
Teaching Case

A Database Design and Development Case: Home Theater Video

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CASE SUMMARY

Home Theater Video, a small video rental store, is faced with the challenge of tracking the rental/sales of DVDs and movie information requested by their customers. Management has realized that the current method of using spreadsheets will no longer be feasible to address their needs of maintaining data and searching for information. Home Theater Video has decided to enter the age of maintaining information in a database to provide adequate support to their customers when searching for a movie/actor, managing customer rental transactions, and support of their back-end processes.

FUNCTIONAL REQUIREMENTS

The owner of Home Theater Video (HTV) recognized that prior to the design of the database he would have to collect the functional requirements of the video store to develop a tracking and payment system. After interviewing customers and employees of their needs, he prepared a functional requirements report. The report includes a sample of the data required for the system and the specifications that are needed to develop the database system. Below is the detailed HTV Functional Requirements Report.

Database Requirements

HTV has over 3,000 DVDs that they need to track. Each of the DVDs is assigned a unique number. For each movie, we need to know its title and category (e.g. comedy, suspense, drama, sci-fi). Below is the list of movie categories we use (Table 1). HTV would like to assign each movie category a unique code, which is included in the list.

HTV gives each movie title a specific id and tracks which movie is recorded on each DVD. HTV also collects the year and rating of each movie. Videos are only stocked in DVD format. We always stock at least one DVD for each movie we carry, but for many of our more popular movies we stock multiple DVDs of the same movie. Each DVD contains a single specific movie. We don't have any movies that require multiple DVDs. The rental fees for our videos vary by the rental code we assign them, please see Table 2 below for details. The movies are rented for a 5-day period. A late fee of \$1.00 accrues for each day a video is returned after the due date.

Code	Category Name	Code	Category Name	Code	Category Name
ADV	Adventure	FNT	Fantasy	SFI	Science Fiction
ANM	Animation	HOR	Horror	SHK	Shakespeare
BIO	Biography	HST	History	SPT	Sports
COM	Comedy	MUS	Musical	SUS	Suspense
CRM	Crime	MYS	Mystery	THR	Thriller
DOC	Documentary	POL	Political	WAR	War
DRM	Drama	RLG	Religious	WST	Western
FAM	Family	RMC	Romance		

Rental Code	Description	Rental Fee
CH	Current Hit	\$3.50
CR	Current Release	\$3.00
PP	Popular	\$2.50
NR	Normal	\$2.00
SP	Special	\$1.00

Table 3. Sample Customers

Membership Id	First Name	Last Name	Address	City	State	Zip Code
WELLA01	Charles	Wellard	2809 Linden Street, Townhouse #3F	Winston-Salem	North Carolina	27104
WELLA02	Paula	Wellard	185 Washington St	Clemmons	North Carolina	27127
STOVE01	Lee	Stover	888 Flower Crt.	Winston-Salem	North Carolina	27104
BALLE01	Steven	Ballenger	333 Lake Drive	Winston-Salem	North Carolina	27106
BALL01	James	Ball	123 North Rideout Rd	Clemmons	North Carolina	27127
BISHO01	Lee Ann	Bishop	723 McCormick Ave	Winston-Salem	North Carolina	27106
LINK01	Stephen	Link	1023 West Embassy Drive	Washington	District of Columbia	20036
SPARR01	Mary	Sparrow	456 Whitesburg Road, Apt. 200	Winston-Salem	North Carolina	27104
LINGE01	Bruce	Lingenfelter	56 Charles Drive	Clemmons	North Carolina	27127
SMITH01	Phil	Smith	44 Maynard Drive, Flat #2C	Winston-Salem	North Carolina	27104
GULED01	Sherly	Guledge	777 Monroe Road	Pfaff Town	North Carolina	27040

HTV customers frequently ask for movies starring specific actors. Tom Hanks and Nicole Kidman are always popular. So they would like to keep track of the leading actors appearing in each movie. Not all of our movies have leading actors, documentaries for instance. Customers like to know each actor's "real" birth name and date of birth. We track only actors who appear in the movies in our inventory and there is no need to differentiate between actors and actresses. By the way, the Screen Actors Guild does not permit two actors to have the same studio name and the studio name never contains a middle

name or initial. We would like to search for an actor by their full stage name. There is also no need to have separate fields for their first, middle, and last real names. We are currently using a spreadsheet to keep track of our videos. We have provided a sample report – **Sample Movies**, for your review in the Appendix. All the data we need to track regarding our movies and DVDs is included on this spreadsheet.

There are several thousand customers. We only rent videos to people who have joined our "video club." To belong to our club, they must have

good credit. For each club member, we'd like to keep their first and last name, current phone number, and current complete address. Of course, each club member has a membership number. The customer list is currently managed with a spreadsheet and a sample for your review is provided below (Table 3).

HTV needs to track the videos each customer currently has checked out, as well as a complete history of the videos each customer has rented. They also would like to track video rental revenue, and late fees collected, - this is to be maintained in a separate details table. A customer may check out multiple videos at any given time. In addition, Home Theater Video would like to track customer payments to maintain the video rental sales. Also, the customers have different payment options. Each transaction may be paid by Credit Card, Cash, or Check. A small sample of the necessary transaction data is provided for your review below (Table 4).

Movie Title	DVD Number	First Name	Last Name	Rental Date
Catch Me If You Can	133	Lee Ann	Bishop	2/1/2011
Harry Potter and the Prisoner of Azkaban	126	Lee Ann	Bishop	2/1/2011
Harry Potter and the Prisoner of Azkaban	128	Lee	Stover	2/2/2011
Million Dollar Baby	137	Lee	Stover	2/2/2011
Master and Commander	124	James	Ball	2/3/2011
Master and Commander	125	Stephen	Link	2/3/2011
Ray	149	Sherly	Guledge	2/3/2011
Ray	148	James	Ball	2/3/2011
Harry Potter and the Prisoner of Azkaban	127	Phil	Smith	2/4/2011
Hotel Rwanda	145	Paula	Wellard	2/4/2011
Cold Mountain	119	Lee Ann	Bishop	2/5/2011
Harry Potter and the Prisoner of Azkaban	126	Charles	Wellard	2/5/2011
Million Dollar Baby	136	Steven	Ballenger	2/5/2011
Spanglish	140	Steven	Ballenger	2/5/2011
Spider-Man 2	141	Bruce	Lingenfelter	2/5/2011
The Lord of the Rings: The Two Towers	103	Bruce	Lingenfelter	2/5/2011
Master and Commander	125	Phil	Smith	2/6/2011
Pirates of the Caribbean	112	Mary	Sparrow	2/6/2011
Million Dollar Baby	136	Stephen	Link	2/8/2011
Pirates of the Caribbean	115	Stephen	Link	2/8/2011
Spider-Man 2	142	Stephen	Link	2/8/2011
The Green Mile	111	Steven	Ballenger	2/8/2011
The Lord of the Rings: Return of the King	121	Steven	Ballenger	2/8/2011
The Terminal	138	Charles	Wellard	2/8/2011
Spider-Man 2	143	Lee	Stover	2/10/2011

Employee ID	Employee Name	Email	Phone
300	Rob Mason	rmason@video.com	336.559.5656
301	Pamela Anderson	panderson@hometheatres.com	336.456.4567
302	Sheree Todd	stodd@hometheatres.com	336.214.3698
303	Mike Thompson	mthompson@hometheatres.com	336.789.4563
304	Marie Saunders	maries@hometheatres.com	336.123.4567
305	Matt Saunders	matts@hometheatres.com	336.258.3698

For each employee, HTV would like to maintain their first and last name, email address, and home phone. A sample of employees is provided in the table below (Table 5). It is important to HTV to not only track the employee information but also their video sales.

Queries Requirements

As HTV's data collection grows in size, it is important for management and staff to extract or filter information to answer questions. HTV will require a variety of queries to extract information from the database. We have determined that the initial set of queries is to include the following:

- Movies Before 2004:** What movies released before 2004 does Home Theater Video stock? Display Movie Id and Title.
- Membership List:** A membership list that displays the member's membership number, last name and first name separated by a comma and a space. Label the column headings as follows: Membership Id and Member's Name.
- Actors Using Real Name:** List the actors whose studio name is the same as their real name. Label column: Actors Using Their Real Name. Sort by the actor's name.
- Actors Age:** A list of actors that displays their studio name, date of birth and age. Sort the list by age with the oldest appearing first on the list. Label the columns: Actor, Date of Birth, and Age.

5. **Fantasy DVDs:** What fantasy DVDs does Home Theater Video have? Display Movie Id, Title, and Rating.
6. **Movie Rental Categories:** A listing of Home Theater Video's movies and their respective rental category. Display Movie Id, Movie Title and Rental Code Description. Sort by Rental Code (not description).
7. **Price List:** A listing of individual DVD prices for Home Theater Video. Display DVD Number, Movie Title, Movie Category, Rating, and Rental Price. Use user-friendly column headings. The rental price is to be formatted as currency. The price list is to be sorted by movie title and category. The output is not to word wrap.
8. **Rental Fee Stats:** A query to display the minimum, maximum, and average rental fee for each movie category. Be sure to format the appropriate columns as currency and label the columns appropriately.
9. **Actors in War Movies:** A listing to display the actors that star in war movies. Display Actor's Stage Name and Movie Title. Sort by Actor.
10. **DVDs Currently Rented:** (a) A query to display the DVDs that are currently rented by members. Display DVD number, Membership ID, Movie Title, Member First Name, Member Last Name, Rental Date, and Date Due. Sort by Date Due. Name this query *DVDs Currently Rented*. (b) Modify the query again, this time sort by Member's Last Name. Save this query as *DVDs Currently Rented by Member's Name*.
11. **Daily Revenue:** A query to display the daily revenue by day. Display Rental Date, Total DVD Rental Revenue, Total Collected Late Fees, and Total Revenue. Total Revenue is the sum of DVD Rental Revenue and Collected Late Fees. Collected Late Fees need to be associated with the Returned Date. Sort the query by rental date.
12. **Member Revenue:** An online listing to display revenue received by member. Display Member Last Name, Member First Name, Total DVD Rental Revenue (Total Revenue is the sum of DVD Rental Revenue and Collected Late Fees), Total Collected Late Fees, and Total Revenue.
13. **Payment Completed:** A query to display all the DVDs that have been paid completely (balance of zero). Display DVD number, Member Last Name, Member First Name.
14. **Employee Sales:** A listing to display total sales by employees. Display Employee's Name (written as: Employee Last Name,

Employee First Name), Total DVD Sales. Sort by highest sales generated.

All query column headings are to be clear, concise and accurately describe the contents of the column to the average user. Only universally accepted abbreviations are to be used. All queries, when printed out, should fit on standard 8 1/2" by 11" paper when printed in landscape mode. The queries are to be named as they are listed above.

Forms Requirements

HTV needs several user-friendly forms so that our employees and administrators are able to enter data into the database. Some forms will be just data entry forms, these are merely replications of the information in the databases; other forms are needed to combine data from multiple tables. Our management team has provided the following functional requirements for Home Theater Video's input and application forms.

Input Forms

Input forms are to allow our employees to enter, edit, or query data in the given table. These forms are to be columnar type forms that display data or allow for input of one record at a time. The forms are to be user friendly with all the field labels consisting of user-friendly descriptive names.

Input/Query forms are to be developed for the following tables:

- Actor
- Membership (Customer Information)
- DVD
- Movie
- Movie Category
- Performance (What actors appear in which movies?)
- Rental Category
- Payment Methods

Application Forms

1. **Current Rentals:** This form is to display the DVDs that are currently rented by a given member. The form when properly formatted is to display the Membership ID and Member's Name at the top of the form in columnar format. The DVD Number, Movie Title, Rental Date, and Due Date are to be in tabular format below the member information. The tabular portion is to display

all of the DVDs currently rented for the member displayed in the columnar section in the top portion of the form. This form is intended to be a query only form and will not be used to input data.

2. **Actor Performances:** Home Theater Video wants to use this form to respond to requests by members inquiring about the movies in which a particular actor has appeared. The top portion of the form is to be in columnar format and include the actor's stage name, real name, and date of birth. The lower portion of the form is to include the Movie Name, Rating, Year Released, Movie Category Description, and Rental Fee. This portion of the form is to be in tabular format. This form is intended to be a query only form and will not be used to input data.
3. **DVD Rental Data Entry:** The purpose of this form is to allow for the data entry or querying of DVD Rental data by member. The form is to be divided into two sections. The first section is to display member related data: Membership ID, Member's First Name, and Member's Last Name. The second section is to allow for the display of past rentals as well as the entry of new ones. This section is to include the following fields: Membership ID, DVD Number, Rental Date, and Rental Fee. The bottom portion of this section is to contain a textbox that keeps a running total of the member's rental fees. This field should look like a total field on a report and appear under the rental fee column and be labeled: Total Rental Fees.
4. **Payment Forms:** Home Theater would like to display a screen that allows for the data entry or querying of payment information. The form is to include member and rental transaction information. Display member related data: Membership ID, Member's First Name, and Member's Last Name (make these so users may not make changes to it – query only). The display of transaction and payment information should include the following fields: Rental Date, DVD Number, Movie Title, Rental Fee, Sales Tax, Total Amount Due, Date Due, Payment Method, Payment Date, and Payment Amount. The Payment Method should be a drop down box with options. The Total Amount Due should be a calculated field based on the rental fee and sales tax. The sales tax rate is 8%.

Report Requirements

There are several initial reports required by the HTV management team. The individual report specifications appear below. All sub-totals should have a line above the subtotal and the grand total should have a double line above the total. The sub-totals and grand totals are to be appropriately labeled with descriptive labels appearing immediately to the left of the totals.

1. **Membership Report:** This report is based on the Membership List Query and is to display each member's Membership ID and Name (last name and first name separated by a comma). Sort by Membership ID.
2. **Movie Rental Categories Report:** This report is based on the Movies Rental Categories Query. The report is to display the Rental Code Description, Movie Title, and Movie Id. The data is to be grouped by Rental Code Description. Sort by Rental Code Description and Movie Title.
3. **DVDs Currently Rented Report:** This report is based on the DVDs Currently Rented Query. The report is to display Date Due, Membership ID, Member's Last Name, Member's First Name, DVD number, Movie Title, and Rental Date. The report is to be grouped by Due Date and Membership ID. All of the member information for a specific member is to appear on the same line. Sort by Date Due, Membership ID, and DVD Number.
4. **Daily Revenue Report:** The Daily Revenue Query forms the basis for this report. Display Rental Date, Total DVD Rental Revenue, Total Collected Late Fees, and Total Revenue. Group by month. All revenue columns are to be totaled by month and for the full report. Sort the query by rental date.
5. **Daily Detailed Rental Category Report:** Create a report to display detailed daily revenue by rental category and movie. Display Rental Date, Rental Category Description, Movie Title, and Total Rental Fees by Title. Group by Rental Date and Rental Category Description. Total the Rental Fees by Rental Category, Rental Date, and the full report.

Switchboard Requirements

HTV management wants to create a system that any of the employees can use, where they are not required to know the specific tables or queries to gather or input information. A menu

system in which employees can easily access forms and reports will assist in the cohesiveness and accuracy of data. Below are the minimum requirements for the switchboard that HTV needs.

The database is to have a menu system designed for our everyday users. The menu is to be user-friendly and contain selections for all the forms and reports. Home Theater Video company colors are red, black and gray. The management team would like to use either the Metro or Technic AutoFormat Style and wants to see the HTV logo (see Figure 1) on the switchboard, forms, and reports.



- The menu is to be executed automatically when the database is opened and the database window is to be displayed in the background.
- The menu is to contain an exit selection that will exit the database application.
- Two Main Menu Options - One for Employees/Management to enter and the second for customers to provide information.
- Within the Employees/Management Switchboard, two sections exist in this Switchboard – Forms and Reports. These sections should include the following:
 - **Employees/Management Switchboard:**
 - Enter/View Information Forms – This main link will give Home Theater Rentals access to submit or view information in the different tables. Links should be created with the following labels:
 - Enter/View Actor Information – link to Actor Input form
 - Enter/View Employee Information – link to Employee Input form
 - Enter/View Movie Information – link to Movie information including DVD Number

- Enter/View Rental Category Information – link to Rental Category Information
- Create a link to query only forms for the Current Rentals and Payment Forms application forms. Name the links: Current Rentals Form and Payment Process Form
- Reports
 - Create a link to all five of the reports created earlier
- **Customer Information Switchboard:**
 - Customer Information
 - Create a link to the customers input form. This should be an input only form.
 - Membership Rentals
 - Create a link to the current rentals form. This should be a query only form.
 - Actor Performances
 - Create a link to the actor performances form to allow customers to review which movies their favorite leading actors have performed in. This should be a query-only form.

Each part of the switchboard should be user friendly. Therefore, there should be an easy way to move in and out of menu selections. Also, HTV would like to have exit buttons on the forms and reports to close them properly.

Pivot Table Requirements

Home Theater Video would like to use the information in the database to discover trends among their rentals. In particular, the management team would like to know which employees are making the most sales and which movies in which categories are generating the most revenue.

Based on the Home Theater Video database, create two queries in MS Access to export to MS Excel. The output of each query should provide HTV with information to determine (1) each employee's total sales by rental category and by day and (2) each movie rental by movie category and by month. Next export the query output into Excel and create the pivot tables that display (1) each employee's total sales by rental category and by day and (2) each movie rental by movie category and by month.

DELIVERABLE REQUIREMENTS

Deliverable One

Create the database structures (tables and relationships) necessary to meet the functional requirements as set forth by Home Theater Video's management. Create meaningful column names when creating your tables. The data types and sizes should be appropriate for the data as described in the scenario. The tables are to be populated with the data contained in the Home Theater Video functional requirements.

Deliverable Two

Create the queries, forms, and reports as discussed in HTV's functional requirements. All developed queries are to use only the tables or

other queries necessary to make the query fully functional. You are to incorporate the Home Video Theater logo into your forms and reports.

Deliverable Three

Develop two additional user-friendly forms for the employees at Home Theater Video. Insert additional data using these forms to demonstrate how the employees will use these forms to enter new data into the database. Create the navigational menu, as set forth in the HTV functional requirements, to navigate between all forms and reports.

You are to create the necessary pivot tables that meet HTV's functional requirements to assist management in understanding Home Theater Video business trends.

APPENDIX

Home Theater Video - Sample Movies

DVD Number	Movie ID	Movie Title	Rental Category	Year	Movie Category	Rating	Leading Actor	Actor Real Name	Birth Date	Lead Actress	Actress Real Name	Birth Date
101	1001	The Lord of the Rings: The Two Towers	Popular	2002	Fantasy	PG13	Elijah Wood Ian McKellen Sean Astin	Same Same Sean Patrick Duke	28-Jan-81 23-May-39 25-Feb-71	Cate Blanchett	Catherine Elise Blanchett	5/14/1969
102												
103												
104												
105												
109	1002	The Green Mile	Normal	1999	Drama	R	Tom Hanks Michael Clarke-Duncan	Thomas Jeffrey Hanks Same	9-Jul-56 10-Dec-57			
110												
111												
106	1003	Mystic River	Normal	2003	Crime	R	Sean Penn Tim Robbins	Same Timothy Francis Robbins	17-Aug-60 16-Oct-59	Marcia Gay-Harden	Same	8/14/1959
107												
108												
112	1004	Pirates of the Caribbean	Popular	2003	Fantasy	PG13	Johnny Depp Geoffrey Rush	John Christopher Depp II Same	9-Jun-63 6-Jul-51	Keira Knightley	Same	3/16/1985
113												
114												
115												
116												
117	1005	Cold Mountain	Normal	2003	War	R	Jude Law	David Jude Law	19-Dec-72	Renee Zellweger Nicole Kidman	Same Same	4/25/1969 6/20/1967
118												
119												
120	1006	The Lord of the Rings: Return of the King	Popular	2003	Fantasy	PG13	Sean Astin	Sean Patrick Duke	25-Feb-71	Alexandra Astin	Same	11/27/1996
121												
122												
123												
124	1007	Master and Commander	Normal	2003	Adventure	PG13	Russel Crowe Paul Bettany	Same Same	7-Apr-64 27-May-71			
125												
130	1008	Spider-Man	Popular	2002	Science Fiction	PG13	Tobey Maguire	Tobias Vincent Maguire	27-Jun-75			
131												
126	1009	Harry Potter and the Prisoner of Azkaban	Current Hit	2004	Science Fiction	PG	Daniel Radcliffe Richard Griffiths	Same Same	23-Jul-89 31-Jul-47	Fiona Shaw	Fiona Mary Wilson	7/10/1958
127												
128												
129												
132	1010	Catch Me if You Can	Popular	2002	Crime	PG13	Martin Sheen Leonardo DiCaprio Christopher Walken Tom Hanks	Ramon Antonion Gerard Estevez Leonardo Wilhelm DiCaprio Ronald Walken Thomas Jeffrey Hanks	3-Aug-40 11-Nov-74 31-Mar-43 9-Jul-56			
133												
134												
135												

Home Theater Video - Sample Movies (cont'd)

DVD Number	Movie ID	Movie Title	Rental Category	Year	Movie Category	Rating	Leading Actor	Actor Real Name	Birth Date	Lead Actress	Actress Real Name	Birth Date
136	1011	Million Dollar Baby	Current Hit	2004	Sports	PG13	Clint Eastwood Morgan Freeman	Same Same	31-May-30 1-Jun-37	Hilary Swank	Same	7/30/1974
137												
138	1012	The Terminal	Current Release	2004	Comedy	PG13	Tom Hanks	Thomas Jeffrey Hanks	9-Jul-56	Catherine Zeta-Jones	Catherine Jones	9/25/1969
139												
140	1110	Spanglish	Normal	2004	Comedy	PG13	Adam Sandler	Same	9-Sep-66			
141	1119	Spider-Man 2	Current Hit	2004	Science Fiction	PG13	Tobey Maguire	Tobias Vincent Maguire	27-Jun-75	Kirsten Dunst	Same	4/30/1982
142												
143												
144	1143	Hotel Rwanda	Current Release	2004	War	PG13	Don Cheadle Nick Nolte	Donald Frank Cheadle Nicholas King Nolte	29-Nov-64 8-Feb-41	Sophie Okonedo	Same	3/26/1968
145												
146	1206	The Polar Express	Popular	2004	Animation	G	Joaquin Phoenix	Same	28-Oct-74			
147												
148	1213	Ray	Popular	2004	Biography	PG13	Jamie Foxx	Eric Marlon Bishop	13-Dec-67			
149												
150												