

CASE STUDY: Brew City Rentals

Systems Development Life Cycle

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Author Note

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Abstract

Brew City Rentals (BCR) is a small video rental shop located on the eastside of Milwaukee that is struggling in a few areas of business. The issues contributed to their need for a new information system (IS) in order to attain their goal of providing prompt, convenient, and personal customer service. This document will address the concerns that BCR is having about their current methods- as well as assess the planning, analysis, and design phases of developing a new IS for the store. Together, all three phases of development should meet all of BCR's needs and system requirements (Shelly & Rosenblatt, 2011).

Keywords: information system, small business, planning, analysis, design

CASE STUDY: Brew City Rentals

Systems Development Life Cycle

During the systems planning phase, BCR was reviewed through preliminary investigation to determine the strength of its business case. The planning phase analyzes the mission, objectives, and needs addressed in the systems request in order to gather enough background information on the scope of BCR's issues for its use in the latter phases of development (Rosenblatt, Shelly & Rosenblatt, 2011).

Planning Phase

The overview below, approaches BCR's needs by reviewing the factors that must be achieved in order to fulfill the list of objectives set by the store.

Overview

Brew City Rentals (BCR) is experiencing efficiency setbacks that are affecting employee morale and customer satisfaction. This in return translates into a loss in revenue and market share. The role these setbacks play are critical against BCR's survival as their customer base is select, and their revenue extensively depends upon customer loyalty. The bulk of the issues at BCR include an erroneously mismanaged spreadsheet system that lacks data integrity, efficiency tools such as audits, relationships between individual spreadsheets, and account management features that can also be utilized by customers. Other accompanying threats BCR's survival include:

- Companies with platforms that boast more convenient and compatible movie-play options at a lower cost, such as Netflix® with live-streaming to portable devices,
- Increased competition from rival franchises that are gaining footing,
- And public libraries that allow patrons to access their film collection at no apparent cost which is more appealing to financially conscious customers in their market.

Goal. Brew City Rentals hopes to utilize a new system that greatly surpasses current performance measures, cuts down on lead times, facilitates day-to-day operations, and satisfies the customer base in order to increase revenue and better maintain their market-share.

Solution. In order to thrive, Brew City Rentals will need a more modernized transaction processing system that solves a variety of issues that current system operations present. The new system will have to include:

- *Backwards compatibility* in reading BCR's current spreadsheets to avoid a timely and costly conversion into the new system.
- *Back-end tools* (i.e.: reports, queries, employee account logins, performance-tracking system, auditing and inventory maintenance, routine scheduled backups).
- *Front-end tools* (i.e.: customer-based account management system, online movie search and reservation and rating services, product waitlist registration, performance feedback, movie recommendation form, rewards system, personalized e-mail/mobile advertisements).

SWOT Analysis

As shown in Figure 1-1, the SWOT analysis examines Brew City's resources and weighs them against threats by reviewing the opportunities and weaknesses that factor into success of the new information system. Reviewing both strengths and weaknesses in the preliminary investigation aids to the creation of realistic goals that yet still consistent with the original objective (Shelly & Rosenblatt, 2011).

PEST Analysis

The PEST Analysis in Table 1, is a solution-oriented proposal categorized by political, economic, social, and technological factors. It is used in this case to lay out key concepts that will satisfy the requirements of all of BCR's shareholders. This analysis focuses on tangibility while still maintaining lucrative ideas that will help motivate BCR to increase their market share.

Benefits

Implementation of the new IS will include several benefits:

- Improved performance of day-to-day operations,
- Cost reduction from maintaining accurate bookkeeping and inventory records,
- Provision of improved services to customers,
- Decreased lead times; also contributing to improved customer service,
- Access to database management tools (i.e.: Queries, reports, audits) in order to increase efficiency and utilize data collected on employees and consumers,
- Improvement of staff-consumer relations,
- Overall employee and consumer morale increase,
- Better data integrity and back-end user centered design,
- Increase in revenue from accurate fee management,
- And observable gains in the market share.

Feasibility

Operational Feasibility. End-users will be significantly less stressed with transaction processing times lasting a fragment of what is currently in place. Improvements in fee management, inventory handling, spreadsheet relationships, and added features such as online reservations will serve as the basis for these decreased transaction times.

The system will work off of the strength of implementing a sufficient database alone. Having a relationship between spreadsheets cuts down on errors and confusion that would otherwise entail by having to update them separately. Having a functional database that can create relationships fully, allows its back-end users to accurately report the status of movies in the inventory by only needing to adjust data in only one area versus many as the current system demands. It will serve as the backbone to the entire information system update by increasing data usability and accessibility.

Resistance will be minimal given that the staff is computer literate and considerably the most in favor of this change. The new system will be more efficient, less complicated than the present one, and have more to offer employees in terms of time management and having the ability of handling additional customers on the sales floor.

The work environment will see a slight change. With the addition of the online reservation application, one worker will be dedicated to handling the order selections and reserving them in the database as they are pulled from the inventory. With less hold-up in the checkout lanes, workers will be able to handle more customers during scheduled hours and as a result, Brew City Rentals will raise their revenue to new heights. With the increase in business flow from online reservations, it is advisable to adapt by increasing the volume of the movie selection to maintain a relatively stocked inventory.

Technical Feasibility. Tracking changes will be easier with the new system. Inventory control, audits, and customers being able to manage their own accounts at a basic level online are all features conducive with a successfully maintained system. Daily reports and sales trackers can be compiled from the database due to having correspondence between spreadsheets. The system also will be able to track individual employee performance which is a vital and efficient analysis

tool in terms of estimating and observing the return of investment on each staff member. With the advantage of uniform data management, a variety of useful charts and figures can be produced, data can be compiled in such a way to yield unnoticed correlations, and discover new revenue building opportunities.

Economic Feasibility. Given that the main reason some businesses fail is under-capitalization, we want to ensure that this information system is cost effective and resourceful enough to implement on a smaller budget. Backwards compatibility of the system is imperative. With backwards compatibility, importing spreadsheets into the system will take a matter of minutes, instead of days or hours. Organizing customers within the database can help fine-tune the advertisement to each sub-group within the market and optimize sales by driving personalization through discovering likes and dislikes. A queue can be established for customers and an alert can be sent to them as new arrivals come into the store that the relationship data finds fit alongside of customer's queue. Because BCR is willing to supply towards new technology, stretching the use of their current POS system is inadvisable. The hidden cost of hardware failures, legalities involving increasing technological standards, maintenance costs, and the limitations of old hardware and software will not measure up against any ROI concerns BCR would have against adapting to new systems, especially when considering that the move towards updated POS terminals would inevitably occur (ShopKeepPOS.com, 2015).

Schedule Feasibility. The system implementation will roll-out in five phases. The first phase will take considerably the most time. Selecting the POS system hardware and software is an important choice that doesn't need to be rushed, however calculating ROI, reviewing costs, investigating consumer reviews, conducting comparisons, and concluding the search with a purchase should occur in two weeks to one month.

The second phase is purchasing the first POS terminal and the necessary software and setting it up as the prototype for later-purchased terminals to model after. This implementation should take a maximum of a week.

The third phase is adding current data to the new software, updating any missing information, fixing inventory errors by running an audit, building relationships on the new database, running initial transactions, fixing errors, and backing up copies of the improved system. When the system is efficient enough to replace the other terminals, the fourth phase, updating the rest of the terminals with new hardware and software, will be relatively shortened and its success is determined on how well the previous phase was executed. These phases should collectively take a maximum of a few weeks if tasks are delegated to a group of people versus one individual.

The final phase is implementation of the online reservation system which should be worked on from the initial phase, however launched after the final phase is running efficiently and staff are familiar with the functions and procedures of the updated IS. The final phase should be launched at least three months from the POS terminals being upgraded to get a fair quarterly report of sales since the terminal upgrade in order to gather enough data compare the sales of the next quarterly report which will consist of adding the online reservation system.

Analysis

The analysis phase breaks down the system processes that dictate day-to-day business primarily at the point-of-sale. After the preliminary investigation, a more in-depth analysis of the in-store functions is required. Interviews, surveys, and observations are needed to make key decisions in selecting a development strategy or a combination of them. After the data is gathered from multiple sources- including the employees and customers, entities are introduced and relationships with data and its storage can be explored to determine the best options for the new

IS. The goal of this analysis is to ensure that the functions of the new IS will help BCR to reach its objective whereas planning was primarily used to determine the background and scope of the issue at hand.

Data Gathering. I would set-up multiple fact finding techniques to acquire the information needed to improve the IS system- the first one being observation.

The best advantages to using the observation method for this situation are substantial. Being able to witness the setbacks of the current system by measuring its efficiency with the use of timers can better track how long the check-out process is in the store. Another benefit to observation is its relative inexpensiveness. Watching the employees handle the spreadsheets will give a better feel of how to properly assess the pitfalls of the IS system that is currently in place. The Hawthorne effect can be avoided with the use of mystery shoppers. This is a very cost effective option. To receive a fair and accurate reporting of the issues within the store, multiple days will be required to figure out average production totals and gauge individual employee performance. Surveying existing customers will also give some insightful background from a longstanding point-of-view.

After daily performance and store activity is monitored, examination of documents is a critical step in determining missing or erroneous data in the spreadsheets. Running the individual spreadsheets into a database and creating relationship data in order to produce reports will help figure out any immediate data integrity concerns such as outliers and/or misappropriated data inputs. In addition to the spreadsheets, bills should be examined in order to keep the IS transition cost effective. If there are periods of lower costs or high revenue, it will be helpful in figuring the purchase dates and deadlines of the new IS.

An employee questionnaire is a vital way to get specific improvements done to the system. Doing a combination of both fixed and free-format questionnaires leaves employees with a general response to gather information about the popularity of certain issues. Free-format questionnaires focus more on issues and opinions not addressed by the fixed format one and leaves room for individual creativity to shine through in the solution of problems observed by the interviewees.

Given the need not to disrupt the store flow as much as possible, interviews should be conducted after all other fact-finding methods have taken place. Extra information that cannot otherwise be obtained from the previous ways should be quick, discrete, and tackled in an one-on-one interview with a member of management and an end-user (employee). The interview should be used to bounce new ideas around and take into account the enthusiasm and verify the proposed effectiveness of these proposals.

System Requirements

Output

- Produce movie collection based upon specific inquiries, primarily by actor/director.
- Compile a running total with sales tax at point of sale.
- Produce reports that track employee productivity by how many DVDs they rent to customers.
- Complete a customer list showing customer ID, last name and first name separated by comma and a space.
- Perform a query that displays the movie ID, title, and rating when organizing movies by genre.
- Display DVD's that are currently rented showing the DVD number, customer ID, first name, last name, movie title, rental date, and date due sorted by due date

- Display DVDs currently rented by customers showing customer ID, first name, last name, DVD number, movie title, rental date, and date due sorted by customer ID. This may either be for all customers or a single customer.
- Revenue of movies rented by rental categories: a list of BCR's rented movies sorted by rental category and movie title.
- On a monthly basis display the revenue by day including date, DVD rental revenue, total collected late fees on the day, and total revenue (sum of DVD rental revenue and collected late fees).
- Display the revenue received by customer including customer last name, first name, DVD rental revenue, total collected late fees and total rental revenue, sorted by DVD rental revenue. This report may be used for promotions for BCR's top customers.
- Display total sales by employees showing employee's full name and total DVD Sales. The results should be ranked from highest sales generated to lowest.
- Overdue DVD's showing customers' full name and contact number and/or e-mail address and late DVDs.
- A list of DVDs that are more than 15 days overdue. These DVDs are written off and customers can keep the movie.

Input

- Assign movie title to a unique ID to track which movie is recorded on each DVD
- Each movie captures title, genre, year of release, film length, language, leading actors/actresses and directors- if any.
- Each movie can be assigned multiple genres.

- Collect customer ratings for each movie.
- For each employee, maintain first and last name, email address, and home phone.
- Allow for capture of new data or amend existing data for the following:
 - Customers
 - DVD's
 - Movies
 - Rental Category
 - Payment Methods
 - Employees
 - Rental Transactions
 - Payment of Late Fees
- Auto-populate and/or calculate all fields that benefit from the feature.

Process

- Generate unique DVD numbers
- Always stock at least one DVD for each movie title carried, but multiples of popular movie titles.
- Each DVD only contains one movie, but allow for multi-DVD movie expansions in the future.
- Generate a running total of outstanding fees incurred per customer and place a rental hold on accounts that have fees at or over \$10.

Performance

- The system must have a quick response time.
- The system must support hundreds of customers.

- The BCR store manager needs to determine whether to re-order the DVDs and s/he needs a report listing all movies that were written off in the past week needs to be generated.

Control

- Ensure secured data by utilizing usernames and passwords to ensure an accurate audit trails and protection of information.
- Staff to remind customers to return DVDs that have been overdue more than 5 days.

Data Flow Diagrams

Context Diagram. As shown in Figure 2-1, the Context Diagram represents a logical model representing how the new information system will control data flow. Its structure is the more abstract of the two DFDs.

Diagram 0. Figure 2-2, Diagram 0, expounds on the data flow and adds additional information about processes and the inputs and outputs the data storage, which is in this case, the database.

Modular Design

The flowchart in Figure 2-3 serves as a guide for the transaction process. It covers abovementioned online reservations and introduces some new proposed concepts like a waitlist for logging the potential sale of currently unavailable rentals, quantity limits at checkout that help control inventory and inadvertently sets the maximum amount of late fees a customer would endure resulting from a single transaction.

Decision Table. The Decision Table in Table 2, provides all possible outcomes of the transaction process, whether valid or invalid. Determining the outcomes aid in setting up the POS system to recognize valid transactions and alternative methods of obtaining a valid transaction.

Decision Tree. The Decision Tree in Figure 2-4 illustrates the decision table's outcomes, synthesizes the data, eliminates the background noise, and presents only the necessary procedures that validate a transaction.

Use Case Diagram

The Figure in 2-5 details the actors in information system and their roles within it. This diagram focuses more on all the main processes at *and* beyond the point-of-sale that involve each transaction, such as updating, processing, notifying, adjusting, and determining data.

Use Case Description. In Table 3, the Use Case Description highlights a single process within the Use Case Diagram and elaborates on the individual conditions and tasks within the process that create a successful outcome.

Development Strategy

Brew City Rentals is under-performing due to a multi-area weakness in their current technology. A simplistic system development plan executed over different phases would be optimal as well as cost-effective.

The first stage of the solution is to address any outdated technology. Instating a considerably recent and proven COTS software would streamline the day-to-day actions that are consuming large amounts of time and revenue. A single COTS software even at the 'vanilla' level would meet 100% of current system requirements, increase intangible benefits such as employee morale due to less overloading and complications, meet strict budget concerns, and reduce the amount of errors and processes that are occurring while performing rather simple tasks.

It is also sufficient to note that BCR should forego In-house developed software options. A general rule is that a business should not see to developing software in attempts to save costs. Having the software tailored to BCR's specified requirements is not a singular task. Upgrading the

software would prove troublesome and risky. Also, given that the lifespan of technology is rapidly decreasing, BCR would have a hard time with the frequency of performing the tasks necessary to keep the software up-to-date. Production and maintenance of such a product could prove far more complicated, costly, and inefficient for the given needs BCR. Though BCR has critical issues, the solution is far more simplistic and time-saving when observing COTS products.

The most immediate issue that BCR currently faces is application disconnect from individual reporting of several spreadsheets that contain no relationships between data. Designating a simple software to sync together all point-of-sale, inventory, account management, and reporting data would give improved harmony to BCR's business processes.

A considerable amount of time should however be spent on researching and choosing the most sufficient COTS for Brew City Rentals. It will likely be a permanent solution and serve as the foundation for any updates and newer software releases from the same developer when tech support is no longer afforded to the current version. Because of this, conducting a review of the software's performance, product longevity, and the quality of the development firm's customer support service is imperative.

Many COTS software for retailers contain easy setup options that are convenient and efficient for the end user. Another benefit of this option is the ability to set up the entire system without stopping or delaying the current business processes. Seeing that BCR is open to purchasing new equipment, only one new computer should be purchased in the first phase of implementation. It will serve as a prototype to the remaining computers that will later be upgraded to the same system and hardware that the new computer is running on. BCR can work at their convenience to convert spreadsheets from the current system to the new one, without temporarily shutting down or experiencing any deviations from the normal flow of business.

After all information has transferred into the new system, and performance tests have been completed, the remaining purchased computers will be easier to cross over into running the updated system considering that most of the trial and error has been completed.

While getting the employees familiar with the system, scheduling an additional employee during each shift so one employee could learn the system while the others performed typical store functions would be ideal. Each employee should spend ten hours training on the new system and demonstrate sufficient knowledge to the management at the end of training.

While implementing the system, BCR should consider different open source, or web business template options to get their rental reservation system online. To reduce liability risks and network security costs, hosting sensitive customer data or transactions on the website would be ill-advised as the benefits would not outweigh the total cost of ownership of the web domain at the present time.

If looking at the cheapest route, outsourcing the production of the website would in the short run, save additional costs, however outsourcing IT work is often a road paved to disaster. Outsourced work is usually poor quality, prone to errors, and needs to be improved by an expert who can effectively cipher through the existing code. The cost of hiring a reputable person to fix outsourced work is usually the same or more than what it costs to hire them to do the original product.

Though BCR could find a reputable person overseas to build their material for a low-price, it's very high risk. Creating an open source repository for the website, will possibly take longer to see completion, however the website will be relatively free outside of purchasing the domain and its web hosting. Considering that the website won't launch for approximately two quarters from

the start of the IS remodel, that should give the project enough time to be completed if taking the route of an open source project.

Design

The final phase, design, takes on a more reputable and physical form than the previously mentioned phases. Design takes in the information from planning and incorporates the concepts from the analysis phase to actually produce solutions with visual aids. Data uses more tangible evidence like figures and works them into useful, aesthetic figures, vital to the development process. For BCR, the design phase is centered on a new database whereas the key feature to be highlighted is the benefit of relationships. With it comes to Brew City Rentals needs; reports, output screens, a database, and user interfaces complete with workable data- bring in a much needed real-world demonstration to sum up the efforts from the previous stages.

User Interface Design

Dashboard. The first illustration in the design phase is the Dashboard in Figure 3-1. The main table at the top is clean without lines, and color distractions. It gives a comprehensive sales overview, complete with consumer data, averages, and totals. The YTD sales spans over a 12-month period and showcases a modern, yet simplistic design that is functional in terms of highlighting the target goal year-round, which is the average monthly revenue. Key Metrics are summarized by spark lines which give a quick informative scope that allows the viewer to check for correlations between the categories of the metrics by matching high and low points. Market share is another important subject for BCR. Percentages are shown to the right and dating is shown at the bottom. Highlighting expenses vs. profit in such a way that dark cells indicate periods of highs and lows help the viewer check for commonalities between the periods at which they occurred. Top customers are highlighted with total revenue as well as their total late fees to

demonstrate how much late fees represent a portion of the revenue per consumer. Rental category and restocking performance is underneath the market share chart on the left. This chart demonstrates the performance of the rentals according to their percentage of sales in each category. Other notable information that is useful is presented below in a clean manner. Negative numbers are highlighted in a lighter shade. Rental performance by genre is included to give the viewer a better understanding of the customer base. Understanding what the customer wants, makes it easier to make inventory decisions later in terms of what categories to add more selections to. Employee performance highlights leadership across the multiple categories of performance, and presents a convenient rating along the right side.

User Interface I(Login Screen). The login screen is the initial screen for the new interface, represented by Figure 3-2. It showcases a dropdown menu that holds all staff member names and an encrypted password entry textbox. The newsletter is below which expands to show general information about the store and important upcoming events. The company logo, along with high-contrast design, variable fonts and sizes, and imagery below all bring the interface a more personable feel for Brew City Rentals (Brew City Logo).

User Interface II (Switchboard). The switchboard shown in Figure 3-3, was kept simple so that the button position is uniform throughout the navigation of the entire interface which enhances muscle memory and cuts down on confusion (which can unintentionally lead to errors). Shortcut options show the stores most selected functions to cut down on processing time at the checkout as well as other storewide functions.

User Interface IV (Add New Film). Figure 3-4 employs a useful search feature which comes in handy when inserting more copies of existing film titles. The same as Figure 3-5 when adding new customers, this form generates a unique ID for each rental, as well as each film title. There is

also an additional drop-down menu to include data for multi-DVD options for future titles that come in sets. Within the multi-DVD option, the system generates a unique product identification for each rental and records the subtitle. The film representation (SAG or international) takes into account a middle name for the director depending upon which radio button is chosen. The system also double-checks the employee's identification when making audits to the inventory as a precautionary measure.

User Interface III (Add New Customer). Figure 3-5 shows BCR's system requirements on collecting customer data are met. The form generates a unique customer identification number, records the basic name, address, phone, email, and birthday information (for potential promotional offers). The form also ensures proper procedure is followed with photo identification and address verification. By requiring documents to be uploaded, the management can be sure that no customer was given preferential treatment in the registration verification process which can cut down on fraudulent activity.

User Interface V (Add New Transaction). The transaction screen in Figure 3-6 provides a lot of useful information. An "Add New Customer" shortcut provides a pop-up screen to add the customer instead of spending time switching screens when the verification is done. It would be an unreasonable demand to expect customers to remember their identification number. For this reason, customer information is loaded upon provision of their phone number. The customer's information is displayed along with past due balances, currently checked out films, and total revenue made from the customer's business. Promotional codes can be entered at the bottom and the store's information is displayed on the screen for quick reference.

Output Screens

Database Overview. In Figure 3-7, a print screen of the database is shown along with an image of the relationships between the individual spreadsheets. The tables, fields, and relationships are in congruence with the Entity-Relationship Design (later discussed).

Output Screen I (Customer List). The customer list in Figure 3-8 meets the most simplistic output need on the systems requirements list: Customer ID and full name separated by a comma with the last name first.

Output Screen II (DVDs Currently Rented by Due Date). Figure 3-9 displays the solution to another system requirement. It successfully pulls the data from relationships between four tables: product, film_Detail, customer, and transaction.

Output Screen III (MTD Display). The screen in Figure 3-10 represents the system requirement guideline that would be used for displaying the report for movies on a monthly basis by revenue by day. This table includes; the date, DVD rental revenue, late fees collected (which can be combined to find the total) and the film identification number so that it tracks the movie title and not just one instance of the particular title.

Reports

Report I (DVDs Currently Rented by Customer ID). Figure 3-11 encompasses the same data as Figure 3-9, except for that it is organized by the customer identification number, and given a printable report appearance.

Report II (Movies by Genre). Figure 3-12 shows the report displaying movies by genre. This figure displays both the query and the report due to show the ease of changing the information in order to pull the necessary genre from the movie list for the report.

Entity-Relationship Design

The ERD shown in Figure 3-13 brings together the entities discussed in the Use Case and Data Flow Diagrams. The primary key is shown with the symbol “PK” which designates a unique identification to each entity. The “FK” symbol represents a *foreign key*, which is a primary key that points to another entity, but is used as an attribute within. The ERD expresses each relationship’s cardinality using crow’s foot notation.

System Architecture

System Architecture Diagram. This diagram in Figure 3-14 symbolizes the system’s physical network design for Brew City Rentals. When deciding between the configurations of the number of servers, a general rule when considering performance is to space out eight users per server. Given that the store has under eight employees, a single-tier design was chosen for the diagram which only needs one firewall. The network utilizes both bus and star topologies. The bus topology is at the physical store location. Whereas the star topology exists at the end-user’s variable location.

Security Concerns. In the event of data-leakage or extensive downtime, if not handled adequately- this can manifest as a loss in reputation. For this reason, reliable system security is a major factor in revenue growth for BCR (Intel, 2013)

Security threats are usually grouped into four main aspects:

1. Physical attacks,
2. Authentication and privilege attacks,
3. Denial of service,
4. And malicious Internet content.

To control physical attacks, such as theft, hardware loss, and USB hacking, video surveillance systems should be used to monitor suspicious activity.

- Authentication and privilege attacks come in various forms:
- Disgruntled employees,
- Weak passwords,
- Shared passwords,
- And inappropriate password policies.

To prevent password leaks, employees should sign an agreement to agree to protect sensitive information pertaining to the store and employment. Should termination for whatever reason occur, their passwords should be changed immediately and employees should be discontinued from using store-owned equipment. All passwords should be encrypted and contain a random alphanumeric sequence.

Denial of service issues present themselves in several ways as well:

- Targeted (i.e.: bandwidth exhaustion, vulnerable servers),
- Single-point failures (i.e.: relying too much on one person, preparation, lack of documentation),
- and Natural disasters (i.e.: power outages, connection downtimes)

At present, DOS and DDOS attacks are becoming harder to perform due to efficient firewalls. Having a vulnerable server is truly, the only way to suffer from an attack that results in bandwidth exhaustion. Single-point failures can be avoided by training all staff to be able to perform all tasks around the store. Changing the staff responsible for online reservations daily can help in multiple ways, repetition can bring errors, unauthorized procedural shortcuts, and job

fatigue. Rotating positions within the store allows flexibility in the event that a staff member is unable to perform certain duties (GFI Software, 2008).

Server connection timeouts occasionally occur. Having a backup payment processing plan (i.e.: carbon copies, manual receipts, off-line inventory records, etc.) or other redundant system is most helpful during these times. (Shelly & Rosenblatt, 2011)

Malicious Internet Content includes a wide-range of attacks:

- Social engineering
- Malware
- Drive-by downloads
- Web application attacks

Blocking unauthorized web content and access, installing a proxy server blocker, educating employees on the dangers of company equipment misuse, and informing them on how to identify phishing attacks, is the best methods that Brew City Rentals can employ to help avoid these issues.

Reflection

To sum up what I've learned, I would say first and foremost the bulk of it was in the revisions. A lot of my errors were in overlooking and not incorporating the details of the project. Time management is critical in this class and too often I rushed, and in the process, overlooked many outcomes and recommendations that should have been considered for the analysis part of the work.

At the start of the class, I didn't really know what to expect by the way it was paced out. I didn't bother to skim ahead either, so I envisioned my own idea of the way the term project should look as I went along and made modifications based upon your grading reviews. I dedicated a good portion of time, but not enough towards reading and thoroughly understanding the project the

project beforehand. I would jump in and review the questions more in-depth later, relying mainly on intuition to get most of the work done. I provided a breakdown of my time spent on each portion below (please note however, this does not include time spent on the final Term Project):

- Planning: 12 hours
- Analysis: 20 hours
- Design: 23 hours

I would allocate the same amount of time towards the assignment sections in the project, however I would do it gradually throughout the week and work my time more efficiently. It is difficult locating errors within the same day that something is initially typed up. Upon revision for the final term project, I found a lot of casual grammatical and language mistakes that I know better than to make. There were minor annoyance issues with wording, and choice of words that I didn't give myself enough time to catch before assignment submission deadlines.

Despite my initial struggles, I can see using the SDLC methodology in the future. Following a standard makes things easier to produce and read. It also makes it easier to determine if there is missing information from my work. Going this alone without using SDLC would clearly be inefficient as I would have to come up with my own standards and methods for the sake of doing things my way and it wouldn't coordinate or harmonize as properly. Using the same standard allows for things to be perfected. While doing revisions, it was easier to track my errors by using the SDLC methodology as a multi-level checklist.

Spending daily time on this class was not an afforded luxury this semester for personal reasons so it ended up being a heavy workload- much heavier than any other class I've had. I wasn't expecting the course load to be that intense, let alone during the summer where the class is accelerated. However this class has more than re-introduced me back into the regular flow of

homework and assignment deadlines. Taking this class after being off from school for an entire year was a bit much to adjust. If I took the class more seriously from the beginning, I wouldn't have had to do so much work cleaning up my term project for the final grade. I feel as if I've spent several hours/days/years of my life with this task of performing necessary revisions on my assignment.

My comments are few, but hopefully they help. I feel like some of my work was harshly graded, whereas others were fair. After the first assignment, there wasn't a single section I received higher than a 'B' on and no one wants to see that many low grades on something they spent hours trying to put forth the energy and brain power on. That is a bit frustrating, in terms of it being an introduction class and setting the bar at a level that requires far more than a lot of effort. Some things are not explicitly stated in the assignment prompts and I end up being deducted a significant percentage of points for not considering them. With that said, it just seems like there's too much going on in this class for a summer course. I often felt exhausted from working on the assignments and had to take a few days off from the class. I didn't even want to look at the next section by the time I had finished the current one. I've done three summers at college, and by far this was the most work. I also think the discussion questions are a good idea and the questions are formatted great, however I really don't enjoy replying to others so it was a bittersweet experience. I think showing us a finished project of what we'll be getting into would have helped me get a feel for the class and the workload that entailed down the line. If there is one thing I don't like about UWM as a whole, it's the inability to work at my own pace. When I'm at other schools, there are no release dates on assignments and I'm able to work at my own pace. Some weeks, I'm just not able to put forth A-quality work, however I feel as if it shouldn't make or break my grade. If there was

any suggestion I had for this class, it would be to give us the full term project guidelines from the start.

References

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Tables

Table 1

PEST Analysis

Political	Economic	Social	Technological
Observe the potentials of net neutrality regulation in terms of ISP's making web-streaming costly.	Rival web-streaming monthly plans by developing variable finance options.	Improve customer satisfaction by hosting social events after hours at BCR.	Offer web services to fulfill customers' desire for more wireless interactions.
Offer government and military discounts,	Solve data integrity issues in fee management and inventory.	Boost morale by hosting parties and engage employees with performance rewards, competitions, and recruiting incentives.	Create a QR-code system for rentals so customers will be able to scan and find out more information on each title while browsing.
Correct errors in inventory and fee management to facilitate records management for tax filing.	Reduce the lead time and simplify the transaction and product search procedure.	Consider methods of expanding and diversifying customer base by offering family-centered options.	
Offer free or discounted movie rental incentives at the public library where customers check out films for free.		Research trends based on the viewing history of the individual customer base and set up a queue.	
Employ data security measures that are current with the Video Privacy Protection Act.			

Decision Table

[illegible]

Table 3

*Use Case Description***Complete Transaction****COMPLETE TRANSACTION Use Case**

Name:	Complete Transaction
Actor:	Customer/Employee
Description:	Describes the process used to complete a rental transaction within the store
Successful completion:	<ol style="list-style-type: none"> 1. Employee checks RENTAL INVENTORY object for availability 2. Employee checks USER ACCOUNT object for active status 3. Employee completes transaction with customer 4. RENTAL INVENTORY object is updated 5. USER ACCOUNT object is updated 6. SALES PERFORMANCE object is updated
Alternative:	<ol style="list-style-type: none"> 1. Employee checks RENTAL INVENTORY object for availability 2. Rental is not available 3. Employee notifies customer of option to add customer to WAITLIST object for rental 4. Employee adds customer's information to WAITLIST object for rental <ol style="list-style-type: none"> 1. Employee checks RENTAL INVENTORY object for availability 2. Employee checks USER ACCOUNT object for active status 3. Customer is not in active status to complete transaction due to having the maximum amount of rentals currently checked out 4. Employee notifies customer of option to return current rentals OR add customer to WAITLIST object for rental 5. Customer returns current rentals and proceeds with successful completion of transaction OR Employee adds customer's information to WAITLIST object for rental <ol style="list-style-type: none"> 1. Employee checks RENTAL INVENTORY object for availability 2. Employee checks USER ACCOUNT object for active status 3. Customer is not in active status to complete transaction due to having an outstanding late fee balance 4. Employee notifies customer of option to pay outstanding fees OR add customer to WAITLIST object for rental 5. Customer pays outstanding fees and proceeds with successful completion of transaction OR Employee adds customer's information to WAITLIST object for rental
Precondition:	Customer requests DVD rental
Postcondition:	Customer completes necessary transaction procedures to acquire rental
Assumptions:	None

Figures

Strengths	Weaknesses	Opportunities	Threats
<ul style="list-style-type: none"> • Knowledgeable staff • Wide-selection of movie titles available • Customer loyalty • Possession of hard-to-find films • Ideal location • Computer literate staff 	<ul style="list-style-type: none"> • Data integrity flaws due to application disconnect • Exceedingly time-consuming processes • Outdated technology • Overly complicated POS system • Missing movies from selection due to spreadsheet mismanagement 	<ul style="list-style-type: none"> • Net neutrality possibly could open more market share if tiered data organized by consumer preferences is allowed • Customer account management system can take care of reservations and front-end queries • Functional database will drastically lessen lead times and inventory errors • Decreasing lead times will increase employee morale and allow staff more time to assist customers 	<ul style="list-style-type: none"> • Web-streaming and Video-on-demand services that offer movies on a multitude of devices • Increase in rival franchises are decreasing market share • Libraries offer free movies from their public selection • Slow processing times and errors within system data are frustrating customers and employees

Figure 1-1. SWOT Analysis

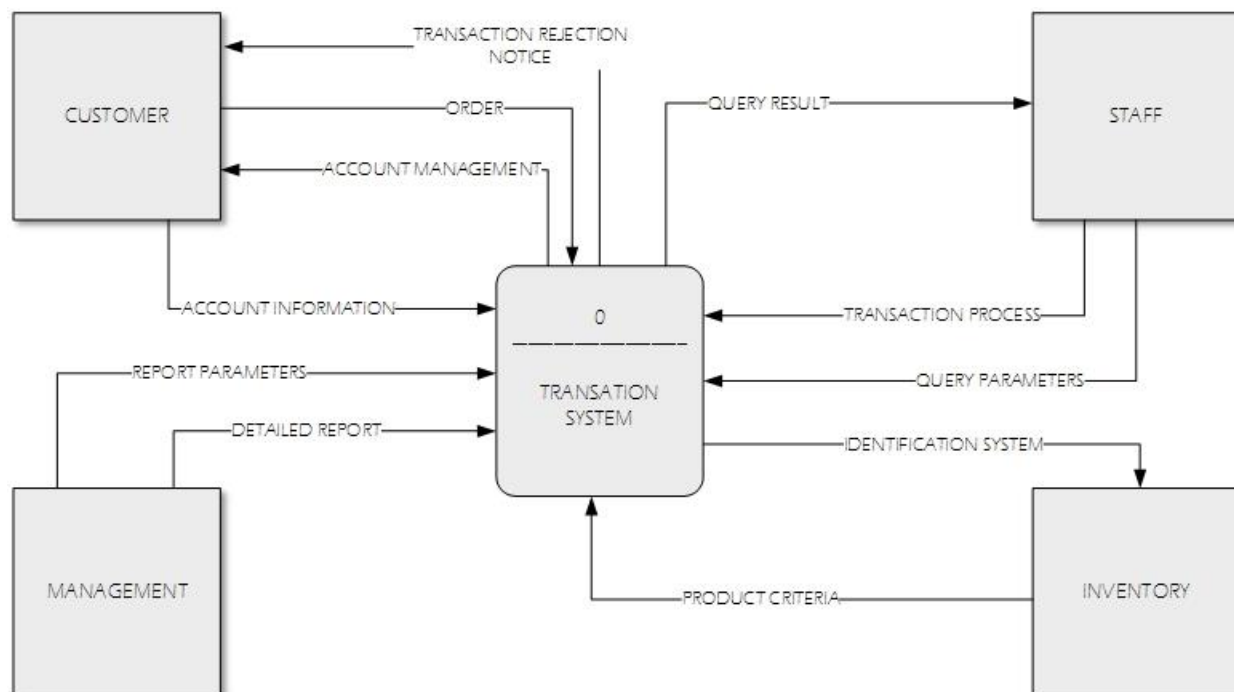


Figure 2-1. Context Diagram

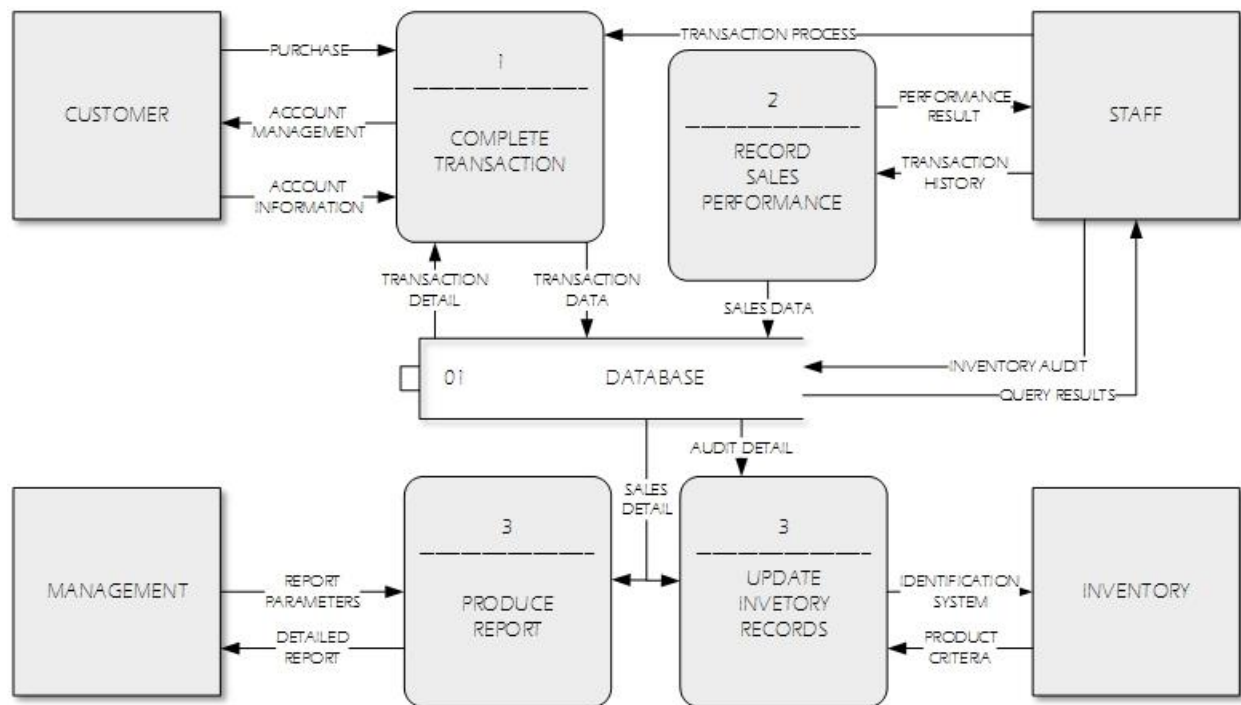


Figure 2-2. Diagram 0

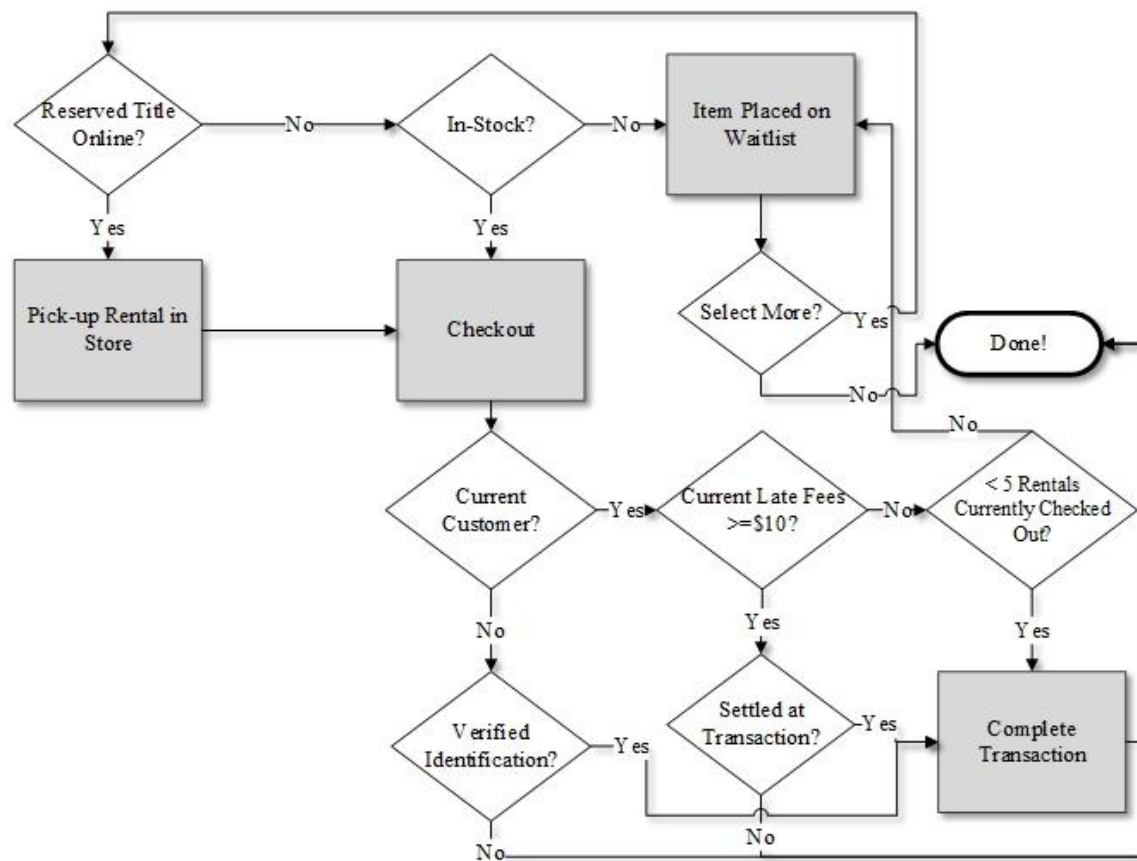


Figure 2-3. Modular Design

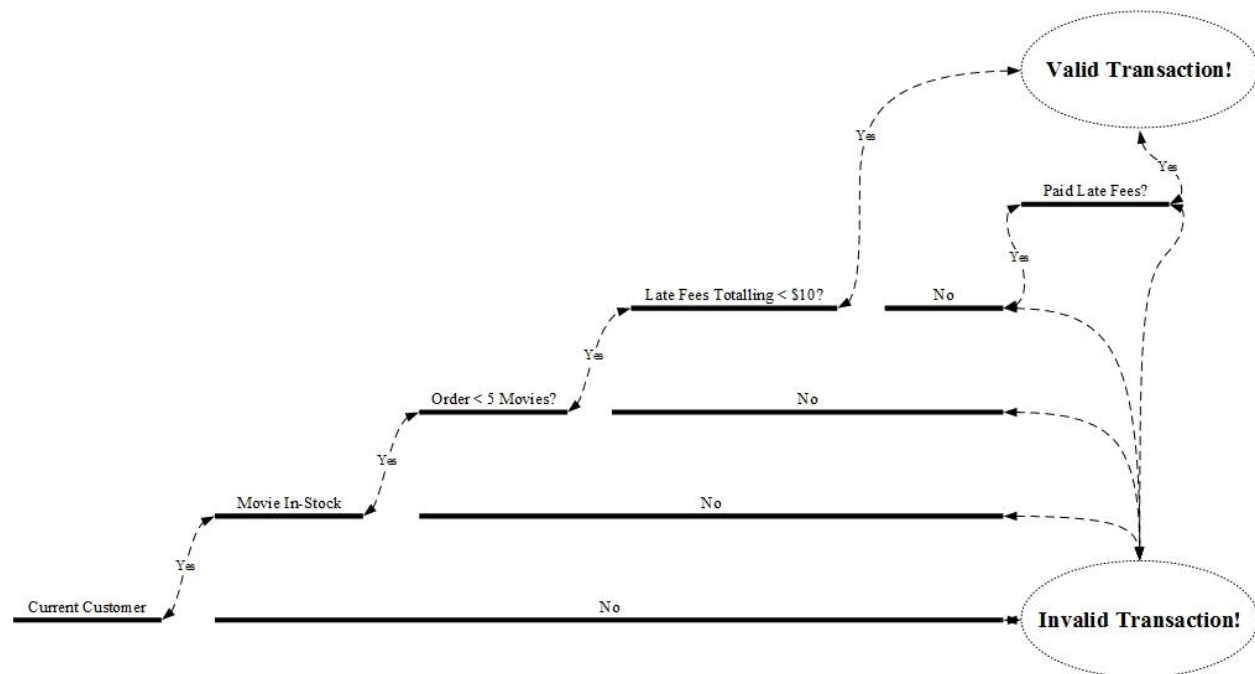


Figure 2-4. Decision Tree

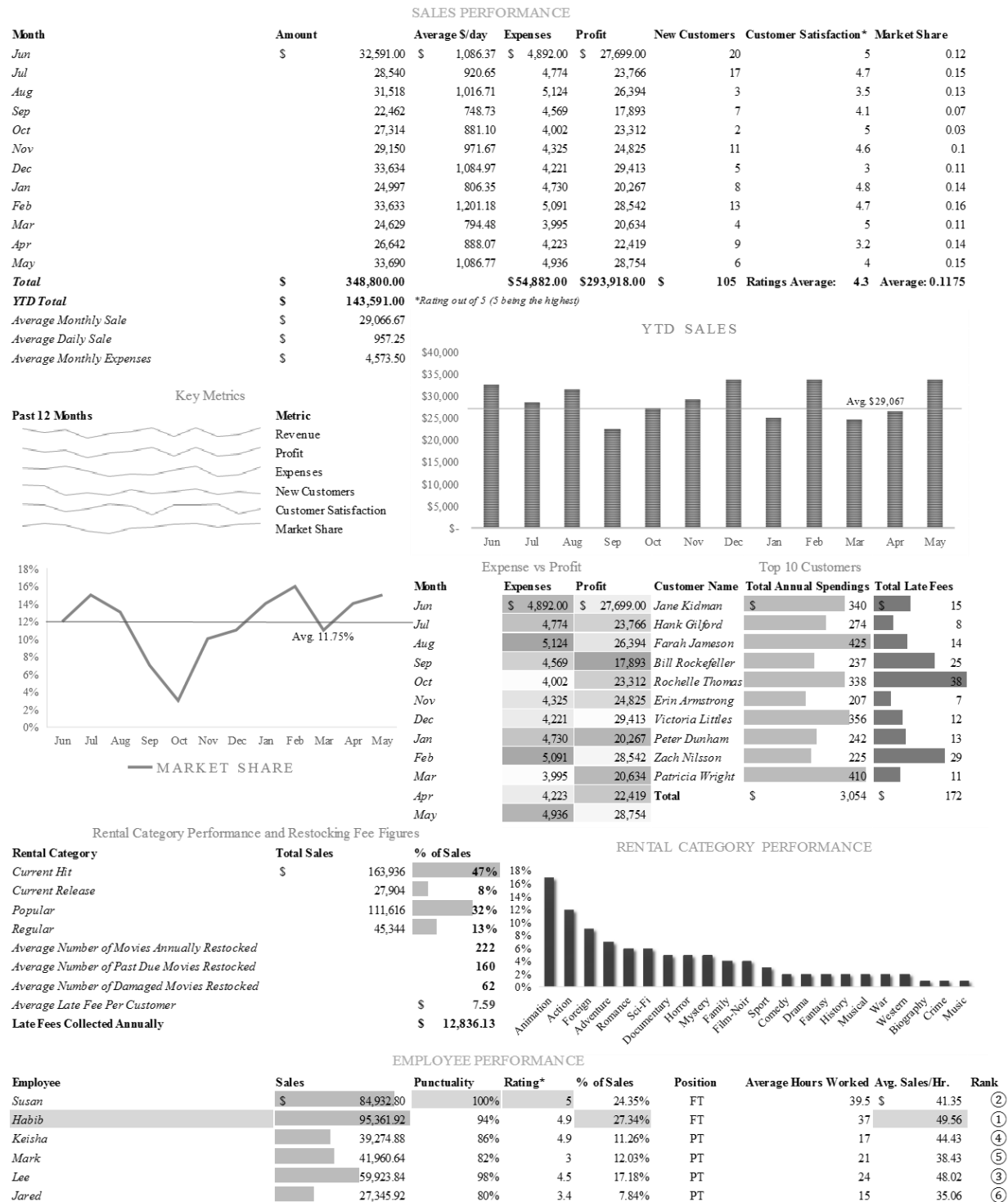


Figure 3-1. Dashboard



Brew City Rentals
Login Screen



Login:
Password:

Login

NEWSLETTER

The numbers are in!

Top Sales MTD

TOP SALES ASSOCIATES FOR JULY

☐ Optional Section

Habib	1st Place
Lee	2nd Place
Susan	3rd Place


Congratulations Habib!



Figure 3-2. User Interface I (Login Screen)



Brew City Rentals
Home Screen



Welcome Habib!
User logged in successfully. Logged in as: Habib

Logout

DASHBOARD

Home Customers Sales Operations Inventory Employees Finance Reports Settings

Shortcuts

<input type="button" value="Start New Transaction"/>	<input type="button" value="Add To Waitlist"/>
<input type="button" value="Add New Customer"/>	<input type="button" value="View Online Reservations"/>
<input type="button" value="Perform Inventory Audit"/>	<input type="button" value="View/Edit Payroll"/>

07/09/2015
5:09 PM CST




Figure 3-3. User Interface II (Switchboard)

Figure 3-4. User Interface III (Add New Film)

Figure 3-5. User Interface IV (Add New Customer)

DASHBOARD

Home Customers Sales Operations Inventory Employees Finance Reports Settings

Start Transaction [Back]

New Customer? [Add New Customer Screen]

ProdID	Title	Promotion	Fee Amount	Customer Phone
1. 119546	A Crazy Thing Called Love	0.00%	\$1.00	593 714 0123
2. 01254	Mrs. Doubtfire	10.00%	\$1.35	

[Load Customer Info]

Name: Jazelle Tribbioli
Email: rSMYGG@example.net
Address: 1199 Dusty Field Oak Creek, WI 14463
CustID: 10
Fee balance: -\$5.00
☐ Add fee balance to total?
Cust. since: 02/19/2001
Total revenue: \$987.23
Total late fees: \$ 79.64
Films currently out: 3

Brew City Rentals TransID: 0488
375 W Wisconsin Ave Suite 200
Milwaukee, WI 53233
[414]555-3729

Promotional Code: JC10
DUE DATE: 7/14/2015
07/09/2015 5:19:23PM CST

Subtotal: \$2.35
Taxes: 5.600%
Promotion Code: RW10
Total: \$2.48
[Checkout]

07/09/2015 5:19 PM CST

Figure 3-6. User Interface V (Add New Transaction)

FILEHOMECREATEEXTERNAL DATADATABASE TOOLS

FIELDS

TABLE

ViewPasteCopyCutFormat Painter

Filter

AscendingDescendingSelectionAdvancedRemove SortToggle Filter

RefreshAllSaveDeleteMore

FindGo ToSelect

Calibri (Detail)11

B I U

Text Formatting

ViewsClipboard

Sort & Filter

Records

Find

All Access Objects

Search...

Tables

Customer

Film_Detail

Product

Shift_Detail

Staff

Transaction

Waitlist

Queries

Customer_List

DVDs_Currently_Rented_By_C...

DVDs_Currently_Rented_By_D...

Movies_By_Genre

MTD_Display

Rental_Revenue_Re

Reports

Customer_List

DVDs_Currently_Re

Movies_By_Genre

Datasheet View

Customer

Film_Detail

Product

Shift_Detail

Staff

Transaction

Waitlist

custID	firstName	lastName	email	address	city	state	zipCode	phone	pastDueFee	cu
1	Saysha	Lampasone	DFL9TD@example.net	8683 Heather Cider Passage	Milwaukee	WI	35210	1984988014	(\$7.00)	
2	Maaja	Stojavljevic	JBzMG0@example.biz	1205 Clear Green	Whitefish Bay	WI	40509	3430150063	(\$8.00)	
3	Dastit	Bloodgood	JXwsbh@example.net	947 Amber Wynd	Milwaukee	WI	85674	8759970125	(\$3.00)	
4	Bjarte	Vuckovich	Kv5Dww@example.com	31 Wishing Common	West Allis	WI	43350	2149347694	\$0.00	
5	Ridvan	Rybakov	MhQFIV@example.net	3622 Merry Route	South Milwaukee	WI	15361	4902550363	(\$2.00)	
6	Templar	Cid	wxOdx@example.com	4071 Umber Park	Milwaukee	WI	71583	1654574172	(\$9.00)	
7	Maru	Golcha	p29WVl@example.com	9474 High Brook Circle	Milwaukee	WI	91464	1730153825	(\$2.00)	
8	Aric	Hardoin	ZEZuKC@example.com	6560 Golden Avenue	Brookfield	WI	59744	1594663364	(\$4.00)	
9	Branton	Cabarga	rTNyt@example.net	8549 Blue Road	Milwaukee	WI	33301	7668004976	(\$3.00)	
10	Jazelle	Tribbioli	rSMYGG@example.net	1199 Dusty Field	Oak Creek	WI	14463	5937140123	\$0.00	
11	Arminda	Jordaon	cWslSY@example.net	3825 Hidden Anchor Key	West Allis	WI	87124	8287710580	(\$5.00)	
12	Xaimte	Babilon	Yl6sSY@example.net	1540 Silent Extension	Milwaukee	WI	49792	7879944715	(\$6.00)	
13	Fasahat	Madurski	CHUWLL@example.com	709 Tawny Stead	Greendale	WI	13128	5487802631	(\$8.00)	
14	Rachaela	Palubski	dEXbIX@example.biz	4377 Gentle Butterfly Impasse	Milwaukee	WI	37057	4528016059	(\$4.00)	
15	Kymn	Alexsen	FdvxbB@example.net	2280 Green Berry Plaza	Milwaukee	WI	67231	5958134660	(\$10.00)	
16	Touria	Hubbel	xLCCu6@example.net	4375 Red Loop	Milwaukee	WI	44701	8471712887	(\$5.00)	

Customer

Film_Detail

Product

Shift_Detail

Staff

Transaction

Waitlist

filmID	filmTitle	rentalCat	genre	runtime	int'l	language	actorNam
1	The Godfather	Regular	crime, drama	175	<input checked="" type="checkbox"/>	Italian	Robert De N
2	The Shawshank Redemption	Popular	crime, drama	142	<input type="checkbox"/>	English	Al Pacino
3	Schindler's List	Current Release	biography, drama, history	195	<input type="checkbox"/>	English	Tom Hanks
4	Raging Bull	Regular	biography, drama, sport	129	<input type="checkbox"/>	English	Johnny Depp
5	Casablanca	Current Hit	drama, romance, war	102	<input type="checkbox"/>	English	Jack Nicholse
6	One Flew Over the Cuckoo's Nest	Popular	drama	133	<input type="checkbox"/>	English	Marlon Bran
7	Gone with the Wind	Regular	drama, romance, war	238	<input type="checkbox"/>	English	Meryl Streep
8	Citizen Kane	Current Release	drama, mystery	119	<input type="checkbox"/>	English	Leonardo DiC

Figure 3-7. Database Overview

Note: The names of the tables and fields match the ERD in Figure 3-13.

Figure 3-8 displays the output of the Customer List query in Microsoft Access. The interface shows the ribbon, the All Access Objects pane, and the query results table. The data table contains the following records:

custID	firstName	lastName
1	Saysha	Lampasone
2	Maaja	Stojasavljevic
3	Dastit	Bloodgood
4	Bjarte	Vuckovich
5	Ridvan	Rybakov
6	Templar	Cid

Figure 3-8. Output Screen I (*Customer List*)

Note: This figure displays both Design Datasheet Views

Figure 3-9 displays the output of the DVDs Currently Rented by Due Date query in Microsoft Access. The interface shows the ribbon, the All Access Objects pane, and the query results table. The data table contains the following records:

prodID	custID	firstName	lastName	filmTitle	entryDate	dueDate
14	19	Ghetto	Brouquet	The Shawshank Redemption	7/5/2015	7/10/2015
53	260	Plumelia	Wermut	Citizen Kane	7/8/2015	7/13/2015
96	267	Alfonzo	Annuziata	On the Waterfront	7/9/2015	7/14/2015
54	212	Holden	Koffner	The Wizard of Oz	7/9/2015	7/14/2015
(New)						

Figure 3-9. Output Screen II (*DVDs Currently Rented by Due Date*)

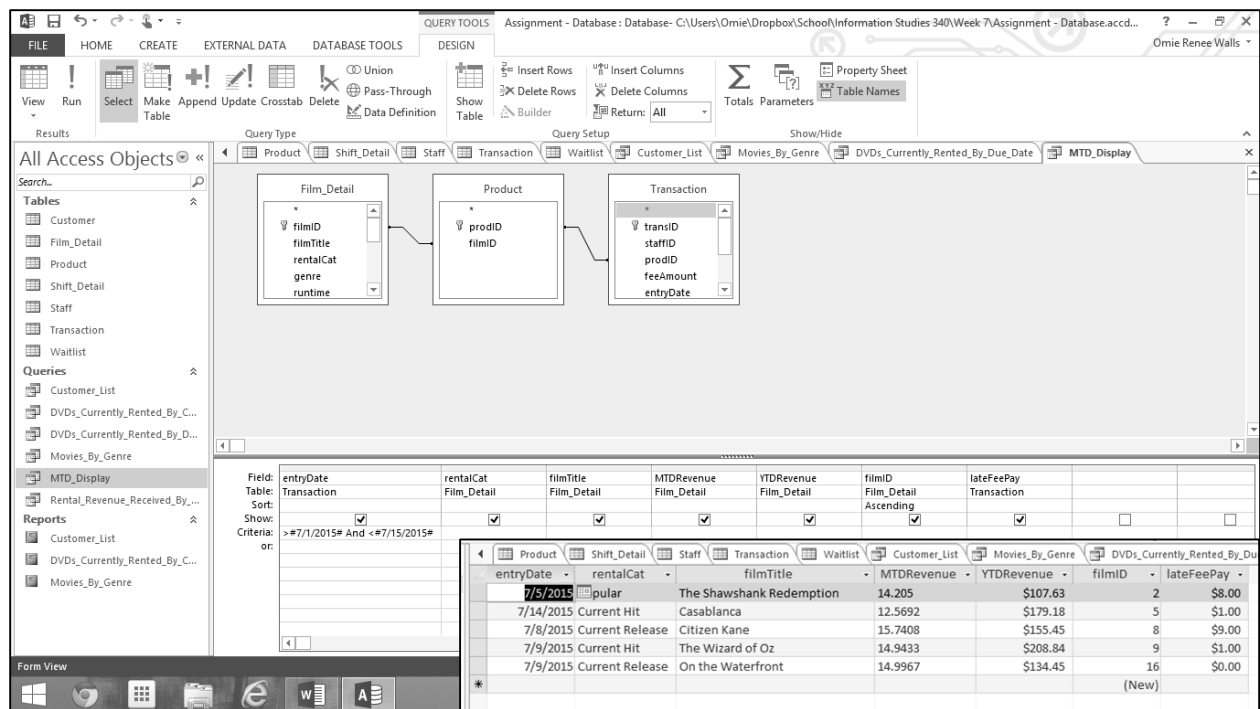


Figure 3-10. Output Screen III (MTD Display)

Customer_List		
custID	lastName	firstName
1	Lampasone	Saysha
2	Stojasavljevic	Maaja
3	Bloodgood	Dastit
4	Vuckovich	Bjarte
5	Rybakov	Ridvan
6	Cid	Templar
7	Golcha	Maru
8	Hardoin	Aric

Figure 3-11. Report I (DVDs Currently Rented By Customer)

Movies_By_Genre			
Genre	Film Title	Rating	Quantity
action, adventure, drama	The Treasure of the Sierra Madre	4	7
adventure, drama, western	Dances with Wolves	3	6
adventure, western	Stagecoach	4	7
biography, crime, western	Butch Cassidy and the Sundance Kid	4	7
drama, romance, western	Shane	4	6
drama, thriller, western	High Noon	4	3
western	The Good, the Bad and the Ugly	5	7
	Unforgiven	4	9
Sunday, July 12, 2015		Page 1 of 1	

filmID	genre	custRating	quantity
Film_Detail	Film_Detail	Film_Detail	Film_Detail
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Like "western"		

Figure 3-11a. Query Snapshot

Figure 3-12. Report II (Movies by Genre)

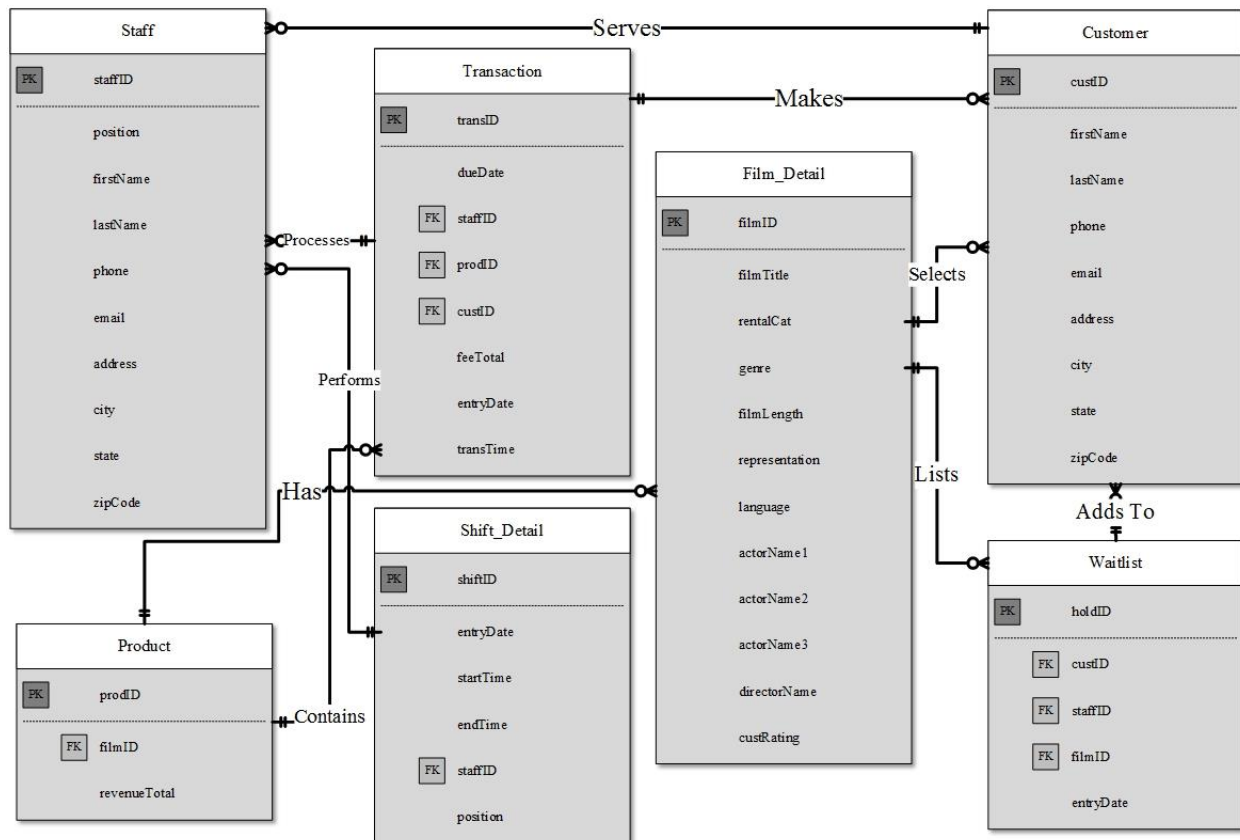


Figure 3-13. Entity-Relationship Diagram

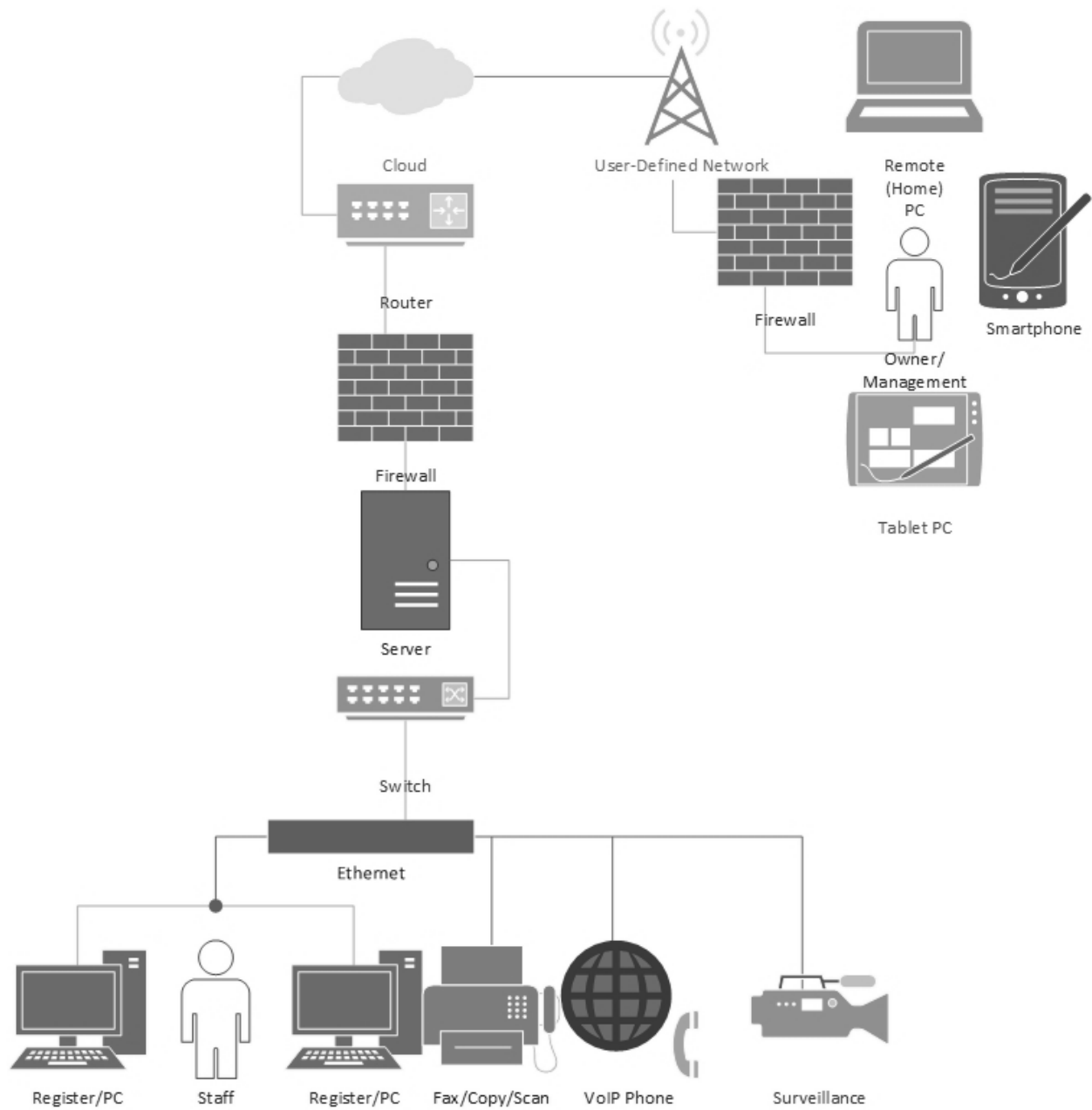


Figure 3-14. System Architecture Diagram