Querying FA with SQL
Technical stream

FA Solutions
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AGENDA

01 | Querying FA with SQL: overview

02 | Applications for queries in FA
Querying FA with SQL: overview
The database
What it contains

- Almost all your data is stored in your own relational database:
  - All contacts, portfolios, transactions, trade orders, securities, tasks, processes, users, and all related objects (e.g. addresses, accounts, and profile data)
  - A full version history of most of the aforementioned objects
  - Precalculated values: purchase lots, daily positions and account balances, daily portfolio values, transaction view objects, limit check results
  - Most FA configurations

- The following is **not** stored in the database:
  - Documents
  - *Some calculated values, e.g. analytics+ results*
Database structure

Database VS FA UI

- Almost all the data you can see in FA may be found in the database.
The database

Technology

- FA uses a **MariaDB** database
- MariaDB is an open-source replacement for **MySQL**
  - Relational database
  - MariaDB has some performance improvements over MySQL
  - Almost identical query language/syntax
- By default, we take regular (nightly) **backups** of the databases
  - Including entire database, *except* calculated database columns
Exploring the database
High-level database structure

- Around 200 tables in total, but...
  - Many tables ending with \_aud
    - Contain version history for the corresponding table without \_aud
  - Many tables starting with \textbf{ACT}\_ 
    - Related to processes and tasks, rarely queried 
  - Many tables starting with \textbf{QRTZ}\_ 
    - Used by our scheduler; you probably won't query these
Exploring the database

High-level database structure

The tables you’ll most often be querying are:

- Contacts: pm2_contact
- Portfolios: pm2_portfolio
- Securities: pm2_security
- Transactions: pm2_transaction
- Trade orders: pm2_transaction

Other noteworthy tables:

- pm2_marketdata_observation includes all security prices
- pm2_posting contains all postings
- pm2_profile2 and pm2_profile2_attribute contain all data for custom fields
Exploring the database

High-level database structure

- Pre-calculated portfolio values/positions:
  - `pm2_pf_report`* – Daily portfolio-level values (in portfolio currency)*
  - `pm2_pf_rep_item`* – Daily position-level values for each portfolio*
  - `pm2_pf_act_item`* – Daily “account positions” (cash) for each portfolio*
  - `pm2_pf_rep_sub_item` – Full history of purchase lots
  - `pm2_pf_act_sub_item` – Full history of accounts’ “purchase lots”
  - *Usually the largest tables of the entire database, so take care when querying them.*

- Portfolio reports (along with the items) are calculated every night, upon request, and/or if data changes (e.g. new transactions, or updated prices)

- Sub items are calculated every time data changes
Exploring the database

Queries view – the basics

- Writing your own queries, and running pre-saved queries, are done on the Queries-view

- It allows you to write and run commands to retrieve any data from the database

- It prevents adding new data, modifying data, or deleting data

- If you don’t have access to the queries view, ask our support to enable it for you

- Explore your data:
  - show tables
  - select * from pm2_portfolio limit 10
  - show columns from pm2_portfolio
  - show indexes from pm2_contact
  - SET STATEMENT max_statement_time=5 FOR SELECT
    MAX(market_trade_amount) FROM pm2_pf_rep_item
Applications for queries in FA
Applications for queries in FA

1. Saved queries, dashboards and report templates
2. Query-based monitoring
3. Query API
4. Queries in FA Front
Saved queries
The cornerstone for what is to come

- Queries may be **saved and shared**
- Saved queries and queries installed from AppStore show up on the **queries view**
- The view supports certain **parameters**
  - $P(portfolioId)$, $P(startDate)$, $P(endDate)$
  - select $P(startDate)$ AS startDate, $P(endDate)$ AS endDate, "$P(portfolioId)" AS portfolioId
- More parameters available in FA v3.4: $P(contactId)$, $P(userId)$, $P(securityId)$, $V(currentUserId)$, several parameters for building queries with limited visibility, and custom parameters
- SQL editor supports code-completion (suggestions of table and column names)
- Exporting query results (PDF, Excel)
Saved queries

Some examples

▶ Show investments into a complex fund structure (feeder funds, multiple securities per feeder) in a single view
▶ List mail addresses of investors of a fund in a single view
▶ Show multi-level security structure in a single view
▶ Calculate some specific figures not available elsewhere – e.g. average AUM for a selected period
▶ List upcoming cashflows
▶ List transaction fees by broker
▶ ...

...
### Queries in dashboards

#### Largest Portfolios

<table>
<thead>
<tr>
<th>Portfolio</th>
<th>Market Value</th>
<th>Return % 1M</th>
<th>Return % 6M</th>
<th>Return % 12M</th>
</tr>
</thead>
<tbody>
<tr>
<td>George Jones</td>
<td>4,106,317</td>
<td>0.02</td>
<td>0.06</td>
<td>0.21</td>
</tr>
<tr>
<td>Fred Fund</td>
<td>3,419,230</td>
<td>0.01</td>
<td>0.0</td>
<td>2.53</td>
</tr>
<tr>
<td>Megan Wilson</td>
<td>5,124,262</td>
<td>0.0</td>
<td>0.00</td>
<td>0.03</td>
</tr>
<tr>
<td>Private Equity</td>
<td>1,487,359</td>
<td>-0.1</td>
<td>-0.01</td>
<td>-0.02</td>
</tr>
<tr>
<td>John Spencer</td>
<td>789,558</td>
<td>3.42</td>
<td>0.27</td>
<td>9.63</td>
</tr>
<tr>
<td>Katie Mill</td>
<td>600,000</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Eva Russell</td>
<td>535,809</td>
<td>0.21</td>
<td>0.03</td>
<td>0.55</td>
</tr>
<tr>
<td>Caroline Customer</td>
<td>564,952</td>
<td>3.49</td>
<td>3.48</td>
<td>12.73</td>
</tr>
<tr>
<td>Eva Russell</td>
<td>309,273</td>
<td>3.28</td>
<td>2.04</td>
<td>8.27</td>
</tr>
<tr>
<td>Colin Customer</td>
<td>291,464</td>
<td>2.94</td>
<td>7.11</td>
<td>21.42</td>
</tr>
</tbody>
</table>

#### Largest Investments

- CapMan Public Market Fund
- Standard Life EU Strategic Par...
- Amazon.com, Inc
- Microsoft Corp
- Apple Inc
- Nokia Oyj
- Capella Capital K/S
- Seadrill Ltd 10/15 6.50%
- 4.5% Norwegian Government...
- Ericsson AB B

#### Total AUM per security type

- Fund
- Stock
- Private Equity
- Bond

#### Total AUM for 1 year

- AUM
Queries in dashboards

- Saved queries available as an option for a Dashboard section
  - **Queries**: Name of your query
- You need to have permissions for queries to select them
  - Pre-configure for someone who doesn’t have the permission
- Result is shown as a table – configure to show as a chart instead
- Parameters mostly not supported yet
- Use CURDATE() in your query to show the given day’s data
Queries as report templates

- Queries may be saved as *report templates*
  - Requires your query to include the portfolio ID parameter
  - Reports are always generated *per customer* or *per portfolio*
- You can decide who to share your report template with
- Report templates appear in the Report window as PDF reports, and can be used as any other report in PDF file format
  - Name of the saved query tab = Name of the report
- Running the template works the same way as PDF export from Queries: runs the query and produces a PDF out of the result
Query based monitoring

The basics

- Process, installable from AppStore, configurable via administration view
- Run any saved query and send the results to:
  - An open task in the tasks view
  - One or more predefined e-mail addresses
  - A file in a predefined location on the server
  - A specified URL as an HTTP POST or HTTP PUT request
- Schedulable
- Results of the query are delivered as a CSV file or JSON (for HTTP PUT/POST)
“Query based monitoring”

More than just monitoring

- Customized monitoring:
  - Report all clients with negative cash balances or negative positions
  - Notify about system warnings/errors/problems
  - Data validity warnings: transactions with crazy dates, negative commitments...

- Custom integrations:
  - Send trades to broker’s e-mail
  - Push specified data from FA to external applications
    - E.g. slack bot
    - E.g. another FA server

- Customized data processing: auto-import content based on custom query
Query based monitoring

Example: make sure our daily transaction file arrived

- Alerts if we don’t have a task for today with title “Imported data from...”

```
SELECT "No integration tasks found for today" AS 'Result'
FROM pm2_portfolio
WHERE NOT EXISTS (SELECT * FROM ACT_RU_TASK WHERE DATE(CREATE_TIME_) = CURDATE() AND NAME_ LIKE 'Imported data from %') LIMIT 1
```
Query based monitoring

Real life use cases: Bloomberg data upload

- Create .csv files for manual daily upload of positions to Bloomberg via email
- Create .req files for automated daily upload of held securities to Bloomberg via SFTP
- Use scheduling manager to automatically run the monitoring process at a specific time
- Create files in FA’s server where they can be configured to be sent to Bloomberg’s SFTP server automatically
- Or send files via email to be uploaded to Bloomberg
Query API

Overview

- A standard API for running saved queries in FA
- Only one mandatory parameter: the name of the saved query
- Optional parameter: list of query parameters
- Returns a JSON representation of the data, e.g. “Top 5 investments” query:

```
[ { "Security": "CapMan Public Market Fund", "Value": 830000 },
  { "Security": "Standard Life EU Strategic Partners", "Value": 420000 },
  { "Security": "Amazon.com, Inc", "Value": 208675 },
  { "Security": "Microsoft Corp", "Value": 171698 },
  { "Security": "Apple Inc.", "Value": 169178 } ]
```
Query API

Why?

- Q: Why use an API? Why not just run the query in FA?
  - A: APIs are meant for other systems to automatically fetch data.

- Q: Why not use one of our other standard APIs to get the data?
  - A: You use the query API instead of one of the other standard APIs when:
    - 1) A suitable standard API doesn’t exist for returning all the desired information in a single API call
    - 2) We want to optimize the speed of the specific search
Simple query which produces a simplified "order book" showing the best bid and ask prices and total units in active orders.

Actual query had filtering based on a tag and another status; modified for demo
Query API

Real life use cases

- Using Query API to fetch information for a separate web application
- Ability to freely choose what information is returned in the API request – more flexibility compared to specialized APIs (contacts API, portfolios API, transactions API, etc.)
Queries in FA Front

- Queries may be selected as a data source for the **datagrid gadget**
- Freely choose which columns to show, and in which order
- Query is run against selected portfolio in FA Front, if query contains $P(portfolioId)$ parameter.
- Query is run against selected date range in FA Front, if query contains $P(startDate)/P(endDate)$.
Queries in FA Front

Welcome Colin Customer!

This is your online trading portal. Get started by browsing through the screens on the left!

In case of any questions, email or call our support.

Your representatives are

Asset Management Co.
(email: info@assetmanagement.com // phone: +358 20 987 6543)

Susanna
(email: susanna@fasolutions.com // phone: +358 20 7118 513)

Queries may also be selected as a data source for the custom content gadget

Portfolio and date range parameters are supported
Queries in FA Front

*Real life use cases*

- Case: company selling structured products via FA Front
- Visualizing products, underlyings, their performance, etc. on FA Front with datagrids and custom content gadgets