	**retperd**	DATE	Last day of return period YYYY-MM-DD
4	**retype**	VARCHAR	Return type
5	**taxtype**	VARCHAR	Tax type
6	**name**	VARCHAR	Name
7	**balmth**	DOUBLE	Balance month (1-12)
8	**balday**	DOUBLE	Balance day (1-31)
9	**rsdncy**	VARCHAR	Residency status (R/N)
10	**sic**	VARCHAR	ANZSIC code

Previous 1 2 3 4 5 ... 10 Next


Taxmate | NZ Treasury
127.0.0.1:5285
TE TAI ŌHANGA
THE TREASURY
Taxmate 0.0.4
Task
Query
Database
aim
1. Company
aim
ir10
ir4
ir44
ir4j
Table
aim
Run
Enter SQL
2 loc DOUBLE Location
3 retperd DATE Last day of return period YYYY-MM-DD
4 retype VARCHAR Return type
5 taxtype VARCHAR Tax type
6 name VARCHAR Name
7 balmth DOUBLE Balance month (1-12)
8 balday DOUBLE Balance day (1-31)
9 rsdncy VARCHAR Residency status (R/N)
10 sic VARCHAR ANZSIC code
Previous 1 2 3 4 5 ... 10 Next

Taxmate | NZ Treasury

127.0.0.1:5285

TE TAI ŌHANGA THE TREASURY

Taxmate 0.0.4

Task | Query

Database

aim

Table

aim

Run

Enter SQL

Column

Show 10 entries

Search:

	Variable	Type	Description
1	[illegible]	VARCHAR	IRD number
2	[illegible]	DOUBLE	Location
3	[illegible]	DATE	Last day of return period YYYY-MM-DD
4	**retype**	VARCHAR	Return type
5	**taxtype**	VARCHAR	Tax type
6	**name**	VARCHAR	Name
7	**balmth**	DOUBLE	Balance month (1-12)
8	**balday**	DOUBLE	Balance day (1-31)
9	**rsdncy**	VARCHAR	Residency status (R/N)
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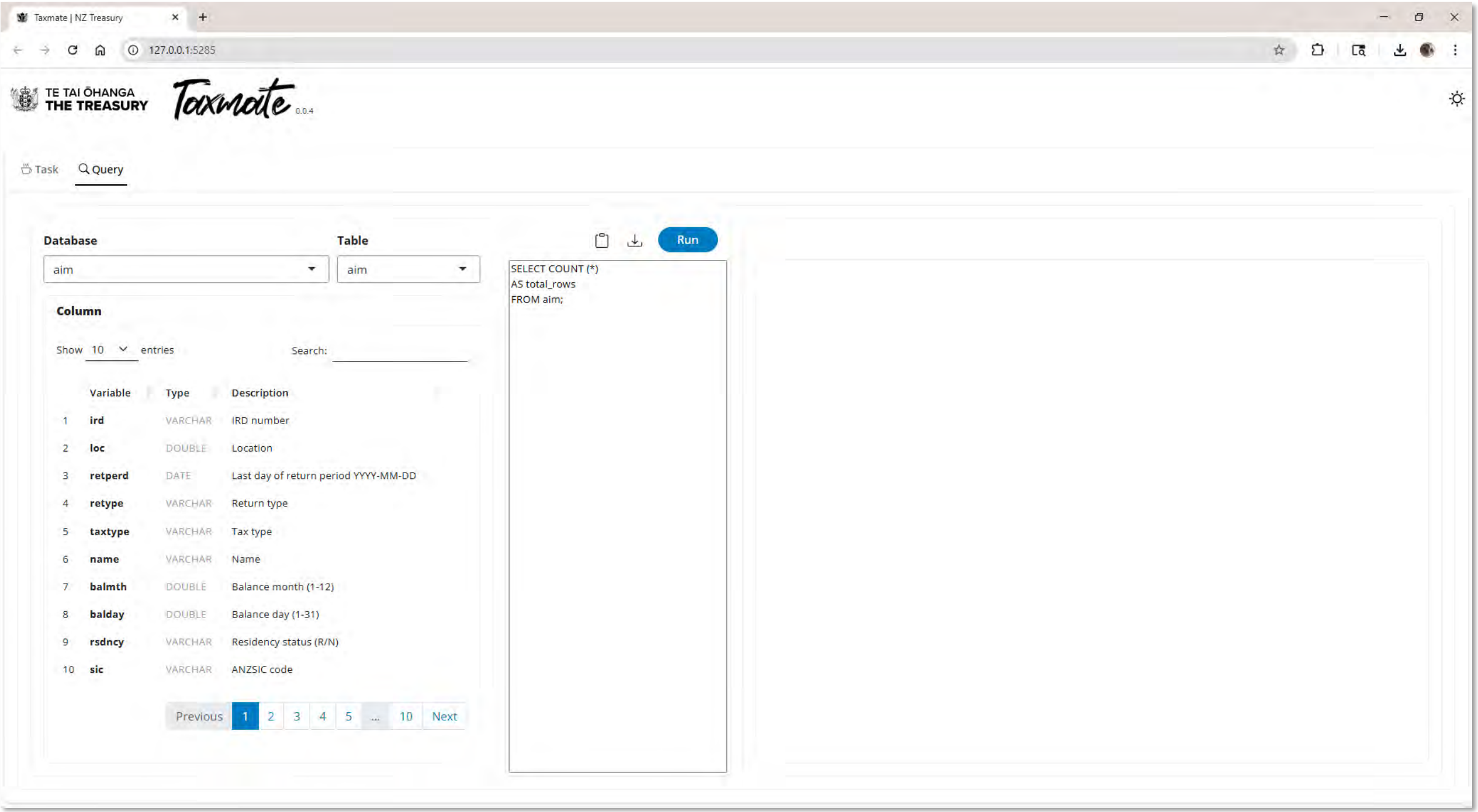
Previous 1 2 3 4 5 ... 10 Next


Taxmate | NZ Treasury
127.0.0.1:5285
TE TAI ŌHANGA
THE TREASURY
Taxmate 0.0.4
Task
Query
Database
aim
Table
aim
Run
SELECT COUNT (*)
AS total_rows
FROM aim;
Column
Show 10 entries
Search:
Variable
Type
Description
1 ird VARCHAR IRD number
2 loc DOUBLE Location
3 retperd DATE Last day of return period YYYY-MM-DD
4 retype VARCHAR Return type
5 taxtype VARCHAR Tax type
6 name VARCHAR Name
7 balmth DOUBLE Balance month (1-12)
8 balday DOUBLE Balance day (1-31)
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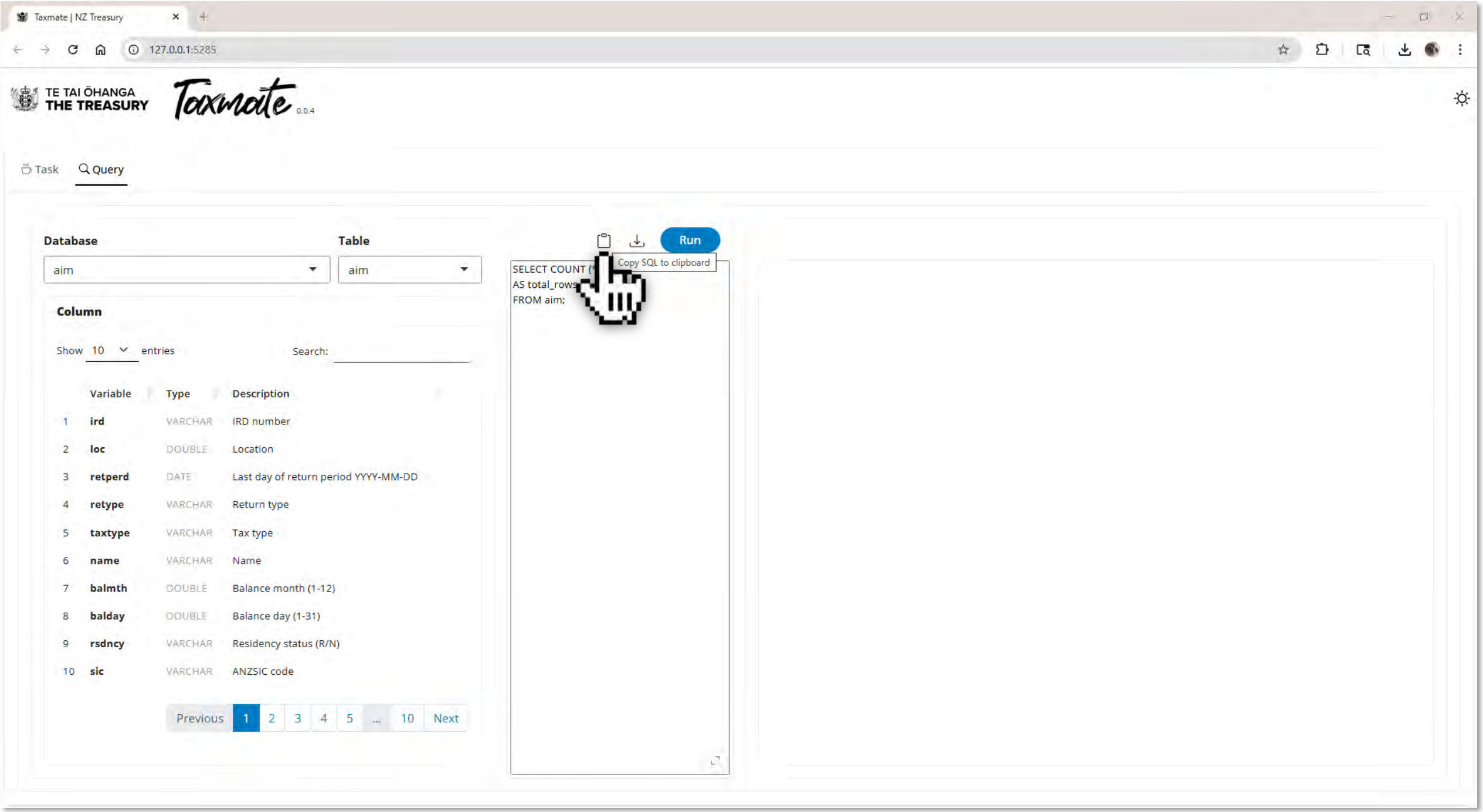
Previous 1 2 3 4 5 ... 10 Next


Taxmate | NZ Treasury
127.0.0.1:5285
TE TAI ŌHANGA
THE TREASURY
Taxmate 0.0.4
Task
Query
Database
aim
Table
aim
Column
Show 10 entries
Search:
Variable Type Description
1 ird VARCHAR IRD number
2 loc DOUBLE Location
3 retperd DATE Last day of return period YYYY-MM-DD
4 retype VARCHAR Return type
5 taxtype VARCHAR Tax type
6 name VARCHAR Name
7 balmth DOUBLE Balance month (1-12)
8 balday DOUBLE Balance day (1-31)
9 rsdncy VARCHAR Residency status (R/N)
10 sic VARCHAR ANZSIC code
Previous 1 2 3 4 5 ... 10 Next
Run
Copy SQL to clipboard
SELECT COUNT (*)
AS total_rows
FROM aim;

Taxmate | NZ Treasury

127.0.0.1:5285

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Taxmate 0.0.4

Task | Query

Database

aim

Table

aim

Run

```
SELECT COUNT (*)
AS total_rows
FROM aim;
```

Column

Show 10 entries Search:

	Variable	Type	Description
1	**ird**	VARCHAR	IRD number
2	**loc**	DOUBLE	Location
3	**retperd**	DATE	Last day of return period YYYY-MM-DD
4	**retype**	VARCHAR	Return type
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Previous 1 2 3 4 5 ... 10 Next

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Taxmate 0.0.4

Task | Query

Database

aim

Table

aim

Column

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4	**retype**	VARCHAR	Return type
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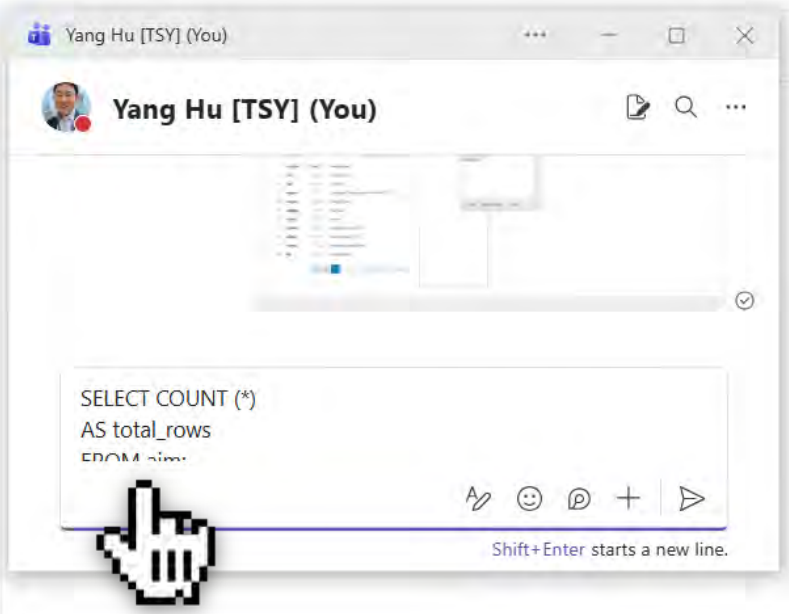
Previous 1 2 3 4 5 ... 10 Next

Run

```
SELECT COUNT (*)
AS total_rows
FROM aim;
```



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Taxmate 0.0.4

Task | Query

Database

aim

Table

aim

Column

Show 10 entries Search:

	Variable	Type	Description
1	**ird**	VARCHAR	IRD number
2	**loc**	DOUBLE	Location
3	**retperd**	DATE	Last day of return period YYYY-MM-DD
4	**retype**	VARCHAR	Return type
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8	**balday**	DOUBLE	Balance day (1-31)
9	**rsdncy**	VARCHAR	Residency status (R/N)
10	**sic**	VARCHAR	ANZSIC code

Previous 1 2 3 4 5 ... 10 Next

Run

Download SQL as a TXT file

```
SELECT COUNT (*)
AS total_rows
FROM aim;
```

127.0.0.1:5285/session/.../app_query_page-3_1_queries_panel-download_SQL_code?w=

Taxmate | NZ Treasury

127.0.0.1:5285

2026-04-28_aim_Untitled SQL code.txt
48 B • Done

TE TAI ŌHANGA THE TREASURY

Taxmate 0.0.4

Task | Query

Database

aim

Table

aim

Run

```
SELECT COUNT (*)
AS total_rows
FROM aim;
```

Column

Show 10 entries Search:

	Variable	Type	Description
1	**ird**	VARCHAR	IRD number
2	**loc**	DOUBLE	Location
3	**retperd**	DATE	Last day of return period YYYY-MM-DD
4	**retype**	VARCHAR	Return type
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8	**balday**	DOUBLE	Balance day (1-31)
9	**rsdncy**	VARCHAR	Residency status (R/N)
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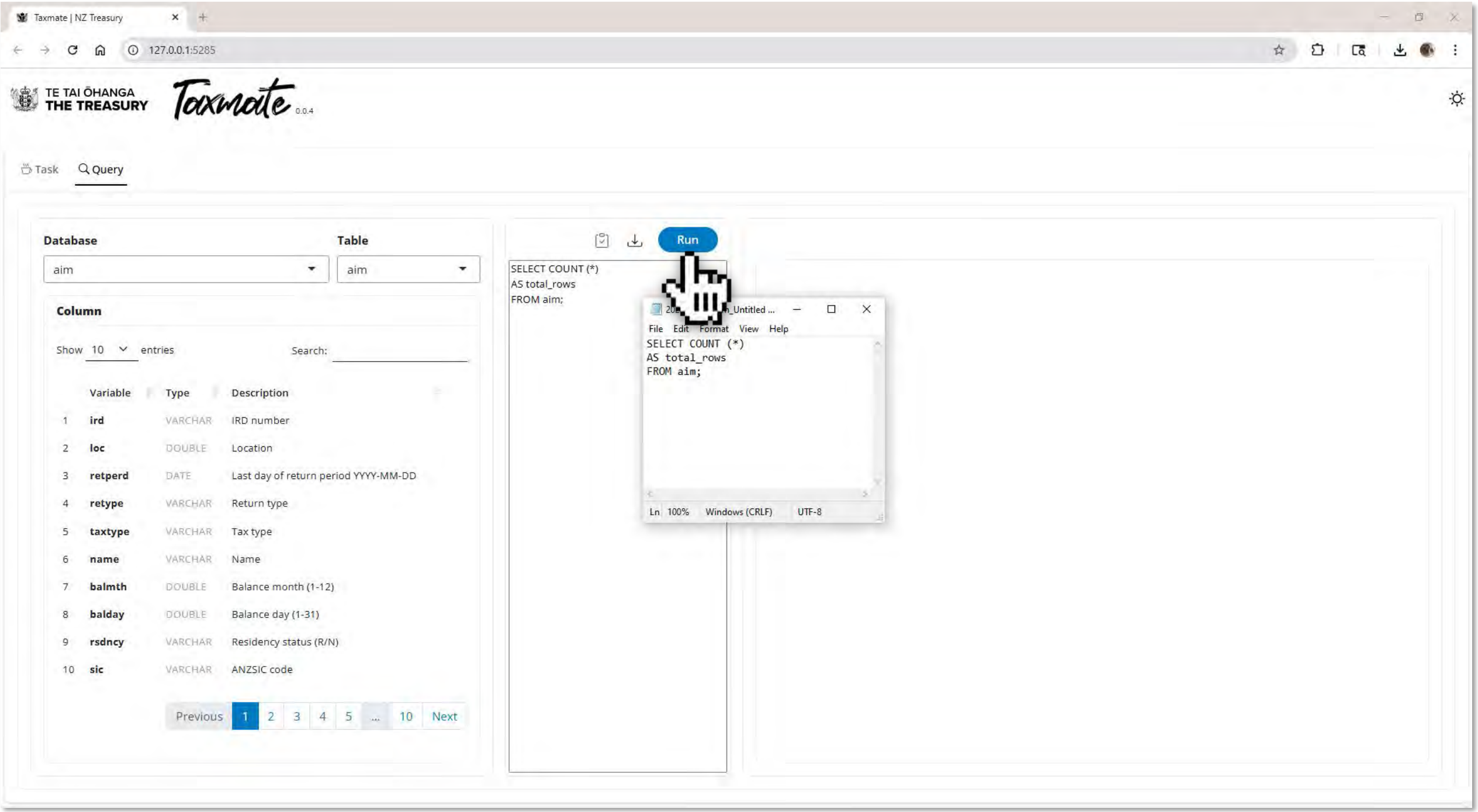
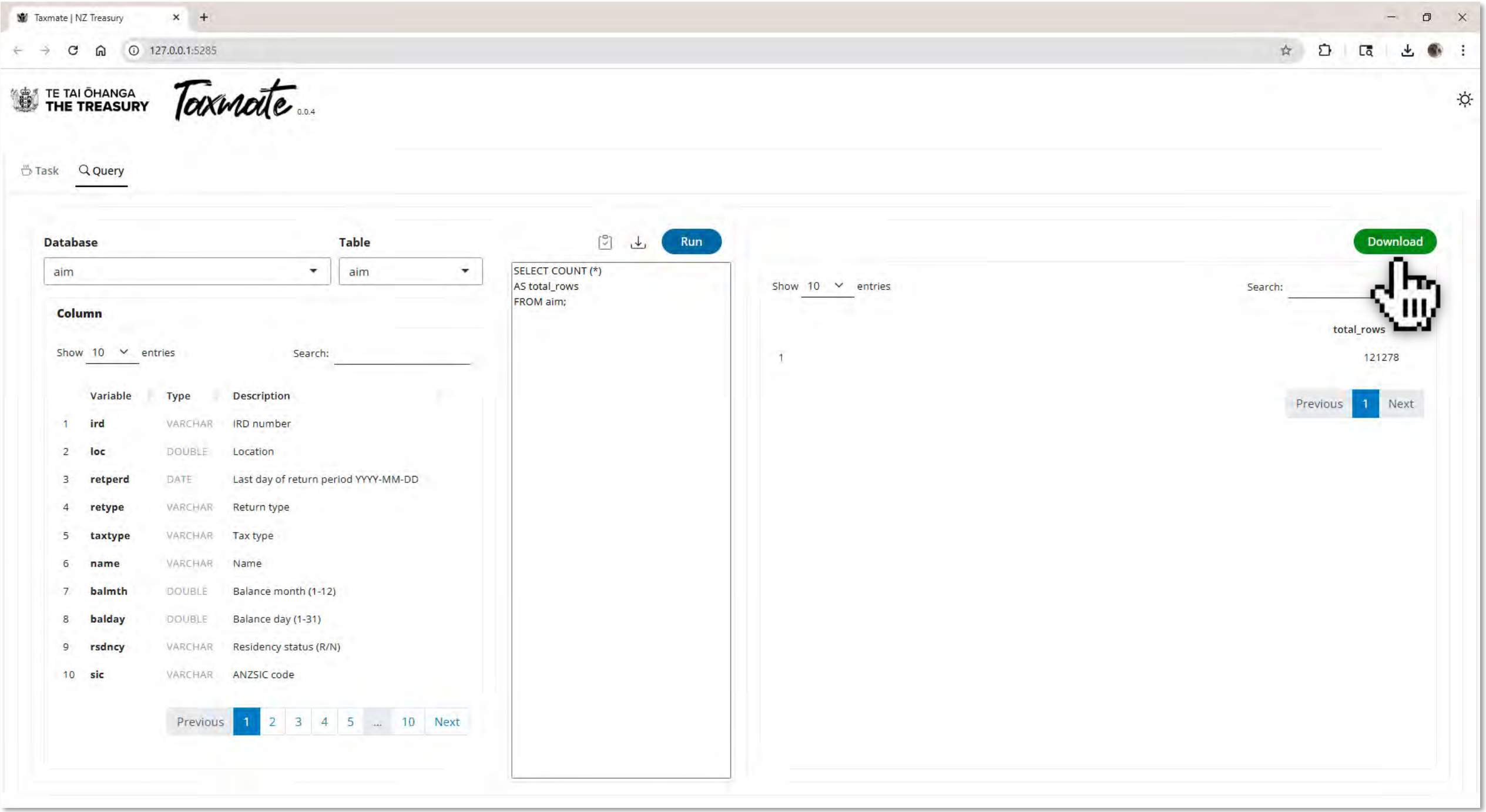
Previous 1 2 3 4 5 ... 10 Next

127.0.0.1:5285/session/.../app_query_page-3_1_queries_panel-download_SQL_code?w=


Taxmate | NZ Treasury
127.0.0.1:5285
TE TAI ŌHANGA
THE TREASURY
Taxmate 0.0.4
Task
Query
Database
aim
Table
aim
Column
Show 10 entries
Search:
Variable Type Description
1 ird VARCHAR IRD number
2 loc DOUBLE Location
3 retperd DATE Last day of return period YYYY-MM-DD
4 retype VARCHAR Return type
5 taxtype VARCHAR Tax type
6 name VARCHAR Name
7 balmth DOUBLE Balance month (1-12)
8 balday DOUBLE Balance day (1-31)
9 rsdncy VARCHAR Residency status (R/N)
10 sic VARCHAR ANZSIC code
Previous 1 2 3 4 5 ... 10 Next
Run
SELECT COUNT (*)
AS total_rows
FROM aim;
Untitled ...
File Edit Format View Help
SELECT COUNT (*)
AS total_rows
FROM aim;
Ln 100% Windows (CRLF) UTF-8


Taxmate | NZ Treasury
127.0.0.1:5285
TE TAI ŌHANGA
THE TREASURY
Taxmate
0.0.4
Task
Query
Database
aim
Table
aim
Column
Show 10 entries
Search:
Variable
Type
Description
1 ird VARCHAR IRD number
2 loc DOUBLE Location
3 retperd DATE Last day of return period YYYY-MM-DD
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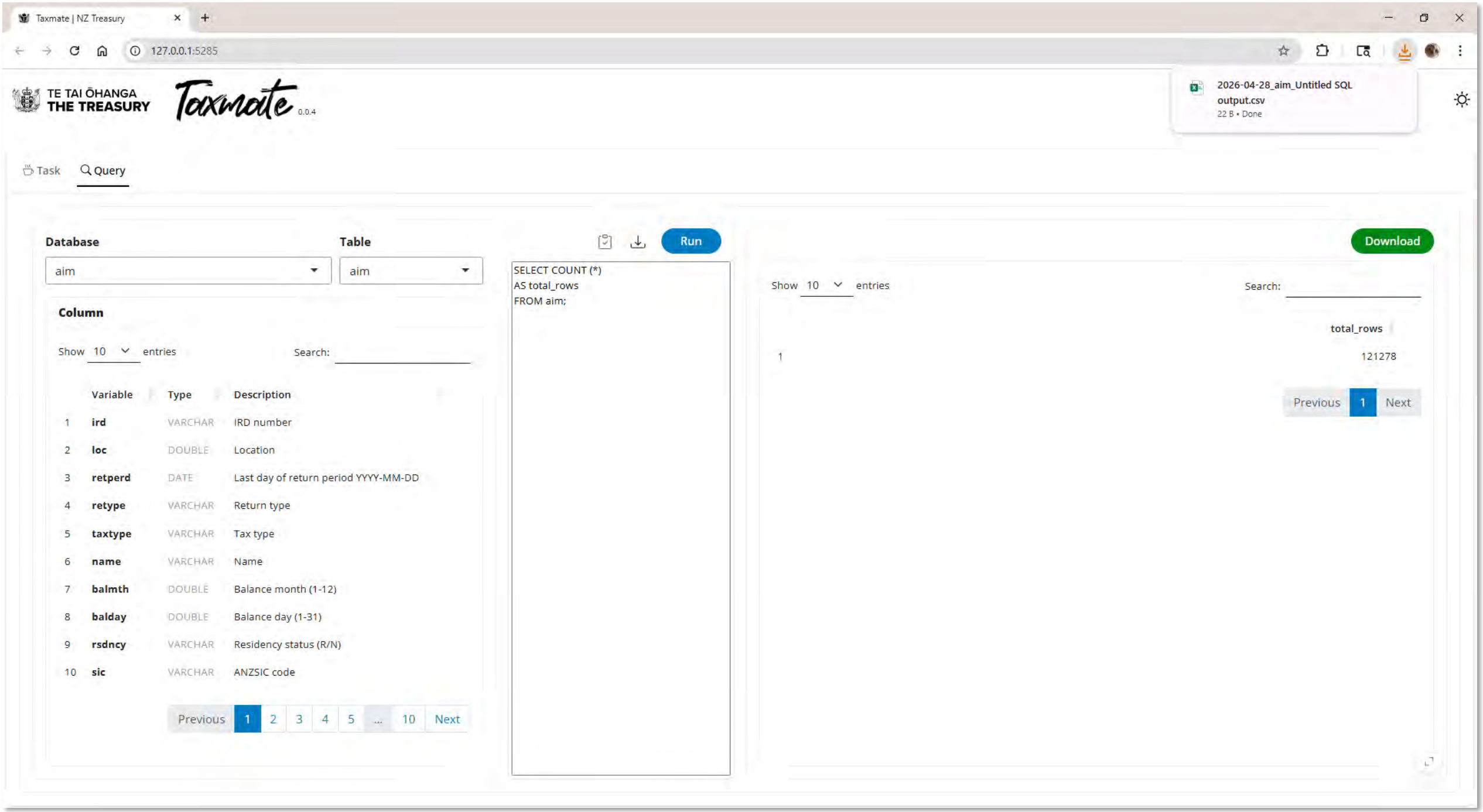
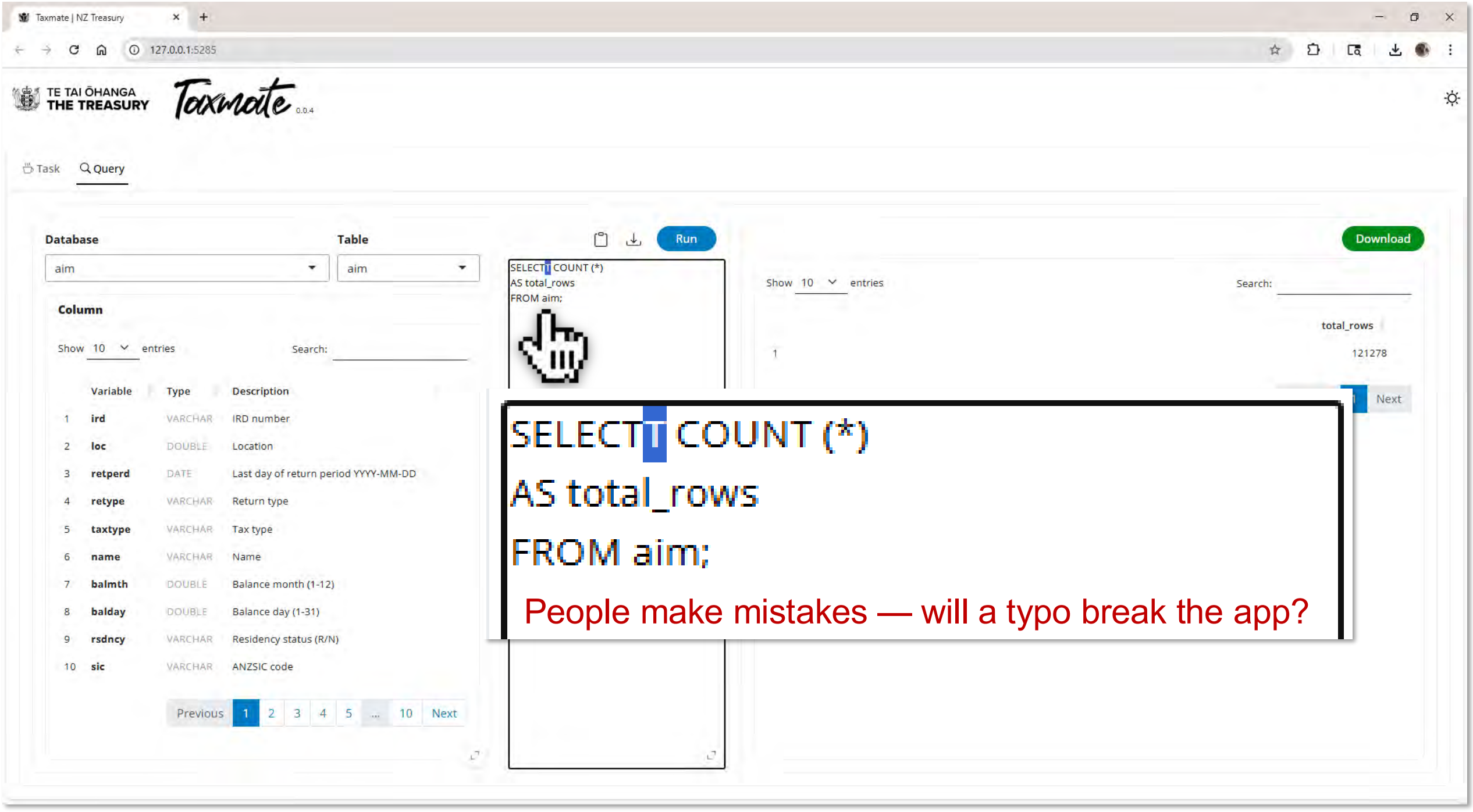
7 balmth DOUBLE Balance month (1-12)
8 balday DOUBLE Balance day (1-31)
9 rsdncy VARCHAR Residency status (R/N)
10 sic VARCHAR ANZSIC code
Previous 1 2 3 4 5 ... 10 Next
Run
SELECT COUNT (*)
AS total_rows
FROM aim;
Download
Show 10 entries
Search:
total_rows
1
121278
Previous 1 Next


Taxmate | NZ Treasury
127.0.0.1:5285
2026-04-28_aim_Untitled SQL output.csv
22 B • Done
TE TAI ŌHANGA THE TREASURY
Taxmate 0.0.4
Task
Query
Database
aim
Table
aim
Run
Download
SELECT COUNT (*)
AS total_rows
FROM aim;
Column
Show 10 entries
Search:
Variable
Type
Description
1 ird VARCHAR IRD number
2 loc DOUBLE Location
3 retperd DATE Last day of return period YYYY-MM-DD
4 retype VARCHAR Return type
5 taxtype VARCHAR Tax type
6 name VARCHAR Name
7 balmth DOUBLE Balance month (1-12)
8 balday DOUBLE Balance day (1-31)
9 rsdncy VARCHAR Residency status (R/N)
10 sic VARCHAR ANZSIC code
Previous 1 2 3 4 5 ... 10 Next
Show 10 entries
Search:
total_rows
1 121278
Previous 1 Next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Run
SELECTT COUNT (*)
AS total_rows
FROM aim;
Download
Show 10 entries
Search:
total_rows
1
121278
Next
SELECTT COUNT (*)
AS total_rows
FROM aim;
People make mistakes — will a typo break the app?

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Task | Query

Database

aim

Table

aim

Column

Show 10 entries Search:

	Variable	Type	Description
1	**ird**	VARCHAR	IRD number
2	**loc**	DOUBLE	Location
3	**retperd**	DATE	Last day of return period YYYY-MM-DD
4	**retype**	VARCHAR	Return type
5	**taxtype**	VARCHAR	Tax type
6	**name**	VARCHAR	Name
7	**balmth**	DOUBLE	Balance month (1-12)
8	**balday**	DOUBLE	Balance day (1-31)
9	**rsdncy**	VARCHAR	Residency status (R/N)
10	**sic**	VARCHAR	ANZSIC code

Previous 1 2 3 4 5 ... 10 Next

Run

```
SELECTT COUNT (*)
AS total_rows
FROM aim;
```

Error: Parser Error: syntax error at or near "SELECTT"

```
LINE 1: SELECTT COUNT (*)
        ^

LINE 1: SELECTT COUNT (*)
        ^
[34mi [39m Context: rapi_prepare
[34mi [39m Error type: PARSER
```

Why I got this error: Parser Error: syntax error at or near "SELECTT" LINE 1: SELECTT COUNT (*) ^ LINE 1: SELECTT COUNT (*) ^ ¥[34mi¥[39m Context: rapi_prepare ¥[34mi¥[39m Error type: PARSER?

The error is simply a **typo** — you wrote `SELECTT` instead of `SELECT` (double "T").

sql

```
-- ❌ Wrong
SELECTT COUNT (*)

-- ✅ Correct
SELECT COUNT(*)
```

Reply...

Sonnet 4.6

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Task | Query

One last thing

Database

aim

Table

aim

Column

Show 10 entries Search:

	Variable	Type	Description
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2	**loc**	DOUBLE	Location
3	**retperd**	DATE	Last day of return period YYYY-MM-DD
4	**retype**	VARCHAR	Return type
5	**taxtype**	VARCHAR	Tax type
6	**name**	VARCHAR	Name
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10	**sic**	VARCHAR	ANZSIC code

Previous 1 2 3 4 5 ... 10 Next

Run

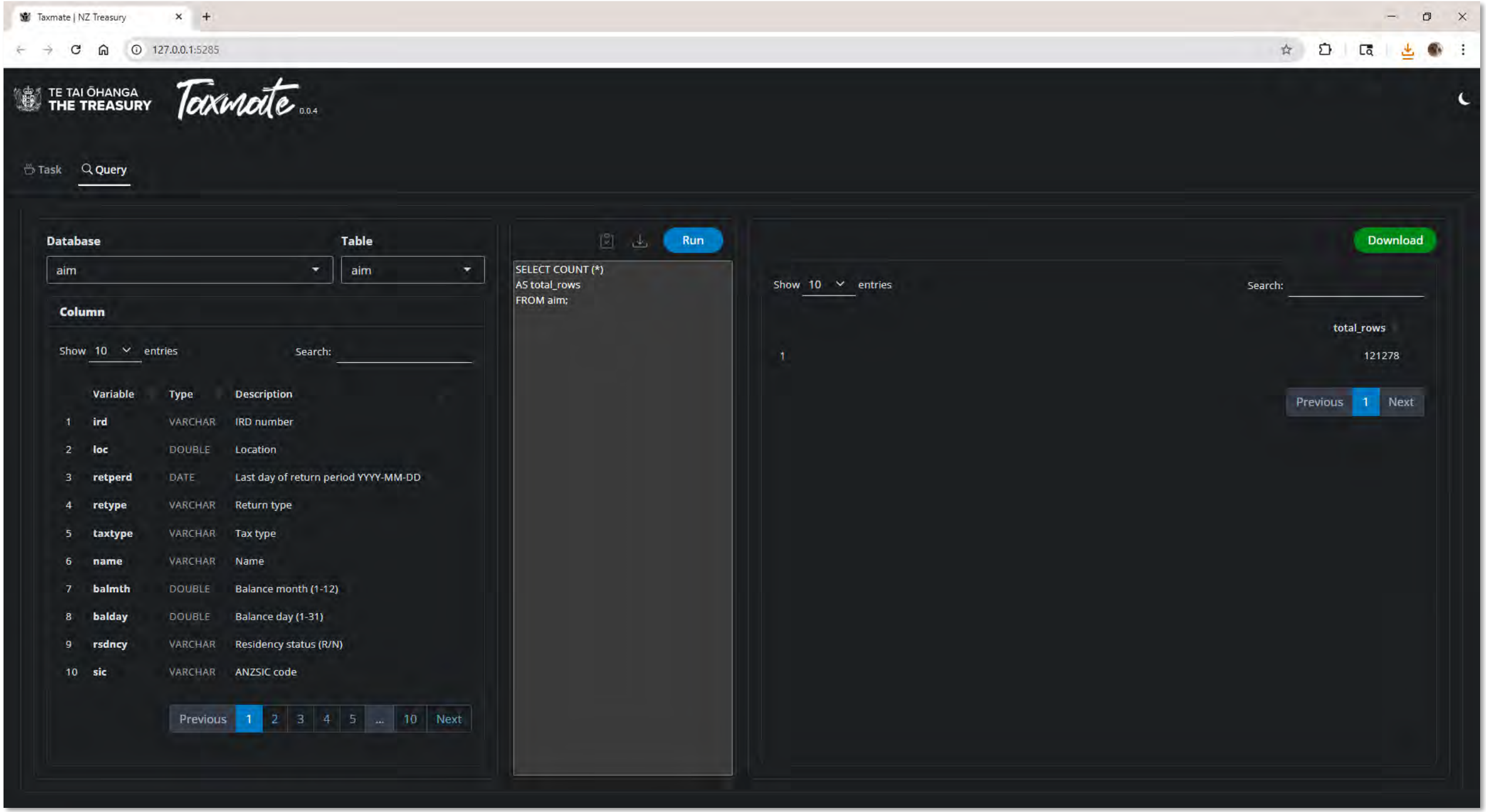
```
SELECT COUNT (*)
AS total_rows
FROM aim;
```

Download

Show 10 entries Search:

	total_rows
1	121278

Previous 1 Next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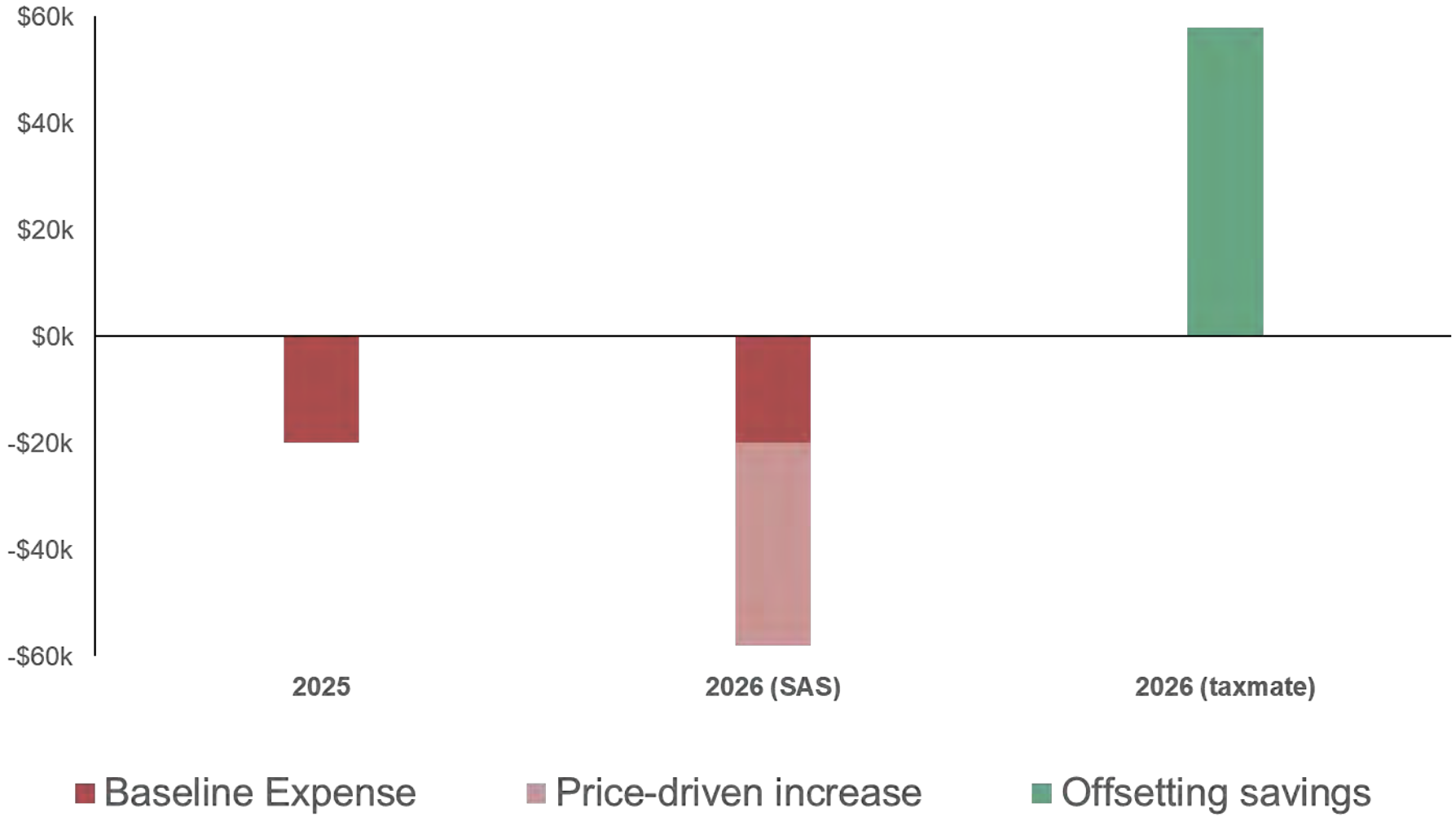
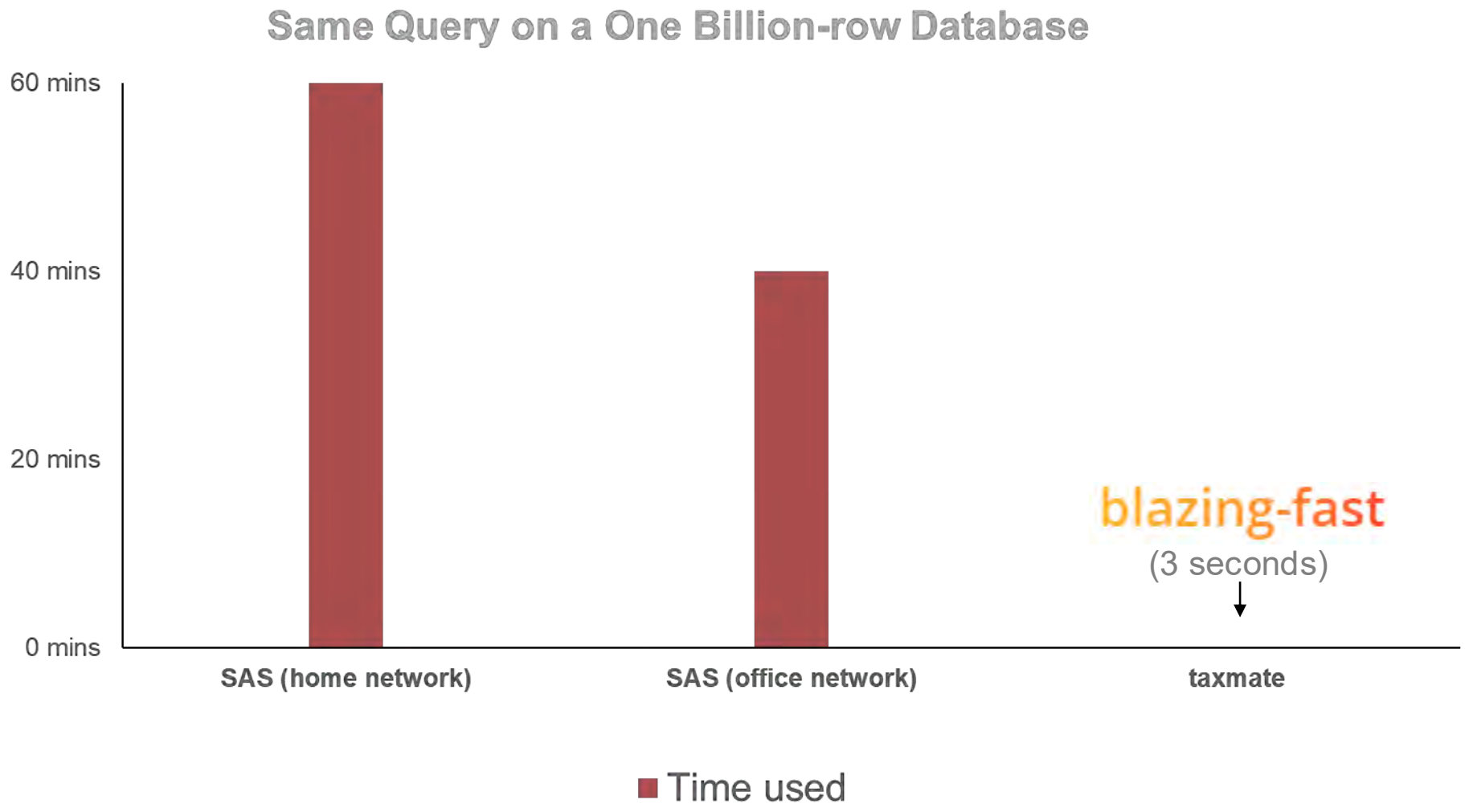
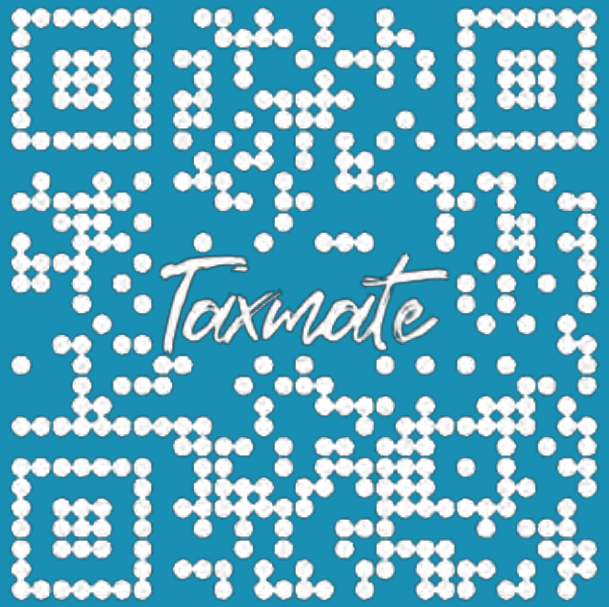
FROM aim;
Download
Show 10 entries
Search:
total_rows
1 121278
Previous 1 Next

Taxmate saves money each year. A lot of money.



Taxmate saves time for users. A lot of time.





Scan for more resources in GitHub

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