University of Calgary

Schulich School of Engineering

Department of Electrical and Computer Engineering

Course: ENSF 619.30

Software Requirements and Process Management

Software Requirements Specification

Document for:

Tool Rental Management System

Team Members:

Toya Okeke, David Haehlen, Alexander Mantey, Craig Martis

Submitted in partial fulfilment of the requirements of

ENSF 619.30 – Fall 2018

Table of Contents

List of Figures

List of Tables

Glossary

TERM	DESCRIPTION
DOMAIN / SCOPE	The area considered within the study
DFD	Data Flow Diagram. A diagram that shows the flow of data and control in a software system
ERD	Entity Relationship Diagram. A diagram that shows the relationship among preserved data entity
DATA STORE	A data-modeling notation to show the places that data rests
DATA DICTIONARY	A set of tables that describes data flow and information in a data store
STD	State Transition Diagram.
TERMINATOR	A source that takes in information (data sink) or receives information (data source)
TRMS	Tool Rental Management System
AWS	Amazon Web Services
GUI	Graphical User Interface
DATA FLOW	Represents the movement of information from one source to another
CONTROL FLOW	A signal from one source to another

1 Introduction

1.1 Purpose

This document describes, in detail, a new tool rental management system. The system allows customers to search through a company's tool inventory and request to rent the tools as needed. Customers have the option of renting a tool online or in-store, but pickup and returns are done in-store only.

1.2 Overview of the Document

1.2.1 Document Conventions

In this document one can assume some entities inherit the behaviours of their parent entity in a hierarchical tree. For example, a manger inherits the behaviour of an employee and has its own additional features. Additionally, the same terminator can appear more than once on the data flow diagram. However, these duplicate icons all refer to the same, single terminator. These duplicate icons are coloured in the same colour for ease of readability. Such duplicate terminators icons were made to prevent data and control flow lines from crossing. Duplicate icons of data stores with the same name also exist for the same reason of diagram layout but they likewise refer to the same, single data store.

1.2.2 Readers and Audiences

This document provides an overview of the new tool rental management system and the services it will provide. Therefore, this document is intended mainly for marketing staff, developers, management and any other users that wish to deploy a tool rental management system. The functionality of the system will differ based on the user. For example, a customer will not be able to implement all the functions of this system that an employee can. How each party is able to use this system will be discussed further. Furthermore, the operating environment the system requires will be explained. This includes hardware requirements, user and communication interfaces, system constraints and other software needs.

The system has many features to maintain information and handle various scenarios, such as late pick-ups and damaged returns. These features will be listed and broken down for developers, employees and management to understand the system requirements and flow of data. The relationships between data entities and their information will also be provided. Non-functional requirements are listed to aid developers in their design decisions during the development phase.

1.3 Scope of Project

The tool rental management system must give customers the ability to rent tools online. The system must also update the inventory when a tool is rented or returned. When a customer wishes to rent a tool, the system will determine the availability of that tool. After, it will give the

available rental periods to the customer, so they can choose the rental period best for them. A customer should not be allowed to rent a tool that is unavailable.

This system is not responsible for updating terms of service or any other contractual relations. Additionally, the system will not order more tools if the inventory is running low. The scope of the project does not include the front end or webpage that the customer uses to make rentals, however this document explains some of the detail of how the user will use the webpage to interact with the system.

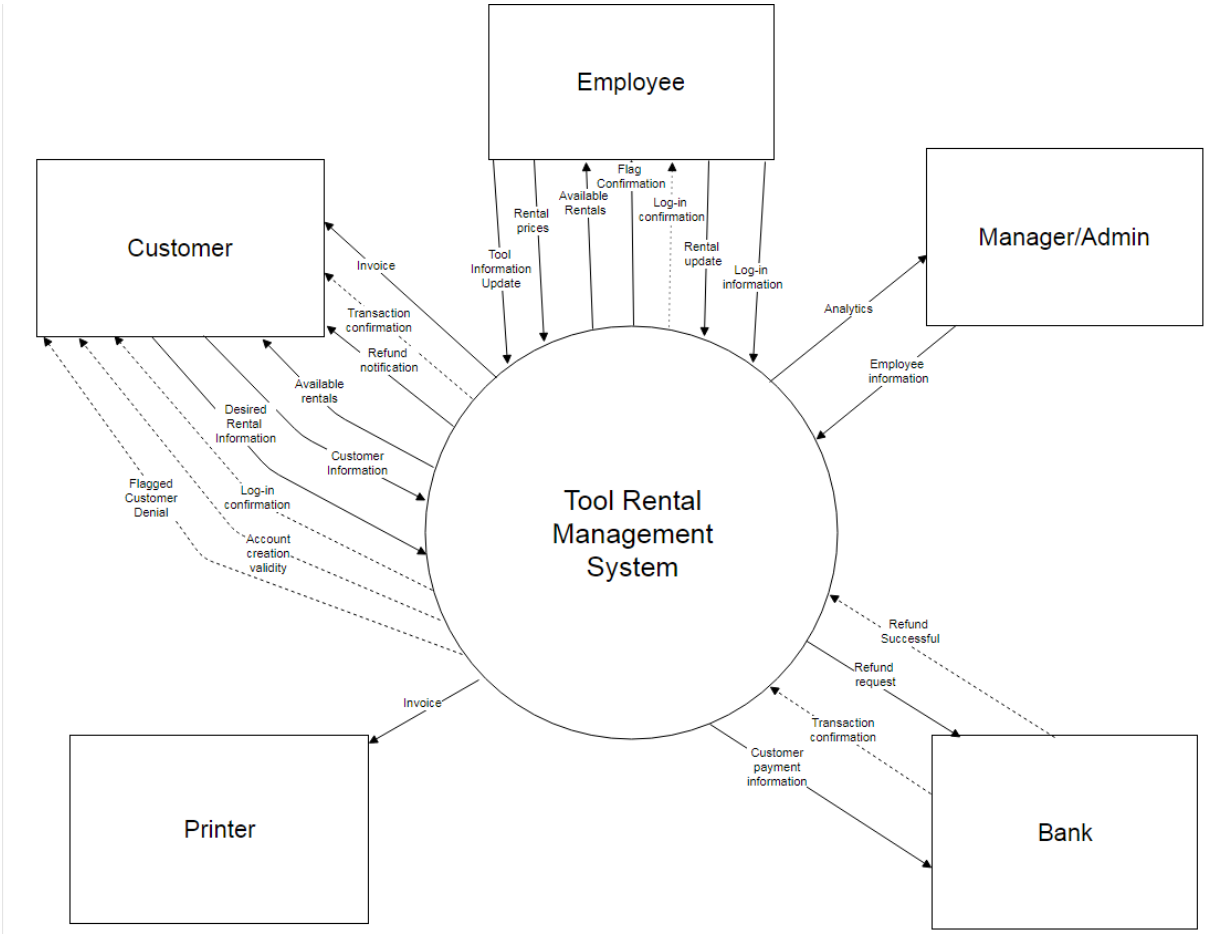


Figure 1 Context Diagram

1.4 References

[1] Amazon, "Databases on AWS," Amazon, 2018. [Online]. Available: https://aws.amazon.com/products/databases/. [Accessed 30 10 2018].

2 Overall Description of the System

2.1 Product Perspective

The tool rental management system is a new system and not derived from an existing system. However, it is inspired by existing rental systems and seeks to provide an alternative product. The system relates only to the software system and the environment it directly operates in. The companies that wish to implement this system are responsible for adding their initial stock, customer list and prices, along with ordering more tools if their stock is running low.

2.2 Product Features

2.2.1 Major Features

The following features are essential to the system operating correctly:

- The system must allow employees and managers to update the tool inventory
- The system must determine the availability and price of a tool and send it to the customer
- The system must direct the customer to the payment method where they will send their payment information. The system will also print out an invoice of the transaction after the bank has processed their payment and can send the invoice to customer via email.

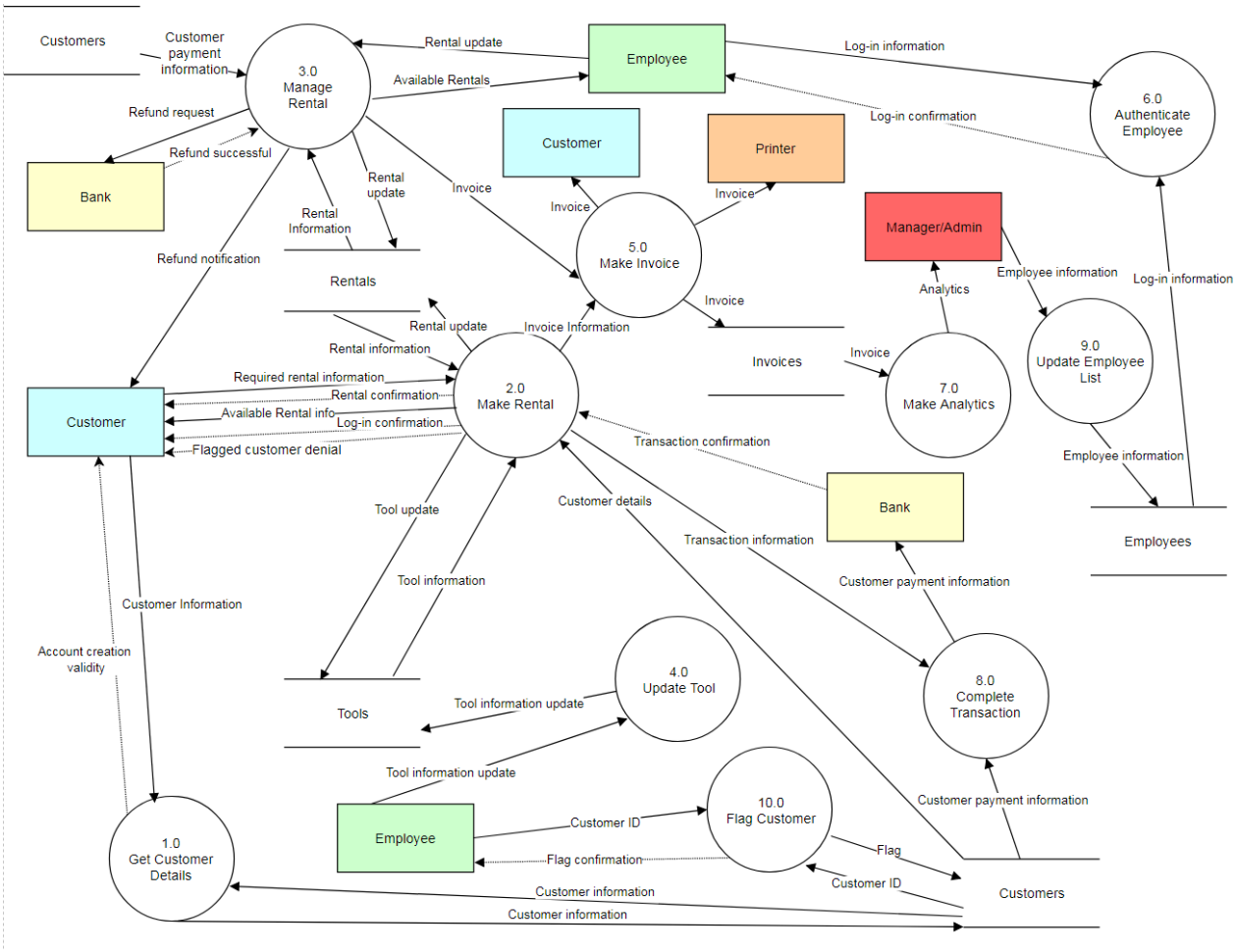


Figure 2 Context Diagram of Tool Rental Management System

2.3 Operating Environment

This is an online system that can operate on all operating systems, including Macintosh, Windows, Linux, Chrome OS, and mobile devices. The website, application, and databases will be hosted off-site on AWS. This will simplify the system administration, allow admin from all locations and avoid the need to build onsite servers to handle the data and web systems.

2.4 System Constraints

There is not an ability to have onsite servers installed because the system has been setup to operate in the cloud on AWS.

In the unlikely scenario that multiple customers attempt to rent the same tool at the exact same instant, the system has no way to resolve this conflict.

2.5 User Documentation

On the webpage there will be a help section along with an FAQ section. In the help section it will go step by step through the rental process, as well as explain how a user can create an account. The frequently asked questions will be updated as customers call in or email with questions they have about the system. Customers may also call in to the store and have the employee carry out the renting process for them if they desire.

2.6 Assumptions

Although a customer can request a tool rental, the company that implements this system will set a maximum length for which the customer may rent any tool. This will prevent any shortage in inventory due to customers renting a tool for too long. However, customers will still have the freedom to choose how long they wish to rent a tool, so long as it is within the maximum rental length.

Given the system has an online platform, it is assumed that customers can reserve tools in advance. In addition, it is safe to assume that the company who wishes to use this system must specify how much earlier in advance a customer may request to reserve a tool.

3 User Classes and Characteristics

Employees that will be using this system are responsible for updating tool inventory. Any changes to rental price and tool information are done by the employees. Before they can make changes to the tool inventory they must authenticate themselves by submitting their login information and receiving a successful login confirmation. Finally, employees can flag customer accounts if they return a damaged tool or do not return a tool.

Managers can do everything an employee can. Additionally, they receive all business analytics when an invoice is made and can update the employee list.

Customers send their information to the system and their desired rental details. The system will return the availability of their requested tool rentals and their prices.

4 System Features

4.1 System Function 1: ID: TRMS-1

4.1.1 Description of Function

The process in Figure 3 receives the customer’s information and passes this information to a data store of customers. This process involves the user creating an account with the system or updating their information if they already have an account. The function checks if there is any account with the same email address and prevents the customer from creating such duplicate accounts. Customer`s information is also checked by the function for validity of each respective input type.

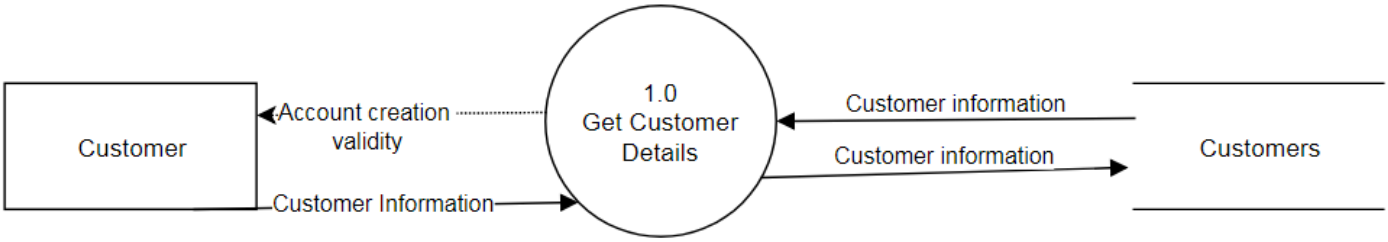


Figure 3 Process 1.0 Get Customer Details

4.1.2 Pre-Conditions and Post-Conditions

The Customer data store to which the function is connected must have all the valid fields that will be entered by the customer when creating an account. The account information of a new account must not match the information of an existing account or the account will not be created.

4.1.3 Possible Risks

It is important that this process and the data store have a high level of security because the user will be providing their credit card information along with their username (email address) and password used to uniquely identify them.

Furthermore, invalid entries for each field must be checked as they are entered or updated. For example, the system must check for valid email addresses so that invoices can be sent to the customer in the future, without further problems. The function must also verify each customer's information is unique and no duplicates are created.

4.2 System Function 2: ID: TRMS-2

4.2.1 Description of Function

The process in Figure 4 has many responsibilities and a second level data flow diagram has been created to help illustrate this (see Figure 5). The first responsibility is to provide the customer with the available types of tools and their respective available dates from Find Tool Availability (2.2). Then the function, in Read User Input (2.1), prompts and reads the user's information that would include the desired tool and rental dates as well as the customer's log-in information. If the login was invalid, Customer Login (2.4) will notify the customer to retry the login. If the customer (identified by their login) has been flagged by the company for whatever reason, Customer Login (2.4) will notify the customer and refuse the rental via Invalid or Flagged customer notification and the function will terminate the rental process. If the login was valid for an un-flagged customer, the function proceeds with the rental. The tool information and dates are passed to Calculate Total Price (2.3). The total price is calculated here and sent along with requested tool details, dates and the customer's basic identification details to Rental Execution (2.5) that sends the payment information to the Complete Transaction (8.0) function external to this function. Rental Execution (2.5) also sends the Rental Details to Rental Confirmation (2.6). This latter function will receive the signal from the bank if the transaction was successful or not.

If successful, it passes a signal to the customer that the rental was successful via the Rental Confirmation line and then updates the Rentals and Tools data stores as well as send the information externally to the Make Invoice function (5.0). If the transaction failed, the customer is notified via the same Rental Confirmation line and the rental is not logged.

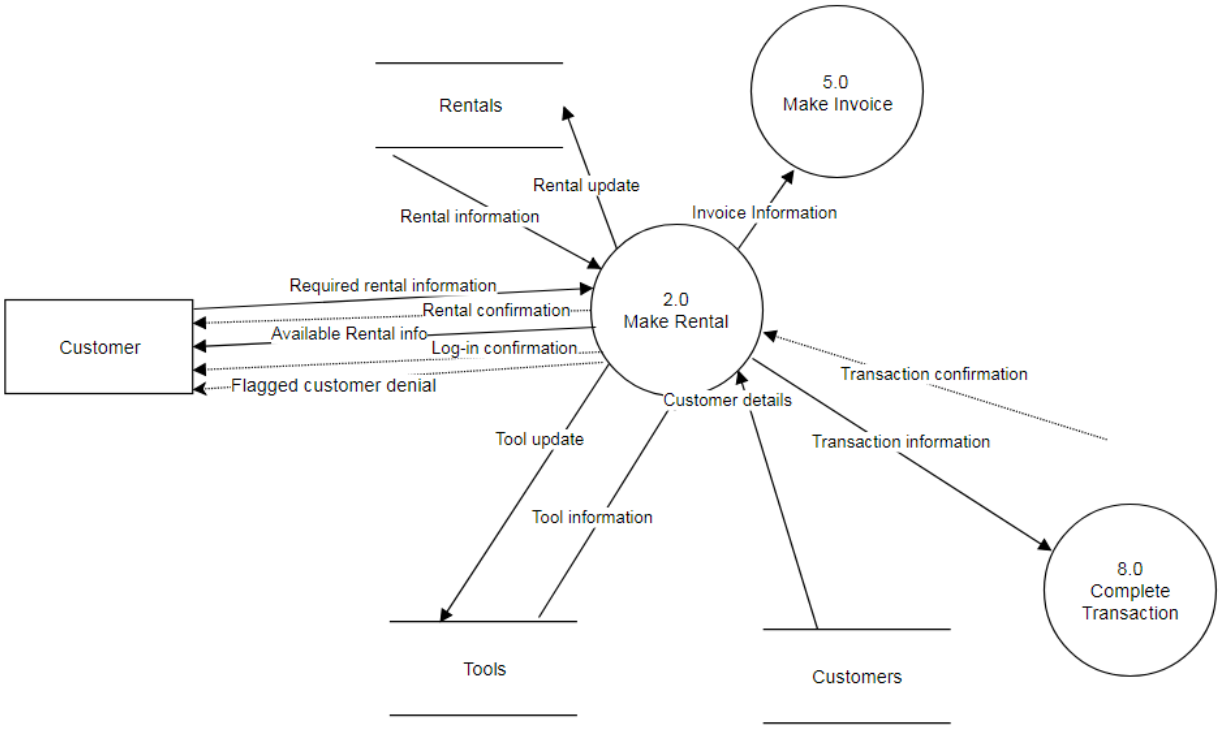


Figure 4 Process 2.0 Make Rental

4.2.2 Pre-Conditions and Post-Conditions

For a rental to successfully be made the customer must provide valid login information corresponding to an account already in the database, they must select available days to rent the tool, they must not be a flagged customer, and the transaction must be received from the bank as successfully completed.

4.3 Supplemental Diagrams

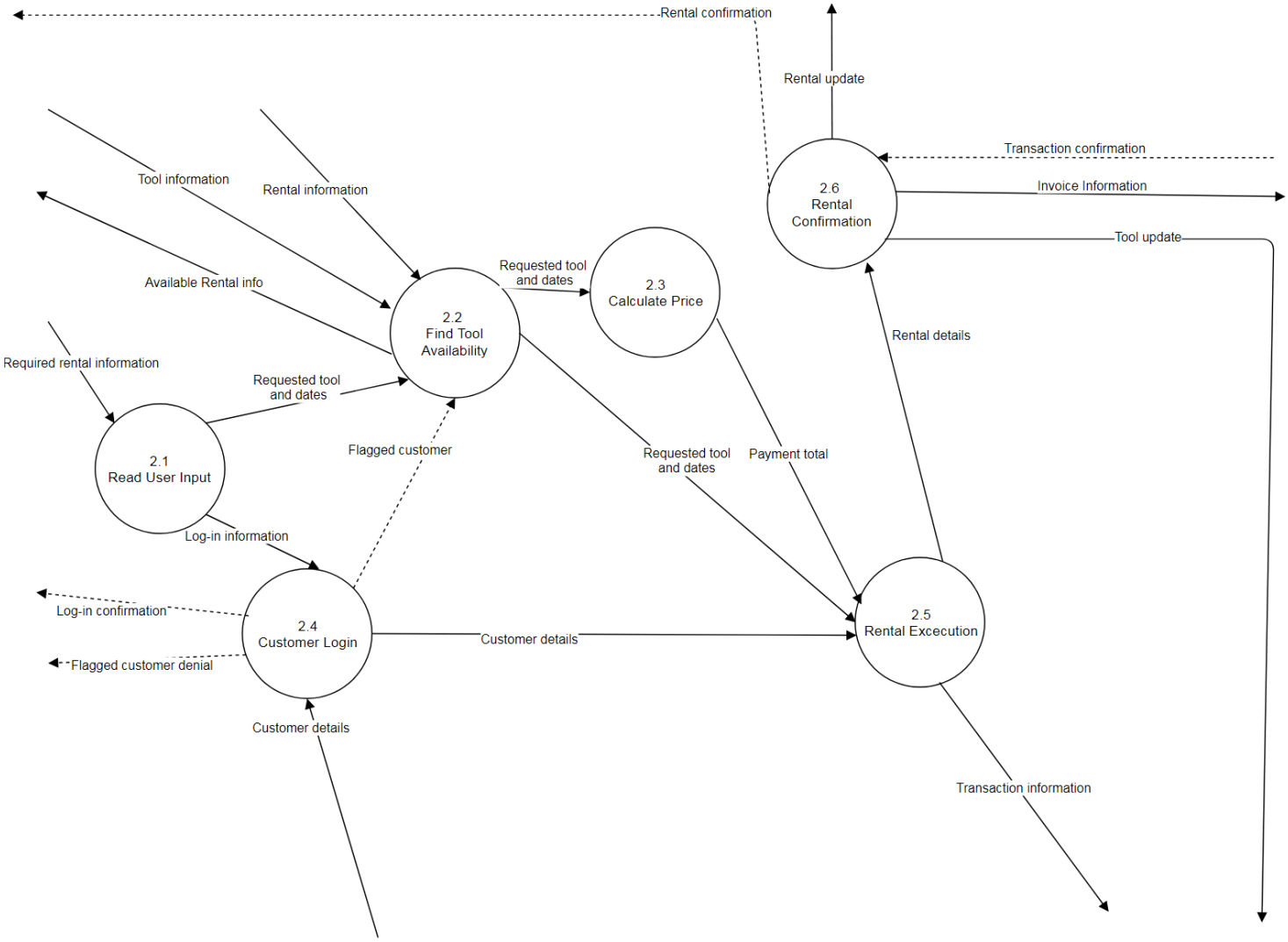


Figure 5 Level 2 Data Flow Diagram for Make Rental Process

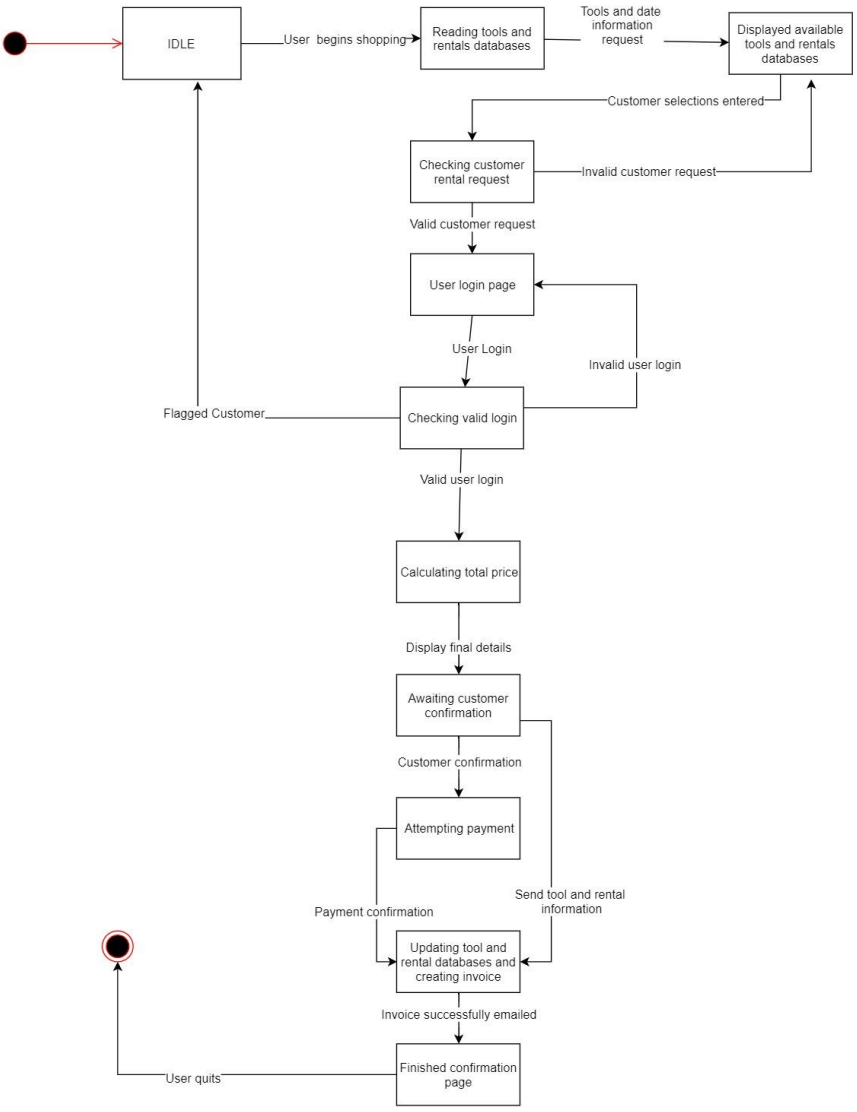


Figure 6 State Transition Diagram for Make Rental Process

4.4 System Function 3: ID: TRMS-3

4.4.1 Description of Function

The process in Figure 7 goes through multiple steps to manage rentals if an existing rental is manually updated by an employee. A second level data flow diagram for this process has also been created (see Figure 8). A potential reason to update a rental could be a tool requiring unexpected, extended maintenance. When this happens, any future rentals that have been reserved with the tools need to be cancelled and customers refunded. The employee views the Rentals data store to manually find these rentals through Process Rental (3.1). The employee puts through cancellation changes back to Process Rental (3.1) which reads the Customers data store for the matching customer of the rental to get the credit information. This is passed on to Issue Refund (3.3) which communicates with the bank to make the refund. If the refund process was

successful, the Rentals data store is updated, and a new invoice is made, by Send Rental Update (3.2).

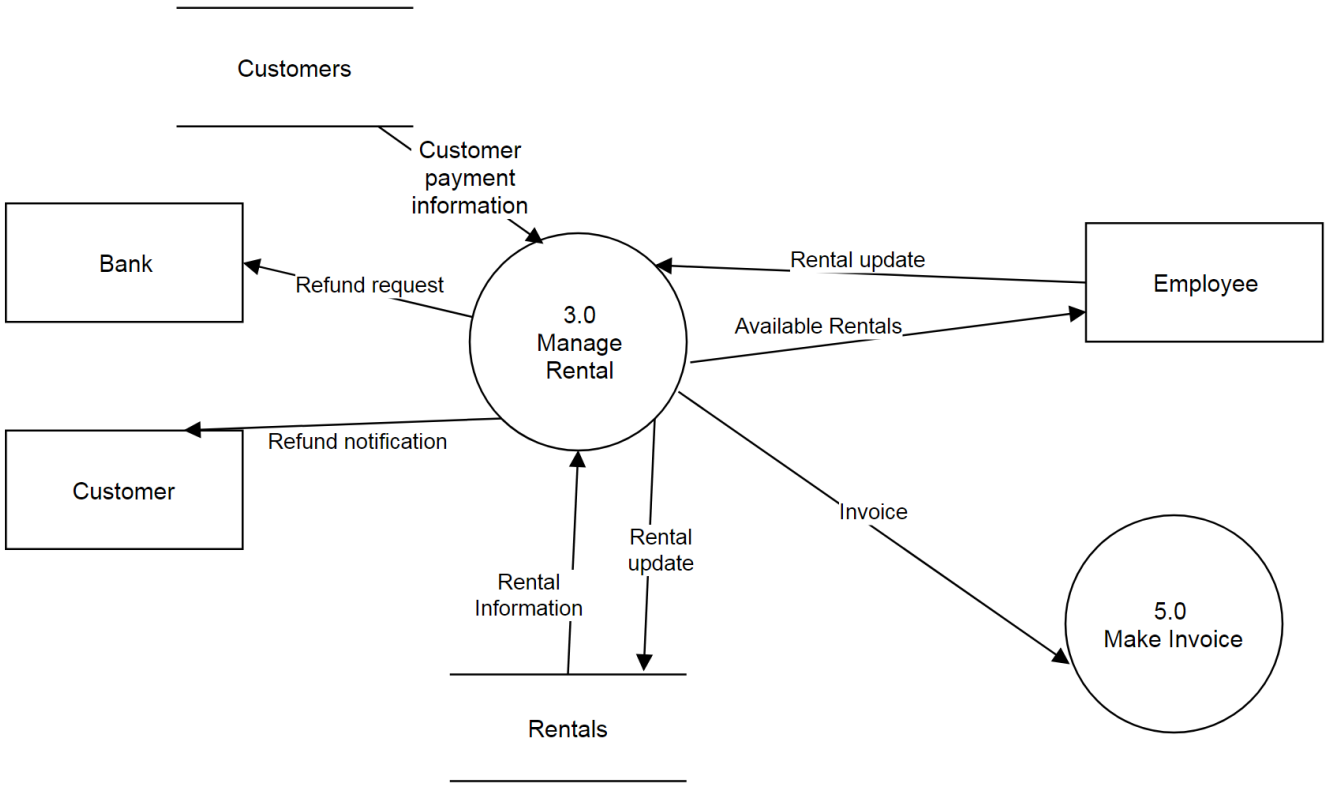


Figure 7 Process 3.0 Manage Rental

4.4.2 Pre-Conditions and Post-Conditions

If an employee wishes to make updates to a rental, the system receives the rental information from the rentals data store and passes available rentals to the employee. Once the employee sends their updates to the system and if the refund is processed successful, the Rentals data store is updated. Finally, information about the transaction is sent to another process to make an invoice that updates the Invoices data store.

4.4.3 Supplemental Diagrams

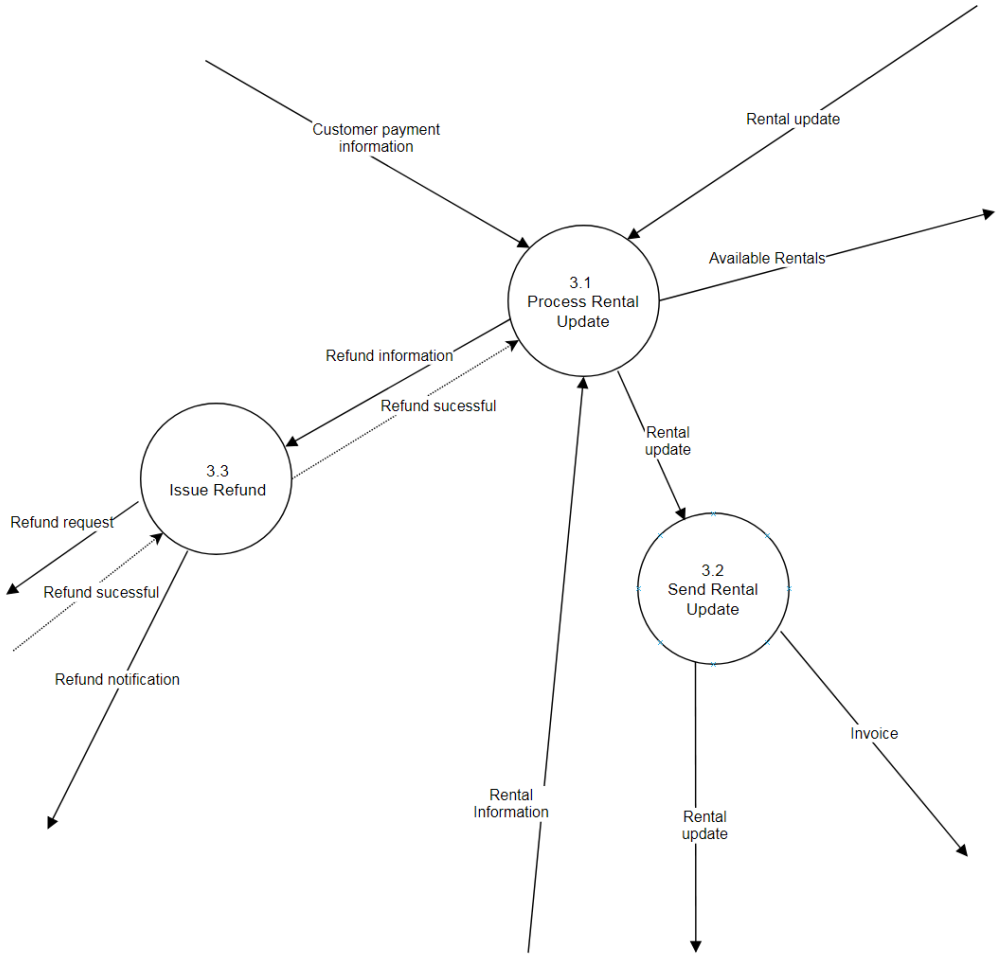


Figure 8 Level 2 Data Flow Diagram for Manage Rental Process

4.5 System Function 4: ID: TRMS-4

4.5.1 Description of Function

The process in Figure 9 allows an employee to update the Tools data store including adding tools to the data store, removing tools, or they can modify the fields of a tool. This can be used when tools need to undergo extended maintenance.

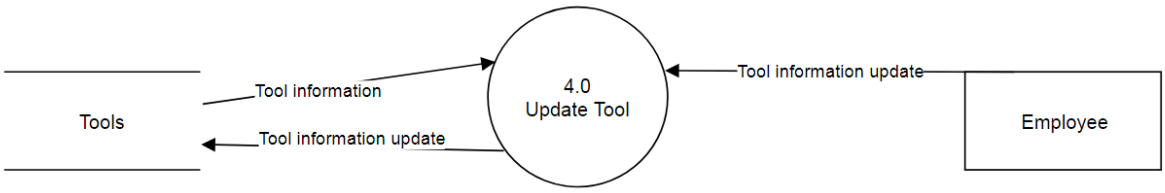


Figure 9 Process 4.0 Update Tool

4.5.2 Pre-Conditions and Post-Conditions

If the employee adds a new tool they must provide values for all the tool's fields. These fields can be seen in the data dictionary for the Tools data store. If they are updating an existing tool, they must provide the unique ID of the tool along with the field and value they wish to change. If the employee is removing a tool, then they just need to provide the ID of the tool.

After this information is received by the Update Tool function, this information is then used to modify the Tools data store.

4.6 System Function 5: ID: TRMS-5

4.6.1 Description of Function

The process in Figure 10 can receive invoice information from Manage Rental (3.0) or Make Rental (2.0). When it comes from Manage Rental it would be if a refund has been issued, and when it comes from Make Rental it would be when a rental has been made. The invoice would then be sent to the Customer in an email, sent to a printer, and sent to the Invoices data store.

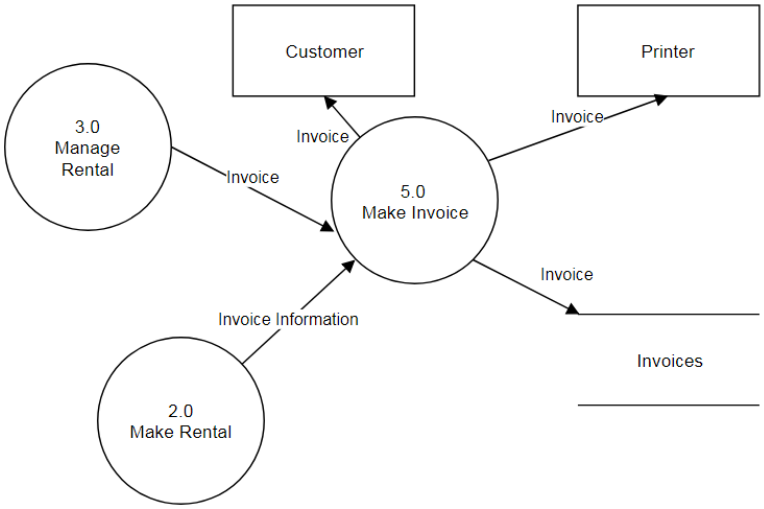


Figure 10 Process 5.0 Make Invoice

4.6.2 Pre-Conditions and Post-Conditions

This process must receive information with all the fields that an invoice requires, as well as the customer's email. These fields can be found in the Invoices data dictionary.

After the invoice has been made the process must be in a system that can send emails and has a connection with a printer.

4.7 System Function 6: ID: TRMS-6

4.7.1 Description of Function

The process in Figure 11 authenticates employees that wish to login to the system.

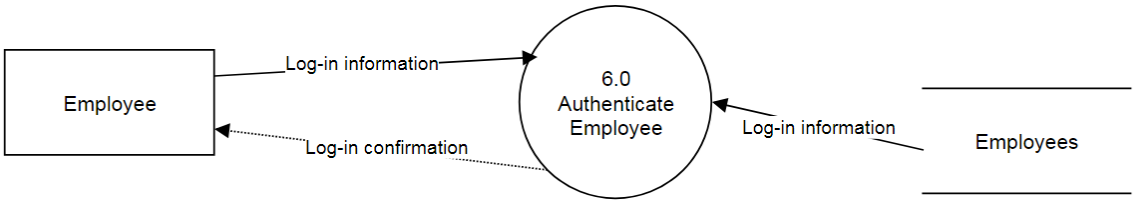


Figure 11 Process 6.0 Authenticate Employee

4.7.2 Pre-Conditions and Post-Conditions

The employee must enter their login information into the system. The system will then take existing login information from the employees' data store and compare it to the employees entered login information. The system will signal the employee their login has been confirmed if it matches the existing login information.

4.8 System Function 7: ID: TRMS-7

4.8.1 Description of Function

The process in Figure 12 generates all business analytics based on the invoices in the data store, and then sends them to the Manager/Admin.

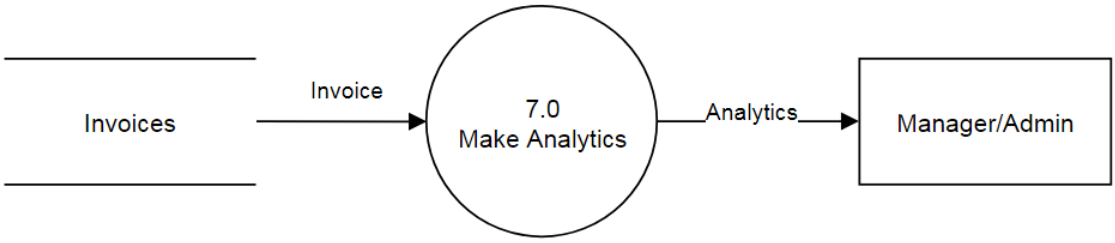


Figure 12 Process 7.0 Make Analytics

4.8.2 Pre-Conditions and Post-Conditions

There must be enough invoices in the data store to create analytics. After the analytics have been made, they are sent to the Manager/Admin.

4.9 System Function 8: ID: TRMS-8

4.9.1 Description of Function

The process in Figure 13 completes a transaction for new rentals that are made. It receives the transaction information (that includes the total amount and customer email and password). The email and password are used to match and retrieve the same customer`s payment information from the Customers data store. This payment information is then sent to the bank to make the transaction.

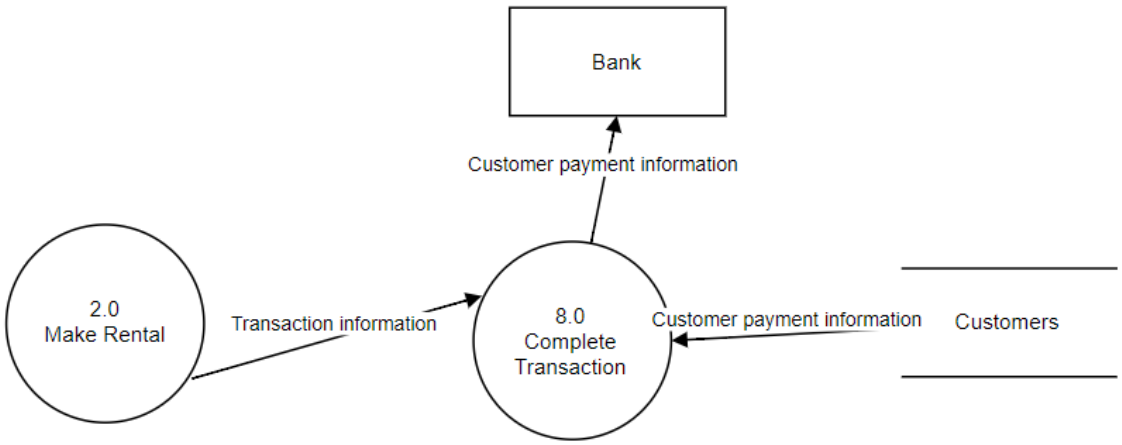


Figure 13 Process 8.0 Complete Transaction

4.9.2 Pre-Conditions and Post-Conditions

A necessary pre-condition must be that the Customers data store must have the complete profile information of the customer requesting the rental. (This was verified in TRMS 2.0, Make Rental.) Additionally, the customer`s information in the data store should already have been verified for accuracy.

4.10 System Function 9: ID: TRMS-9

4.10.1 Description of Function

The process in Figure 14 allows an administrator to update the employee list. This can be to add or remove an employee, or to modify the information for an existing employee.

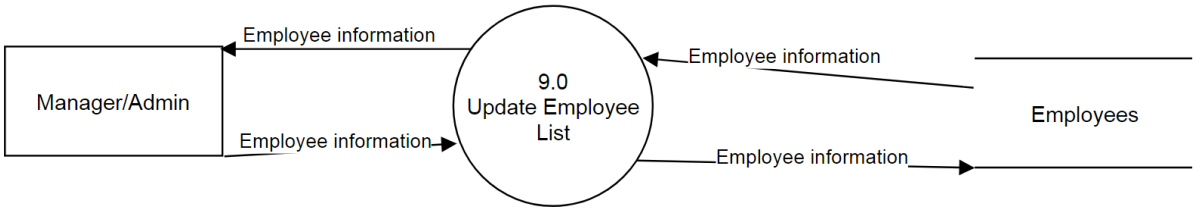


Figure 14 Process 9.0 Update Employee List

4.10.2 Pre-Conditions and Post-Conditions

The Manager/Admin must provide all the fields that are in the Employees data store if they are adding an employee. These fields can be found in the Employees data dictionary. If they are modifying an employee, they must provide that employee's unique ID, and a value and field that they wish to modify. If they are removing an employee, then they only need to provide the employee's ID.

4.11 System Function 10: ID: TRMS-10

4.11.1 Description of Function

The process in Figure 15 allows employees to flag a customer's account if they return a damaged tool or do not return a tool, then the process will notify the employee if the flagging is successful or not.

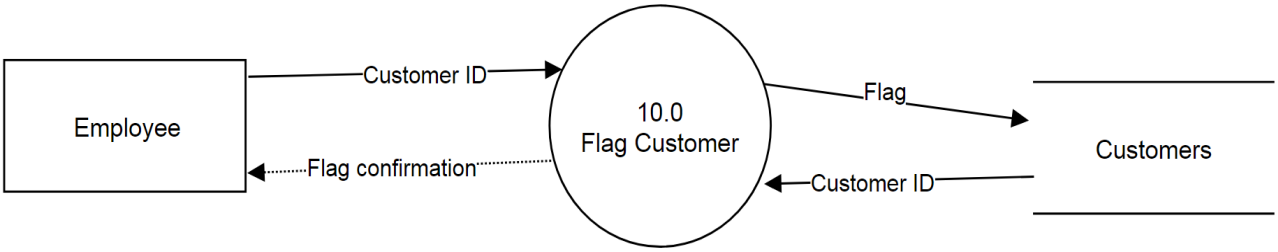


Figure 15 Process 10.0 Flag Customer

4.11.2 Pre-Conditions and Post-Conditions

The employee can view a list of the customers, and they must enter an ID that matches one in the Customers data store. They can view the customers ID on the invoice of the rental that was the reason for flagging the customer. If the ID that they enter is found and flagged successfully then the employee will receive a signal indicating this, and if it isn't found then they will be prompted to re-enter the ID.

5 External Interface Requirements

5.1 User Interfaces

5.1.1 Textual Description

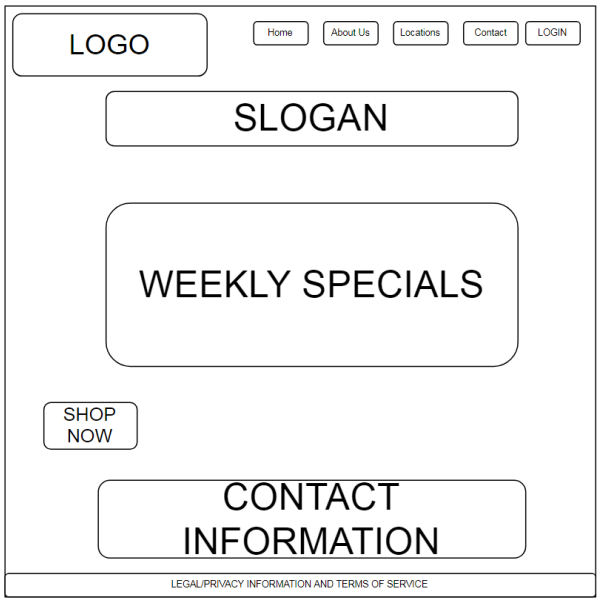
Three user interfaces are essential for this system: the main window, tool information window and make rental window. Other interfaces like the locations window and contact window will not be discussed since these are custom interfaces that depend on the company implementing this system. The main, tool information and make rental windows can be seen in Figure 16.

The home window will be the first window that appears for the customer once they view the system. It displays any key information that the customer would need to know and drop-down menus where they can login to the system, check store hours and locations, or start shopping by clicking a "shop now" button. The bottom of the window contains directories to any legal and copyright information the company needs to mention.

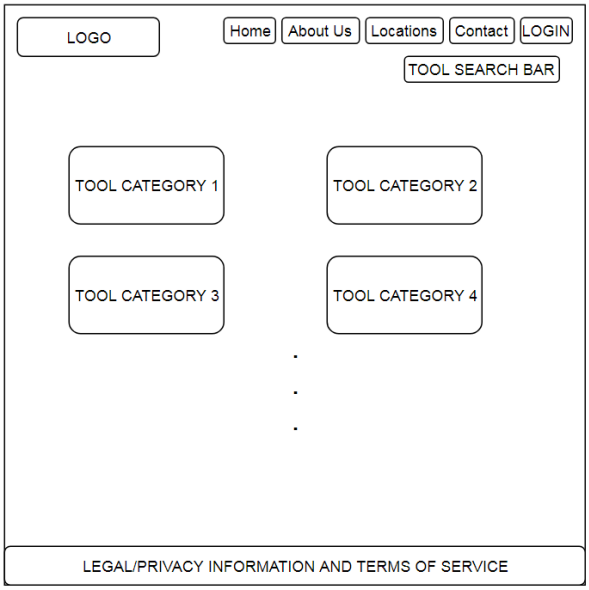
The customer will be redirected to the tool information window when they click the shop now button. This window can be accessed before the customer chooses to login. It will display the tool categories and have a search bar if the customer knows the name or other specific information about the tool.

Once the customer has selected a tool they will be directed to the make rental window. This window shows the available dates for the tool and price. Additionally, there will be an image and information about the tool on this window and a section where they can proceed to payment. It will also have sections where the customer can see the location of the store where they pick up their tool and select how long they want to rent for.

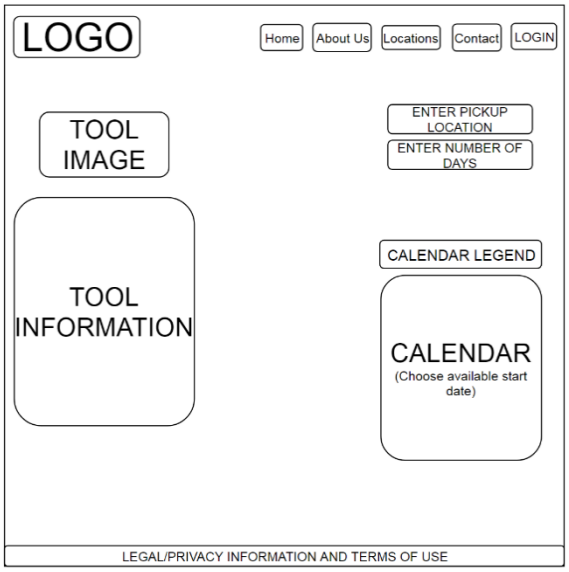
5.1.2 Prototype Graphic or Screenshot



(a)



(b)



(c)

Figure 16 Sample of (a) the Main Window, (b) the Tool Information Window and (c) the Make Rental Window

5.2 Hardware Interfaces

5.2.1 Textual Description

Any standard desktop, keyboard, mouse and monitor will be enough to access the system. A wired or wireless internet connection is also necessary.

5.3 Software Interfaces

5.3.1 Textual Description

Amazon Web Services (AWS) is widely used for ecommerce applications and they provide resources and tools to help developers make their ecommerce applications on their platform.

The system would use AWS as a host for the application, and for its data stores. The application will utilize Amazon Aurora, which is a MySQL compatible relational database that is used in cloud applications [1]. Amazon recommends this database for ecommerce applications, and this application has data that is common in ecommerce applications.

The plan is to develop the application in Java, and AWS provides a software development kit for Java developers.

The system would be designed so that an employee would use a Windows PC and access the application that is running in the cloud on AWS. The employee could then update and view information in the database of the application. There would be a GUI for the customer to interact with the database so that they wouldn't have to write queries.

The customers don't view the application directly but instead they see the website. After the customer submits information to the system the website communicates with the application and the database is updated.

Customers may use any modern operating system to access this tool rental management system, including mobile operating systems.

5.4 Communications Interfaces

5.4.1 Textual Description

The customers would interact with this system with a web browser, whether they are on a computer or a mobile device. To enter their personal information, they would enter it using electronic forms on the website.

The system has the capability to send invoices through email to customers.

As with any application that deals with sensitive information security is a concern. It is important that this information is well protected and certain pieces of it are encrypted. For example, an employee can see information within the Customers data store such as addresses, names, and whether customers are flagged, but the password and credit card information should be encrypted, so that even an employee can't read that information.

6 Non-Functional Requirements/Quality Requirements

6.1 Performance Requirements

To ensure speed of search process, it is critical that the system relays requested and available the tool details, dates etc. back and forth from the respective data stores to customers interface in an efficient manner, so that the responsiveness of the system contributes to customer satisfaction.

Many error handling pathways have been considered in the system to eliminate run-time errors These, again, will maintain customer satisfaction.

The system also needs to be able to support the non-functional feature of having many users on the website at once as well as processing these multiple rentals simultaneously.

It is important that the system has the non-functional requirement to update the availability of tools in real time (as the current design allows). This will prevent customers from being annoyed that the system indicated a tool was available in store when it wasn't showing online until much later. It will also help to increase business in the scenario that a tool is returned early. The tool can then be rented as soon as possible again.

6.2 Safety Requirements

Renting damaged or malfunction tools can pose a major safety hazard, and a potential liability should a customer rent them in their defective state. The employees have the capability and responsibility to remove these tools from the Tools data store.

6.3 Security Requirements

The system deals with sensitive customer information, so it is important that it is kept secure and some of it is encrypted. The system needs to be able to keeps its customer's information secure, and some of the information needs to be private from even the employees and admins.

7 Prioritization and Release Plan

7.1 Choice Prioritization Method

The highest priority level is Level 1and the lowest is Level 3. The rationale behind assignment of each function is given in the remarks in Table 1 below. Overall, functions that were directly responsible for the major functions of the system were assigned a Level 1. Functions that provided very useful functionality but, without which the system could still be made to operate, were assigned a Level 2. Functions that were assigned a Level 3 were nice-to-have features.

7.2 Prioritization Table of Requirement

Table 1 Prioritization and Release Plan Table

FEATURE ID	PRIORITY LEVEL	TYPE OF FEATURE	RELEASE DATE	REMARKS
TRMS-1	1	F	March 1, 2018	System needs the customer's information saved in a customer profile in order to make a rental
TRMS-2	1	F	March 1, 2018	Major requirement for system is so customers can make rentals
TRMS-3	1	F	March 1, 2018	System must be able to keep track of rentals database for proper functioning of the rest of system
TRMS-4	1	F	March 1, 2018	System must be able to update tool database for the system to function properly
TRMS-5	2	F	March 15, 2018	Important to have copies of all rentals, but renting functionality is not compromised without it
TRMS-6	3	F	May 1, 2018	All other system features can still function without verifying employees, if system is made to temporarily run without login credentials on employee workstations in-store.
TRMS-7	3	F	May 31, 2018	Additional feature, not critical to overall system
TRMS-8	1	F	March 1, 2018	Critical feature in completing rental process
TRMS-9	3	F	April 22, 2018	Major system functions can still take place without updating employee list for the same remarks as in TRMS-6
TRMS-10	3	F	May 15, 2018	Additional feature, not critical to overall system

8 Appendices

8.1 Appendix A: Process Diagrams

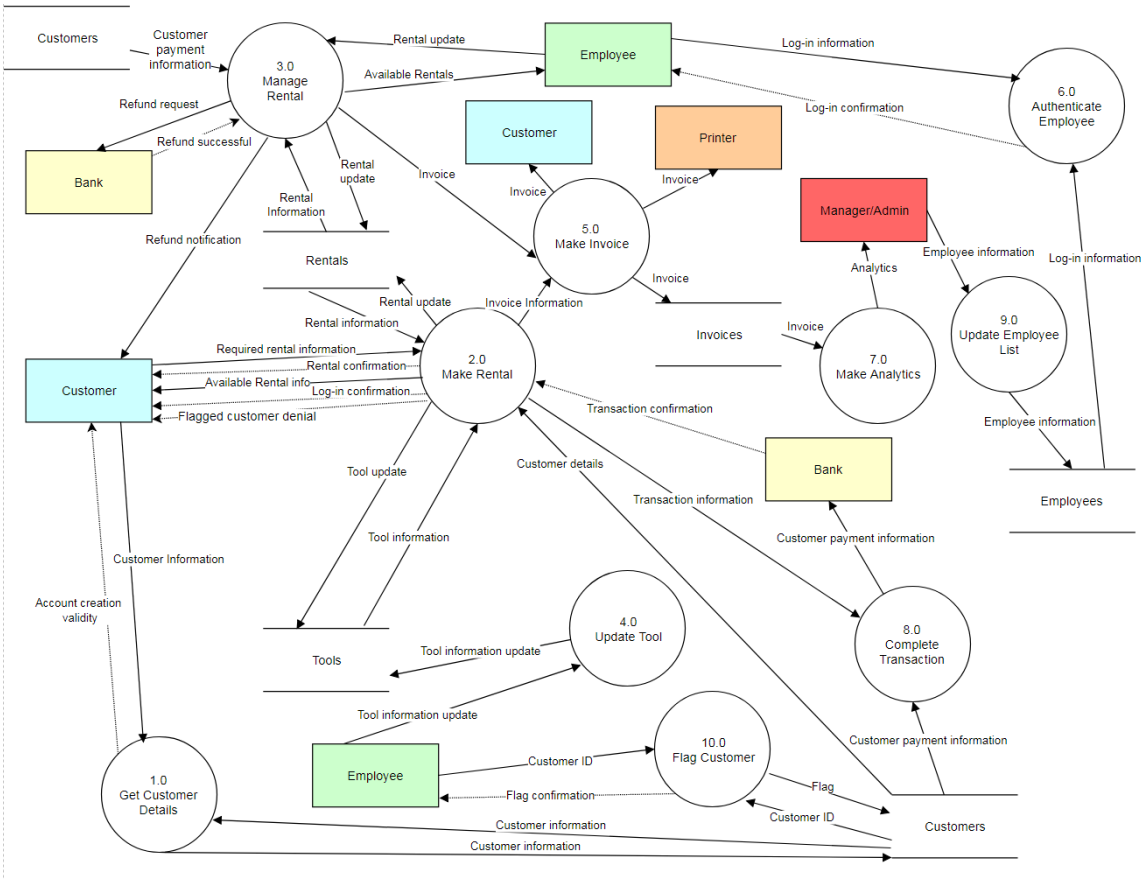


Figure A 1 Context Diagram of Tool Rental Management System

8.2 Appendix B: Entity Relationship Diagrams

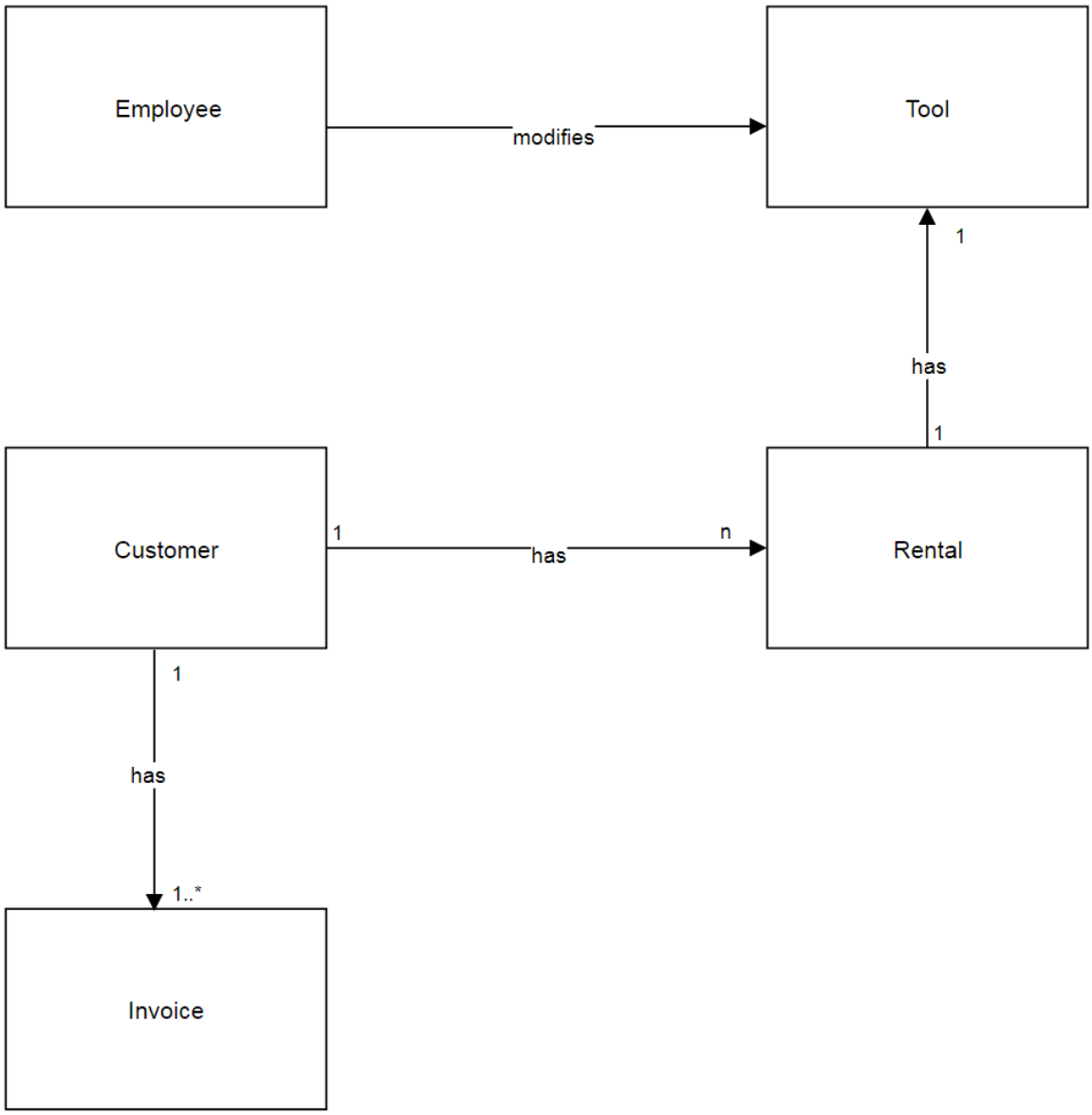


Figure B 1 Entity Relationship Diagram of Tool Rental Management System

8.3 Appendix C: Data Dictionary

Data Dictionaries

Table C 1 Customers Dictionary

CUSTOMERS

Field	Type	Length	PK	FK	Description
Building no.	string	8	no	no	Customer's building number
Card expiry	date	8	no	no	Customer's payment card expiry date
Country	string	30	no	no	Customer's Country
Credit Number	integer	16	no	no	Customer's payment card number
Customer ID	string	8	yes	no	ID for customer record
Email	string	25	no	no	Customer's email address
First Name	string	30	no	no	Customer first name
Flag	Boolean	1	no	no	Customer has damaged a tool
Last Name	string	50	no	no	Customer last name
Password	string	25	no	no	Must be at least 8 characters and contain both numbers and letters
Postal Code	string	6	no	no	Customer's postal code
Province	string	30	no	no	Customer's Province
Street	string	25	no	no	Customer's street

Table C 2 Employees Dictionary

EMPLOYEES

Field	Type	Length	PK	FK	Description
First Name	string	30	no	no	Employees first name
ID	string	8	yes	no	ID for employee record
Last Name	string	50	no	no	Employees last name
Password	string	25	no	no	Must be at least 8 characters and contain both numbers and letters

Table C 3 Invoices Dictionary

INVOICES

Field	Type	Length	PK	FK	Description
Building no.	string	8	no	no	Customer's building number
Card expiry	date	8	no	no	Customer's payment card expiry date
Country	string	30	no	no	Customer's Country
Credit Number	integer	16	no	no	Customer's payment card number
End Date	date	8	no	no	End date of rental
First Name	string	30	no	no	Customer first name
ID	string	8	yes	no	ID of invoice record
Invoice amount	double	10	no	no	Amount on invoice
Last Name	string	50	no	no	Customer last name
Payment	double	10	no	no	Amount paid by customer
Postal Code	string	6	no	no	Customer's postal code
Province	string	30	no	no	Customer's Province
Return Date	date	8	no	no	Date tool was returned
Start Date	date	8	no	no	Start date of rental
Street	string	25	no	no	Customer's street
Tool ID	string	8	no	yes	key to tool information in tool database

Table C 4 Rentals Dictionary

RENTALS

Field	Type	Length	PK	FK	Description
Customer ID	string	8	no	yes	Key to customer information it customer database
End Date	date	8	no	no	End date of rental
ID	string	8	yes	no	ID of rental record
Invoice id	string	8	no	yes	Invoice the rental is on
Start Date	date	8	no	no	Start date of rental
Tool description	string	256	no	no	Description of the tool
Tool ID	string	8	no	yes	Key to tool information in tool database

Table C 5 Tools Dictionary

TOOLS

Field	Type	Length	PK	FK	Description
Category	string	50	no	no	Tool category
Description	string	140	no	no	Description of tool
ID	string	8	yes	no	ID for tool
Is rented	Boolean	1	no	no	Flag if the tool is rented
Max Rent Duration	integer	2	no	no	Maximum number of days tool can be rented
Name	string	10	no	no	Tool name
Rental Fee	double	10	no	no	Cost per day of rental

Data Flow Dictionaries

Table C 6 Analytics Dictionary

Name	**Analytics**
Aliases	None
Where Used	Function 8.0
How Used	System output
Description	Analytics = Monthly sales total + Most rented tools + Least rented tools + Sales per customer + Sales per tool category + Average rental duration
Format	

Table C 7 Available Rentals Dictionary

Name	**Available rentals**
Aliases	Rental Information
Where Used	Function 3.0, Function 2.2
How Used	System output, Function 2.2 input
Description	Available Rentals = Tool ID + Tool description + Dates booked
Format	

Table C 8 Available Rental Info Dictionary

Name	**Available rental info**
Aliases	None
Where Used	Function 2.2
How Used	System output
Description	Available rental info = Tool ID + Tool rental price + Tool description + Tool name + Tool rental limit
Format	

Table C 9 Customer Information Dictionary

Name	**Customer information**
Aliases	Customer details
Where Used	Function 1.0, Function 2.4, Function 2.5
How Used	System input, Function 2.4 output, Function 2.5 input
Description	Customer information = First name + Last name + Building number + Street + Postal code + Province + Country + Credit card + Expiry date + Security number
Format	

Table C 10 Customer Payment Information Dictionary

Name	**Customer payment information**
Aliases	None
Where Used	Function 8.0
How Used	Input, System output
Description	Customer payment information = Customer name + Customer address + Credit number + Date + Security number
Format	

Table C 11 Employee Information Dictionary

Name	**Employee information**
Aliases	None
Where Used	Function 9.0
How Used	System input, output
Description	Employee information = ID + First name + Last name + Password
Format	

Table C 12 Invoice Dictionary

Name	**Invoice**
Aliases	Invoice information
Where Used	Function 6, Function 8
How Used	Function 6 output, Function 8 input
Description	Invoice = Customer Information + Invoice amount + Payment + Tool ID + Dates
Format	

Table C 13 Log-in Information Dictionary

Name	**Log-in information**
Aliases	None
Where Used	Function 6.0
How Used	Input, System input
Description	Log-in information = ID + password
Format	

Table C 14 Refund Notification Dictionary

Name	**Refund notification**
Aliases	None
Where Used	Function 3.0
How Used	System output
Description	Refund notification = Invoice ID + Amount + Notice
Format	

Table C 15 Refund Request Dictionary

Name	**Refund request**
Aliases	None
Where Used	Function 3.0
How Used	System output
Description	Refund request = Refund amount + Customer name + Credit information
Format	

Table C 16 Rental Update Dictionary

Name	**Rental update**
Aliases	None
Where Used	Function 3.0, Function 2.2
How Used	Function 3.0 output, System input, Function 2.2 input
Description	Rental update = Rental ID + rental update information
Format	

Table C 17 Required Rental Information Dictionary

Name	**Required rental information**
Aliases	None
Where Used	Function 2.1
How Used	System input
Description	Required rental information = Tool ID + {Date}2 + Email + Password
Format	

Table C 18 Tool Information Dictionary

Name	**Tool information**
Aliases	None
Where Used	Function 2.2
How Used	Input
Description	Tool information = Tool ID + Tool description + Rental fee + Max rent duration + Tool category + Is rented flag
Format	

Table C 19 Tool Information Update Dictionary

Name	**Tool information update**
Aliases	None
Where Used	Function 2.0
How Used	Input
Description	Tool information update = Tool ID + Tool update information
Format	

Table C 20 Transaction Information Dictionary

Name	**Transaction information**
Aliases	None
Where Used	Function 2.0, Function 3.0
How Used	Function 2.0 output, Function 3.0 input
Description	Transaction information = Customer email + Password + Amount
Format	

Table C 21 Tool Update Dictionary

Name	**Tool update**
Aliases	None
Where Used	Function 2.0
How Used	Output
Description	Tool update = Tool ID + Is rented flag
Format	