Database Answers

Best Practice in

Enterprise Data Migration

for Customer-Services

Barry Williams
barryw@databaseanswers.org

1.Management Summary

For over fifteen years I have been engaged in Assignments involving Enterprise Data Migration for a number of Industries, including Banks (Investment and Retail), Central and Local Government, Insurance, Logistics, Retail, Transport and Travel .

After every assignment I would think about the work that I had done, the problems I had solved and whether I had learned anything new to add to my Best Practice

Over a period of time, a number of Solution Patterns emerged.

These Patterns were of two types :-

- Data Models
- Layers in a Data Architecture

Then my Best Practice became an Approach that linked the Data Models and the Architecture.
There are four benefits :-

1. I can 'hit the ground running'
2. I can offer future Clients reduced costs
3. I can provide mentoring in Best Practice
4. The Approach is open-ended and can be extended and adapted to meet new requirements.

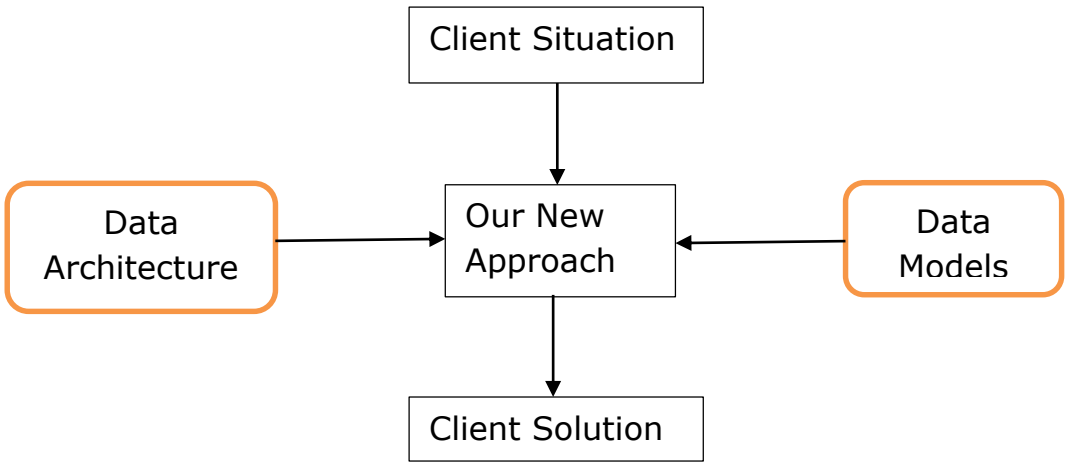
During this time, I have developed an Approach that help my Clients achieve savings in the time and cost of data migration Projects.

My Approach is based on a Layered Data Architecture that reflects Best Practice in Enterprise Data Migration.

It includes a Data Architecture with related Data Models.

I have applied this Approach to migration to the Clouds, including Big Data.

It traces the path of data from its origin from an Operational Data Store to its final destination in a Business Intelligence (BI) Layer with KPIs (Key Performance Indicator Indicators).



The remainder of this document provides details of the Approach.

2. Approach to Enterprise Data Migration

Our purpose is to present a new Approach to Enterprise Data Migration.

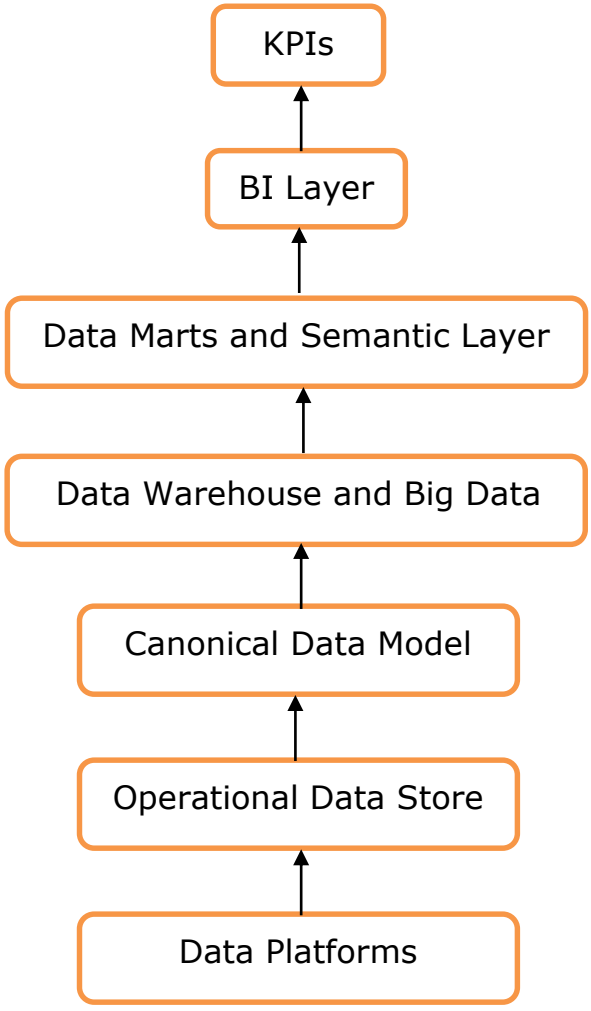
The first half contains Conceptual Data Models that are used in discussion with business users to establish the requirements.
Then Logical Data Models are used to define the details of the solutions to meet the Requirements.

A major Component is a series of Canonical Data Model.

3.Our Approach

3.1 Best Practice Data Architecture

We have designed a Layered Data Architecture which is discussed in the following Chapters.

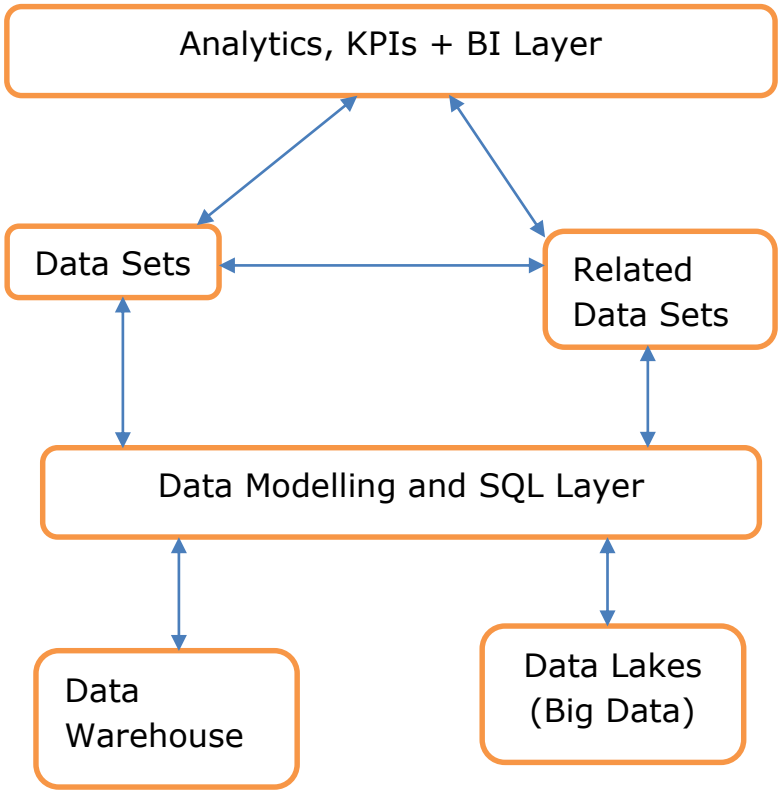


3.2 Analytics and Data Sets

This Data Model shows KPIs and a BI Layer :-

- http://www.databaseanswers.org/data_models/kpi_triangle/index.htm

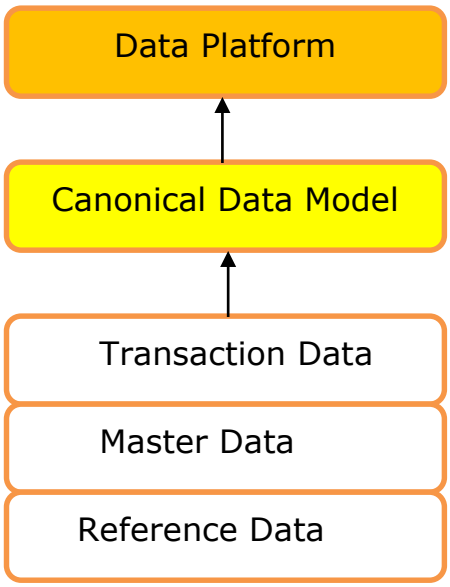
Some examples of KPIs for Customer-Services are Total Customer counts and Services Requested and Provided.
This Data Architecture shows the Components :-



3.3 Data Architecture

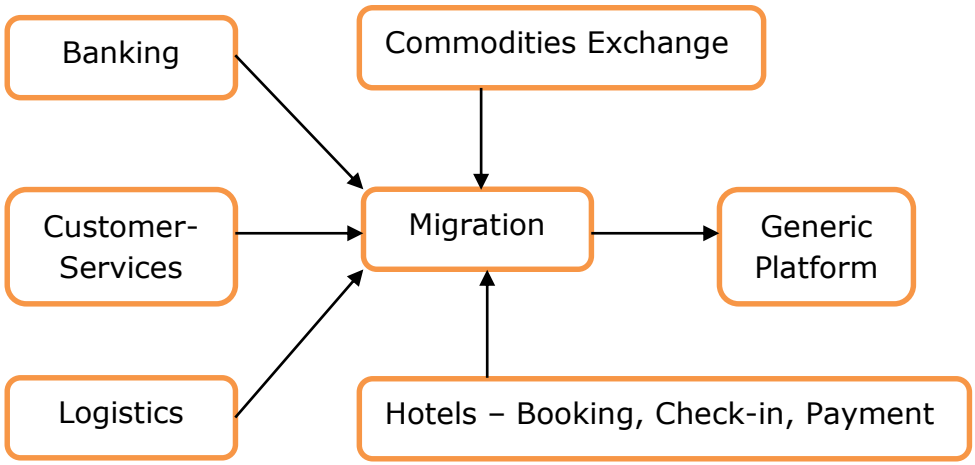
Our Target Data Architecture consists of different Layers :-

In Chapter 12 we have included a number of Logical Data Models to act as Templates.



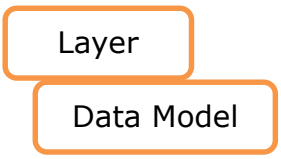
3.4 Proof-of-Concept (PoC)

Our PoC applies to five Industry Sectors – Banking, Commodities Exchange, Customer-Services, Hotels and Logistics :-



3.5 How it Works

Our PoC applies to three Industry Sectors – Banking, Customer-Services and Logistics.
For each of our Layers, we will control changes to a Data Model for each Layer:-



We use a Template to plan and control the implementation of Data Migration.

We start with a Template with names of SQL Scripts that create Tables.

We make changes, (usually adding fields) and apply strict Data Governance procedures to each Layer that is appropriate.

Nr.	Layer	Script Name	Initials	Change Date
1	KPI			
2	BI Layer			
3	Data Mart and Semantic Layer			
4	Data Warehouse			
5	Canonical Data Model			
5	Operational Data Store			
6	Data Platform			

3.6 Migration to the Clouds

Our Approach looks like this :-

4. KPIs

Key Performance Indicators ('KPIs') are very important in any business.

They can provide a valuable Alert facility which can keep senior management in touch their operational responsibilities.

They are playing an increasing part as mobile working as we move to a mobile-friendly world.

5. BI Layer

The Business Intelligence ("BI") Layer plays an important part by presenting information in a format that end-users find natural to use.

Tis data is derived from Data Marts or Dimensional Models that contain data grouped under common headings or Dimensions such as Time-Periods or Locations.

6. Data Marts and Semantic Layer

6.1 What ?

Data Marts are also called Dimensional Models.

The most basic Dimensions, such as Customers, Products, Locations and Time-periods.

Here is a useful entry in Wikipedia :-

- https://en.wikipedia.org/wiki/Data_mart

6.2 Semantic Layer

The Business Intelligence ("BI") Layer plays an important part by presenting information in a format that end-users find natural to use.

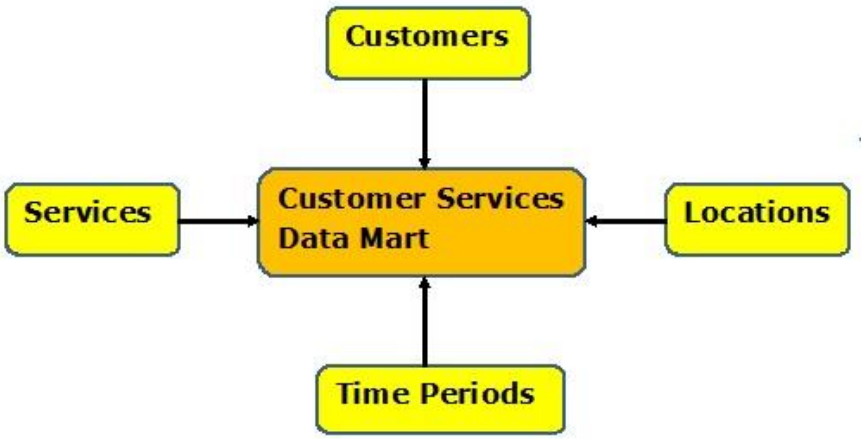
This often means that a Semantic Layer is added to translate technical terms to business-friendly terms.

The most common example is the translation of Party (a term that Data Modellers like, to Customer, Staff or Supplier, which are terms that end-users are comfortable with).

6.3 Customer Services

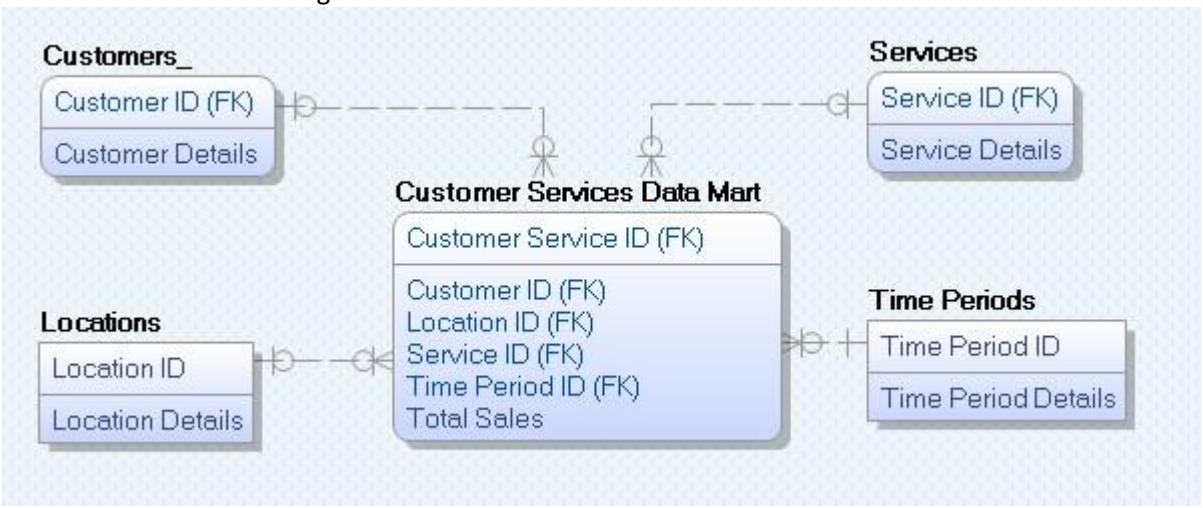
6.3.1 Conceptual Model

Here we show a very basic example of a Data Mart for Customer Services.
In it there are four Dimensions of Customers, Locations, Services and Time Periods.
The Facts include Total Customer Count ,Total Sales and Total Services by Locations and Time-Periods.



6.3.2 Logical Data Model

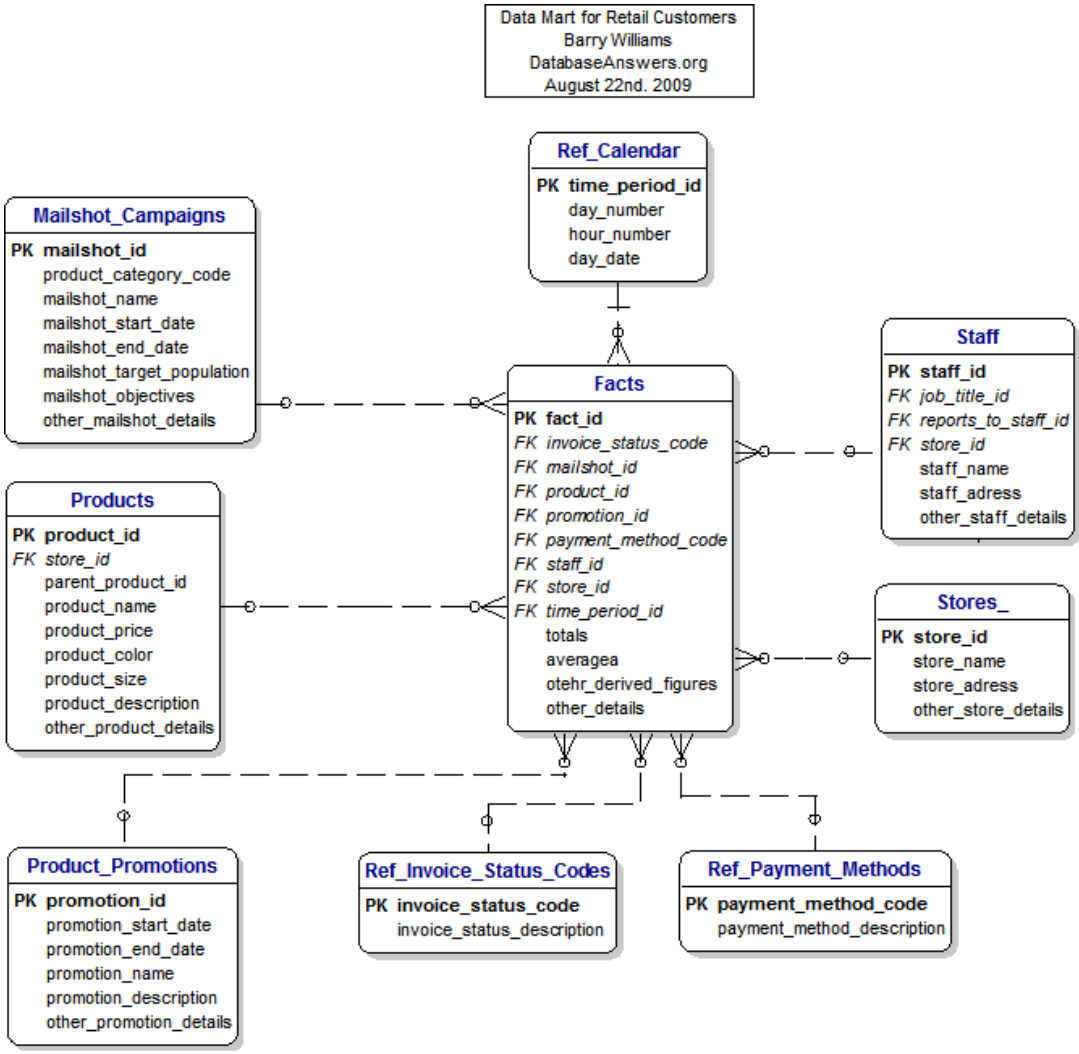
Here we show an Erwin Logical Data Model



6.4 Retail Customers Data Mart

Here is a model for a Retail Customers Data Mart :-

- http://www.databaseanswers.org/data_models/retail_customers/retail_customers_data_mart.htm



6.5 Performance Reports

We use the Data Mart to provide data for Performance Reports.
We can identify the 'Dimensions' as Customer, Location, Service and Time Period.

Customer	Location	Service	Time Period	Total Sales	Grand Total
Bruno Mars	London	Maintenance	1-April-2016	100	
James Brown	London	Retail	2-April-2016	500	
Richard Penniman	London	Retail	3-April-2016	1,000	
					1,600

7. Data Warehouse and Big Data

7.1 Discussion

We have included some links to Wikipedia to provide a consistent and objective perspective.

In our Data Warehouses we include Data Marts and Big Data.

This results in a clean Layered Data Architecture.

Data Warehouses are useful to provide a 'Single View of the Truth'.

Here is a Wikipedia link for Data Warehouses :-

- https://en.wikipedia.org/wiki/Data_warehouse

They also provide a guide to the data that is available for Enterprise Data Analysis.

They also support Data Governance

7.2 Wikipedia

Here is a Wikipedia link for Data Warehouses :-

- https://en.wikipedia.org/wiki/Data_warehouse

The Data Warehouse needs a Data Model for its foundation and we use our Canonical Data Model.

7.3 Big Data

A good start is the Wikipedia entry for Big Data :-

- https://en.wikipedia.org/wiki/Big_data

Big Data can be defined as high-volume data with variable structures that have to be modelled in a flexible manner that corresponds to the Entity-Attribute-Value paradigm (E-A-V).
Our Data Model for E-A-V looks like this :-

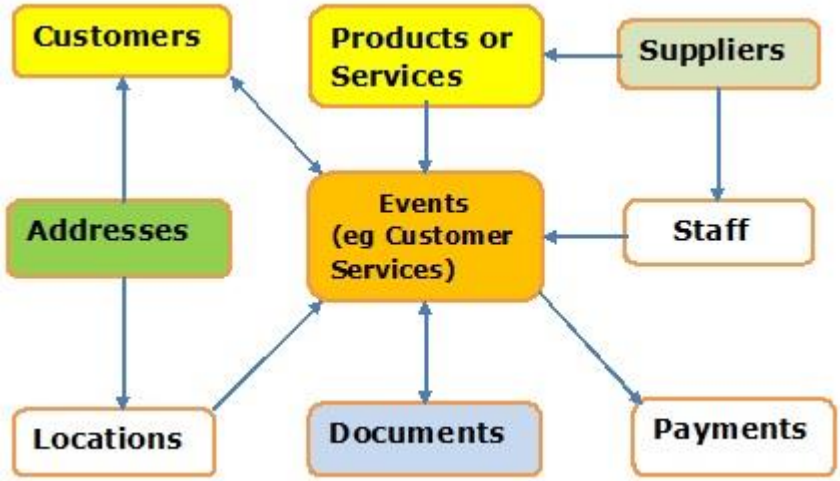
- http://www.databaseanswers.org/data_models/entity_attribute_values/index.htm

8. Canonical Data Model

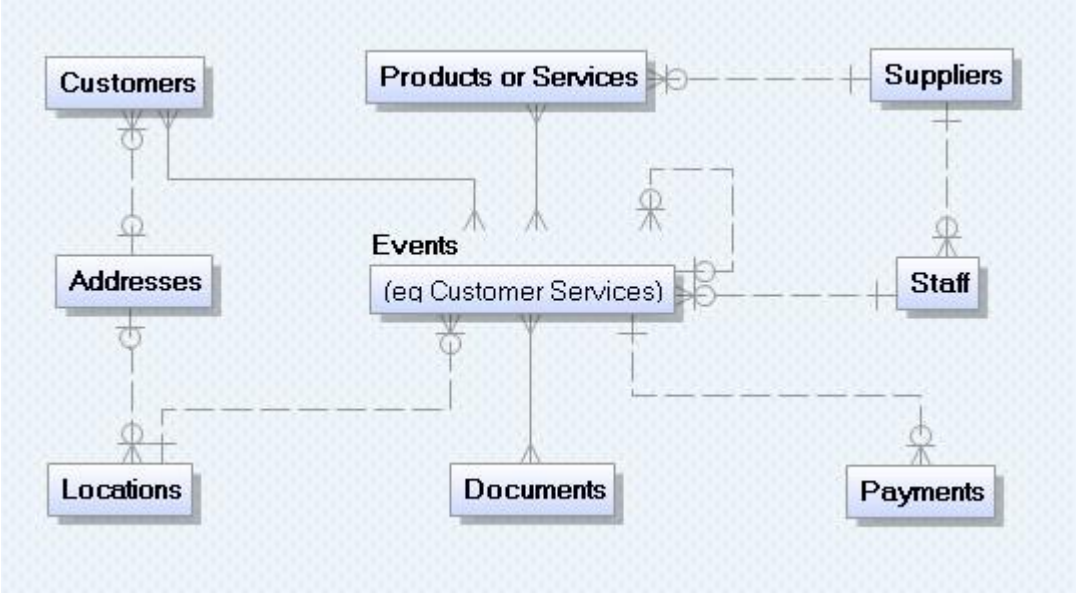
Here is a link for our Canonical Data Model :-

- http://www.databaseanswers.org/data_models/canonical_data_models/index.htm

Here is the Conceptual version of our Model :-



And here is the Logical version :-



9. Operational Data Stores

Now we add an Operational Data Store which is where we store data extracted data from our Operational and Third-Party Systems

Here is useful entry in Wikipedia :-

- https://en.wikipedia.org/wiki/Operational_data_store

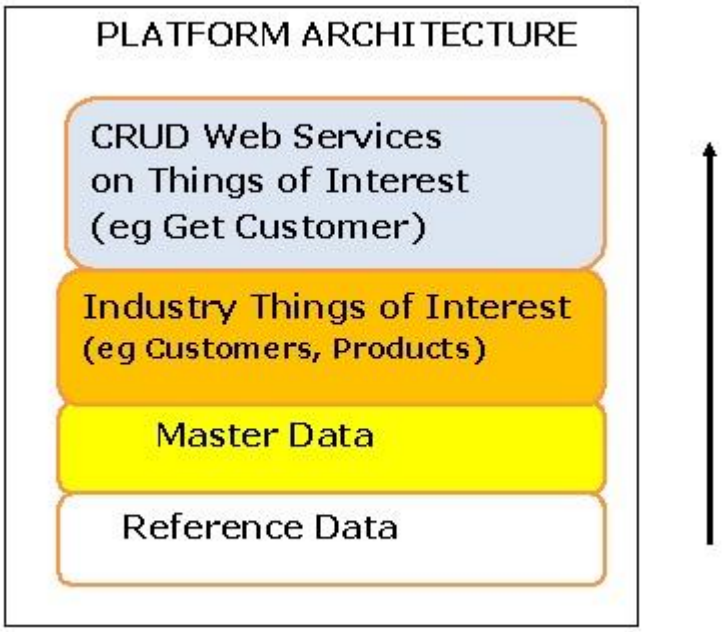
Operational Data Store
(CSV, Oracle's EBS,
SAP, Salesforce, etc)

10. Data Platforms

10.1 Layered Data Architecture

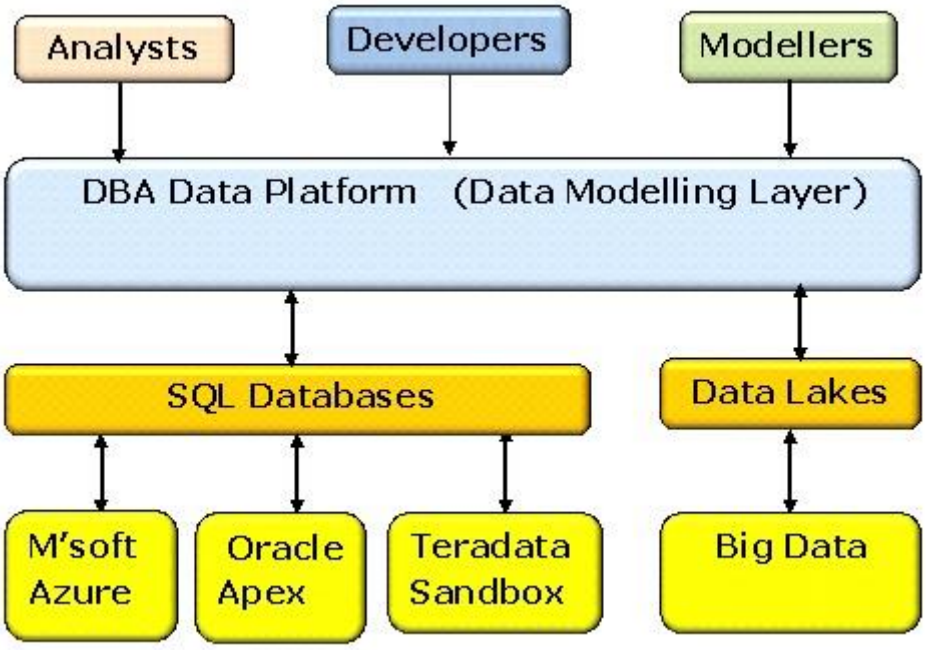
The Entities in the Operational Data Platform are derived from our Canonical Data Model :-

- http://www.databaseanswers.org/data_models/layered_service_delivery_platforms/index.htm



10.2 Top to Bottom

The Layers in this Data Platform include an SQL Layer and Data Lakes for Big Data.



11. Data Types

11.1 Master Data

Description of Master Data is frequently Products and Services
It can also include Customers depending on how frequently they change and the difficulties of achieving a 'Single View of a Customer'.

11.2 Reference Data

Reference Data is typically Codes and Type data.
On this page, we have listed the examples shown below :-

- http://www.databaseanswers.org/data_models/reference_database\available_reference_data.htm

Calendar	Records Day Dates with Business Days, Weekends, etc.. Can be used to validate Dates and to perform time-related calculations , such as interest payments.
CRM	Booking Status, Contact Channels, Contact Outcomes, Contact Reasons, Contact Status, Contact Type Codes
Customers	Address Types, Customer Type Codes, Product Categories, Service Types.
Financial	Payment Methods, Transaction Types
ISO	Country, Currency Codes
Personal	Gender Codes, Marital Status, Relationship Types
US States	From Alabama to Wyoming

12. Data Mapping

A typical migration would involve mapping data from a source Customer to a target Customer.

Data Migration is driven by definitions of Rules for Transformation of Source fields to Target fields.

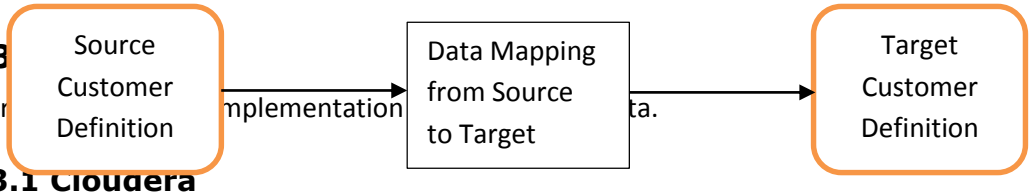
This mapping is often combined with validation.

Source field Name	Source field Data Type	Validation Rules	Target field name	Target field Data Type
Passenger	eg 12 Character	Eg >0	Customer	eg Auto-increment Number

The specification of the source fields might be provided by third-party product such as Safyr from Silwood Technology.

Here is the Silwood Web Site :-

- http://www.silwoodtechnology.com/



13

Her mplementation ta.

13.1 Cloudera

Cloudera offers the following features :-

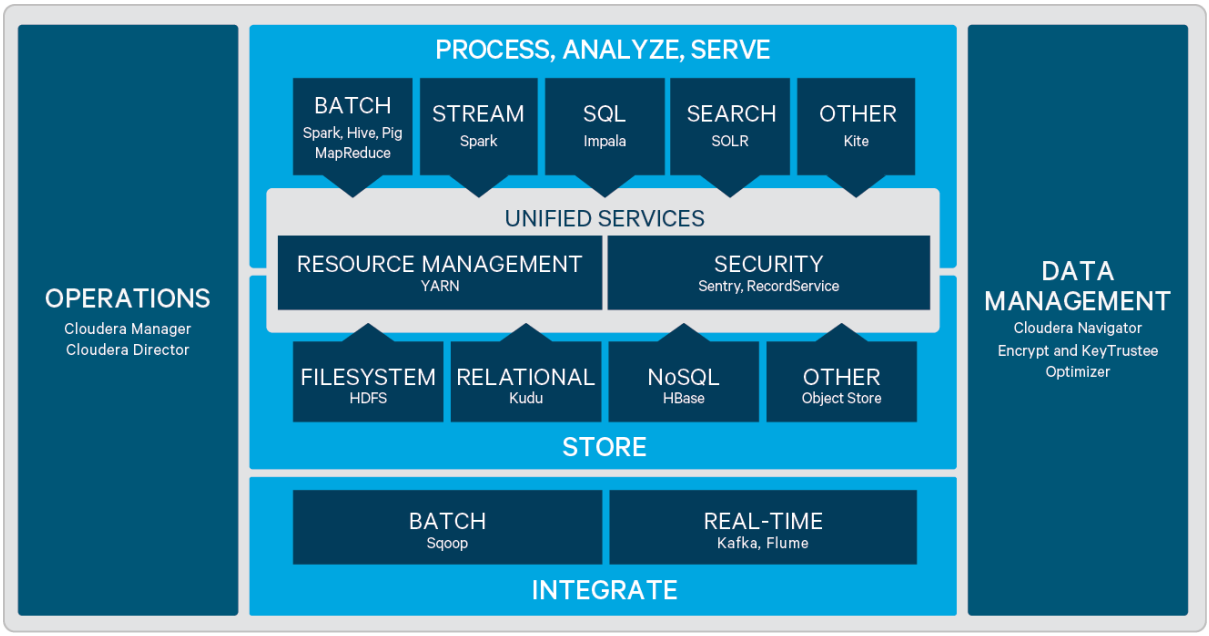
1. Targets 9 industries, including Financial Services, Retail and Technology
2. HDFS File System support
3. SQL Compatibility

You can check out their Web Site at :-

- www.cloudera.com

This shows the Cloudera facilities :-

- http://www.cloudera.com/products.html



13.2 Looker Data Platform

Looker offers some attractive features :-

1. A Data modelling Language called LookML that allows you to build customised metrics.
2. A Modelling Layer
3. Salesforce 'out-of-the-box' integration

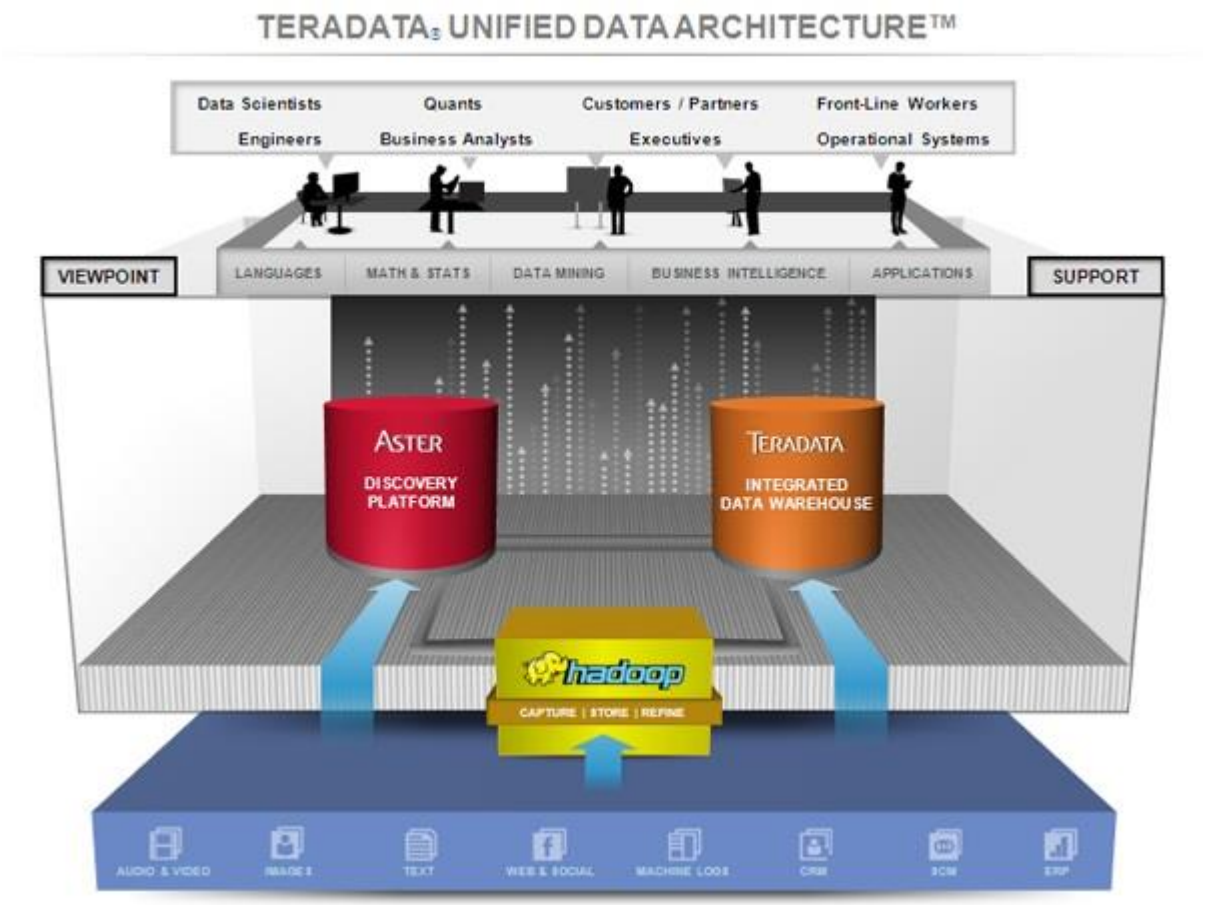
You can check out their Web Site at :-

- www.looker.com/product

13.3 Teradata

Teradata offers a Unified Data Architecture which is Integrated with their Enterprise Data Aster Analytics. We show it on this page of our Web Site :-

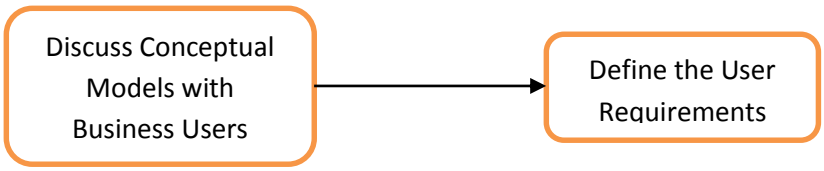
- www.databaseanswers.org/data_models/big_data/Teradata_Unified_Data_Architecture.htm



14. Data Models

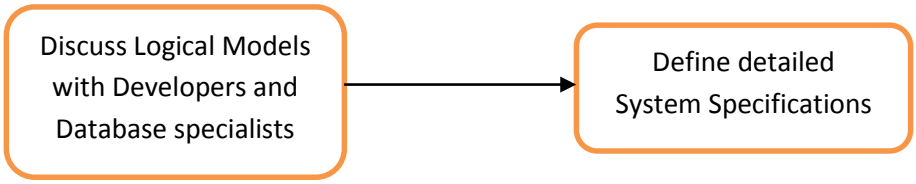
14.1 Using Conceptual Models

Best Practice recommends that Conceptual Models are used to establish common ground for discussion with Business Users.



14.2 Using Logical Models

For Logical Models Best Practice recommends their use for detailed discussions to define detailed System Specifications with Developers and Database specialists .

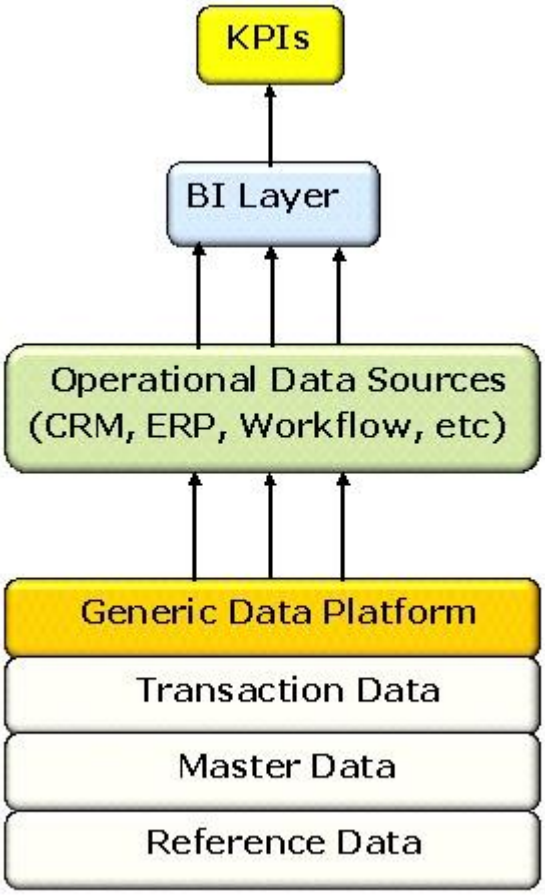


14.3 Conceptual Data Models

14.3.1 KPI Triangle

This shows a basic Model for KPI Definitions.

- http://www.databaseanswers.org/data_models/kpi_triangle/index.htm

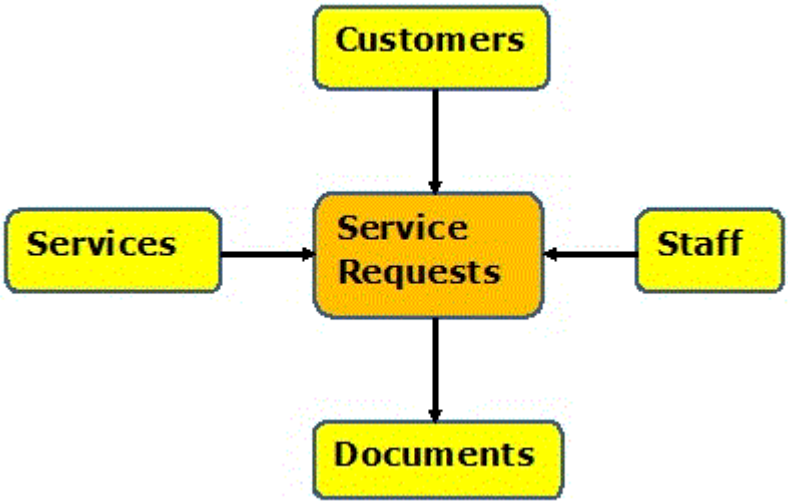


14.3.2 Generic Customer Services

Here is the link to the page on our Database Answers Web Site:-

- http://www.databaseanswers.org/data_models/customers_and_services_generic/index.htm

and here is the Conceptual Model :-

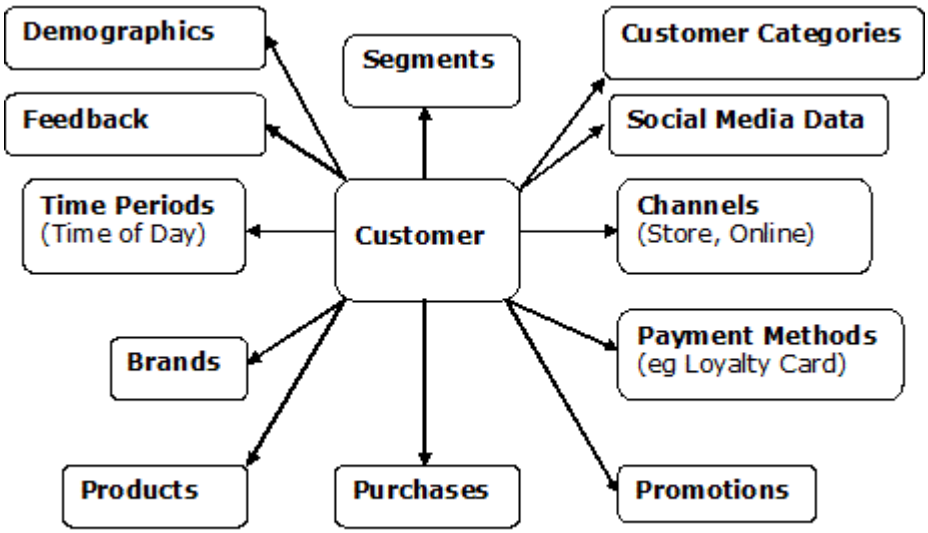


14.3.3 Customer Experience Management

Here is the link to the page on our Database Answers Web Site:-

- http://www.databaseanswers.org/data_models/customer_experience_management/index.htm

and here is the Conceptual Data Model :-

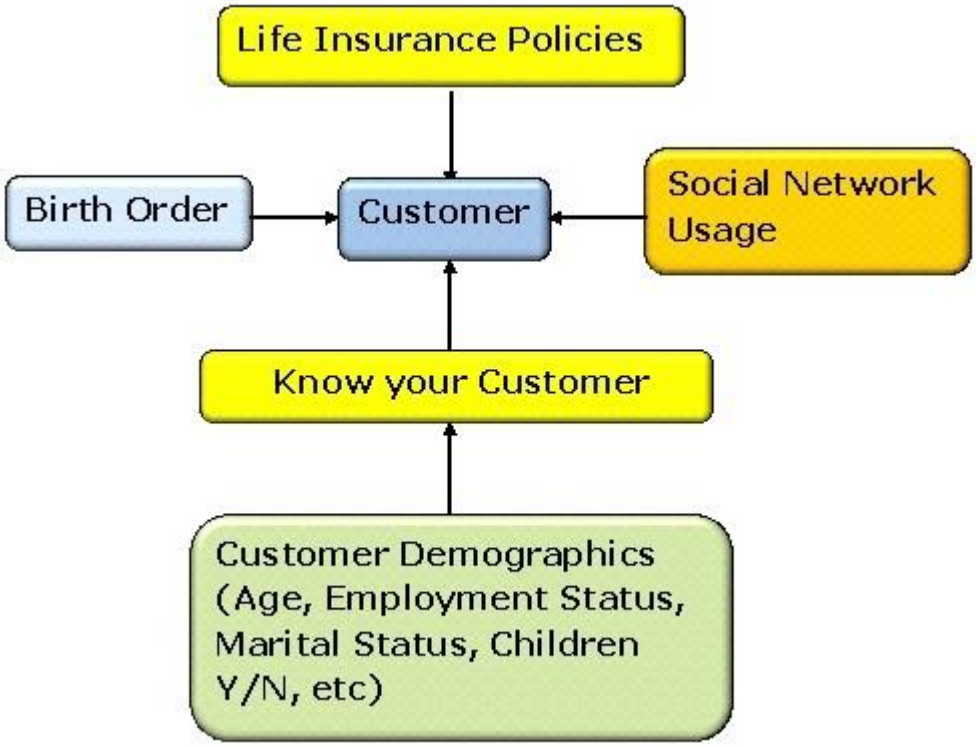


14.3.4 Customer Lifetime Value

Here is the link to the page on our Database Answers Web Site:-

- http://www.databaseanswers.org/data_models/customer_lifetime_value/index.htm

and here is the Conceptual Data Model :-



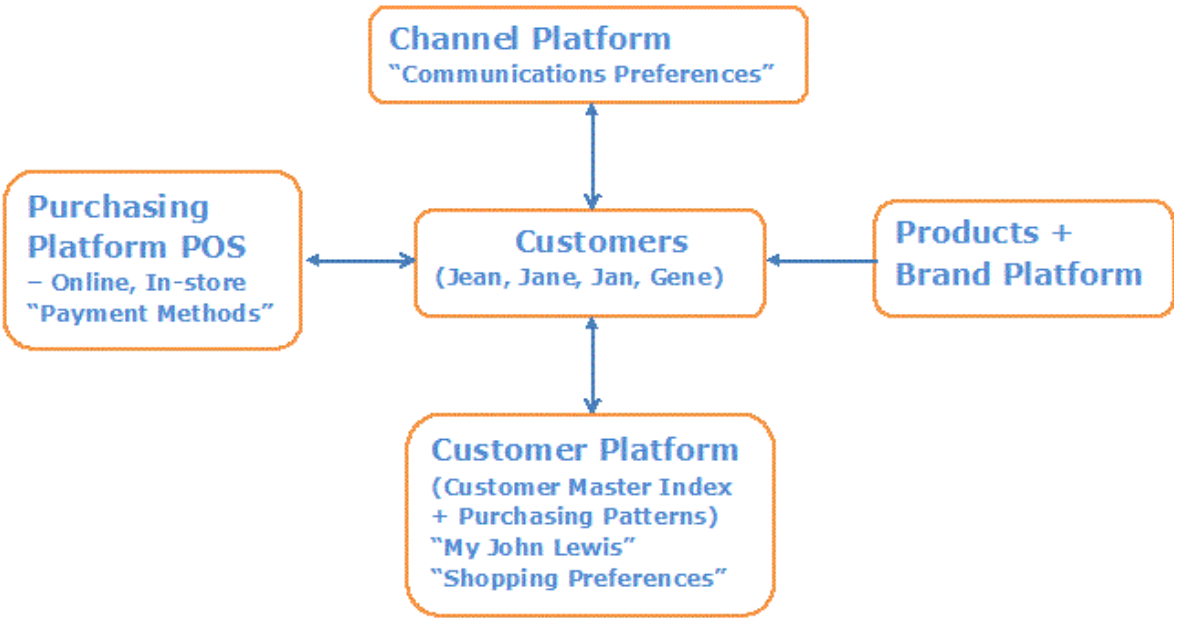
14.3.5 Omni-Channel Retailing

We like Omni-Channel Retailing because it puts the Customer at the centre of the stage.

Here is the link to the page on our Database Answers Web Site:-

- http://www.databaseanswers.org/data_models/omni_channel_retailing/index.htm

and here is the Conceptual Data Model :-

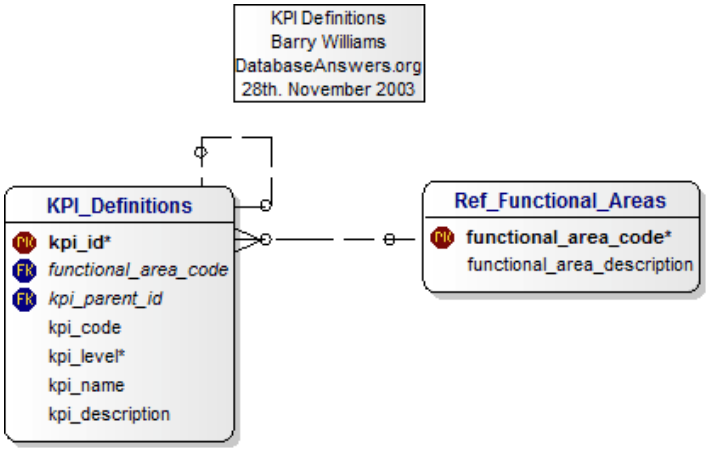


14.4 Logical Data Models

14.4.1 KPI Definitions

This shows a basic Model for KPI Definitions.

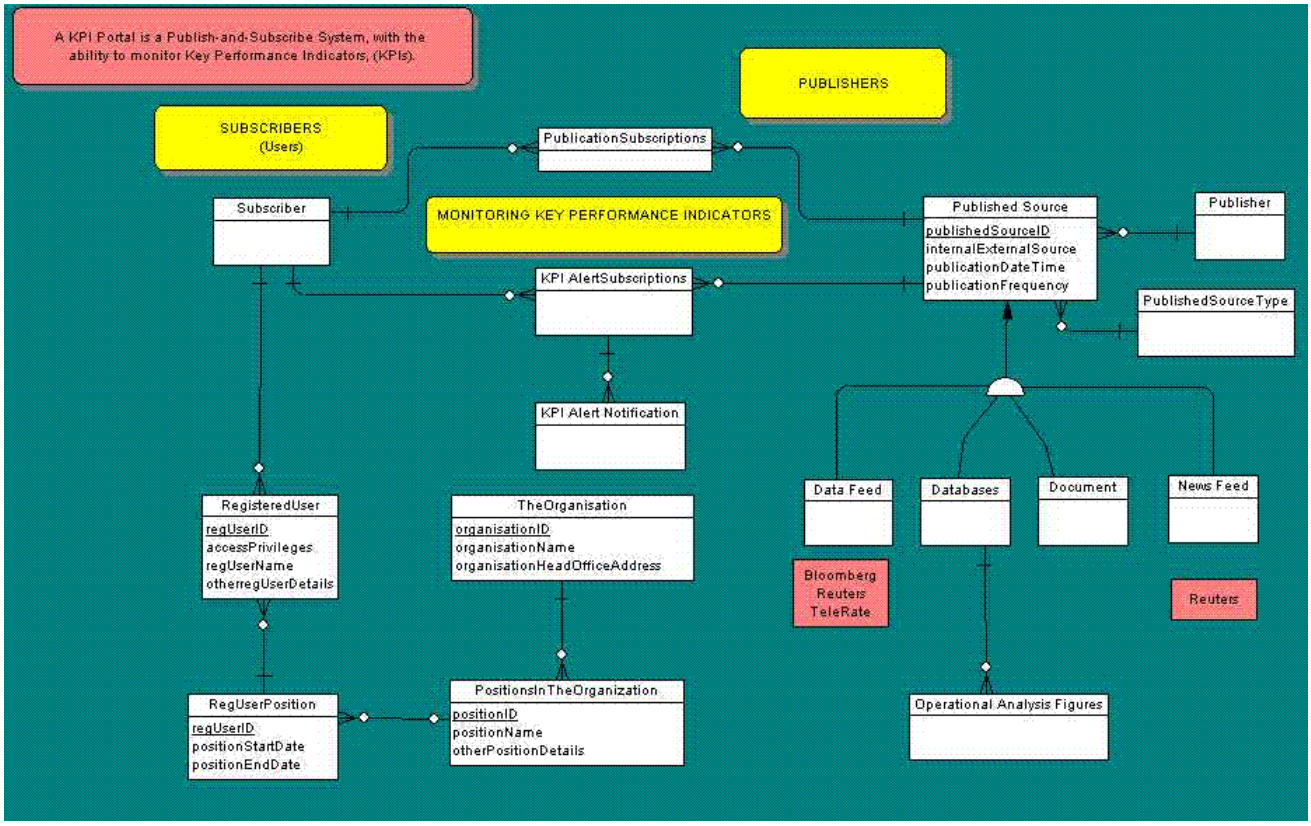
- http://www.databaseanswers.org/data_models/kpi_definitions/index.htm



14.4.2 KPI Portal

This Model of KPI Portals appears on this page of our Web Site :-

- http://www.databaseanswers.org/data_models/financial_portals/index.htm

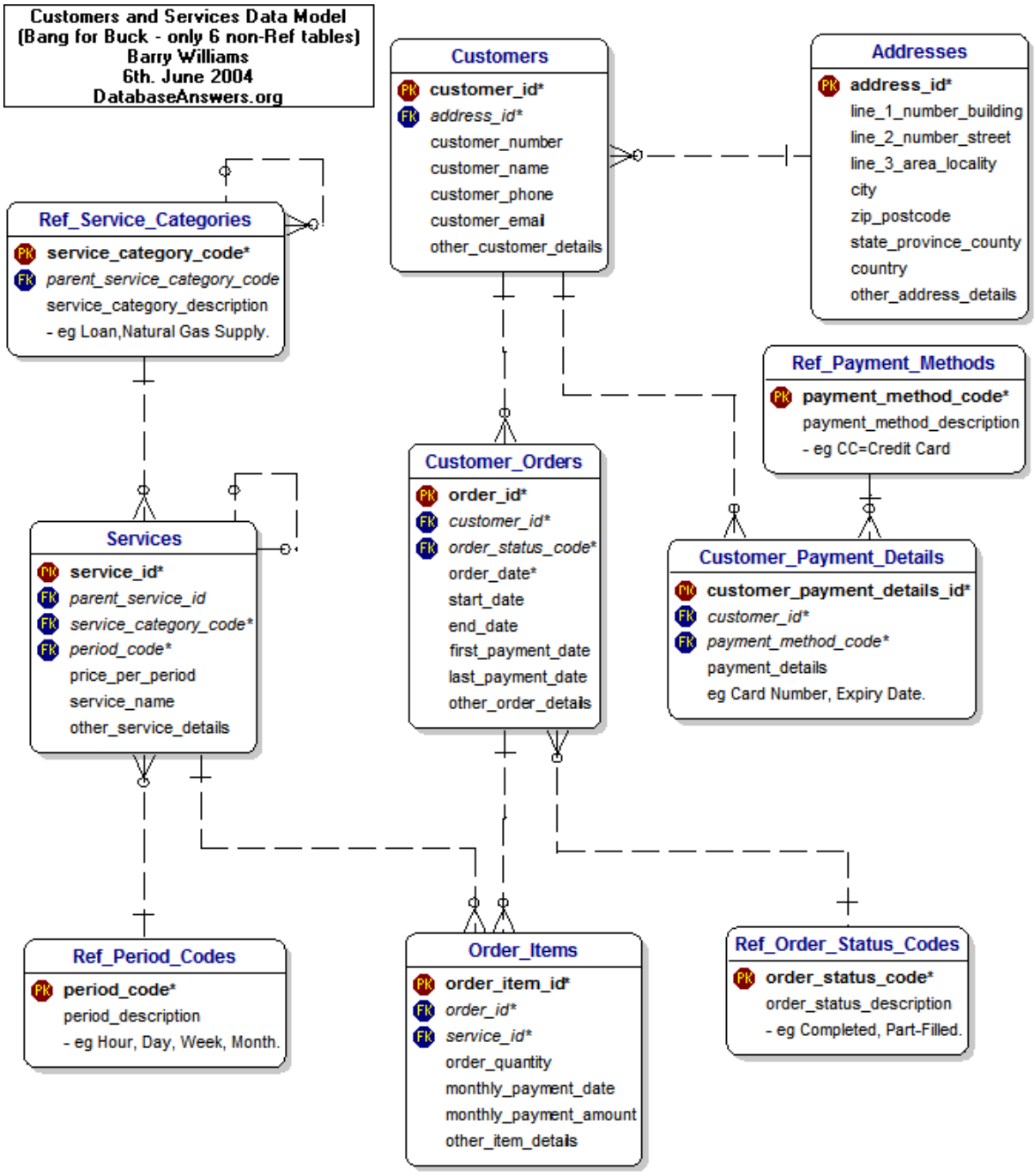


14.4.3 Basic Customer Services

Here is the link to the page on our Database Answers Web Site:-

- http://www.databaseanswers.org/data_models/customers_and_services/index.htm

here is the Logical Model :-

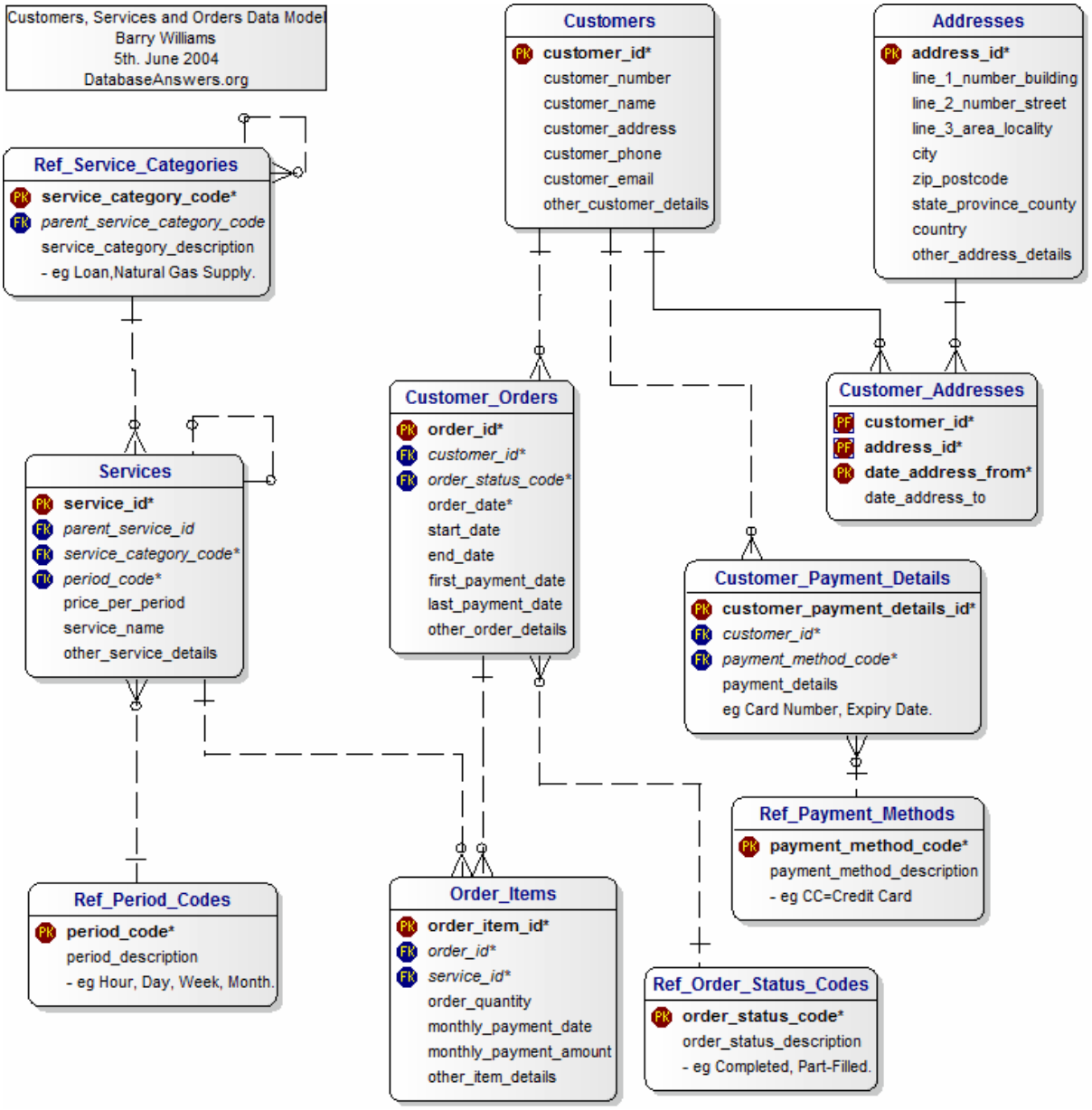


14.4.4 Advanced Customer Services

Here is the link to the page on our Database Answers Web Site:-

- http://www.databaseanswers.org/data_models/customers_and_services/customers_and_services_not_bang4buck.htm

and here is the Logical Model :-



14.4.5 Generic Customer Services

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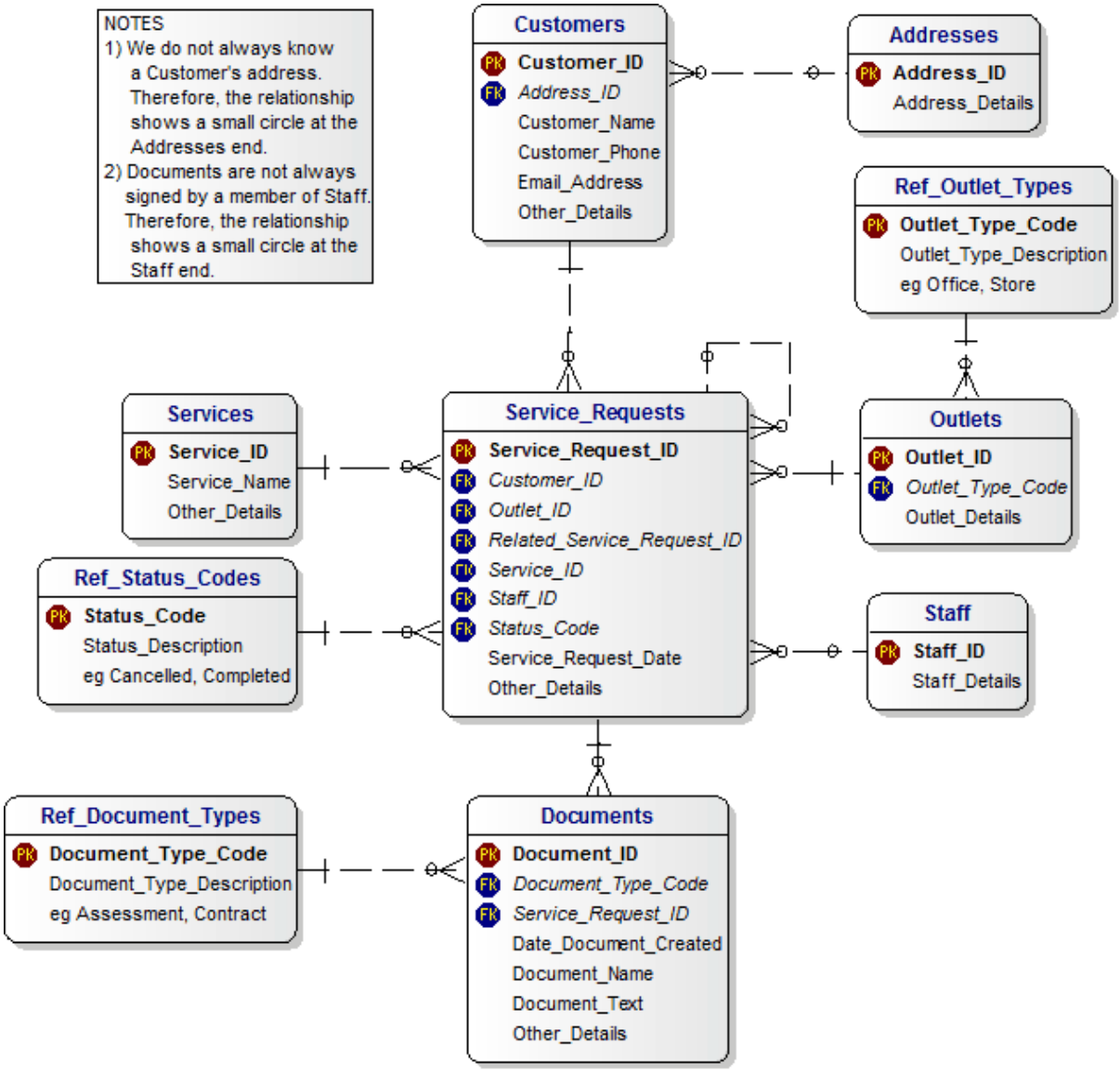
and here is the Logical Model :-



14.4.6 Customer Experience Management

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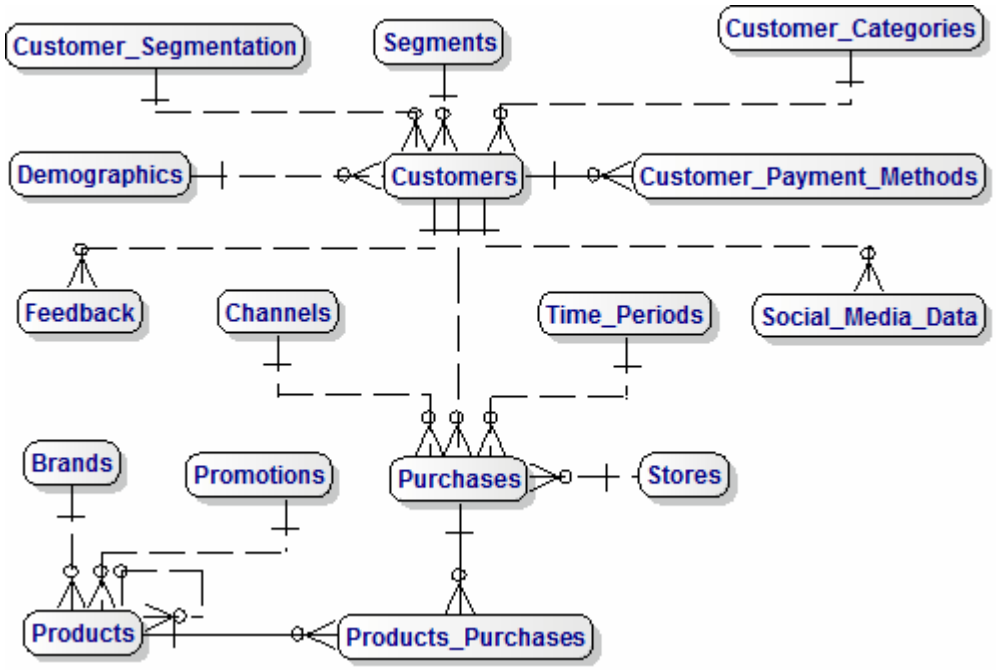
- http://www.databaseanswers.org/data_models/customer_experience_management/index.htm

and here is the Logical Data Model :-

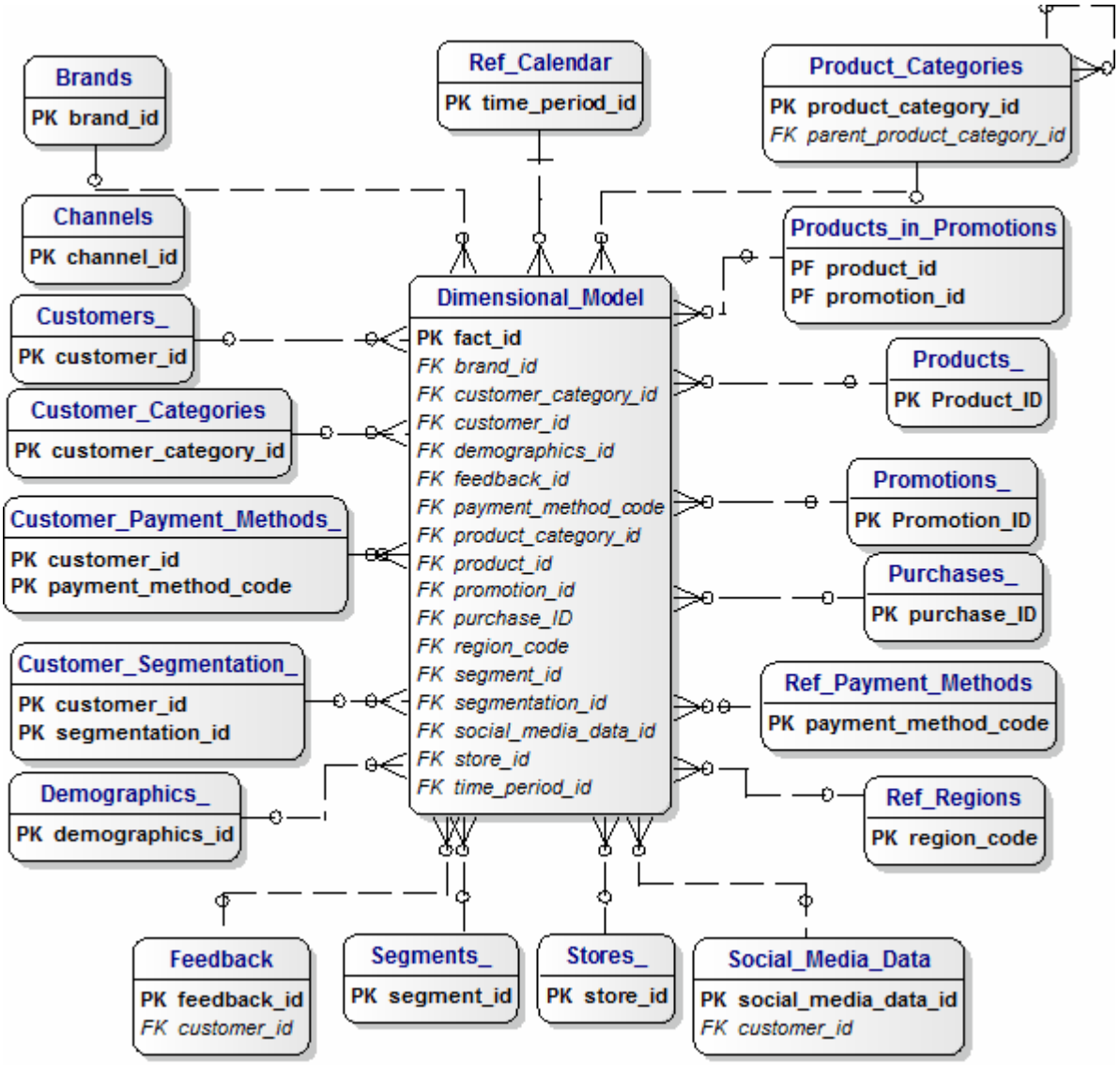


14.4.7 Customer Experience Management Data Mart

The Data Mart is on this page :-

- http://www.databaseanswers.org/data_models/airline_reservations/airline_reservations_data_mart.htm

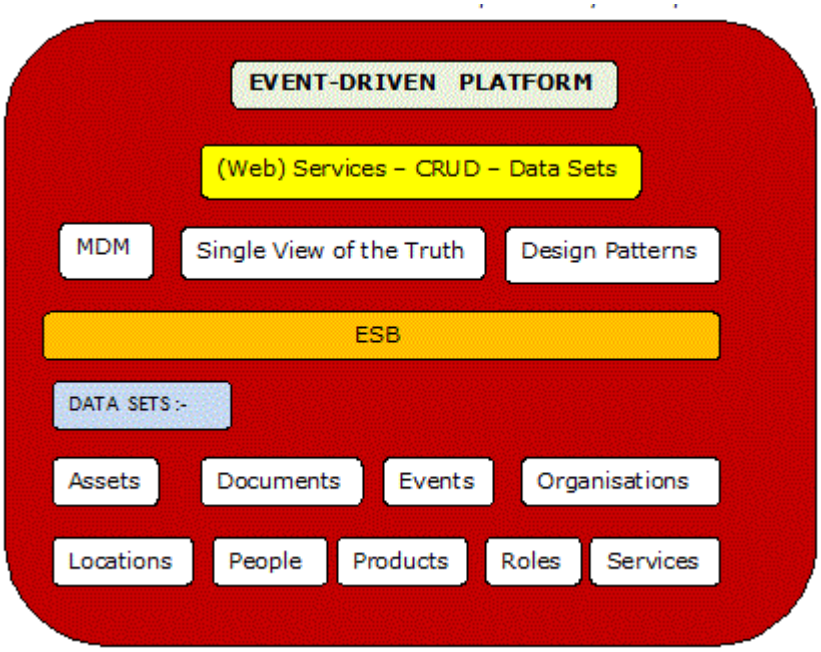
and looks like this :-



14.4.8 Platform Data Model

A Canonical Data Model is stripped to its basics. It shows the essential features but no more.

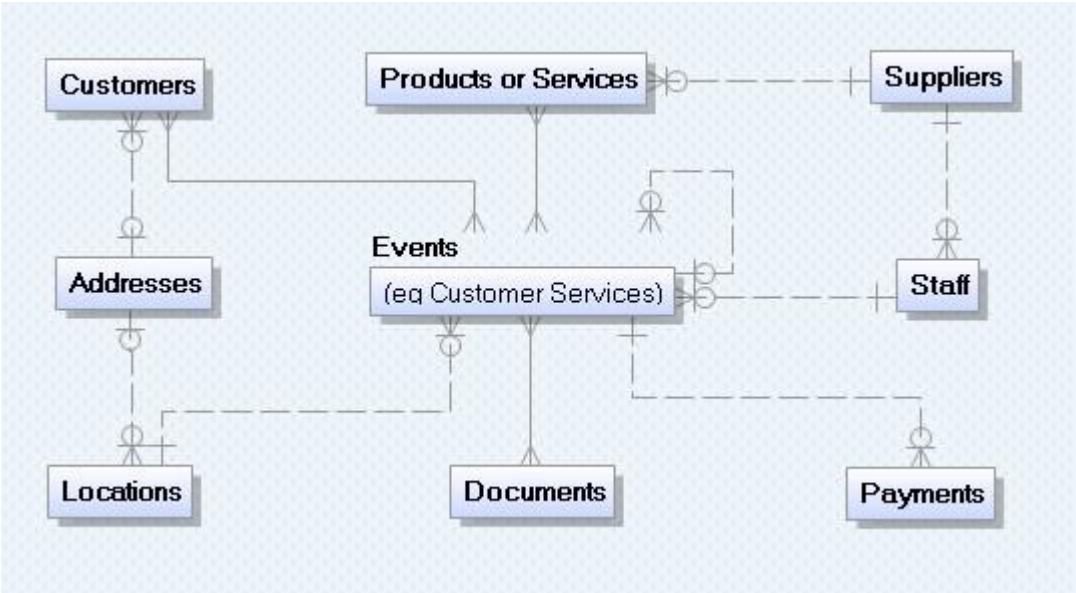
- http://www.databaseanswers.org/data_models/event_driven_platform/index.htm



14.4.9 Canonical Data Model

A Canonical Data Model is stripped to its basics. It shows the essential features but no more.

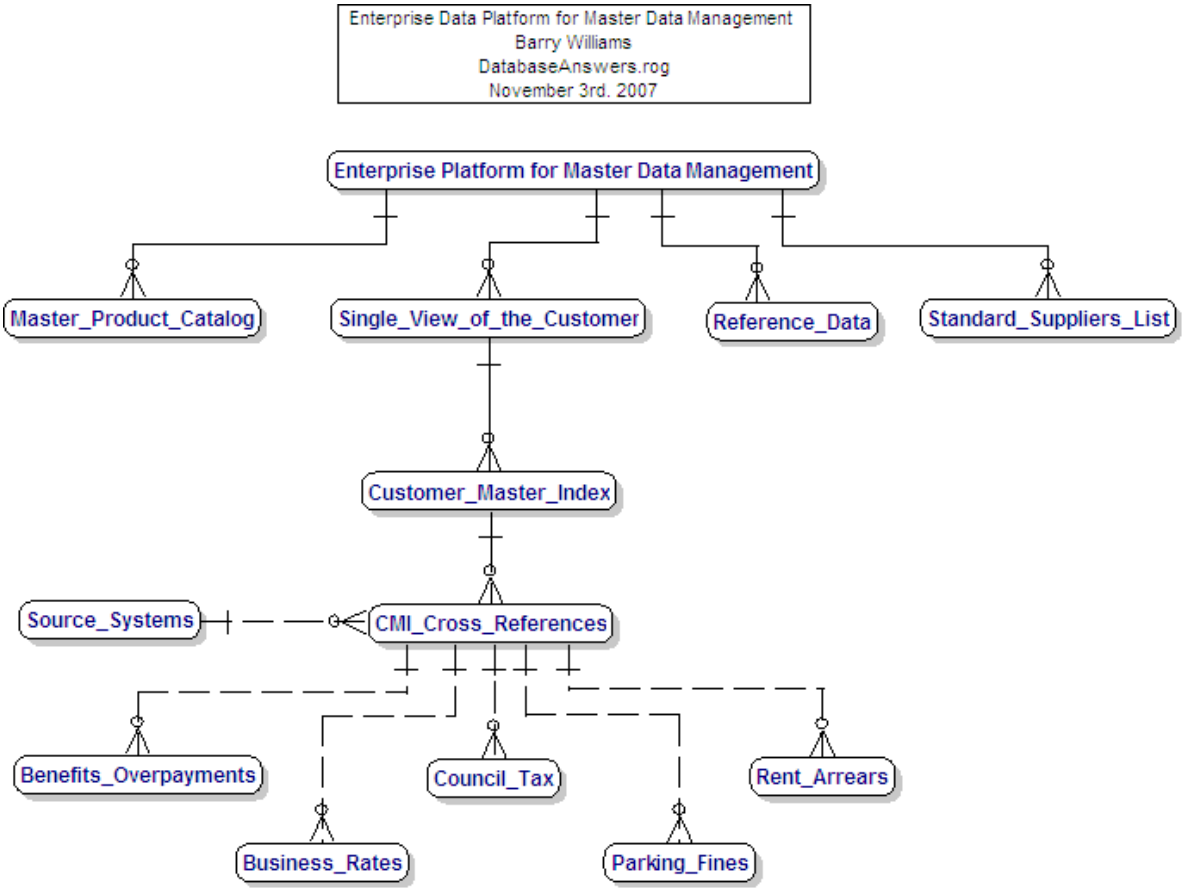
- http://www.databaseanswers.org/data_models/canonical_data_models/index.htm



14.4.10 Master Data

Reference Data and Master Data Management

- http://www.databaseanswers.org/data_models/master_data_mgt/index.htm



Appendix A. Barry's Secret Sauce

A.1 Ingredients

Americans sometimes refer to a 'Secret Sauce' by which they mean a secret combination of ingredients that make a product special and unique. A simple example is Coca-Cola.
I have defined my own 'Secret Sauce', based on a unique combination of technical features that I have found useful over the years. The foundation is the Model-View-Controller (M-V-C) which is the most commonly used framework for Internet Applications.

I have designed a Data Model for M-V-C :-

- http://www.databaseanswers.org/data_models/mvc_model_view_controller/index.htm

Our Secret Sauce combine these fourteen powerful ingredient that provides us with a unique competitive edge :-

1 CRUD Services (Create, Read, Update, Delete)
2 Design Patterns
3 Event –Driven Approach
4 Generic Solutions
5 Industry-specific Service Delivery Platforms (Banking, etc)
6 Inheritance
7 Layered Data Architectures
8 Mapping (eg Passengers to Customers)
9 Model-View-Controller (MVC)
10 Platform Concept (eg Banking, Customer-Services, Logistics)
11 Reporting Toolkit (Patterns of Generic Reports and KPIs)
12 SOA Facilities
13 Triggers (for KPIs)
14 User-Defined Hierarchies

A.2 Recipe

This diagram shows how the Ingredients can be combined.
I am currently designing a Proof-of-Concept using Oracle's Apex Data-as-a-Service.