**Solution Development Plan**

Solution: NorthwindFoods

Owner: RRoot

Date: 08/15/12

Change Log

|  |  |  |
| --- | --- | --- |
| Who | When | What |
|  |  |  |
|  |  |  |

Summary

The Northwind Foods Company wants a BI Solution that will provide information to managers and employees about what products are being order by its customers. Currently reports have become more inaccurate and the solution must assist in solving that problem.

Expectations

1. The solution will store and present verified data.
2. The solution will allow for simple ad hoc queries.
3. The solution must include a data warehouse that is easy to use.
4. The solution should include an OLAP cube.
5. The solution should be simple to keep development and maintenance costs at a minimum.
6. A working prototype should be available in a short period of time.

OpenIssues

|  |  |  |
| --- | --- | --- |
| Who | When | What |
|  |  |  |
|  |  |  |

Closed Issues

|  |  |  |
| --- | --- | --- |
| Who | When | What |
|  |  |  |
|  |  |  |

# Solution Naming Conventions

ETL Staging Database (SQL Server)

|  |  |  |  |
| --- | --- | --- | --- |
| Object Type | Convention | Example | Description |
| Table | EtlTableName | EtlTimeTable | A table used to temporarily hold data for the ETL process |
| View | vEtlViewName | vEtlCastCustomerData | A saved select statement that provides ETL data |
| Stored Proc. | pEtlProcedureName | pEtlTransformCustomerNames | A set of saved statements that provides ETL data |
| Function | fEtlFunctionName | fEtlLookupValues | A saved select statement that provides ETL data |
| … |  |  |  |

Data Warehouse Database (SQL Server)

|  |  |  |  |
| --- | --- | --- | --- |
| Object Type | Convention | Example | Description |
| Fact Table | FactTableName | FactOrders | A table that holds measures and dimensional keys |
| Dimension Table | DimTableName | DimCustomers | A table that holds dimensional keys and descriptive dimensional attributes |
| View | vRptViewName | vRptOrdersByTitle | A saved select statement used for reporting |
| Stored Proc. | pRptProcedureName | pRptOrdersByTitle | A saved set of statements used for reporting |
| Function | fRptFunctionName | fRptOrdersByTitle | A saved select statement used for reporting |
| … |  |  |  |

ETL Processing Objects (Integration Services)

|  |  |  |  |
| --- | --- | --- | --- |
| Object Type | Convention | Example | Description |
| File Connection | NameOfFile | ZipCodeList | A SSIS File connection object |
| Database Connection | DatabaseName | Northwind | A SSIS DB connection object |
| Task | ObjectName ObjectType | Load DimCustomers Data Flow | A SSIS task object |
| Container | ObjectName ObjectType | Load FactTables Sequence Container | A SSIS container object |
| … |  |  |  |

OLAP Cube Database (Analysis Server)

|  |  |  |  |
| --- | --- | --- | --- |
| Object Type | Convention |  | Description |
| Data Source | NameOfDataWarehouse | DWNorthwind | A SSAS Data Source |
| D.S. View | NameOfConnectionNameOfSubject | DWNorthwindOrderFacts | A SSAS Data Source View |
| Dimension | DimNameOfSubject | DimCustomers | A SSAS Dimension |
| Cube | NameOfSubject | CubeOrdersFacts | A SSAS Cube |
| … |  |  |  |

Report Objects (Reporting Services)

|  |  |  |  |
| --- | --- | --- | --- |
| Object Type | Convention |  | Description |
| Shared Data Source | SharedObjectTypeNameOfSource | SharedDataSourceDWNorthwind | A DataSource that is shared between reports |
| Local Data Source | ObjectTypeNameOfSource | DataSourceDWNorthwind | A DataSource that is part on a individual report |
| Shared Data Set | SharedObjectTypeNameOfSubject | ShareDataSetOrdersByCustomers | A DataSet that is shared between reports |
| Local DataSet | ObjectTypeNameOfSource | DataSetOrdersByCustomers | A DataSet that is part on a individual report |
| Report Component | ObjectTypeNameOfSubject | TableOrderssByCustomers | A SSRS Report Component |
| … |  |  |  |

# *Original Source Objects*

***Data Files***

***OLTP Database Tables***

***Table Name: Customers***

*Description: Contains customer data*

*Columns*

|  |  |  |  |
| --- | --- | --- | --- |
| Column Name | Data Type | Example | Used in this version |
| CustomerID | nchar(5) | ALFKI | Yes |
| CompanyName | nvarchar(40) | Alfreds Futterkiste | Yes |
| ContactName | nvarchar(30) | Maria Anders | No |
| ContactTitle | nvarchar(30) | Sales Representative | No |
| Address | nvarchar(60) | Obere Str. 57 | No |
| City | nvarchar(15) | Berlin | Yes |
| Region | nvarchar(15) | NULL | Yes |
| PostalCode | nvarchar(10) | 12209 | No |
| Country | nvarchar(15) | Germany | Yes |
| Phone | nvarchar(24) | 030-0074321 | No |
| Fax | nvarchar(24) | 030-0076545 | No |

*Constraints*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Column Name | Primary Key | Foreign Key | Not Null | Check | Unique | Default |
| CustomerID | Yes | No | Yes | No | Yes | Yes |
| CompanyName | No | No | Yes | No | No | No |
| ContactName | No | No | No | No | No | No |
| ContactTitle | No | No | No | No | No | No |
| Address | No | No | No | No | No | No |
| City | No | No | No | No | No | No |
| Region | No | No | No | No | No | No |
| PostalCode | No | No | No | No | No | No |
| Country | No | No | No | No | No | No |
| Phone | No | No | No | No | No | No |
| Fax | No | No | No | No | No | No |

***Table Name:Employees***

*Description: Contains employee data*

*Columns*

|  |  |  |  |
| --- | --- | --- | --- |
| Column Name | Data Type | Example | Used in this version |
| EmployeeID | int | 1 | Yes |
| LastName | nvarchar(20) | Davolio | Yes |
| FirstName | nvarchar(10) | Nancy | Yes |
| Title | nvarchar(30) | Sales Representative | No |
| TitleOfCourtesy | nvarchar(25) | Ms. | No |
| BirthDate | datetime | 1948-12-08 00:00:00.000 | No |
| HireDate | datetime | 1992-05-01 00:00:00.000 | No |
| Address | nvarchar(60) | 507 - 20th Ave. E. Apt. 2A | No |
| City | nvarchar(15) | Seattle | No |
| Region | nvarchar(15) | WA | No |
| PostalCode | nvarchar(10) | 98122 | No |
| Country | nvarchar(15) | USA | No |
| HomePhone | nvarchar(24) | (206) 555-9857 | No |
| Extension | nvarchar(4) | 5467 | No |
| Photo | image(2147483647) | 0x151C2F0 | No |
| Notes | ntext(1073741823) | Education includes a | No |
| ReportsTo | int | 2 | No |
| PhotoPath | nvarchar(255) | http://accweb/emmployees/davolio.bmp | No |

*Constraints*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Column Name | Primary Key | Foreign Key | Not Null | Check | Unique | Default |
| EmployeeID | Yes | No | Yes | No | Yes | Yes |
| LastName | No | No | Yes | No | No | No |
| FirstName | No | No | Yes | No | No | No |
| Title | No | No | No | Yes | No | No |
| TitleOfCourtesy | No | No | No | No | No | No |
| BirthDate | No | No | No | No | No | No |
| HireDate | No | No | No | No | No | No |
| Address | No | No | No | No | No | No |
| City | No | No | No | No | No | No |
| Region | No | No | No | No | No | No |
| PostalCode | No | No | No | No | No | No |
| Country | No | No | No | No | No | No |
| HomePhone | No | No | No | No | No | No |
| Extension | No | No | No | No | No | No |
| Photo | No | No | No | No | No | No |
| Notes | No | No | No | No | No | No |
| ReportsTo | No | Yes | No | No | No | No |
| PhotoPath | No | No | No | No | No | No |

***Table Name: Orders***

*Description: Contains Order data*

*Columns*

|  |  |  |  |
| --- | --- | --- | --- |
| Column Name | Data Type | Example | Used in this version |
| OrderID | int | 10248 | Yes |
| CustomerID | nchar(5) | VINET | Yes |
| EmployeeID | int | 5 | Yes |
| OrderDate | datetime | 1996-07-04 00:00:00.000 | Yes |
| RequiredDate | datetime | 1996-08-01 00:00:00.000 | Yes |
| ShippedDate | datetime | 1996-07-16 00:00:00.000 | Yes |
| ShipVia | int | 3 | No |
| Freight | money | 32.38 | No |
| ShipName | nvarchar(40) | Vins et alcools Chevalier | No |
| ShipAddress | nvarchar(60) | 59 rue de l'Abbaye | No |
| ShipCity | nvarchar(15) | Reims | No |
| ShipRegion | nvarchar(15) | Demo | No |
| ShipPostalCode | nvarchar(10) | 51100 | No |
| ShipCountry | nvarchar(15) | France | No |

*Constraints*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Column Name | Primary Key | Foreign Key | Not Null | Check | Unique | Default |
| OrderID | Yes | No | Yes | No | Yes | Yes |
| CustomerID | No | No | No | No | No | No |
| EmployeeID | No | No | No | No | No | No |
| OrderDate | No | No | No | Yes | No | No |
| RequiredDate | No | No | No | No | No | No |
| ShippedDate | No | No | No | No | No | No |
| ShipVia | No | No | No | No | No | No |
| Freight | No | No | No | No | No | Yes |
| ShipName | No | No | No | No | No | No |
| ShipAddress | No | No | No | No | No | No |
| ShipCity | No | No | No | No | No | No |
| ShipRegion | No | No | No | No | No | No |
| ShipPostalCode | No | No | No | No | No | No |
| ShipCountry | No | No | No | No | No | No |

***Table Name: Order Details***

*Description: Contains data about each line items for an order*

*Columns*

|  |  |  |  |
| --- | --- | --- | --- |
| Column Name | Data Type | Example | Used in this version |
| OrderID | int | 10248 | Yes |
| ProductID | int | 11 | Yes |
| UnitPrice | money | 14.00 | Yes |
| Quantity | smallint | 12 | Yes |
| Discount | real | 0 | No |

*Constraints*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Column Name | Primary Key | Foreign Key | Not Null | Check | Unique | Default |
| OrderID | Yes | Yes | Yes | No | No | No |
| ProductID | Yes | Yes | Yes | No | No | No |
| UnitPrice | No | No | Yes | Yes | No | No |
| Quantity | No | No | Yes | Yes | No | No |
| Discount | No | No | Yes | Yes | No | No |

***Table Name: Products***

*Description: Contains data products*

*Columns*

|  |  |  |  |
| --- | --- | --- | --- |
| Column Name | Data Type | Example | Used in this version |
| ProductID | int | 1 | Yes |
| ProductName | nvarchar(40) | Chai | Yes |
| SupplierID | int | 1 | No |
| CategoryID | int | 1 | No |
| QuantityPerUnit | nvarchar(20) | 10 boxes x 20 bags | No |
| UnitPrice | money | 18.00 | Yes |
| UnitsInStock | smallint | 39 | No |
| UnitsOnOrder | smallint | 0 | No |
| ReorderLevel | smallint | 10 | No |
| Discontinued | bit | 0 | Yes |

*Constraints*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Column Name | Primary Key | Foreign Key | Not Null | Check | Unique | Default |
| ProductID | Yes | Yes | Yes | No | No | Yes |
| ProductName | No | No | Yes | No | No | No |
| SupplierID | No | No | No | No | No | No |
| CategoryID | No | No | No | No | No | No |
| QuantityPerUnit | No | No | No | No | No | No |
| UnitPrice | No | No | No | Yes | No | Yes |
| UnitsInStock | No | No | No | Yes | No | Yes |
| UnitsOnOrder | No | No | No | Yes | No | Yes |
| ReorderLevel | No | No | No | Yes | No | Yes |
| Discontinued | No | No | Yes | No | No | Yes |

***Table Name: Categories***

*Description: Contains data product categories*

*Columns*

|  |  |  |  |
| --- | --- | --- | --- |
| Column Name | Data Type | Example | Used in this version |
| CategoryID | int | 1 | Yes |
| CategoryName | nvarchar(15) | Beverages | Yes |
| Description | ntext(1073741823) | Soft drinks, coffees, teas, beers, and ales | No |
| Picture | image(2147483647) | Binary Data | No |

*Constraints*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Column Name | Primary Key | Foreign Key | Not Null | Check | Unique | Default |
| CategoryID | Yes | Yes | Yes | No | No | Yes |
| CategoryName | No | No | Yes | No | No | No |
| Description | No | No | No | No | No | No |
| Picture | No | No | No | No | No | No |

# Data Warehouse Objects

Data Warehouse Tables

Table Name: FactOrders

Description: Contains information about orders by customers, products, employees, and dates.

Columns

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Column Name | Data Type | Example | Max Value | Min Value | Invalid Examples |
| OrderId | Int | 1 | Int Max | > 0 | 0, -1, A |
| CustomerKey | Int | 1 | Int Max | Int Min | A |
| EmployeeKey | Int | 1 | Int Max | Int Min | A |
| ProductKey | Int | 1 | Int Max | Int Min | A |
| OrderDateKey | Int | 1 | Int Max | Int Min | A |
| RequiredDateKey | Int | 1 | Int Max | Int Min | A |
| ShippedDateKey | Int | 1 | Int Max | Int Min | A |
| OrderQuantity | Int | 1 | Int Max | > 0 | 0, -1, A |
| OrderPrice | Decimal(18,4) | 1.200 | Decimal Max | > 0 | 0, -1, A |

Constraints

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Column Name | Primary Key | Foreign Key | Not Null | Check | Unique | Default |
| OrderId | Yes | No | Yes | > 0 | No | No |
| CustomerKey | Yes | Yes | Yes | No | No | No |
| EmployeeKey | Yes | Yes | Yes | No | No | No |
| ProductKey | Yes | Yes | Yes | No | No | No |
| OrderDateKey | Yes | Yes | Yes | No | No | No |
| RequiredDateKey | Yes | Yes | Yes | No | No | No |
| ShippedDateKey | Yes | Yes | Yes | No | No | No |
| OrderQuantity | No | No | Yes | > 0 | No | No |
| OrderPrice | No | No | Yes | > 0 | No | No |

Table Name: DimCustomers

Description: Contains information about customers.

Columns

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Column Name | Data Type | Example | Max Value | Min Value | Invalid Examples |
| CustomerKey | Int | 1 | Int Max | Int Min | A |
| CustomerId | nVarChar(5) | TESTC | Max nChar | Min nChar | More than 5 char. |
| CustomerName | nVarChar(100) | TestCo | Max nChar | Min nChar | More than 100 char. |
| CustomerCity | nVarChar(50) | Seattle | Max nChar | Min nChar | More than 50 char. |
| CustomerRegion | nVarChar(50) | Washington | Max nChar | Min nChar | More than 50 char. |
| CustomerCountry | nVarChar(50) | USA | Max nChar | Min nChar | More than 50 char. |

Constraints

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Column Name | Primary Key | Foreign Key | Not Null | Check | Unique | Default |
| CustomerKey | Yes | No | Yes | No | Yes | No |
| CustomerId | No | No | Yes | No | No | No |
| CustomerName | No | No | Yes | No | No | No |
| CustomerCity | No | No | Yes | No | No | No |
| CustomerRegion | No | No | Yes | No | No | No |
| CustomerCountry | No | No | Yes | No | No | No |

Table Name: DimProducts

Description: Contains information about products.

Columns

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Column Name | Data Type | Example | Max Value | Min Value | Invalid Examples |
| ProductKey | Int | 1 | Int Max | Int Min | A |
| ProductId | Int | 1 | Max nChar | Min nChar | More than 5 char. |
| ProductName | nVarChar(100) | TestProd | Max nChar | Min nChar | More than 100 char. |
| ProductCategoryName | nVarChar(100) | Food | Max nChar | Min nChar | More than 50 char. |
| ProductStdPrice | Decimal(18,4) | 1.200 | Max nChar | Min nChar | More than 50 char. |
| ProductIsDiscontinued | nChar(1) | T,F | T | F | Y, n, More than 1 char. |

Constraints

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Column Name | Primary Key | Foreign Key | Not Null | Check | Unique | Default |
| ProductKey | Yes | No | Yes | No | Yes | No |
| ProductId | No | No | Yes | No | No | No |
| ProductName | No | No | Yes | No | No | No |
| ProductCategoryName | No | No | Yes | No | No | No |
| ProductStdPrice | No | No | Yes | No | No | No |
| ProductIsDiscontinued | No | No | Yes | In ('T','F') | No | No |

Table Name: DimEmployees

Description: Contains information about employees.

Columns

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Column Name | Data Type | Example | Max Value | Min Value | Invalid Examples |
| EmployeeKey | Int | 1 | Int Max | Int Min | A |
| EmployeeId | Int | 1 | Int Max | Int Min | A |
| EmployeeName | nVarChar(100) | TestEmp | Max nChar | Min nChar | More than 100 char. |
| ManagerKey | Int | 1 | Int Max | Int Min | A |
| ManagerId | Int | 1 | Int Max | Int Min | A |

Constraints

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Column Name | Primary Key | Foreign Key | Not Null | Check | Unique | Default |
| EmployeeKey | Yes | No | Yes | No | Yes | No |
| EmployeeId | No | No | Yes | No | No | No |
| EmployeeName | No | No | Yes | No | No | No |
| ManagerKey | No | Yes | Yes | No | No | No |
| ManagerId | No | Yes | Yes | No | No | No |

Table Name: DimDates

Description: Contains information about Dates.

Columns

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Column Name | Data Type | Example | Max Value | Min Value | Invalid Examples |
| DateKey | Int | 19900101 | 19901231 | 19900101 | A |
| FullDate | datetime | 1990-01-01 | 1990-12-31 | 1990-01-01 | A, |
| DateName | nVarChar(50) | January, 1, 1990 | December, 31, 1999 | January,1,1990 | Not a date |
| MonthKey | Int | 199001 | 199912 | 199001 | A, < 1, > 12 |
| MonthName | nVarChar(50) | January | December | January | Not a Month |
| QuarterKey | Int | 19901 | 19904 | 19901 | A, < 1, > 4 |
| QuarterName | nVarChar(50) | Q1 | Q4 | Q1 | Not a Quarter |
| YearKey | Int | 1990 | 1999 | 1990 | A, < 1990, > 1999 |
| YearName | nVarChar(50) | 1990 | 1999 | 1990 | Not a Year |

Constraints

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Column Name | Primary Key | Foreign Key | Not Null | Check | Unique | Default |
| DateKey | Yes | No | Yes | No | Yes | No |
| FullDate | No | No | Yes | No | No | No |
| DateName | No | No | Yes | No | No | No |
| MonthKey | No | No | Yes | No | No | No |
| MonthName | No | No | Yes | No | No | No |
| QuarterKey | No | No | Yes | No | No | No |
| QuarterName | No | No | Yes | No | No | No |
| YearKey | No | No | Yes | No | No | No |
| YearName | No | No | Yes | No | No | No |

Data Warehouse Views

None required

Data Warehouse Stored Procedures

None required

Data Warehouse Functions

None required

# ETL Staging Objects

This is a list of all the known ETL staging objects (tables, views, stored procedures, or functions)

ETL Staging Database Tables

None required

ETL Staging Database Views

None required

ETL Staging Database Stored Procedures

None required

ETL Staging Database Functions

None required

# ETL SSIS Objects

This is a list of all the known ETL SSIS objects

ETL SSIS Projects

ProjectName: DWNorthwindOrdersETL

Description: Contains packages for the Northwind Foods ETL processing

ETL SSIS Packages

Package Name: ETLProcessForDWNorthwindOrders.dtsx

Description: Contains tasks for clearing and loading the DWNorthwindOrders data warehouse database.

Connections

|  |  |  |
| --- | --- | --- |
| Connection Name | Type | Connection String |
| Northwind | OLE DB | Data Source=(local);Initial Catalog=Northwind;Provider=SQLNCLI11.1;Integrated Security=SSPI;Auto Translate=False; |
| DWNorthwindOrders | OLE DB | Data Source=(local);Initial Catalog=DWNorthwindOrders;Provider=SQLNCLI11.1;Integrated Security=SSPI;Auto Translate=False; |

Containers

|  |  |  |
| --- | --- | --- |
| Container Name | Type | Description |
| Prepare ETL Process | Sequence | Setup tasks to prepare for loading |
| Fill Dimension Tables | Sequence | Tasks and packages that fill the dimension tables |
| Fill Fact Tables | Sequence | Tasks and packages that fill the fact tables |
| End ETL Process | Sequence | Final task that complete the ETL process |

Tasks

|  |  |  |
| --- | --- | --- |
| Task Name | Type | Description |
| Drop Foreign Keys | Execute SQL Task | Removes Foreign key constraints from database |
| Clear All Tables | Execute SQL Task | Truncates data from all tables |
| Fill DimCustomers | Data Flow Task | Loads the DimCustomers table with data |
| Fill DimEmployees | Data Flow Task | Loads the DimEmployees table with data |
| Fill DimProducts | Data Flow Task | Loads the DimProducts table with data |
| Fill DimDates | Execute SQL Task | Loads the DimDates table with data |
| Add Null Date Lookup Values | Execute SQL Task | Add rows of data to the DimDates table that represent various types of null entries |
| Fill FactOrders | Execute SQL Task | Loads the FactOrders table with data |
| Add Foreign Key Constraints | Execute SQL Task | Places Foreign key constraints back into the database |

# OLAP Cubes Database Objects

OLAP Cubes

Cube Name:

Description:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Measure Name | Data Type | Example | Max Value | Min Value | Description |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

Dimensions

|  |  |
| --- | --- |
| Dimension | Dimension Key |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

OLAP Dimensions

Dimension Name:

Description:

Type:

Source:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute Name | Data Type | Example | Max Value | Min Value | Description |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

Dimension Name:

Description:

Type:

Source:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute Name | Data Type | Example | Max Value | Min Value | Description |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

*Reporting Objects*

***Excel Reports***

*Description:*

*Type:*

*Source:*

|  |  |  |
| --- | --- | --- |
| Field | Example | Description |
|  |  |  |
|  |  |  |

***Reporting Server Reports***

*Description:*

*Type:*

*Source:*

|  |  |  |
| --- | --- | --- |
| Field | Example | Description |
|  |  |  |
|  |  |  |