Getting to know each other by... sharing code

Francesco Garue
SimCorp Italiana
Asset and Liability Management
Asset and Liability Management

- Transactions
Asset and Liability Management

• Transactions
• Holdings situation
Asset and Liability Management

- Transactions
- Holdings situation
- Portfolio yield
Asset and Liability Management

A quite simple scheme
Asset and Liability Management

A quite simple scheme

Transactions → Position calculation → Holdings situation → Portfolio yield

Fair price engine
Asset and Liability Management

A quite simple scheme
Asset and Liability Management

A not so simple scheme

Transactions
- Fair price engine
  - Credit risk scenario
  - Stress on yield curves
- Dividends scenario
- Share prices evolution
- FX rates evolution
- Income composition
- Average capital type
- Closings parameters
- Mortality tables
- Lapse tables
- ...
Asset and Liability Management

A not at all simple scheme
Asset and Liability Management

A not at all simple scheme

Transactions database

Position calculation

Holdings database

Rebalancing (buy & sell)

Portfolio yield

Event plans database

Securities database

Investment strategy

Target asset allocation

Target yield

FX rates evolution

Dividends scenario

Stress test evolution

Income components

Average capital type

Closings parameters

Mortality tables

Lapse tables

Rule: annual or slippery?
Asset and Liability Management

A not at all simple scheme
Asset and Liability Management

A not at all simple scheme

Transactions database

Securities database

Holdings database

Transactions

Position calculation

Liabilities

Rebalancing (buy & sell)

Portfolio yield

Event plans database

Fair price engine

Credit risk scenario

Stress on yield curves

FX rates evolution

Dividends scenario

Stated rates evolution

Income components

Average capital type

Closings parameters

Mortality tables

Lapse tables

Investment strategy

Target asset allocation

Target yield

Rule: annual or slippery?
The new adventure

The game

• SimCorp was aiming to build Dimension’s own ALM module

• Sofia had already learnt the ropes of ALM over the years

• So... We decided to go green and reuse some Sofia code!
The new adventure

The players

• 2 scrums in Copenhagen
• 2 scrums in Kiev
• 3 programmers in Milan
The new adventure

The players
The Rebalancing Component

The «extraction»
The Rebalancing Component

What it does

• Reads transactions and holdings situation
• Sums all cash flows to get the total liquidity
• Buys and sells to achieve the target asset allocation
• Computes fair prices and cash flows of all new assets bought
• Iterates for each period
The Rebalancing Component

What it does, what it needs to do it

• Reads transactions and holdings situation
• Sums all cash flows to get the total liquidity
• Buys and sells to achieve the target asset allocation
• Computes fair prices and cash flows of all new assets bought
• Iterates for each period

• Transactions and holdings situation stored in a "comfortable" data structure
• Asset allocation classes
• Asset allocation target weights
• Fictitious assets information
• Yield curves
The Rebalancing Component

The «extraction»: a few bumps along the way

- Remove dependency on system-specific databases or tables
- Avoid reading and writing files for intermediate results
- Translate, map, adapt
The Rebalancing Component

The «extraction»: a few bumps along the way

• Remove dependency on system-specific databases or tables
• Avoid reading and writing files for intermediate results
• Translate, map, adapt
• Refactor, refactor, refactor

«No guts, no glory...»
The Rebalancing Component

The architecture

Dimension

- Position results
- Asset allocation, classes and weights, investment strategy, yield curves
- Rebalancing results

Rebalancing

- Collect data
- Compute
- Format results
The Rebalancing Component

The architecture

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Rebalancing

- Collect data
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- Format results

D: «Compute this!»

JSON:
```
{
    "positionService": "https://dk01sv8700.scdom...",
    "resultService": "https://dk01sv8700.scdom.n...",
    "targetAllocationDefinition": "NTTB D_GI SMA...",
    "dates": {
        "start": "2019-06-30",
        "end": "2021-12-31"
    },
    "forecast": "NTTB D_FRST SMALL",
    "accounting": "MAIN",
    "pricingProfile": "KYS PRICE",
    "portfolio": "",
    "portfolioGroup": "",
    "label": "NTTB 20_8",
    "instrumentTypes": [
        "Equity",
        "Fund certificate",
        "Bond",
        "Index bond",
        "ABS",
        "SSD"
    ],
    "logaat": 1
}
```
The Rebalancing Component

The architecture

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- Position results
- Asset allocation classes and weights, investment strategy, yield curves
- Rebalancing results

Rebalancing

- Collect data
- Compute
- Format results

R: «Ok, work in progress»

JSON:

```
{
  "done": false,
  "reqid": "3ZCKYMYPYWXEXQP44LTM2M",
  "status": "inprogress",
  "log": [
    "2019-08-23 10:01:28Z [2] ... batch received...",
    "2019-08-23 10:01:28Z [2] ... done",
  ]
}
```
The Rebalancing Component

The architecture

Asset allocation classes and weights, investment strategy, yield curves

Dimension

Position results

Rebalancing

Collect data

Rebalancing results

Compute

Format results

R: «Fetch me some data»

URL:
https://dk01sv8700.scdom.net:44300/odata/
PositionResult?$filter=(PositionCalculationId eq 'NTTB D_FRST SMALL' and date(AnalysisDate) ge 2019-06-30 and date(AnalysisDate) le 2021-12-31 and AccountingFramework eq 'MAIN' and PricingProfile eq 'KYS PRICE' and PositionType eq 'Original')&$select=AnalysisDate,AccountingFramework,ExternalId,InstrumentType,Portfolio,SecurityId,Transactions,Nominal,AccruedInterestQC,AccruedInterestPC,AccountingAnalytics,CleanValueQC,CleanValuePC
The Rebalancing Component

The architecture

Position results
Asset allocation classes and weights, investment strategy, yield curves
Rebalancing results

Dimension

Collect data
Compute
Format results

Rebalancing

D: «Help yourself!»

JSON:
[
  {
    "AccruedInterestPC": 0,
    "AccruedInterestQC": 0,
    "AnalysisDate": "2020-08-31T02:00:00+02:00",
    "CleanValuePC": 21000,
    "CleanValueQC": 21000,
    "ExternalId": "05f9a0a9-df36-47f4-afb7-94d_",
    "InstrumentType": "Equity",
    "Nominal": 1000,
    "Portfolio": "D_GI_SMAL1",
    "SecurityId": "KYS EUR 01",
    "Transactions": [
      {
        "BankAccount": "D_GI BA1",
        "BusinessTransactionCode": "DividendPm_",
        "ElementaryTransactionCode": "Dividend_",
        "Nominal": 0,
        "NominalBase": 1000,
        "PaymentAmountPC": 12000,
        "PaymentAmountQC": 12000,
        "PaymentDate": "2020-08-20T02:00:00+02:00",
        "TradeDate": "2020-08-20T02:00:00+02:00"
      }
    ],
    "AccountingAnalytics": {
      ...
    }
  }
]
The Rebalancing Component

The architecture

Asset allocation classes and weights, investment strategy, yield curves

Position results

Dimension

Rebalancing

Collect data

Compute

Format results

Rebalancing results

URL:
https://dk01sv8700.scdom.net:44300/odata/GetTargetAllocation

JSON BODY:
{
    "argument": {
        "FromDate": "2019-07-31",
        "TargetAllocationId": "NTTB_DGI_SMALL2"
    }
}
The Rebalancing Component

The architecture

Asset allocation classes and weights, investment strategy, yield curves

Position results

Rebalancing results

Dimension

Collect data

Compute

Format results

Rebalancing

D: «There you go!»

```json
{
  "TargetClasses": [ 
    {
      "Date": null,
      "TargetClassId": "LIQUIDITY",
      "TargetWeight": 0,
      "Tolerance": 0
    },
    {
      "Date": null,
      "TargetClassId": "NTTB ASSETS",
      "TargetWeight": 100,
      "Tolerance": 0
    }
  ],
  "RepresentativeSecurities": [ 
    { 
      "AnnualCouponRate": 0,
      "CouponFrequency": "Quarterly",
      "Date": "2021-07-31T00:00:00+02:00",
      "PriceTypeCode": 5,
      "RepresentativeSecurityKey": 4257,
      "RepresentativeSecurityType": "FloatingR_",
      "TargetClassId": "NTTB ASSETS",
      "TargetWeight": 25,
      "TermToMaturity": 20,
      "YieldCurveId": "OAK ZC EUR"
    }...
  ]
}```
The Rebalancing Component

The architecture

- Rebalancing
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The Rebalancing Component

The architecture

Dimension

Position results

Asset allocation classes and weights, investment strategy, yield curves

Rebalancing results

Rebalancing

Collect data

Compute

Format results

R: «Here’s the result!»

JSON:

```json
{
  "Portfolio": "",
  "PortfolioGroup": "",
  "PositionCalculationId": "NTTB D_FRST SMALL",
  "WhatIfLabel": "NTTB 20_8",
  "Simulations": [
    {
      "TradeDate": "2019-07-31",
      "Transactions": [
        {
          "BusinessTransactionCode": "Buy",
          "FictitiousSecurityCode": 1000001,
          "Nominal": 9142,
          "RepresentativeSecurityKey": 3968,
          "ExternalId": ""
        }
      ]
    },
    {
      "TradeDate": "2019-08-31",
      "Transactions": [
        {
          "BusinessTransactionCode": "Buy",
          "FictitiousSecurityCode": 1000002,
          "Nominal": 11000,
          "RepresentativeSecurityKey": 3968
        }
      ]
    }
  ]
}
```
The Rebalancing Component

The architecture

- Asset allocation classes and weights, investment strategy, yield curves
- Position results
- Rebalancing results
- Collect data
- Compute
- Format results

D: «Roger that!»

JSON:
{
  "response":{
    "IsOk":true,
    "Message":null
  }
  "statuscode":"OK"
}
The Rebalancing Component

The architecture

Dimension ➔ Rebalancing

Position results ➔ Collect data ➔ Compute ➔ Format results ➔ Rebalancing results

Asset allocation classes and weights, investment strategy, yield curves

D: «I’m done!»

JSON:
{
  "done": true,
  "elapsed": 3719,
  "reqid": "3ZCKKYMPYWE5XQG44LTW2M",
  "status": "ok",
  "output": "https://dk01sv8700.scdom.net:4430...
"result": {
  "response": {
    "IsOk": true,
    "Message": null
  },
  "statuscode": "OK"
},
"log": [
  "2019-08-23 10:01:28Z [2] ... batch received...
  "2019-08-23 10:01:28Z [2] ... done",
  "2019-08-23 10:01:28Z [2] Converting the position results...
  "2019-08-23 10:01:28Z [2] Start the computation...",
  "2019-08-23 10:01:29Z [2] Formatting the result...
  "2019-08-23 10:01:31Z [2] Result sent to: ...
]
The Rebalancing Component

Demo time...