Calypso Cross-Asset Profit & Loss (CAPL)
Calypso Cross-Asset Profit & Loss (CAPL)

For CALYPSO V13

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Purpose of this Training Manual

The Calypso University team has prepared this Training Manual to facilitate your successful transition into using the Calypso suite of products. It is very important to us that you understand not only the “hows” of using Calypso software but in most cases the “whys”. This methodology will help you to become not only a more proficient user of the software but will provide you with additional knowledge that will enhance your current skills.

Using the Training Manual

We have made every attempt to ensure that your learning experience using this Training Manual is enjoyable. To that end we have developed internal iconology that should facilitate a consistent and easy-to-understand learning methodology. The iconology is as follows:

**Iconology Legend**

- **Monitor** - found in task/step portion of manual. It will let you know what screen you will need to be in to complete the task along with the path to reach the screen.
- **Notes** - generally found to the right side of each page in a grayed out box. It is the area set aside for you to take notes.
- **Additional Research** - Any additional information or research that is related to the module subject will be located in the section following this icon.
- **Comment** - Any tips, suggestions or comments will be preceded by this icon.
- **Warning** - Any terms or information that are important for completing module objective or that will be part of a review or exam will be preceded by this icon.
Cross-Asset Profit & Loss (CAPL)

Course Prerequisites

Calypso University recommends that you are familiar with the following:

• Trade capture and pricing processes including the Pricing Environment and Market Data
• The Calypso Workstation (CWS) and the Middle-tier structure including running reports based on trade filters and the Market Data Server
• Position keeping in Calypso.
• Registered participants of this course are also encouraged to review the following e-learning modules:
  • 101 Calypso Workstation
  • 101 Check Pricing Environment
  • 101 Cross Asset P&L
  • 101 Domain Values
  • 101 FX Volatility Surfaces
  • 101 Interest Rate Swap Trade
  • 101 Interest Rate Volatility Surfaces
  • 101 Introduction to Middle Office Risk Architecture
  • 101 Market Data Server
  • 101 Pricing Environment
  • 101 Pricing Framework
  • 101 Risk Reports
  • 101 Scheduled Task
  • 101 Trade Capture Window
  • 101 Trade Filters
  • 101 Trading Books
  • 101 Underlying Instruments
  • 101 Yield Curves
  • 102 Middle Tier Setup
  • 102 Vanilla Interest Rate Swap
CAPL Reporting In Today’s Dynamic Environment

Financial institutions that buy and sell financial instruments such as banks, hedge funds and brokerage firms are regularly involved in trading activities that result in frequent transfers of cash and securities between trading parties and other financial intermediaries such as agents, depositories, and exchanges.

It is critical for both the short and long-term success of these institutions to analyze and report the profitability of their existing cash positions, asset positions, and projected cash flows resulting from their ongoing market activities.

To meet these requirements and to ensure that trading decisions are properly informed, Calypso offers a top-down approach to attribute P&L based on time, market data or trade lifecycle changes. Various levels of aggregation or drill-down are available. Drill-down can be done at the trade level or at market data underlying level. Calypso P&L is fully integrated into the Calypso trading and risk management platform to provide comprehensive P&L reporting solutions.

The benefits of the Calypso P&L solution include:

- Single P&L report for a cross-asset portfolio, hence the name CAPL (Cross-Asset Portfolio)
- Live updates to reflect changes in P&L owing to market data changes and trade lifecycle events
- On-demand P&L report as well as saved P&L report for past dates
- Multiple ways of slicing and dicing of P&L data using Calypso Work Station’s Reporting Framework
- Official P&L management tools like PL-Lockdown, PL-Archive, PL-Sweep, Missing-Trade adjustments
- P&L solutions that cater to specific markets
  - P&L by FX position for high volume FX desks
  - Accrual P&L for funding and financing desks
- Two methodologies to explain the P&L
  - Full Revaluation
  - Granularity of P&L Explain to each market data’s underlying level
  - P&L Explained by Greeks
Course Description

The objective of this 2-day course is to provide participants with an in-depth understanding of the business context of P&L calculations and how these issues are resolved in Calypso. Participants will gain hands-on experience in all of the Calypso processes necessary to manage position-based Products and Cash positions, set up the middle tier and CWS from a P&L and risk reporting perspective, monitor P&L from a portfolio manager and trader perspective, and manage P&L production and reporting from a Middle Office perspective.

Calypso University Learning Strategy

This course takes a ground-up approach to the learning the CAPL process in Calypso. Calypso University instructors use the following instructional framework in order to provide you with the opportunity to obtain fundamental Calypso skills:

- One or more presentations for each learning module.
- Coaching, guidance, and specific feedback from the instructor regarding correct software use throughout the course.
- A set of practice exercises for each learning module that will be completed by the participant using his/her own instance of Calypso.
- At course completion, participants will be given a final exam to measure their level of comprehension and demonstrate their achievement of course objectives. Participants who satisfactorily complete the final exam will be presented with a Calypso University course completion certificate.

Course Competencies

On completion of this course, you will be able to:

- Demonstrate how the Liquidation and Position Engine generates and tracks positions including Position Aggregation and Settle Position concepts
- Configure various position specs to be used by the Trade Filter to load positions
- Generate snapshots and demonstrate how they are used to undo Position Engine positions
- Filter and present the P&L output by various parameters including PL State and PL Status columns
- Explain what a Mark is and why it is useful for Front Office and Middle Office users
- Generate Marks for a cross asset portfolio
- Calculate P&L for every asset class in Calypso
- Demonstrate how P&L is explained and the meaning and calculations behind every effect
- Generate end-of-day Greeks for a cross asset portfolio and use them to explain the P&L
- Explain how PL funding cost is computed and why it is used
- Manually translate P&L for different types of asset classes using Histo measure methodology
- Explain why trades are exploded in P&L and how the explode process works
- Generate an EOD P&L report and save it to the database, Excel, and a .csv file using an RISK_ANALYSIS scheduled task
- Manually adjust marks for a given trade and to add a new missing trade adjustment both via P&L report and Marks report and see the results of the update in real time in CWS
- Lock and unlock Marks via scheduled task and Mark report
- Sweep P&L by val date and settle date and explain why a given amount was swept
- Archive trades and reconcile an output with archived trades
# Course Schedule

The Calypso CAPL course is structured as a two-day class.

<table>
<thead>
<tr>
<th>Day</th>
<th>Modules</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1</td>
<td>Module 1: Managing Positions</td>
</tr>
<tr>
<td>Day 2</td>
<td>Module 2: P&amp;L Calculations and Using Marks</td>
</tr>
<tr>
<td></td>
<td>Module 3: P&amp;L – Translation P&amp;L and P&amp;L Explained</td>
</tr>
</tbody>
</table>
Module: 1
Managing Positions

By the end of Module 1, you will be able to:

• Describe the main types of P&L reports that are available for you
• Describe the PL Architecture for generating reports
• Explain the usage of the Position Engine and Liquidation Engine
• Perform the basic steps in producing a report
Introduction

Traders and middle office managers need to be able compute Profit and Loss on a daily basis to be able to make appropriate responses, such as adding or removing hedging trades or unwinding positions. This module describes the Calypso P&L Framework. This module includes a discussion of the reports available to you and provides an overview of the calculations. Examples of configured reports and details of the calculations are described in more detail in later modules.

It is assumed that you understand the Pricing Framework in Calypso, including Pricing Environments, and the concepts of Pricers, and Pricer Measurers. The Pricer Measures are the basis of the PL calculations. More detail is available from eLearning modules and from classroom course “Mastering Calypso Interest Rate Derivatives Pricing; Linear Products”.

You also require an understanding of Trade Filters and Scheduled Tasks. Trade Filters and Scheduled Tasks are also both briefly reviewed in an Appendix to this course.

In this class we will be using Calypso Workstation (CWS) and will point out a few features that are useful for configuring views of you P&L reports, but it is also assumed that you understand the basics of this tool.
1.1 Overview of CAPL Framework

The Calypso PL Framework is able to produce P&L results for any trade or set of trades which can be priced in Calypso (using Calypso or custom Pricers) or prices (Marks) from third parties, regardless of the mathematical complexity of the model.

The reports available fall into three main categories:

<table>
<thead>
<tr>
<th>Report Type</th>
<th>Main Usage and Calculation Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAPL (Cross-Asset P&amp;L)</td>
<td>Standard P&amp;L report, which can compute P&amp;L daily, month-to-date, year-to-date; or since inception; provides total PL and realized and unrealized P&amp;L.</td>
</tr>
<tr>
<td>PL Explained</td>
<td>P&amp;L report decomposes the total P&amp;L into contributions which can be attributed to movements market data, time and changes in the trades.</td>
</tr>
<tr>
<td>PL by Greeks</td>
<td>P&amp;L report which computes P&amp;L estimates by multiplying changes in inputs times first and second order derivatives; one method for computing PL Explained.</td>
</tr>
</tbody>
</table>

For CAPL calculations, Calypso computes P&L measures and results using simple arithmetic operations on input values—Pricer Measures. Because the P&L is essentially the difference between values on the start date and end date of the analysis, the input Pricer Measures such as NPV and cash must be available for both dates.

This approach ensures that the P&L calculator does not need to know anything about the models, the trades, or the market data in order to produce consistent results. The PL calculator only needs to know what arithmetic operations to perform on Pricer Measures returned from the models or obtained from previously stored values.

The Calypso CAPL Framework separates definition of the CAPL parameters in Analysis Designer from the selection of trades (through trade filters) and selection of the pricing environment.
You can think of the Framework as a numbers factory for producing PL Measures that uses the following algorithm:

1. Using the selected Trade Filter, build the portfolio: list of trades and positions to be analyzed.

2. Using the Pricing Environment and the portfolio, retrieve the list of market data items (quotes, curves, surfaces, matrixes, and other data) that are requested to price the portfolio; if Marks are to be used for either start or end date, retrieve pre-stored values for the trades.

3. Price the trades using the pricing sources (Pricers or Marks) to obtain the vector of values at the start date of the report and at the end of the report.

4. Apply the calculation as specified in the PL measures to obtain the result for each trade.

5. Save results in the Middle Tier Data Base (MDTDB).

6. In Calypso Workstation, configure how portfolio results are to be viewed.

**Analysis Design: CAPL Rule**

The concept of a CAPL Rule is straightforward. The rule specifies for the report: the start and end dates, the start and end times, the pricing environment, the PL Measures to calculate and whether or not to use marks (note there are additional settings that are described in later modules.

**Example Rule #1:** Calculate the Daily PL using the pricing environment from the trade; measures to calculate are Realized Full PL, Unrealized Full PL, Total PL and Trade Translation PL.
**Example Rule #2:** Calculate Year To Date (YTD) P&L using mark; calculate Unrealized PL, Realized PL, Cash PL and Unrealized Cash PL.

**Example Rule #3:** Calculate Daily PL and Monthly PL using marks, the measures to calculate are Unrealized PL, Realized PL, Cash PL and Unrealized Cash PL.

Note from these examples that rules can be simple or complex, and can be encompass more than one type of market data element. In later modules we will show examples of rules that can be configured in Analysis Designer for specific business cases.

### Analysis Design: PL Explain

Calypso allows you to determine the contribution to total P&L from various changes between the report start and end date as shown in the diagram:

More detail on these effects and the computations are provided in Module 3.

A PL Explained report is done run within the CAPL report, so that the results are totally consistent. You can choose the method from among: Independent, Cumulative, and Greeks. Additionally you can choose to drill down further into the Rate Effect, the Volatility Effect and the Credit Effect.

Examples of Rules:

- **Example Rule #1:** Calculate P&L Explained using independent method
- **Example Rule #2:** Calculate P&L Explained using Greeks

### Trade Filter

Trade Filters are used to select trades or positions to be included in an analysis. A review of trade filters is included in the Appendix to this course and in Calypso University eLearning.

Key points to note:

- If you set up a Trade Filter that does not correctly capture all the trades to be analyzed, you will be missing some P&L results.
- For position-based products, such as bonds, futures or spot equities, you normally will run P&L on your positions, not trades, so you need to include a Position Spec in the Trade Filter for these assets. Also, to run P&L analyses you need to create Position Snapshots using the Scheduled Task CREATE_POSITION_SNAPSHOT.
- You can run your Analysis as many times as you need against different trade filters, because the Trade Filter selection is not part of the Analysis Parameters. The Trade Filter is selected at runtime.
- To ensure that results are consistent across time the Trade Filter definitions should be kept constant.
Notes

Pricing Environment

In Calypso, Pricing Environments are used to map products to Pricers, market data items, and Pricer Parameters.

Key points to note in generating P&L results are:

• The CAPL rule works only on the market data elements you select through the Market Data Set and you need to have values for the start and end dates and times as specified in the Analysis Parameters.

• You can run your Analysis multiple times against different Pricing Environments, because the Pricing Environment selection can be specified at run time. This means you can run both intraday and official P&L reports with the same CAPL and PL Explained Rules but against different pricing environments.

• Best practice is to leave Pricing Environment definitions unchanged as you run reports over time.

• Another best practice, for efficiency and consistency is to use Marks. The marking process, described in a later module can use internally generated and saved results or you can store external values.

Output Reports

The output reports in simple forms have one row per trade or position. The columns show attributes as selected in the Analysis Designer and the calculated Risk Measure(s). The reports can be saved in Calypso format for recall in Calypso Workstation or in other formats such as Excel which can be accessed by other applications. Within the Calypso Workstation, report views can be configured according to your preferences.

Reports can also be run live (real-time) where they are configured to update when new trades are added or when market data changes or both, providing you with up-to-date PL values.
1.2 Overview of Analysis Designer for CAPL Reports

The Analysis Designer is the interface through which you set up a P&L report. This section provides an overview of the Analysis Designer. Some specific configurations for specific business cases are provided in later modules.

Configuring an Analysis

In this section we provide a brief overview. Detailed examples are provided in the following modules.

Navigate to:

Main Entry > Configuration > Reporting & Risk > Analysis Designer...

This command opens the Analysis Designer window.
The left-hand panel shows the tree of the available analyses, categorized by type and user-defined groups. Out-of-the-box, Calypso Fast-Track provides a variety of pre-configured reports for you to use “as is” or as the basis for your own designs (parameter sets). The right-hand side will be blank until you choose a design (parameter set) to view. To open an Analysis Design:

1. Click open the folder “Others” under Cross Asset P&L.

2. Click on any Analysis to open the Parameter Entry panel.

In the right-hand panel, the details of the Analysis Design (Parameter Set) are displayed.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PL Dates</strong></td>
<td>Determines the start and end dates and Pricing Environment</td>
</tr>
<tr>
<td><strong>Start/End Times</strong></td>
<td>Determines the start and end times; note as of v13 the start time must match a Snapshot Time. For end date you can choose from: current valuation date and time; an absolute specific time; book end-of-day for the book you choose; snapshot time.</td>
</tr>
<tr>
<td><strong>Select PL Columns</strong></td>
<td>Determines the PL measures to be calculated and the Pricer Measures to display; as well you can choose additional trade and PL attributes to include in the report; also allows you to turn on the Explain P&amp;L feature</td>
</tr>
<tr>
<td><strong>Use Marks</strong></td>
<td>Determines whether or not to use Marks at the start or end or both</td>
</tr>
<tr>
<td><strong>Advanced Configuration</strong></td>
<td>Use to set Undo feature on or off and whether or not to include Cost of Carry and soft archived trades</td>
</tr>
</tbody>
</table>
1.3 Overview of the PL Architecture

Although this course is aimed at business users who need to set up Analyses and interpret the output of those Analyses, an understanding of the PL Architecture and the link to the Middle Tier speeds up any implementations.

CAPL Schematic

There are several alternative routes in Calypso for running risk reports.

- You can use the Scheduled Task RISK_ANALYSIS to produce reports on a regular schedule. The saved reports can be opened viewed in Calypso Workstation.

- You can run reports during the day, configured for real time updating when trades are added or amended or when market data changes or both. Real time updating requires the use of the Market Data Server.

- You can run Ad Hoc reports on demand from a trade, the trade blotter, or Calypso Workstation. In general Ad Hoc reports are not recommended to be used for P&L reports.

In all cases, your reports are generated through the Middle Tier Architecture, which has as its main components the Calculation Server, the Presentation Server and the Middle Tier Data Base. For more information on the Middle Tier Components, please consult the Appendix. This infrastructure is designed to fit into Calypso’s client-server architecture and provides the base for optimized timely report generation.
Overview of the Calypso Workstation (CWS)

The Calypso Workstation is the primary application through which P&L (Profit and Loss) and Risk reports are viewed. Reports of interest are added to the Report Collections Tree Panel. Results are displayed in movable tabs, one report per tab. Each report can be configured to match the preferences of the person using the reports. Various panels such as the Market Data panel and On Demand Analysis Panel can be shown or hidden. Panel Layouts can be stored and retrieved. Specific examples of Report Configurations are included in the business cases in the following modules. (NOTE: It is assumed in this class that you have knowledge of CWS features and functions. These are only reviewed here briefly.)

1. Report Collections List
2. Analysis Results; displayed as configured using the settings under the Report command
3. Market Data panels
4. Configured Drilldown, showing details for a particular row selected
5. Panel Selector, to show or hide viewable panels; layout can be saved for reuse.

Configuration of CWS and examples of configured reports are discussed in detail in the following modules, when we walk through some business cases.
1.4 Position Management in Calypso

Certain types of trades (for example, FX, bonds, equities or futures) are managed by position in Calypso. Although the underlying product is traded multiple times, values such as the net quantity and the average price can be easily computed. This approach conforms to standard market practice and improves performance and usability of the P&L reports.

Positions are also generated to meet specific market requirements including cash position aggregation, viewing FX trades grouped by settle date due to high volume, and aggregate positions based on portfolio metrics (sectors, strategies). Another reason trades are organized into positions is to capture buy and sell trade liquidations and to calculate the realized and unrealized amounts on a given product. Based on the Calypso configuration, various positions are computed and stored. These positions are then available for position management and reporting.

Positions can be grouped based on trading strategy: by currency pairs for FX traders, by strategy, by region, and by trader. It is also important to have the flexibility to view the same positions by different aggregation views.

Product Positions

There are two major types of positions in Calypso: Product Positions and Cash Positions. Product Positions represent an aggregation of trades that share the same book, product, currency and potentially, other attributes. The products for which product positions are built are fungible and other than FX, follow particular rules when buy and sell trades are combined.

In general, position based products include, but are not limited to, Bonds, Equities, Futures, Future Options, CFDs, ETOs, and FX. For reporting purposes, product positions replace the trades that they represent.

For a list of supported position based products within a Calypso environment, you can review the values for the Domain “PositionBasedProducts.”

Navigate to:

Main Entry > Configuration > System > Domain Values

Cash Positions

Cash positions represent a collection of cash flows and in most cases, are viewed alongside the trades and product positions from which the flows originate. Cash positions are used for cash management and risk reporting for a given portfolio or desk. For settled FX products, either the cash position or the product position is monitored.

Engines

There are two engines in Calypso that are used to build positions: the Liquidation Engine and the Position Engine. The main difference between the two engines is the amount of information that a given position contains. Liquidation Engine positions contain information about the liquidation of particular buy and sell trades against each other to calculate the realized P&L amount. This approach is used for a majority of the position-based products. The Position Engine positions contain only the summary totals. This allows the engine to quickly build and update the positions and is used for FX and Cash positions.
Position Spec

To view positions instead of trades in a report, a Position Spec must be added to the Trade Filter. There are three types of Position Specs: Liquidity, Spot Blotter, and Risk and PL. Liquidity and Spot Blotter are used exclusively with Forward Ladder analysis. In this section, we will focus on Risk and PL.

Navigate to:

**Main Entry > Configuration > Filters > Position Specification**

The different positions that have been created by the Liquidation and Position Engine are loaded based on the parameters defined in the Position Spec.

The Trade Date/Settle Date designation only applies for Cash positions. For Product positions, the position is picked up based on the configuration in the Liquidation/Position Key and the Liquidation Config fields. The example above defines Product Position By as Trade Date. It is grayed out so that it is not changeable, but this does not mean that the position will always be loaded by trade date. Cash positions are generally loaded based on Settle Date, but for some Asset Management reports there is still an option for Trade Date cash positions.

The same Liquidation and Position Key is chosen in the Position Spec. This means that when setting up the position and Liquidation Engine configuration, it is important to use the same key so that when you run the report all of the positions can be loaded correctly.

There are two options in the Position Spec that enable FX position loading features in CAPL. “Gp Non-Settled FX Trades by Settle Dt” allows you to load the unsettled positions from the Position Engine instead of the unsettled FX trades. “Split Ccy Prs by Ccy” means that the currency pair-based FX position is split into two lines by currency. Unsettled FX positions are split into two lines and priced by the FX Pricer. For settled FX positions, instead of the FX product position, the FX Cash position is loaded. Both positions need to be maintained for this feature to work for settled positions.
FX Trades Example

Below are four examples of a set of two settled FX trades and two FX Forwards that settle on the next month.

<table>
<thead>
<tr>
<th>Trade Id</th>
<th>Product Description</th>
<th>Trade Date</th>
<th>Trade Settle Date</th>
<th>Entered Date</th>
<th>Entered User</th>
<th>Bundle Name</th>
<th>Bundle Type</th>
<th>Quantity</th>
<th>Trade Price</th>
<th>Book</th>
</tr>
</thead>
<tbody>
<tr>
<td>4430</td>
<td>FX Forward EUR/USD</td>
<td>Dec 29, 2011 01:52:24 AM</td>
<td>Dec 29, 2011 02:52:24 AM</td>
<td>calypso_user</td>
<td>calypso_user</td>
<td>PLPosition</td>
<td>1940</td>
<td>0.0000</td>
<td>1.122591 (BookNYC)</td>
<td></td>
</tr>
<tr>
<td>4446</td>
<td>FX Forward EUR/USD</td>
<td>Dec 29, 2011 01:52:24 AM</td>
<td>Dec 29, 2011 02:52:24 AM</td>
<td>calypso_user</td>
<td>calypso_user</td>
<td>Trade</td>
<td>1940</td>
<td>0.0000</td>
<td>1.122591 (BookNYC)</td>
<td></td>
</tr>
<tr>
<td>3946</td>
<td>FX Forward EUR/USD</td>
<td>Dec 29, 2011 01:52:24 AM</td>
<td>Dec 29, 2011 02:52:24 AM</td>
<td>calypso_user</td>
<td>calypso_user</td>
<td>Trade</td>
<td>1940</td>
<td>0.0000</td>
<td>1.122591 (BookNYC)</td>
<td></td>
</tr>
<tr>
<td>3947</td>
<td>FX Forward EUR/USD</td>
<td>Dec 29, 2011 01:52:24 AM</td>
<td>Dec 29, 2011 02:52:24 AM</td>
<td>calypso_user</td>
<td>calypso_user</td>
<td>Trade</td>
<td>1940</td>
<td>0.0000</td>
<td>1.122591 (BookNYC)</td>
<td></td>
</tr>
</tbody>
</table>

This is how they will appear after the CAPL report is run on 12/21/2011 using the different configurations.

Example 1: No FX Product Boxes Flagged

This is the result of the Position Spec configuration with no FX Product checkboxes flagged. Unsettled trades are seen as separate trades. Settled trades are seen as a currency pair based position.

Example 2: Split Ccy Prs by Ccy Flagged

This is for the configuration with the “Split Ccy Prs by Ccy” checkbox flagged. Unsettled trades are seen as separate trades. Settled trades are seen as positions split into cash by currency.
Example 3: Group Trades Into Positions Flagged

This is the result with the checkbox to group trades into positions flagged. Unsettled trades and settled trades are seen as different currency pair based positions depending on their settlement dates.

Example 4: Both FX Specific Checkboxes Flagged

This is the result for the configuration with both FX Product checkboxes flagged. Unsettled trades and settled trades are both seen as positions split up by currency.
1.5 Position Aggregation and Aggregation Keys

Calypso provides various tools for grouping trades. The set of criteria that control how trades are organized into positions is called a Position Aggregation. The individual criteria used to organize positions are called Aggregation Keys. All positions in Calypso are aggregated based on at least two keys: Book and Product. This means that in any given position, all the trades will be in the same book and share the same product.

If the reporting requires more granularity, there is a lot of flexibility in aggregation beyond the default configuration. Some examples of common additional aggregation keys are Bundle, Counterparty, Trader, and Strategy. Strategy is an interesting position key, because it is based on a keyword, rather than an innate attribute of the trade.

In addition to the few keywords that have been designated as keys, more position keys can be created based on keywords. It is important to note that when viewing reports, there is no way to aggregate these positions at a level lower than book and product if additional keys are not defined.

![Example of a Configured Aggregation Showing Strategy](image)

When setting up a Position Aggregation, a single configuration can aggregate the position on any number of keys at once to ensure the necessary granularity is achieved. Additionally, any number of aggregations can be created with different sets of keys. For every aggregation that is created, a separate position is saved in the database, so it would be wise to only create the configurations that are going to be most useful.

Creating the positions at the lowest required level and then aggregating in the report as necessary would be the optimal solution, as long as that lowest level is not unreasonably granular. However, the benefit of this type of configuration is that many aggregations could then be created within the Viewer rather than at the Position level.