Modeling an Online Music Business

Zane Kansil
Loyola Marymount University
Database Systems

December 9, 2014

Contents

I Title Page **1**

II Contents **2**

III Description of the Enterprise **3**
III.1 Ten sample Questions John would ask 4

IV Definition of Environment **5**
IV.1 Input and Report forms 5
IV.2 Assumptions 8
IV.3 User-oriented data dictionary 9
IV.4 Cross-reference table 11

V Enterprise Database Design **13**
V.1 Logical model of the Enterprise 13
V.1.1 List of Entities and Attributes 13
V.1.2 List of Relationships and Attributes 15
V.1.3 Entity-Relationship diagram of the Enterprise 16
V.2 Conceptual model of the enterprise 17
V.3 Table dictionary 19
V.4 Attribute dictionary 20

VI Database and Query Definition **21**
VI.1 Database Definition 21
VI.2 Database Queries 28
VI.3 Design Tradeoffs and Limitations 30

VII Database Integrity and Security **31**
VII.1 Functional Dependencies 31
VII.2 Adjustments for Normalization 31
VII.3 Integrity and Security 31

VIII Implementation Notes **32**
VIII.1 Indices 32
VIII.2 Data 32
VIII.3 Query Trace 32
VIII.4 Implementation Assessment 32

IX Lessons Learned **33**

Chapter III

Description of the Enterprise

A friend of mine intends to put out an all-purpose site for his musical career. The site will be a hub for his online business and allow him to track sales and interactions with his fans.

The site will serve as a place to feature embedded music and video players for John's music. It will be necessary to monitor this hosted media in terms of listens and views. Some other metrics John is interested in are on-site plays (not a redirect), and redirects to his Soundcloud and YouTube accounts from their embedded players on his site. Videos and Songs are tracked separately due to their differing properties.

There is a sales aspect to the site, merchandise will also be sold under the same domain. Some merchandise will be physical, such as hats, headbands, wristbands and stickers. Other merchandise will be digital, such as a donation to download a mixtape (a non-album collection of John's music). Physical merchandise needs to be shipped, so appropriate data such as `shipping_status` and `destination` will need to be tracked. With physical merchandise, quantity and availability must be tracked. Digital merchandise is easier to manage as it is transmitted and there is less customer data to collect. Digital merchandise will also be infinitely available if listed, so there is no quantity related data to track.

JohnDB records data for Physical and Digital consumers separately.

As the main operator of his business, John wants to track of his sales and revenue. The most simple way to track this would be through a table of sales records. These records would detail everything necessary about the sale. A sale would correspond to a single type of product. If multiple products were purchased in the same transaction, then multiple sale entries would be logged.

III.1 Ten sample Questions John would ask

1. How many video plays today?
2. How many redirects to Soundcloud from embedded music players?
3. What is the redirect rate for videos?
4. Is “Black Silk Hooded Sweatshirt” sold out?
5. How many “Red Summer Beanie” items were sold in October 2014?
6. What physical goods are currently frozen? (sales prevented)
7. How many orders do I have to fill to the US?
8. What precentage of my digital consumers are from outside the US?
9. What is the average monthly revenue over the past six months?
10. What products have garnered zero sales in the past 14 days?

Chapter IV

Definition of Environment

IV.1 Input and Report forms

1. Video Metadata View

    - Video Name
    - Video (hosted at) URL
    - Number of plays
    - Total plays
    - Plays Today
    - Total redirects to YouTube

2. Song Metadata View

    - Song Name
    - Song Artist
    - Song (hosted at) URL
    - Total plays
    - Plays Today
    - Total redirects to SoundCloud

3. Add New Physical good

    - Name
    - Description Paragraph
    - Upload/Choose an Image
    - Color (optional)
    - Size (optional)
    - Price (in USD)
    - Current stock on hand

4. Add New Digital good

    - Name
    - Description Paragraph
    - Upload/Choose an Image
    - Price (in USD)

5. Physical Good Admin View

- Name
- Good SKU
- Good description (editable)
- Good's image url (editable)
- Price (in USD)
- Color of Good (editable)
- Quantity
- Size of Good

6. Digital Good Admin View

    - Name
    - Good SKU
    - Good description (editable)
    - Good's image url (editable)
    - Price (in USD)
    - Available (togglable)

7. Physical Consumer Admin View

    - Customer id
    - First Name (editable)
    - Last Name (editable)
    - Customer Phone Number (editable)
    - Address Line 1 (editable)
    - Address Line 2 (editable)
    - Customer Country (fixed to 'US')
    - Customer State (US states including 'HI' and 'AL')
    - Customer Zip Code (editable)

8. Digital Consumer Admin View

    - Customer id
    - First Name (editable)
    - Last Name (editable)
    - Customer Phone Number (editable)
    - Customer Country (editable)

9. Transaction Log

    - Item SKU
    - Sale type (`digital` or `physical`, derived)
    - Status (`received`, `shipped` or `fulfilled`)
    - Availability of Good
    - Quantity (of each line item)
    - Unit Price (of each line item)
    - Line number (each line item is numbered sequentially)
    - Total Order Cost (derived)
    - Sale date (time that purchase was made)

10. Interaction Log

    - Interaction timestamp

- Media identifier (interaction was made against this Song or Video)
- Title of Media

IV.2 Assumptions

1. Forms are used to add items to the site
2. Tables as opposed to graphs are the prefered way to view data
3. The Sales table functions as an Orders table as well, showing the status of each order in addition to transaction information
4. Only customers in the US are allowed to order physical goods

IV.3 User-oriented data dictionary

Datum	**Information Definition**
c_email	Email address
c_first_name	First name of customer
c_id	Identifies a customer
c_last_name	Last name of customer
c_phone	Phone number. All digits, no dashes or spaces.
dc_country	Country which customer resides. Optional and may be any country.
dc_id	Alias of 'c_id', used specifically to identify a digital consumer
dg_id	Alias of 'g_id', used specifically to identify a digital good
dg_is_available	Reflects whether or not this good is available for purchase. Set to "false" to prevent customers from soliciting a copy
g_description	Description of good
g_image_url	URL of image for good
g_name	Name of physical good
g_price	Price of good in USD pennies
g_sku	Uniquely identifies a class of item for sale. For physical goods this is specific for each color color size.
i_date	Datetime this interaction was logged
i_id	Interaction identifier.
li_number	Identifies the particular line item amongst a list of line items. Line items in a purchase are numbered sequentially in this manner
li_quantity	Number of units sold in the line item. A series of line items composes a purchase.
m_id	Media identifier. Identifies a Song or Video hosted on the site.
mv_plays	Total plays originating at the site. This is derived from the log of PLAY entries pointing to this song.
mv_plays_today	Plays originating at the site today. This is derived from the log of PLAY entries pointing to this song.
mv_redirects	Number of redirects to YouTube (which occurs when the embedded video is clicked by a viewer). This is derived from the log of REDIRECT entries pointing to this song.
mv_title	Music videos title, identical to its title on Youtube
mv_upload_date	Date/time that the video was uploaded to YouTube
mv_url	YouTube URL that the video is hosted at
pc_address_line_1	Address of customer
pc_address_line_2	Second line of customer address
pc_country	Country which customer resides. This will always be "US"
pc_id	Alias of 'c_id', used specifically to identify a physical consumer
pc_state	State which customer resides
pc_zip_code	Zip code. 5 digits in the US.
pg_color	Color of good

pg_id	Alias of 'g_id', used specifically to identify a physical good
pg_quantity_available	Current quantity available. This is an editable field so users should take care not to set the field inappropriately.
pg_size	Size of good, either 'S', 'M','L', ..., or a numbered size, or 'OSFA' (one size fits all)
redirect_url	The non-local url that the redirect sent the user to. Music videos redirect to a Soundcloud uri, Videos redirect to a Youtube uri.
sale_date	Datetime this sale was logged
sale_fulfill_date	Date this sale was set to 'fulfilled'
sale_id	Sales/transaction identifier
sale_status	The shipping status, 'received', 'shipped' or 'fulfilled'
so_artist	Artist of song, including features
so_plays	Total plays originating at the site. This is derived from the log of PLAY entries pointing to this song.
so_plays_today	Plays on the site today. This is derived from the log of PLAY entries pointing to this song.
so_redirects	Redirects to SoundCloud (triggered by clicks on the embedded player). This is derived from the log of REDIRECT entries pointing to this song.
so_title	Title of song
so_upload_date	Date/time that the video was uploaded to SoundCloud
so_url	SoundCloud URL that the video is hosted at

IV.4 Cross-reference table

Datum	Form or Screen									
	Video Metadata View	Song Metadata View	Add New Physical good	Add New Digital good	Physical Good Admin	Digital Good Admin	Physical Consumer Admin View	Digital Consumer Admin View	Transaction Log	Interaction Log
c_email							x	x		
c_first_name							x	x		
c_id										
c_last_name							x	x		
c_phone							x	x		
dc_country								x		
dc_id								x		
dg_id						x				
dg_is_available				x		x			x	
g_description			x	x	x	x				
g_image_url			x	x	x	x				
g_name			x	x	x	x			x	
g_price			x	x	x	x			x	
g_sku									x	
i_date										x
i_id										x
li_number									x	
li_quantity									x	
m_id										x
mv_plays	x									
mv_plays_today	x									
mv_redirects	x									
mv_title	x									x
mv_upload_date	x									
mv_url	x									
pc_address_line_1							x			
pc_address_line_2							x			
pc_country							x			
pc_id							x			
pc_state							x			
pc_zip_code							x			
pg_color			x		x				x	

pg_id					x					
pg_quantity_available			x		x					
pg_size			x		x				x	
redirect_url										
sale_date									x	
sale_fulfill_date									x	
sale_id									x	
sale_status									x	
so_artist		x								
so_plays		x								
so_plays_today		x								
so_redirects		x								
so_title		x								x
so_upload_date		x								
so_url		x								

Chapter V

Enterprise Database Design

V.1 Logical model of the Enterprise

V.1.1 List of Entities and Attributes

1. Media
    - m_id
2. Music Video
    - mv_id (alias of m_id)
    - mv_title
    - mv_url (url video is hosted at)
    - mv_upload_date
3. Song
    - so_id (alias of m_id)
    - so_title
    - so_artist
    - so_url (url song is hosted at)
    - so_upload_date
4. Interaction
    - i_id
    - i_date
5. Play
    - pl_id (alias of i_id)
6. Redirect
    - re_id (alias of i_id)
    - re_url
7. Consumer
    - c_id
    - c_firstname

- c_lastname
- c_email
- c_phone

8. Physical Consumer

    - pc_id (alias of c_id)
    - pc_address_line_1
    - pc_address_line_2
    - pc_country
    - pc_state

9. Digital Consumer

    - dc_id (alias of c_id)
    - dc_country (optional)

10. Purchase

    - sale_id
    - sale_status ("received", "shipped" or "fulfilled")
    - sale_date (datetime)
    - sale_fulfill_date (datetime)

11. Line Item

    - li_quantity

12. Good

    - g_sku
    - g_name
    - g_description
    - g_price

13. Digital Good

    - dg_id (alias g_sku)
    - dg_is_available (boolean, used to prevent ordering)

14. Physical Good

    - pg_id (alias g_sku)
    - pg_color
    - pg_size
    - pg_quantity_available

* - A datetime is an instant in time. Has date information and time-of-day information. Example: 2014-09-06T15:35:58+00:00 (September 6, 2014, 3:35:58pm)

V.1.2 List of Relationships and Attributes

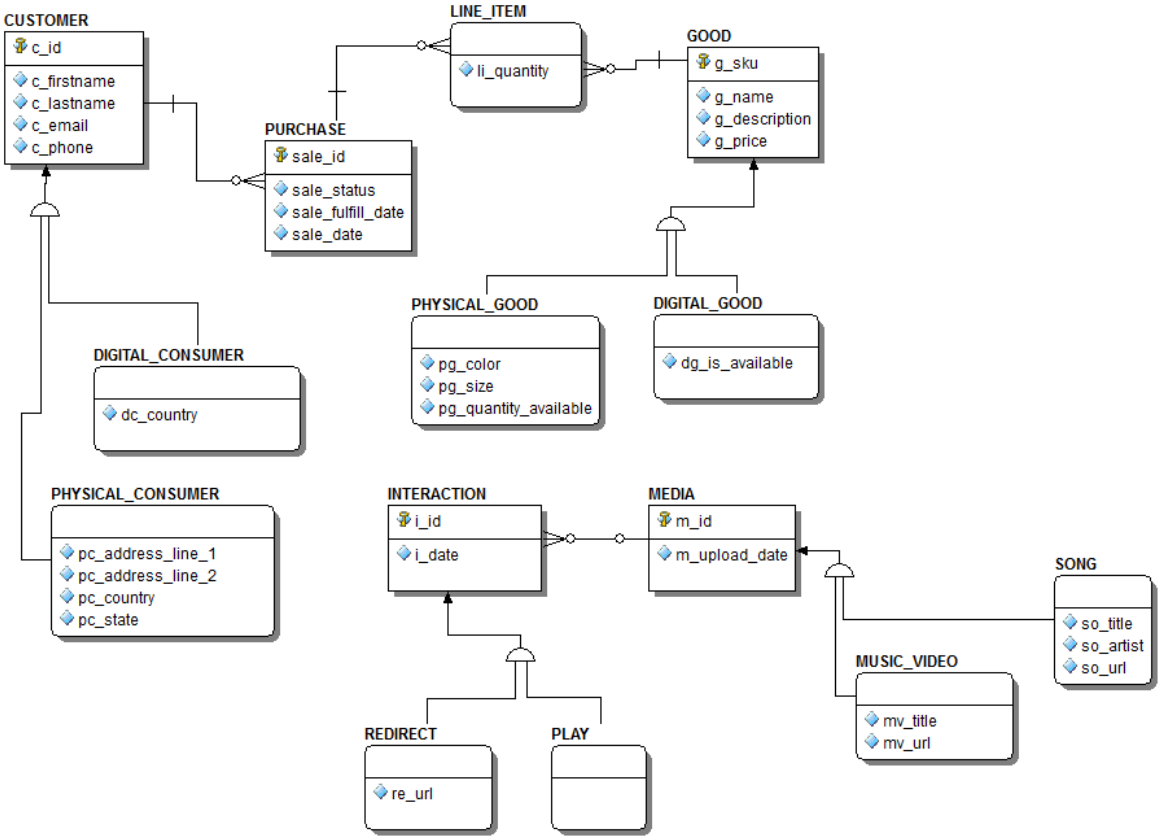
Media Relationships

1. m_id ⟶ m_upload_date, so_id, mv_id
2. so_id ⟶ so_title, so_artist, so_url, m_id
3. mv_id ⟶ mv_title, mv_url, m_id
4. i_id ⟶ i_date, m_id, re_id, pl_id
5. re_id ⟶ re_url, i_id
6. pl_id ⟶ i_id

Sales Relationships

1. c_id ⟶ c_firstname, c_lastname, c_email, c_phone, dc_id, pc_id
2. dc_id ⟶ dc_country, c_id
3. pc_id ⟶ pc_address_line_1, pc_address_line_2, pc_country, pc_state, c_id
4. sale_id ⟶ sale_status, sale_date, sale_fulfill_date
5. g_sku ⟶ g_name, g_description, g_price, pg_id, dg_id
6. pg_id ⟶ pg_color, pg_size, pg_quantity_available, g_sku
7. dg_id ⟶ dg_is_available, g_sku
8. (sale_id, g_sku) ⟶ li_quantity

V.1.3 Entity-Relationship diagram of the Enterprise



V.2 Conceptual model of the enterprise

```
MEDIA(m_id, m_upload_date)

MUSIC_VIDEO(mv_id, mv_title, mv_url)
    PK/FK: mv_id
    CK: m_id, mv_title, mv_url

SONG(so_id, so_title, so_artist, so_url)
    PK/FK: so_id
    CK: so_id, so_title, so_url

PLAY(pl_id, m_id, i_datetime)
    PK: pl_id
    FK: m_id
    CK: pl_id

REDIRECT(m_id, m_to)
    PK: re_id
    FK: m_id
    CK: re_id

CONSUMER(c_id, c_firstname, c_lastname, c_email)
    PK: c_id
    CK: c_id, c_email

PHYSICAL_CONSUMER(
  pc_id
, pc_address_line_1
, pc_address_line_2
, pc_country
, pc_state
, pc_phone
)
    PK/FK: pc_id
    CK: pc_id, pc_phone

DIGITAL_CONSUMER(
  dc_id
, pc_phone
, pc_country
)
    PK/FK: dc_id
    CK:    dc_id, pc_phone

PURCHASE(sale_id, c_id, sale_date, sale_fulfill_date)
    PK/FK: sale_id
    CK:    sale_id, c_id
```

```
LINE_ITEM(sale_id, g_id, li_quantity)
    PK: sale_id
    CK: sale_id
    FK: sale_id, g_id

GOOD(g_sku, g_name, g_description, g_price)
    PK: g_sku
    CK: g_sku

DIGITAL_GOOD(dg_id, dg_is_available)
    PK: dg_id
    CK: dg_id

PHYSICAL_GOOD(pg_id, pg_color, pg_size, pg_quantity_available)
    PK/FK: pg_id
    CK:    pg_id
```

V.3 Table dictionary

V.4 Attribute dictionary

Chapter VI

Database and Query Definition

VI.1 Database Definition

```
--
-- ER/Studio Data Architect 9.6 SQL Code Generation
-- Project :      zk-online-music-business.DM1
--
-- Date Created : Tuesday, December 09, 2014 16:44:51
-- Target DBMS : MySQL 5.x
--

--
-- TABLE: CUSTOMER
--

CREATE TABLE CUSTOMER(
    c_id           CHAR(20)       NOT NULL,
    c_firstname    VARCHAR(20)    NOT NULL,
    c_lastname     VARCHAR(20)    NOT NULL,
    c_email        VARCHAR(20)    NOT NULL,
    c_phone        VARCHAR(20)    NOT NULL,
    PRIMARY KEY (c_id)
)ENGINE=INNODB
;



--
-- TABLE: DIGITAL_CONSUMER
--

CREATE TABLE DIGITAL_CONSUMER(
    dc_id         CHAR(20)       NOT NULL,
    dc_country    VARCHAR(20)    NOT NULL,
    PRIMARY KEY (dc_id)
)ENGINE=INNODB
;
```

```
--
-- TABLE: DIGITAL_GOOD
--

CREATE TABLE DIGITAL_GOOD(
    dg_id              CHAR(20)    NOT NULL,
    dg_is_available    BIT(1)      NOT NULL,
    PRIMARY KEY (dg_id)
)ENGINE=INNODB
;



--
-- TABLE: GOOD
--

CREATE TABLE GOOD(
    g_sku            CHAR(20)         NOT NULL,
    g_name           VARCHAR(255)     NOT NULL,
    g_description    VARCHAR(2048)    NOT NULL,
    g_price          INT              NOT NULL,
    PRIMARY KEY (g_sku)
)ENGINE=INNODB
;



--
-- TABLE: INTERACTION
--

CREATE TABLE INTERACTION(
    i_id      CHAR(20)    NOT NULL,
    m_id      CHAR(20),
    i_date    DATETIME    NOT NULL,
    PRIMARY KEY (i_id)
)ENGINE=INNODB
;



--
-- TABLE: LINE_ITEM
--
```

```
CREATE TABLE LINE_ITEM(
    sale_id        CHAR(20)    NOT NULL,
    g_sku          CHAR(20)    NOT NULL,
    li_quantity    INT,
    PRIMARY KEY (sale_id, g_sku)
)ENGINE=INNODB
;



--
-- TABLE: MEDIA
--

CREATE TABLE MEDIA(
    m_id             CHAR(20)    NOT NULL,
    m_upload_date    DATETIME,
    PRIMARY KEY (m_id)
)ENGINE=INNODB
;



--
-- TABLE: MUSIC_VIDEO
--

CREATE TABLE MUSIC_VIDEO(
    mv_id       CHAR(20)        NOT NULL,
    mv_title    VARCHAR(50)     NOT NULL,
    mv_url      VARCHAR(100)    NOT NULL,
    PRIMARY KEY (mv_id)
)ENGINE=INNODB
;



--
-- TABLE: PHYSICAL_CONSUMER
--

CREATE TABLE PHYSICAL_CONSUMER(
    pc_id                CHAR(20)        NOT NULL,
    pc_address_line_1    VARCHAR(255)    NOT NULL,
    pc_address_line_2    VARCHAR(255),
    pc_country           VARCHAR(20)     NOT NULL,
    pc_state             VARCHAR(20)     NOT NULL,
    PRIMARY KEY (pc_id)
)ENGINE=INNODB
```

```
;



--
-- TABLE: PHYSICAL_GOOD
--

CREATE TABLE PHYSICAL_GOOD(
    pg_id                   CHAR(20)       NOT NULL,
    pg_color                VARCHAR(20),
    pg_size                 VARCHAR(20),
    pg_quantity_available   INT            NOT NULL,
    PRIMARY KEY (pg_id)
)ENGINE=INNODB
;



--
-- TABLE: PLAY
--

CREATE TABLE PLAY(
    pl_id    CHAR(20)    NOT NULL,
    PRIMARY KEY (pl_id)
)ENGINE=INNODB
;



--
-- TABLE: PURCHASE
--

CREATE TABLE PURCHASE(
    sale_id              CHAR(20)       NOT NULL,
    sale_status          VARCHAR(20)    NOT NULL,
    sale_fulfill_date    DATETIME,
    sale_date            DATETIME       NOT NULL,
    c_id                 CHAR(20)       NOT NULL,
    PRIMARY KEY (sale_id)
)ENGINE=INNODB
;



--
-- TABLE: REDIRECT
```

```
--

CREATE TABLE REDIRECT(
    re_id     CHAR(20)        NOT NULL,
    re_url    VARCHAR(255)    NOT NULL,
    PRIMARY KEY (re_id)
)ENGINE=INNODB
;



--
-- TABLE: SONG
--

CREATE TABLE SONG(
    so_id        CHAR(20)        NOT NULL,
    so_title     VARCHAR(50)     NOT NULL,
    so_artist    VARCHAR(20)     NOT NULL,
    so_url       VARCHAR(100)    NOT NULL,
    PRIMARY KEY (so_id)
)ENGINE=INNODB
;



--
-- TABLE: DIGITAL_CONSUMER
--

ALTER TABLE DIGITAL_CONSUMER ADD CONSTRAINT RefCUSTOMER2
    FOREIGN KEY (dc_id)
    REFERENCES CUSTOMER(c_id)
;


--
-- TABLE: DIGITAL_GOOD
--

ALTER TABLE DIGITAL_GOOD ADD CONSTRAINT RefGOOD7
    FOREIGN KEY (dg_id)
    REFERENCES GOOD(g_sku)
;


--
-- TABLE: INTERACTION
--
```

```
ALTER TABLE INTERACTION ADD CONSTRAINT RefMEDIA15
    FOREIGN KEY (m_id)
    REFERENCES MEDIA(m_id)
;


--
-- TABLE: LINE_ITEM
--

ALTER TABLE LINE_ITEM ADD CONSTRAINT RefPURCHASE4
    FOREIGN KEY (sale_id)
    REFERENCES PURCHASE(sale_id)
;

ALTER TABLE LINE_ITEM ADD CONSTRAINT RefGOOD5
    FOREIGN KEY (g_sku)
    REFERENCES GOOD(g_sku)
;


--
-- TABLE: MUSIC_VIDEO
--

ALTER TABLE MUSIC_VIDEO ADD CONSTRAINT RefMEDIA10
    FOREIGN KEY (mv_id)
    REFERENCES MEDIA(m_id)
;


--
-- TABLE: PHYSICAL_CONSUMER
--

ALTER TABLE PHYSICAL_CONSUMER ADD CONSTRAINT RefCUSTOMER1
    FOREIGN KEY (pc_id)
    REFERENCES CUSTOMER(c_id)
;


--
-- TABLE: PHYSICAL_GOOD
--

ALTER TABLE PHYSICAL_GOOD ADD CONSTRAINT RefGOOD6
    FOREIGN KEY (pg_id)
    REFERENCES GOOD(g_sku)
```

```
;


--
-- TABLE: PLAY
--

ALTER TABLE PLAY ADD CONSTRAINT RefINTERACTION12
    FOREIGN KEY (pl_id)
    REFERENCES INTERACTION(i_id)
;


--
-- TABLE: PURCHASE
--

ALTER TABLE PURCHASE ADD CONSTRAINT RefCUSTOMER3
    FOREIGN KEY (c_id)
    REFERENCES CUSTOMER(c_id)
;


--
-- TABLE: REDIRECT
--

ALTER TABLE REDIRECT ADD CONSTRAINT RefINTERACTION13
    FOREIGN KEY (re_id)
    REFERENCES INTERACTION(i_id)
;


--
-- TABLE: SONG
--

ALTER TABLE SONG ADD CONSTRAINT RefMEDIA11
    FOREIGN KEY (so_id)
    REFERENCES MEDIA(m_id)
;
```

VI.2 Database Queries

```
-- (1) How many video plays today?

SELECT count(‘p‘.‘i_date‘)
FROM       ‘MUSIC_VIDEO‘ AS ‘mv‘
INNER JOIN ‘PLAY‘        AS ‘p‘
ON         ‘mv‘.‘m_id‘   =  ‘p‘.‘m_id‘
WHERE      ‘p‘.‘i_date‘  >= curdate()
AND        ‘p‘.‘i_date‘  <= curdate()
;

-- (2) How many redirects to Soundcloud from embedded music players?

SELECT count(‘r‘.‘to‘)
FROM       ‘SONG‘     AS ‘s‘
INNER JOIN ‘REDIRECT‘ AS ‘r‘
ON         ‘s‘.‘m_id‘ =  ‘r‘.‘m_id‘
WHERE      ‘r‘.‘to‘   =  "soundcloud"
;

-- (3) What is the redirect rate for videos?

SELECT count(‘p‘.‘m_id‘), count(‘r‘.‘m_id‘)
FROM       ‘MUSIC_VIDEO‘ AS ‘mv‘
INNER JOIN ‘PLAY‘        AS ‘p‘
ON         ‘mv‘.‘m_id‘   =  ‘p‘.‘m_id‘
INNER JOIN ‘REDIRECT‘    AS ‘r‘
ON         ‘mv‘.‘m_id‘   =  ‘r‘.‘m_id‘
;

-- (4) Is Black Silk Hooded Sweatshirt sold out?

SELECT ‘pg‘.‘pg_quantity_available‘
FROM   ‘PHYSICAL_GOOD‘ AS ‘pg‘
;

-- (5) How many Red Summer Beanie items were sold in October 2014?

SELECT count(‘s‘.‘sale_id‘)
FROM  ‘PURCHASE‘      AS ‘s‘
WHERE ‘s‘.‘sale_date‘ >= "2014-10-1"
AND   ‘s‘.‘sale_date‘ <= "2014-10-31"
;

-- (6) What physical goods are currently frozen? (sales prevented)

SELECT ‘pg‘.‘pg_name‘
FROM   ‘PHYSICAL_GOOD‘     AS ‘pg‘
```

```
WHERE  ‘pg‘.‘pg_is_frozen‘ =  1
;

-- (7) How many orders do I have to fill to the US?

SELECT count(‘pg‘.‘sale_id‘)
FROM       ‘PHYSICAL_CUSTOMER‘ AS ‘pc‘
INNER JOIN ‘PURCHASE‘          AS ‘sale‘
ON         ‘pc‘.‘c_id‘         =  ‘sale‘.‘c_id‘
WHERE      ‘pc‘.‘pc_country‘   =  "US"
;

-- (8) What precentage of my digital consumers are from outside the US?
SELECT count(‘dg‘.‘c_id‘), count(‘foreign‘.‘c_id‘)
FROM   ‘DIGITAL_CUSTOMER‘     AS ‘dg‘
   ,   ‘DIGITAL_CUSTOMER‘     AS ‘foreign‘
WHERE  ‘foreign‘.‘dc_country‘ != "US"
;

-- (9) What is the average monthly revenue over the past six months?

#  INCOMPLETE

-- (10) What products have garnered zero sales in the past 14 days?

SELECT DISTINCT ‘g‘.‘g_name‘
FROM            ‘LINE_ITEM‘      AS ‘li‘
LEFT JOIN       ‘GOOD‘           AS ‘g‘
ON              ‘li‘.‘g_sku‘     =  ‘g‘.‘g_sku‘
WHERE           ‘li‘.‘sale_date‘ >= DATE_SUB(curdate(), INTERVAL 2 WEEK)
AND             ‘g‘.‘g_sku‘      IS NULL
;
```

VI.3 Design Tradeoffs and Limitations

Not too many limitation currently. I recently added a parent `MEDIA` entity for videos and songs.

Chapter VII

Database Integrity and Security

VII.1 Functional Dependencies

A list of the functional dependencies that hold on your database.

VII.2 Adjustments for Normalization

An explanation of the changes needed to normalize your database.

VII.3 Integrity and Security

A list (in English) of the integrity and security constraints which are to hold on your database.

Chapter VIII

Implementation Notes

VIII.1 Indices

A list of the indices used by your database, with a justification for each.

VIII.2 Data

The data used to populate your database.

VIII.3 Query Trace

A trace of the execution of each of your queries.

VIII.4 Implementation Assessment

An assessment of how smoothly your implementation went

Chapter IX

Lessons Learned