Retail passion. Innovative solutions.

Retek® Data Warehouse™ 11.0

User Guide

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Customer Support hours

Customer Support is available 7x24x365 via email, phone, and Web access.

Depending on the Support option chosen by a particular client (Standard, Plus, or Premium), the times that certain services are delivered may be restricted. Severity 1 (Critical) issues are addressed on a 7x24 basis and receive continuous attention until resolved, for all clients on active maintenance. Retek customers on active maintenance agreements may contact a global Customer Support representative in accordance with contract terms in one of the following ways.

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E-mail	support@retek.com
Internet (ROCS)	rocs.retek.com Retek's secure client Web site to update and view issues
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When contacting Customer Support, please provide:

- Product version and program/module name.
- Functional and technical description of the problem (include business impact).
- Detailed step-by-step instructions to recreate.
- Exact error message received.
- Screen shots of each step you take.

Contents

Chapter 1 – Introduction to Retek Data Warehouse

This section introduces you to the role of decision support and data warehousing in a retail environment. It reviews the basic requirements for a decision support system for retailers and explains how Retek Data Warehouse (RDW) fulfills the information needs of a retail organization.

Decision support

Decision support in the retail environment

Decision support allows all users in a retail organization to answer questions about the business. You will need answers to questions like these to operate and plan in the retail marketplace:

- How do actual sales this period compare to the current plan?
- What is the retail value of inventory on hand and how does it compare to the same period last year?
- How do my prices compare to my competitor's prices?
- What are my best selling items in a category or department?
- How effective was the last promotion?

The answers to these questions and others are embedded in the enormous volume of sales and returns, price changes, receipts, and other transactions generated by your retail organization. These transactions are the raw material for decision support.

Transaction level data must be converted to information that is useful for supporting the decisions that a retail organization must make.

Data warehousing and decision support

The data warehouse is the central repository for the data that is required for decision support in a retail environment. The applications and components that comprise the data warehouse perform these functions:

- Extract transaction and other data from source systems.
- Organizes and standardizes data so that it can be stored in a consistent format in the data warehouse.
- Load data to a relational database management system that is specially constructed for decision support.
- Provide analytical tools and interfaces necessary to deliver information throughout the retail organization.

Online transaction processing (OLTP) systems, such as the Retek Merchandising System (RMS), are designed for efficient record keeping and generally hold only a small amount of historical information. The data warehouse, on the other hand, consists entirely of historical data organized by business area. These business areas consist of a relatively small number of very large tables. This type of organization is optimal in the decision support environment, where large quantities of historical data must be stored and made available to users in summary form. The tables that make up the data warehouse contain the information that is needed to create a picture of the organization at any point during the period for which data is kept, usually two to five years.

The tables in the data warehouse consist of *facts* and *attributes*. Knowing the meaning of these terms is essential to understanding a data warehouse and how it works. Facts are numeric pieces of information about the business, such as sales amount or inventory unit count. The majority of facts are *additive*, meaning that we can add two facts of the same type and create a meaningful number. For example, we can add up sales dollars for every day in a week to arrive at the total sales for that week. Some facts are *semi-additive*, meaning that we cannot add facts of the same type in all circumstances. For example, we would add receipts for an item to existing inventory, but we would not add the number of units on hand for every day during a week to arrive at a weekly total. Rather, the amount of inventory is expressed as a position for some time period such as day or week.

In and of themselves, facts have no meaning. The statement “inventory on hand was 10” only becomes intelligible when given the context of time and place. Entities that place facts in context and make them meaningful are referred to as *attributes*. An attribute is the general description of some aspect of the business, such as location, day, or item. Specific instances of an attribute are called *attribute elements*, for example, Minneapolis (location), April 16, 2002 (day), and scarves (item). Facts become useful only when qualified by one or (as is most often the case) more attribute elements.

Attributes are frequently part of a *hierarchy*. Hierarchies are groups of related attributes that have well-defined relationships with one another. Hierarchies represent the business structure of the retail organization. Individuals at different levels in the organization have different information requirements. Hierarchies make it possible to analyze the business at any level required. For example, a location manager might wish to view sales for his location only by subclass for the previous week. The region manager, on the other hand, wants to view sales for her region by department for the current month.

The data in fact tables provides the basis for the measurements that are needed for decision support, but are not sufficient to answer many of the complex questions in the retail business. The business function of the data warehouse is to fulfill requests for specific information by users at all levels of the retail organization. Decision support in a retail environment requires a set of sophisticated business measures that extend analytical capability beyond the raw facts held in the data warehouse. Answers to many business questions require complex queries and calculations using data in the data warehouse, for example:

- What percentage of sales has a specific class contributed to overall sales for the department for the season and year to date?
- How do profit margins in each region compare to the same period last year?
- What are the most and least profitable items in our marketplace?
- How do actual sales compare to planned sales for this period?

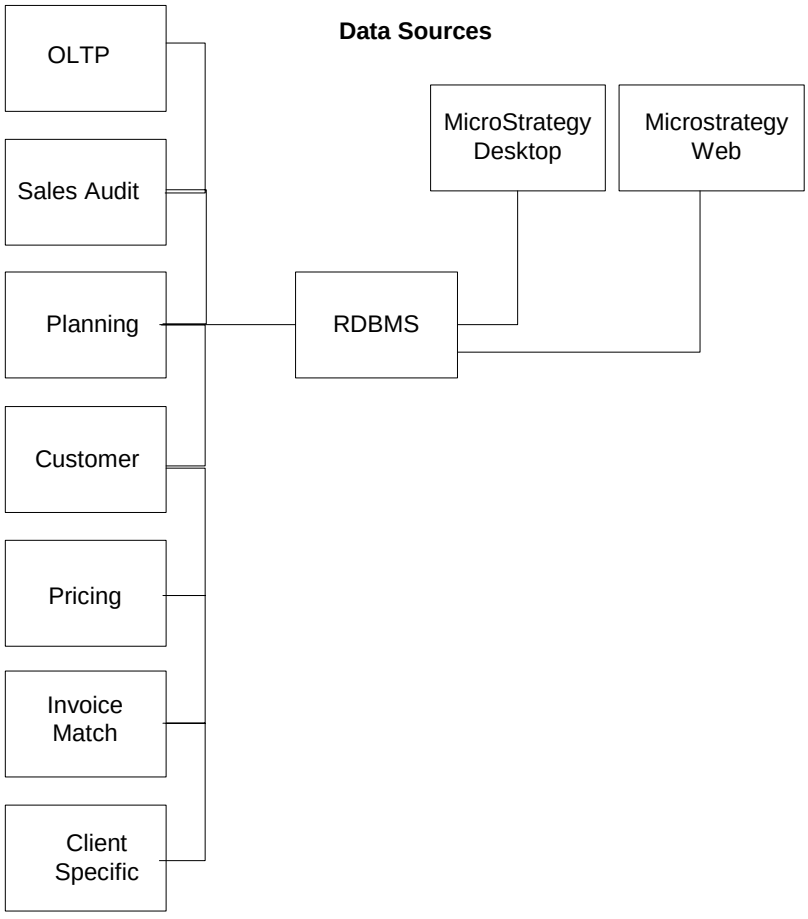
Answering these and the thousands of other questions required to support the retail organization requires sophisticated query and analytical engines for retrieving and manipulating data in the data warehouse. These capabilities are provided by online analytical processing (OLAP) tools. These applications and interfaces make it possible to create the sophisticated business measurements needed for analysis, execute highly complex queries against the data warehouse, and deliver information on demand to a large and diverse user population.

Retek Data Warehouse (RDW)

Overview

RDW fulfills the information needs of decision makers throughout the retail organization. RDW has been specifically designed and optimized for the retail environment. Its components load massive volumes of data provided by transaction systems throughout the organization and transform the data into meaningful business measurements.

The following diagram shows the major components of RDW.



Data sources

An online transaction processing (OLTP) system, such as the Retek Merchandising System (RMS), is the principal source of data for RDW. The OLTP provides the majority of attribute data, including the organization, product, time calendar, and most other hierarchies. In addition, the OLTP supplies facts for many of the data marts including inventory, pricing, cost, stock ledger, and supplier compliance.

Transactions at point of sale are a key source of information for several of RDW's fact tables. Transformation of this data to levels where it is appropriate for decision support yields crucial information about sales and returns. In addition, data from point of sale is the source for information about employee productivity and loss prevention. Transaction data from point of sale can be provided by Retek Sales Audit (ReSA) or via an interface with another system.

RDW holds planning data for sales and other data marts, allowing comparison of planned to actual results. Plan facts for an original and current plan are imported from the Retek TopPlan application or, if TopPlan is not in use, another planning system.

Retek Customer Order Management (RCOM) is a centralized solution covering all channels for management of customer interaction. RCOM is the source for customer and demographic data. This information must be extracted from another system if RCOM is not in use.

Retek Invoice Matching (ReIM) is a solution that provides all the data necessary to support the invoice verification function, minimizing interface development and maintenance costs. ReIM can serve as the source of invoice cost data. This information must be extracted from another system if ReIM is not in use.

Retek Price Management (RPM) is a solution that suggests and assists with pricing decisions. RPM can serve as the source of promotion data. This information must be extracted from another system if RPM is not in use.

RDW provides infrastructure for data for which no Retek source system exists. Client specific interfaces must supply data for the following attribute data:

- Customer account
- Customer geographic
- Product and customer clusters
- Plan season
- Market data

In addition, client specific interfaces must capture facts in these areas:

- Market data
- Space allocation
- Store traffic

See the *RDW Operations Guide* for additional information.

The data from transaction systems is transformed to accommodate the RDW database structure. This data serves as the building blocks for business measurements, but is not sufficient to answer most business questions. Typically, data is held at a low or granular level in RDW. For example, RDW holds sales data by the attributes location, item, and day. That is, there will be one row in the sale fact table for every combination of these attributes. In most cases, however, the analyst will want to view data at higher levels in the product and organization hierarchies, and for a longer span of time than a single day.

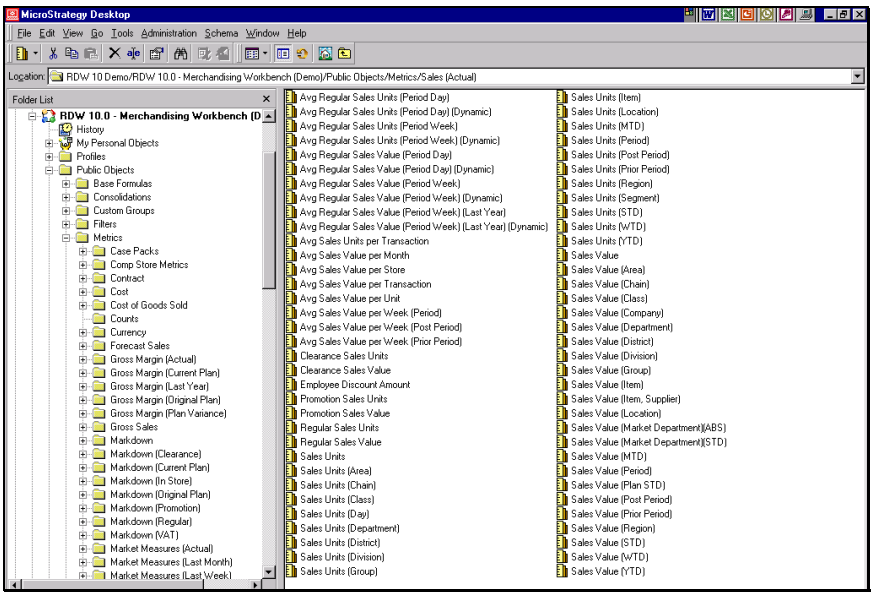
Effective decision support requires that facts be held at a granular level, while letting measurement take place at any level in the organization where it is needed. For example, a location manager making an assessment of monthly sales at the department level wants a report showing total sales for each department. When the location manager spots a potential problem at the department level, he may want to focus analysis on the subclass or even the specific items where a problem exists. RDW permits analysis at any level where it is needed by storing information at a low or granular level while allowing reporting at summary levels.

In some cases, RDW holds data at multiple levels to facilitate analysis and improve performance. For example, sale facts are held by subclass and week as well as item and day (the location attribute is present in both tables). The result of this is that the same data exists in more than one fact table in the database. While redundant data improves performance by reducing the number of queries that must be serviced by the system, it also requires more maintenance because it requires programs and table maintenance. RDW uses redundant data in a few cases, where all clients will benefit in terms of performance. For the most part, however, clients must determine where this is needed based on an analysis of their needs.

Summarization of data to any level where it is required is only the first requirement for fulfilling the complex information needs of the retail decision maker. By itself, however, it is not sufficient to create complex business measurements needed in most kinds of analysis. Consider the question “What percentage of sales value did each location contribute to total sales value for the region?” To answer this, we must know both the total sales value for the region and the total for each location that belongs to that region, and then perform the required calculation (Region Sales/Location Sales).

The OLAP tool performs these functions in the data warehouse. The MicroStrategy Desktop™ interface can be used to create business measures in addition to the set of business measures and key performance indicators already provided by RDW for decision support in a retailing environment. The existing measurements were developed in accordance with best practices and focus on the main report requirements of the retail business. They provide the building blocks from which a business can incorporate their own unique set of business measures and key performance indicators.

The following graphic shows RDW as seen through the MicroStrategy Desktop application.



View of RDW business measures and key performance indicators from MicroStrategy Desktop

The set of retail metrics are used in the construction of pre-defined reports. The pre-defined reports are part of the RDW toolkit, which provides a business with the foundation of retail reporting requirements, yet allows for the building of unique reports in addition to the pre-defined reports. Pre-defined reports are available to users of RDW after the application has been installed and data becomes available. The following example is a pre-defined sales analysis report created in MicroStrategy Desktop.

Organization (Location)	Metrics	Sales Value	Regular Sales Value	% Contrib Regular to Sales Value	Promotion Sales Value	% Contrib Promotion Sales Value	Clearance Sales Value	% Contrib Clearance to Sales Value
Minneapolis	14101	376,849	72,444	19.22%	215,062	57.07%	89,344	23.71%
St. Paul	14102	465,516	125,116	26.88%	212,456	45.64%	127,943	27.48%

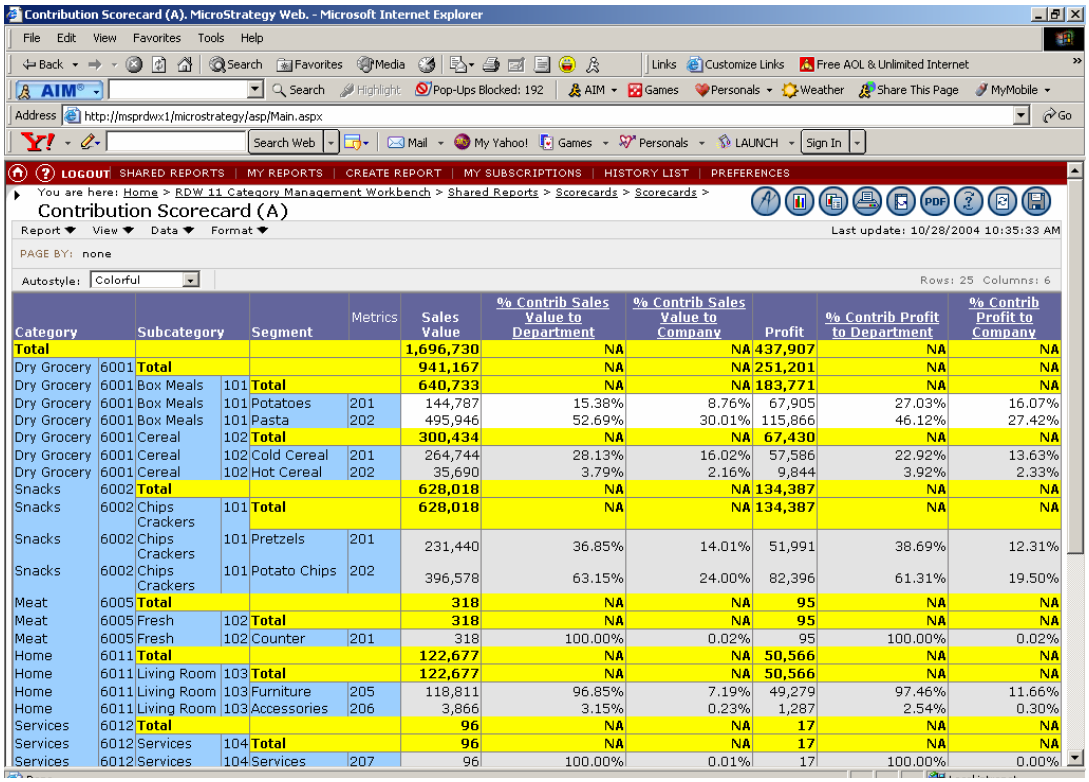
Sales analysis report

Although the pre-defined report set covers the foundation information needs in the retail organization, it is not exhaustive. Business analysts and other users should add their own reports in accordance with business practices specific to their organization. For example, a retailer may want to report at an organizational or product level where no pre-defined report exists. In some cases, the measurements required for the report will be found in the RDW set of pre-defined metrics. In this circumstance, the function of the Desktop user is to understand the business requirements for the report, identify the appropriate metrics in the RDW set, and build the report. Occasionally, it may be necessary for the business analyst to modify a pre-defined metric or create a new metric to suit the business practices of the organization. The Desktop interface makes this possible.

Chapters 2 – 4 in this document provide additional information about the set of metrics available in RDW and how these are used in reporting.

Most users in a retail organization will not need the extensive functionality available in MicroStrategy Desktop. They will interact with RDW through Microstrategy Web, a flexible, easy to learn application with an intuitive interface that provides access to the powerful analytical engine of RDW.

The following graphic shows Microstrategy Web with a pre-defined report on display.



Category		Subcategory		Segment	Metrics	Sales Value	% Contrib Sales Value to Department	% Contrib Sales Value to Company	Profit	% Contrib Profit to Department	% Contrib Profit to Company
Total						**1,696,730**	NA	NA	**437,907**	NA	NA
Dry Grocery	6001	**Total**				**941,167**	NA	NA	**251,201**	NA	NA
Dry Grocery	6001	Box Meals	101	**Total**		**640,733**	NA	NA	**183,771**	NA	NA
Dry Grocery	6001	Box Meals	101	Potatoes	201	144,787	15.38%	8.76%	67,905	27.03%	16.07%
Dry Grocery	6001	Box Meals	101	Pasta	202	495,946	52.69%	30.01%	115,866	46.12%	27.42%
Dry Grocery	6001	Cereal	102	**Total**		**300,434**	NA	NA	**67,430**	NA	NA
Dry Grocery	6001	Cereal	102	Cold Cereal	201	264,744	28.13%	16.02%	57,586	22.92%	13.63%
Dry Grocery	6001	Cereal	102	Hot Cereal	202	35,690	3.79%	2.16%	9,844	3.92%	2.33%
Snacks	6002	**Total**				**628,018**	NA	NA	**134,387**	NA	NA
Snacks	6002	Chips Crackers	101	**Total**		**628,018**	NA	NA	**134,387**	NA	NA
Snacks	6002	Chips Crackers	101	Pretzels	201	231,440	36.85%	14.01%	51,991	38.69%	12.31%
Snacks	6002	Chips Crackers	101	Potato Chips	202	396,578	63.15%	24.00%	82,396	61.31%	19.50%
Meat	6005	**Total**				**318**	NA	NA	**95**	NA	NA
Meat	6005	Fresh	102	**Total**		**318**	NA	NA	**95**	NA	NA
Meat	6005	Fresh	102	Counter	201	318	100.00%	0.02%	95	100.00%	0.02%
Home	6011	**Total**				**122,677**	NA	NA	**50,566**	NA	NA
Home	6011	Living Room	103	**Total**		**122,677**	NA	NA	**50,566**	NA	NA
Home	6011	Living Room	103	Furniture	205	118,811	96.85%	7.19%	49,279	97.46%	11.66%
Home	6011	Living Room	103	Accessories	206	3,866	3.15%	0.23%	1,287	2.54%	0.30%
Services	6012	**Total**				**96**	NA	NA	**17**	NA	NA
Services	6012	Services	104	**Total**		**96**	NA	NA	**17**	NA	NA
Services	6012	Services	104	Services	207	96	100.00%	0.01%	17	100.00%	0.00%

Report viewed through Microstrategy Web

Microstrategy Web users can run pre-defined reports or other public reports that have been made available to them. Users can also create reports using one of several options. In addition to running and creating reports, Microstrategy Web users can:

- Format and print reports.
- Save reports that they have created or modified in a personal folder.
- Subscribe to reports for automatic execution.
- Search for reports or specific business measures by keyword.
- Export data to other applications.

Chapter 2 – Report components and concepts

Users of RDW view information by running reports. Reports are composed of several other objects that provide a structure and specify the information that will be included. These report building blocks exist independently in RDW to allow re-use of objects. This chapter explains the role of each object type in the data warehouse.

Overview

A report is composed of three objects: metrics, attributes, and filters.

Metrics are the business measurements and key performance indicators that appear on a report. Sales Value and the other column headings in the sample report are metrics.

Attributes qualify business metrics and give them meaning. Sales Value and other metrics in the report are only meaningful if they are referenced by one or more attributes. In the example, metrics are referenced by location and department.

A *filter* limits or constrains the data in the report so that it contains only the information that is pertinent to the problem that is being investigated. In the example, the filter limits the report to a single location and department. In addition, it limits the time period covered in the report to a single week.

Reports may contain other objects such as prompts or hierarchies. These are discussed later in this section.

			Sales Value	Sales Value (MTD)	Sales Value (YTD)	% Change Sales Value vs Last Year	% Change Sales Value vs Last Year (MTD)	% Change Sales Value vs Last Year (YTD)	% Variance Net Sales Value vs CP	% Variance Net Sales Value vs CP (MTD)	% Variance Net Sales Value vs CP (YTD)
Total	Total		99,530,519	147,583,893	147,583,893	(16.15%)	(18.57%)	(18.57%)	554.12%	556.28%	556.28%
SS US East	1015										
	Minneapolis	14101	13,613,503	21,435,129	21,435,129	31.22%	36.29%	36.29%	640.63%	689.47%	689.47%
	St. Paul	14102	12,459,920	18,114,903	18,114,903	(35.31%)	(38.50%)	(38.50%)	577.03%	564.14%	564.14%
	Green Bay	20003	13,073,377	19,279,510	19,279,510	21.95%	17.48%	17.48%	607.49%	606.58%	606.58%
SS Canada East	1016										
	Quebec	14202	11,024,229	16,111,183	16,111,183	(39.94%)	(42.34%)	(42.34%)	491.33%	484.01%	484.01%
MV Canada West	1017										
	Edmonton	15101	12,592,297	18,322,872	18,322,872	17.30%	11.52%	11.52%	552.91%	548.28%	548.28%
MV US West	1018										
	Los Angeles	15201	11,590,074	16,795,180	16,795,180	(39.87%)	(43.00%)	(43.00%)	492.23%	476.75%	476.75%
	San Francisco	15205	12,735,013	19,475,937	19,475,937	18.86%	18.85%	18.85%	551.80%	575.58%	575.58%
	Las Vegas	15206	12,442,106	18,049,178	18,049,178	(35.40%)	(38.67%)	(38.67%)	526.55%	514.60%	514.60%

Location Sales Flash

To create metrics and reports, the OLAP tool must have visibility to the facts and attributes stored in the RDW database. In addition, the OLAP tool requires a definition of data types and their relationships. The data and tables in the database are visible through a set of entities called *schema objects*. Schema objects are the building blocks for the business metrics and reports that are visible to users. Metrics and reports, along with a number of other objects used for reporting to end-users of RDW, are referred to as *public objects*. Schema and public objects are treated in detail later in this chapter.

RDW workbenches

RDW is divided into four workbenches by business area and user role, as follows:

- Merchandising
- Category Management
- Store Operations
- Customer

In MicroStrategy terms, each workbench is defined as a *project*. These projects share the physical database and have visibility to the fact and attribute tables appropriate to their function. For example, the customer information is available only in the Customer workbench.

Although projects share the physical database and a set of data, they appear to users of Microstrategy Web and MicroStrategy Desktop as separate entities because they require separate logins and have their own security.

The following sections discuss schema and Public Objects in some detail. Each project has a full set of user and schema objects as part of the product. The information in the following sections is designed to help you understand the business measures and key performance indicators presented in Chapter 4.

Schema objects

Schema objects provide visibility to the tables, views, fact columns, attribute descriptions and other objects in the RDW database. These objects are stored in the Schema Objects folder for the project in MicroStrategy Desktop.

Tables

The RDW database consists of fact tables and attribute description tables. For example, the sale fact table contains a record of sales data for every combination of the attributes item, location, and day. Attribute tables contain descriptive information about attributes. For example, the location table holds a record for each location in the organization. A table must be included in a project in order to access the data in the table. Each RDW project includes all of the tables that are required for reporting in its business area.

Facts

A fact is a schema object that allows access to a column containing numeric data in one or more database tables. For example, the sale fact F_SLS_AMT (sale amount) allows access to the corresponding column in the sales tables in the RDW database.

Facts are the basis for the formulas used to construct business metrics. For example, the formula SUM(F_SLS_AMT) is the basis for the calculation of gross sales amount.

As a general rule, all fact columns in tables available to the project have been converted to MicroStrategy fact objects. Facts are the basis for another object type called *base formulas*. These are described in the next section. Facts for the project are located in the Facts subdirectory in the Schema Objects folder for the project.

Attributes

An attribute is a schema object that describes some aspect or characteristic of the business. Attributes are used to aggregate data and constrain data in a report, as will be seen in the discussion of metrics and filters in the next section.

Attributes can be related to one another through parent child relationships. In a relationship of this type the child attribute belongs to one, and only one, parent attribute. Parent-child relationships form hierarchies in which the relationship of any attribute to any other attribute higher up becomes predictable. For example, the location attribute in the organization hierarchy is defined as the child of the region attribute. All elements of the location attribute will exist in one and only one region. Since the region attribute is also defined as the child of another attribute, the relationship of the location attribute to all other attributes in the hierarchy can be predicted.

Hierarchies permit the drills into data that are frequently an important part of business analysis. Investigation of a business problem frequently begins at a summary level and moves to detailed level as analysis progresses. Drills allow a user to focus on parts of the data set where problems have been identified.

Attributes that are not part of the same hierarchy are related when they exist on the same fact table. The attributes item, location, and week are not formally related in a hierarchy. However, all of these attributes exist on the sale fact table. This means that we can obtain the answer to any question that involves referencing data by one or some combination of these attributes. For example, we might ask first to see sales data by location and week. Since the fact table contains the attribute item as well, a reorganization of the data is possible using the item attribute. As a general rule, information can be referenced by any attribute or combination of attributes that are present on the fact table.

Attributes for the project are defined in the Attributes subdirectory in the Schema Objects folder for the project.

User hierarchies

User hierarchies are schema objects that provide browse sequences for filter prompts and other Public Objects that make use of attributes and their elements. User hierarchies should not be confused with the logical hierarchies defined in the data model. A user hierarchy can, and often does, contain attributes that are related in a logical hierarchy. However, a user hierarchy is simply a convenient method for users of the project to browse attributes and their elements. As a result, a user hierarchy can contain elements from many attributes and hierarchies. When a user hierarchy does contain related attributes, it may skip levels of the hierarchy for the sake of convenience. For example, the attribute year is defined as the parent of the attribute quarter. A user hierarchy might, however, allow users to bypass quarter and navigate directly from year to month, week, or day.

User hierarchies are located in the Hierarchies subdirectory in the Schema Objects folder for the project. Each workbench contains a set of hierarchies that is appropriate for its functions. Clients may wish to create additional hierarchies to suit the specific needs of their users. Consult the MicroStrategy Desktop documentation for information about using the hierarchy editor.

Transformations

Time based comparisons are an essential part of analysis at almost every level in a retail environment. Typical examples are the comparison of sales value for the current season-to-date to the same period last year, or the retail value of inventory compared to the previous week.

Time transformations require tables that relate the elements of time-based attributes to other elements of the same attribute. For any given year, month, week, or day, there is a corresponding time frame for the previous year. Transformation tables simply specify the relationship between elements for some time-based frame of reference. For example, comparing sales value for the current week to the same week last year employs a table that specifies every calendar week and the corresponding week for the previous year. This table makes it possible to identify the corresponding week for last year for every week on the calendar. This is an example of a *one-to-one* transformation. For every element in the table, there is one corresponding element for the time frame in question.

In addition, there are *many-to-many* transformations for calculating year-to-date, season-to-date and similar totals. These tables specify all of the elements that are to be included in calculating a total from a given reference point. For example, a year-to-date transformation specifies all of the days or weeks that will be included in the transformation from a given day or week since the beginning of the year.

Transformations are attached as properties to metrics. These metrics retrieve the information specified in the transformation tables.

Transformations are located in the Schema Objects folder in the MicroStrategy Desktop interface. RDW includes and extensive, but not exhaustive, set of time transformations. Clients may need to create additional transformations based on their specific needs. Adding a new transformation requires adding a table and making the appropriate modifications to batch programs, in addition to creating the transformation through MicroStrategy Desktop.

The schema objects described here make it possible to create the business measurements and other objects required for delivering information to users of RDW. These are described in the next section.

Public objects

Public objects are the components that users view or interact with. A report is a public object, as is a metric or a filter. The objects that make up a report are defined independently to allow re-usability. Like a schema object such as a fact or attribute, metrics or other public objects are created once and made available throughout the project.

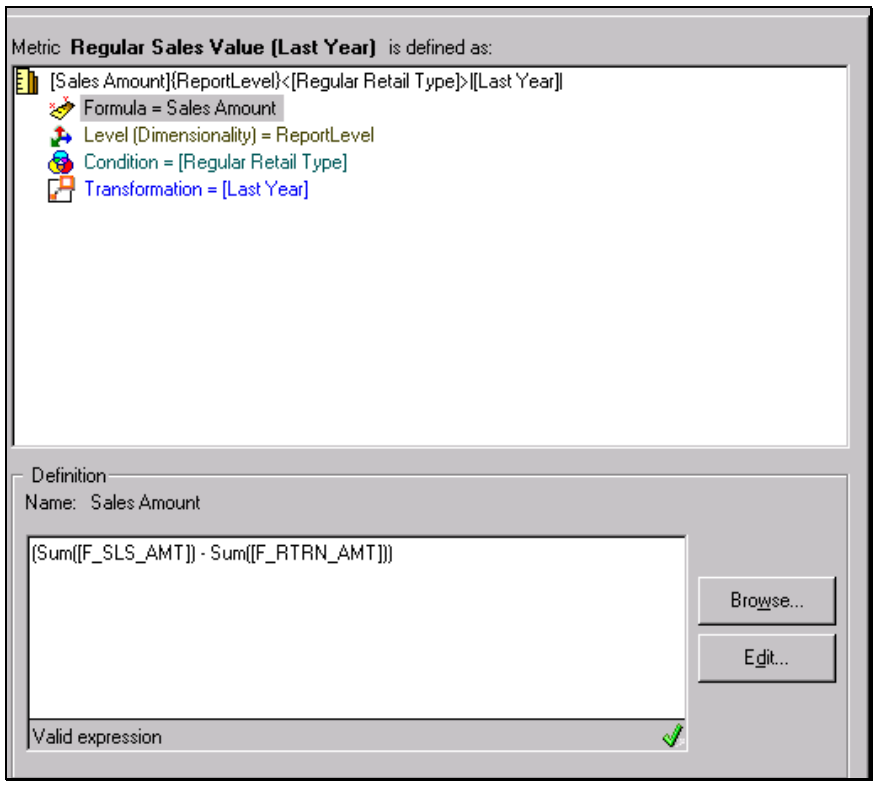
Metrics

RDW contains an extensive set of business measurements and key performance indicators specifically designed for decision support in a retail environment. In MicroStrategy terms, these objects are called *metrics*. Metrics are organized by business area in the Metrics subfolder in the Public Objects folder in MicroStrategy Desktop.

The material in this section is designed to help you understand what metrics do and how they work in general. Chapter 4 provides more specific information on the different metrics available in RDW, grouped by business area. Metrics are performance measurements, typically numeric, that allow a user to analyze business performance. Metrics range in complexity from a simple metric that sums the values in a single fact column, to highly complex calculations that may contain one or more mathematical operators.

A metric can be viewed as a statement that specifies how a performance measure is calculated. The basic building component of a metric is a formula that specifies the calculation to be made. A metric may contain other components that specify additional criteria for calculating the metric. These components of a metric are discussed in detail in the following subsections.

The following graphic shows the component parts of a metric as defined in the MicroStrategy Desktop Metric Editor.



Formula

All metrics have a formula that specifies how the metric is calculated. The formula for a "simple metric" specifies a fact and a function for the fact. For example, the following formula calculates a sum of values in the sales fact column:

```
Sum(F_SLS_AMT)
```

```
where F_SLS_AMT is the fact and SUM is the function to be performed.
```

In the case of a "compound metric," the formula contains two or more metrics and a formula for calculation. For example, a formula for a compound metric may calculate the average sales value by dividing the net sales metric by another metric that calculates the number of units sold.

The metric formula can be stored as a separate object in MicroStrategy Desktop called a *base formula*. A base formula is a reusable public object that can be referenced by multiple metrics. In many cases, several variations of a metric employ the same formula. For example, an identical formula using different sets of data calculates sales value for a current and previous year. The importance of base formulas and their re-usability will become clearer in the discussion of metric levels and transformations.

RDW metrics do not directly access fact objects. Rather, the fact is referenced in the metric via a base formula for that fact. A base formula exists for every fact in RDW, even if the fact is not currently used in a metric.

In some cases, a base formula will contain multiple fact columns and perform an arithmetic operation. For example, RDW maintains sales and returns in separate fact columns in the sales fact tables. However, net sales (sales minus returns) is the value that is most often needed for display on a report or calculation. As a result, a base formula exists for sales value as follows:

```
Sum(F_SLS_AMT-F_RTRN_AMT)
```

Base formulas are located in the Public Objects folder in MicroStrategy Desktop. They are organized by business area.

As might be expected, simple metrics that perform aggregate functions on facts are insufficient for sophisticated analysis. Complex analysis requires calculations that are constructed from other metrics. As mentioned above, these are called "compound metrics." The following compound metric formula calculates average sales value per unit using two simple metrics:

```
Sales Value / Sales Units
```

Compound metrics may be used further to create other compound metrics. For example, the formula for the stock turn metric employs a simple metric (sales value) and a compound metric (average stock retail value):

```
Sales Value / Avg Stock Retail Value
```

"Avg Stock Retail Value" in the above formula is itself a compound metric constructed from three simple metrics that access base formulas for the facts used in the calculation:

```
((BOH Retail Value + EOH Retail Value (SUM)) / (No of Weeks with
Stock + 1))
```

Variance metrics are very common compound metrics in RDW. These metrics are designed to compare the change or difference in two different data points. Tracking the variance in sales, profit, or inventory levels, most commonly over time, is an important part of understanding the retail business.

% Change or *% Variance* metrics within RDW are defined as (A-B) / B. The following are some examples of % Variance metrics:

Metric	Formula
% Change Sales Value vs Last Year	(Sales Value – Sales Value (Last Year)) / Sales Value (Last Year)
% Change Sales Units vs Last Year	(Sales Units – Sales Units (Last Year)) / Sales Units (Last Year)
% Change Profit vs Last Year	(Profit – Profit (Last Year)) / Profit (Last Year)
% Change EOH Retail Value vs Last Year	(EOH Retail Value – EOH Retail Value (Last Year)) / EOH Retail Value (Last Year)
% Chang Receipts Retail Value vs LY	(Receipts Retail Value – Receipts Retail Value (Last Year)) / Receipts Retail Value (Last Year)

Level

The level component of a metric specifies the attribute level to which a metric will aggregate. By default, a metric aggregates to the level of the attributes on the report. The following sample report shows sales value by location. In this case, the sales value metric aggregates to the location level. If the attribute were region rather than location, the sales value metric would aggregate to region rather than location.

Organization (Location)		
Minneapolis	14101	389,914

Sales Value by Location

Some complex metrics require more than one level of aggregation in formulas. For example, we might want a report that shows the percent contribution sales value of each location to its region. We must know the sales value for each location and the total sales value for region to which it belongs to create the formula for this metric:

```
Sales Value (Location) / Sales Value (Region)
```

The sample report calculates sales value at the location level only. The region total, however, is a requirement for the more complex calculation. This value must be obtained by a separate query of the database, outside the constraints imposed by the default level of aggregation for the report.

Location Description	Location Identifier	Metrics	Sales Value	Sales Value (Region)
Los Angeles	15201		284,867	832,071
San Francisco	15205		276,455	832,071
Las Vegas	15206		270,749	832,071

Sales Value by Location with Region Total

Note that the region total is the sum of values for all locations in the region. Consequently, it is a repeating value for all locations that are in the same region. Although it is needed to make the calculation, the region total would normally not appear on the report because it adds little that is useful in the context of this business question. It may appear as a subtotal, although this will be a total of sales value for only those locations present in the report and will be equal to the total for the region only if all locations for the region are present.

The following sample report shows values for all locations and the percent contribution to the region total. The metric that calculates the region total does not appear on the report, but is used in the calculation of percent contribution.

Location Description	Location Identifier	Metrics	Sales Value	% Contrib Sales Value to Region
Los Angeles	15201		284,867	34.24%
San Francisco	15205		276,455	33.22%
Las Vegas	15206		270,749	32.54%

Location Contribution to Region Sales

Complex calculations of the type shown here require an OLAP tool that is capable of making multiple queries, sometimes referred to as passes, to the database when calculating a single metric. This ability is essential in the retail environment where calculating percent contribution and variances along the organization and product hierarchies is a constant requirement.

A metric that specifies a level of aggregation other than the default level for the report is referred to as a "dimensional metric." RDW includes many dimensional metrics for sales and profit for attributes in the organization and product hierarchies. In RDW, when a metric has a predefined dimension level, the name of the attribute level appears in parentheses after the metric name. Following are some of the dimensional metrics for sales value in the product hierarchy.

- Sales Value (Company)
- Sales Value (Division)
- Sales Value (Group)
- Sales Value (Department)
- Sales Value (Class)

The above dimensional metrics make it possible to build compound metrics that measure the contribution of lower level elements to higher or parent levels. Following are some examples of these contribution metrics.

Metric	Formula
% Contribution Sales Value to Company	Sales Value / Sales Value (Company)
% Contribution Sales Value to Division	Sales Value / Sales Value (Division)
% Contribution Sales Value to Group	Sales Value / Sales Value (Group)
% Contribution Sales Value to Department	Sales Value / Sales Value (Department)
% Contribution Sales Value to Class	Sales Value / Sales Value (Class)

The following sample report shows the sales and profit contribution of subclass to the parent attributes company and department.

Subclass		Metrics	Sales Value	% Contrib Sales Value to Department	% Contrib Sales Value to Company	Profit	% Contrib Profit to Department	% Contrib Profit to Company
Total			**1,542,113**	**NA**	**NA**	**396,152**	**NA**	**NA**
Potatoes	201		178,346	18.88%	11.78%	80,470	30.80%	20.82%
Pretzels	202		200,839	39.75%	13.27%	44,568	43.21%	11.53%
Cold Cereal	203		213,697	22.62%	14.12%	45,172	17.29%	11.69%
Pasta	204		527,797	55.87%	34.87%	128,931	49.35%	33.35%
Potato Chips	205		304,390	60.25%	20.11%	58,581	56.79%	15.15%
Hot Cereal	206		24,805	2.63%	1.64%	6,710	2.57%	1.74%
Furniture	207		87,467	94.82%	5.78%	30,613	96.51%	7.92%
Accessories	208		4,774	5.18%	0.32%	1,107	3.49%	0.29%

Contribution Scorecard (A)

Condition

A condition or filter constrains the data that is retrieved from the database. The filter attached to a report limits the data that is retrieved for the metrics in the report. For example, a filter might limit the information in a report to a particular month, department, and location.

Filters generally constrain all of the metrics in a report. In some cases, however, it is necessary to place additional constraints on individual metrics in a report. When a condition is applied to a single metric it does not affect the other metrics in the report. A metric condition plays the same role in a metric that a filter plays in a report, limiting the data that is retrieved based on one or more conditions.

In RDW, sales and return amounts are segmented by price type according to the retail price type (regular, promotion, or clearance). Sales fact tables hold sales and return amounts in two fact columns (F_SLS_AMT and F_RTRN_AMT). The retail price type is indicated by a code for each row in the table. Consequently, a sales metric retrieves all values, regardless of type, unless a price type is specified. To do this, a filter specifying the price type is attached to the metric. For example, regular price type is indicated in the fact table by a value of 1. A filter stating that price type must equal 1 is attached to a metric. Queries for this metric will limit the data to rows in the fact table that have a retail type of 1.

The following sample report displays sales value by retail price type. The metric Sales Value is a total for all retail price types. This metric ignores retail price type. It is constrained only by the filter that is applied to the report as a whole. The metrics for each price type have an additional constraint, limiting values based on the three price types.

Month	Metrics	Sales Value	Regular Sales Value	% Contrib Regular to Sales Value	Promotion Sales Value	% Contrib Promotion to Sales Value	Clearance Sales Value	% Contrib Clearance to Sales Value
200301 FEBRUARY		955,937	541,281	56.62%	288,224	30.15%	126,431	13.23%

Sales Value by Retail Type

Metric conditions are used in a variety of situations in RDW where conditionality must be applied to a single metric. Filters used in metric conditions are located in the subfolder Metric Conditions in the Filters folder.

Transformation

Transformations are schema objects that allow comparison of values at corresponding intervals of time. For example, a report that shows sales value for the current season-to-date may contain a transformation metric that shows the season-to-date for the same period in the previous year.

A transformation, much like a level or condition, is applied to a single metric. It does not affect other metrics in the report.

There are a large number of transformation metrics available in RDW to accommodate the extensive needs of the retail organization for comparison reporting. The sample report below shows a series of transformations from the current to previous year.

Week	Metrics	Sales Value	Sales Value (Last Year)	% Change Sales Value vs Last Year	Sales Value (MTD)	Sales Value (MTD, Last Year)	% Change Sales Value vs Last Year (MTD)	Sales Value (STD)	Sales Value (STD, Last Year)	% Change Sales Value vs Last Year (STD)	Sales Value (YTD)	Sales Value (YTD, Last Year)	% Change Sales Value vs Last Year (YTD)
200302 Week 2		282,120	311,791	(9.52%)	748,792	763,218	(1.89%)	748,792	1,526,435	(50.95%)	748,792	763,218	(1.89%)

Time, Sales Value to Date

The first transformation metric (Sales Value (Last Year)) makes a transformation to the week in the previous year corresponding to the week in the report. The remaining transformation metrics display sales value for the month, season, and year to date and for corresponding periods in the previous year. Note that for the month-to-date and other many-to-many transformations for last year, two transformations are actually applied: the first makes the many to many transformation for month-to-date and the second the transformation to last year.

Metric Subtotals and Dynamic Aggregation

Dynamic aggregation and subtotals settings control how a metric "totals" are calculated once they are already on a report or when the report is being manipulated. For example, look at the report below. In particular, consider what the total and subtotal values in cells marked A, B, C, D, E, and F should be in the following grid.

Year	Month	Metrics	Sales Value	Avg Sales Value
2002	FEBRUARY		959,258	10,541
	MARCH		547,545	11,903
	NOVEMBER		42,344	14,115
	JANUARY		152,261	9,516
	Total		**A**	**D**
2003	FEBRUARY		1,004,345	10,043
	MARCH		556,432	10,304
	NOVEMBER		36,157	6,026
	Total		**B**	**E**
Total			**C**	**F**

Sales Report 1

Subtotals

The total and subtotals for the metrics can often be calculated based on the metric values already on the grid. The MicroStrategy engine always calculates them using the granular values already displayed on the report grid. In the report above, the values in A, B, and C are clearly calculable by simple summation of other values on the grid: The value for A is just the sum of values for the four months in 2002, the value for B is the sum of the three months in 2003, and the value for C is the sum of these two subtotals.

While the desired values A, B, and C are obvious, the values for D, E, and F are not as clear-cut. Because D, E, and F pertain to average sales value, should the subtotals be the sum of the corresponding average values or their average? That is, should D add up the average sales values for the four months in 2002, or average them? Subtotal settings in MicroStrategy allow the users to define how any given metric is to be subtotaled. In this case, a user may set the subtotal setting for the average sales value metric to sum the individual values, average them, or even disable subtotaling because neither of them are entirely accurate mathematically.

Subtotal settings are defined by selecting the “Subtotals/Aggregation” tab in the metric editor. You can determine which subtotals are to be available for the metric, or whether they should be available at all. In addition to summation and average, you can choose from a number of different formulas for subtotal aggregation. The available functions are:

Aggregation	Description
Sum	Sum[sum] total of all input values added together
Count	Count[count] number of input values
Average	Avg[average] sum of input values divided by number of input values
Minimum	Min[minimum] smallest input value
Maximum	Max[maximum] largest input value
Product	Product[product] all input values multiplied together
Median	Median[median] middle value when all values are sorted
Mode	Mode[mode] most frequently found input value
Standard deviation	Stdev[standard deviation] distribution of input values.
Variance	Var[variance] square of the distribution of input values
Geometric mean	Geomean[geometric mean] square root of the product of input values

Dynamic Aggregation

Dynamic aggregation is related to the OLAP Services feature that is available with version 7.2 or later releases of MicroStrategy. OLAP Services allow a user to add or remove attributes and metrics from a report's view and re-calculate the metric values without having to re-execute a new query against the database.

Look back at our sample grid report above (Sales Report 1) to illustrate dynamic aggregation functionality and its implications. Suppose you have run Sales Report 1 above that gives sales value and average sales value at the month level for the years 2002 and 2003. Now suppose you want to see the values of this metric at the year level. One option is to remove the month attribute from the report and execute the new report against the database again (or just create a new report that has year, sales value, and average sales value on the report template).This may give you a result that looks like the following:

Year	Metrics	Sales Value	Avg Sales Value
2002		1,701,408	10,906
2003		1,596,934	9,981

Sales Report 2

The value for the sales value metrics in the above grid gives the sum of sales in 2002 and 2003 years respectively. The value for the average sales value metric is the average of sales for those two same years. This option requires one or more new queries to the database to re-calculate the numbers, which may require significant amount of additional time and resources.

Alternatively, if you have already run Sales Report 1 above, then Sales Report 2 is exactly the same report with just the subtotals A, B, C, and D displayed on the grid thus:

Year	Metrics	Sales Value	Avg Sales Value
2002		**A**	**C**
2003		**B**	**D**

Sales Report 3

The dynamic aggregation feature in MicroStrategy allows you to precisely do this. It allows you to move the attribute month from the view of Sales Report 1 above to its "Working Set," and display just the subtotals A, B, C, and D of that report as shown in Sales Report 3. This is much more efficient because it does not require executing the report against the database again.

However, though dynamic aggregation works in many instances, there are many other cases where this is not possible. In fact, the underlying nature of the problem with dynamic aggregation is exactly the same as the problem with subtotals as described above in the context of subtotaling the average sales value metric in Sales Report 1. Specifically, just as it is not clear what the values of the C and D should be in Sales Report 1 it is not clear what their values should be in Sales Report 3 either.

When MicroStrategy engine realizes, as in the case of C and D, that it cannot perform dynamic aggregation, then it displays a "—" on the report grid as shown below. Moreover, if you would like to define a specific function to do the aggregation, as in the case of subtotaling above, you can use the dynamic aggregation setting to specify what function you would like to use to do the dynamic aggregation.

Year	Metrics	Sales Value	Avg Sales Value
2002		1,701,408	--
2003		1,596,934	--

Sales Report 4

If you would like to have the values recalculated by re-executing a new query against the database and not use dynamic aggregation, you will have to remove the month attribute completely from the report, and not leave it in its working set.

Refer to MicroStrategy Tech Note TN5200-072-0147 for more information on dynamic aggregation.

Prompts

Prompts are public objects that allow you to establish report content at run-time. Prompts make reports flexible by permitting input from individual users. Prompts make it possible to customize filter criteria and other parts of a report, allowing multiple users to use the same report to answer different business questions.

Prompts are used primarily in RDW for defining filter criteria for the report at run time. These prompts allow you to select elements for the report filter from attributes and hierarchies, or qualify data based on characteristics of an attribute or the value of a metric.

Hierarchy prompts allow you to select elements from hierarchies in RDW, such as time, product, or organization. Most predefined RDW reports contain prompts for several hierarchies.

A hierarchy prompt displays some or all of the attributes in a hierarchy along with the selectable elements shown below the attribute. You specify report criteria by selecting elements from these lists.

An *attribute element list prompt* displays the attribute with all of its selectable elements shown below it. The elements that are displayed may be all of the attribute's elements, or only those selected to be included in the prompt. This type of prompt is used to select elements for individual attributes.

Metric qualification prompts allow you to constrain the data in a report based on the value for a metric. For example, you might want to limit items in a report based on sales value. A metric qualification allows you to specify a value above or below a certain amount. The report will exclude any items that do not meet this condition. Similarly, you can specify a qualification based on some characteristic of an attribute. For example, you might want to limit the customers in a report to those above or below a certain age.

See the MicroStrategy documentation for additional information on other prompt types.

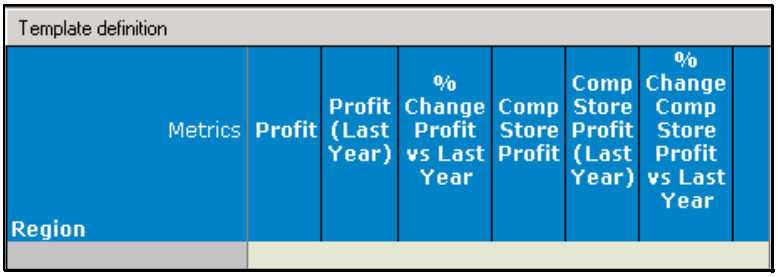
Templates and filters

The report used by the decision maker or analyst consists of two separate MicroStrategy objects. These are the *template* and the *filter*. These objects in turn are constructed from the schema and public objects discussed previously.

The template specifies the structure of the report. It contains metrics and the attributes for which measurement will take place. The filter constrains the data in the report, limiting it to the set where measurement is desired. Together, the template and the filter provide all of the information that is required to build the SQL queries that retrieve data from the RDW database and transform it into useable information.

Templates and filters are independent objects and are therefore reusable. The templates and filters for all pre-defined reports in RDW exist as separate objects. However, this is not a requirement for all report objects. For example, separate objects may not exist for the ad hoc reports created by users for their own or limited use. While the template and filter do not exist independently for these reports, they are embedded in the report and can be created at any time. Retek recommends that you create separate objects for reports that will be made public. You can use MicroStrategy Desktop to create these objects and combine them into reports.

The template specifies the columns and rows for the data and provides structure for the report. In the template shown below, the row contains an attribute from the organization dimension and several metrics. A report that makes use of this template returns information about profitability and other related measures for one or more regions.



Template

If you are familiar with SQL queries, note that a template provides the information needed for the SELECT and GROUP BY clauses in a SQL statement. The template also contains specifications for the display of the report such as column width, font, color, and many other display settings.

You can create your own templates using existing attributes and metrics. Consult the MicroStrategy Desktop documentation for more information.

While a template provides the display structure of a report, a filter limits or constrains the information that is in the report. For example, a regional manager might wish to see a report that contains data for only the stores in his region. Or, a category or department manager may want to see only the items in the category that she manages.

Filters allow a user to retrieve only the information that is needed, while eliminating data that is not required. In SQL terms, the filter supplies the information required to formulate the WHERE (and HAVING) clauses of an SQL statement. Given the huge volume of data in RDW, unfiltered reporting would seriously degrade performance in the data warehouse and can return unmanageable amounts of data. The filters attached to pre-defined reports require input for the time hierarchy and the option for entering criteria from other hierarchies

The following report shows the above template being used with the filtering criteria displayed in the upper left corner. The report contains only the information that meets both of the specified conditions.

Filter Details:
Year = 2003
AND
Chain = RDW Chain 2:1005:2

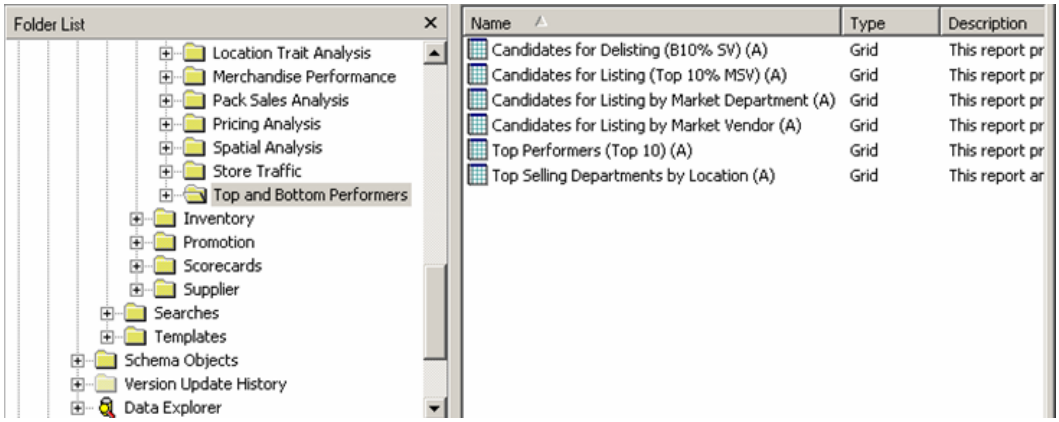
Region / Metrics	Profit	Profit (Last Year)	% Change Profit vs Last Year	Comp Store Profit	Comp Store Profit (Last Year)	% Change Comp Store Profit vs Last Year
Total	171,738	248,344	(30.85%)	0	0	NA
RDW Northwest 51 1017	54,631	71,969	(24.09%)	0	0	NA
RDW Southwest 52 1018	117,108	176,375	(33.60%)	0	0	NA

User object organization and naming conventions

This section explains how RDW user objects are organized and named in the MicroStrategy Desktop and Microstrategy Web interfaces. This information will help you locate reports and other objects. If you modify existing reports, or add new reports it is recommended that you follow the organizational and naming conventions described here.

Report folder names and descriptions

Reports in RDW are organized into folders according to business area. An expanded folder displays the reports contained in that folder. Report folders typically contain no more than 10 to 12 reports.



Example of folder and report names

You can get additional information about the contents of a folder by accessing the folder description. In MicroStrategy Desktop, you can access the folder description by right clicking on the folder name, and then selecting properties. In Microstrategy Web, the description is shown right after the folder name.

Report names and descriptions

Understanding the naming conventions used for reports in RDW will help you find the information you are looking for more quickly. The name of a report contains the following information about the report:

- The display mode (grid or graph).
- The attributes and dimensions used in the report.
- The business measurements contained in the report.
- The type of filter used in the report.

The icon on the left side of the report name indicates the default display mode for the report (grid or graph). For example, in the graphic above, all reports in the Store Contribution folder except the Sales Value by Type (A) report are displayed in grid format. An icon containing a bar graph is displayed for reports that are displayed in graph mode.

The report name indicates the type of measurements contained in the report. The report name also indicates the attributes and filtering criteria used in the report. All reports in the Store Contribution folder employ a prompted filter, as indicated by the (A) at the end of the report name. Every report also contains a description that gives more detail on the business significance of the report. As in the case of folders, you can access the description of a report in MicroStrategy Desktop by right-clicking on it and selecting Properties. In Microstrategy Web, the description is shown following the report name.

Template names and descriptions

Templates are organized by business areas, just as reports are. In general, the template folder names and template names are identical to the corresponding report folder names and report names. Since a template can be used for more than one report, the template folder may contain fewer entries than the report folder.

Template descriptions provide additional information about the contents of the template. Typically, template descriptions provide the following information about the contents of a template:

- The type of measures or metrics included on the template, such as inventory measures, sales, profits, and so on.
- The level of reporting as defined by the attributes that are included on the template.

Descriptions are accessed by right-clicking on the template name and selecting Properties. Descriptions are accessible only in MicroStrategy Desktop, and not in Microstrategy Web.

Filter names and descriptions

Filters are named based on what they are intended to qualify on. For example, the prompt filter name Time, Prod, Org (A) indicates that the user is allowed to select attribute elements from the time, product, and organizational hierarchies.

Filters are organized in folders based on what these filters are meant to qualify on: attribute elements, metrics, and dynamic dates. Since a filter can be used for more than one report, the filter folder contains fewer filters than reports and templates. Filter descriptions provide additional information about the design and intention of the filter. In MicroStrategy Desktop, right-clicking on the filter name and selecting properties accesses its description. They are accessible only in MicroStrategy Desktop, and not in Microstrategy Web.

Metric names and descriptions

There are a large number of metrics available in RDW. Hence, it is important to organize metric folders in a logical manner. Creating specific sub-categories or folders ensures that there are a manageable number of metrics in each folder and that metrics can be easily located. For example, Sales metrics can be organized into various folders such as Sales Value (Variance), Sales Value (Actual), Sales Value (Plan), and so on.

In RDW, the pre-defined metrics are located in the Metrics folder inside the Public Objects folder. Metric folder descriptions are comprehensive and provide summary information on the various types of metrics included as well as the level and nature of information provided. In addition, the descriptions indicate how and where the metrics are used, that is, the functional area of the measurement. Like any other folder in MicroStrategy Desktop, you can access the description of a metric folder by right clicking on the folder and selecting Properties. Microstrategy Web does not display the metric folder.

Each individual metric also has its own description. Metric descriptions provide basic information about the purpose and function of a particular measure.

Metric descriptions include as much of the following as possible:

- Metric type, such as count and system metric.
- Functional area, such as net cost.
- Metric definition or functional description. For example, base cost is defined as the initial cost before any discounts are applied.
- Constraints, for example, net profit data is only available by primary supplier.

In MicroStrategy Desktop, you can access metric definitions by right-clicking on the metric name and selecting Properties. The metric description is not accessible via Microstategy Web.

Chapter 3 – RDW hierarchies and attributes

RDW hierarchies and attributes represent the structure and activities of a retail organization and make measurement possible. As described previously, data is stored in RDW at low levels to allow maximum flexibility in reporting. Hierarchies make it possible to summarize this information at higher levels where it is needed to support business decision-making. For example, the sale fact table holds data at the location, item, and day level. The time, product, and organization hierarchies make it possible to summarize this data at any level where it is needed.

In addition, hierarchies make it possible to drill into data. Data drilling is frequently an essential part of the decision support process because it allows the analyst to identify business problems or trends at a high level and then focus on data as the analysis proceeds.

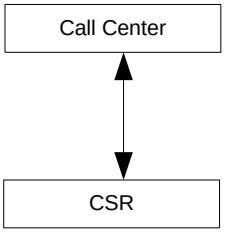
Call center

The call center hierarchy allows analysis of customer orders by the call center location where the order was taken as well as by the customer service representative who took the order. Analysis of customer orders by the call center hierarchy help retailers provide quality customer service and improve performance of their overall processes.

System hierarchy

This diagram illustrates the drillable hierarchy of the call center hierarchy.

Call Center Hierarchy



Attributes

The following list describes the attributes that are part of the call center hierarchy:

Call Center

- Identifies the Call Center taking the customer order.

CSR

- Identifies the customer service representative taking the customer order.

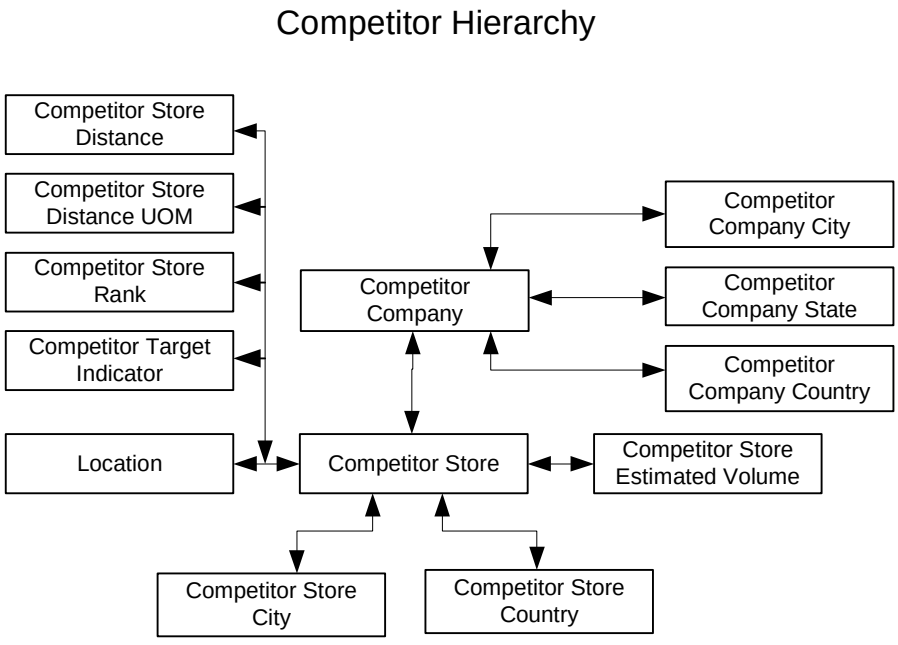
Competitor

Nearly every retailer faces competition from other organizations that market products much like theirs and try to attract the same group of customers. Effective business planning requires an understanding of the competition's product line, pricing policies, and future direction

The competitor dimension holds information about each competitor store and associates it with a location in the organization. Competitor pricing facts can then be associated to a specific competitor location and mapped to an item in the product hierarchy. This provides the means to compare competitor prices for identical or similar items, at a direct competitor location. With this type of timely information, promotion and price change strategy can be implemented in time to prevent costly defection of customers.

System hierarchy

This diagram illustrates the drillable hierarchy within the competitor hierarchy.



Attributes

The following list describes the attributes that are part of the competitor hierarchy.

Competitor Company

Competitor company is the highest attribute within the competitor hierarchy. A competitor company will consist of one or more competitor stores.

Competitor Company City

Competitor company city is an attribute of competitor company. This attribute represents the city in which the competitor company is located.

Competitor Company Country

Competitor company county is an attribute of competitor company. This attribute represents the county in which the competitor company is located.

Competitor Company State

Competitor company state is an attribute of competitor company. This attribute represents the state in which the competitor company is located.

Competitor Store

Competitor store is the lowest attribute within the competitor hierarchy.

Competitor Store City

Competitor store city is an attribute of competitor store. This attribute represents the city in which the competitor store is located.

Competitor Store Country

Competitor store county is an attribute of competitor store. This attribute represents the county in which the competitor store is located.

Competitor Store Estimated Volume

Competitor store estimated volume is an attribute of competitor store. This attribute represents the yearly volume of the competitor store.

Competitor Store Distance

Numeric value that represents the distance from a specific location to a competitor.

Competitor Store Distance UOM

Identifies the unit of measure used with the competitor store distance.

Competitor Store Rank

Rank represents the relative importance of a competitor location to a specific location.

Competitor Target Indicator

Identifies a competitor store as the target for a given location.

Customer

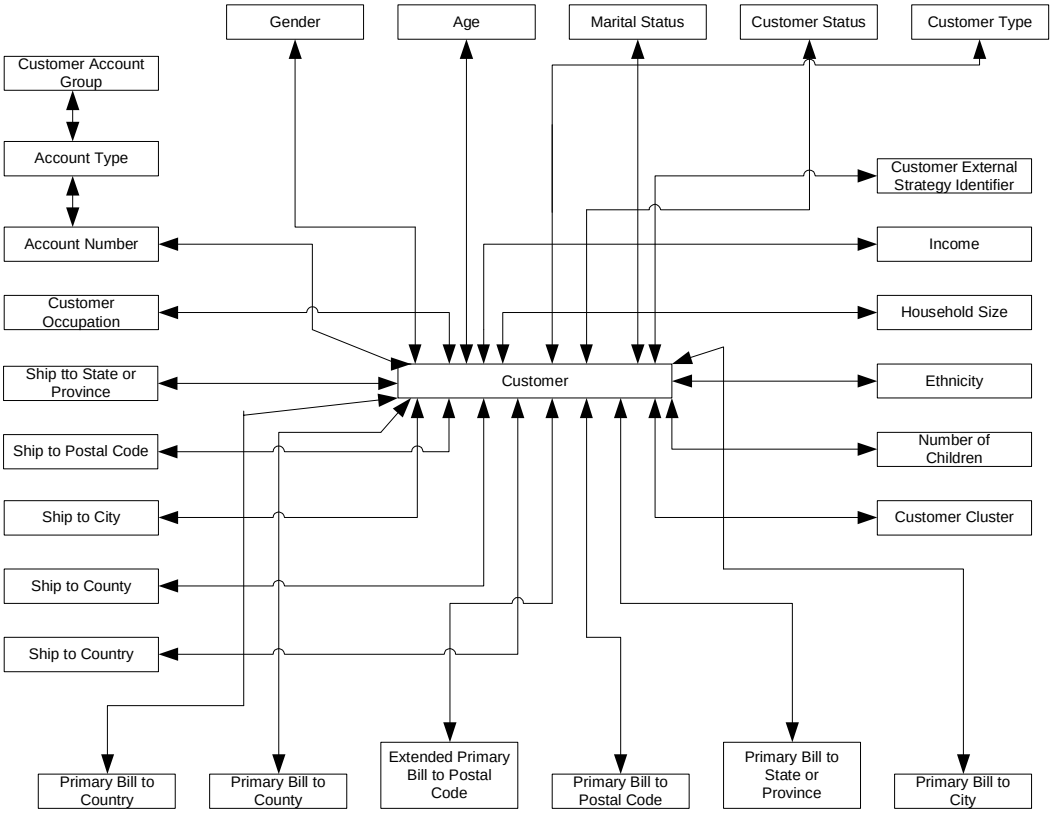
Customers are the retailer's most valuable asset. Knowledge of the customer's preferences and buying behavior allows the retailer to increase sales through up-selling efforts, target customers for promotions, and prevent defection to competitors.

In RDW, customer information and transaction history are used to segment the customer base by one of several methods. This analysis yields important information about who the best customers are and the affinity of customer segments to particular products.

System hierarchy

This diagram illustrates the drillable hierarchy in the customer hierarchy.

Customer Hierarchy



Attributes

Account Number

Identifies the account number of the customer's account.

Account Type

Identifies the type of account within account group.

Age

Identifies the age of the Customer.

Customer

Identifies the Customer.

Account Group

Identifies the group in which the customer's account falls into. Examples include: Loyalty Card, Credit Card, etc.

Customer Cluster

Identifies the Cluster that the Customer falls into, based on buying behavior.

Customer External Strategy Identifier

Identifies the External Strategy preferred by the Customer. For example, do not call the employee at work.

Customer Occupation

Identifies the occupation of the customer.

Customer Status

Identifies the status of a customer. For example, Active or Inactive.

Customer Type

Identifies the Customer type.

Ethnicity

Identifies the ethnicity of the Customer.

Extended Primary Bill To Postal Code

Identifies the extended primary Bill To Postal Code of the customer.

Gender

Identifies the gender of the Customer. Can be Male, Female or Unknown.

Household Size

Identifies the size of the Customer's Household.

Income

Identifies the Customer's income.

Marital Status

Identifies the Customer's marital status.

Number of Children

Identifies the Customer's number of children.

Primary Bill To City

Identifies the primary Bill To City of the customer.

Primary Bill To Country

Identifies the primary Bill To Country of the customer.

Primary Bill To County

Identifies the primary Bill To County of the customer.

Primary Bill To Postal Code

Identifies the primary Bill To Postal Code of the customer.

Primary Bill To State or Province

Identifies the primary Bill To State or Province of the customer.

Ship To City

Identifies the actual Ship To City of the customer.

Ship To Country

Identifies the actual Ship To Country of the customer.

Ship To County

Identifies the actual Ship To County of the customer.

Ship To Postal Code

Identifies the actual Ship To Postal Code of the customer.

Ship To State or Province

Identifies the actual Ship To State or Province of the customer.

Customer order

Customer orders lie at the heart of a Direct-To-Customer (DTC) retail model. Virtually every customer transaction in a DTC marketplace is captured as part of a customer order, whether it is a normal sale, cancellation, return, or exchange. A customer order consists of a "customer order header" that contains one or more "customer order lines". To allow for flexibility, RDW stores most of the information related to a customer order at the order line level. This information supports reporting based on various aspects of a customer order, such as the products and services ordered, the size of and reasons for lost sales, and the overall profitability, the trends within the order life-cycle, etc.

RDW supports a number of different attributes of a customer order to allow performance analyses of DTC retailing. A complete list of these attributes and their descriptions is listed in the following section. These attributes allow a user to slice and dice customer order data for analyses by alternative selling, returns and replacements, value added services, order delivery information, and other customer order details.

Alternative selling

If an item in an order line is sold as a cross-sell, up-sell, or substitute for another item, then the "CO Line Type" of that order line will be identified as such. This attribute of the order line can be used to analyze the demand for the original item the customer wanted and the alternative items that were actually ordered. The "Reference Item" attribute can be used to find out the item that the customer originally wanted and will be populated whenever an order line is designated by one of these alternative selling types.

CO Line Type

- Identifies the customer order line type. Examples of order line types related to alternative selling functionality are 'Normal', 'Return', 'Partial', 'Cross Sell', 'Up Sell', and 'Substitute'. There may be other order line types related to other functionality such as returns and exchanges. The Return and Exchange order line types are described below.

Reference Item

- Identifies the item originally ordered that triggered the up-sell, cross-sell, substitute, or partial transaction.

Returns, replacements, exchanges, and partials

In addition to alternative selling, the “CO Line Type” attribute also identifies if a particular order line is a return, exchange, replacement, or partial order line. If an item in a given order line is returned to the retailer, the “Disposition” attribute can be used to find out the disposition of the item, for example a damaged item may be marked as “disposed.” Additionally, the “Return Status” attribute identifies the current status of the return order line.

CO Line Type

Identifies the customer order line type. Examples of order line types related to returns and exchanges functionality are 'Return', ' Exchange Out', ‘Exchange In’, ‘Replacement In’, Replacement Out’, and 'Partial'. There may be other order line types related to other functionality such as alternative selling. The alternative selling order line types are described above.

Return Status

Identifies the status of a return, exchange, or replacement customer order line. Examples of return statuses are "Return Pending", "Return Complete", "Return Cancel".

Disposition

Identifies the disposition of the item being returned after receipt from the customer to the retailer. The returned merchandise will be inspected for damage and may be disposed of or returned to stock.

Partial Reason Code

Identifies the reason a partial order line was created. The partial reason could be “Damaged”, “Missing” etc. This provides the ability to analyze why the retailer is sending out partial orders.

Reference Item

Identifies the item originally ordered that triggered the up-sell, cross-sell, substitute, or partial transaction.

Value added service

An order line may have one or more additional services, such as monogramming, personalization and gift-wrapping, added to it. RDW allows for analyses based on the characteristics of these services. The available attributes are “Service Type”, “Service Style”, “Service Color”, and “Service Font”.

Service Type

Identifies the type used within the service line, such as gift-wrapping, wedding card, engraving, embossing, and painting.

Service Style

Identifies the style of service requested by the customer, such as personalization, monogramming, gift-wrap, and gift enclosure card.

Service Color

Identifies the color used within the service line.

Service Font

Identifies the font used within the service line.

Customer order dates

RDW allows the analyses of customer order data by different types of dates associated with the customer order. You can perform analyses by the estimated delivery date for the customer order, the date when an order went into backorder or was cancelled, the date when an order was shipped, and by the date when part of the order was shipped or cancelled.

In addition to these dates, you can also analyze the data by when a customer order is created. This is discussed separately under the "Customer order create time calendar" section in this chapter,

BO Start Date

Identifies the date the customer order line starts in backorder status.

Estimated Customer Delivery Date

Identifies the expected delivery date given to the customer when taking the customer order.

Ship Date

Identifies the date the customer order line is fully shipped.

Partial Ship Date

Identifies the first date the customer order line partially ships.

Partial Cancel Date

Identifies the date when part of the customer order line is cancelled.

Cancel Date

Identifies the date the customer order line is cancelled.

Note: RDW also provides the ability to easily analyze customer order data by the date on which certain transactions take place. That is, it allows you to run a report that can easily show, for example, how many items were ordered, shipped, cancelled, partially cancelled, etc. on any given day without having to deal individually with the different types of dates listed above. You can use the Time Calendar hierarchy for this type of reporting. Refer to the section on Customer Order in Chapter 4 for more details on this.

Other customer order attributes

In addition to the ones discussed above, there are a few other customer order related attributes in RDW that allow reporting on customer orders. In particular, RDW provides attributes that help answer whether the customer order line item is a gift, what the current demand status for a cancelled order is, why an item is being held, whether the customer order line item is to be shipped directly to the customer, and which carrier or carrier service was used.

Gift Ind

Indicates that the customer order line item is a gift.

Demand Status

Identifies the demand status of a customer order line. Examples of demand statuses included 'NLA', 'Credit Decline', 'Customer Cancel', etc.

Hold Event

Identifies the event associated to a customer order line if it is being held for a specific event. For example, a hold event could be a specific holiday or a personal hold.

Drop Ship Ind

Indicates that the customer order line item is to be shipped directly to the customer (drop ship) from the supplier’s warehouse.

Carrier

Identifies the carrier that ships the customer order line item.

Carrier Service

Identifies the shipping service used in the delivery of the customer order line item (ground, rush, etc.)

Customer order create time calendar

Customer Order Create Time Calendar dimension represents the time of creation of customer orders in a direct-to-customer (DTC) retailing business. This dimension and the Time Calendar dimension look and function very much alike in RDW. By default it is based on a 4-5-4 system, and alternatively, it can be a thirteen-period system. See the section on Time Calendar dimension for details.

Even though the Time Calendar dimension and the Customer Order Create Time Calendar dimensions are identical in terms of the structure and the underlying data, RDW introduces these two separate time dimensions in order to do related but different types of analyses.

Using these two different time dimensions, RDW allows you to distinguish between the time an order was taken and the time the sale was actually booked (and/or the time the inventory was adjusted) for that order. This distinction is needed in order to analyze performance by orders that were taken in one time period but were shipped in another time period. This is best explained with an example.

Suppose there were orders for 2000 units of lamps in January, of which 1000 lamps were shipped the same month, but the remaining 1000 were shipped only in February because they went out of stock at the time of the first shipment. Moreover, suppose 500 more lamps were ordered in February and were shipped the same month.

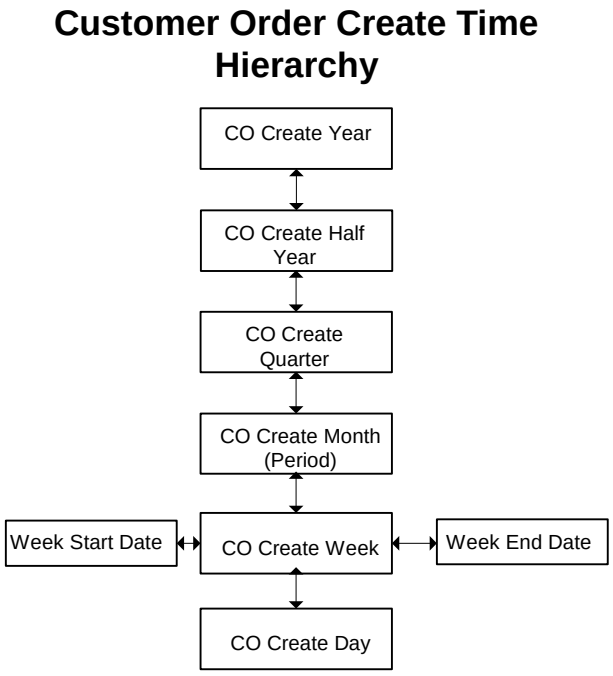
Suppose you want to see how many lamps were ordered and sold in February? This is a fairly simple query, because all you have to do is run a report that has the demand and sales metric for lamps on it and is filtered by *Month = February*. This would return 500 in demand and 1500 in sales for February.

However, if you want to see how many lamps were sold in February that were actually ordered in January, the report becomes a little more complex. If you run a report where the sales metric is filtered by *Month=January*, then you will get 1000. If you change the filter to *Month=February*, then you will get1500. Neither of them is correct. The correct answer is 500.

It is in order to be able to generate this type of report RDW requires the additional customer order create time dimension. Thus, you would be able to create this report by filtering the report by customer orders with *Order Create Month=January and Month = February*. The *Month=February* portion of this filter can be defined to imply the month when the sale was booked as opposed to the month when the order was taken.

System hierarchy

This diagram illustrates the drillable hierarchy in the Customer Order Create time hierarchy.



Note: The CO Create Half Year attribute does not exist in a 13-period calendar.

Attributes

The following list describes the attributes that are part of the Customer Order Create time calendar hierarchy.

CO Create Year

Identifies the year the customer order was created.

CO Create Half Year

Identifies the half-year the customer order was created.

CO Create Quarter

Identifies the quarter the customer order was created.

CO Create Month

Identifies the month the customer order was created.

CO Create Week

Identifies the week the customer order was created.

CO Create Day

Identifies the day the customer order was created.

Week End Date

Identifies the end of the week by date in MM/DD/YY format.

Week Start Date

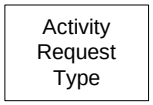
Identifies the start of the week by date in MM/DD/YY format.

Customer requests

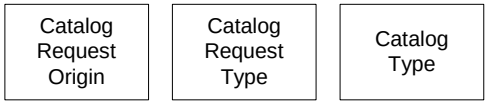
The customer request dimension holds information about catalog and activity requests which permit analysis of how customer request volume has changed over time.

System hierarchy

This diagram illustrates the drillable activity request hierarchy.



This diagram illustrates the drillable catalog request hierarchy.



Attributes

Activity Request Type

Identifies the type of activity requested by the customer. Examples include Where Is My Order (WISMO), general, and gift certificate lookup.

Catalog Request Origin

Identifies the origin of the catalog request. Examples of origins are telephone, fax, or internet.

Catalog Request Type

Identifies the type of catalog request. Examples include Paid Inquiry, Unpaid Inquiry, Referral Inquiry, and Store Inquiry.

Catalog Type

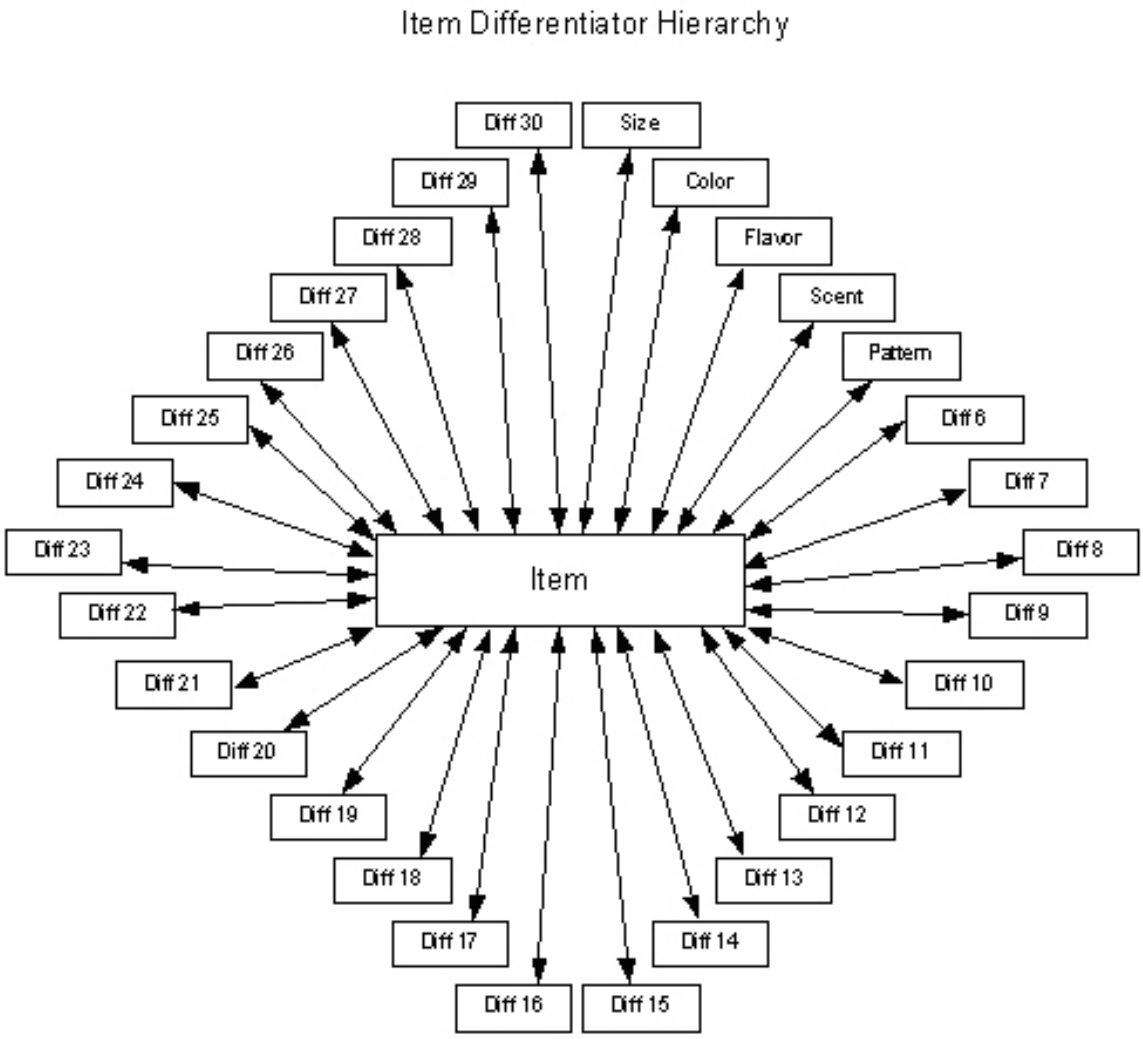
Identifies the type of catalog requested by the customer.

Differentiator hierarchy

Differentiators (Diffs) are used to define the characteristics of an item. Characteristics such as size, color, flavor, scent, and pattern, are attached to the items as Diffs within the merchandising system. These first five Diff types are pre-determined within RDW, but an additional 25 for a total of 30, are available for use. The ability to report by Diff, will add tremendous value, and enable the user to determine trends by a particular size, color, flavor, scent, or pattern.

System hierarchy

This diagram illustrates the drillable hierarchy in the product hierarchy.



Attributes

The following list describes the attributes that are part of the product hierarchy.

Size

Identifies the characteristic of an item that belongs to the item differentiation type 1. These characteristics are comprised of the following differentiation types: color, flavor, size, scent, or pattern.

Color

Identifies the characteristic of an item that belongs to the item differentiation type 2. These characteristics are comprised of the following differentiation types: color, flavor, size, scent, or pattern.

Flavor

Identifies the characteristic of an item that belongs to the item differentiation type 3. These characteristics are comprised of the following differentiation types: color, flavor, size, scent, or pattern.

Scent

Identifies the characteristic of an item that belongs to the item differentiation type 4. These characteristics are comprised of the following differentiation types: color, flavor, size, scent, or pattern.

Pattern

Identifies the characteristic of an item that belongs to the item differentiation type 5. These characteristics are comprised of the following differentiation types: color, flavor, size, scent, or pattern.

Unit of Measure

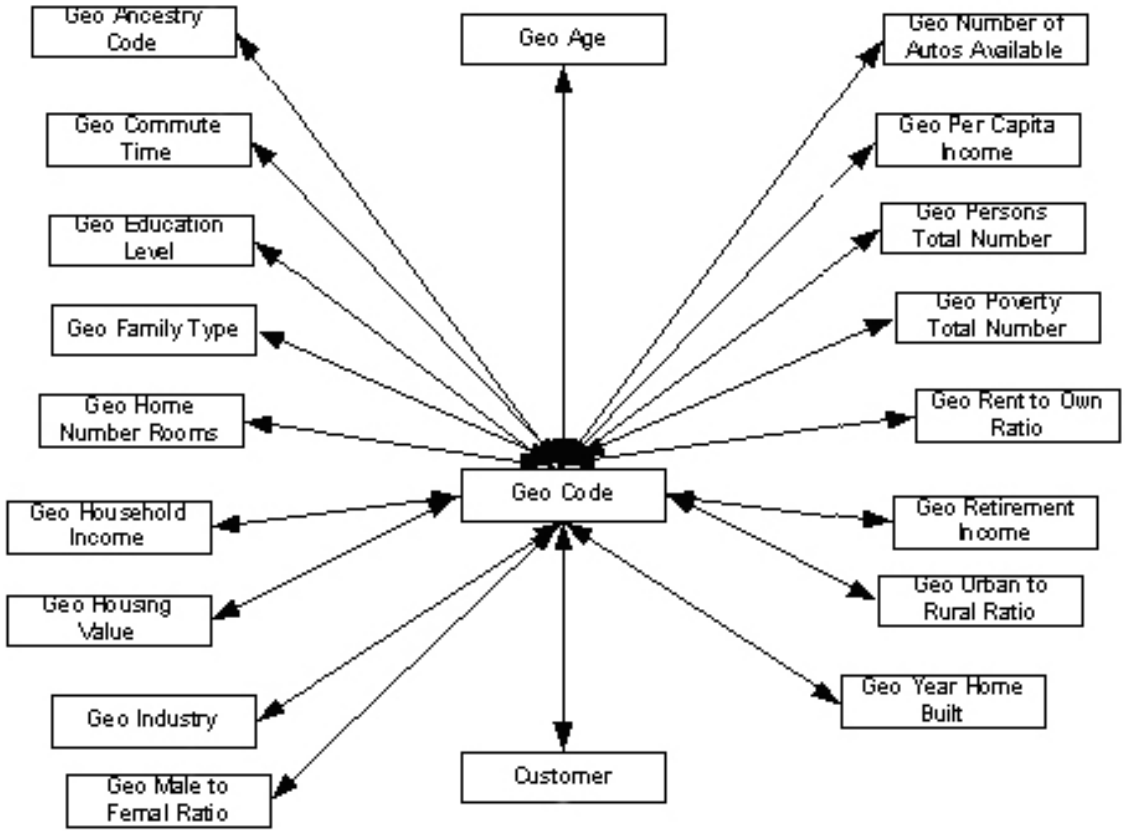
Identifies the standard unit of measure for an item.

Geographic

The geographic hierarchy segments customers according to a set of geographic characteristics. A Geo Code is assigned to each customer based on a geographic segment such as zip code. All customers in this segment share the Geo Code. The attributes for the Geo Code represent averages in the geographic segment. The attributes do not represent individual characteristics for each customer.

System hierarchy

This diagram illustrates the drillable hierarchy in the geographic hierarchy.



Attributes

Geo Age

Identifies the age of persons in the Geographic population in which the Customer resides.

Geo Ancestry Code

Identifies the Ethnic Ancestry of the geographic population in which the Customer resides.

Geo Code

Identifies the code of the geographic population in which the Customer resides.

Geo Commute

Time Identifies the work commute time of the geographic population in which the Customer resides.

Geo Education Level

Identifies the level of education of the geographic population in which the Customer resides.

Geo Family Type

Identifies the Family Type of the geographic population in which the Customer resides.

Geo Home Number Rooms

Identifies the number of rooms in homes in the geographic population in which the Customer resides.

Geo Household Income

Identifies the Household income of the geographic population in which the Customer resides.

Geo Housing Value

Identifies the value of housing of the geographic population in which the Customer resides.

Geo Industry

Identifies the industry of employment of the geographic population in which the Customer resides.

Geo Male to Female Ratio

Identifies the Male to Female ratio of the geographic population in which the Customer resides.

Geo Number of Autos Available

Identifies the number of autos available to a household of the geographic population in which the Customer resides.

Geo Per Capita Income

Identifies the per capita income of the geographic population in which the Customer resides.

Geo Persons Total Number

Identifies the total of persons in a family of the geographic population in which the Customer resides.

Geo Poverty Total Number

Identifies the amount of poverty of the geographic population in which the Customer resides.

Geo Rent to Own Ratio

Identifies the number of families that are renting homes to eventually own in the geographic population in which the Customer resides.

Geo Retirement Income

Identifies the families whose main source of income is retirement income in the geographic population in which the Customer resides.

Geo Urban to Rural Ratio

Identifies the urban homestead to rural homestead ratio of the geographic population in which the Customer resides.

Geo Year Home Built

Identifies the year home built of the geographic population in which the Customer resides.

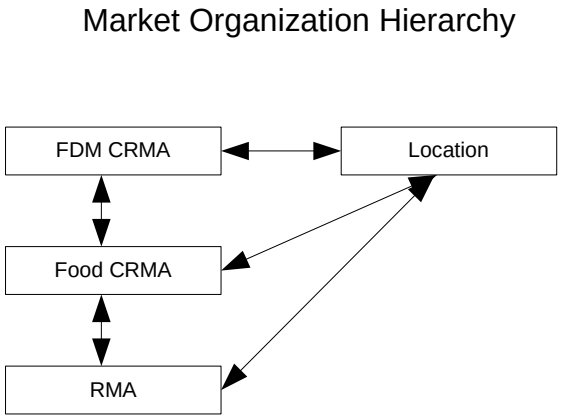
Market organization

The market organization hierarchy reflects the structure of the market as a whole. It allows the analyst to examine the performance of the retail organization in the general marketplace. Understanding of the market situation allows the analyst to identify areas in which the marketplace is outperforming the organization and take corrective action.

For example, a store in the New York area produced $4000.00 in sales on a given day, while the market data indicates that the average in the general marketplace is $10,000.00. The analyst can use this information to identify the problem at this location and take the appropriate action.

System hierarchy

This diagram illustrates the drillable hierarchy in the market organization hierarchy.



Attributes

The following list describes the attributes that are part of the market organization hierarchy.

FDM CRMA

Food, Drug stores, and Mass Merchants (FDM) Competitive Regional Marketing Area (CRMA) is the highest attribute within the market organization hierarchy. FDM CRMA represents the highest geography type at which market data for a regional marketing area is being provided. Examples of RDM CRMAs include NY FDM CRMA, Maine/Vermont FDM CRMA.

Food CRMA

Food CRMA represents the second highest geography type at which market data for a regional marketing area is being provided. Examples of Food CRMAs include NY Food CRMA and Maine/Vermont Food CRMA.

RMA

Regional Marketing Area (RMA) is the lowest attribute within the market organization hierarchy. RMA represents the retailer’s market data for a regional marketing area. Examples of RMAs include NY RMA and Maine/Vermont RMA.

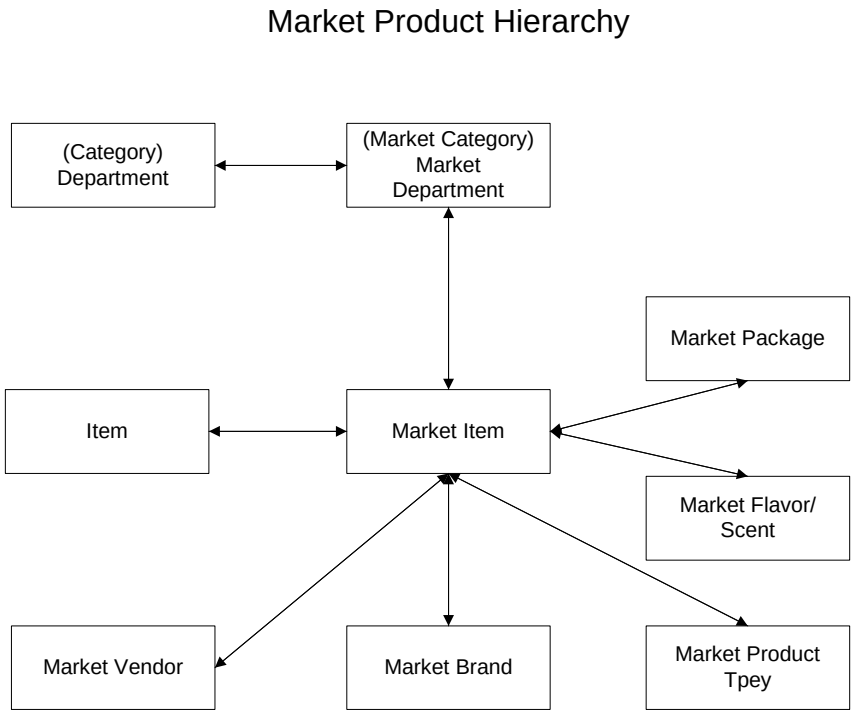
Market product

The market product hierarchy reflects the structure of the market as a whole at the product level. It allows the analyst to examine the performance of the retailer's products in the general marketplace. Understanding of the market situation allows the analyst to identify items in which the marketplace is outperforming the retailer and take corrective action.

For example, a product in the New Jersey area produced $4000.00 in sales on a given day, while the market data indicates that the average in the general marketplace is $12,000.00. The analyst can use this information to identify the problem with this item and take the appropriate action.

System hierarchy

This diagram illustrates the drillable hierarchy in the market product hierarchy.



Attributes

The following list describes the attributes that are part of the market product hierarchy.

Market Category

The category in the market.

Market Item

An item in the market.

Market Flavor/Scent

The flavor or scent of the market item. For example, if the item is yogurt, the flavor might be strawberry.

Market Type

A market data attribute supplied by a syndicated data provider to represent the product classification (for example, soda or cookies).

Market Vendor

A Vendor is a Retailer's source for purchasing goods to be sold. Also known as supplier.

Market Brand

Market Brand represents a name, term, design, symbol, or any other feature that identifies one seller's good or service as distinct from those of other sellers.

Market Package

A market data attribute supplied by a syndicated data provider to represent the type of packaging a product is presented in (for example, can, glass, or box).

Media

The media hierarchies represent the different means that a retail company uses to sell products as part of its direct-to-customer (DTC) business. Media can be Internet web stores where customers can browse through thousands of items and order them online, catalogs with hundreds of items that customers can buy by mailing in order forms, or a simple postcard with just one item on promotion that a customer can purchase by calling a toll-free number. RDW refers to these non-brick-and-mortar channels simply as media.

While media serve a very similar purpose to a traditional brick-and-mortar store in that they all provide a storefront for customers to shop for products and make purchasing decisions, they are very different in their basic mode of operation. For example, a retailer can sell an item on a catalog that is not currently in stock whereas a physical store generally sells only items that are on the shelf. Similarly, shipping and handling charges, which are an integral part of media sales, are not applied to a traditional store sale.

Because of many such fundamental differences in the mode of operations between media and a bricks and mortar store, a data model built around analyzing performance by geography is not sufficient to analyze performance of media. RDW, hence, includes separate media hierarchies to allow for reporting for a DTC business.

The media tied to a customer order header (and what is driving the customer to place an order) may be different than the media tied to the customer order line (the one in which the merchandise was offered). In order to distinguish when a media is tied to a customer order header versus a customer order line, two separate media hierarchies have been created. This distinction allows analysis of relevant metrics by either header media or line media or the combination of the two. Please note, header media and line media are available for demand reporting, but only line media is available for sales reporting.

The media hierarchies are fairly simple. At the top of both the header and line media hierarchy is the banner, which can contain one or more channels. Within a channel, there may be one or more media. As noted earlier, examples of media are catalogs, postcards, and online web stores. Line and header media may have a season and year associated with them.

Items, selling items, and depiction codes are only applicable to line media because it is the customer order line media, not necessarily the customer order header media, where that item/selling item combination is actually depicted. Items that are sold via these media are presented to customers as selling items. A selling item is a group of related inventory items presented to a customer as a single display unit in a catalog. For example, a single selling item may be a woven rug. The rug may come in different sizes or colors. The same selling item in different catalogs may contain a different collection, such as a different set of colors, of inventory items.

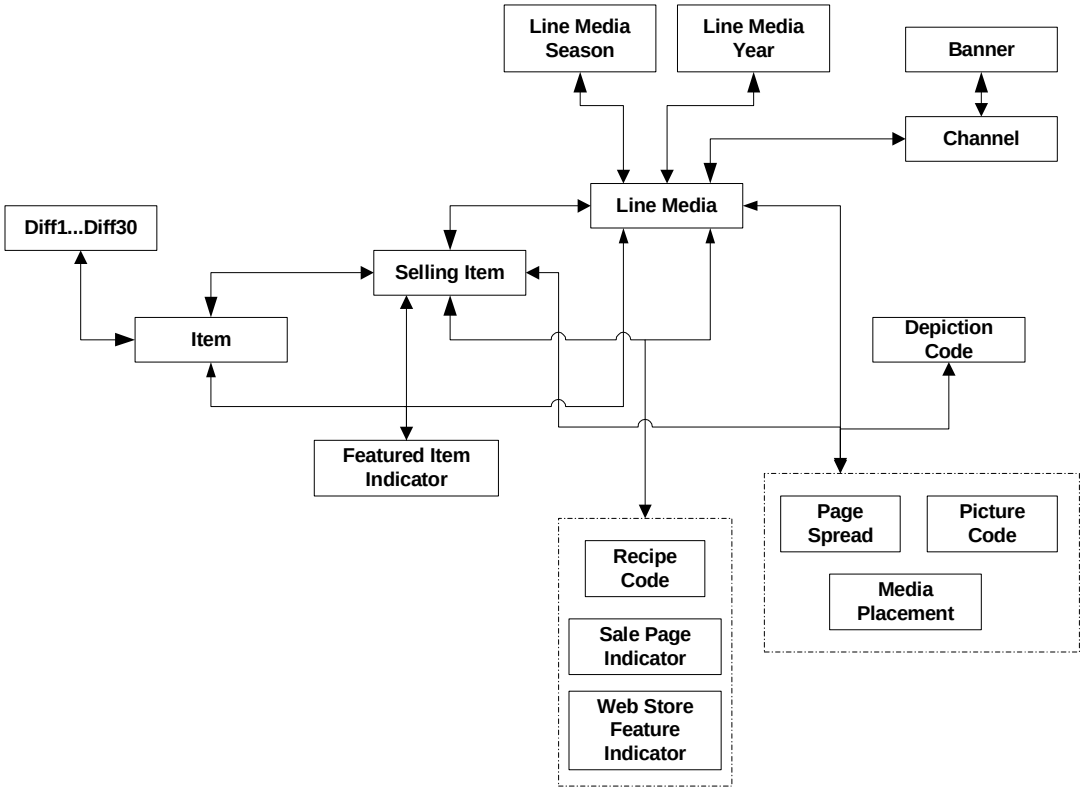
A customer who wishes to purchase the furniture set does not really purchase the selling item. The customer purchases the individual inventory items included in the selling item. Attributes that can be used for reporting include whether the selling item was displayed on a sale page in the media, whether the selling item was featured on the web store, and the recipe code attached to the selling item within the media.

A depiction code identifies the creative representation that was used to present a selling item or group of selling items to the customer within a given media. There are a number of attributes of a depiction code for a selling item that can be used for reporting. These attributes pertain to such characteristics of a depiction code for a selling item as the page in which it is displayed, its placement in the catalog, the alphanumeric key code attached to the selling item within the depiction, etc.

Transactions not specifically associated with a catalog or media will not be reflected in a report that has media on it. For example, if a retailer sells through brick and mortal stores as well as catalogs, a report that displays item sales will aggregate sales made by both DTC and non-DTC channels and group them by items. However, a report that displays sales by media will aggregate only DTC sales with an associated media, and not include brick and mortar location sales.

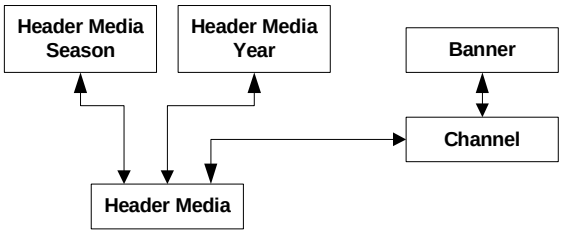
System hierarchies

This diagram illustrates the drillable hierarchy in the line media hierarchy.



Drillable hierarchy in the line media hierarchy

This diagram illustrates the drillable hierarchy in the header media hierarchy.



Drillable hierarchy in the header media hierarchy

Attributes

The following list describes the attributes that are part of the media hierarchy.

Banner

The name of a retail company's subsidiary that is recognizable to the consumer or the name of the store as it appears on the catalog, web channel or brick and mortar store. This attribute is also part of the organization hierarchy.

Channel

The outlet for sale and delivery of goods and services to the customer. A retailer can have multiple outlets such as brick and mortar, website, and catalog. This attribute is also part of the organization hierarchy.

Header Media

Media such as catalogs, postcard, and the Internet associated with customer order headers.

Line Media

Media such as catalogs, postcard, and the Internet associated with customer order lines.

Selling Item

The selling item that is used to consistently identify an item or a group of items across the media. The media contain one or more selling items, and each selling item contains one or more items.

Item

The lowest level attribute within the Product dimension. Sales and inventory facts are tracked at one of three predetermined levels within the item attribute. The media contain one or more selling items, and each selling item contains one or more inventory items.

Header Media Season

The season to which the customer order header media is associated.

Line Media Season

The season to which the customer order line media is associated.

Header Media Year

The fiscal year to which the customer order header media is associated.

Line Media Year

The fiscal year to which the customer order line media is associated.

Media Placement

The placement of a selling item on a depiction code within the media.

Page Spread

The page assignment of a selling item on a depiction code within the media.

Picture Code

The alphanumeric pictorial assignment given to the selling item on a depiction code for the page spread.

Recipe Code

Identifies the recipe code that was associated to a selling item in the media.

Sale Page Indicator

Indicates whether a selling item is being presented on a sale page of the media.

Web Store Feature Indicator

Indicates whether the selling item is featured in the web store.

Featured Item Indicator

Identifies the items that were featured for a selling item in the media. A featured item is one whose picture is displayed in a depiction for a selling item.

Depiction Code

Identifies the creative representation that was used to present a selling item or group of selling items to the customer within a media.

Organization

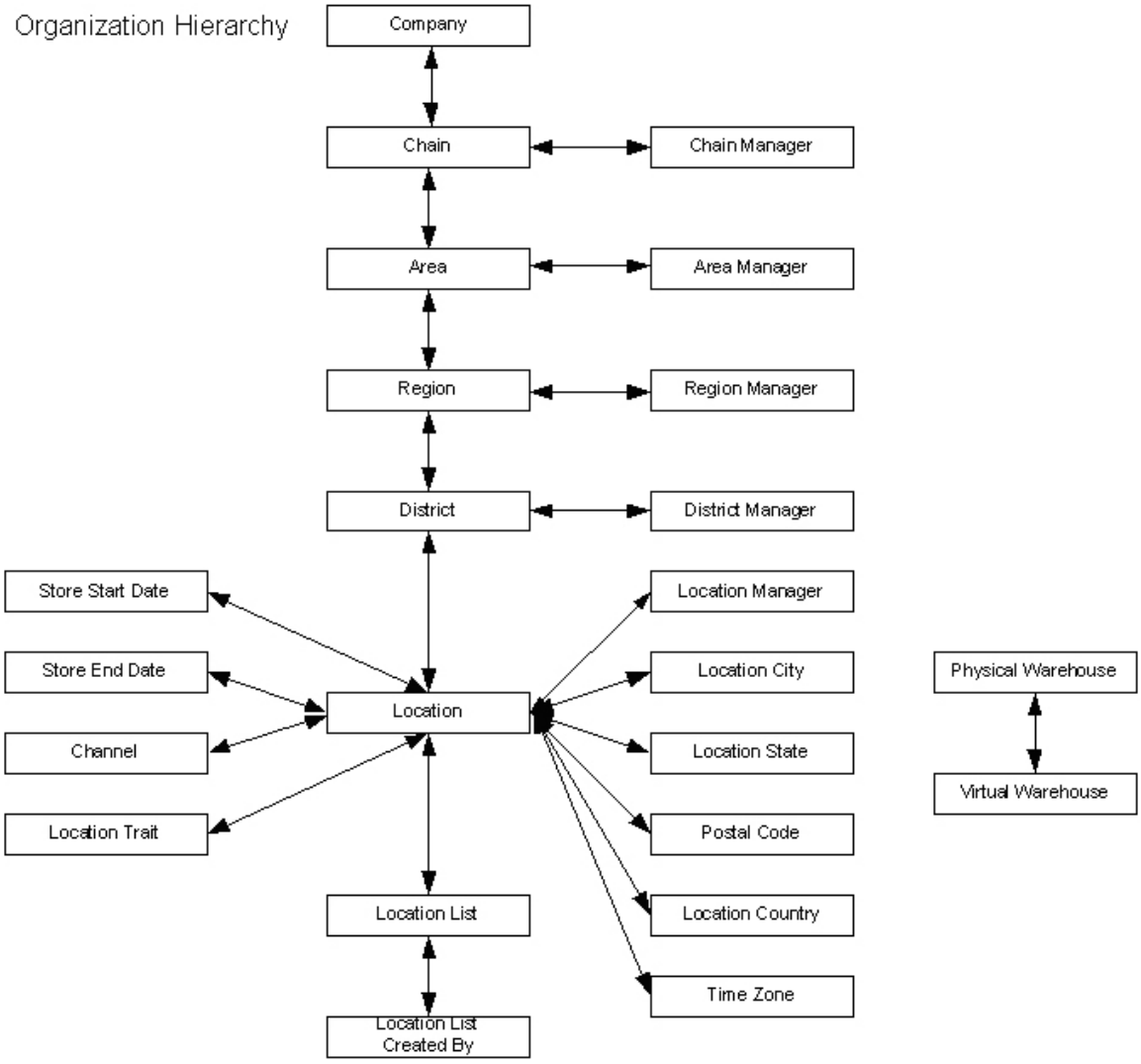
The organization hierarchy mirrors the structure of the retail company, allowing analysis at every level of the organization where it is needed. When used in conjunction with the time hierarchy, this hierarchy allows the analyst to obtain a complete picture of the retail organization at any level represented by an attribute.

Due to its importance in the retail environment, the organization hierarchy plays a predominant role in nearly all types of analysis available in RDW. Assessing the contribution of a child attribute to its parent attributes, for example location to region or chain, allows a business analyst to identify the segments of the larger organization that are performing as planned, as well as those whose performance is below expectations. In addition, the organization hierarchy makes it possible to analyze sales by channel and perform comparable store analysis.

The majority of business measurements in RDW reference data by attributes in the organization hierarchy. Sales and profit, markdowns, stock position and most of the other data marts are held by location, the lowest level attribute in the organization hierarchy.

System hierarchy

This diagram illustrates the drillable hierarchy in the organizational hierarchy.



Attributes

The following list describes the attributes that are part of the organizational hierarchy.

Area

Area is the 3rd highest attribute within the organization hierarchy. An area consists of one or more regions.

Area Manager

Represents the identity of the person assigned to manage a particular area.

Banner

The name of a retail company's subsidiary that is recognizable to the consumer or the name of the store as it appears on the catalog, web channel or brick and mortar store.

Chain

Chain is the 2nd highest attribute within the organization hierarchy. A chain consists of one or more areas.

Chain Manager

Represents the identity of the person assigned to manage a particular chain.

Channel

The outlet for sale and delivery of goods and services to the customer. A retailer can have multiple outlets such as bricks and mortar, website, and catalog.

Location City

City is an attribute of location. This attribute represents the city of the primary address for the location.

Company

Company is the highest attribute within the organization hierarchy. A company consists of one or more chains.

District

District is the 5th highest attribute within the organization hierarchy. A district consists of one or more locations.

District Manager

Represents the identity of the person assigned to manage a particular district.

Location

Location is the lowest attribute within the organization hierarchy. Identifies a warehouse store, or partner within the company. Additional attribute forms for location include:

- Remodel Date – Date on which the location was remodeled.
- Stock Holding – Indicates whether the location holds stock.
- Format – The format of the location.
- Linear Distance – Location's total linear selling space.
- Local Currency – Location's local currency
- Location Type – Identifies the location as a 'S'tore, 'W'arehouse, or 'E'xternal Finisher/Partner..
- Desc 2 – The secondary description or name of the store or warehouse.

Location Country

Identifies the country of the primary address for the location.

Location List

The location list identifies a group of pre-defined locations.

Location List Created by

Identifies the user who created the location list. A user may have one or more location lists.

Location Manager

Represents the identity of the person assigned to manage a particular location.

Location Trait

The location trait's unique identifier. Only store locations can have valid entries for this attribute.

Physical Warehouse

Identifies a physical warehouse location.

Postal Code

Identifies the postal code to of the primary address for the location.

Region

Region is the 4th highest attribute within the organization hierarchy. A region consists of one or more districts.

Region Manager

Represents the identity of the person assigned to manage a particular region.

Location State

Identifies the state of the primary address for the location.

Store End Date

Identifies the date on which a location was closed.

Store Start Date

Identifies the date on which a location was opened.

Time Zone

Identifies the time zone in which the location is located.

Virtual Warehouse

Identifies virtual locations in a physical warehouse.

Product

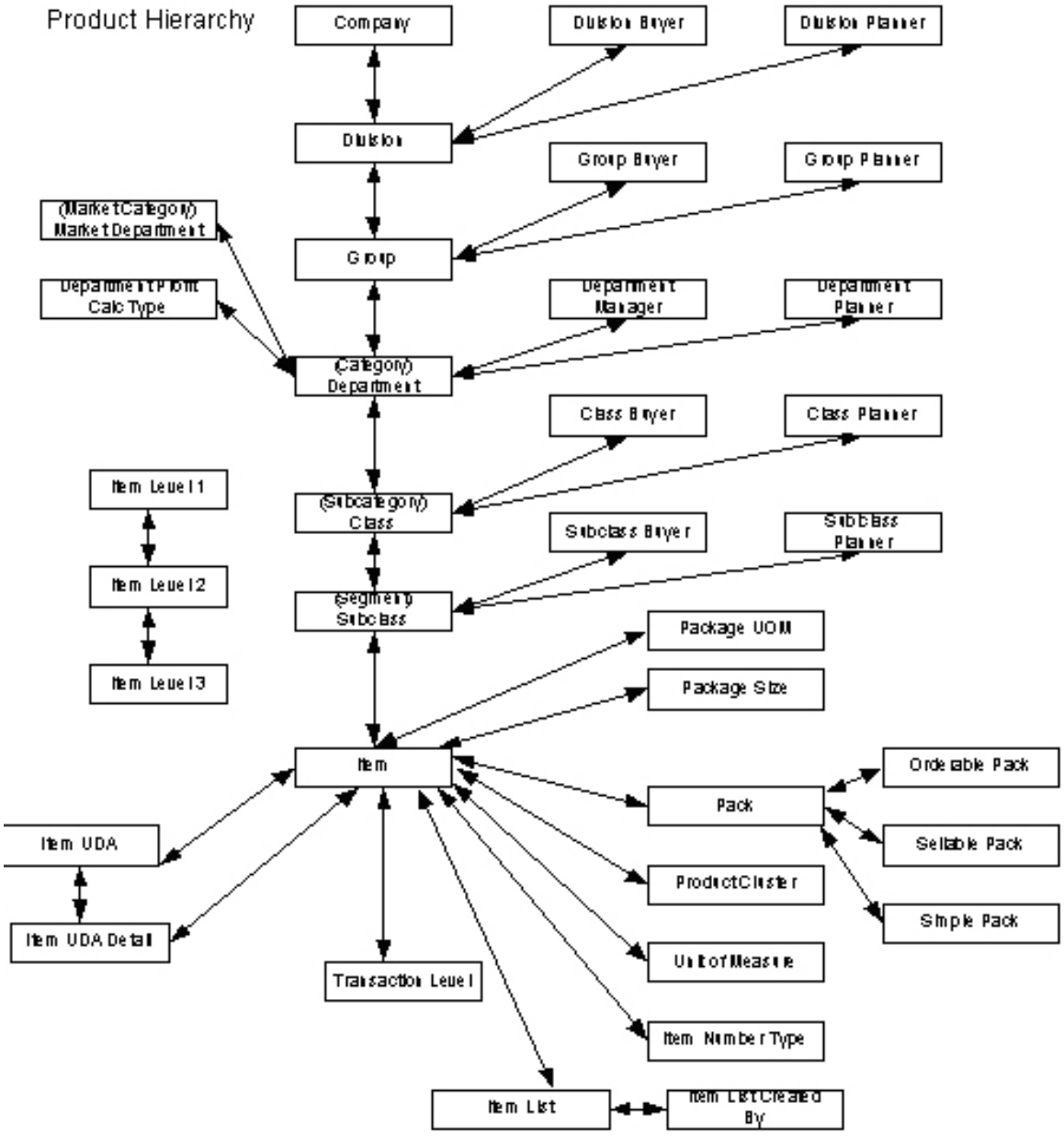
The product hierarchy represents the product line that the company sells. Retailers must understand their products when making crucial decisions about what items to buy and how to sell them to customers. The product hierarchy makes it possible for analysts to measure performance at any level represented in the product hierarchy.

The product hierarchy is essential to the category or department manager who needs to know what items turn the highest profit, or how an item performs within the market as a whole.

Due to its importance for analysis in the retail environment, attributes from the product hierarchy are present in nearly every datamart in RDW. In most cases, data is kept at the lowest level in the hierarchy (item) to allow maximum flexibility and detail in reporting.

System hierarchy

This diagram illustrates the drillable hierarchy in the product hierarchy.



Product drillable hierarchy

Attributes

The following list describes the attributes that are part of the product hierarchy.

Category

Category is the 4th highest attribute within the Product hierarchy. A category consists of one or more subcategories.

Category Manager

Represents the identity of the person assigned to manage a particular product category.

Category Planner

Represents the executive responsible for meeting the financial goals of an area through the placement and flow of merchandise in a store and/or retail channel for a particular category.

Category Profit Calc Type

Indicates what method was used to calculate the profit for the category.

Category Supplier

Represents the identity of the person or company who was assigned as the supplier for a particular category.

Company (Prod)

Company is the highest attribute within the Product hierarchy. A company consists of one or more divisions.

Conveyable Type

The unique identifier for the conveyable type. Conveyable type indicates whether the product needs to be hand carried or can be placed on the conveyer belt to be moved.

Division

Division is the 2nd highest attribute within the Product hierarchy. A division consists of one or more groups.

Division Buyer

Represents the executive responsible for purchasing merchandise to be sold in a store and/or retail channel for a particular division.

Division Planner

Represents the executive responsible for meeting the financial goals of an area through the placement and flow of merchandise in a store and/or retail channel for a particular division.

Group

Group is the 3rd highest attribute within the Product hierarchy. A group consists of one or more categories.

Group Buyer

Represents the executive responsible for purchasing merchandise to be sold in a store and/or retail channel for a particular group.

Group Planner

Represents the executive responsible for meeting the financial goals of an area through the placement and flow of merchandise in a store and/or retail channel for a particular group.

Inventory Ind

Indicates whether an item is an inventory item or a non-inventory item (such as gift certificates, labor).

Item

Item is the lowest level attribute within the Product hierarchy. Sales and inventory facts are tracked at one of three predetermined levels within the item attribute.

Item Level 1

This represents the highest item level and may consist of one or more items at level 2.

Item Level 2

This represents the second highest item level and may consist of one or more items at level 3.

Item Level 3

This represents the lowest item level.

Item List

The item list identifies a group of pre-defined items.

Item List Created by

This identifies the user who created the item list. A user may have one or more item lists.

Item Number Type

This identifier indicates the format in which an item number is being held (for example, UPC, internal number, PLU, and so on).

Item Type

The unique identifier for the item type. Example item types include Swatch, Component, Raw, etc.

Item UDA

Identifies a user-defined attribute of an item.

Item UDA Detail

Identifies the detailed information of a particular item UDA.

Merchandise Ind

Indicates whether the item's sales are financially tracked in the stock ledger.

Orderable Pack

Identifies whether the pack is an orderable pack.

Pack

Identifies a group of items that are packaged and sold together.

Pack Indicator

Identifies an item as a pack item.

Package Size

A numerical value that represents the size of the item package.

Package UOM

The unit of measure associated with the item package.

Perishable Ind

Indicates whether the item is perishable.

Primary Supplier

Indicates the main supplier for an item.

Recipe Card Ind

Indicates whether a recipe card is available for the item.

Segment

Segment is the 2nd lowest attribute within the Product hierarchy. A segment consists of one or more items.

Segment Buyer

Represents the executive responsible for purchasing merchandise to be sold in a store and/or retail channel for a particular segment.

Segment Planner

Represents the executive responsible for meeting the financial goals of an area through the placement and flow of merchandise in a store and/or retail channel for a particular segment.

Sellable Ind

Indicates whether the item can be sold and have a price greater than 0. If 'N', then the item can only be placed on customer orders of type replacement or partial.

Sellable Pack

Identifies a pack as a sellable pack.

Simple Pack

Identifies a pack as a simple pack.

Subcategory

Subcategory is the third lowest attribute within the Product hierarchy. A subcategory consists of one or more segments.

Subcategory Buyer

Represents the executive responsible for purchasing merchandise to be sold in a store and/or retail channel for a particular subcategory.

Subcategory Planner

Represents the executive responsible for meeting the financial goals of an area through the placement and flow of merchandise in a store and/or retail channel for a particular subcategory.

Transaction Level

Identifies the item level at which sales information is stored.

Unit of Measure

Identifies the standard unit of measure for an item.

Item architecture

Item-level information

Tracking level and item level

In order to bring the new RMS item hierarchy (line/line extension/variant) into RDW hierarchy tables, the existing RDW hierarchies have been modified to reflect the new, unified item hierarchy table relationships. The tracking level remains the same for each item family, where item level indicates at which level the item is in the item family. The reclassification does not occur within each item family, but to the item family as a whole.

Item identifiers

In order to accommodate the varying item identifiers in RMS (UPC, variable weight UPC, EAN, PLU, and so on), RDW expanded the item column item_idnt (formerly item_idnt) to varchar2(25), from the current varchar2(10). Item_idnt on RDW side is either level1_idnt or level2_idnt or level3_idnt. There are always surrogate keys for a hierarchy: item_key, level1_key, level2_key, and level3_key columns have a datatype of number(12).

The current release of RDW uses one item master table and three views to hold item level information. The three views are used for the front end to drill up and down among three levels in an item family.

User defined attributes (UDAs)

Because UDA functionality did not change in RMS, the UDA database objects and batch modules were updated to account for new item hierarchy table/column name changes. Business Rule: RDW only holds UDA information at the tracking level.

Pack

Pack database objects and batch modules were updated to account for new item hierarchy and sales table/column name changes.

Supplier

The most significant change to the supplier hierarchy relies on the modification to the supplier functionality in RMS. Although RMS used to hold item cost at the item-supplier-country level, that cost is now held at the item-supplier-country-location level.

Item list

Item list functionality did not change in RMS. However, the Item list database objects and batch modules have been updated to account for the new item hierarchy table/column name changes.

Product season

Retek Merchandising System (RMS) can be a source for the Product Season dimension. Product season functionality allows the user to categorize each item according to different seasons and phases within a season. For example, a user may assign a season of *Spring* to a group of items, according to the supplier's deliveries of fashion items. Those relationships can be further broken down into the phases, such as *Spring I and Spring II*. These item-season relationships are then loaded into RDW. Clients can then query sales and inventory data, for instance, based on all items in the *Spring* season.

Note: On a given day, an item can only belong to one product season. In addition, product seasons cannot overlap; the same item-day cannot belong to two product seasons.

Plan season

Retek TopPlan can be a source for retail planning data. RDW holds facts from TopPlan (or a client planning source system) for a current and an original plan. To aid in querying planning facts, clients can populate the Plan Season dimension. Because planning facts are held in RDW at week level, the Plan Season dimension and season-to-date attributes will associate a specific range of calendar weeks with a plan season.

Note: Plan seasons cannot overlap; the same week cannot belong to two plan seasons.

Promotion

A promotion is an attempt to stimulate the sale of merchandise. This can be accomplished by temporarily reducing its price, by advertising it, or by tying its sale to offers of other merchandise at reduced prices (or for free). A promotion can take place for many different reasons, such as the desire to attract a certain type of customer, increase sales of a particular class of merchandise, introduce new items, or gain competitive advantage. Tracking of sales and demand by promotion allows retailers to assess the success in attracting customers to purchase items that have been placed on promotion.

A single promotion can be part of a larger effort or *event*. Several promotions may be associated with an event. For example, a summer sale event may consist of several promotions such as *Daisy Sale* and *4th of July* sale. In RDW, a promotion can be represented at two levels: as a promotion header which holds start and end dates, or at a more granular level, a promotion detail which includes additional information on the promotion such as promotion format, trigger type, etc. For example, the promotion header *24 hour sale* might have two promotion detail records, *buy one get one free for all men's shirts* and *10% off all women's shoes*.

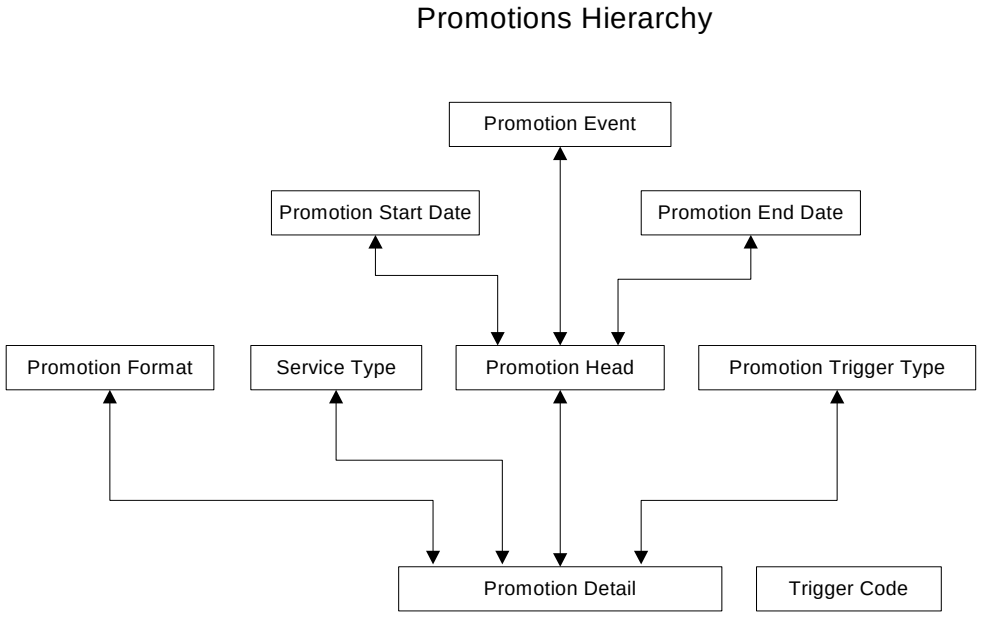
There are a number of formats in which a promotion can be offered. Some common examples of these formats are *Get specific percent off the price of an item, Buy a certain quantity of an item and get a certain amount off the total purchase value, Buy a certain item and get a discount on another item* or *Get free Shipping & Handling*. Every promotion has one of the following promotion formats:

- General: Get Y (percent or amount) discount on item A.
- Threshold: Buy X (quantity or amount) of item A, get Y (percent or amount) discount on item A.
- Mix and Match: Buy X (quantity or amount) of item A, get Y (percent or amount) discount on item B.
- Service: Get Y (percent or amount) discount on service charges. (If the promotion format is Service, there will also be a service type. A service type can be Monogramming, Gift Wrap, Personalization, or Shipping and Handling.)

Typically a promotion on an item is not applied universally, and is triggered only for certain stores, for certain media, for certain customer types, or for certain offer coupons, etc. The type of circumstance that triggers a promotion is called the promotion *trigger type*. In a brick-and-mortal market, a promotion is always triggered by the store. In a direct-to-consumer market, there can be different trigger types such as Source Code, Media Code, Selling Item Code, Customer Type, etc. One promotion can be triggered by only one promotion trigger type.

System hierarchy

This diagram illustrates the drillable hierarchy for promotions.



Attributes

Promotion Event

Identifies the event for which one or more promotions are offered.

Promotion Head

Identifies a business activity that includes one or more promotions.

Promotion Detail

Identifies unique item(s) and attributes of a single promotion. It entails detailed information on promotion such as the items for which this promotion is valid, the format of the promotion, etc.

Promotion Start Date

Identifies the date when the promotion started.

Promotion End Date

Identifies the date when the promotion ended.

Promotion Format

Identifies the format and source in which the promotion is offered. Examples of formats are "threshold", "general", "service", and "mix and match". Examples of sources are “RPM” and “DTC”..

Promotion Service Type

Identifies the service type of the promotion when the promotion format is Service. Examples of service types are Monogramming, Gift Wrap, Personalization, and Shipping and Handling.

Promotion Trigger Type

Identifies the type of the trigger that prompted the promotion. Examples of trigger types are Media Code, Offer Code, Selling Item Code, Item Code, and Order Type Code.

Promotion Trigger Code

Identifies the code of the medium that prompted the promotion. Examples of trigger mediums are Media Codes, Offer Codes, Selling Item Code, and Order Type Codes.

Reason

The reason dimension makes it possible to track why a particular action was taken in the areas of Inventory Adjustment and Sales. Return reasons, such as ‘Wrong item shipped’ or ‘Defective’, are tracked by Return Reason. Other transactional reasons, such as why a paid out was done, or the reason why an even exchange was made are tracked by Transaction Reason. This information makes it possible to spot trends and anomalies in sales.

Inventory adjustments are tracked by Inv Adjustment Reason. Identification of the reasons for an inventory adjustment allows the business analyst to identify areas where stock availability or other problems exist, and thereby able to make the appropriate changes.

Attributes

Inventory Adjustment Reason

Identifies, as a detailed description, the reason why a particular action was taken. For example, inventory shrink can occur for several reasons such as spoilage or theft.

Return Reason

Identifies the reason why an item is being returned.

Transaction Reason

Identifies, as a detailed description, the reason why a particular action on a transaction was taken.

The reason attributes do not form a hierarchy.

Regionality

Regionality is not technically an attribute or hierarchy, but acts much like one. This term refers to a filter object that allows users of RDW to view only information that is associated with their area of responsibility. For example, the Regionality filter can be used to retrieve only information associated with a specific User Group. The regionality filter limits the report to information that is associated with a defined set of location(s), department(s), and supplier(s) that the User Group has responsibility for. For example, a user may belong to User Group 1, which has responsibility over the assortments in Category A of locations 1 and 2 that come from Supplier X. Choosing User Group 1 from the Regionality filter will allow the user to view only sales from this area of responsibility.

This filter can be used in conjunction with other filters, including Primary Supplier Indicator, to achieve the desired results.

Note: The attributes that define a User Group must be set up in RMS and subsequently fed to RDW.

Retail type

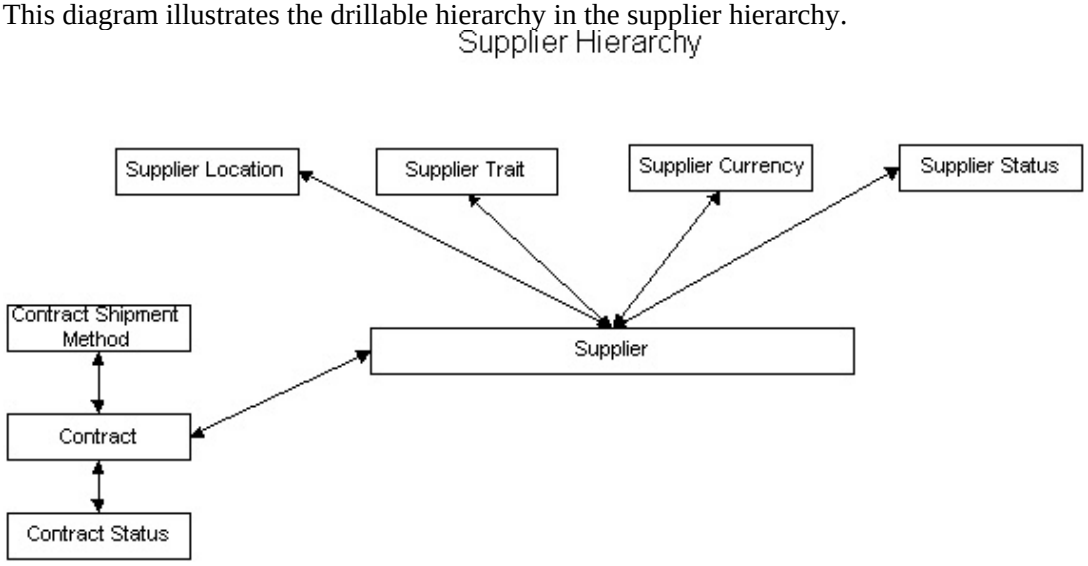
The retail type attribute represents the price type at which items were sold or held as inventory. There are four values for retail type: Regular, Promotional, Clearance, and Intercompany. This attribute segments a number of business measurements by price type, including sales and profit, stock position and value, markdowns, markups, and competitor pricing. This information is valuable when determining a pricing strategy, analyzing inventory value, or evaluating a competitor.
The retail type attribute is not part of a drillable hierarchy.

Supplier

Retail organizations depend upon their suppliers to deliver quality product in a timely manner. The attributes in the supplier hierarchy allow the business analyst to rate supplier performance based on delivery history and the quality of product. This information can be used to identify suppliers whose performance is below standard, as well as those who are in compliance with the company's expectations.

System hierarchy

This diagram illustrates the drillable hierarchy in the supplier hierarchy.



Attributes

The following list describes the attributes that are part of the supplier hierarchy.

Supplier

Uniquely identifies a supplier by name.

Supplier Category

Establishes a many to many relationship between category and supplier.

Supplier Currency

Identifies the currency that the supplier operates under.

Supplier Location

Identifies the main location of the supplier.

Supplier Status

Indicates if the supplier is currently active.

Supplier Trait

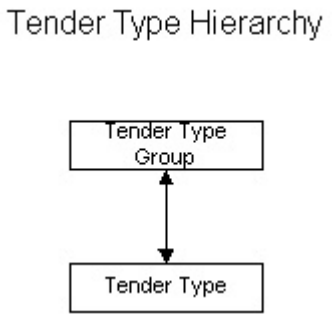
Merchandising supplier trait unique identifier.

Tender type

This hierarchy allows reporting of sales and return transactions and vouchers by tender type. In the loss prevention area, this allows identification of cashiers who have an abnormal number of vouchers issued or redeemed, or ratio of sales to returns for a particular tender type.

System hierarchy

This diagram illustrates the drillable hierarchy in the tender type hierarchy.



Attributes

Tender Type Group

Identifies the tender type group.

Tender Type

Identifies the tender type.

Cash Equivalent Indicator

Identifies the cash equivalent indicator.

Time calendar

The time dimension plays a central role in the data warehouse. Business questions in a retail environment, as in any other, are almost invariably time-based. The statement “Sales value for shoes at the Minneapolis location was $500.00” is almost meaningless if we do not know the time interval in which this activity took place. Because of its importance, an attribute from the time hierarchy is present on every fact table in RDW and part of nearly every data extraction operation.

Time-based performance comparisons are an important part of decision support in retailing. For example, we might want to assess sales performance for a current month or season by comparing it to the same month or season for the previous year. The time dimension allows the transformations required to support time-based comparisons to take place.

Time intervals in RDW are based on the 4-5-4 calendar, Gregorian calendar or a thirteen-period calendar.

4-5-4 Calendar

The 4-5-4 calendar is the default. The calendar can be implemented as 4-5-4, 4-4-5, or 5-4-4, depending upon the needs of the client. In addition, the client determines the weekday on which a week begins and ends. Every quarter contains 13 full weeks. Quarters have two four-week months, and a five-week month.

Gregorian Calendar

Both 454 and Gregorian calendars can be used within the same project. However Gregorian standalone is not an option. The Gregorian calendar is based upon the length of the Earth's revolution around the Sun (and hence called a solar calendar). Under the Gregorian calendar, a solar year is divided up into 12 months of 30 or 31 days (with February having 28 or 29 depending on if the year is a leap year). This gives a year of 365 or 366 days. According to the Gregorian calendar, leap years occur in every year divisible by 4 except years divisible by 100. A week in a Gregorian calendar may not have 7 days, therefore reporting on a Gregorian week may not always show a full week for comparison analysis. For that reason, Gregorian week analysis is not a valid option in RDW.

13 Period Calendar

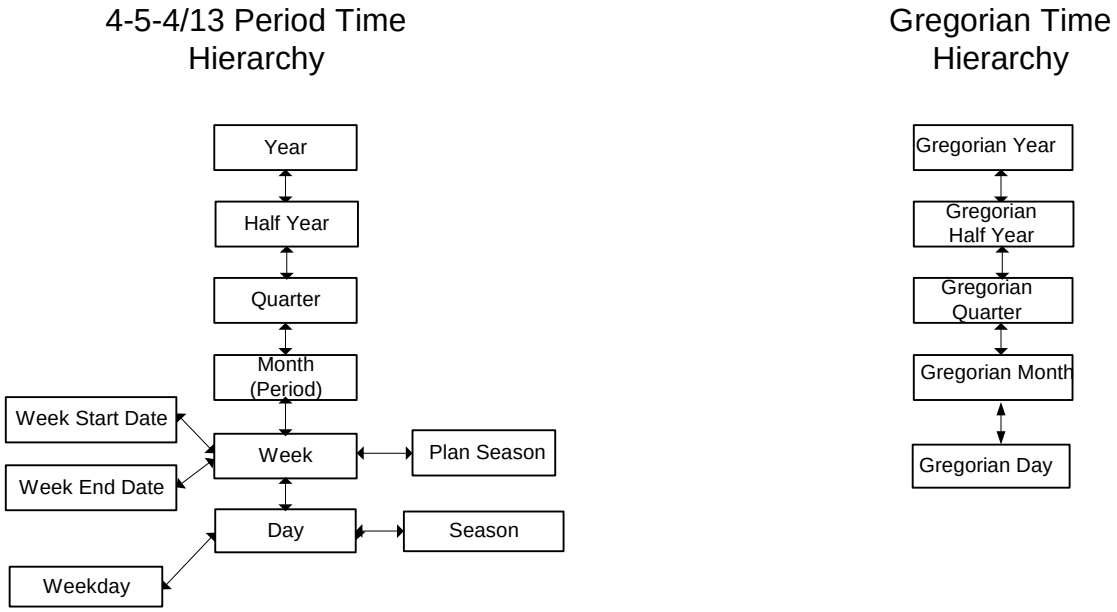
A 13 period calendar may be used as an alternative. The client must determine the structure of the calendar and implement it consistently. For example, a 13-Period Calendar begins on the Sunday after the last Saturday in February. The calendar year ends on a Saturday 52 or 53 weeks after it begins. Every 5 or 6 years there are 53 weeks in the year.

The13 period Calendar year is divided into 4 quarters. The first quarter contains 4 periods of 4 weeks, and each successive quarter contains 3 periods of 4 weeks. Every 5th or 6th year, however, there are 53 weeks. The calendar has a 28-year cycle of 6 yrs, 5 yrs, 6 yrs, 6 yrs, and 5 yrs. In a 53-week year, the 4th quarter contains 2 periods of 4 weeks and the last period of 5 weeks.

See the *RDW 11.0 Middle-Tier Installation Guide* for additional information about using this option.

System hierarchy

This diagram illustrates the drillable hierarchy in the time hierarchy.



Note: The Half Year attribute does not exist in a 13-period calendar.

Attributes

The following list describes the attributes that are part of the 4-5-4/13-period time calendar hierarchy. See the section, *Time transformations*, in Appendix C for a comparable table of transformational time attributes.

Year

The unique numeric representation for a year.

Half Year

Uniquely identifies the half-year. The display consists of a description, half-year identifier. For example, Half Year 1 20021 where the half-year identifier consists of the year and half-year number (1-2).

Quarter

The unique numeric representation of a quarter.

Month (Period)

The unique numeric representation for a month (period)

Week

The unique numeric representation for a week.

Plan Season

Identifies the plan season.

Week End Date

Identifies the end of the week by date in the MM/DD/YY format.

Week Start Date

Identifies the start of the week by date in the MM/DD/YY format.

Day

Uniquely identifies the day. The display consists of a description, date, and day (for example, Sunday 02/24/02 2002001, where the identifier consists of 4 digits for the year and 3 digits for the day [001 – 365]).

Weekday

Identifies a day in the week by name (for example, Wednesday). The user of this attribute allows tracking by day of the week.

Season

Identifies the season by description and number.

The following list describes the attributes that are part of the Gregorian time calendar hierarchy. See the section, *Gregorian Time transformations*, in Appendix C for a comparable table of transformational time attributes.

Gregorian Year

Identifies the year within the Gregorian time calendar hierarchy.

Gregorian Half Year

Identifies the half year within the Gregorian time calendar hierarchy.

Gregorian Quarter

Uniquely identifies the Gregorian quarter. The display consists of a quarter description and year. For example, Quarter 1 2002.

Gregorian Month

Identifies the month within the Gregorian time calendar hierarchy.

Gregorian Day

Identifies the day within the Gregorian time calendar hierarchy.

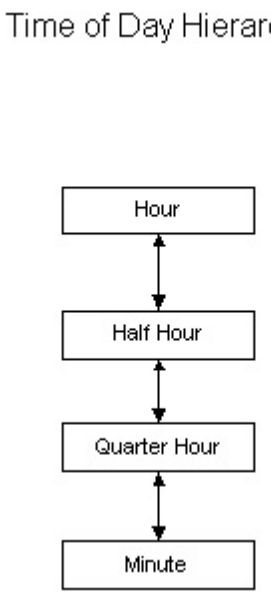
Time of day

The time of day hierarchy permits analysis in the loss prevention and employee productivity areas where identifying problems and trends requires the use of hourly or smaller time increments. In addition, the time of day hierarchy allows analysis of sales and return transactions on an hourly basis.

This hierarchy is used only in the Store Operations Workbench. It is not related or linked to the time calendar hierarchy.

System hierarchy

This diagram illustrates the drillable hierarchy.



Attributes

The following list describes the attributes that are part of the time calendar hierarchy.

Half Hour

Identifier for the half hour, made up of the hour_idnt followed by a 1 or 2 to indicate the half of that hour.

Hour

Identifier of the hour (0-23).

Minute

Identifier for the minute, made up of the hour_idnt followed by a number 1-60 to indicate the minute of that hour.

Quarter Hour

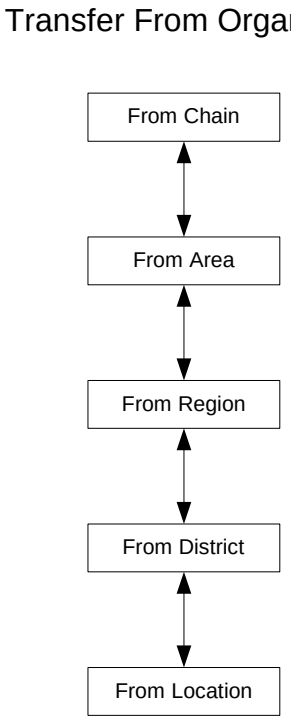
Identifier for the quarter hour, made up of the hour_idnt followed by a 1, 2, 3, or 4 to indicate the quarter of that hour.

Transfer from organization

This hierarchy allows tracking of inventory transfers from a location or other organizational attribute. This permits analysis of the number of units transferred and the retail and cost value of the transfer in the organization.

System hierarchy

This diagram illustrates the drillable hierarchy in the transfer from organization hierarchy.



Transfer from organization drillable hierarchy

Attributes

The following list describes the attributes that are part of the transfer from organization hierarchy.

From Chain

Identifies a chain in the company from which a transfer originates.

From Area

Identifies an area in the company from which a transfer originates.

From Region

Identifies a region in the company from which a transfer originates.

From District

Identifies a district in the company from which a transfer originates.

From Location

Identifies a warehouse store, or partner from which a transfer originates.

Transfer Type

The transfer type attribute represents the different types of transfers at which items were moved from one location to another location. There are three values for transfer type: Normal, Book, and Intercompany.

The transfer type attribute is not part of a drillable hierarchy.

Chapter 4 – Retail base and performance metrics

Comparable store analysis

Comparable stores or *comp stores* are stores that have been open for business for a set period of time and were in operation within the time period of analysis. In other words, comp stores are really established stores as opposed to new or closed stores. Comp store measurements are important to an analyst because profits and sales from the more established stores provide stable indicators of business performance. New or closed stores tend to be more volatile and can have a skewing effect on business performance indicators. Sales and profits from new or closed stores are not really comparable in business analysis, and as a result, they are not included in the comp store measurements.

RDW utilizes two different approaches to determine if a store is comp or not.

- The first approach uses a mathematical formula based on the store open date. When a store location has been open for 53 weeks, and is still in operation, the store becomes comp.
- The second approach uses a comp indicator, based on comp start and end dates that are set for each store location in the source system. These dates are used within RDW to determine a store location as "comp" for a given week.

A retailer can choose which approach best fits their business practice and eliminate reports for the other approach to minimize any confusion for the end user. RDW uses the term 'comp store' for all measurements and reports utilizing the first approach, and 'comp' for all measurements and reports utilizing the second approach.

Comp store analysis using store open date

The Comp Store Measurements measure the growth in sales and profit, excluding the impact of newly opened stores. Sales and profits from new stores are not reflected in same-store comparisons until those stores have been open for 53 weeks before the beginning of the current year's comp period. These stores must also be still open at the end of the current year's comp period. A comp period can be a month, a quarter, or a year.

With this approach, stores whose open dates have not been captured in the source system are not included in these comparisons. Each store needs to have a store open date as well as a store close date, if a store has been closed. If there is no close date, the store is assumed to be still in operation.

Metrics

Following are some sample comp store metrics found in RDW:

Metric	Definition	Description
Comp Store Sales Value	Sales – Returns [Store Age >= 53 Weeks and Open w/ Sales]	This metric calculates comparable store sales, excluding sales of stores that have not been opened fifty-three (53) weeks before the start of the comparable period or are already closed at the end of the comparable period.
Comp Store Sales Value (Last Year)	Sales – Returns [Store Age >= 53 Weeks and Open w/ Sales]	This metric calculates comparable store sales for last year, excluding sales of stores that have not been opened fifty-three (53) weeks before the start of the comparable period or are already closed at the end of the comparable period.
Comp Store Profit	Profit on Sales – Profit Lost on Returns [Store Age >= 53 Weeks and Open w/ Sales]	This metric calculates total comparable store profit, minus comparable store profit lost on returns, excluding sales of stores that have not been opened fifty-three (53) weeks before the start of the comparable period or are already closed at the end of the comparable period.
Comp Store Profit (Last Year)	Profit on Sales – Profit Lost on Returns [Store Age >= 53 Weeks and Open w/ Sales]	This metric calculates total comparable store profit last year, minus comparable store profit lost on returns last year.
% Change Comp Store Profit vs Last Year	Comp Store Profit - Comp Store Profit (Last Year) / Comp Store Profit (Last Year)	This metric calculates percent variance in comparable store profit over the previous year.
% Change Comp Store Sales vs Last Year	(Comp Store Sales Value - Comp Store Sales Value (Last Year)) / Comp Store Sales Value (Last Year)	This metric calculates percent variance in comparable store sales value over the previous year.

As shown in the table above, the condition that is used in comp store metrics is “Stores >= 53 Weeks and Open”. This filter will select only the stores that have been open for 53 weeks before the beginning of the filter period of analysis and are still open at the end of the filter period of analysis. The metrics that calculate beginning of period and end of period are part of the collection of system metrics in RDW. They are described in the following table. System metrics are used to support the user metrics, and are not used on reports.

System Metric	Description
Period Start Date	This metric calculates the beginning date of a period.
Period End Date	This metric calculates the ending date of a period.
Store Start Date	This metric displays the date the store was opened. This date is brought in as a metric to allow for date calculations.
Store End Date	This metric displays the date the store has closed. This date is brought in as a metric to allow for date calculations.
Period Start Date – Store Start Date	This metric calculates the number of days between a period's start date and a store's start date. If the result of this calculation is 371 days (53 weeks) or greater, the store has been open long enough to qualify as a comp store.
Store End Date – Period End Date	This metric calculates the number of days between a store's end date and a period's end date. If the result of this calculation is greater than 0, the store remained open up to the period end date. This establishes that the store was open for the entire selected filter period.

Comp analysis using comp indicator

With this approach, comp stores are established at the week level within a source system through the use of comp start and end dates. RDW uses these dates to set a comp indicator. Each store that is established as comp has the comp indicator set to Y, while stores that are not comp will have the comp indicator set to N.

Metrics

Following are some sample comp metrics found in RDW:

Metric	Definition	Description
Comp Sales Value	Sales – Returns Comp Indicator = 'Y'	This metric calculates comparable sales value, by including only those stores that have a comparable indicator set to "Y" for a given week within the filter criteria. The amount is net of returns and inclusive of VAT.
Comp Base Sales Value	Sales – Returns Comp Indicator = 'Y'	This metric calculates base comparable sales value, by including only those stores that have a comparable indicator set to "Y" for a given week this year and corresponding facts for last year. The amount is net of returns and inclusive of VAT.
Comp Sales Value (Last Year)	Sales – Returns Comp Last Year	This metric calculates comparable sales value, by including only those stores that have a comparable indicator set to "Y" for a given week, last year. The amount is net of returns and inclusive of VAT.
Comp Profit	Profit on Sales – Profit Lost on Returns Comp Indicator = 'Y'	This metric calculates comparable profit, by including only those stores that have a comparable indicator set to "Y" for a given week within the filter criteria.
Comp Base Profit	Profit on Sales – Profit Lost on Returns Comp Indicator = 'Y'	This metric calculates base comparable profit, by including only those stores that have a comparable indicator set to "Y" for a given week this year and corresponding facts for last year.
% Change Comp Profit vs Comp Base	(([Comp Profit] - [Comp Base Profit]) / [Comp Base Profit])	This metric calculates the percent increase or decrease in comp profit over the base comp profit.
% Change Comp Sales vs Last Year	(Comp Sales Value - Comp Sales Value (Last Year)) / Comp Sales Value (Last Year)	This metric calculates the percent increase or decrease in comp sales value over the comp sales value for last year.

Customer order

For direct-to-consumer retail companies, effective customer order management is one of the most critical aspects to ensuring a healthy bottom line, positively impacting cash flow and improving customer satisfaction. Mismanagement at a single point in the order fulfillment process can translate into an empty space on the bank ledger for the duration of the entire sales cycle, as well as jeopardize relationships with valued customers who expect timely and complete delivery of products.

RDW provides a comprehensive set of metrics to help retailers achieve these goals. Included are key performance measurements for order fulfillment, demand analysis, status-aging, customer order line position, and value added services. Translating customer order performance objectives into tangible metrics and actionable decision support information empowers retailers to make more informed business decisions.

Order fulfillment

Order fulfillment metrics allow retailers to measure their performance in delivering: the correct product, to the correct place, at the correct time, in the correct condition and packaging, in the correct quantity, with the correct documentation.

The following are samples of Order Fulfillment metrics found in RDW:

Metric	Definition	Description
CO Backorder Retail Value*	Sum(F_BO_RTL_AMT) Order Line Type Not Replacement Out or Partial AND Demand Status Not Order Entry Error	This metric calculates the retail value of the items backordered for the customer order line, excluding order entry errors, and replacement (out) and partial (out) order lines.
CO Pick Retail Value*	Sum(F_PICK_RTL_AMT) Order Line Type Not Replacement Out or Partial AND Demand Status Not Order Entry Error	This metric calculates the retail value of the items picked for the customer order line, excluding order entry errors, and replacement (out) and partial (out) order lines.
CO Reserve Retail Value*	Sum(F_RSV_RTL_AMT) Order Line Type Not Replacement Out or Partial AND Demand Status Not Order Entry Error	This metric calculates the retail value of the items reserved for the customer order line, excluding order entry errors, and replacement (out) and partial (out) order lines.
CO Retail Value*	Sum(F_CO_RTL_AMT) Order Line Type Not Replacement Out or Partial AND Demand Status Not Order Entry Error	This metric calculates the retail value of the items for the customer order line, excluding order entry errors, and replacement (out) and partial (out) order lines.

Metric	Definition	Description
CO Units*	Sum(F_CO_QTY) Order Line Type Not Replacement Out or Partial AND Demand Status Not Order Entry Error	This metric calculates the quantity of the items for the customer order line, excluding order entry errors, and replacement (out) and partial (out) order lines.
CO Final Fill Rate*	([CO Ship Units] / [CO Units])	This metric calculates the number of units shipped as a percentage of the units ordered for the customer order line.
No of Customer Orders	Count (CO Header No)	This metric calculates the total number of customer orders.
CO Shipped Complete Units*	Sum([F_SHIP_QTY]) Shipped Complete	This metric calculates the number of units that were shipped complete on the first try. Shipped on the first try means that the items did not go through backorder nor partial ship. This calculation does not include drop ships.
% CO Shipped Complete Orders*	([CO Shipped Complete Units] / [CO Units])	This metric calculates the number of units that were shipped complete on the first try, as a percentage of the total number of units. Shipped on the first try means the items did not go through backorder nor partial ship.

Metrics with * in the table above can show different values depending on the time context they are analyzed by. When analyzing these metrics by the Time hierarchy, they show the values for the transactions that occurred in the selected time period

On the other hand, viewing these metrics by the CO Create Time hierarchy shows the corresponding values for orders that were created in the selected period. This is because the CO Create Time hierarchy represents the time when the order was originally created. Please see the CO Create Time Hierarchy section in Chapter 3 for more elaborate explanation of this hierarchy.

For example, CO Backorder Retail Value by Week will return how much went into backorder in each of the selected weeks. So it will help answer questions such as: “how much went into backorder last month?” However, CO Backorder Retail Value by CO Create Week will return how much went into backorder for orders that were *created* in the selected weeks. The CO Create Time hierarchy will help answer questions such as: ‘how much went into backorder for orders *that were taken* last month?”

The following sample report displays the sales and shippable retail values of customer orders, grouped by Banner and Line Media.

Banner	Line Media	Metrics	Sales Value	CO Shippable Retail Value
Total			**178,473**	**243,571**
Banner #1				
	Total		**138,387**	**199,118**
Banner #2				
	Total		**40,087**	**44,453**
Banner #1				
	Late Fall 2002 Catalog		43,080	65,175
	Spring 2002 Catalog		30,062	30,077
	Late Winter 2002 Catalog		23,575	31,780
Banner #2				
	Winter 2003 Catalog		20,746	20,682
Banner #1				
	Late Winter 2003 Catalog		18,242	25,087
	Late Fall 2003 Catalog		12,465	27,398
	Spring 2003 Catalog		10,962	19,601
Banner #2				
	Mid Spring 2003 Catalog		8,205	9,241
	Fall 2003 Catalog		7,386	11,242
	Holiday 2003 Catalog		3,288	3,288
	Late Winter 2003 Catalog		350	0
	Late Winter 2002 Catalog		112	0
	Partial Catalog		0	0

Line Media Performance by Banner

The following sample report displays the quantity of items that went into backorder for a specified time period, grouped by Line Media.

Line Media	Metrics	CO Backorder Units
Total		**22**
Late Fall 2002 Catalog		NA
Late Fall 2003 Catalog		NA
Late Winter 2003 Catalog		1
Spring 2002 Catalog		NA
Spring 2003 Catalog		2
Holiday 2003 Catalog		NA
Mid Fall 2003 Catalog		14
Mid Winter 2003 Catalog		1
Early Spring 2003 Catalog		4

Backorder Units by Line Media

Demand analysis

Demand analysis metrics allow direct-to-consumer retailers to compare the sales of their product versus what the demand was. Demand is what the customers intended to purchase but could not or did not due to circumstances that cause their orders to be unfulfilled, such as cancellations, item unavailability, backorder abandonment, etc Demand analysis helps retailers determine lost sales.

In analyzing demand for an item, one can calculate the value using one of two methods. The first is using the selling price of the item as published in the catalog (media unit retail value). The second method is using the price the customer is expected to pay net of any item-related discount that is applicable on its purchase (transaction retail value). The media unit retail value as well as the transaction retail value are held in RDW. However, all the demand and status metrics are calculated using the transaction retail value. The media selling price fact is available for building custom metrics, if needed.

The following are samples of Demand Analysis metrics found in RDW:

Metric	Definition	Description
CO Retail Value	Sum(F_CO_RTL_AMT) Order Line Type Not Replacement Out or Partial AND Demand Status Not Order Entry Error	This metric calculates the retail value of the items for the customer order line, excluding order entry errors, and replacement (out) and partial (out) order lines.
CO Units	Sum(F_CO_QTY) Order Line Type Not Replacement Out or Partial AND Demand Status Not Order Entry Error	This metric calculates the quantity of the items for the customer order line, excluding order entry errors, and replacement (out) and partial (out) order lines.
CO Cancel Retail Value	Sum(([F_CNCL_RTL_AMT]))	This metric calculates the retail value of the items cancelled for the customer order line, excluding order entry errors, and replacement (out) and partial (out) order lines.
CO Cancel Units	Sum(F_CNCL_QTY)	This metric calculates the quantity of the items cancelled for the customer order line, excluding order entry errors, and replacement (out) and partial (out) order lines.

The following report displays quantity and value of cancelled items grouped by Banner and Demand Status.

Banner	Demand Status		Metrics	CO Cancel Units	CO Cancel Retail Value
Banner #1					
	Company Cancel	CPNYCNCL		3	2,871
	Credit Decline	CDCLN		1	1,449
	Customer Cancel	CUSTCNCL		1	1,159
Banner #2					
	Company Cancel	CPNYCNCL		1	2,839
	Credit Decline	CDCLN		4	2,438
	Customer Cancel	CUSTCNCL		1	2,839

Cancelled Orders by Demand Status (A)

Status-Aging

Status-aging metrics measure the **velocity** at which a retailer provides products to the consumer. RDW provides metrics that measure average time spent on each step of the customer order lifecycle. These help retailers determine bottlenecks and improve internal productivity.

A customer order line normally goes through the following steps in its lifecycle: New, Reserve, Pick, Ship. However, it can also go through the following steps depending on circumstances: Backorder, Partial Ship, and Cancel. The status-aging metrics provided in RDW uses the start and end dates of each of these steps to be able to measure the average number of days for a customer order line to go from one step to another, or, the average number of days a customer order line sits in one step or status. For example, a high average on the number of days a customer order line sits in backorder is indicative of internal productivity problem.

The following are samples of the Status Aging metrics found in RDW:

Metric	Definition	Description
Avg No of Backorder Days	Avg([DF_BACKORDER_DAYS])	This metric calculates the average number of days a customer order line is in backorder. The calculation includes order lines that are still in backorder.
Avg No of Order Fulfillment Days	Avg([Max No of Order Fulfillment Days])	This metric calculates the average number of days to fulfill a customer order, and the maximum time for a given order is used. The calculation excludes order headers that haven't been fulfilled.
Avg No of Line Fulfillment Days	Avg([DF_LINE_FULFILLMENT_DAYS])	This metric calculates the average number of days to fulfill a customer order line. The calculation excludes order lines that haven't been fulfilled.

The following report displays the quantity and value of items on backorder grouped by banner and age band (0-30, 31-60, 61-90 etc.)

Banner	Backorder Age Band	Metrics	CO Backorder Units	CO Backorder Retail Value
Banner #1	BO Age 31-60 Days		3	2,937
Banner #2	BO Age 31-60 Days		4	1,036
Banner #2	BO Age 61-90 Days		1	2,529

Backorder by Age Band (A)

Customer order line position

Customer order line position provides the ability to answer the question of how much of an order is in reserve, picking, or backorder status, at the end of the evaluation period. This can be helpful to identify items that are stuck in an unfavorable status and may require corrective action, such as purchase orders being created or expedited.

The following are samples of the Customer Order Line Position metrics found in RDW:

Metric	Definition	Description
CO EOP Backorder Retail Value	Sum([F_EOP_BO_AMT]) The ending fact for the time period	This metric calculates the customer order backorder retail value at the end of the period.
CO EOP Backorder Units	Sum([F_EOP_BO_QTY]) The ending fact for the time period	This metric calculates the customer order backorder quantity at the end of the period.

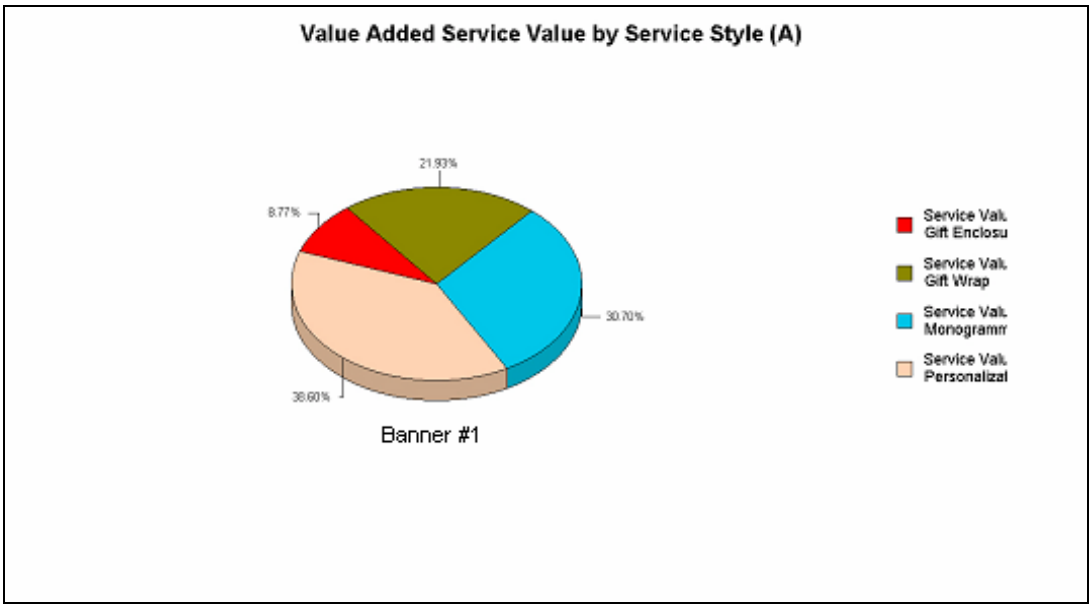
Value added service

Value added services are things that may be added to an item that is ordered. Examples are personalization, monogramming, gift-wrapping or a gift ‘enclosure’ card. Retailers can analyze these services, not only by the styles listed above, but also by color, font, and type. Examples of types are birthday gift-wrap, wedding card, engraving, embossing, and painting. The ability to analyze customer order lines, for both personalization and gift services, will enable retailers to understand how these are being used by customers. The ability to quickly respond to changing customer needs can add tremendous value to meeting the ultimate goal of meeting and exceeding customer satisfaction.

The following are samples of the Value Added Service metrics found in RDW:

Metric	Definition	Description
CO Gift Card Service Units	Sum([F_SVC_QTY]) Service Style = Gift Card	This metric calculates the total units for the gift card service requested.
CO Gift Card Service Value	Sum([F_SVC_AMT]) Service Style = Gift Card	This metric calculates the service charge applied to the customer order line, for gift card services, in primary currency.
CO Gift Wrap Service Units	Sum([F_SVC_QTY]) Service Style = Gift Wrap	This metric calculates the total units for the gift-wrap service requested.
CO Gift Wrap Service Value	Sum([F_SVC_AMT]) Service Style = Gift Wrap	This metric calculates the service charge applied to the customer order line, for gift-wrap services, in primary currency.
CO Monogram Service Units	Sum([F_SVC_QTY]) Service Style = Monogram	This metric calculates the total units for the monogram service requested.
CO Monogram Service Value	Sum([F_SVC_AMT]) Service Style = Monogram	This metric calculates the service charge applied to the customer order line, for monogram services, in primary currency.
CO Personalize Service Units	Sum([F_SVC_QTY]) Service Style = Personalize	This metric calculates the total units for the personalize service requested.
CO Personalize Service Value	Sum([F_SVC_AMT]) Service Style = Personalize	This metric calculates the service charge applied to the customer order line, for personalize services, in primary currency.
CO Service Units	Sum([F_SVC_QTY])	This metric calculates the total units for the service requested. Examples are personalization, monogramming, care card, gift card, and gift wrapping.
CO Service Value	Sum([F_SVC_AMT])	This metric calculates the service charge applied to the customer order line, in primary currency. Examples are personalization, monogramming, care card, gift card, and gift wrapping.
% Contrib Gift Card Svc Val to CO Retail Val	([Gift Card Service Value] / [CO Original Retail Value])	This metric calculates percent contribution of the gift card service value to customer order retail value.

The following graph (pie chart) report displays the percent of each service style to the total service value.



Value Added Service Value by Service Style (A)

Alternative selling

An organization's business development strategy is driven by the three business priorities of acquisition, retention, and growth. Cross-sell (more products per customer), up-sell (higher value products) and substitute (selling replacement products for out-of-stock items) are important components of the mix for protecting and growing the value of the customer franchise.

Alternative selling activities helps these business priorities by:

1 Influencing behavior of high potential value customers to do more business.

2 Growing existing customer business, which is more efficient than acquiring new customers.

3 Improving customer satisfaction and loyalty as a result of more personalized, relevant messages.

4 Increased revenue and profit.

To provide an effective cross-sell/up-sell/substitute strategy, an effective monitoring and review process has to be established to ensure that the program achieves the desired outcomes. RDW provides the following business measures to help retailers monitor how well their alternative selling strategies are faring:

Metric	Definition	Description
CO Cross-sell Retail Value	Sum(([F_CO_QTY] * [F_CO_UNIT_RTL_AMT])) Order Line Type = Cross-sell	This metric calculates the retail value of items involved in cross-sell activities.
CO Up-sell Units	Sum([F_CO_QTY]) Order Line Type = Up-sell	This metric calculates the number of units of items involved in up-sell activities.
CO Up-sell Retail Value	Sum(([F_CO_QTY] * [F_CO_UNIT_RTL_AMT])) Order Line Type = Up-sell	This metric calculates the retail value of items involved in up-sell activities.

Returns, Exchanges, Replacements, and Partials

An important aspect of customer order analysis involves understanding the effects of return, replacement, exchange, and partial transactions. These are events that may happen to a customer order after the order has already been shipped (and hence, recorded as a completed sale). These transactions involve the merchant either accepting a previously shipped item back, or shipping out to the customer another item, or both. Separate analytical capabilities are required for these areas in order for the retailer to understand factors such as the value, quantity, and types of products being returned, the timing of these returns, the quantity of partials, the value of promotions and value-added services affected, etc. These measurements allow retailers to develop and apply strategies that will enable them to understand and thereby control returns, exchanges, replacements, and partials.

These types of transactions will be discussed in both the Sales and Profit section of this chapter, and here, in the Customer Order section. The following explains how return, replacement, exchange, and partial transactions are defined and used in RDW:

Returns

A return transaction takes place when customers return merchandise that they bought ("return in") and get a refund of (all or part of the) payments that they originally made. A return happens when customers no longer want the merchandise they bought either because the merchandise is defective, or because the customers changed their mind and want their money back. A return is not included in demand metrics, although it counts against net sales.

Exchanges

An exchange transaction takes place when the merchandise that customers return ("exchange in") is not identical to the merchandise that they get in exchange ("exchange out"). This may be because the merchandise have different SKUs, or because the value and/or quantity of the merchandise are different, or both. An exchange may happen, for example, when customers no longer want the original merchandise they bought because it was damaged or they changed their mind, and want some other merchandise in exchange.

Replacements

A replacement transaction takes place when customers return merchandise that they bought and get the *exact* same merchandise in replacement. No additional payments are made by or refunded to customers in this transaction because the retail value of the merchandise that is returned ("replace in") and the retail value of the merchandise that they get in replacement ("replace out") are exactly the same.

Partials

A partial transaction takes place when a part of an item is sent to customers ("partial out") because the part in the original shipment was damaged or missing. A partial may or may not involve charging/refunding money to customers. The items that are sent out as part of a partial transaction are not included in demand metrics. The value of the items is, however, included as part of sales.

The returns, exchanges, replacements, and partials-specific business measurements that are available in RDW are listed below.

Note: The formulas for the compound metrics in this table do not use the actual metric names, as found in the project. The business definition of the metric is shown instead.

Metric	Definition	Description
% Contrib CO Return Rtl Val to CO Rtl Val	CO Return Retail Value / CO Shippable Retail Value	This metric calculates the retail value of items sent back to the retailer in return transactions, as a percentage to the entire net retail value of the customer orders.
CO Exchange In Retail Value	Sum(([F_CO_RTRN_QTY] * [F_CO_RTRN_UNIT_RTL_ AMT])) CO Line Type = 'Exchange In'	This metric calculates the value of items sent back to the retailer due to exchange transactions.

Metric	Definition	Description
CO Exchange In Units	Sum([F_CO_RTRN_QTY]) CO Line Type = ‘Exchange In’	This metric calculates the quantity of items sent back to the retailer due to exchange transactions.
CO Exchange Out Retail Value	Sum(([F_CO_QTY] * [F_CO_UNIT_RTL_AMT])) CO Line Type = ‘Exchange Out’	This metric calculates the value of items sent out to the customer due to exchange transactions.
CO Exchange Out Units	Sum([F_CO_QTY]) CO Line Type = ‘Exchange Out’	This metric calculates the quantity of items sent out to the customer due to exchange transactions.
CO Replacement In Units	Sum([F_CO_RTRN_QTY]) CO Line Type = ‘Replacement In’	This metric calculates the quantity of items sent back to the retailer due to replacement transactions.
CO Replacement Out Units	Sum([F_CO_QTY]) CO Line Type = ‘Replacement Out’	This metric calculates the quantity of items sent out to customers due to replacement transactions.
CO Return Retail Value	Sum(([F_CO_RTRN_QTY] * [F_CO_RTRN_UNIT_RTL_ AMT])) CO Line Type = ‘Return’	This metric calculates the value of items sent back to the retailer due to return transactions.
CO Return Units	Sum([F_CO_RTRN_QTY]) CO Line Type = ‘Return’	This metric calculates the quantity of items sent back to the retailer due to return transactions.

Sales and Demand Relationship

Sales and Demand are two separate, but related datamarts in RDW. This section describes how the data in these two different datamarts are related, and under what circumstances they would be different.

Customer Order Lines

The Demand datamart holds customer orders that are placed but may never be fulfilled due to cancellations, order entry errors, etc. Until a customer order is shipped, the order is not considered to have been "sold", and hence, there is no data on that order in the Sales datamart.

In a straightforward scenario, when products from a customer order are shipped, those order lines should become sales transactions tied to the day the product was shipped. If the ordered products are never shipped for any reason, the Demand datamart will capture the fact these products were demanded, but the Sales datamart will not capture them as having been sold. Moreover, when a customer calls to return a product, the return is created as a pending Customer Order return and is held only in the Demand datamart. If a user looks at return data in the Demand datamart during the time when a return is in "pending" status, that return will be attributed to the date the return line was initially created. Once the item is physically returned to the retailer, the return transaction is also processed in the Sales datamart, and the Customer Order return is put into "returned" status. The date attributed to the return in the Demand datamart is then updated to be the date the return is put into "returned" status.

Value Added Services:

In the Demand datamart, value added services are tied to the customer order line for the service item and also associated to the item on which the service is applied. As discussed in the Value Added Service section of this document, these services can be analyzed by service attributes such as service type and service color.

In the Sales datamart, value added services come to RDW as separate lines of a sales transaction and are for the non-merchandise item representing the service. There is no association to the item on which the service is applied. For example, if an item is monogrammed, the Sales datamart captures a sale of a non-merchandise item called "Monogramming" with no link to the original item on which the monogramming was applied.

Shipping and Handling:

Shipping and Handling charges are available as a separate fact/metric in the Demand datamart at the customer order header level.

In the Sales datamart, shipping and handling will be processed as a sales transaction with a non-merchandise item, similar to value added services. The values for these shipping and handling charges are included in sales values, but could be segregated out of sales metrics if they are created under their own, unique department for instance.

Customer loyalty

Loyal customers are among the retailer's most precious assets. A loyal customer contributes to your business on a regular basis over an extended period of time and almost always ranks as one of your best customers.

Customer loyalty programs are designed to target and retain your best customers. An effective loyalty program promotes retention of your best customers through discounts, recognition, or some other means of rewarding the customers that you want to retain.

Loyalty metrics are used to assess the effectiveness of your loyalty programs. When used in conjunction with RFMP analysis, they allow you to assess the impact of loyalty programs on your best customers. Ideally, the percentage of customers in loyalty programs should be higher for segments containing your most valued customers.

In RDW, customers who enroll in a loyalty program are tracked by their account group. A metric condition is used to identify whether or not the account group indicates that the customer is part of a loyalty program.

Loyalty metrics count the number of customers enrolled in loyalty programs and calculate it as a percentage of the whole. Similar metrics are used to perform the calculations for those customers who are not part of a loyalty program.

The following list describes customer loyalty metrics using in RDW reporting.

Metric	Description
Loyalty Program Customer Count	The number of customers enrolled in a loyalty program.
Non-loyalty Program Customer Count	The number of customers not enrolled in a loyalty program.
% Loyalty Program Customer	The percentage of customers enrolled in a loyalty program.
% Non-loyalty Program Customer	The percentage of customers not enrolled in a loyalty program.

The following sample report provides information on both customers who participate and customers who do not participate in loyalty programs, by frequency segment.

Metrics Frequency Segments (Time)	Loyalty Program Customer Count	% Loyalty Program Customer	Non-loyalty Program Customer Count	% Non-loyalty Program Customer
Frequency Segment 1	14	27.45%	8	15.69%

Customer segmentation

Customer segmentation is the process of identifying and classifying customers according to their current and future value to your business. Segmentation identifies your most and least valuable customers based on how frequently and recently customers have purchased, and the monetary value and profitability of their business. This information can be used to establish programs and policies that protect your most valued customers against defecting to a competitor. In addition, segmentation assists the marketing analyst in identifying customers whose purchasing history indicates the potential to become more profitable, as well as those who contribute little value to your business.

Your best customers are those who:

- Have purchased goods or services from you recently.
- Purchase from you frequently.
- Spend a large amount of money.
- Make a significant contribution to profitability.

MicroStrategy's N-Tile function is used to rank customers according to these criteria. This function distributes customers into one of ten segments, or an alternate number of segments selected for the function, as explained later in this section.

RFMP analysis

RFMP analysis is a database marketing methodology that ranks your customers based on their purchase history. This method employs four criteria for ranking customers according to their value to your company. These criteria are described in the following sub-sections.

Recency

Recency segmentation profiling measures the amount of time that has elapsed since the customer's last purchase. It is an established principle of marketing that the more recently customers have purchased from you, the more likely they are to make another purchase.

Recency is calculated as the number of elapsed days between the last day of the period being analyzed and the date of the last purchase. Customers with the fewest number of days will rank in the highest group. Customers with the largest number of days will rank in the lowest group.

Frequency

Frequency segmentation profiling measures the number of times that a customer has purchased from you since a specified date. The greater the frequency of purchases, the more likely a customer will purchase from you in the future. The value is determined for each customer based on a count of the number of days on which transactions occurred for this customer. Customers are rated and placed in segments based on this value.

Monetary

Monetary segmentation profiling measures value according to the amount of money a customer has spent in the course of a specified time period. Customers are ranked according to the *total* monetary value of their purchases and assigned to a segment based on this value.

Profitability

This segmentation type measures customer value according to the profitability derived from purchases in a specified time period. Customers are ranked according to the *total* profitability and assigned to a segment based on this value.

Note: Caution should be exercised in interpreting results based on Frequency, Monetary, and Profitability. New customers will tend to be ranked lower than customers with longer purchase histories. This does not necessarily indicate that a new customer is of less value than an established customer whose purchases extend over a longer period. For new customers, recency ranking provides a more accurate measurement of the potential value.

Business Metrics

The following table contains a description of the metrics used in segmentation profiling.

Metric	Description
No of Customers with Transactions	Count of the number of customers with transactions.
Count of Customer Frequency	The total number of days on which customer transactions took place.
% Customer Frequency Value	The percent contribution to the total frequency count.
Sales Value	The net sales amount for customer purchases.
% Customer Monetary Value	The percentage of sales contribution to total sales.
Avg Spent per Customer Purchase	The average dollar amount of purchases per customer.
Profit	The net profit amount for customer purchases.
% Customer Profit Value	The percentage of profit contributed by this customer to total profit.

The NTile function

NTile is a ranking function used to distribute data over a specified number of groups, or segments, based on a metric or other value. In the RDW, the NTile function is used to rank customers based on the values in RFMP analysis.

Following is the algorithm for the NTile function:

N is the number of tiles.

V is the number of values.

Ascending is set to true so that values are sorted in ascending order. The lowest values are placed in the first segment and highest values in the last segment.

If the number of tiles is 10 and the number of values is 20, V/N = 2; the function distributes 2 values per tile, as illustrated in the following example.

Customer	Sales Value	Segment (Ascending)
13	501	10
1	492	10
7	491	9
8	487	9
2	484	8
4	478	8
9	477	7
3	473	7
6	468	6
5	458	6
12	452	5
10	448	5
14	441	4
11	439	4
18	426	3
15	391	3
16	389	2
17	387	2
19	357	1
20	335	1

Customers with identical sales value are always placed in the same tile. If the identical values comprise the entire next tile, that tile is skipped. As illustrated below, customers 7, 8, 2, and 4 all reside in tile 9 because they have identical sales values. Customers 2 and 4 would have been in tile 8 if their values had not been identical to customers 7 and 8. Because of this, tile 8 is skipped and tile 7 becomes the next available tile. However, if the identical values do not comprise the entire next tile, that tile is still utilized. As illustrated below, customers 14, 11, and 18 all reside in tile 4 since they have identical sales values. Only customer 15 resides in tile 3 since there are 2 values in each tile and tile 4 contains only one of the values that would otherwise belong in tile 3. So in this case, tile 3 only contains one value, but is still included.

Customer	Sales Value	Segment (Ascending)
13	501	10
1	492	10
7	491	9
8	491	9
2	491	9
4	491	9
9	477	7
3	473	7
6	468	6
5	458	6
12	452	5
10	448	5
14	441	4
11	439	4
18	439	4
15	410	3
16	389	2
17	387	2
19	357	1
20	335	1

Changing the number of tiles

You can change the number of tiles created by the NTile function by editing the segmentation metrics. These metrics are located in the Customer Segmentation folder in the Customer Workbench.

For example, to create five monetary segments you would change the Tiles parameter from 10 to 5. In addition, you would change the band size in the custom group to 5.

Consult the MicroStrategy documentation for additional information on editing these objects.In-store markdowns

In-store markdowns happen when a sales transaction has a different retail than what is recorded in the Price History and cannot be attributed to a promotion. For example, if the cashier decides to give an unhappy customer an extra $10 off, that will be recorded as an in-store markdown.

In-store markdowns are held by retail type as well, and can be associated with regular, promotional, and clearance merchandise. .

Metrics

The following are some sample in-store markdown metrics found in RDW:

Metric	Definition	Description
In Store Markdown Value	Sum([F_SLS_IS_MKDN_AMT]) - Sum([F_RTRN_IS_MKDN_AMT])	This metric calculates instore markdown sales.
In Store POS Markdown Value	Sum([F_SLS_IS_MKDN_AMT]) - Sum([F_RTRN_IS_MKDN_AMT]) where retail type is “promotion”	This metric calculates instore point-of-sale markdowns, including promotional markdowns.

Local currency

RDW holds amounts in primary and local currency. These facts are populated only if the source system (such as RMS) provides facts in both local and primary currency. If the source system does not require local and primary currency, then all facts will be in primary currency.

Fact names for local currency amounts are the same as the corresponding facts for primary currency with the letters LCL appended to the name. For example, the local version of the sale fact F_SLS_AMT is F_SLS_AMT_LCL.

Local currency facts are available in all but the following reporting areas:

- Planning

Base formulas exist for all facts in local currency. A limited number of metrics for local currency are included in the projects. Clients must create metrics for local currency in other areas. Clients must also add metrics for local currency to existing reports, or create new reports. Markdowns

A markdown is the result of a reduction in the retail price of an item or a group of items. Markdowns are used to induce sales of merchandise that might otherwise be difficult to sell. Markdowns of merchandise may occur for a number of reasons such as the overstock of items of a particular size or color or other errors in the buying process, routine promotion or clearance of merchandise, and so forth.

A markdown may be generated for permanent or temporary price reductions, for Point of Sale (POS) markdowns, or for an Intercompany Transfer. Permanent Markdowns can be generated either as regular or clearance markdowns and the markdown impact is taken at the time that new retail takes affect at a location.

Temporary or POS markdowns occur at the time of the sale of the product and are a result of either a promotion or an in-store markdown. The type of markdown associated with each sales transaction is based on the retail price that the item was transacted at if it is different than the retail price on the price history for that item/location. The markdowns listed in this section include both POS and permanent markdowns.

Metrics

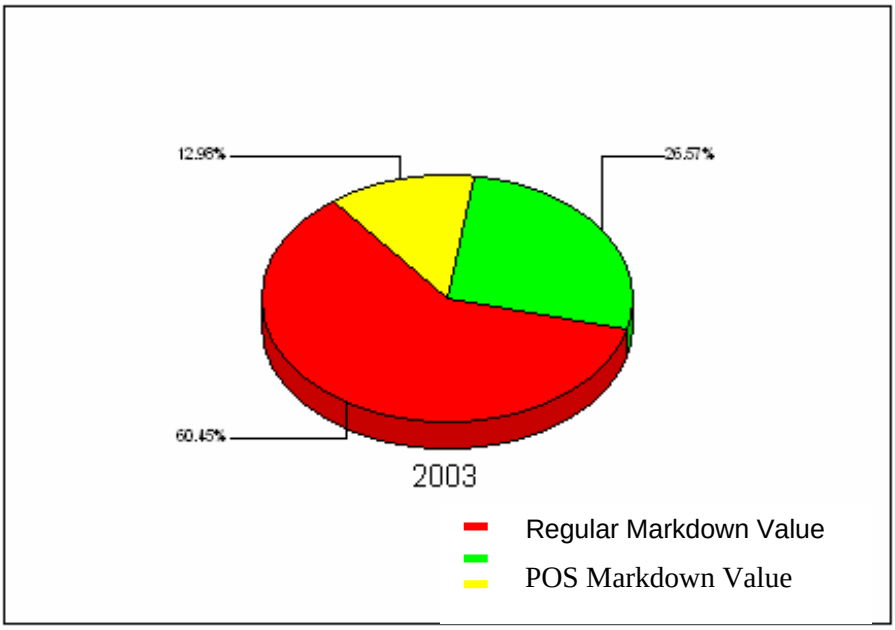
RDW has several types of metrics related to markdowns. RDW applies metric conditions to limit the markdown amount by different retail types (such as regular, clearance, promotions or intercompany). There are several markdown metrics that calculate percent change in markdown amounts from previous time periods. There are also metrics that calculate the contribution of different types of markdowns to the total net sales amount.

The following are some sample markdown metrics found in RDW:

Metric	Definition	Description
Regular Markdown Value	Sum(F_MKDN_AMT) where transaction type is “regular”.	This metric calculates regular markdown value. The regular markdown reflects the regular price markdown and is based on price history information.
POS Promo Markdown Value	Sum(F_MKDN_AMT) where transaction type is “promotional”	This metric calculates point-of-sale markdowns, including promotional markdowns. It includes both discounts given to a customer because of promotions attached to the transaction as well as any in-store markdowns.
Clearance Markdown Value	Sum(F_MKDN_AMT) where transaction type is “clearance”	This metric calculates clearance markdown value. The clearance markdown reflects the clearance price markdown and is based on price history information.
Intercompany Markdown Value	Sum(F_MKDN_AMT) where transaction type is “Intercompany”	This metric calculates net intercompany markdown value. The intercompany markdown reflects the intercompany price markdown and is based on price history information
Markdown Value	Sum(F_MKDN_AMT)	This metric calculates net markdown value.
% Markdown	Markdown Value/Sales Value	This metric calculates the net markdown percent, as markdown value divided by net sales value.

Note: RDW also provides a number of markdown metrics that are related to planning. These metrics are discussed under the planning section.

The following graph report displays markdown values broken by retail type:



Report: Markdown Value by Type (A)

Loss prevention

This section contains information on Loss Prevention, Loss Prevention Voucher Overview, and Loss Prevention Transaction Activity.

Preventing loss through employ theft or other means is an important part of controlling cost. Loss prevention permits monitoring of employee activity by transaction. This information allows the retailer to spot trends and anomalies in transaction activity by cashier.

The following information is important for understanding the information in loss prevention reports:

- When you see cashier on a report, it is reporting the number of sales transactions, overrides, and so on, taken at the register for that cashier, or rung with that cashier number.
- When you see employee on a report, the employee is the purchaser. So when cashier and employee appear together (as they do), it is a transaction executed by that cashier to somebody else who is an employee.
- Loss Prevention (LP) Transactions aggregated at the Employee level give the number of LP Transactions that these employees initiated (that is, the number of cases where employee is the customer). This does not show how many LP transactions the employee entered in the system. For that, you would have to look at LP Transactions at Cashier or Sales Person levels.

Over/short amounts

Over/short amounts can be used to track loss over time, assisting in loss prevention issues. Over amounts are positive, and short amounts are negative. The information used in calculating over/short amounts is drawn from sales audit.

Drawer over/short amounts are held by location, cashier, and register (F_DRAWER_OS_AMT).

Overrides

Loss prevention tables hold the total number of transactions processed. Overrides are the number of manual transactions taken at the register. Overrides may be markdowns or markups. Override counts are maintained for markups and markdowns. These values and the total number of loss prevention transactions are used to calculate the percentage of override transactions:

Metric	Formula
No of LP Transactions	Sum(F_LP_COUNT)
No of Override Markups	Sum(F_SLS_IS_MKUP_COUNT)
Override Markup Value	Sum(F_SLS_IS_MKUP_AMT)
No of Override Markdowns	Sum(F_SLS_IS_MKDN_COUNT)

The following report shows override activity by cashier.

	No of LP Transactions	No of Override Markups	Override Markup Value	No of Override Markdowns	Override Markdown Value
Minneapolis 14101					
John Anderson CASHIERA					
Paid Out - Lottery 3	32	52	33	77	37
Colleen Brady CASHIERB					
Paid Out - Lottery 3	30	30	24	46	25

Cashier Override Activity

Loss prevention voucher

A voucher is a document for issue of goods and services. Vouchers are issued by the retailer and redeemed. Loss prevention tables hold the number and value of vouchers issued and redeemed.

Metric	Formula
No of Vouchers Issued	Sum(F_ISS_COUNT)
Value of Vouchers Issued	Sum(F_ISS_AMT)
No of Vouchers Redeemed	Sum(F_RED_COUNT)
Value of Vouchers Redeemed	Sum(F_RED_AMT)
No of Vouchers Escheated	Sum(F_ESCH_COUNT)
Value of Vouchers Escheated	Sum(F_ESCH_AMT)

The number of outstanding vouchers is also tracked to allow trending and voucher age reporting.

	No of Vouchers Issued	Value of Vouchers Issued	No of Vouchers Redeemed	Value of Vouchers Redeemed
Minneapolis 14101				
John Anderson CASHIERA				
Gift Certificate 4000	428	6,420	392	5,880

Cashier Voucher Detail (A)

Loss prevention transaction activity

RDW holds a count and value of loss prevention transactions by cashier, location, and reason type for each quarter hour.

These facts are used to calculate the percentage of total transactions that each cashier accounts for.

```
No of LP Transactions / No of LP Transactions (All Cashiers)
```

Tracking of transaction by reason type allows calculation of the ratio of a reason type to all transactions.

Discount coupons and scanned Items

Loss prevention holds data on coupons, manually entered and scanned items, and credit cards.

Measure	Fact
No of Manufacturer Coupons	SUM(F_TNDR_COUPON_COUNT)
Manufacturer Coupon Value	SUM(F_TNDR_COUPON_AMT)
No of Store Coupons	SUM(F_DSCNT_COUPON_COUNT)
No of Items Manually Entered	SUM(F_ENTER_ITEM_COUNT)
No of Items Scanned	SUM(F_SCAN_ITEM_COUNT)
No of Credit Cards Manually Entered	SUM(F_ENTER_CC_COUNT)
No of Credit Cards Scanned	SUM(F_SCAN_CC_COUNT)

The formulas are used to calculate the percentage of manual and scanned items to the total number of items:

```
No of Items Manually Entered / (No of Items Scanned + No of Items
Manually Entered)
```

The percentages of scanned and manually entered credit card are similarly calculated:

```
No of Credit Cards Scanned / (No of Credit Cards Manually Entered] +
No of Credit Cards Scanned)
```

Employee sales and returns

RDW holds sales and return values by employee. In addition, transactions are tracked by cashier and employee; this allows you to track transactions where the employee is the purchaser.

When sale and return values are tracked by employee, the employee is the *purchaser*. Consequently, these values reflect transactions in which the employee bought or returned goods to the store.

Sales and returns by tender type

RDW holds sales and return amounts by tender type. This information is further segmented into cash and non-cash equivalents at the fact level. Tender type is important because it allows the Point of Sale system to distinguish between the use of cash, credit cards, gift certificates and other forms of payment. In RDW, this information can be used to track loss prevention issues.

Metric	Formula	Condition
Tender Sales Value	SUM(F_TNDR_SLS_AMT)	None
Tender Sales Value (Cash Equivalent)	SUM(F_TNDR_SLS_AMT)	Cash Equivalent = Y
Tender Sales Value (Non-Cash Equivalent)	SUM(F_TNDR_SLS_AMT)	Non-cash Equivalent = Y
Tender Return Value	SUM(F_TNDR_RTRNS_SLS_AMT)	None

Metric	Formula	Condition
Tender Return Value (Cash Equivalent)	SUM(F_TNDR_RTRNS_SLS_AMT)	Cash Equivalent = Y
Tender Return Value (Non-Cash Equivalent)	SUM(F_TNDR_RTRNS_SLS_AMT)	Non-cash Equivalent = Y

Media analysis

Typically, the business measures that are central to the analysis of media performance are metrics related to customer demand and sales. Sales Value, Sales Units, Customer Order Retail Value, and Customer Order Units are examples of such metrics, and their definitions and usage in RDW are covered under the "Sales and Profit" and "Customer Order" sections in this chapter. But in addition to these demand and sales metrics, RDW also provides a number of other metrics that augment media analysis by allowing additional comparisons within media, selling items and items.

Most of these additional metrics provide supplementary information about the media that would be useful in analyzing its performance in comparison to other media, such as the number of pages, the total item count, total circulation, total advertising cost, etc. They also include a number of expected and forecasted measures for the media such as the expected media response rate, the expected average customer order, the total forecasted demand, etc.

It is important to note that many of these media-specific measurements are determined at the time when the media is set up in the source system, and they do not change over time after the media has been set up. Examples of metrics that remain constant with respect to media, and do not change over time, are Number of Pages, Number of On Sale Pages, Number of Items, etc. If these numbers are changed for a given catalog, RDW will hold only the latest value, and will not store any previous values.

RDW also provides a few metrics that provide supplementary information about selling items or depiction codes included in the media, such as total unit area covered by the selling item in a depiction code, the retail price printed on the media for the item, additional delivery charge for the item, etc.

Metrics

The media-specific business measurements that are available in RDW are listed below.

Note: The formulas for the compound metrics in this table do not use the actual metric names, as found in the project. The business definition of the metric is shown instead.

Metric	Definition	Description
No of Pages	Sum(F_PAGE_QTY)	This metric calculates the total number of pages in the media.
No of Selling Item Pages	Sum(F_SELLING_PAGE_QTY)	This metric calculates the number of pages with selling items in the media.

Metric	Definition	Description
No of Selling Items	Sum(F_SELLING_ITEM_QTY)	This metric calculates the total number of selling items in the media.
Circulation	Sum(F_TOTAL_CRCL_QTY)	This metric calculates the total circulation of the media.
Space Cost	Sum(F_SPACE_COST_AMT)	This metric calculates the total advertising cost for the media.
Expected Response Rate	Avg(F_EXPCT_RSPND_RATE)	This metric calculates the expected response rate for the media.
Orig Forecast Value	Avg(F_ORIG_FCST_AMT)	This metric calculates the original forecasted demand value for the media.
Current Forecast Value	Avg(F_CURR_FCST_AMT)	This metric calculates the current forecasted demand value for the media.
Avg Price Point	Avg(F_AVG_PRICE_POINT_AMT)	This metric calculates the average price point for all the selling items in the media.
Median Price Point	Avg(F_MEDIAN_PRICE_POINT_AMT)	This metric calculates the median price points for all the selling items in the media.
Media Area (Media)	Sum([DF_MEDIA_AREA]) for all Media	This metric calculates the total area of printable space in the media.
Response Rate	Number of Customer Orders/Total Circulation	This metric calculates the response rate for media. It is the number of customer orders divided by the total circulation.
Sales per Media Unit Area	Total Sales/Total Media Area	This metric calculates sales per unit area for the media.
Cost per Page	Total Space Cost/Total Number of Pages	This metric calculates the cost per page for the media.
Contrib per Page	(Profit – Space Cost)/Total Number of Pages	This metric calculates the average contribution per page for the media.

Pack sales

A sellable pack is a group of individual items associated together by the retailer to be sold as one item. An example would be a bottle of shampoo and a bottle of conditioner, both individual items on their own but packaged together to be sold as a unique pack item. Pack sales facts are captured daily via an interface with Retek's Sales Audit (ReSA). Pack sales analysis provides retailers with the ability to evaluate their packs through the analysis of their pack sales. How well has an item sold as a single item? How well has a pack sold? How well has an item sold when it was included in a specific pack? How do the sales of an item sold by itself compare with the sales of the item inside a specific pack?

Component item contribution to pack sales reporting is facilitated by RDW's ETL processing, which prorates a pack's value into its component items (see the subsection, *Prorating of packs* later in this section). Pack sales value is modeled similarly to sales value and is available by regular, clearance, and promotion retail type.

Metrics

The following are some sample pack sales metrics found in RDW:

Metric	Definition	Description
Pack Sales Value	Sum(F_PACK_SLS_AMT) – Sum(F_PACK_RTRN_AMT))	This metric calculates the total value of regular, clearance and promotion pack sales. The amount does not include returns but is inclusive of VAT.
Regular Pack Sales Value	(Sum(F_PACK_SLS_AMT) – Sum(F_PACK_RTRN_AMT))	This metric calculates the total value of regular pack sales. The amount does not include returns but is inclusive of VAT.
Promotion Pack Sales Value	(Sum(F_PACK_SLS_AMT) – Sum(F_PACK_RTRN_AMT))	This metric calculates the total value of promotion pack sales. The amount does not include returns but is inclusive of VAT.
Clearance Pack Sales Value	(Sum(F_PACK_SLS_AMT) – Sum(F_PACK_RTRN_AMT))	This metric calculates the total value of clearance pack sales. The amount does not include returns but is inclusive of VAT.
Pack Sales Units	(Sum(F_PACK_SLS_QTY) - Sum(F_PACK_RTRN_QTY))	This metric calculates the total quantity of regular, clearance and promotion pack sales units.

The following sample report shows pack sales by retail type.

Department / Metrics	Pack Sales Value	Regular Pack Sales Value	% Contrib Regular to Pack Sales Value	Clearance Pack Sales Value	% Contrib Clearance to Pack Sales Value	Promotion Pack Sales Value	% Contrib Promotion to Pack Sales Value
Total	**344,627**	**236,714**	**NA**	**27,180**	**NA**	**80,733**	**NA**
Dry Grocery 6001	344,627	236,714	68.69%	27,180	7.89%	80,733	23.43%

Product, Pack Sales – Detail by Type

Prorating of packs

The prorating of a pack's value into its component items requires calculation. The following formulas are used for prorating packs:

```
Item Prorated Sales Value = Pack Sales Value * Item Prorate %

Item Prorate % = (Item Price * Pack Item Qty) / Pack Component
Sales Value

Pack Component Sales Value = (Item A Price * Item A Qty) + (Item
B Price * Item B Qty) + (Item C Price * Item  C Qty) + …+ (Item n
Price * Item n Qty)
```

Example Data

1 Pack A contains:
- Item A
- Item B
- Item C

2 Quantities of each Item in Pack A:
- Item A = 2
- Item B = 1
- Item C = 1

3 Prices:
- Pack A = $9
- Item A = $4
- Item B = $2
- Item C = $1

4 Pack Sales Value:
- $90,000

Calculation steps

Step one (part 1) – pack component sales value

```
Item A Price * Quantity of Item A in Pack A
4 * 2 = 8
Item B Price * Quantity of Item B in Pack B
2 * 1 = 2
Item C Price * Quantity of Item C in Pack C
1 * 1 = 1
```

Step one (part 2) – pack component sales value

```
8 + 2 + 1 = 11
```

Step two – item prorate percent

```
8/11 = .7273
2/11 = .1818
1/11 = .0909
```

Step three – item prorated sales value

```
$90,000 * .7273 = $65,457.00 = Item A Prorated Sales Value
$90,000 * .1818 = $16,362.00 = Item B Prorated Sales Value
$90,000 * .0909 = $8,181.00 = Item C Prorated Sales Value
```

Planning

Competition and the changing needs of consumers are forcing retailers to plan and pay close attention to the lowest levels of detail in order to stay competitive and profitable. Retailers need to sift through large amounts of data quickly, in order to recognize opportunities and respond in a proactive way. The ability to use both a planning application to help with these predictions and a data warehouse to report on the actual financial performance against a plan helps to measure the success of a plan.

RDW holds facts for a current and original plan in several reporting areas, including sales, inventory, and profit. Population of these facts requires Retek TopPlan or another planning application that provides current and original planning data. TopPlan is a tool that outlines a business process to execute merchandise financial plans from Company to Class level and Company to Class level by location over time. (Note that TopPlan is not limited to planning at these levels). In essence, it is a business strategy that supports a product strategy. TopPlan allows for both pre-season (Original) and in-season (Current) planning of the key financial elements including sales, markdowns, receipts, inventory, gross margin, and open-to-buy in both dollars and units.

Plan Sales and Profit

The following are some sample planning sales and profit metrics found in RDW:

Metric	Definition	Description
CP Profit	CP Profit Amount [can we use SUM]	This metric calculates current plan profit based on expected sales.
CP Sales Value	CP Sales Amount [can we use SUM]	This metric calculates the current plan sales value, based on regular, clearance, and promotional sales amount. Inclusion of returns is dependent on data source.
CP Sales Units	CP Sales Quantity [can we use SUM]	This metric calculates current plan sales units based on regular, clearance and promotion plan sales units. Inclusion of returns is dependent on data source.
OP Sales Value	OP Sales Amount [can we use SUM]	This metric calculates the original plan sales value, based on regular, clearance, and promotional sales amount. Inclusion of returns is dependent on data source.
OP Sales Units	OP Sales Quantity [can we use SUM]	This metric calculates original plan sales units based on regular, clearance and promotion plan sales units. Inclusion of returns is dependent on data source.

Plan Inventory

The following are some sample planning inventory metrics found in RDW:

Metric	Definition	Description
CP BOP Retail Value	Sum([F_PLN_CURR_BOP_RTL_AMT]) The beginning fact based on the lookup table for the time period	This metric calculates the selling value of the current plan stock on hand at the beginning of the time period selected.
OP BOP Retail Value	Sum([F_PLN_CURR_BOP_RTL_AMT]) The beginning fact based on the lookup table for the time period	This metric calculates retail value for the original plan stock on hand at the beginning of a selected period
CP EOP Retail Value	Sum([F_PLN_CURR_EOP_RTL_AMT]) The ending fact for the time period	This metric calculates the selling value of the current plan stock on hand at the end of the time period selected.
OP EOP Retail Value	Sum([F_PLN_CURR_EOP_RTL_AMT]) The ending fact for the time period	This metric calculates retail value for the original plan stock on hand at the end of a selected period
CP BOP Cost Value	Sum([F_PLN_CURR_BOP_COST_AMT]) The beginning fact based on the lookup table for the time period	This metric calculates the cost value of the current plan stock on hand at the beginning of the time period selected.

Plan Mark-ups and Mark-downs

The following are some sample planning inventory metrics found in RDW:

Metric	Definition	Description
CP Markdown Value	CP Clearance Markdown Amount + CP Promotion Markdown Amount + CP Regular Markdown Amount	This metric calculates current plan markdown value for clearance, promotion and regular sales.
CP Clearance Markdown Value	Sum([F_PLN_CURR_CLRC_MKDN_AMT])	This metric calculates the current plan clearance markdown value.
CP Promotion Markdown Value	Sum([F_PLN_CURR_PRMTN_MKDN_AMT])	This metric calculates the current plan promotion markdown value.
CP Regular Markdown Value	Sum([F_PLN_CURR_RGLR_MKDN_AMT])	This metric calculates the current plan regular markdown value.
OP Markdown Value	OP Clearance Markdown Amount + OP Promotion Markdown Amount + OP Regular Markdown Amount	This metric calculates original plan markdown value for clearance, promotion and regular sales. [same as comments for CP Values]
OP Clearance Markdown Value	Sum([F_PLN_ORIG_CLRC_MKDN_AMT])	This metric calculates the original plan clearance markdown value. [same as comments for CP Values]
OP Promotion Markdown Value	Sum([F_PLN_ORIG_PRMTN_MKDN_AMT])	This metric calculates the original plan promotion markdown value. [same as comments for CP Values]
OP Regular Markdown Value	Sum([F_PLN_ORIG_RGLR_MKDN_AMT])	This metric calculates the original plan regular markdown value. [same as comments for CP Values]

Price

The pricing of merchandise plays an essential role in maximizing profit. Pricing must be a balance between profit margin and competition consideration. Pricing is a strong motivation in a consumer's decision regarding whether or not to buy a product. The price for an item generally varies according to the competitive situation, promotions, and other factors.

Base formulas and metrics

RDW holds price as a retail value for an item, day, and location. For the purpose of analysis, the average price is calculated over the time period selected for the report.

Metric	Formula
Avg Retail Price	Avg(F_UNIT_RTL_AMT)

Transformational metrics allow for the calculation of average retail price and values for the week-to-date, month-to-date, and year-to-date.

Promotions

A promotion is an attempt to stimulate the sale of merchandise by temporarily reducing its price or by tying its sale to other merchandise offers at reduced prices (or for free). A promotion can take place for many different reasons, such as the desire to attract a certain type of customers, increase sales of a particular class of merchandise, introduce new items, or gain competitive advantage. Tracking of sales and demand by promotion allows retailers to assess their success in attracting customers to purchase items that have been placed on promotion.

Note: In a Direct-to-Consumer (DTC) market, there may be more than one promotion tied to a single customer order line, for example $10 off the total retail of the promotion item in which a quantity of 10 units were purchased and additional 20% off promotion if the entire order retail was over $100. Using the example above, the sales of 10 units will both be accredited to the $10 off promotion as well as the additional 20% off promotion.

If a report is created with both the promotions on the template, the total sales for each of the two promotions will appear as $100, which is not inaccurate. However, when looking at the totals, one should be careful not to add up the two lines, and conclude that $200 worth of sales took place.

Metrics

RDW has a number of metrics to measure a promotion against sales data, as well as against customer order demand data. As in the case of most of the metrics, the names of metrics that measure against demand are prefixed with a CO, signifying these metrics pertain to the Customer Order.

The following are some sample promotion metrics found in RDW:

Metric	Definition	Description
CO Promotion Markdown Value	Sum(F_PRMTN_L_DSCNT_AMT)	This metric calculates the discount amount due to non-shipping and handling promotions in customer orders. For example, if the promotion were "Buy One, Get One Free", the discount amount would be the value of the "Get One" product.
Promotion Markdown Value	Sum(F_PRMTN_MKDN_AMT)	This metric calculates the discount amount in sales due to promotions in sales transactions. For example, if the promotion were "Buy One, Get One Free", the discount amount would be the value of the "Get One" product.
No of Items with Promotion Sales	Count (Item) where they were on promotion	This metric calculates the number of items with promotional sales.
No of Stores with Promotion Sales	Count (Location) where they were on promotion	This metric counts the number of distinct stores with promotions.

Metric	Definition	Description
CO SH Promotion Markdown Value	Sum(F_PRMTN_DSCNT_AMT)	This metric calculates the discount amount due to shipping and handling promotions in customer orders.

Note: Also refer to the section on Markdowns for other metrics that measure promotional, regular, and clearance markdowns.

Sales and profit

The role of business intelligence is to provide decision makers with the information needed to increase sales and reduce expenses, thereby increasing profits margins. Sales and profit are fundamental business measurements in any retail organization. RDW includes a complete set of metrics for measuring sales and profit at virtually any level in the retail organization.

Gross sales value is the total dollar amount the retailer sells to consumers. Gross sales value is calculated by multiplying the unit price of an item by the number sold to consumers. Returns are the portion of sales that are returned to the store for a refund. Sales value is the net value after customer returns have been subtracted from gross sales value.

RDW maintains gross sales and returns for amounts and number of units in separate fact fields. Separation of these values allows for analysis of returns and the use of gross sales in calculations where this is desirable. Net sales value is required for most calculations. In addition, the retailer may need to track sales according to price type to allow analysis of sales for promotional and clearance items. RDW holds sales amount and units by retail price type to allow analysis at this level, which is discussed later in this section.

Profit is calculated as the difference between sales amount and cost of the item in the transaction. The cost of the item is based on what is stored in the merchandising system as the average cost of the item for a given location.

Metrics

The following are some sample sales and profit metrics found in RDW:

Note: The definition for the compound metrics in this table do not use the actual metric names, as found in the workbenches. The business definition of the metric is shown instead.

Metric	Definition	Description
Sales Value	Sum(F_SLS_AMT) - Sum(F_RTRN_AMT)	This metric calculates the total value of regular, clearance and promotion sales. The amount is net of returns and inclusive of VAT.
Sales Units	Sum(F_SLS_QTY) - Sum(F_RTRN_QTY)	This metric calculates total number of units sold based on regular, clearance and promotion sales. The quantity is net of returns.

Metric	Definition	Description
Profit	Sum(F_SLS_PRFT_AMT) - Sum(F_RTRN_PRFT_AMT)	This metric calculates total regular, clearance and promotion profit, including profit lost on returns.
Sales Value (Last Year)	Sum(F_SLS_AMT) - Sum(F_RTRN_AMT)	This metric calculates total sales value, based on regular, clearance and promotion sales, for last year. The amount is net of returns and inclusive of VAT.
Sales Units (Last Year)	Sum(F_SLS_QTY) - Sum(F_RTRN_QTY)	This metric calculates total number of units sold, based on regular, clearance and promotion unit sales for last year. The quantity is net of returns.
Profit (Last Year)	Sum(F_SLS_PRFT_AMT) - Sum(F_RTRN_PRFT_AMT)	This metric calculates total profit earned on regular, clearance and promotion sales, including profit lost on returns, for last year.
% Change Sales Value vs Last Year	(Sales Value – Last Year's Sales Value)/ Last Year's Sales Value	This metric calculates the percent increase or decrease in sales value over the previous year.
% Change Sales Units vs Last Year	(Sales Units – Last Year's Sales Units) / Last Year's Sales Units	This metric calculates the percent increase or decrease in unit sales over the previous year.
% Change Profit vs Last Year	(Profit – Last Year's Profit)/ Last Year's Profit)	This metric calculates the percent increase or decrease in profit earned on sales, including profit lost on returns, over the previous year.
% Contrib Sales Value to Department	([Sales Value] / [Sales Value (Department)])	This metric calculates the percent contribution of sales to total department sales.
% Contrib Sales Value to Location	([Sales Value] / [Sales Value (Location)])	This metric calculates the percent contribution sales value to total location sales.

Retail type

Sales and profit are segmented by retail price type. Conditional metrics are used to constrain data based on retail type.

Sale Type	Retail Type
Regular	1
Promotion	2
Clearance	3
Intercompany	4

Metrics

The following table displays the metric formulas and conditions used in *Organization, Sales Value by Type* report.

Metric	Definition	Description	Retail Type
Sales Value	Sum(F_SLS_AMT) - Sum(F_RTRN_AMT)	This metric calculates the total value of regular, clearance and promotion sales. The amount is net of returns and inclusive of VAT.	None
Regular Sales Value	Sum(F_SLS_AMT) - Sum(F_RTRN_AMT)	This metric calculates the total value of regular sales. The amount is net of returns and inclusive of VAT.	1
% Contrib Regular to Sales Value	Regular Sales Value / Sales Value	This metric calculates the percent contribution of regular sales value to total sales value.	NA
Promotion Sales Value	Sum(F_SLS_AMT) - Sum(F_RTRN_AMT)	This metric calculates the total value of promotion sales. The amount is net of returns and inclusive of VAT.	2
% Contrib Promotion to Sales Value	Promotion Sales Value / Sales Value	This metric calculates the percent contribution of promotion sales value to total sales value.	NA
Clearance Sales Value	Sum(F_SLS_AMT) - Sum(F_RTRN_AMT)	This metric calculates the total value of clearance sales. The amount is net of returns and inclusive of VAT.	3
% Contrib Clearance to Sales Value	Clearance Sales Value / Sales Value	This metric calculates percent contribution of clearance sales value to total sales value.	NA

The following sample report displays the sales value by retail type and the percent contribution of each sales type to total sales value:

Location / Metrics	Sales Value	Regular Sales Value	% Contrib Regular to Sales Value	Promotion Sales Value	% Contrib Promotion to Sales Value	Clearance Sales Value	% Contrib Clearance to Sales Value
Minneapolis 14101	209,413	102,909	49.14%	74,734	35.69%	31,770	15.17%

Organization, Sales Value by Type (A)

Value Added Tax (VAT)

Currently, RDW holds VAT amounts for the retail amounts of sales and return transactions only. If VAT is used in the source systems, such as RMS andReSA, RDW extracts sales and return retail values and loads them to the sales data mart with VAT included. RDW also holds the VAT portion independently in the facts F_SLS_VAT_AMT and F_RTRN_VAT_AMT.

Markdown and profit amounts in RDW are always VAT-exclusive. For sales forecast facts, RDW only holds sales forecast quantity information that does not include VAT.

For implementations where RMS is in use:

If VAT indicator in RMS is on, the retail sales coming from ReSA may or may not include VAT depending on certain RMS system options. RDW, however, will always hold VAT inclusive sales and return retail amounts, based on the item's VAT rate as held in RMS.

If VAT indicator is off in RMS, all the values for RDW sales and returns are VAT exclusive, of course. VAT facts such as F_SLS_VAT_AMT will then be empty.

Standalone implementations employing a client-supplied source for sales values for sales and returns could be VAT inclusive or exclusive depending on the source data the client provides RDW. VAT facts such as F_SLS_VAT_AMT also need to be supplied by clients in this case.

Returns, Exchanges, Replacements, and Partials

Returns, Replacements, Exchanges, and Partials are events that may happen to a customer order after the order has already been shipped (and hence, recorded as a completed sale). They involve the merchant either accepting a previously shipped item back, or shipping out to the customer another item, or both.

These types of transactions have implications both on the demand side as well as the sales side of transactions. Therefore, they are discussed both in the Customer Order section of this chapter, as well as here, in the Sales section. The metrics and definitions below apply to a return, exchange, replacement or partial at the time the customer order management system processes this transaction and communicates this transaction to a sales audit and/or merchandising system. The Customer Order section highlights these types of transaction from the viewpoint of demand analysis.

Returns

A return transaction takes place when the customer returns merchandise that was purchased ("return in") and receives a refund of (all or part of the) payment that was originally made. A return happens when the customer no longer wants the merchandise that was purchased, either because the merchandise is defective or because the customer changed their mind, and wants their money back. A return does not affect demand, though it does counts against net sales.

Replacements

A replacement transaction takes place when the customer returns merchandise that was purchased and gets the *exact* same merchandise in replacement. No additional payments are made by or refunded to the customer in this transaction because the retail value of the merchandise that is returned ("replace in") and the retail value of the merchandise that is replaced ("replace out") are exactly the same. A replacement is essentially treated as two different transactions: a "replacement in" transaction followed by a "replacement out" transaction. A replacement neither affects demand nor does it affect net sales.

Exchanges

An exchange transaction takes place when the merchandise that the customer returns ("exchange in") is not identical to the merchandise that he gets in exchange ("exchange out"). This may be because the merchandise has a different SKUs, or because the value and/or quantity of the merchandise is different, or both. A return may happen, for example, when the customer no longer wants the original merchandise that was purchased because it was damaged or because the customer changed their mind, and wants a different item in exchange. An exchange is treated as two different transactions: a return transaction followed by a new sale transaction. The value of the merchandise that is returned ("exchange in") is counted as a return and hence counted against net sales. The "exchange return", however, does not affect demand. The Merchandise that is sent out as part of an exchange transaction ("exchange out") is considered as part of demand as well as sales.

Partials

A partial transaction takes place when a part of an item is sent to the customer ("partial out") because the part in the original shipment was damaged or missing. A partial may or may not involve charging/refunding money to the customer. The items that are sent out as part of a partial transaction are not considered part of demand. The value of the items is, however, included as part of sales.

Metrics

The following are some sample returns and replacements metrics found in RDW:

Metric	Definition	Description
Return Units	Sum([F_RTRN_QTY])	This metric calculates the quantity of items returned by customers in units
Return Value	Sum([F_RTRN_AMT])	This metric calculates the total value of regular, clearance and promotion returns. The amount is inclusive of VAT.
Replacement In Cost Value	Sum([F_RPLC_COST_IN_AMT])	This metric calculates the cost incurred for items being replaced.
Replacement In Units	Sum([F_RPLC_IN_QTY])	This metric calculates the quantity of items that are being replaced.
Replacement Out Cost Value	Sum([F_RPLC_COST_OUT_AMT])	This metric calculates the cost incurred for items sent out to customers due to replacements.
Replacement Out Units	Sum([F_RPLC_OUT_QTY])	This metric calculates the quantity of items sent out to customers due to replacements.

Accommodations

Accommodations refer to monetary adjustments given to a customer, by the retailer in an act of goodwill to help achieve customer satisfaction. Depending on the circumstance under which an accommodation is given to a customer, it may be recorded differently in the transaction system, and hence, would also be held differently in the RDW. Specifically:

- If an accommodation is given to a customer while the customer order is still open, then it is not only treated and stored as an accommodation but also as an in-store markdown. The amount of the accommodation is subtracted from the amount of the original sales amount in such a transaction.
- If an accommodation is given to a customer for a customer order that has already been closed, then the accommodation amount is recorded in a new transaction with negative sale value equal to the accommodation amount.
- If an accommodation cannot be tied to a specific customer order line or transaction, then the accommodation amount is stored as a loss prevention amount on the loss prevention data mart, with a reason of "customer accommodation".

In summary, accommodation metrics in RDW discussed here include only those accommodations that could be tied to a specific customer order line or transaction.

Note: As a consequence of the above-mentioned practice in capturing accommodations, note also that, except when reported at the most granular transaction level, the sales and profit metrics in RDW are net of any accommodation amount that may have been applied on the customer orders. Moreover, the in-store markdown metrics in RDW include, in addition to the normal in-store discounts, all accommodations that were given to customers while the customer orders were still open.

Metrics

The following is a sample accommodation metric found in RDW:

Metric	Definition	Description
Sales Accommodation Value	Sum([F_SLS_ACCOM_AMT]	This metric calculates customer order accommodations associated with items, in primary currency, for sales transactions.

Spatial analysis

In grocery and convenience store retailing, the ability to report on how efficiently space is being used is a critical requirement. Spatial Analysis, or performing analysis on the amount of space allocated to an item in a store on a day, allows retailers to make more informed space planning decisions.

By holding a measurement of space, it is possible to report on sales and profitability per unit of space allocation and compare this to previous time periods.

RDW holds Linear, Square, and Cubic measurements for space allocation reporting. The unit of space allocation measurement that is populated (such as linear, square, cubic) will depend on the type of item. For example: A fashion item, such as a dress, may be displayed on a rack. Racks are likely to use a linear unit of measurement. A grocery item, such as a box of cereal, may be displayed on a shelf. Shelves are likely to use a square unit of measure. Other grocery items, such as fruit, may be displayed in large containers. These would use a cubic unit of measure.

Base formulas and metrics

Space Allocation facts are held on the space allocation item table (at item-location-day) and space allocation department table (at dept-location-day). The following base metrics are used to build more complex space allocation metrics.

Metric	Formula
Avg Space Allocation (Ln)	Avg(F_SA_LINEAR_AMT)
Avg Space Allocation (Sq)	Avg(F_SA_SQUARE_AMT)

All of the space allocation metrics are based on these three base metrics (Cubic, Linear, Square feet). The business measures that follow are all available in these three varieties.

Profit Per Unit of Allocated Space

RDW maintains the transformations required for viewing profit measures per units of allocated space. The profit measures can come from both actual sales and plan sales. Average profit on actual sales per average unit of allocated space can be viewed for this year, last year, and as a percent change between the two. Sample business measure:

Metric	Formula
Avg Profit per Space Allocation (Ln)	(Avg Profit on Sales] / Avg Space Allocation (Ln))

Sales Per Unit of Allocated Space

Transformations also exist for viewing sales measures per units of allocated space. The sales measures can come from both actual sales and plan sales. Average sales value per average unit of allocated space can be viewed for this year, last year, and as a percent change between the two.

Sample business measure:

Metric	Formula
Avg Sales per Space Allocation (Ln)	([Avg Sales Value] / [Avg Space Allocation (Ln)])

Space allocation aggregation

Note: The RDW Operations Guide provides two options for loading space allocation data into RDW. You can either directly load item and/or department level space allocation data to the fact tables or you can load item-level space allocation facts and then allow an RDW aggregation batch module to summarize that data to the department level.

If you choose the former method (direct load to item and department), some clarification is in order regarding drilling between item and department for space allocation facts. Let's say there are two departments for which the client has space allocation data: Dept A and Dept B. Dept A space allocation facts are tracked in the source system at item level, and that item-level data is directly loaded to RDW. Dept B, however, only tracks space allocation facts in the source system at the department level, and that dept-level data is directly loaded to dept space allocation tables in RDW. In this situation, a space allocation report run with only department on the template (and an empty filter) would only show facts for Dept B. This is because there are no facts for Dept. A's items summarized at department level. If the client drilled to item level from Dept B, however, the report would return no data since there are no facts below department level for Dept. B. If a space allocation report had only item on the template (and was run with an empty filter), such a report would only return facts for Dept A, because that is the only department with item-level space allocation data. Contrast the above situation to inventory position (and most other facts in RDW), where data is always available at item level and is then aggregated to higher levels.

Stock ledger

Financial control is important to a retailer. The results of the inventory and merchandise process need to be recorded and analyzed. The information for Stock Ledger analysis comes from RMS.

The lowest level stock ledger facts are kept at is the subclass and week level. This gives RDW visibility to store/subclass/week level and subclass month. Consequently, stock ledger reporting is not available at the item and day level. Reports and drills into data that are lower than the subclass/week level will return null values for stock ledger facts.

For RDW clients who get stockledger information from RMS, the RMS stock ledger feed to RDW supports either 454 fiscal time or Gregorian time. For clients running a Gregorian stock ledger, reporting in RDW can be done at the subclass, location, and month level. Reports and drills into data that are lower than the subclass/month level will return null values for stock ledger facts. Clients running a 454 stock ledger can analyse stock ledger at the subclass, location, week, and month level. Reports and drills into data that are lower than the subclass/week level will return null values for stock ledger facts. Any other time calendars, such as 13 period time calendar, are not supported by the RMS-RDW interface for stockledger facts. As a result, if an RMS client were to customize their stockledger to work as a 13-period calendar, there will be inconsistencies with the RMS-RDW stockledger interface unless modifications are made.

Because the month level stockledger is directly related to the RMS month_data table, data for a specific month will only be available in RDW after the close of that month.

Facts and base metrics

RDW stock ledger maintains a set of sales, profit, and inventory metrics for use in complex business metrics.

Sales and gross margin

RDW holds facts for sales at retail value and gross profit margin:

Metric	Formula
Stock Ledger Gross Margin Value	Sum(F_IVL_GRS_PRFT_AMT)
Stock Ledger Returns Retail Value	Sum(F_IVL_RTRNS_RTL_AMT)
Stock Ledger Sales Retail Value	Sum(F_IVL_SLS_RTL_AMT)
Stock Ledger Sales Cost Value	Sum(F_IVL_SLS_COST_AMT)

Percent gross margin is the ratio of gross profit amount to total sales at retail value and is calculated as follows:

Metric	Formula
Stock Ledger % Gross Margin	(Stock Ledger Gross Margin Value / Stock Ledger Sales Retail Value)

Note that time transformations will be applied to sales and gross margin within stock ledger. Time transformation will allow retail sales to be retrieved for month-to-date, season-to-date, and year-to-date with corresponding metrics for last year.

Beginning and ending stock values

Beginning and ending values are maintained at retail and cost.

Metric	Formula
Stock Ledger BOH Retail Value	Sum(F_IVL_BEG_SOH_RTL_AMT)
Stock Ledger BOH Cost Value	Sum(F_IVL_BEG_SOH_COST_AMT)
Stock Ledger EOH Retail Value	Sum(F_IVL_END_SOH_RTL_AMT)
Stock Ledger EOH Cost Value	Sum(F_IVL_END_SOH_COST_AMT)

These values are used to calculate average stock cost value. Average stock cost value is the average cost of stock over a period of weeks. This value is held at retail and cost.

Metric	Formula
Stock Ledger Avg Stock Retail Value	((Stock Ledger BOH Retail Value] + Stock Ledger EOH Retail Value (SUM)) / (No of Weeks with Stock + 1))
Stock Ledger Avg Stock Cost Value	((Stock Ledger BOH Cost Value + Stock Ledger EOH Cost Value (SUM)) / (No of Weeks with Stock + 1))

Stock turn retail value

Stock turn retail value is calculated using sales value and the average stock cost at retail:

Metric	Formula
Stock Ledger Stock Turn Retail value	(Stock Ledger Sales Retail Value / [Stock Ledger Avg Stock Retail Value)

Gross margin return per dollar of inventory (GMROI)

GMROI calculates the relative effectiveness of inventory investment. It is kept in RDW in the stock ledger tables at the subclass and week level and calculated as follows:

Metric	Formula
Stock Ledger GMROI	(Stock Ledger Gross Margin Value / Stock Ledger Avg Stock Cost Value)

Receipts

The stock ledger holds receipts at cost and retail value. Below is a sample metric:

Metric	Formula
StkLedger Receipt Retail Value	Sum(F_IVL_RCPTS_RTL_AMT)

Stock movement

Stock movement is concerned with transactional (rather than positional) values. For example, a receipt is transactional because it is a series of events which take place on successive days during the week. At the end of the week all receipts for that week can be added together to determine the total for the week.

This area includes receipts, transfers, returns to vendor (RTV), and stock adjustments. Basic measurements are units and valuation (cost and retail).

Receipts

Receipts are units purchased and placed in inventory. RDW holds the number of units purchased at the day and week level and at retail and cost value. Receipts are held at item level for day and week and at the subclass (segment) level for day and week.

Metric	Formula
Receipts Units	Sum(F_I_RCPTS_QTY)
Receipts Cost Value	Sum(F_I_RCPTS_COST_AMT)
Receipts Retail Value	Sum(F_I_RCPTS_COST_AMT)

These base metrics are used in calculating the performance metrics described below.

Variances

Receipt value metrics have transformations for month, season, and year-to-date for a current and previous year. These metrics allow for the display of to date measures and a comparison of values for a current year to the previous year. Percent change in receipts retail value vs. last year is calculated as follows:

```
((Receipts Retail Value - Receipts Retail Value (Last Year)) /
Receipts Retail Value (Last Year))
```

Percent markup on projected receipts

The receipt values at retail and cost can be used to calculate the percent initial markup on receipts, as follows:

```
(Receipts Retail Value - Receipts Cost Value) / (Receipts Retail
Value)
```

Plan and variance from plan

Plan values for receipts are held for an original and current plan. Plan values are held at subclass, location, and week levels. Planned receipts values allow for calculation of variance from plan.

Return to vendor (RTV)

RTV units are units returned to the vendor for any reason. RDW maintains a record of RTV units and the value of RTV units at cost and retail amount. RTV facts are held at the item/supplier/location/day/return reason level.

Metric	Formula
RTV Units	Sum(F_I_RTV_QTY)
RTV Retail Value	Sum(F_I_RTV_RTL_AMT)
RTV Cost Value	Sum(F_I_RTV_COST_AMT)

RTV plan facts are available for units for an original plan (F_PLN_CURR_RTV_QTY) and current plan (F_PLN_ORIG_RTV_QTY) and for retail value (F_PLN_CURR_RTV_QTY) and (F_PLN_ORIG_RTV_RTL_AMT). These facts allow reporting of actual RTV data to a current and original plan.

Plan facts are held at the subclass/location/week level.

Transfers

RDW distinguishes between two types of transfers, book and intercompany, with an attribute called transfer type.

Book transfer items are inventory units moved from one part of the company to another; for example, warehouse to location/store, by department, or store to store. RDW holds transfer units and cost and retail values of transferred units.

Intercompany transfer items are inventory units moved from one business entity into another business entitity. RDW holds transfer units cost, and retail values of transferred units

Tranfers are held at the item or subclass, destination, location, shipping location, and day or week levels.

Metric	Formula
Transfer To Loc Units	Sum(F_I_TSF_TO_LOC_QTY)
Transfer To Loc Retail Value	Sum(F_I_TSF_TO_LOC_RTL_AMT)
Transfer To Loc Cost Value	Sum(F_I_TSF_TO_LOC_COST_AMT)

Stock adjustments

Stock adjustments are changes to inventory level. RDW holds stock adjustment units and values by reason code at the item, location, and day level.

Facts and base metrics

Metric	Formula
SOH Adjustment Units	Sum(F_I_ADJ_QTY)
SOH Adjustment Retail Value	Sum(F_I_ADJ_RTL_AMT)
SOH Adjustment Cost Value	Sum(F_I_ADJ_COST_AMT)

Gross margin return on inventory (GMROI)

GMROI is the rate per dollar of return on investment in inventory. GMROI measures how effectively inventory investment has produced gross margin dollars.

In RDW, GMROI is calculated as follows:

```
(Gross Margin Value / Avg Stock Cost Value)
```

Gross Margin Value is (Profit – Profit Lost on Returns). See the *Sales and Profit* section for additional information on Gross Margin.

The average stock value at cost is calculated as follows:

```
((BOH Cost Value + EOH Cost Value (SUM)) / (No of Weeks with Stock +
1))
```

EOH Cost Value (SUM) is a sum of all values for the period rather than an ending position.

All components required for calculation of GMROI are available with transformation to last year.

(Gross Margin Value (Last Year) / Avg Stock Cost Value (Last Year))

Stock position

Stock position is the quantity and value of inventory at the beginning or end of a unit of time, such as day, week, or month. Stock-on-hand, in-transit, and on-order are measured as positions. A positional measurement differs from a transactional measurement, such as sales or returns, in the way that it is handled in relation to time.

Sales transactions are a series of discrete events that occur over time. The values of these transactional events can be added together to create a new and meaningful value. For example, the values of daily sales are added together to calculate weekly sales which in turn are used to determine monthly sales, and so on.

Position is a constant state in which a value or position shifts over time. Stock-on-hand is at a certain position at the beginning and end of a week and at any point in between. Positional values cannot be added together to arrive at a meaningful number. For example, the ending stock-on-hand values for the days in a week do not add up to the ending value for a week. Rather, there is a position at the end of each day and, in this example, the ending position for the week is the same as the position for the last day of the week. For this reason, positional measurements are *semi-additive*. They are not additive in the time dimension. In other dimensions they act much like transactions. For example, the ending-on-hand value for a subclass can be determined by adding the ending values for items in that subclass.

In RDW, positional values are used in several important measurements, including inventory contribution, variances in the value of stock between the current and previous year, the number of days in a month on which the item was out of stock, and sales velocity metrics.

Stock on Hand

Metrics

Beginning Stock on Hand (BOH) and Ending Stock on Hand (EOH) are the beginning and ending values for stock on hand (SOH) in a defined period of time.

In RDW it is assumed that position has been captured at the end of a day, week, or month

- EOH is the ending value for the time period. It is the position at the end of the day, week, month, or year in question.
- BOH is the ending value for the previous day, week, month, or year in question.

Special metrics are used to extract a positional value from the fact table. Positional metrics specify the dimensional hierarchy (time calendar) in which the position exists and the grouping which is always set to ending.

The following are some sample stock position metrics found in RDW:

Metric	Definition	Description
BOH Units	Sum(F_I_SOH_QTY)	This metric calculates the unit quantity of stock on hand at the beginning of a selected period.
BOH Cost Value	Sum(F_I_SOH_COST_AMT)	This metric calculates the cost value of the stock on hand at the beginning of the time period selected.
BOH Retail Value	Sum(F_I_SOH_RTL_AMT)	This metric calculates the retail value of the stock on hand at the beginning of the time period selected.
EOH Units	Sum(F_I_SOH_QTY)	This metric calculates the unit quantity of stock on hand at the end of a selected period.
EOH Cost Value	Sum(F_I_SOH_COST_AMT)	This metric calculates the cost value of the stock on hand at the end of the time period selected.
EOH Retail Value	Sum(F_I_SOH_RTL_AMT)	This metric calculates the retail value of the stock on hand at the end of the time period selected.

RDW holds EOH retail values by retail type, allowing for the valuation of inventory position by retail type. A condition is added to these metrics to indicate retail type (Regular, Promotional, or Clearance).

The following sample report displays the inventory value by retail type and the percent contribution of each sales type to total inventory value:

Location		Metrics	EOH Retail Value	EOH Regular Retail Value	% Contrib Regular to EOH Retail Value	EOH Clearance Retail Value	% Contrib Clearance to EOH Retail Value
Total			**62,039**	**64,404**	**NA**	**0**	**NA**
Minneapolis	14101		62,039	64,404	103.81%	NA	0.00%

Organization, EOH Value by Type

Note: If a client receives inventory data from RMS (via DWI batch extraction), the RDW fact F_I_SOH_QTY equates to the end-of-day SOH value from RMS's item-location tables. In RMS, SOH includes goods on the shelf (goods available for sale), unavailable inventory, and inventory reserved from this location (for example, inventory to be transferred to another location that is waiting for the transfer to be shipped).

In Transit

In transit is the quantity that is on approved and shipped transfers for the receiving location.

Metrics

The following are some sample in transit metrics found in RDW:

Metric	Definition	Description
In Transit Units	Sum(F_I_IN_TRNST_QTY)	This metric calculates the unit quantity of inventory currently in transit.
In Transit Retail Value	Sum(F_I_IN_TRNST_RTL_AMT)	This metric calculates the retail value of inventory currently in transit.
In Transit Cost Value	Sum(F_I_IN_TRNST_COST_AMT)	This metric calculates the cost value of inventory currently in transit.

On Order

On Order are the approved purchase order quantities of all quantities not yet received on a purchase order written for a particular location.

Metrics

The following are some sample on order metrics found in RDW:

Metric	Definition	Description
On Order Units	Sum(F_I_ON_ORD_QTY)	This metric calculates the unit quantity of items on order.
On Order Retail Value	Sum(F_I_ON_ORD_RTL_AMT)	This metric calculates the retail value of items on order.
On Order Cost Value	Sum(F_I_ON_ORD_COST_AMT)	This metric calculates the cost value of items on order.

Reserved

Reserved quantity and value are positional facts that represent the quantity and value of inventory currently reserved from other locations to this location. Once the inventory that was reserved at the other locations is shipped, it becomes IN_TRANSIT and is no longer reserved at the To location.

Metrics

The following are some sample reserved metrics found in RDW:

Metric	Definition	Description
Reserved Units	Sum(F_I_ALLOC_RSV_QTY) + Sum(F_I_TRNSFR_RSV_QTY)	This metric calculates the total reserved units of inventory, at the receiving location. This may be composed of the warehouse-to-store and store-to-store reserved quantities.
Reserved Retail Value	Sum(F_I_ALLOC_RSV_RTL_AMT) + Sum(F_I_TRNSFR_RSV_RTL_AMT)	This metric calculates the total reserved retail value of inventory for the receiving location.
Reserved Cost Value	Sum(F_I_ALLOC_RSV_COST_AMT) + Sum(F_I_TRNSFR_RSV_COST_AMT)	This metric calculates the total reserved cost value of inventory for the receiving location.

Store traffic

Overview

Store traffic reporting measures the ratio of sales transactions to the total number of customers in the store on a daily and weekly basis. Store traffic is an important measure for understanding how many shoppers a retailer converts to buyers. This information can be used to assess the store layout and adjacency information.

Facts and base measures

RDW holds the volume of store traffic and the number of transactions by location and day.

Note: Store traffic must be loaded by a third party or client-supplied application.

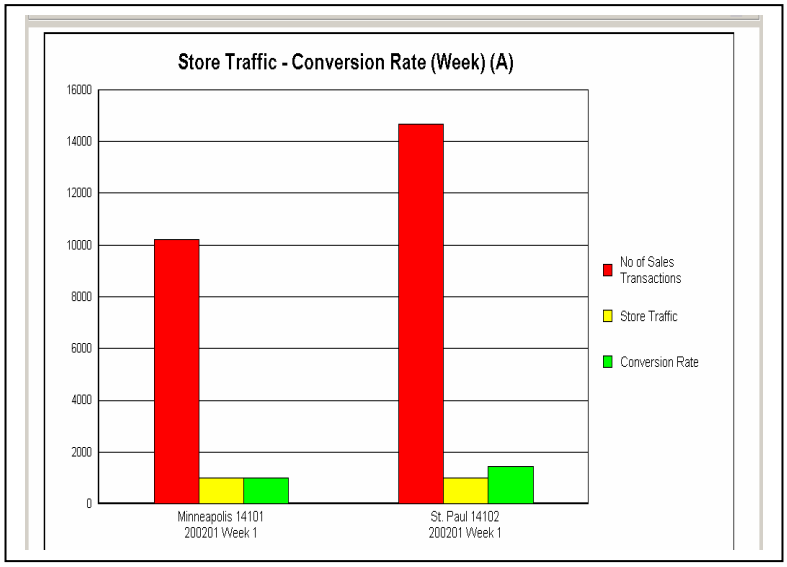
Measure	Fact
Store Traffic	F_STORE_TRAFFIC
No of Sales Transactions	F_SLS_COUNT

Conversion rate

The conversion rate is the number of transactions divided by the amount of store traffic and is calculated as follows:

```
(No of Sales Transactions / Store Traffic) * 100) = Conversion Rate
```

The following report shows the conversion rate by week and location.



Store Traffic – Conversion Rate (Week) (A)

Supplier compliance

Supplier compliance is an important part of retailers' supplier evaluation process. These ratings or measures can determine the need for corrective actions and follow-up inspections. Supplier Compliance can be explained as the process of measuring supplier performance based on some key performance indicators, such as timeliness and accuracy of deliveries. The supplier compliance functionality in RDW includes and supports supplier evaluation based on the following parameters:

- Timeliness
- Delivery accuracy
- Order fulfillment
- Quality measure

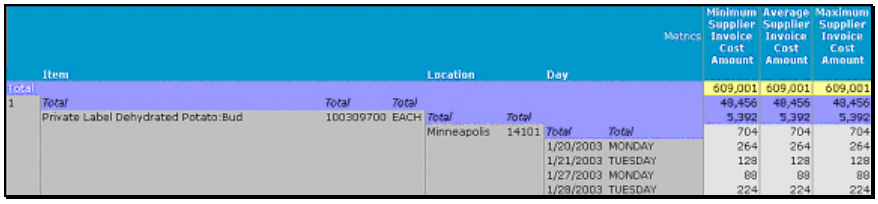
The Supplier compliance scorecard report is detailed view of most all of the supplier compliance measures. As you can see from the report below, all suppliers can be analyzed for their compliance.

Supplier	Metrics	Supplier Compliance Rating	Timeliness Rating	Delivery Accuracy Rating	Order Fullfillment Rating	Quality Rating
Total		35.85%	33.68%	25.19%	34.55%	49.98%
Parrot Goods	8	37.74%	34.19%	27.81%	37.45%	51.50%
York Industries	20	37.62%	30.44%	25.31%	39.01%	55.72%
US Products Inc.	3	37.18%	36.49%	23.46%	36.91%	51.84%
Azur Limited	6	37.06%	35.08%	24.00%	37.99%	51.17%
Kwong Lee	2	36.46%	35.51%	24.14%	35.57%	50.63%
Crystal Imports	10	36.39%	36.27%	28.80%	31.54%	48.96%
Din Bright Industries	4	36.29%	34.11%	26.01%	34.96%	50.08%
United Suppliers Warehouse	17	36.29%	33.64%	27.42%	34.77%	49.33%
All Products Inc.	21	36.01%	34.61%	25.90%	31.88%	51.65%
International Market Goods	12	35.97%	32.99%	26.98%	33.70%	50.23%
Kabuki	16	35.95%	37.07%	24.29%	34.33%	48.10%
Dawson Distribution	18	35.93%	34.03%	23.12%	34.14%	52.42%
General Suppliers	1	35.63%	32.41%	24.88%	34.03%	51.21%
Wilshire Dry Goods	9	35.52%	33.03%	23.11%	33.48%	52.48%
Purple Cow Products	15	34.75%	32.59%	27.00%	33.79%	45.60%
Greenhouse Enterprises	13	34.72%	30.23%	27.34%	30.46%	50.85%
Bullseye Imports	11	34.71%	31.46%	25.86%	35.11%	46.39%
White Emporium Goods	14	34.55%	32.94%	24.11%	32.59%	48.55%
Miller International	5	33.44%	33.83%	24.04%	32.94%	42.96%
Hudson Companies	19	33.37%	30.16%	22.78%	33.96%	46.58%

Supplier invoice cost

Supplier invoice cost is the actual cost as shown on the vender's invoice (from Retek Invoice Matching process). Supplier invoice purchase order cost is the expected cost previously agreed upon in the purchase order, before any deals or discounts. A difference between the two can be reflective of deals, discounts, clerical errors, or dishonesty.

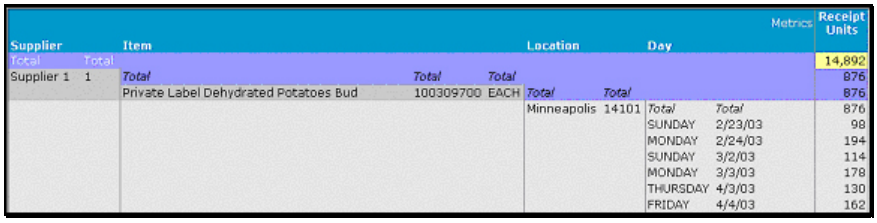
Supplier invoice cost and supplier invoice purchase order cost is held in F_SUPP_INVC_UNIT_COST_AMT and F_PO_ITEM_UNIT_COST_AMT respectively at the supplier-item-location-day level. The report contains the average invoice cost and the average invoice purchase order cost for line items. The following is a sample report:



Item				Location		Day		Metrics: Minimum Supplier Invoice Cost Amount	Average Supplier Invoice Cost Amount	Maximum Supplier Invoice Cost Amount
Total								609,001	609,001	609,001
1	*Total*	*Total*	*Total*					48,456	48,456	48,456
	Private Label Dehydrated Potato:Bud	100309700	EACH	*Total*	*Total*			5,392	5,392	5,392
				Minneapolis	14101	*Total*	*Total*	704	704	704
						1/20/2003	MONDAY	264	264	264
						1/21/2003	TUESDAY	128	128	128
						1/27/2003	MONDAY	88	88	88
						1/28/2003	TUESDAY	224	224	224

Receipts by supplier

RDW supplier compliance data mart provides the ability to report receipt units grouped by supplier, item, location, and day. The fact column F_RECEIVED_QTY contains the quantity from the qty_received column in the RMS table shipsku. The following is a sample report:



Supplier		Item			Location		Day		Metrics: Receipt Units
Total	Total								14,892
Supplier 1	1	*Total*	*Total*	*Total*					876
		Private Label Dehydrated Potatoes Bud	100309700	EACH	*Total*	*Total*			876
					Minneapolis	14101	*Total*	*Total*	876
							SUNDAY	2/23/03	98
							MONDAY	2/24/03	194
							SUNDAY	3/2/03	114
							MONDAY	3/3/03	178
							THURSDAY	4/3/03	130
							FRIDAY	4/4/03	162

Receipt units by supplier

It should be noted that the supplier compliance data mart does not contain cost or sales data. Consequently, it cannot be used to report on sales or cost by supplier. The quantity in the supplier compliance data mart should not be confused with receipt units in the inventory movement data mart.

Supplier compliance rating

The *supplier compliance rating* is calculated by taking the average of the timeliness, accuracy, order fulfillment and quality measures, or it can be modified based on the retailer's business requirement. This calculation is done on the front end:

```
Supplier Compliance Rating =(Timeliness + Delivery Accuracy + Order
Fulfillment + Quality Measure) / 4
```

Timeliness

How satisfied to do you feel about the timeliness of your suppliers? Timeliness measures the supplier's ability to deliver according to schedule. Early, late, and on-time shipments are tracked in the supplier compliance system. Retailers have the capability to measure their supplier-timeliness on a daily basis.

```
Timeliness = No of On Time Deliveries / ( No of On Time Deliveries
+  No of Early Deliveries  +  No of Late Deliveries )
```

For example, if the number of on-time deliveries is 75 and the total of all deliveries is 100, the timeliness rating is 75%.

Missed deliveries are defined as deliveries that did not take place within the timeframe specified. As such, a late delivery is also a missed delivery. Because the timeliness measure would not be very meaningful if two of its components were counted twice, missed deliveries will not be included in the timeliness measure. Missed deliveries can be reported at the supp/loc/time level as a separate metric.

Delivery accuracy

Delivery accuracy measures the supplier's ability to deliver the correct items and quantities on the order. The rating is determined by comparing the total number of deliveries for the supplier to the number of deliveries where the quantity or item was incorrect:

```
Delivery Accuracy = Number of ASN Expected Deliveries / Number of
Deliveries
```

```
Where Number of Deliveries = No of ASN Expected Deliveries + No of
ASN Over Deliveries + No of ASN Under Deliveries + No of Mismatched
Deliveries
```

Mismatched is defined as a count of deliveries that contain at least one mismatched item.

For example, if the number of on-time deliveries is 75 and the total number of deliveries is 100, the delivery accuracy rating is 75%.

Order fulfillment

Order fulfillment measures the supplier's ability to deliver on order in full. The rating is determined by calculating the ratio of completely filled order to the total number of orders.

```
Order Fulfillment = No of Full Order Deliveries/ No of Order
Deliveries
```

```
Where Total Orders = Orders Received in Full + Orders Received in
Part + Orders Received in Excess
```

For example, a supplier earns an order fulfillment rating of 75% if the total number of orders is 4 and the number of partial deliveries is 1.

Quality measure

RDW will support reporting of a shipment rejected due to quality control failure reasons, and this will give a quality measure of vendor performance. The quantity of items that fail quality control checks, compared to the total quantity of items received, indicates the quality of the shipment received. Note that not all items require QC checks. This measure only applies to those items that do (qc_ind = 'Y').

```
Quality = Passed QC Units/ Receipt QC Units
```

If this measure equals to 100, then the vendor's quality measure is 100%.

Variance reporting

Transformations exist for all compliance ratings for last year. This allows comparison of a current compliance rating with the rating for last year.

See the Supplier Compliance Comparison TY vs. LY (A) for an example.

Supplier contracts and availability

The supplier contracts and availability metrics allow you to assess unit availability by supplier, balance of contract (BOC) units, and supplier cost. This analysis will convey contract information by supplier, item, and day.

Base formulas and metrics

RDW holds facts for supplier contract and availability quantities and cost values. These facts are aggregated and used in formulas to define the following metrics.

Metric	Formula
Contract Units	Sum(F_CNTRCT_QTY)
Available Units	Sum(F_AVAIL_QTY)
Contract Order Units	Sum(F_CNTRCT_ORD_QTY)
Contract Cost Value	Sum(F_CNTRCT_COST_AMT)
Avg Contract Cost Value	Avg(F_CNTRCT_COST_AMT)
Contract Order Cost Value	Sum(F_CNTRCT_ORD_COST_AMT)

Balance of contract

Base metrics above are used to calculate the quantity and value of what remains on the contract.

Metric	Formula
BOC Total Units	(Contract Quantity - Contract Order Quantity)
BOC Total Value	((Contract Quantity - Contract Order Quantity) * Avg Contract Cost Value)
Contract Order Cost Unit Value	(Contract Order Cost Value / Contract Order Quantity)

The following sample report displays balance of contract metrics.

		Contract Quantity	Contract Cost Value	Contract Order Quantity	BOC Total Value	Contract Order Cost Value	BOC Total Units
Total	Total	182	419	14	37,596	32	168
Supplier 14	14						
	147	114	262	7	28,055	16	107
	168	68	156	7	9,540	16	61

Balance of contract total value

Commitment total units and value

Total committed units is calculated as the sum of existing units on hand, BOC units, and on order units and values.

Measure	Formula
Commitment Total Units	((BOC Total Units + On Order Units) + EOH Units)
Commitment Total Value	([BOC Total Value] + On Order Retail Value) + EOH Retail Value)

The following sample report displays contracts and availability measure by department and item:

				Contract Cost Unit Value	Contract Order Quantity	Contract Order Cost Unit Value	BOC Total Units	BOC Total Value
Total	Total			13	53	13	307	45,314
Dry Grocery	6001							
135	Pillsbury Potato Buds:Flavored	100310090	EACH	1	15	1	87	9,761
136	Pillsbury Potato Buds:Plain	100310170	EACH	1	14	1	89	11,000
156	Pillsbury Potato Buds:Flavored	100310090	EACH	3	9	3	49	9,379
157	Pillsbury Potato Buds:Plain	100310170	EACH	4	5	4	52	10,374
178	Betty Crocker Potatoes	100310410	EACH	4	10	4	30	4,800

Supplier performance

This functional area focuses on reporting that provides supplier performance information based on key performance measures. These reports enable users to assess the strengths and weaknesses of new or existing suppliers and their performance over time.

Supplier Performance reports provide the information you need to evaluate the sales and profitability of suppliers. The reports help you confirm that you currently work with the best suppliers for the marketing and sales needs of your stores.

Collection of this data makes the following types of analysis available to RDW users:

- Compare and contrast supplier performance over time
- Compare and contrast category performance by primary supplier
- Monitor category performance in terms of sales volume and value
- Compare and contrast market vendor with supplier performance

Primary supplier

Retailers and category managers in particular, need access to comparative sales and profit contribution information by primary supplier. The ability to identify suppliers of profitable versus non-profitable items, the ability to measure contribution to total category performance, and the ability to identify how their categories are performing relative to other categories, as well as relative to last year using various business measures (for example, sales and profitability), is necessary to enable retailers to monitor supplier performance.

The ability to compare and contrast category performance by Primary Supplier adds significant value, and is a vital tool in the grocery and convenience store industry.

Unless a data mart stores facts by supplier (such as net cost), all facts in that data mart can only be attributed to the primary supplier. The next section analyzes these two differences:

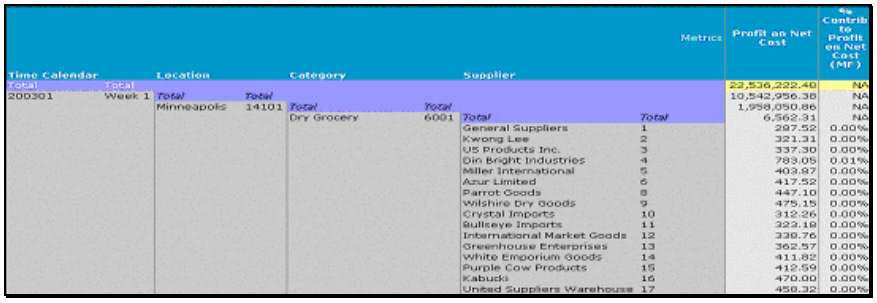
Primary Supplier Sales and Profit Analysis

The Primary Supplier Sales and Profit Analysis (A) report illustrates sales and profit by only primary suppliers. This report presents sales and profit metrics for items sold and relates those facts to only the item's primary suppliers for those items. Here is the report below:

			Sales Units	Sales Units (Last Year)	% Change Sales Units vs Last Year	Sales Value	Sales Value (Last Year)	% Change Sales Value vs Last Year	Profit	Profit (Last Year)	% Change Profit vs Last Year
Total	Total		43,541	63,241	(31.15%)	4,011,930	7,400,823	(45.79%)	1,077,427	2,033,048	(47.00%)
Dry Grocery	6001										
	Total	*Total*	11,229	15,302	(26.62%)	56,155	57,027	(1.53%)	15,790	15,941	(0.95%)
	General Suppliers	1	3,969	4,082	(2.77%)	15,969	11,093	43.95%	4,562	3,137	45.45%
	Wilshire Dry Goods	9	4,159	5,391	(22.85%)	24,601	21,896	12.36%	7,040	6,163	14.22%
	United Suppliers Warehouse	17	3,101	5,829	(46.80%)	15,585	24,038	(35.16%)	4,188	6,641	(36.93%)

Profit on Net Cost Contribution

The Profit on Net Cost Contribution (A) report illustrates Net Cost by suppliers. In this example, there are regular suppliers that have facts (net cost) attached. Because Net Cost facts are stored by supplier, both primary and non-primary suppliers will show up on this report.



Time Calendar		Location		Category		Supplier		Metrics	Profit on Net Cost	% Contrib to Profit on Net Cost (MF)
Total	Total								22,536,222.40	NA
200301	Week 1	Total	Total						10,542,956.38	NA
		Minneapolis	14101	Total	Total				1,998,050.86	NA
				Dry Grocery	6001	Total	Total		6,562.31	NA
						General Suppliers	1		297.52	0.00%
						Kwong Lee	2		321.31	0.00%
						US Products Inc.	3		337.30	0.00%
						Din Bright Industries	4		783.05	0.01%
						Miller International	5		403.87	0.00%
						Azur Limited	6		417.52	0.00%
						Parrot Goods	8		447.10	0.00%
						Wilshire Dry Goods	9		475.15	0.00%
						Crystal Imports	10		312.26	0.00%
						Bullseye Imports	11		323.19	0.00%
						International Market Goods	12		330.76	0.00%
						Greenhouse Enterprises	13		362.57	0.00%
						White Emporium Goods	14		411.82	0.00%
						Purple Cow Products	15		412.59	0.00%
						Kabuki	16		470.00	0.00%
						United Suppliers Warehouse	17		450.32	0.00%

Performance metrics

The following types of measures are a part of supplier performance:

- Sales and profit
- Inventory position and movement
- Net (Deal) cost

Sales and profit (as related to supplier)

- Sales value and variance in sales value from last year
- Sales units and variance in sales units from last year
- Profit amount and variance in percent profit from last year
- Percent contribution to total sales value for the department

Inventory position and movement (as related to supplier)

- Sell through
- Stock turn
- Beginning stock on hand (BOH) and ending stock on hand (EOH) retail value
- Receipts
- Gross margin return per dollar of inventory (GMROI)

See the *Inventory* section in this reference manual for more information on these calculations.

Net cost

Net Cost, sometimes referred to as Deal cost, measures are held at the supplier level.

Net cost is populated with data from RMS or another source system. The data from RMS consists of cost values that represent different discounts on base cost that the supplier provides. These different discounts may consist of:

- Deals with Deal Partners: for items, or items at specific locations. Deal partners can be suppliers, wholesalers, distributors, and manufacturers. Within a deal, you create deal components, specify the items for the deal component, and define thresholds.
- Fixed Deals with Suppliers: your organization receives payments from suppliers in return for mentioning their products in promotions or for displaying their products on prime shelf space.
- Bracket Costing Deals with Suppliers: your organization receives a certain deal price on an order depending on the size of the order. Different types of brackets can be established, based on mass, volume, pallet, case, each, or stat case.

RDW Metric	RDW Fact Field	Definition
Base Cost	F_SUPP_BASE_COST_AMT	This is the supplier base cost of the item/supplier/location at a given location on a given day. It is the initial cost before any deals or discounts are applied. It is stored in primary currency.
Net Cost	F_SUPP_NET_COST_AMT	This is the supplier net cost for the item/supplier/location on a given day. It is the defined as the base cost minus any deal components that have been applied by the retailer. If no deals or discounts are applier at this level, the supplier net cost = supplier base cost. It is stored in primary currency.
Net Net Cost	F_SUPP_NET_NET_COST_AMT	This is the supplier net net cost of the item/supplier/location on a given day. It is defined as the net cost minus any deal components designated by a retailer as applicable to the net net cost. If no deals or discounts are applied at this level, the supplier net net cost = supplier net cost. It is stored in primary currency.
Dead Net Cost	F_SUPP_NET_NET_COST_AMT	This is the supplier dead net cost of the item/supplier/location on a given day. It is the final cost after all deals or discounts have been applied. It is defined as the net net cost minus any deal components designated by a retailer as applicable to the dead net cost. If no deals or discounts are applied at this level, the supplier dead net cost = supplier net net cost. It is stored in primary currency.

Variances

Transformations exist for last year and last month allowing for the calculation of variance from a previous month and last year.

For last month, transformations exist for all base metrics, allowing for the comparison of cost for this month to last month.

Supplier		Item		Metrics	Base Cost	% Change Base Cost vs Last Period	Net Cost	% Change in Net Cost vs Last Period	Net Net Cost	% Change in Net Net Cost vs Last Period	Dead Net Cost	Cha in N Cos Pe
Supplier 1	1	Private Label Dehydrated Potatoes Bud	100309700	EACH	1.90	35.71%	1.90	35.71%	1.71	22.14%	1.71	22.
Supplier 2	2	Pillsbury Potato Buds:Flavored	100310090	EACH	2.00	33.33%	2.00	33.33%	1.80	20.00%	1.80	20.
Supplier 3	3	Pillsbury Potato Buds:Plain	100310170	EACH	2.10	31.25%	2.10	31.25%	1.89	18.13%	1.89	18.
Supplier 4	4	Betty Crocker Potatoes:06 ounce: Special Retail	100310760	EACH	2.20	29.41%	2.20	52.25%	1.98	37.02%	1.98	37.
		Private Label Pasta X	100311720	EACH	2.50	25.00%	2.50	38.89%	2.50	38.89%	2.50	38.
Supplier 5	5	Betty Crocker Potatoes:06 ounce:Regular Retail	100310840	EACH	2.30	27.78%	2.19	34.88%	1.97	21.39%	1.97	21.
Supplier 6	6	Pack Item 1 - Potatoes	100342180	EACH	2.40	26.32%	2.40	40.35%	2.40	40.35%	2.40	40.
Supplier 8	8	Brand X Pasta:Mac n Cheese Elbow	100311990	EACH	2.60	23.81%	2.60	45.66%	2.60	45.66%	2.60	45.
Supplier 9	9	Brand X Pasta:Mac n Cheese Spiral	100312280	EACH	2.70	22.73%	2.70	36.36%	2.70	36.36%	2.70	36.
Supplier 10	10	Mac n Cheese:Elbow	100312870	EACH	2.80	21.74%	2.38	14.98%	2.38	14.98%	2.14	14.
Supplier 11	11	Mac n Cheese:Spiral	100312950	EACH	2.90	20.83%	2.61	14.47%	2.61	14.47%	2.35	14.
Supplier 12	12	Brand X Cereal:Bran	100314040	EACH	3.00	20.00%	2.70	20.00%	2.70	20.00%	2.43	20.
Supplier 13	13	Brand X Cereal:Oat	100314120	EACH	3.10	19.23%	2.79	7.31%	2.51	7.31%	2.26	7.
Supplier 14	14	Kellog Cereal:10 ounce:Puffs	100314550	EACH	3.20	18.52%	2.72	0.74%	2.45	0.74%	2.20	0.
Supplier 15	15	Kellog Cereal:10 ounce:Oat	100314630	EACH	3.30	17.86%	2.97	6.07%	2.67	6.07%	2.67	6.
Supplier 16	16	Pack Item 4	100342420	EACH	3.40	17.24%	3.06	5.52%	2.75	5.52%	2.75	5.
Supplier 17	17	Private Label Hot Cereal 1	100315000	EACH	3.50	16.67%	3.33	16.67%	2.99	16.67%	2.99	16.

Sample Report: Cost – this month vs last month

Transformations are available for net cost and net net cost for last year, allowing for the comparison of these figures to a previous year.

Velocity metrics

Velocity metrics measure the rate at which stock is sold and replaced. Stock turn and percent sell through are velocity metrics.

Stock turn

Stock turn is a measurement of the rate at which stock is sold and replaced. In RDW, the stock turn value is calculated as a ratio between sales value and the average value of stock during the same period.

RDW calculates both stock turn value and stock turn unit quantity.

Stock turn value

Stock turn value is calculated using sales value and the average stock value as follows:

```
Sales Value / Average Stock Value
```

For example, if sales of widgets are 2 million during month 1 and the average stock value during the same month is 500K, the stock turn value is 2,000,000/500,000.

The average stock retail value is calculated as follows:

```
((BOH Retail Value + EOH Retail Value (SUM)) / (No of Weeks with
Stock] + 1))
```

EOH Retail Value (SUM) is a sum of all values for the period rather than an ending position.

Stock turn units

Stock turn units is similarly calculated:

```
(Net Sales Units / (([BOH Units] + EOH Units (SUM)) / (No of Weeks
with Stock]+ 1)))
```

Plan values and variance to plan

RDW holds planning data that is sufficient to calculate stock turn for a current plan. This allows for the comparison of actual stock turn to planned levels. RDW holds last year facts required to calculate stock turn, allowing for a comparison of stock turn value to last year.

% Sell Through

Sell through is the number of units sold expressed as a percentage of total units on hand for a defined time period. It is calculated as follows:

```
(Sales Units / (EOH Units + Sales Units))
```

Appendix A – Frequently asked questions

Note: The questions and answers in this section are grouped by subject.

Tracking

Q: You want to see a report listing sales for three different lines in the same subclass. Each line tracks at a different level. Line 3 tracks at variant level. You want to have that report return the sales for each variant for line 3, and then an empty set of data for lines 1-2, but still have those lines show up on the same report. What business benefit do these empty set rows provide? A report at variant level returns just sales for lines that have sales tracked at variant level. If you want to know what other lines in that subclass aren't tracked at variant, should you consider using other reference lookup features of MicroStrategy (such as drilling up, hierarchy lists, and so on), instead of trying to add that information to the same report? Right now limitations of the tool only allow this to be done on two separate reports. What is more important, flexibility of reporting or having the data tie out?

A: When running a report that gives sales at the variant level, only items that track at the variant level are reported. When running a report that gives sales at the lineX level, sales for all tracking level items that are tracked at the lineX and variant level are reported. If you drill down to variant on this report, display all the variants tied to the lines, regardless of whether they are tracked, and if the variants are not the tracking level, do not show the sales (or other tracking level specific metrics) for the variant, and display any other metric on the report that is valid at the variant level (for example, cost). When running a report that gives sales at the Line level, report sales for all tracking level items whether at the line, lineX or variant level. Again, you have the ability to drill down to the lower levels, but sales will not be visible at all levels (or other tracking level specific metrics) for the lineX or variant, (whichever level you are drilling down to). However, any metric on the report that is valid at the drill-down level will be displayed (for example, cost).

Note: Currently in RDW there is no data (for example, costs) held below the tracking level. This may be impacted by the scope of cost functionality for RMS 11.0

Sales

Q: Why are sales only available by primary supplier?

A: In the past, RDW obtained its sales data from RMS, sales data is not held at the supplier, item, location, day level. RMS only provides sales at the item, location, day level. However, every item is associated with a primary supplier, so it is possible to obtain sales by primary supplier.

Licenses

Q: What is the difference between limited and full use licenses?

A: Limited use means you cannot add separate data marts, such as an HR data mart or financial data mart. You also cannot use MicroStrategy tools in any other systems.

Integration

Q: What products is RDW integrated with?

A: RDW is integrated with the Retek Merchandising System (RMS), Retek TopPlan, Retek Sales Audit (ReSA), Retek Customer Order Management (RCOM), and Retek Invoice Matching (ReIM).

Dynamic Aggregation

Q: Why does my report display "--" for some metric values?

A: The "OLAP Services" feature (also referred to as the "Intelligent Cube") introduced in MicroStrategy 7.2 allows manipulation of reports that involves addition and removal of attributes from a report view without having to re-execute the report against the database. If a metric on the report uses only a simple Sum or Count aggregation function, then the MicroStrategy Engine will be able to re-aggregate the metric using the values on the report when moving an attribute from the report view to the working set. If the metric uses a more complex formula, it may not be possible to re-aggregate this value without re-executing the report against the database. If the MicroStrategy Engine cannot re-aggregate, the report will show two dashes ("--") for the value of the metric. If you would like MicroStrategy to calculate the metric from the database, you will need to remove the attributes both from the report view as well as from the report working set.

Please refer to Appendix D – Technical considerations under the Metric Subtotals and Dynamic Aggregation section for a detailed explanation of how subtotals and dynamic aggregations work and why this problem occurs.

Appendix B – Joint-child attributes

Joint-Child Attributes exist at the intersection of two or more indirectly related attributes. For example, the weather attribute *Rainy*, only makes sense at the cross-dimensional intersection of Location and Day.

Item

This table summarizes joint-child attributes in items, whose detailed descriptions follow.

Joint-Child Attribute Name	Joint-Children	Description
Deposit Code	Item Location	Indicates whether a deposit is associated with this item at the location.
Electronic Marketing Club	Item Location	Holds the code that represents the electronic marketing clubs to which the item belongs at the location.
Food Stampable Ind	Item Location	Indicates whether the item is approved for food stamps at the location.
Full Pallet Item Ind	Item Location	Indicates whether a store must reorder an item in full pallets only.
National Brand Comparison Item	Item Location	Holds the nationally branded item to which you would like to compare the current item.
New Item Start Date	Item Location	Holds the date that the item should first be sold at the location.
Presentation Method	Item Supplier	Defines how an item is displayed (for example, shelf, j-hook, pegged).
Primary Supplier Ind	Item Supplier	Indicates that the supplier is the primary supplier for the item.
Reorderable Ind	Item Location	Indicates whether the store may re-order the item.
Reward Club Eligible Ind	Item Location	Indicates whether the item is valid for various types of bonus point or award programs at the location.
Unauthorized Ind	Item Location	Indicates that sale of the item should be stopped immediately at the location.
VPN	Item Supplier	Identifies the supplier part number for the item.

Deposit Code

A deposit code allows you to report on income generated from deposits at specific item-locations. For example, Snapple bottles have refundable deposits in some states (Michigan, California, and so on), and a report could be generated indicating the amount refunded for the deposit code.

This is modeled as a Joint-Child Attribute, establishing the relationship of Item-Location. This Joint-Child Attribute can be displayed on a template, and/or used in a filter to constrain the desired query.

Electronic Marketing Club

Electronic Marketing Club refers to a membership club for consumers for a particular retailer. By being a member of an electronic marketing club, a consumer will get offered special deals on items when they use their membership card when purchasing an item. This attribute ties in to the Reward Club Eligible Indicator and defines to a greater detail the award clubs tied to each item. This attribute is used for filtering and defining sales for items tied to award programs. **.]**

This is modeled as a Joint-Child Attribute, establishing the relationship of Item-Location. This Joint-Child Attribute can be displayed on a template, and/or used in a filter to constrain the desired query.

Food Stampable Indicator

This attribute indicates whether food stamps are valid tender when purchasing the item. Redemption of food stamps (a tender type) can be tracked against the items purchased to validate usage of food stamps. Additionally, stores that receive a higher quantity of food stamp purchases may assort their products differently than stores that receive little food stamp revenue.

A report using the Food Stampable Indicator might have item assortment and sales information for products where the Food Stampable Indicator is *Y*. With knowledge of what the demographics are of the stores being handled, the assortment can be managed appropriately to the demographic demand.

This is modeled as a Joint-Child Attribute, establishing the relationship of Item-Location. This Joint-Child Attribute can be displayed on a template, and/or used in a filter to constrain the desired query.

Full Pallet Item Indicator

This attribute indicates whether the item must be ordered by pallet. This attribute could be used in exception reporting, especially where unexpected vendor fees are appearing. You look for purchases not equal to pallet quantities for items that are pallet item only.

This is modeled as a Joint-Child Attribute, establishing the relationship of Item-Location. This Joint-Child Attribute can be displayed on a template, and/or used in a filter to constrain the desired query.

National Brand Comparison Item

This attribute represents the nationally branded item (Kemps ice cream) to which you wish to compare the current item (private label ice cream). This attribute is used as a reference and for filtering. For example, pull sales for all items with Kemps as the National Brand Comparison in the ice cream category, and then compare those results with all the items with the actual brand of Kemps in the same category.

This attribute is modeled as a Joint-Child Attribute, establishing the relationship of Item-Location. This Joint-Child Attribute can be displayed on a template, and/or used in a filter to constrain the desired query.

New Item Start Date

The new item start date holds the date that the item should first be available for sale. This attribute could be used in two different scenarios:

- To track sales trends, beginning with the new item start date, in order to see how quickly the item is up trending.
- To perform exception reporting to ensure that no sales were recorded prior to the new item start date. This type of reporting would be done for licensed products that have supplier-driven release dates (such as Disney movies).

A report using new item start date would show sales trend for items with new item start date in the last month (for example, greater than 12-9-00).

This is modeled as a Joint-Child Attribute, establishing the relationship of Item-Location. This Joint-Child Attribute can be displayed on a template, and/or used in a filter to constrain the desired query.

Presentation Method

This attribute defines how an item is displayed (for example, shelf, j-hook, pegged). This allows you to pull sales information by this attribute; for example, sales for pegged item versus shelved.

Primary Supplier Indicator

When more then one Supplier is set up for an item, the Primary Supplier indicator will be the defaulted Supplier for cost and other reporting. Once merchandise is received into stock on hand, visibility to which Supplier provided the inventory, when more then one Supplier is attached to the item will lose visibility. Therefore, when comparing inventory units and inventory costs, the cost of the primary supplier will be used.

This is modeled as a Joint-Child Attribute establishing the relationship of Item-Supplier-Location. This attribute can be displayed on a template, and used in a filter to constrain the desired query.

Re-orderable Indicator

The re-orderable indicator signifies whether the store may re-order the item. For example, you can run an exception report of items where the re-orderable indicator is set to *No* and selling is continuing

This is modeled as a Joint-Child Attribute, establishing the relationship of Item-Location. This Joint-Child Attribute can be displayed on a template, and/or used in a filter to constrain the desired query.

Reward Club Eligible Indicator

This attribute indicates whether the item is valid for various types of bonus point or award programs at the location. This attribute would likely be referenced when analyzing sales trends on products. An item may sell more strongly in a state that allows for bonus points to be accrued on its sales, versus a state that disallows point accumulation on certain products

A possible report is sales by reward club ineligible value for a given region/category.

This is modeled as a Joint-Child Attribute, establishing the relationship of Item-Location. This Joint-Child Attribute can be displayed on a template, and/or used in a filter to constrain the desired query.

Unauthorized Indicator

This attribute indicates that sales should not be processed for the item at the location (that is, for safety recalls of products). Exception tracking of sales on items flagged *unauthorized* allows a company to verify compliance to the recall.

This is modeled as a Joint-Child Attribute, establishing the relationship of Item-Location. This Joint-Child Attribute can be displayed on a template, and/or used in a filter to constrain the desired query.

VPN

This attribute indicates the vendor product number as set up for an item and may represent the supplier style number for an item.

This is modeled as a Joint-Child Attribute, establishing the relationship of Item-Location. This Joint-Child Attribute can be displayed on a template, and/or used in a filter to constrain the desired query.

Competitor pricing

This table summarizes the joint-child attributes in competitor pricing, whose detailed descriptions follow.

Joint-Child Attribute Name	Joint-Children	Description
Competitor Multi Units Incentive	Competitor Pricing	Identifies the multiple incentive pricing type if a multiple pricing method was in place for the item when it was competitively shopped.
Competitor Offer Type	Competitor Pricing	Provides detail as to what kind of promotion the competitor’s product was on when it was competitively shopped.
Competitor Store Distance	Competitor Location	Indicates the distance between the competitor location and the owned location.
Competitor Store Distance UOM	Competitor Location	Indicates the Unit of Measure utilized by the Distance Joint-Child Attribute.

Joint-Child Attribute Name	Joint-Children	Description
Competitor Store Rank	Competitor Location	Indicates the priority of the competitor in relation to comparing prices.
Competitor Target Ind	Competitor Location	Indicates which competitor in the ranked list for the owned location is used for rules based pricing.

Competitor Multi Units Incentive

Competitor Multi Units Incentive is mainly referenced as a type of price (for example, 2 for 1.00, 3 for 1.45, and so on). You may want to only see the competitor multi unit incentive pricing and compare it to your prices for the same period.

This is modeled as a Joint-Child Attribute, Competitor Multi Units Incentive, establishing the relationship of Location, Competitor Store, Item and Day. This Joint-Child Attribute can be displayed on a template, and/or used in a filter to constrain the desired query.

Competitor Offer Type

This Joint-Child Attribute indicates whether the item was on regular or promotional pricing at the time of the competitive shop. A report you may want returned is one that shows you where your competitor was priced promotionally and you were priced regularly. Also, you would want to be able to filter on the type so that you can look at your pricing strategies separately.

This is modeled as a Joint-Child Attribute, Competitor Multi Units Incentive, establishing the relationship of Location, Competitor Store, Item and Day. This Joint-Child Attribute can be displayed on a template, and/or used in a filter to constrain the desired query.

Competitor Store Distance / Competitor Store Distance UOM

These Joint-Child Attribute references the distance that the competitor's location is to the owned location it is associated to. Used in a report, you may want to filter on the distance to pull only competitors within a certain radius of your own store. For example: you can see the past month's competitor pricing history, compared to your own prices, only for competitor locations with a distance of 10 (distance) miles (distance UOM) or less.

This is modeled as two joint-child attributes, Competitor Store Distance and Competitor Store Distance UOM, establishing the relationship of Competitor Store-Store. These joint-child attributes can be displayed on a template, and/or used in a filter to constrain the desired query.

Competitor Store Rank

This Joint-Child Attribute references the assigned rank given to a competitor location by the category manager and equates to the competitor's impact on the owned location's price strategy.

Example: A price change at a competitor location ranked 1 would have a greater impact on your decision to change retails than that of a competitor ranked 3.

Used in a report, you may want to filter on the rank to enable decision-making.

Example: (1) Show the past month's competitor pricing history, compared to your own prices, only for competitors ranked 1. (2) Show the past month's competitor pricing history, compared to your own prices, for all competitor locations, and show what their ranking is. This tells you if you have the right competitor ranked 1.

This is modeled as a Joint-Child Attribute, establishing the relationship of Competitor Store and Location. This Joint-Child Attribute can be displayed on a template, and/or used in a filter to constrain the desired query.

Competitor Target indicator

This Joint-Child Attribute identifies which competitor is driving the competitive price. This attribute is also used to filter, for example, compare competitor prices to owned prices only where Competitor Target indicator is 'Y'.

This is modeled as a Joint-Child Attribute, Competitor Target Indicator, establishing the relationship of Competitor Store-Store. This Joint-Child Attribute can be displayed on a template, and/or used in a filter to constrain the desired query.

Pricing

This table summarizes the joint-child attributes in pricing, whose detailed descriptions follow.

Joint-Child	Hierarchy	Description Attribute Name
Selling UOM	Pricing Qualities	Selling unit of measure represents the unit of measure in which an item is sold on a specified day at a specified location.
Multi Selling UOM	Pricing Qualities	Multi Selling unit of measure represents the multiple of units in which an item is sold on a specified day at a specified location.

Multi Selling UOM / Selling UOM

These two attributes (one for items priced in multiples, the other for single unit pricing) indicate the unit of measure that the item price reflects. In other words, are you selling in pounds, kilograms, or each? These are shown on the report when indicating the retail at which the item is selling. You need to know if you are selling the item correctly (for example, watermelons selling at .99 per pound is an entirely different price than watermelons selling at .99 per each).

This is modeled as two joint-child attributes, Multi Selling UOM and Selling UOM, establishing the relationship of Competitor Store-Store. This Joint-Child Attribute can be displayed on a template, and/or used in a filter to constrain the desired query.

Appendix C – Transformations

Types of transformations

There are two types of transformations: table-based transformations and expression-based transformations.

- Table-based transformations use a relationship table in the warehouse to define the transformation from one time period to another.
- Expression-based transformations implement transformations by using a mathematical expression.

All of RDW's transformations are table-based except for 'Last Year,' 'Next Year' (at the year level), 'Last Line Media Year', and 'Last Header Media Year', which are expression-based. Table-based transformations are only used when the relationship between the two attributes cannot be expressed mathematically. Since RDW uses fiscal calendar years, it is not possible to use mathematical expressions to define transformations.

Mapping Types for table-based transformations

1 **One-to-one mapping**. One-to-one mapping is when you map **one** period of time to **one** prior or future period of time. For example, 'Last Year' mapped at the day level relates a day in the current year to a particular day in a previous year. To better understand the One-to-one mapping, see the table below:

DAY_IDNT	LAST_YR_DAY_IDNT
1997001	1996001
1997002	1996002
1997003	1996003
...	...

The DAY_IDNT 1997001 is mapped to only one LAST_YR_DAY_IDNT (1996001), and the LAST_YR_DAY_IDNT 1996001 is also only mapped to one DAY_IDNT (1997001).

2 **Many-to-many mapping**. Many-to-many mapping is when an entity A is mapped to many entity Bs, and an entity B is mapped to many entity As. To-date transformations are examples of Many–to-many mapping. For instance, 'Week to Date' includes every date up to and including the value of the day attribute. To better understand the Many-to-many mapping, see the table below:

DAY_IDNT	WTD_DAY_IDNT
1999001	1999001
1999002	1999001
1999002	1999002
1999003	1999001
1999003	1999002
1999003	1999903
…	…

The DAY_IDNT 1999002 is mapped to many WTD_DAY_IDNT's (1999001 and 1999002), and the WTD_DAY_IDNT 1999002 is mapped to many DAY_IDNT's (1999002 and 1999003). Therefore, you have a many to many mapping.

Time transformations

Time transformations are used to compare values from different time periods. This year versus last year and month-to-date comparisons are examples of common time transformations. Transformations are useful for discovering and analyzing time-based trends in your data.

Any transformation can be included as part of the definition of a metric to allow a metric to assume the properties of the transformation. For example, applying the 'Last Year' transformation to a 'Sales Value' metric effectively creates a 'Sales Value (Last Year)' metric that calculates the sales for last year. Multiple transformations can be applied to the same metric.

RDW time transformation levels

Each time transformation in RDW is defined at all the levels applicable for that transformation. For example, the ‘Last Week’ transformation is defined at the day and week levels; ‘Last Month’ is defined at the day, week, and month levels; ‘Last Year’ at the day, week, month, quarter, half-year and year levels, and so on. This is done for better query performance.

Transformation list

The following list describes the transformations in RDW. See the *Transformation mappings* section later in this chapter for mappings of each transformation.

Last Week

Returns corresponding last week fact data for the time period selected.

Last Month

Returns corresponding last month fact data for the time period selected.

Last Period

Returns corresponding last period fact data for the time period selected.

Last Quarter

Returns corresponding last quarter fact data for the time period selected.

Last Half Year

Returns corresponding last half-year fact data for the time period selected.

Last Year

Returns corresponding last year fact data for the time period selected.

LFL Last Year

Returns corresponding like-for-like last year fact data for the time period selected.

Last Header Media Year

Returns corresponding last customer order header media year fact data for the time period selected.

Last Line Media Year

Returns corresponding last customer order line media year fact data for the time period selected.

Next Year

Returns corresponding next year fact data for the time period selected.

Week to Date

Returns corresponding week-to-date fact data for the time period selected.

Month to Date

Returns corresponding month-to-date fact data for the time period selected.

Period to Date

Returns corresponding period-to-date fact data for the time period selected.

Quarter to Date

Returns corresponding quarter-to-date fact data for the time period selected.

Half Year to Date

Returns corresponding half-year-to-date fact data for the time period selected.

Year to Date

Returns corresponding year-to-date fact data for the time period selected.

Plan Season to Date

Returns corresponding plan season-to-date fact data for the time period selected.

Transformation mappings

Day level

Transformations at the day level for a one-to-one mapping relate a day of a specified time period to a day of another. For example, the transformation at the day level for 'Last Week' maps a day of a particular week to the corresponding day of the previous week; the transformation at the day level for 'Last Month' maps a day of a particular month to the corresponding day of the previous month. Below is an example of a day-level mapping for the 'Last Week' transformation.

Last week by day

DAY_IDNT	LAST_WK_DAY_IDNT
1997001	1996358
1997002	1996359
…	…
1997365	1997358
1997366	1997359
…	…
1997371	1997364
1998001	1997365
…	…
1998007	1997371
1998008	1998001
...	...
1998364	1998357
…	…

Transformations at the day level for a many-to-many mapping relate a day of a specified time period to the corresponding day(s). For example, the transformation at the day level for 'Week to Date' maps a day of a particular week to the corresponding days included in that week up to that day; the transformation at the day level for 'Month to Date' maps a day of a particular month to the corresponding days included in that month up to that day. Below is an example of a day-level mapping for the 'Week to Date' transformation.

Week to date by day

DAY_IDNT	WTD_DAY_IDNT
1999001	1999001
1999002	1999001
1999002	1999002
...	...
1999007	1999001
1999007	1999002
1999007	1999003
1999007	1999004
1999007	1999005
1999007	1999006
1999007	1999007
1999008	1999008
1999009	1999008
1999009	1999009
…	…

Week level

Transformations at the week level for a one-to-one mapping relate a week of a specified time period to a week of another. For example, the transformation at the week level for 'Last Month' maps a week of a particular month to the corresponding week of the previous month; the transformation at the week level for 'Last Quarter' maps a week of a particular quarter to the corresponding week of the previous quarter. Below is an example of a week-level mapping for the 'Last Month' transformation.

Last month by week

WK_IDNT	LAST_MTH_WK_IDNT
199701	199649
199702	199650
...	...
199753	199749
199801	199750
...	...
199804	199753
199805	199801
...	...
199852	199848
…	…

Transformations at the week level for a many-to-many mapping relate a week of a specified time period to the corresponding week(s). For example, the transformation at the week level for 'Month to Date' maps a week of a particular month to the corresponding weeks included in that month up to that week; the transformation at the week level for 'Quarter to Date' maps a week of a particular quarter to the corresponding weeks included in that quarter up to that week. Below is an example of a week-level mapping for the 'Month-to-Date' transformation.

Month to date by week

WK_IDNT	MTD_WK_IDNT
199901	199901
199902	199901
199902	199902
...	...
199904	199901
199904	199902
199904	199903
199904	199904
199905	199905
199906	199905
199906	199906
…	…

Month level

Transformations at the month level for a one-to-one mapping relate a month of a specified time period to a month of another. For example, the transformation at the month level for 'Last Quarter' maps a month of a particular quarter to the corresponding month of the previous quarter; the transformation at the month level for 'Last Year' maps a month of a particular year to the corresponding month of the previous year. Below is an example of a month-level mapping for the 'Last Quarter' transformation.

Last quarter by month

MTH_IDNT	LAST_QTR_MTH_IDNT
199701	199610
199702	199611
...	...
199712	199709
199801	199710
...	...
199803	199712
199804	199801
...	...
199812	199809
…	…

Transformations at the month level for a many-to-many mapping relate a month of a specified time period to the corresponding month(s). For example, the transformation at the month level for 'Quarter to Date' maps a month of a particular quarter to the corresponding months included in that quarter up to that month; the transformation at the month level for 'Year to Date' maps a month of a particular year to the corresponding months included in that year up to that month. Below is an example of a month-level mapping for the 'Quarter to Date' transformation.

Quarter to date by month

MTH_IDNT	QTD_MTH_IDNT
199901	199901
199902	199901
199902	199902
199903	199901
199903	199902
199903	199903
199904	199904
199905	199904
199905	199905
...	...

Quarter level

Transformations at the quarter level for a one-to-one mapping relate a quarter of a specified time period to a quarter of another. For example, the transformation at the quarter level for 'Last Half Year' maps a quarter of a particular half-year to the corresponding quarter of the previous half-year; the transformation at the quarter level for 'Last Year' maps a quarter of a particular year to the corresponding quarter of the previous year. Below is an example of a quarter-level mapping for the 'Last Half Year' transformation.

Last half year by quarter

QTR_IDNT	LAST_HALF_QTR_IDNT
19991	19983
19992	19984
19993	19991
19994	19992
...	...

Transformations at the quarter level for a many-to-many mapping relate a quarter of a specified time period to the corresponding quarter(s). For example, the transformation at the quarter level for 'Half Year to Date' maps a quarter of a particular half-year to the corresponding quarters included in that half-year up to that quarter; the transformation at the quarter level for 'Year to Date' maps a quarter of a particular year to the corresponding quarters included in that year up to that quarter. Below is an example of a quarter-level mapping for the 'Half Year to Date' transformation.

Half year to date by quarter

QTR_IDNT	HTD_QTR_IDNT
19991	19991
19992	19991
19992	19992
19993	19993
19994	19993
19994	19994
…	…

Half-year level

Transformations at the half-year level for a one-to-one mapping relate a half-year of a specified time period to a half-year of another. For example, the transformation at the half-year level for 'Last Year' maps a half-year of a particular year to the corresponding half-year of the previous year. Below is an example of a half-year-level mapping for the 'Last Year' transformation.

Last year by half-year

HALF_IDNT	LAST_YR_HALF_IDNT
19971	19961
19972	19962
19981	19971
…	…

Transformations at the half-year level for a many-to-many mapping relate a half-year of a specified time period to the corresponding half-year(s). For example, the transformation at the half-year level for 'Year to Date' maps a half-year of a particular year to the corresponding half-years included in that year up to that half-year. Below is an example of a half-year-level mapping for the 'Year to Date' transformation.

Year to Date by half-year

HALF_IDNT	YTD_HALF_IDNT
19991	19991
19992	19991
19992	19992
...	...

Year level

Transformations at the year level is expression based and maps a year of a specified time period to a year of another time period. For example, the transformation at the year level for 'Last Year' maps a year of a particular year to the corresponding year of the previous year. Below is the mathematical expression used for defining the 'Last Year' transformation.

YR_IDNT - 1

Time transformations for RDW's 4-5-4, Gregorian, and 13-period calendars

Mappings for RDW's time transformations are calculated according to the type of calendar a client is using, i.e., 4-5-4, Gregorian or 13-period. There are three calendar configurations supported in RDW: 4-5-4 only, 4-5-4 and Gregorian together, or 13 period only.

Time transformations for the RDW 4-5-4 time calendar

The RDW 4-5-4 year is a year that contains a series of 4-week, 5-week and 4-week months. Thus, a typical year includes 364 days, 52 weeks, 12 months, 4 quarters and 2 half-years. For a detailed explanation of the RDW 4-5-4 time calendar, please see section Time Calendar in Chapter 3.

Based on the figures above, a 4-5-4 calendar's last year mapping at the day level is then calculated as 364 days earlier than the day in question. In the same vein, a 4-5-4 calendar's last year mapping at the week, month, quarter, and half-year levels are calculated as 52 weeks, 12 months, 4 quarters, and 2 half-years earlier, respectively.

Similar logic applies for last half-year, last quarter and last week transformations. The table below illustrates the number of days, weeks, months, quarters or half-years that RDW uses to add or subtract to the time period in question for a particular time transformation.

Time Transformation	Day	Week	Month	Quarter	Half year	Year
Last year	-364	-52	-12	-4	-2	-1
Next year	+364	+52	+12	+4	+2	+1
Last half year	-182	-26	-6	-2	-1	N/A
Last quarter	-91	-13	-3	-1	N/A	N/A
Last month	N/A	N/A	-1	N/A	N/A	N/A
Last week	-7	-1	N/A	N/A	N/A	N/A

Last month day calculations are not performed because the 4-5-4 time calendar can frequently have five-week months. Therefore the last month day will be inaccurate if it were to always be calculated as a day four weeks ago.

Time transformations for the RDW Gregorian time calendar

A Gregorian year is divided up into 12 months of 30 or 31 days with February having 28 or 29 depending on if the year is a leap year. This gives a year of 365 or 366 days. According to the Gregorian calendar, leap years occur in every year divisible by 4. The Gregorian year is dependent upon the start_of_half_month from RMS source system. For example if start_of_half_month =2, then the Gregorian 1st day start on Feb 1st of the same year, the Gregorian 1st month starts in February, the Greogrian 1st quarter contains February, March and April, the Gregorian 1st half year contains February, March, April, May, June and July. This Gregorian year will start on Feb this year until January next year. If start_of_half_month = -12, the Gregorian 1st day starts on December 1st the preivous year, the Gregorian 1st month starts on December the previous year, the Gregorian 1st quarter contains December previous year, January and February current year and so on.

Based on the figures above, a Gregorian calendar's last year mapping at the day level is then calculated as 365 days earlier than the day in question. In case of a leap year, the extra day Feb 29th will not be mapped to any date for previous year or next year as there is no Feb 29th in the previous year or next year. Last month day, half and quarter calculations are not performed because there is no business need for it. The Gregorian calendar's last year mapping at the week, month, quarter, and half-year levels are calculated as 12 months, 4 quarters, and 2 half-years earlier, respectively. Similar logic applies for calculating last year (half, quarter, month)'s month, quarter and half. The table below illustrates the number of days, months, quarters or half-years that RDW uses to add or subtract to the time period in question for a particular time transformation.

Gregorian Time Transformation	Day	Week	Month	Quarter	Half year	Year
Gregorian Last Year	-365	N/A	-12	-4	-2	-1
Gregorian Next Year	+365	N/A	+12	+4	+2	+1
Gregorian Last Half Year	N/A	N/A	-6	-2	-1	N/A
Gregorian Last Quarter	N/A	N/A	-3	-1	N/A	N/A
Gregorian Last Month	N/A	N/A	-1	N/A	N/A	N/A

Time transformations for the RDW 13-period time calendar

The RDW 13-period calendar is composed of 13 periods of 4 weeks each. Thus, a year typically includes 364 days, 52 weeks, 13 periods, and 4 quarters. For a detailed explanation of the RDW 13-period time calendar, see the *Time Calendar* section in Chapter 3.

Based on the figures above, a 13-period calendar's last year mapping at the day level is then calculated as 364 days earlier than the day in question. In the same vein, a 13-period calendar's last year mapping at the week, month, and quarter levels are calculated as 52 weeks, 13 periods, and 4 quarters earlier, respectively.

Similar logic applies for last quarter, last period and last week transformations. The table below illustrates the number of days, weeks, months, or quarters that RDW uses to add or subtract to the time period in question for a particular time transformation.

Time Transformation	Day	Week	Month	Quarter	Half year	Year
Last year	-364	-52	-13	-4	N/A	-1
Next year	+364	+52	+13	+4	N/A	+1
Last half year	N/A	N/A	N/A	N/A	N/A	N/A
Last quarter	-84	-12	-3	-1	N/A	N/A
Last period	-28	-4	-1	N/A	N/A	N/A
Last week	-7	-1	N/A	N/A	N/A	N/A

Due to the nature of the calculations above, in both 454 and 13-period fiscal calendars, the last year mapping for the 53rd week in a 53-week year is the first week of the 53-week year; the first week of the year following the 53-week year is the second week of the 53-week year, and so on. The entire year following the 53-week year will be offset by a week, but the transformation will return to its normal mapping after that year is over.

Media transformations

Clients using RDW's DTC functionality may wish to establish relationships among media, apart from time associations. A table, MEDIA_LFL_BY_MEDIA_DM, exists in RDW to allow clients to establish their own "last season's media" and "last year's media" relationships. This table allows many-to-many mappings between a surrogate media key and one or more corresponding last year's surrogate media key(s) and/or one or more corresponding last season's surrogate media key(s). No front-end transformation objects have been created in RDW. Refer to the RDW Data Model and API specifications for table layout.

Appendix D – Technical considerations

VLDB properties

VLDB properties are used to customize the SQL generated by the MicroStrategy engine. VLDB properties are important because:

- They permit full control of the database engine.
- Databases differ in syntax and optimization.
- They address the special needs of the data model.

VLDB settings are divided into nine categories. MicroStrategy provides default VLDB settings for each database it supports. The default VLDB settings for MicroStrategy are listed in the VLDB Settings chapter in the System Administration Guide.

Some VLDB settings have been changed for RDW to optimize database performance. The following is a list of modified settings by platform:

Oracle

Joins / Cartesian Join Warning – was changed from the *default Execute without warning to If only one side of Cartesian join contains warehouse tables, SQL wil be executed without warning*. This was done to prevent a Cartesian join on two or more warehouse tables, which is very costly and can present erroneous data.

Metrics / Null Check – was changed from the default *Check for NULL in temp table joins only* to *Check for NULL in all queries*. This was done to ensure that calculations with Nulls were handled consistently.

Metrics / Metric Join Type – was changed from the default *Inner Join* to *Outer Join.* This was done to ensure the desired result of combining results of two or more metrics and visibility to all of the data.

Query Optimizations / Engine Attribute Role Options – was changed from the default *Disable Engine Attribute Role Feature* (for upgraded projects) to *Enable Engine Attribute Role Feature.* This was done to enable the analytical engine's ability to treat attributes defined on the same column with the same expression as attribute roles.

DB2

Joins / Cartesian Join Warning – was changed from the *default Execute without warning to If only one side of Cartesian join contains warehouse tables, SQL wil be executed without warning*. This was done to prevent a Cartesian join on two or more warehouse tables, which is very costly and can present erroneous data.

Metrics / Null Check – was changed from the default *Check for NULL in temp table joins only* to *Check for NULL in all queries*. This was done to ensure that calculations with Nulls were handled consistently.

Metrics / Metric Join Type – was changed from the default *Inner Join* to *Outer Join.* This was done to ensure the desired result of combining results of two or more metrics and visibility to all of the data.

Query Optimizations / Engine Attribute Role Options – was changed from the default *Disable Engine Attribute Role Feature* (for upgraded projects) to *Enable Engine Attribute Role Feature*. This was done to enable the analytical engine's ability to treat attributes defined on the same column with the same expression as attribute roles.

Teradata

Joins / Cartesian Join Warning – was changed from the *default Execute without warning to If only one side of Cartesian join contains warehouse tables, SQL wil be executed without warning*. This was done to prevent a Cartesian join on two or more warehouse tables, which is very costly and can present erroneous data.

Metrics / Null Check – was changed from the default *Check for NULL in temp table joins only* to *Check for NULL in all queries*. This was done to ensure that calculations with Nulls were handled consistently.

Metrics / Metric Join Type – was changed from the default *Inner Join* to *Outer Join.* This was done to ensure the desired result of combining results of two or more metrics and visibility to all of the data.

Query Optimizations / Engine Attribute Role Options – was changed from the default *Disable Engine Attribute Role Feature* (for upgraded projects) to *Enable Engine Attribute Role Feature*. This was done to enable the analytical engine's ability to treat attributes defined on the same column with the same expression as attribute roles.

Joins / Join Type – was changed from the default *SQL 89 Inner Join and SQL 92 Outer Join* to *Join 92*. This corrected an error with some of the reports that were getting an improper column reference when joining tables.

Pre/Post Statements / Report Pre Statement 1– was updated to include the statement "*database RDW10DM*", where RDW10DM is the database owner of the warehouse tables. This is the first half of the process that alleviates the need for views from RDW10SYS user to the RDW10DM user.

Pre/Post Statements / Report Post Statement 1– was updated to include the statement "*database RDW10SYS*", where RDW10SYS is the middle tier system user. This is the second half of the process that alleviates the need for views from the RDW10SYS user to the RDW10DM user.

Tables / Table Prefix – was updated to include the statement "*RDW10SYS.*" where RDW10SYS is the middle tier system user. This determines where the temp tables are created for multi-pass SQL.

Database Specific Syntax

In general, database objects have been defined to permit cross-platform compatibility. However, a few objects have been altered to address issues specific to the platform. Below are the definitions of objects that differ across platforms.

Metrics

No of Promotion Days

(Oracle, TD) ApplySimple("Case When #1 is Null Then (#2-#0) Else (#1-#0) End", Min([Promotion Start Date]@ID), Max([Promotion End Date]@ID), Max([Calendar Date]@ID)) {~}

(DB2) ApplySimple("Case When #1 is Null Then (DAYS(#2)-DAYS(#0)) Else (DAYS(#1)-DAYS(#0)) End", Min([Promotion Start Date]@ID), Max([Promotion End Date]@ID), Max([Calendar Date]@ID)) {~}

Period Start Date – Store Start Date

(Oracle, TD) ApplySimple("Case When #1 is Null Then (#0-#2) Else (#0-#1) End", [Period Start Date], [Store Start Date], [Period Start Date])

(DB2) ApplySimple("Case When #1 is Null Then (DAYS(#0)-DAYS(#2)) Else (DAYS(#0)-DAYS(#1)) End", [Period Start Date], [Store Start Date], [Period Start Date])

Store End Date – Period End Date

(Oracle, TD) ApplySimple ("Case When #0 is Null Then ((#1-#2)+1) Else (#0-#2) End", [Store End Date], [Period End Date], [Period End Date])

(DB2) ApplySimple("Case When #0 is Null Then ((DAYS(#1)-DAYS(#2))+1) Else (DAYS(#0)-DAYS(#2)) End", [Store End Date], [Period End Date], [Period End Date])

Recency

(Oracle, TD) ApplySimple("(#1 - #0)", [Day Date], Max([Calendar Date]@ID) {[Time Calendar]})

(DB2) ApplySimple("(Days (#1) - Days (#0))", [Day Date], Max([Calendar Date]@ID) {[Time Calendar]})

Recency (Customer)

(Oracle, TD) ApplySimple("(#1 - #0)", [Day Date(Customer)(MO)], Max([Calendar Date]@ID) {[Time Calendar]})

(DB2) ApplySimple("(Days (#1) - Days (#0))", [Day Date(Customer)(MO)], Max([Calendar Date]@ID) {[Time Calendar]})

Recency by Year

(Oracle, TD) ApplySimple("(#1 - #0)", [Day Date], Max([Calendar Date]@ID) {[Time Calendar]})

RDW 10 (DB2) ApplySimple("(Days (#1) - Days (#0))", [Day Date], Max([Calendar Date]@ID) {[Time Calendar]})

Attributes

Age

(Oracle, TD) ApplySimple("extract (year from current_date) - extract (year from #0) ", [CUST_DT_OF_BIRTH])

(DB2) ApplySimple("year (current date) - (year(#0))", [CUST_DT_OF_BIRTH])

Facts

F_CMPTR_RECD_AGE

(Oracle, TD) ApplySimple("(CURRENT_DATE - #0)", [F_CMPTR_RECD_AGE])

*New column alias – F_COUNT_DAYS (Numeric 6,0)

(DB2) ApplySimple("Days (CURRENT DATE) - Days (#0)", [F_CMPTR_RECD_AGE])

*New column alias – F_COUNT_DAYS (Numeric 6,0)

Loss of database precision (DB2)

Problem

DB2 returns an error when a decimal divide operation returns a negative scale (SQL0419 – “Negative scale not valid”).

DB2 calculates the scale for decimal division using the following algorithm:

```
31 – NP + NS – DS
```

Where:

- NP is the precision of the numerator
- NS is the scale of the denominator
- DS is the scale of the numerator.

This error occurs because a decimal divide operation produces a negative scale.

Solution

This issue has been resolved by setting the MIN_DEC_DIV_3 database parameter to YES.

The MIN_DEC_DIV_3 database configuration parameter changes the resulting scale of a decimal arithmetic operation involving division. If the value is NO, the scale is calculated as 31-p+s-s'. If set to YES, the scale is calculated as MAX(3, 31-p+s-s'). This causes the result of decimal division to always have a scale of at least 3. Precision is always 31.

See TN041115 in the MicroStrategy Knowledge Base for a detailed description of this problem and additional references.

Zeros returned for compound metrics (DB2/Teradata)

Problem

A compound metric that divides two simple metrics returns zero. This occurs when division is performed between two expressions (functions or constants) that hold an integer data type. For example, count metrics always returns an integer. Zero is returned when the numerator is less than the denominator.

Solution

The issue has been resolved by modifying all count metrics to include an additional multiplication operation, which forces the data type to a non-integer numeric type.

Example:

Old formula for No of Customers:

```
(Count<Distinct=True>(Customer))
```

New formula for No of Customers:

```
(Count<Distinct=True>(Customer) * (1.0000001 / 1.0000001))
```

Metrics display two dashes (--) when removing attributes from the report view

Problem

In MicroStrategy SQL Generation Engine 7i - 7.2.0, an Aggregate NULL is generated when a metric cannot be aggregated to a higher level in a report view. This happens because the Analytical Engine cannot raise the level of the metric due the nature of the aggregate function. Refer to MicroStrategy Tech Note TN5200-072-0147 for more information.

Solution

Metrics that were defined with the following types of equations were updated to reflect the dynamic aggregation of sum.

Metrics with base formulas as follows:

Sum (A) – Sum (B)

Sum (A *B) – Sum (B * C)

This is done within each metric, by selecting the Subtotals / Aggregation tab and updating the Dynamic aggregation function from Default to Sum.

Attribute table mapping

RDW has several attributes that take advantage of “heterogenous mapping” and “attribute role” features. In order to use these features, these attributes are manually mapped to their corresponding columns in the database. Because these attributes are manually mapped, they will not automatically pick up new tables added to the project. The administrator must open up these attributes and manually map any new tables.

Heterogeneous mapping: Allows an attribute or fact to be mapped to columns with different names in different tables. For example, the ID for the Date attribute may be mapped to the DAY_DT column in the lookup table while mapping to ORDER_DT column in the fact table. In this case, the Date attribute is considered to be heterogeneously mapped to the columns DAY_DT and ORDER_DT.

Attribute Roles: Allows two or more attributes to be defined using the same lookup table and column. For example, date is used to represent the transaction date and also to represent the date when an order was taken. These two dates use the same data set for lookup information but represent two different values. The transaction date would represent the date of the transaction where the order date represents when that order was taken.

The following are the manually mapped attributes in the RDW Projects:

- Banner
- Cash Equivalent Ind
- CO Create Day
- CO Create Half
- Co Create Month
- CO Create Quarter
- CO Create Week
- Co Create Week Day
- CO Create Year
- Comp Ind
- Comp Week
- Day
- Drop Ship Ind
- Featured Item Ind
- Gift Ind
- Gregorian Day
- Gregorian Half Year
- Gregorian Month
- Gregorian Quarter
- Gregorian Year
- Half Year
- Header Media
- Header Media Season
- Header Media Year
- Item
- Last Month (Day)
- Last Quarter (Day)
- Last Year (Day)
- Last Year (Week)
- Line Media
- Line Media Season
- Month

- On Display Ind
- On Feature Ind
- Pack Ind
- Quarter
- Reference Item
- Sale Page Ind
- Web Store Feature Ind
- Week
- Weekday
- Week End Date
- Week Start Date
- Year

Appendix E – Project Documentation

The Project Documentation Wizard allows you to create online project documentation, including information about application objects, schema objects, and configuration objects. You can also choose to print the project documentation.

Using the Project Documentation Wizard:

1 Select Project Documentation from the Tools menu in Microstrategy Desktop. The Welcome page provides you with a summary of what you can do in the Project Documentation wizard.

2 Click Next to continue with the next page of the wizard, Projects.

3 In the list of available projects, select the project or projects (RDW workbench) to document.

Note: If you do not choose any projects, the only available objects will be configuration objects, that is, users and groups.

4 Click Next to access the next page of the wizard, Categories.

5 Select the object categories to be included in the documentation. The categories are:

- **Folders** display the properties of the folders at the beginning of the folder's content definition.
- **Application objects** are the objects used to create reports. They include drill maps, filters, metrics, consolidations, documents, prompts, HTML Documents, and other objects, including reports.
- **Schema objects** are objects created from the logical model. Examples include facts, attributes, and hierarchies.
- **Configuration objects** are administrative and connectivity-related objects, such as users and groups.

6 Click Next to access the next page of the wizard, Options by Category.

7 Set options for each object category you selected in the previous page. For each category, you can include

- all the available information by selecting the category
- a subset of the information, such as Basic Properties, Definition, or Advanced Definition
- Note: Definition is not available for folders. Advanced Definition is not available for folders and configuration objects.
- individual properties, such as Location or Description under Basic Properties

Basic Properties includes information such as Creation Time, Owner, and ID. The information included in the Definition varies depending on the object type selected. For example, the Definition of a filter is an expression and the Definition of a metric is a formula. Similarly, Advanced Definition also varies.

8 Click Next to access the next page of the wizard, Options by Type.

9 Set options for each object type. Object types are metrics, reports, attributes, facts, users, and so on.
The options set on the Options by Category page are used as the defaults on this page. For example, the default rule for the attribute object type is the same as schema objects on the Options by Category page. You can override these defaults by selecting what to include in the project documentation files for each object type:

- all the available information for all the object types by selecting the category.
- all the available information for a particular object type by selecting that object type.
- a subset of the information, such as Basic Properties or Definition, for a particular object type.

Note: Definitions are available for base formulas, consolidations, custom groups, filters, metrics, prompts, documents, reports, templates, HTML Documents, attributes, facts, hierarchies, logical tables, transformations, users, and user groups. Advanced Definitions are available only for metrics, prompts, reports, templates, attributes, and transformations.

- individual properties, such as Location or Formula, for a particular object type.

  Click Next to access the next page of the wizard, Settings.

10 Click the setting type to change what options are displayed on the right. Settings are split into General, Paper, Formatting, and Images.
General
General settings include

- how to create the structure of the HTML files, which is how the objects are organized within the HTML files:
  - by folder, which creates a folder structure identical to the one in Desktop
  - by list, which organizes the objects by object type
  - by both folder and list, which creates both list and folder structures
- the number of objects included on each HTML page
- sorting
- whether to include hidden objects, including objects in hidden folders, such as object templates
- whether to include sections where all the properties are set to default, such as VLDB properties or report data options
- Note: If you do not include these sections, the properties are listed for non-default settings only. This setting applies only to the object definitions, not basic properties.

- the location in which to save the HTML files

  Paper

  The Paper options are applied to the printed HTML pages. By default, they also affect how the HTML pages are displayed. Clear the Apply the following options for HTML pages check box to apply these settings only to the print display.

  The settings include the following:

- Paper size: Choose from Letter (8.5" by 11"), Legal (8.5" by 14"), Folio (8.5" by 13"), Quatro (8.47" by 10.83"), or Custom.
- Paper width: Use this option to set the width for a custom paper size.
- Paper height: Use this option to set the height for a custom paper size.
- Orientation: Select Portrait (8.5" by 11" for letter) or Landscape (11" by 8.5" for letter).
- Top margin in inches.
- Bottom margin in inches.
- Left margin in inches.
- Right margin in inches.

  Formatting

  Select the font size for the text on the page.

  Images

  Select where to find the image files used in the HTML pages:

  a. Installation directory, which is the default. It is also where the original images are saved.

  b. Another folder, to copy the image files to a directory other than the installation directory. Specify the folder to use.

  c. Folder relative to the destination folder, to copy the image files to the Images folder in the folder specified in the General Settings.

  d. Click Next to access the next page of the wizard, Summary.

11 The Summary page displays the selections you made throughout the wizard. Click Finish to complete the process with selected options or click Back to make any necessary changes.

   Once you click Finish, a status bar appears at the bottom of the page. It tracks the progress of the documentation process.

Note: Depending on your selections and the size of your project, this process can take a few minutes.

12 Once the project documentation HTML files have been created, the Finished page opens.

   If you do not want to view the project documentation HTML files, clear the Open project documentation check box.

13 Click Next to print the files or Close to end the Project Documentation Wizard.