Universal Patterns:
Blue Prints for Data Modeling

Presented by Paul Agnew,

Universal Data Models, LLC

PURPOSE

Share

WHAT WE ARE GOING TO COVER

-Introduction

-Patterns

      Declarative Role,

      Contextual role,

      Status,

      Classification

- Conclusion

MY PROMISE

- Understanding

- Application

- Involvement

- Answers

WHAT IS A PATTERN?

A template or guide for making something else.
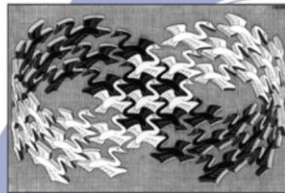
A Pattern Language

Towns · Buildings · Construction

Christopher Alexander
Sara Ishikawa · Murray Silverstein
WITH
Max Jacobson · Ingrid Fiksdahl-King
Shlomo Angel

EXAMPLES OF STANDARD UNIVERSAL DATA MODELS

These are common data model constructs applicable to most enterprises:

People and organization models

Product models

Order models

Work effort and project mgmt models

Shipment models

Invoicing models

Accounting and budgeting models

E-Commerce models
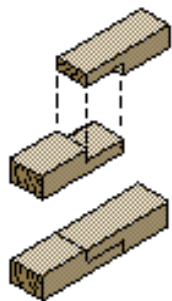
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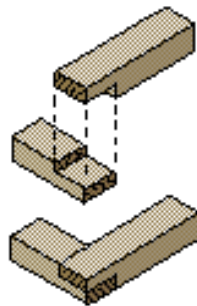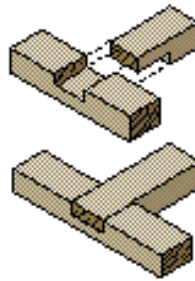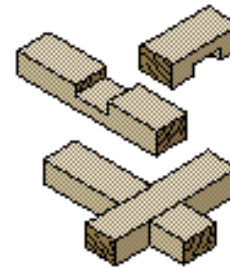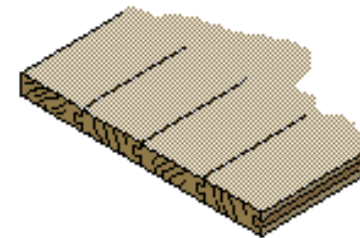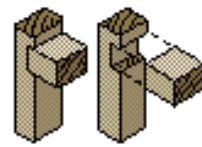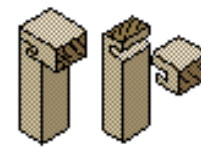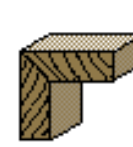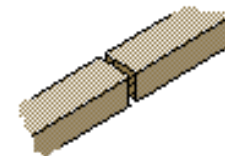
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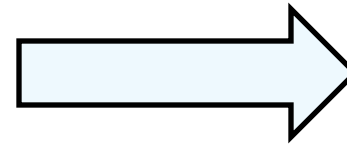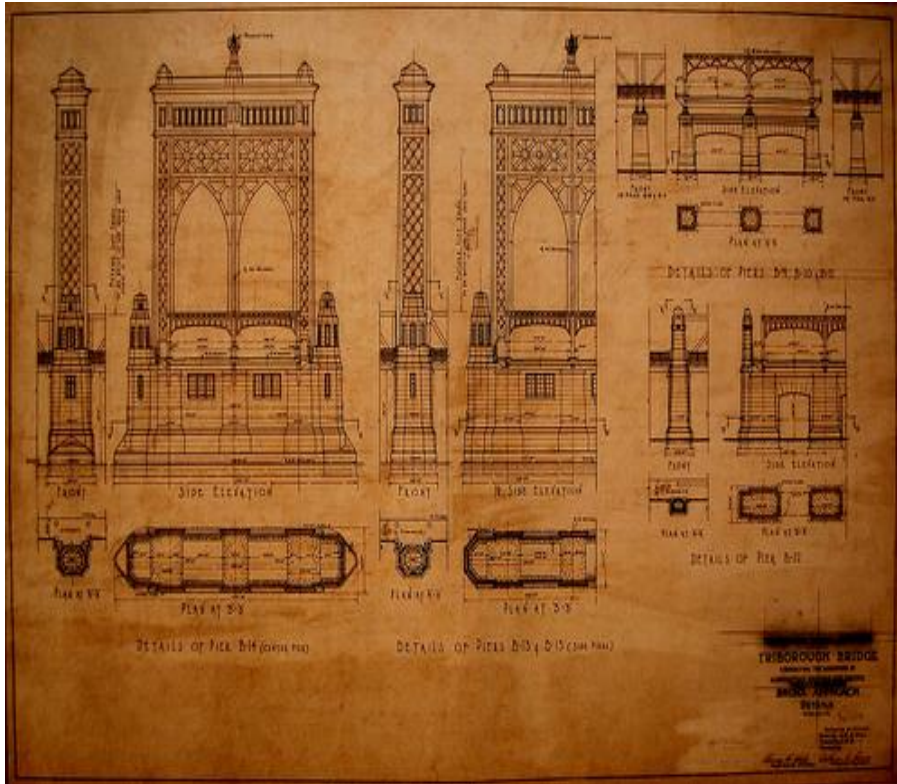
UNIVERSAL PATTERNS FOR DATA MODELING
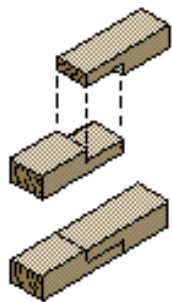
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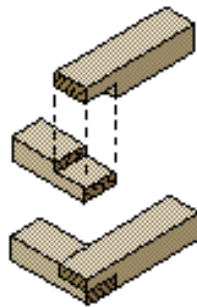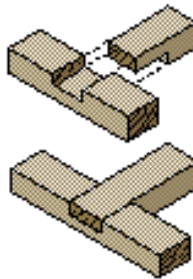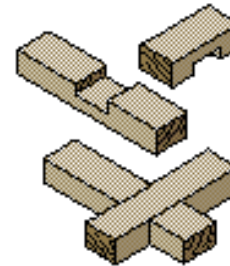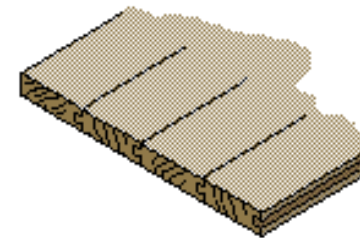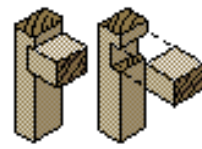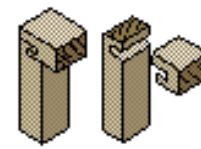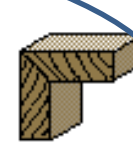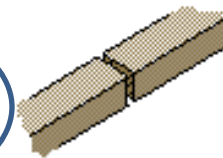
Rabbet — Dado — Dado and Rabbet — Dado Tongue and Rabbet — Mitre — Butt

SPECIFIC MODELING VS. GENERALIZED MODELING
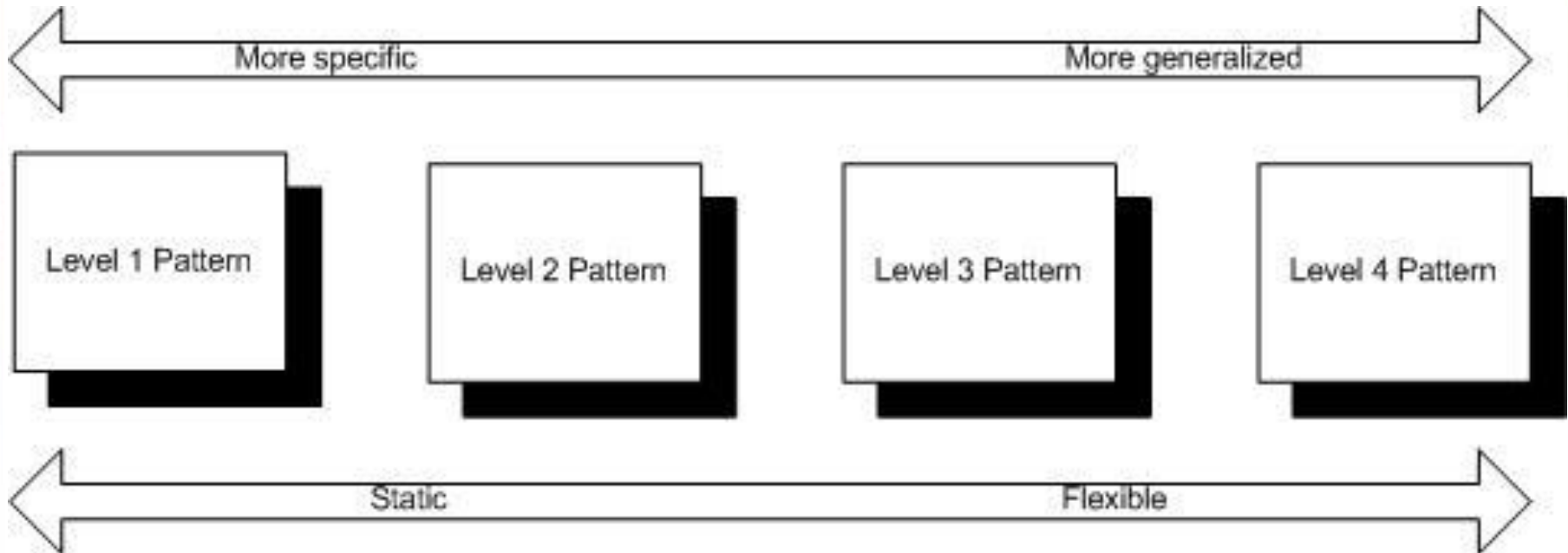
WHEN SHOULD I USE A SPECIFIC OR GENERALIZED PATTERN?

- Specific – Understand requirements
- Generalized – Flexibility
- Why not Conceptual, logical or physical?
- Use Both?
- Plug and play approach

THE PATTERNS

Declarative Roles

Contextual Roles

Status

Classification

Recursive Pattern

Contact Mechanism

Business Rules

Identifiers (work in progress)

DECLARATIVE ROLES PATTERNS
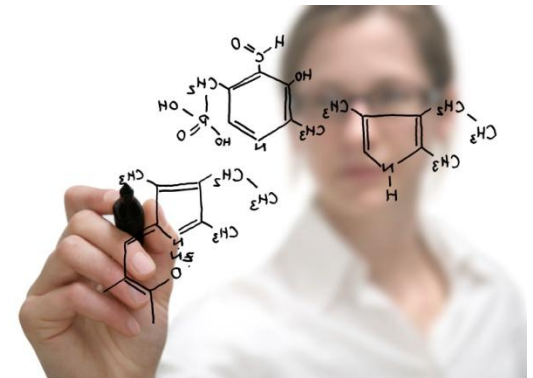
People and Organizations wear
many different hats!

LEVEL 1 DECLARATIVE ROLES

DECLARATIVE ROLE
DECLARATIVE ROLE ID	ID (PK)
o ORGANIZATION NAME	CHAR
o LAST NAME	CHAR
o FIRST NAME	CHAR

CUSTOMER
CUSTOMER ID	ID (PK)
o ORGANIZATION NAME	CHAR
o LAST NAME	CHAR
o FIRST NAME	CHAR
o CREDIT LIMIT	MONEY

SUPPLIER
SUPPLIER ID	ID (PK)
o ORGANIZATION NAME	CHAR
o TAXATION IDENTIFIER	CHAR

PARTNER
PARTNER ID	ID (PK)
o ORGANIZATION NAME	CHAR
o LAST NAME	CHAR
o FIRST NAME	CHAR
o PARTNER TYPE ID	ID (FK)

EMPLOYEE
EMPLOYEE ID	ID (PK)
o LAST NAME	CHAR
o FIRST NAME	CHAR
* EMPLOYEE NUMBER	CHAR

LEVEL 1 DECLARATIVE ROLES

Organization Name	Last Name	First Name	Credit Limit
ABC Corporation			$100,000
	Percy	Caroline	$300

CUSTOMER
- CUSTOMER ID   ID (PK)
- o ORGANIZATION NAME CHAR
- o LAST NAME   CHAR
- o FIRST NAME   CHAR
- o CREDIT LIMIT   MONEY
....

Organization Name	Taxation Identifier
ABC Corporation	A1234-23
Kantowitz Computers	T5645-23

SUPPLIER
- SUPPLIER ID   ID (PK)
- o ORGANIZATION NAME CHAR
- o TAXATION IDENTIFIER CHAR

....

Organization Name	Last Name	First Name	Partner Type (ID)
ABC Corporation			Silver (02)
Matrix Services			Gold (01)

PARTNER
- PARTNER ID   ID (PK)
- o ORGANIZATION NAME CHAR
- o LAST NAME   CHAR
- o FIRST NAME   CHAR
- o PARTNER TYPE ID   ID (FK)
....

Last Name	First Name	Employee Number
Corr	Una	123-232-232
Percy	Caroline	454-045-454

EMPLOYEE
- EMPLOYEE ID   ID (PK)
- o LAST NAME   CHAR
- o FIRST NAME   CHAR
- * EMPLOYEE NUMBER   CHAR

....

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Level 2
Declarative Roles

DECLARATIVE ROLE 1
* DECLARATIVE ROLE 1 ID   ID (PK)
* PARTY ID   ID (FK)
....

DECLARATIVE ROLE 2
* DECLARATIVE ROLE 2 ID   ID (PK)
* PARTY ID   ID (FK)
....

DECLARATIVE ROLE 3
* DECLARATIVE ROLE 3 ID   ID (PK)
* PARTY ID   ID (FK)
....

a role for

acting as

PARTY
PARTY ID   ID (PK)
....

acting as

ORGANIZATION
o CURRENT ORGANIZATION NAME   CHAR

acting as

PERSON
o CURRENT LAST NAME   CHAR
o CURRENT FIRST NAME   CHAR
o DATE OF BIRTH   DATE

CUSTOMER
* CUSTOMER ID   ID (PK)
* PARTY ID   ID (FK)
o CREDIT LIMIT   MONEY
....

SUPPLIER
* SUPPLIER ID   ID (PK)
* PARTY ID   ID (FK)
o TAXATION IDENTIFIER   CHAR
....

PARTNER
* PARTNER ID   ID (PK)
* PARTY ID   ID (FK)
o PARTNER TYPE ID   ID (FK)
....

EMPLOYEE
* EMPLOYEE ID   ID (PK)
* PARTY ID   ID (FK)
* EMPLOYEE NUMBER   CHAR
....

a role for

acting as

PARTY
PARTY ID   ID (PK)
....

acting as

ORGANIZATION
o CURRENT ORGANIZATION NAME   CHAR

acting as

PERSON
o CURRENT LAST NAME   CHAR
o CURRENT FIRST NAME   CHAR
o DATE OF BIRTH   DATE

Level 2 Declarative Roles

Customer Id	Party Id	Credit Limit
1	1	$100,000
2	3	$300

Supplier Id	Party Id	Taxation Identifier
1	1	A1234-23
2	2	T5645-23

Partner Id	Party Id	Partner Type (ID)
1	1	Silver (02)
2	5	Gold (01)

Employee Id	Party Id	Employee Number
1	4	123-232-232
2	3	454-045-454

CUSTOMER
* CUSTOMER ID ID (PK)
* PARTY ID ID (FK)
o CREDIT LIMIT MONEY
....

SUPPLIER
* SUPPLIER ID ID (PK)
* PARTY ID ID (FK)
o TAXATION IDENTIFIER CHAR
....

PARTNER
* PARTNER ID ID (PK)
* PARTY ID ID (FK)
o PARTNER TYPE ID ID (FK)
....

EMPLOYEE
* EMPLOYEE ID ID (PK)
* PARTY ID ID (FK)
* EMPLOYEE NUMBER CHAR
....

a role for

PARTY
PARTY ID ID (PK)
....

acting as

ORGANIZATION
o CURRENT ORGANIZATION NAME CHAR

PERSON
o CURRENT LAST NAME CHAR
o CURRENT FIRST NAME CHAR
o DATE OF BIRTH DATE

Party Id	Organization. Current Organization Name	Person. Current Last Name	Person. Current First Name	Person. Date of Birth
1	ABC Corporation			
2	Kantowitz Computers			
3		Percy	Caroline	1/2/1980
4		Corr	Una	5/6/1983
5	Matrix Services			

Level 3 Declarative Roles

Level 3 Declarative Roles

Party Role Id	Party Id	Role Type Id (Role Type.Name)	Customer. Credit Limit	Supplier. Taxation Identifier	Partner Type Id (name)	Employee.Employee Number	From Date	Thru Date
1	1	3 (Customer)	$100,000				1/2/2009	
3	1	4 (Supplier)		A1234-23			1/2/2009	
4	1	5 (Partner)			Silver		1/2/2009	
6	4	6 (Employee)				123-232-232	6/3/1999	
7	3	6 (Employee)				454-045-454	4/4/2000	

PARTY ROLE
PARTY ROLE ID   ID (PK)
* PARTY ID   ID (FK)(UID)
* ROLE TYPE ID   ID (FK)(UID)
* FROM DATE   DATE (UID)
o THRU DATE   DATE

CUSTOMER
o CREDIT LIMIT   MONEY

SUPPLIER
o TAXATION IDENTIFIER   CHAR

PARTNER
o PARTNER TYPE ID   ID (FK)

EMPLOYEE
* EMPLOYEE NUMBER   CHAR

for

acting as

classified by

PARTY
PARTY ID   ID (PK)

PERSON
o FIRST NAME   CHAR
o LAST NAME   CHAR
o DATE OF BIRTH   DATE

ORGANIZATION
o NAME   CHAR

a classification for   within   further broken down into

ROLE TYPE
ROLE TYPE ID   ID (PK)
o PARENT ROLE TYPE ID   ID (FK)
* NAME   CHAR

Party Id	Organization. Current Organization Name	Person. Last Name	Person. First Name	Person. Date of Birth
1	ABC Corporation			
2	Kantowitz Computers			
3		Percy	Caroline	1/2/1980
4		Corr	Una	5/6/1983
5	Matrix Services			

Role Type Id	Parent Role Type Id (Name)	Name
1		Person Role
2		Organization Role
3		Customer
4	2 (Organization Role)	Supplier
5		Partner
6	1 (Person Role)	Employee

Something to think about – Declarative Roles

- CCI customers are mainly organizations such as distributors, retail stores, and large organizations. On rare occasions they sell to individual customers. The CEO wants to know who their customers are! They also want to know which customers are also suppliers. They want information on their partners , many who use CCI computers in larger solutions. They are also keenly interested in knowing about their sales force, other employees, and other human resources such as contractors.

- Some of their suppliers are also customers and partners. CCI don't know how to gauge the risk of a supplier going under. They usually know how much they owe a supplier, but if the supplier is also a customer, how much does that mean we owe, because they might owe us? But before they can figure out who owes them what, we need to help them figure out what relationships they have to other organizations and people outside and inside of their company.

- The CIO wants us to create a quick statement of scope of all of the roles that we need to capture for the enterprise as a whole. This has to be easily explained to any business person. As time is off the essences he also wants us to create a working prototype that can quickly be leveraged into a full-blown system.

  HOW WOULD YOU DEVELOP A DATA MODEL FOR THE ABOVE SCENARIO THAT CAN BE EASILY EXPLAINED TO A BUSINESS REPRESENTATIVE AND BE USED FOR A PROTOTYPE.

CONTEXTUAL ROLES PATTERNS

How people or organizations are involved.

Level 1 Contextual Roles Pattern

SALES ORDER

SALES ORDER ID	ID (PK)
* PLACING CUSTOMER NAME	CHAR
o SALES PERSON NAME	CHAR
* SHIP TO CUSTOMER NAME	CHAR
o BILL TO CUSTOMER NAME	CHAR
....	

INVOICE

INVOICE ID	ID (PK)
o BILL TO CUSTOMER NAME	CHAR
* SENDER OF NAME	CHAR
....	

ENTITY

ENTITY ID	ID (PK)
* CONTEXTUAL ROLE 1	CHAR
* CONTEXTUAL ROLE 2	CHAR
o CONTEXTUAL ROLE 3	CHAR
o CONTEXTUAL ROLE 4	CHAR
....	

PERFORMANCE REVIEW

PERFORMANCE REVIEW ID	ID (PK)
* EMPLOYEE	CHAR
* INTERNAL ORGANIZATION	CHAR
o MANAGER	CHAR
o MENTOR	CHAR
o COMMENTS	DESC
o MEETS-NEEDS INDICATOR	IND
....	

PROJECT

PROJECT ID	ID (PK)
* PROJECT NAME	CHAR
o PROJECT SPONSOR	CHAR
* PROJECT WORKER	CHAR
o PROJECT LEAD	CHAR
....	

Level 1 Contextual Roles Pattern

Sales Order Id	Placing Customer Name	Sales Person Name	Ship to Customer Name	Bill to Customer Name
00001	ABC Corporation	Caroline Percy	ABC Corporation	ABC Corporation
00002	Matrix Services	Una Corr	Kantowitz Computers	Matrix Services

SALES ORDER

SALES ORDER ID	ID (PK)
* PLACING CUSTOMER NAME	CHAR
o SALES PERSON NAME	CHAR
* SHIP TO CUSTOMER NAME	CHAR
o BILL TO CUSTOMER NAME	CHAR
....	

Invoice Id	Bill to Customer Name	Sender Of Name
9990001	ABC Corporation	Caroline Percy
9990002	Matrix Services	Una Corr

INVOICE

INVOICE ID	ID (PK)
o BILL TO CUSTOMER NAME	CHAR
* SENDER OF NAME	CHAR
....	

Performance Review Id	Employee	Internal Organization	Manager	Mentor	Meets-Needs Ind
0111	Caroline Percy	Sales	Dan Smith	Nadine Girard	Y
0112	Una Corr	Sales	Caroline Percy	Neena Davies	N

PERFORMANCE REVIEW

PERFORMANCE REVIEW ID	ID (PK)
* EMPLOYEE	CHAR
* INTERNAL ORGANIZATION	CHAR
o MANAGER	CHAR
o MENTOR	CHAR
o COMMENTS	DESC
o MEETS-NEEDS INDICATOR	IND
....	

Project Id	Project Name	Project Sponsor	Project Worker	Project Lead
90903	Hardware Sales effort	Dan Smith	Caroline Percy	Dan Smith
90903	Hardware Sales effort	Dan Smith	Una Corr	Dan Smith

PROJECT

PROJECT ID	ID (PK)
* PROJECT NAME	CHAR
o PROJECT SPONSOR	CHAR
* PROJECT WORKER	CHAR
o PROJECT LEAD	CHAR
....	

Level 1 Contextual Roles Pattern, Relationships

ENTITY
ENTITY ID	ID (PK)
o DECLARATIVE ROLE 2 ID	ID (FK)

involving — for

ENTITY ROLE 1
ENTITY ROLE 1 ID	ID (PK)
* ENTITY ID	ID (FK)(UID)
* DECLARATIVE ROLE 1 ID	ID (FK)(UID)
* FROM DATE	DATE (UID)
o THRU DATE	DATE

played by — playing the role within the context of

DECLARATIVE ROLE 1
DECLARATIVE ROLE 1 ID	ID (PK)

involving

playing the role within the context of

DECLARATIVE ROLE 2
DECLARATIVE ROLE 2 ID	ID (PK)

SALES ORDER
SALES ORDER ID	ID (PK)
o SALES PERSON ID	ID (FK)
o SALES ORDER DATE	DATE

for — placed by

PLACING CUSTOMER
PLACING CUSTOMER ID	ID (PK)
* SALES ORDER ID	ID (FK)(UID)
* FROM DATE	DATE (UID)
o THRU DATE	DATE

placed by — the placer of

CUSTOMER
CUSTOMER ID	ID (PK)
* CUSTOMER NAME	CHAR

for — with a requested bill to

BILL TO CUSTOMER
BILL TO CUSTOMER ID	ID (PK)
* SALES ORDER ID	ID (FK)(UID)
* FROM DATE	DATE (UID)
o THRU DATE	DATE

with a requested bill to — the requested bill to

sold by — responsible for

SALES PERSON
SALES PERSON ID	ID (PK)
* LEAD FIRST NAME	CHAR
* LEAD LAST NAME	CHAR

Level 1 Contextual Roles Pattern, Relationships

Placing Customer Id	Customer Id (Customer Name)	Sales Order Id	From Date/Thru Date
001	001 (ABC Corporation)	00001	1/2/2009
002	002 (Matrix Services)	00002	1/3/2009

Customer Id	Customer Name
001	ABC Corporation
002	Matrix Services
003	Kantowitz Computers

SALES ORDER
SALES ORDER ID   ID (PK)
o SALES PERSON ID   ID (FK)
o SALES ORDER DATE   DATE

PLACING CUSTOMER
PLACING CUSTOMER ID   ID (PK)
* SALES ORDER ID   ID (FK)(UID)
* FROM DATE   DATE (UID)
o THRU DATE   DATE

CUSTOMER
CUSTOMER ID   ID (PK)
* CUSTOMER NAME   CHAR

for   placed by

placed by   the placer of

BILL TO CUSTOMER
BILL TO CUSTOMER ID   ID (PK)
* SALES ORDER ID   ID (FK)(UID)
* FROM DATE   DATE (UID)
o THRU DATE   DATE

for   with a requested bill to

with a requested bill to   the requested bill to

SALES PERSON
SALES PERSON ID   ID (PK)
* LEAD FIRST NAME   CHAR
* LEAD LAST NAME   CHAR

sold by   responsible for

Sales Order Id	Sales Person Id (Name)	Sales Order Date
00001	00111 (Caroline Percy)	3/2/2009
00002	00112(Una Corr)	3/4/2009

Bill to Customer Id	Customer Id (Customer Name)	Sales Order Id	From Date/Thru Date
001	001 (ABC Corporation)	00001	1/2/2009
003	003(Kantowitz Computers)	00002	1/3/2009

Sales Person Id	Lead First Name	Lead Last Name
00111	Caroline	Percy
00112	Una	Corr

Level 2 Contextual Role Pattern
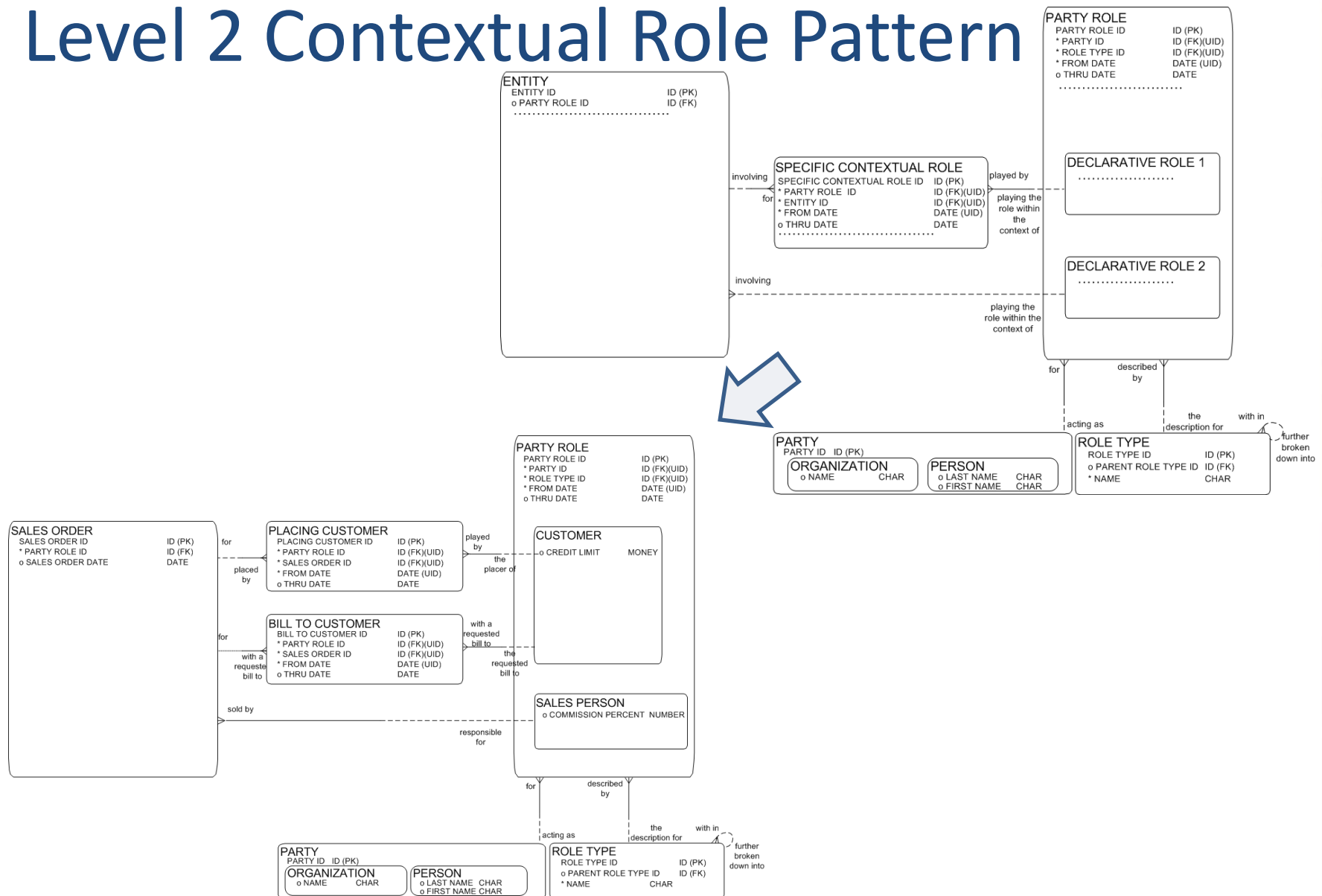
Level 2 Contextual Role Pattern

Sales Order Id	Party Role Id (name)	Sales Order Date
00001	3 (Caroline Percy)	3/2/2009
00002	4 (Una Corr)	3/4/2009

Placing Customer Id	Customer Id (Customer Name)	Sales Order Id
001	001 (ABC Corporation)	00001
002	002 (Matrix Services)	00002

Party Role Id	Party Id (Customer Name)	Credit Limit
001	1 (ABC Corporation)	$100,000
002	2 (Matrix Services)	$250,000
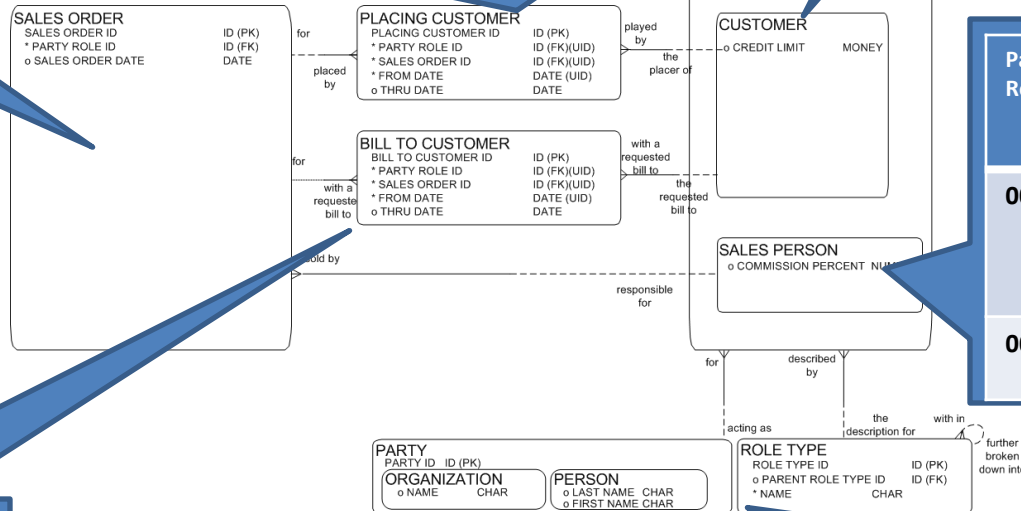
Party Role Id	Party Id (Sales Person Name)	Commission Percentage
003	3 (Caroline Percy)	.05
004	4 (Una Corr)	.09

SALES ORDER
SALES ORDER ID — ID (PK)
* PARTY ROLE ID — ID (FK)
o SALES ORDER DATE — DATE

PLACING CUSTOMER
PLACING CUSTOMER ID — ID (PK)
* PARTY ROLE ID — ID (FK)(UID)
* SALES ORDER ID — ID (FK)(UID)
* FROM DATE — DATE (UID)
o THRU DATE — DATE

BILL TO CUSTOMER
BILL TO CUSTOMER ID — ID (PK)
* PARTY ROLE ID — ID (FK)(UID)
* SALES ORDER ID — ID (FK)(UID)
* FROM DATE — DATE (UID)
o THRU DATE — DATE

PARTY ROLE
PARTY ROLE ID
* PARTY ID
* ROLE TYPE ID
* FROM DATE
o THRU DATE

CUSTOMER
o CREDIT LIMIT — MONEY

SALES PERSON
o COMMISSION PERCENT — NUM

PARTY
PARTY ID — ID (PK)
ORGANIZATION
o NAME — CHAR
PERSON
o LAST NAME — CHAR
o FIRST NAME — CHAR

ROLE TYPE
ROLE TYPE ID — ID (PK)
o PARENT ROLE TYPE ID — ID (FK)
* NAME — CHAR

Bill to Customer Id	Customer Id (Customer Name)	Sales Order Id
001	001 (ABC Corporation)	00001
002	002 (Matrix Services)	00002

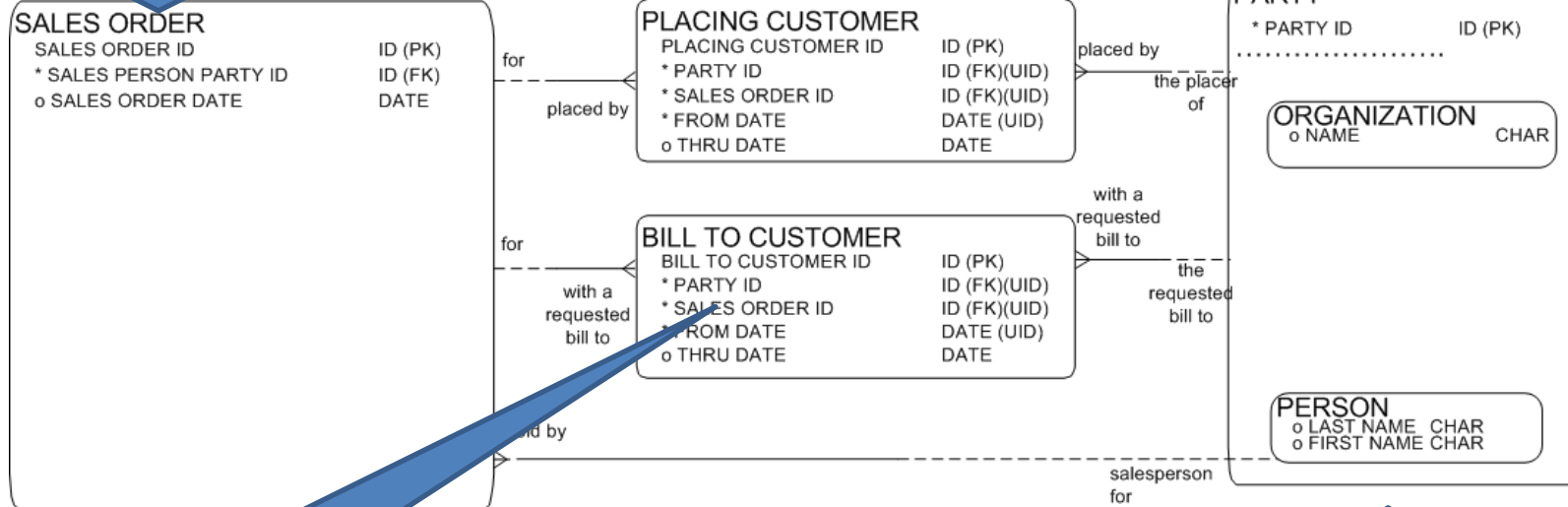| Party Id	Organization. Current Organization Name	Person. Last Name	Person. First Name	Role Type. Name
1	ABC Corporation			Customer
2	Kantowitz Computers			Customer
3		Percy	Caroline	Sales Person
4		Corr	Una	Sales Person

Level 2 Contextual Role, Party Only
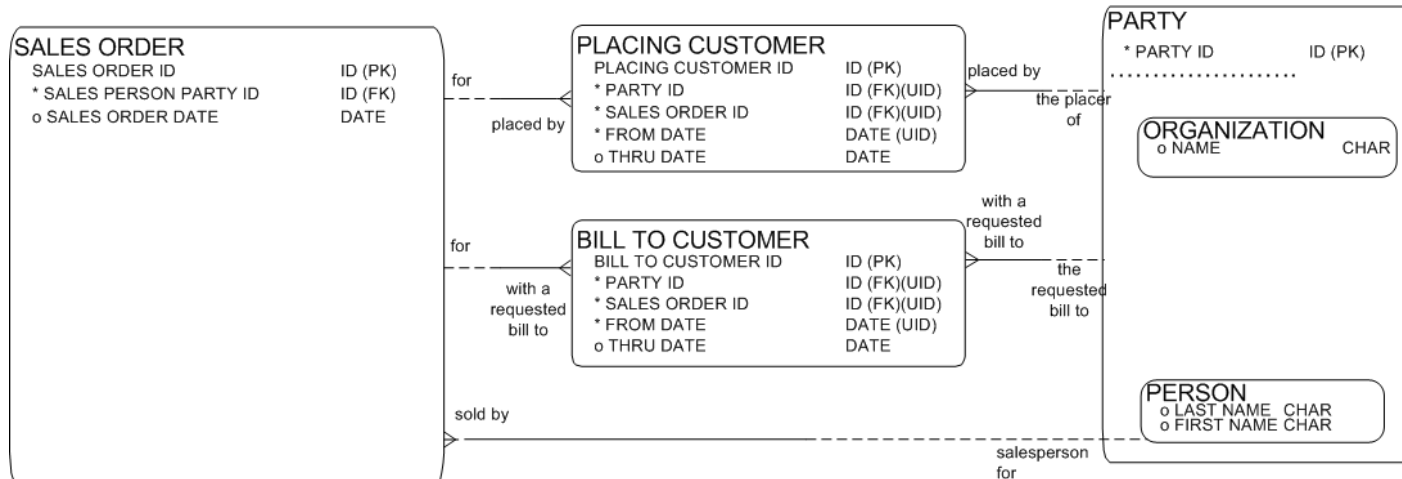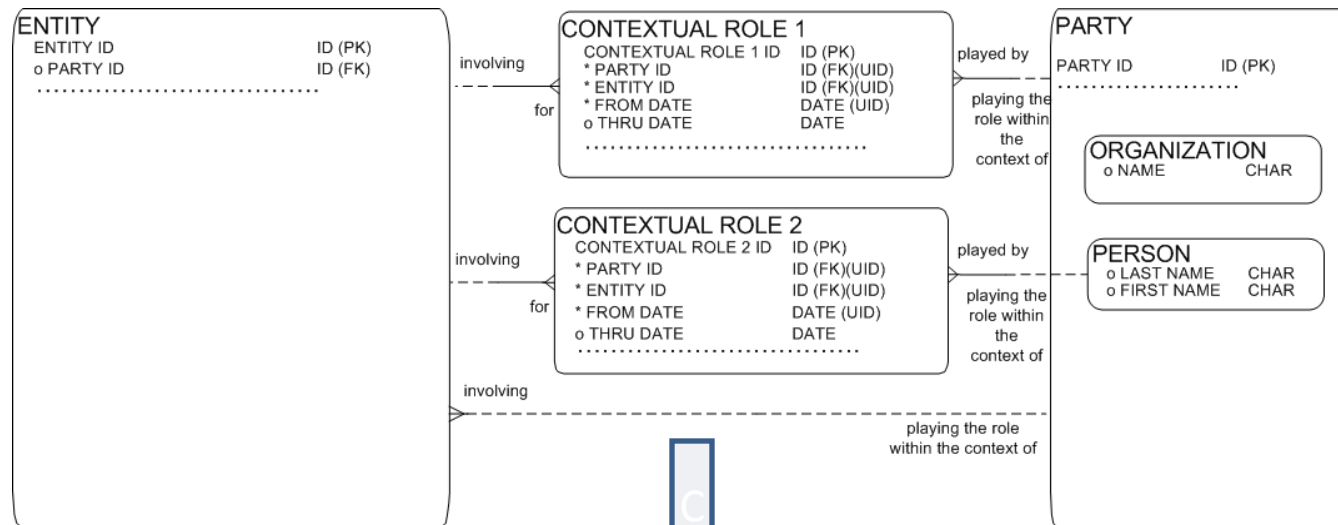
Level 2 Contextual Role, Party Only

Sales Order Id	Sales Person Party Id (name)	Sales Order Date
00001	3 (Caroline Percy)	3/2/2009
00002	4 (Una Corr)	3/4/2009

Placing Customer Id	Party Id (Party Name)	Sales Order Id
001	1 (ABC Corporation)	00001
002	2 ((Matrix Services)	00002

SALES ORDER
SALES ORDER ID   ID (PK)
* SALES PERSON PARTY ID   ID (FK)
o SALES ORDER DATE   DATE

for
placed by

PLACING CUSTOMER
PLACING CUSTOMER ID   ID (PK)
* PARTY ID   ID (FK)(UID)
* SALES ORDER ID   ID (FK)(UID)
* FROM DATE   DATE (UID)
o THRU DATE   DATE

placed by
the placer of

PARTY
* PARTY ID   ID (PK)

ORGANIZATION
o NAME   CHAR

for
with a requested bill to

BILL TO CUSTOMER
BILL TO CUSTOMER ID   ID (PK)
* PARTY ID   ID (FK)(UID)
* SALES ORDER ID   ID (FK)(UID)
* FROM DATE   DATE (UID)
o THRU DATE   DATE

with a requested bill to
the requested bill to

PERSON
o LAST NAME CHAR
o FIRST NAME CHAR

...d by
salesperson for

Bill to Customer Id	Party Id (Party Name)	Sales Order Id
001	1 (ABC Corporation)	00001
002	2 (Matrix Services)	00002

Party Id	Organization. Current Organization Name	Person. Last Name	Person. First Name
1	ABC Corporation		
2	Kantowitz Computers		
3		Percy	Caroline
4		Corr	Una

Level 3 Contextual Roles Pattern

Level 3 Contextual Roles Pattern

SALES ORDER ROLE table:

Sales Order Role Id	Party Id (Organization Name)	Role Type Id (Name)	Sales Order Id	From Date/Thru Date
001	1 (ABC Corporation)	8 (Placing Customer)	00001	1/2/2009
002	2 (Matrix Services)	8 (Placing Customer)	00002	1/3/2009
001	1 (ABC Corporation)	11 (Bill To Customer)	00001	1/2/2009
002	2 (Una Corr)	10 (Sales Person)	00002	1/3/2009
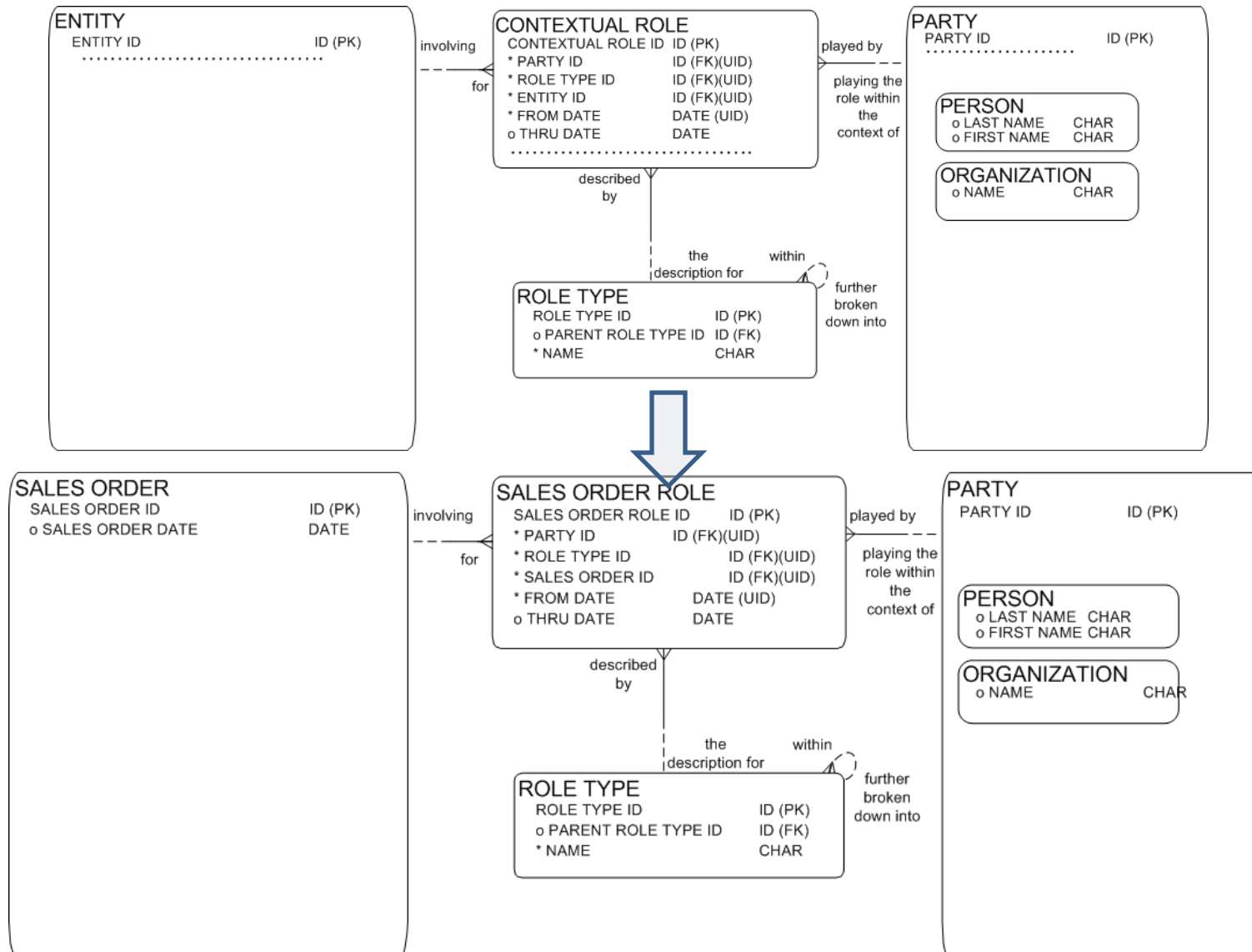
Sales Order Id	Sales Order Date
00001	3/2/2009
00002	3/4/2009

SALES ORDER
- SALES ORDER ID — ID (PK)
- o SALES ORDER DATE — DATE

involving / for

SALES ORDER ROLE
- SALES ORDER ROLE ID — ID (PK)
- * PARTY ID — ID (FK)(UID)
- * ROLE TYPE ID — ID (FK)(UID)
- * SALES ORDER ID — ID (FK)(UID)
- * FROM DATE — DATE (UID)
- o THRU DATE — DATE

played by / playing the role within the context of

PARTY
- PARTY ID — ID (PK)

PERSON
- o LAST NAME — CHAR
- o FIRST NAME — CHAR

ORGANIZATION
- o NAME — CHAR

described by / the description for / within / further broken down into

ROLE TYPE
- ROLE TYPE ID — ID (PK)
- o PARENT ROLE TYPE ID — ID (FK)
- * NAME — CHAR

ROLE TYPE table:

Role Type Id	Parent Role Type Id (Name)	Name
1		Person Role
11		Order Role
3		Customer
8	11 (Order Role)	Placing Customer
9	11 (Order Role)	Bill to Customer
10	1 (Person Role)	Sales Person

PARTY table:

Party Id	Organization. Current Organization Name	Person. Current Last Name	Person. Current First Name	Person. Date of Birth
1	ABC Corporation			
2	Kantowitz Computers			
3		Percy	Caroline	1/2/1980
4		Corr	Una	5/6/1983
5	Matrix Services			

Specific and Generalized (Hybrid) Contextual Roles Pattern
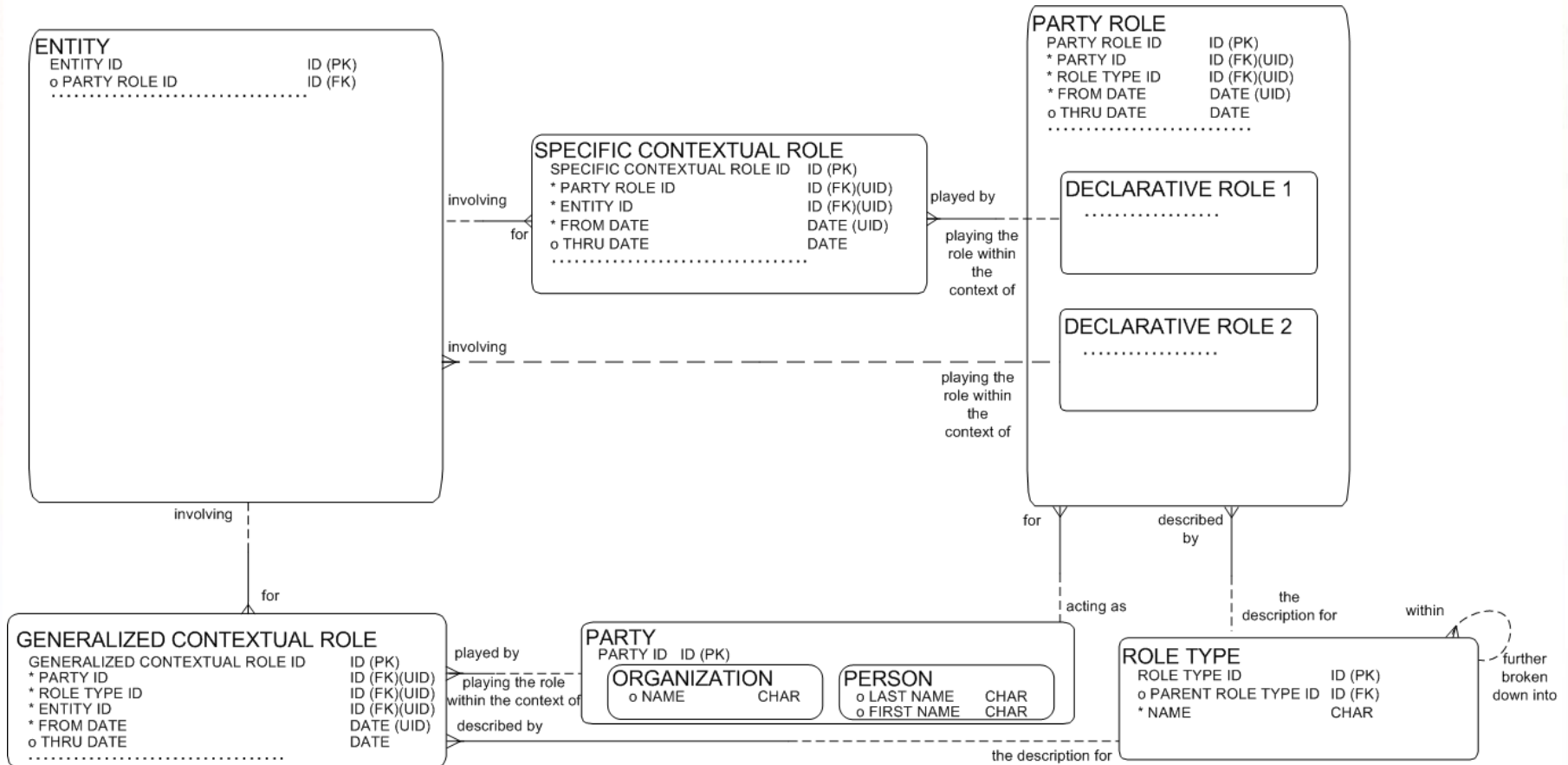
Specific and Generalized (Hybrid) Contextual Roles Pattern Example
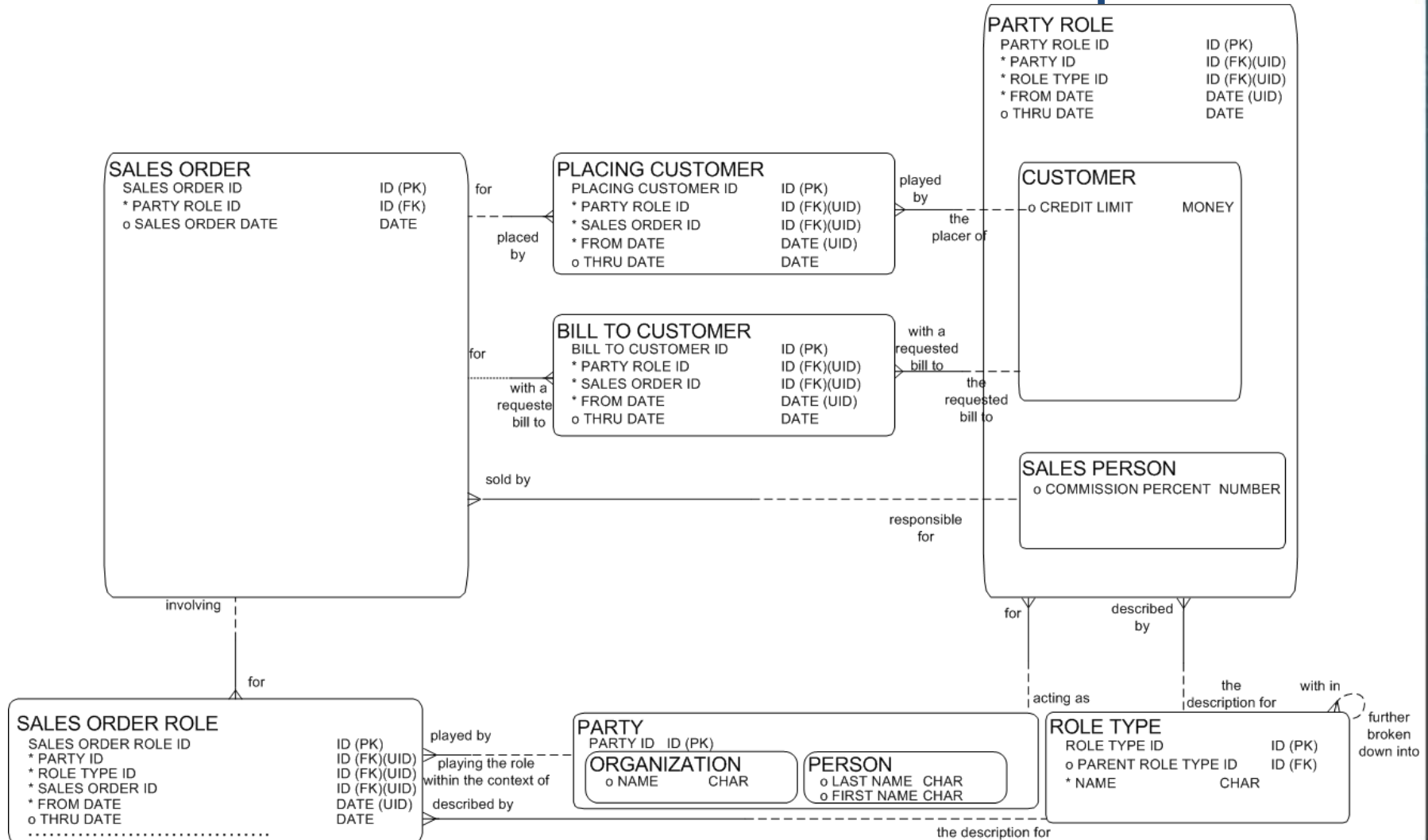
Something to think about– Contextual Roles

Customers place orders with CCI and it is critical to track the various people and organizations involved in the order process. Specifically, it is important to track:

- the person that placed the order
- the organization (or person) to whom the order will be delivered. The current policy is to only allow an order to be delivered to one person or organization, however, this may change in the future as CCI is considering the idea of allowing different parts of the order to be delivered to different parties,
- the salespeople involved in the order (and the percentage of the order that each salesperson is credited with)
- who is responsible for paying for the order
- the person that enters the order in their order entry system
- they are considering implementing additional processes that may include additional people involved in the order entry process such as a person that reviews the orders for accuracy, a customer service person that is designated to make sure that the fulfillment of the order happens smoothly and possible other new processes that are not yet defined.

HOW WOULD YOU DEVELOP A DATA MODEL FOR THE ABOVE SCENARIO THAT WILL BE USED FOR THE CCI ENTERPRISE DATA MODEL WHICH WILL BE A COMMON, STANDARD WAY OF MODELING THIS FOR ALL TYPES OF APPLICATIONS THROUGHOUT CCI.

Status Pattern

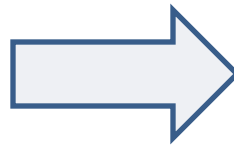## The States of Data.

Level 1 Status Pattern

```
ENTITY
  ENTITY ID                    ID (PK)
  o EVENT 1 DATETIME           DATETIME
  o EVENT 2 DATETIME           DATETIME
  o EVENT 3 DATETIME           DATETIME
  o EVENT INDICATOR            IND
  o EVENT FROM DATE            DATE
  o EVENT THRU DATE            DATE
  ...................
```

```
ORDER
  ORDER ID                          ID (PK)
  o ORDER DESCRIPTION               DESC
  o ORDER RECEIVED  DATETIME        DATETIME
  o ORDER ENTRY DATETIME            DATETIME
  o ORDER CONFIRMATION DATETIME     DATETIME
  o ORDER CANCELLED DATETIME        DATETIME
  o ORDER OPENED FROM DATE          DATE
  o ORDER CLOSED THRU DATE          DATE
   ...................
```
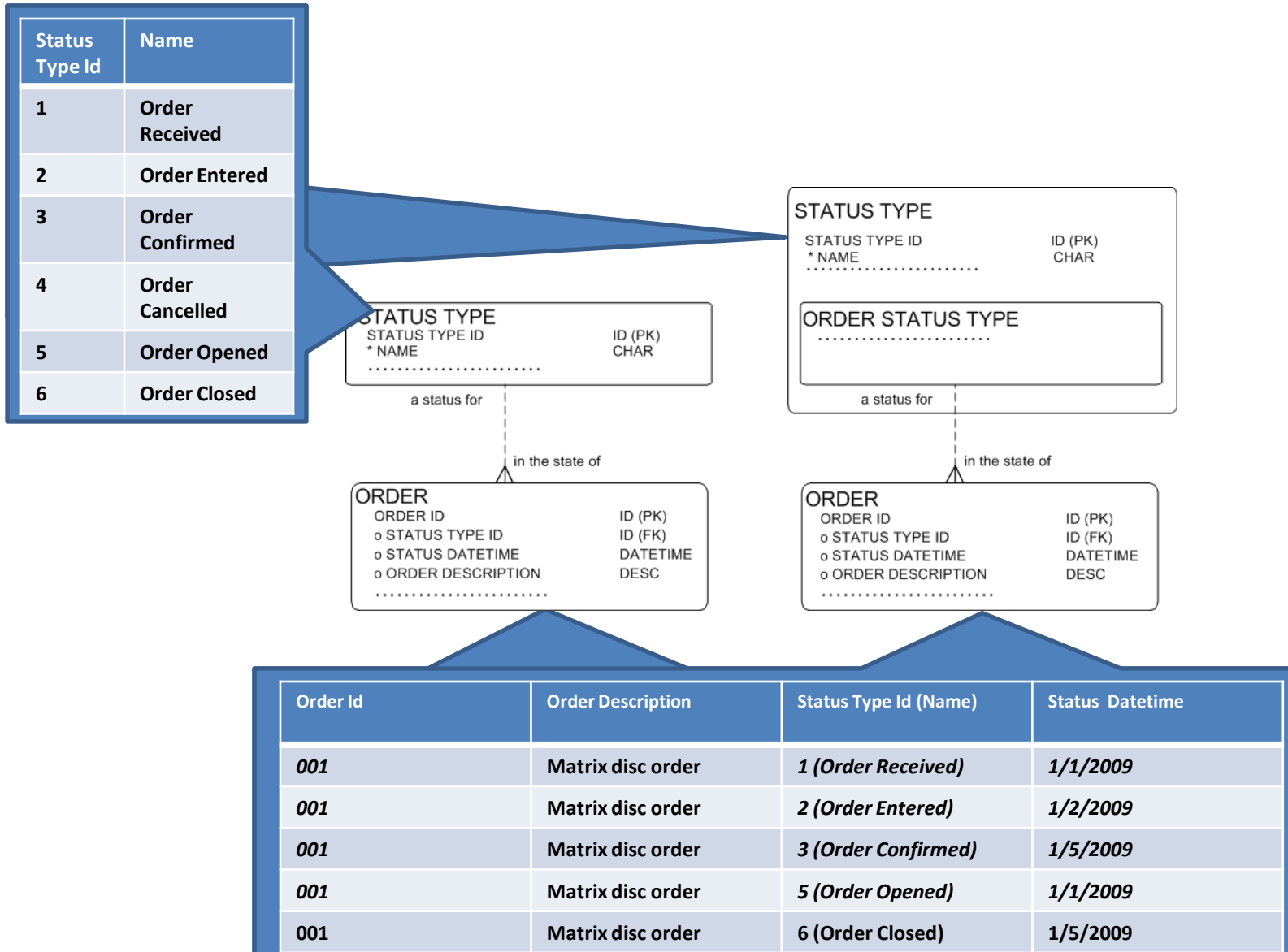
ORDER

ORDER ID	ID (PK)
o ORDER DESCRIPTION	DESC
o ORDER RECEIVED DATETIME	DATETIME
o ORDER ENTRY DATETIME	DATETIME
o ORDER CONFIRMATION DATETIME	DATETIME
o ORDER CANCELLED DATETIME	DATETIME
o ORDER OPENED FROM DATE	DATE
o ORDER CLOSED THRU DATE	DATE

· · · · · · · · · · · · · · · · · ·

Order Id	Order Description	Order Received Datetime	Order Entry Datetime	Order Confirmation Datetime	Order Cancelled Datetime	Order Opened From Date	Order Closed Thru Date
001		1/1/2009	1/2/2009	1/5/2009		1/1/2009	1/5/2009
002		1/2/2009	1/4/2009		1/4/2009	1/1/2009	
003		1/3/2009	1/3/2009	1/3/2009		1/3/2009	

Level 2 Status Pattern

Level 2 Status Pattern

Status Type Id	Name
1	Order Received
2	Order Entered
3	Order Confirmed
4	Order Cancelled
5	Order Opened
6	Order Closed

STATUS TYPE
STATUS TYPE ID — ID (PK)
* NAME — CHAR

STATUS TYPE
STATUS TYPE ID — ID (PK)
* NAME — CHAR

ORDER STATUS TYPE

a status for

a status for

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in the state of

ORDER
ORDER ID — ID (PK)
o STATUS TYPE ID — ID (FK)
o STATUS DATETIME — DATETIME
o ORDER DESCRIPTION — DESC

ORDER
ORDER ID — ID (PK)
o STATUS TYPE ID — ID (FK)
o STATUS DATETIME — DATETIME
o ORDER DESCRIPTION — DESC

Order Id	Order Description	Status Type Id (Name)	Status Datetime
001	Matrix disc order	1 (Order Received)	1/1/2009
001	Matrix disc order	2 (Order Entered)	1/2/2009
001	Matrix disc order	3 (Order Confirmed)	1/5/2009
001	Matrix disc order	5 (Order Opened)	1/1/2009
001	Matrix disc order	6 (Order Closed)	1/5/2009

Level 3 Status Pattern
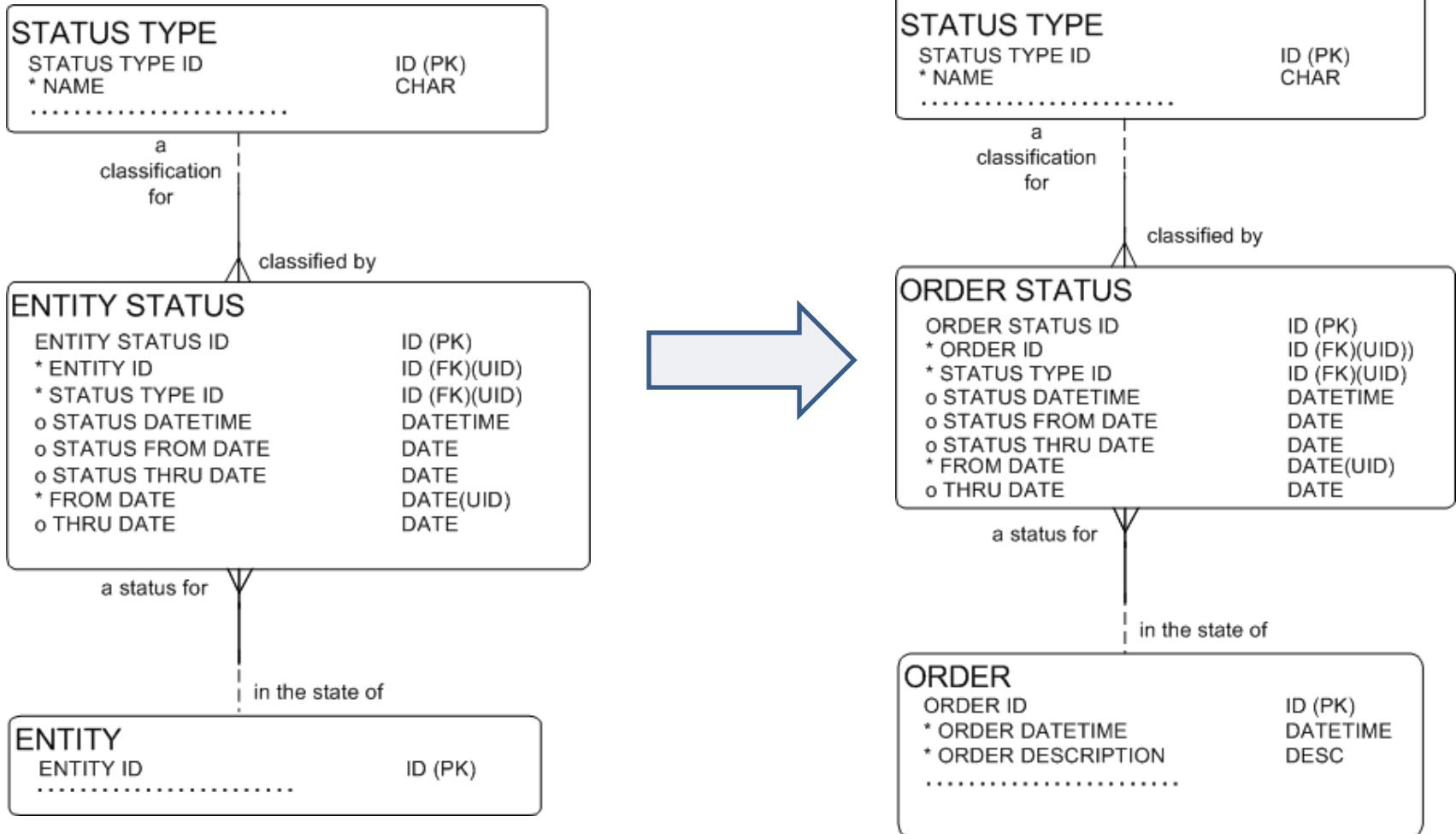
Level 3 Status Pattern

Status Type Id	Name
1	Order Received
2	Order Entered
3	Order Confirmed
4	Order Cancelled
5	Order Opened
6	Order Closed
7	Credit Hold

STATUS TYPE

STATUS TYPE ID	ID (PK)
* NAME	CHAR

. . . .

a classification for

classified by
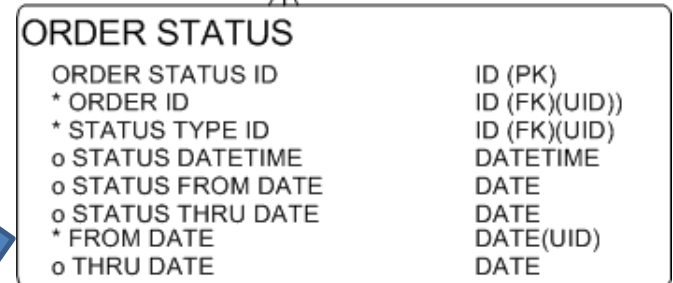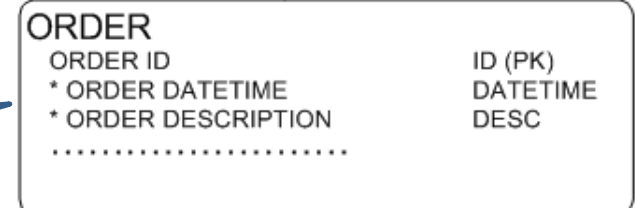
Order Status Id	Order Id	Status Type Id (Name)	Status Datetime	Status From Date	Status Thru Date
01	003	01 (Order Received)	1/1/2009		
02	003	02 (Order Entered)	1/2/2009		
03	003	03 (Order Confirmed)	1/5/2009		
07	003	05 (Credit Hold)		1/5/2009	1/6/2009

ORDER STATUS

ORDER STATUS ID	ID (PK)
* ORDER ID	ID (FK)(UID)
* STATUS TYPE ID	ID (FK)(UID)
o STATUS DATETIME	DATETIME
o STATUS FROM DATE	DATE
o STATUS THRU DATE	DATE
* FROM DATE	DATE(UID)
o THRU DATE	DATE

a status for

in the state of

Order Id	Order Description
001	Matrix disc order
002	Kantowitz Hardware
003	ABC hardware replacement

ORDER

ORDER ID	ID (PK)
* ORDER DATETIME	DATETIME
* ORDER DESCRIPTION	DESC

. . . .

Level 4 Status Pattern

Hybrid Status Pattern

Something to think about – Status

- After the success of data modeling in the prototyping effort and in the enterprise data model, the CIO wants to make sure that data models are used effectively within applications, specifically their new customer order application that is being developed. CCI is specifically interested in modeling status information about their customers, orders and invoices.

- The status information they are seeking involves the status (including the status and date and time of the status) of orders (sales and purchase orders) throughout the life cycle of any order (e.g.. Some of the statuses are "entered", "active", "cancelled", "backordered", and "closed") and also invoice statuses (e.g.. "entered", "active", "paid", "overdue", "written off")

- The CEO would like also to know what is the status of some of his bigger customers in terms of risk. In other words, which of his big customers are on a solid financial footing, and which one's look like they could go bust? If they go bust how will this effect CCI financially? Other business representatives want to know the statuses of customers regarding when they first became a customer and how active each customer is (statuses for this are "highly active", "moderately active" and "inactive").

- The CIO wants us to leverage what was achieved in the previous modeling effort and integrate it into this effort. Also the CIO knows that status types change all the time so he needs a flexible model. But any solution that we come up with has to be understood and signed off by the business representatives.

HOW WOULD YOU DEVELOP A DATA MODEL FOR THE ABOVE SCENARIO THAT WILL BE USED AS A COMMON, STANDARD WAY OF MODELING THIS FOR ALL TYPES OF APPLICATIONS THROUGHOUT CCI.
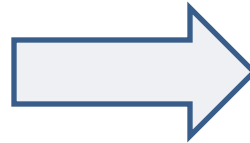
Classification Pattern

The classification of data.

Level 1 Classification Patterns

ENTITY

ENTITY ID	ID (PK)
* ENTITY TYPE 1	CHAR
* ENTITY TYPE 2	CHAR
o ENTITY TYPE 3	CHAR

. . . .

PRODUCT

PRODUCT ID	ID (PK)
* PRODUCT NAME	CHAR
* PRODUCT TYPE	CHAR
o PRODUCT FAMILY	CHAR
* PRODUCT LINE 1	CHAR
o PRODUCT LINE 2	CHAR
o DISK CAPACITY	CHAR
o COLOR	CHAR
o REQUIRED DISK SPACE	CHAR

Level 1 Classification Patterns

PRODUCT

PRODUCT ID	ID (PK)
* PRODUCT NAME	CHAR
* PRODUCT TYPE	CHAR
o PRODUCT FAMILY	CHAR
* PRODUCT LINE 1	CHAR
o PRODUCT LINE 2	CHAR
o DISK CAPACITY	CHAR
o COLOR	CHAR
o REQUIRED DISK SPACE	CHAR

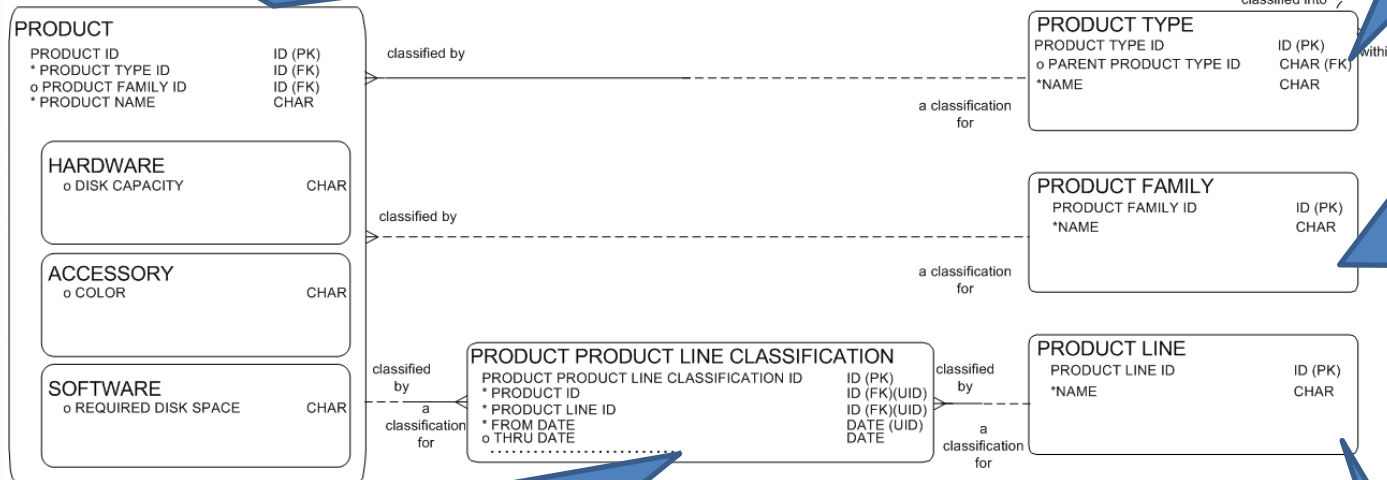| Product Id	Product Name	Product Type	Product Family	Product Line 1	Product Line 2	Disk Capacity	Color	Required Disk Space
001	Save Disk 2000	Hardware	Disk Drives	Home Use	Commercial Use	200 GB	Black	
002	Standard Memory Card	Hardware	Computer Memory	Home Use	Home Business	1GB		

Level 2 Classification Pattern
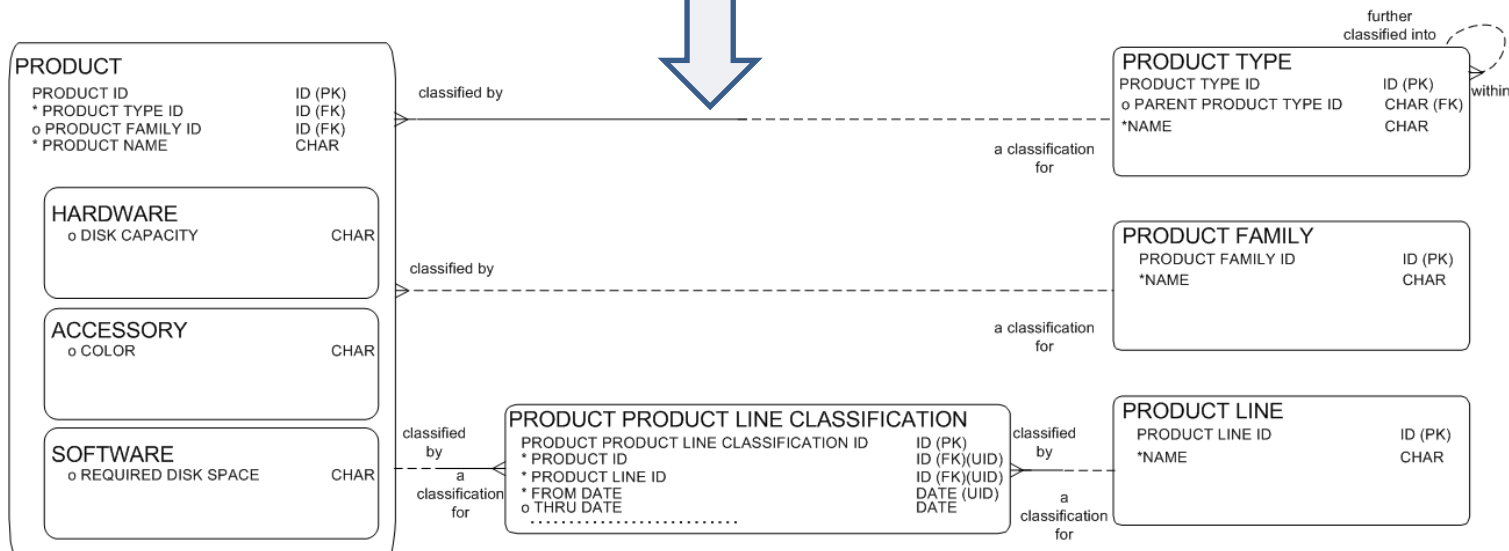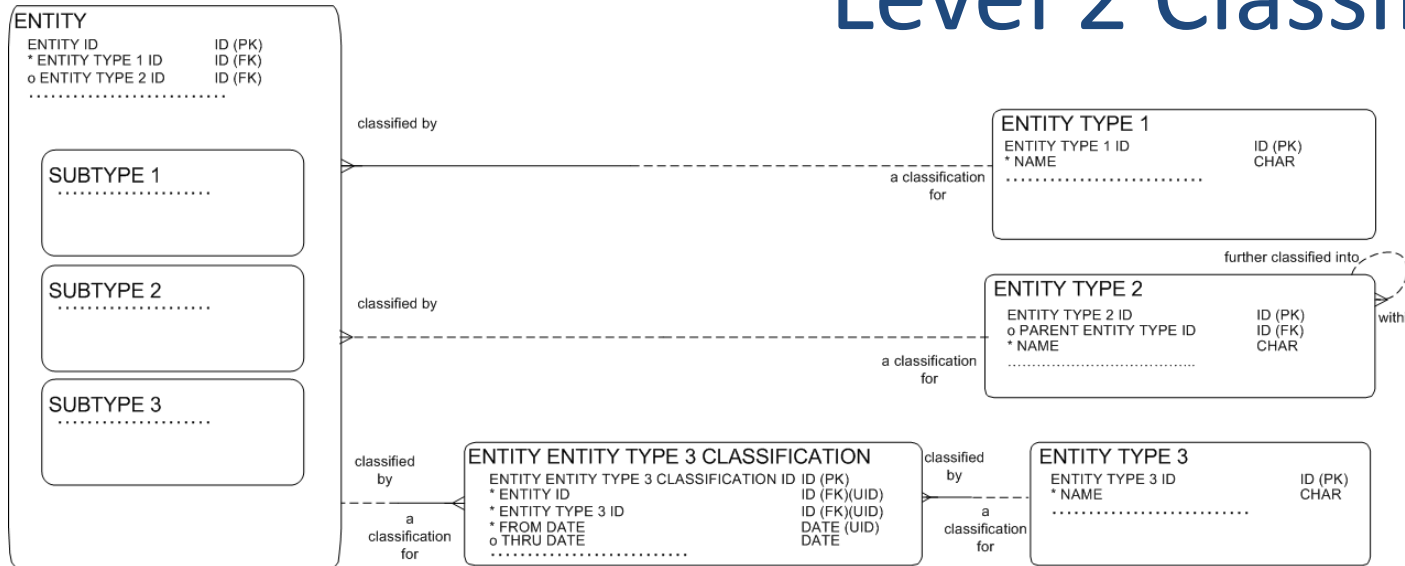
Level 2 Classification Pattern

Product Id	Product Name	Disk Capacity	Color	Required Disk Space	Product Type Id (Type Name)	Product Family Id (Type Name)
001	Save Disk 2000	200 GB	Black	200 GB	02 (Hardware)	02 (Disk Drives)
002	Standard Memory Card	1GB			02 (Hardware)	06 (Computer Memory)

Product Type Id	Name
02	Hardware
04	Accessory
06	Software

PRODUCT
PRODUCT ID — ID (PK)
* PRODUCT TYPE ID — ID (FK)
o PRODUCT FAMILY ID — ID (FK)
* PRODUCT NAME — CHAR

HARDWARE
o DISK CAPACITY — CHAR

ACCESSORY
o COLOR — CHAR

SOFTWARE
o REQUIRED DISK SPACE — CHAR

classified by

further classified into

PRODUCT TYPE
PRODUCT TYPE ID — ID (PK)
o PARENT PRODUCT TYPE ID — CHAR (FK)
*NAME — CHAR

within

a classification for

classified by

a classification for

PRODUCT FAMILY
PRODUCT FAMILY ID — ID (PK)
*NAME — CHAR

Product Family Id	Name
02	Disk Drives
04	Carrying Case
06	Computer Memory

PRODUCT PRODUCT LINE CLASSIFICATION
PRODUCT PRODUCT LINE CLASSIFICATION ID — ID (PK)
* PRODUCT ID — ID (FK)(UID)
* PRODUCT LINE ID — ID (FK)(UID)
* FROM DATE — DATE (UID)
o THRU DATE — DATE

classified by

a classification for

classified by

a classification for

PRODUCT LINE
PRODUCT LINE ID — ID (PK)
*NAME — CHAR

Product Product Line Classification Id	Product Id	Product Line Id (Name)	From Date (Name)	Thru Date
1	001	02 (Home Use)	1/2/2009	
2	001	04 (Commercial Use)	1/4/2009	

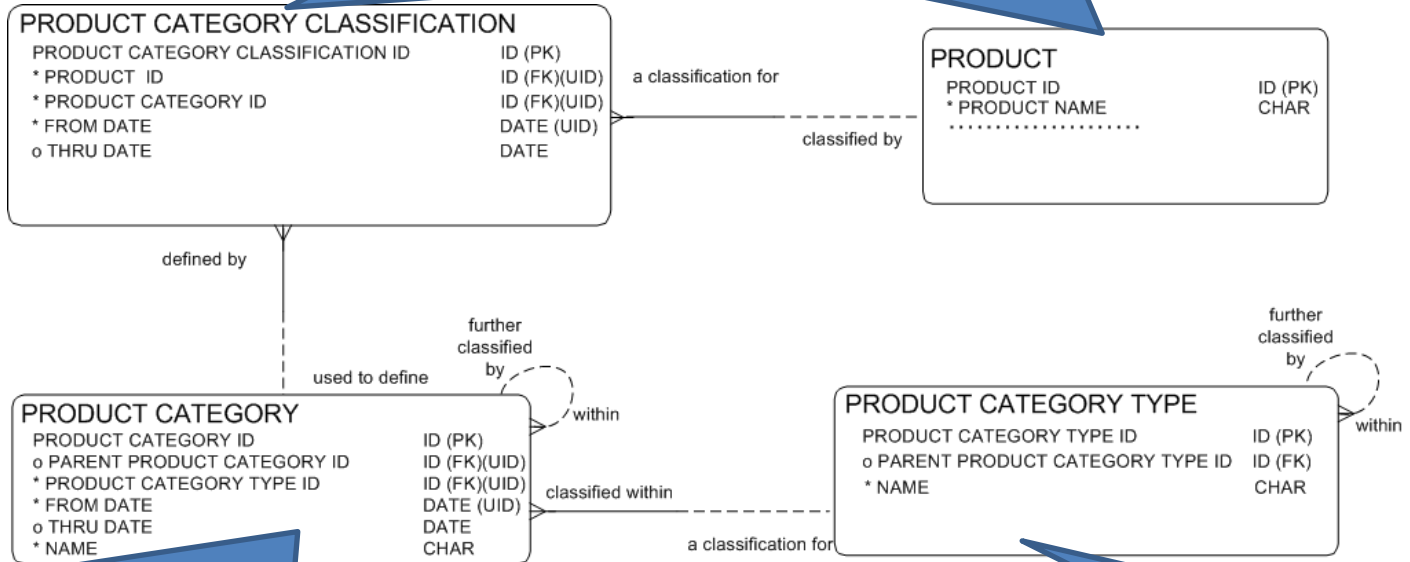| Product Line Id	Name
02	Home Use
04	Commercial Use
06	Home Business

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Level 3 Classification Pattern
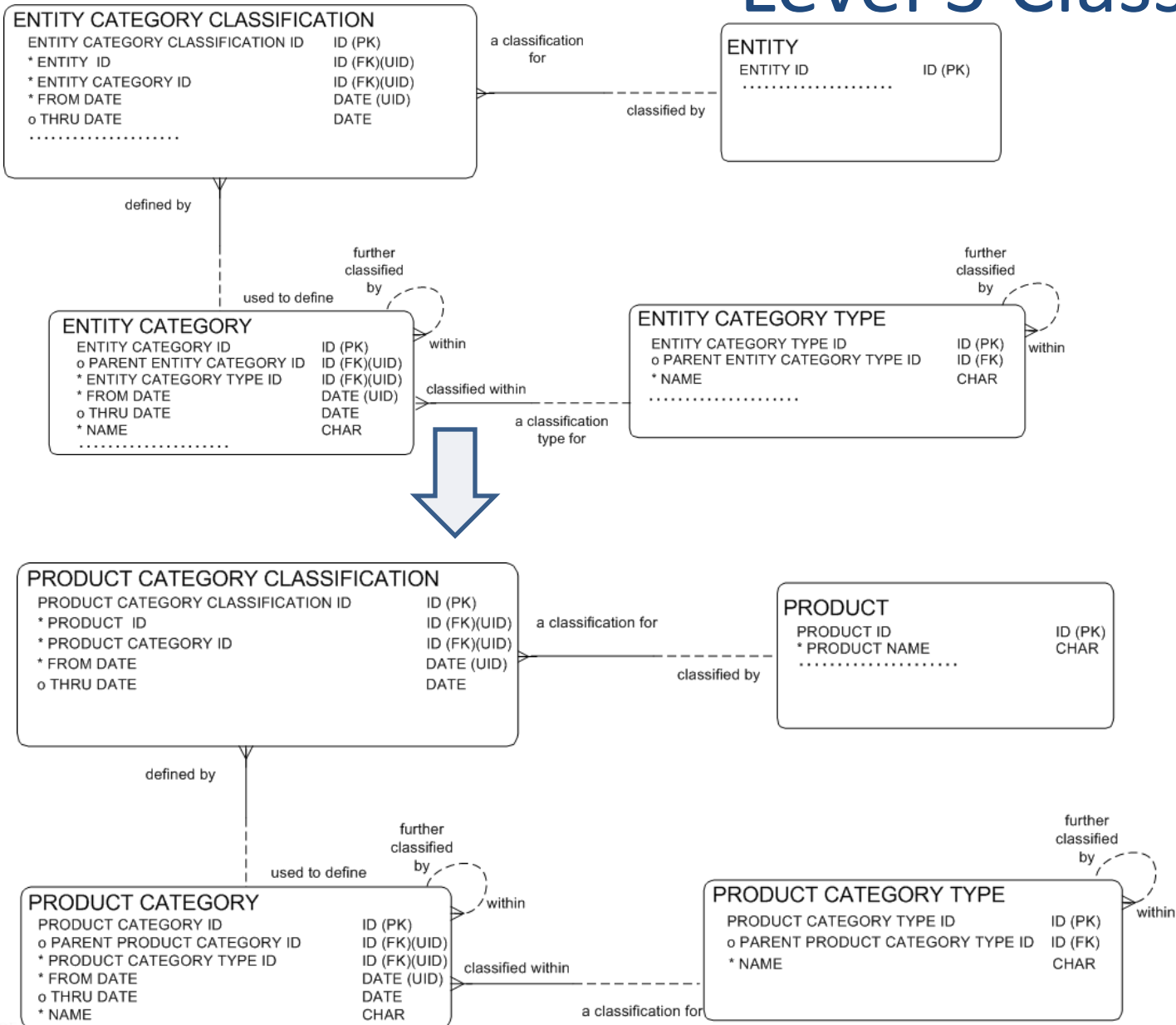
Level 3 Classification Pattern

| Product Category Classification Id	Product Id (Name)	Product Category Id (Name)
100	001 (Save Disk 2000)	01 (Hardware)
200	001 (Save Disk 2000)	02 (Storage Devices)
300	001 (Save Disk 2000)	04 (Commercial Use)

Product Id	Product Name	Disk Capacity	Color	Required Disk Space
001	Save Disk 2000	200 GB	Black	200 GB
002	Standard Memory Card	1GB		

PRODUCT CATEGORY CLASSIFICATION
PRODUCT CATEGORY CLASSIFICATION ID   ID (PK)
* PRODUCT ID   ID (FK)(UID)
* PRODUCT CATEGORY ID   ID (FK)(UID)
* FROM DATE   DATE (UID)
o THRU DATE   DATE

a classification for

PRODUCT
PRODUCT ID   ID (PK)
* PRODUCT NAME   CHAR

classified by

defined by

further classified by

used to define   within

PRODUCT CATEGORY
PRODUCT CATEGORY ID   ID (PK)
o PARENT PRODUCT CATEGORY ID   ID (FK)(UID)
* PRODUCT CATEGORY TYPE ID   ID (FK)(UID)
* FROM DATE   DATE (UID)
o THRU DATE   DATE
* NAME   CHAR

classified within

a classification for

PRODUCT CATEGORY TYPE
PRODUCT CATEGORY TYPE ID   ID (PK)
o PARENT PRODUCT CATEGORY TYPE ID   ID (FK)
* NAME   CHAR

further classified by

within

Product Category Id	Parent Product Category Id	Product Category Type Id (Name)	From Date	Thru Date	Name
01		001 (Product Type)			Hardware
02	01 (Hardware)	001 (Product Type)			Storage Devices
03		002 (Product Line)			Home Use
04		002 (Product Line)			Commercial Use

Product Category Type Id	Name
001	Product Type
002	Product Line
003	Product Family
004	Product Group

Hybrid Classification Pattern
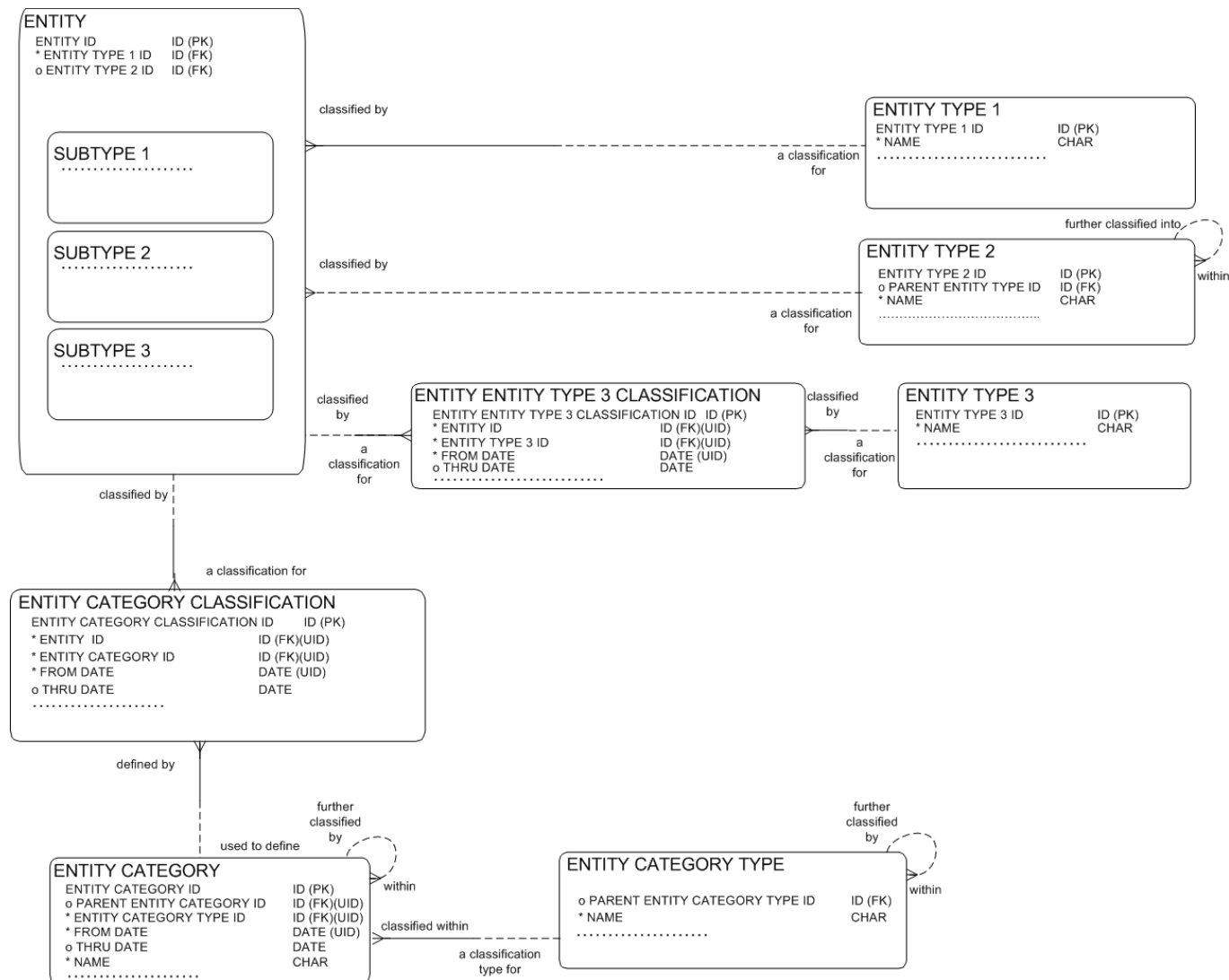
Hybrid Classification Pattern Example
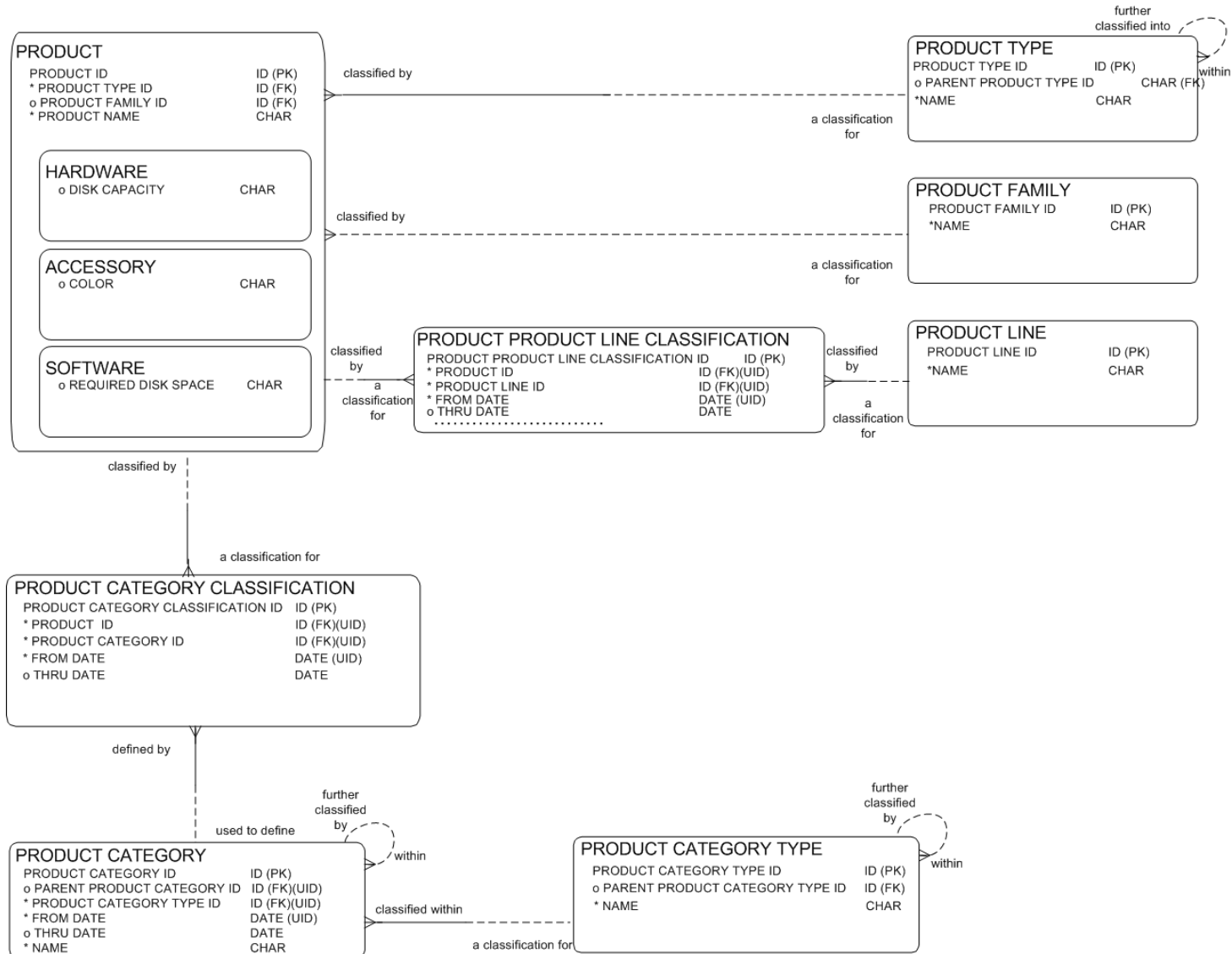
Something to think about- Classifications

- With the success of their order entry application, CCI decides to develop a new customer and product information application system and the below represent some of the key data requirements for this system.

- CCI needs to maintain classifications of their customers by size, industry, loyalty class (gold, silver, bronze) and many other classifications such as minority status, # of employees, etc.

- Each of the products that CCI may be classified by product family, product type, product line. Each of these classifications can have their own structures and hierarchies, in other words a product line may roll up into another product line.

- A new head of marketing has been employed and he has some new and interesting idea's about products. He wants the flexibility to add different product lines and product types. He also wants to have the capability to add new ways to classify products over time such as by market segment or by product usage. He also has enough data modeling experience to make him dangerous, but not particularly useful!

- The Idea of a product family is set in stone at CCI. It is so integrated into all other systems that to change the structure of it would have a cascading effect on many other systems in CCI. It is a core concept that can't be touched.

- The CIO needs a flexible model that allows the new marketing manager the flexibility to create any new classification, but a model that does not slaughter the holy cow of "Product Family". The business now trusts IT to produce good data models and they have become more accustomed to seeing and understanding more generalized data models. But should you still produce a specific data model as well as a generalized data model?

- The CIO also wants to kill two birds with one stone. Master Data Management (MDM), has appeared on his radar. He asks you what the data model look like in terms of master data management and if we can use the same data model for master data management as for this new customer and product information application.

- The CIO wants this model integrated with everything else that we have modeled so far.

HOW WOULD YOU DEVELOP A DATA MODEL FOR THE ABOVE SCENARIO THAT CAN BE USED NOT ONLY FOR THE CUSTOMER AND PRODUCT INFORMATION APPLICATION BUT ALSO FOR THE MASTER DATA MANAGEMENT APPLICATION.

Conclusion

- What can we learn from the patterns approach?

- Different models for different purposes
  - Specific – understanding
  - Generalized – flexibility

- A model is never right or wrong, it is only useful or not useful

- The plug and play approach of patterns

Contact us anytime!

- Feel free to email Len Silverston or Paul Agnew at
  lsilverston@univdata.com , pagnew@univdata.com

- New vol. 3 book, published Jan 09
  The Data Model Resource Book, Volume 3:
  Universal Patterns in Data Modeling

- More about Universal Data Models offerings

  – Our webs site www.universaldatamodels.com

  – Embarcadero distributes UDMs
    http://www.embarcadero.com/products/universal_d
    ata_models/

  – Wiley publishing offerings www.silverston.wiley.com

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