Institute of Technology, Carlow

Report

for

Customer Invoice System

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Description:

In this project, I had to make a **Customer Invoice System** in **Java** using a minimum of 3 DB tables.

I had to implement a lot of classes to make this system:

- Account
- AccountType
- Company
- DatabaseHandler
- Invoice
- InvoiceItem
- Item
- Main
- Packet
- PacketResult
- Product
- UnEditableDefaultTableModel

And I had to make a bunch of JFrame forms from **Netbeans** to handle the front-end:

- CompanyMenu
- LoginAccountForm
- SelectAccountType
- SignUpAccountForm

And I used a lot of different software throughout this project:

- **Netbeans** as my IDE as it has a powerful GUI builder
- **Docker** as a container for the **mySQL** database

- **MySQL Workbench** to view the database tables
- **Microsoft Word** for documentation writing
- **Github** and **Github desktop** for my repository
- **OBS studio** to record my screencast
- **StarUML** to create my ER diagram
- **VSCode** to grab code snippets
- **Snippping Tool** from Windows to take DB screenshots

And lastly this report was commissioned by Jason Barron in the Object Orientated Software Development module in IT Carlow.

The document contains the following sections:

- Description
- Requirements
- Database tables
- ER Diagram
- Interesting source code snippets
- Tests

Requirements:

A Customer Invoice Management system is a system that can be used to manage customer invoices. The customers can login and view their invoices and so as the companies as well. The companies which use the system can create invoices which they can hand out to customers.

Both companies and customers can sign up to the system.

Products can also be added into the system with a quantity and cost defined by the company.

Companies should be able to view basic information for the customers.

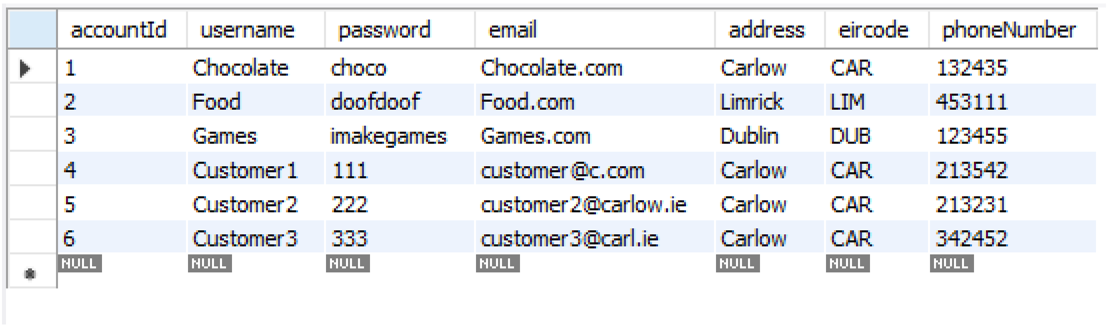
Invoices must contain the customer information and the products that company has added to the invoice.

The information of the product or invoice can be changed later by the company which created the item.

All products are owned by individual companies and should not be visible by other companies.

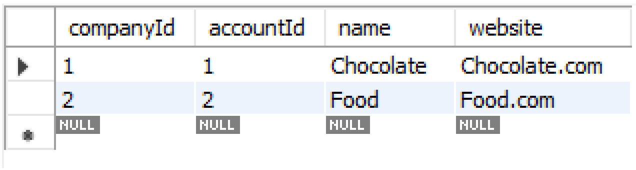
Database tables:

Account:



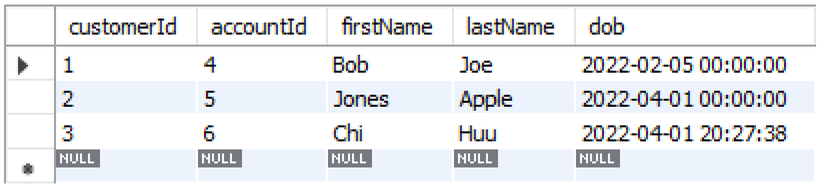
accountId	username	password	email	address	eircode	phoneNumber
1	Chocolate	choco	Chocolate.com	Carlow	CAR	132435
2	Food	doofdoof	Food.com	Limrick	LIM	453111
3	Games	imakegames	Games.com	Dublin	DUB	123455
4	Customer1	111	customer@c.com	Carlow	CAR	213542
5	Customer2	222	customer2@carlow.ie	Carlow	CAR	213231
6	Customer3	333	customer3@carl.ie	Carlow	CAR	342452
NULL	NULL	NULL	NULL	NULL	NULL	NULL

Company:



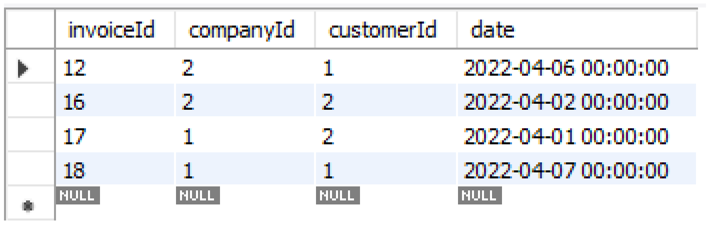
companyId	accountId	name	website
1	1	Chocolate	Chocolate.com
2	2	Food	Food.com
NULL	NULL	NULL	NULL

Customer:



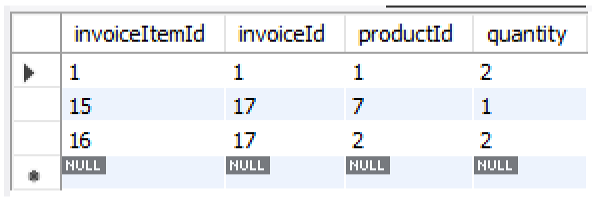
customerId	accountId	firstName	lastName	dob
1	4	Bob	Joe	2022-02-05 00:00:00
2	5	Jones	Apple	2022-04-01 00:00:00
3	6	Chi	Huu	2022-04-01 20:27:38
NULL	NULL	NULL	NULL	NULL

Invoice:



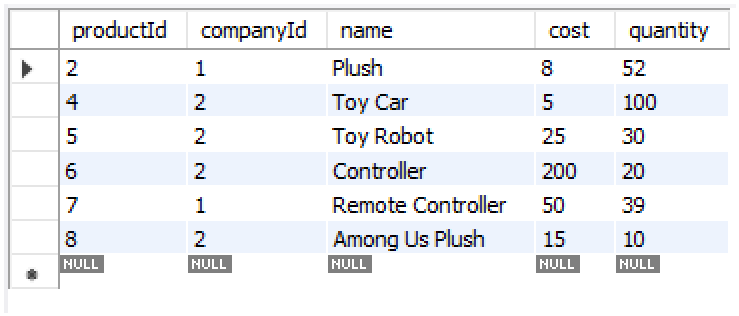
invoiceId	companyId	customerId	date
12	2	1	2022-04-06 00:00:00
16	2	2	2022-04-02 00:00:00
17	1	2	2022-04-01 00:00:00
18	1	1	2022-04-07 00:00:00
NULL	NULL	NULL	NULL

Invoice Item:



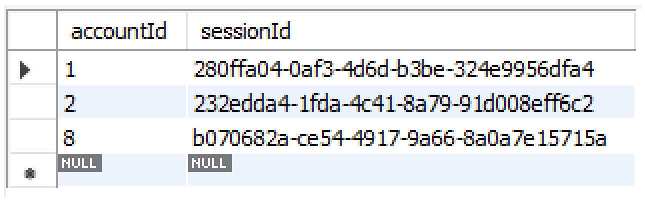
invoiceItemId	invoiceId	productId	quantity
1	1	1	2
15	17	7	1
16	17	2	2
NULL	NULL	NULL	NULL

Product:



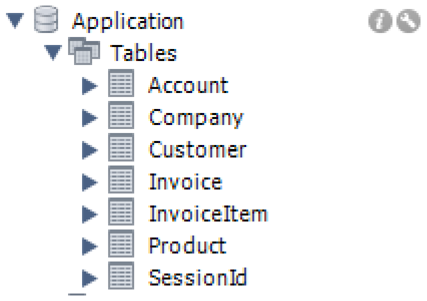
productId	companyId	name	cost	quantity
2	1	Plush	8	52
4	2	Toy Car	5	100
5	2	Toy Robot	25	30
6	2	Controller	200	20
7	1	Remote Controller	50	39
8	2	Among Us Plush	15	10
NULL	NULL	NULL	NULL	NULL

Session Id:



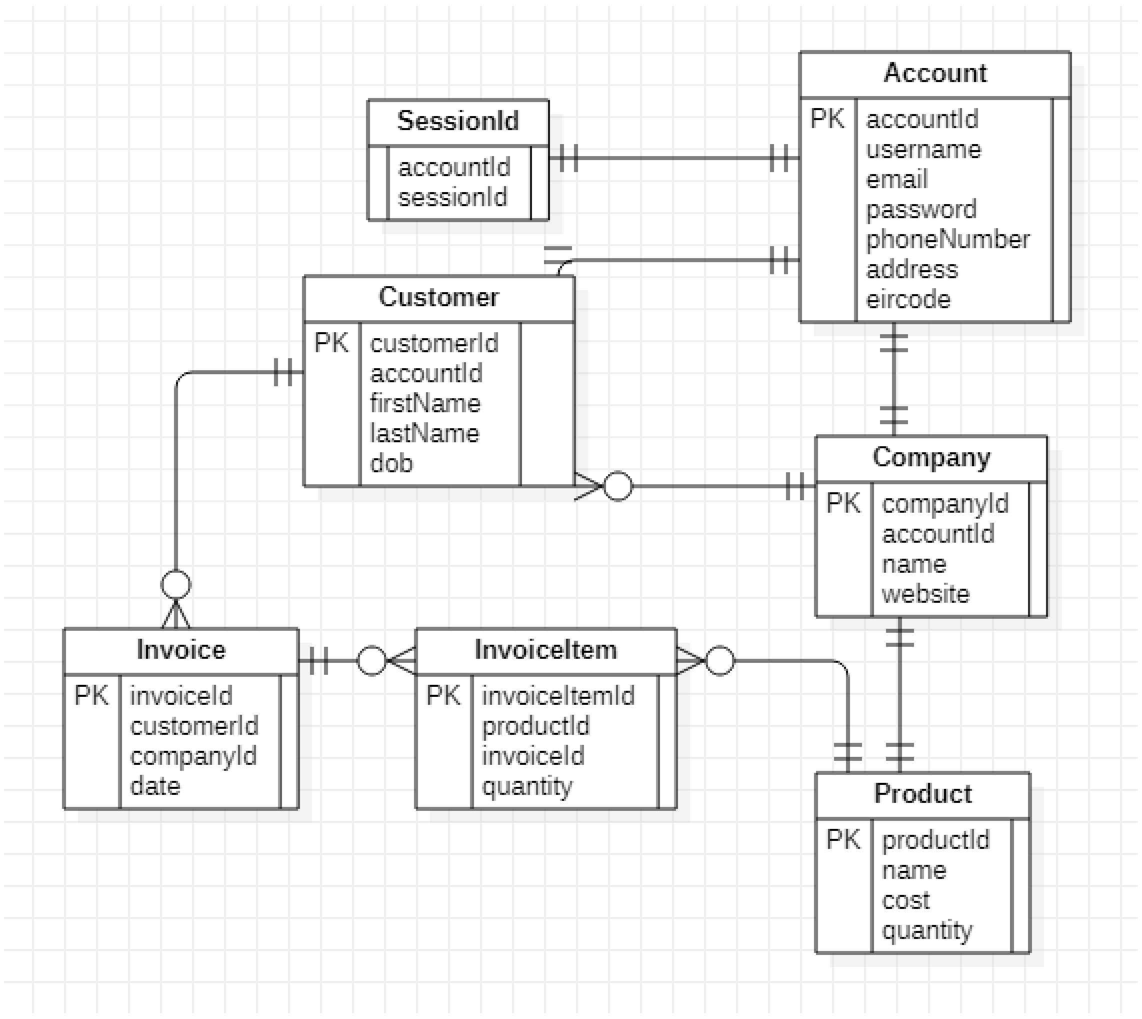
accountId	sessionId
1	280ffa04-0af3-4d6d-b3be-324e9956dfa4
2	232edda4-1fda-4c41-8a79-91d008eff6c2
8	b070682a-ce54-4917-9a66-8a0a7e15715a
NULL	NULL

All Tables:



```
▼ Application
  ▼ Tables
    ▶ Account
    ▶ Company
    ▶ Customer
    ▶ Invoice
    ▶ InvoiceItem
    ▶ Product
    ▶ SessionId
```

ER Diagram:


SessionId
accountId
sessionId
Account
PK
accountId
username
email
password
phoneNumber
address
eircode
Customer
PK
customerId
accountId
firstName
lastName
dob
Company
PK
companyId
accountId
name
website
Invoice
PK
invoiceId
customerId
companyId
date
InvoiceItem
PK
invoiceItemId
productId
invoiceId
quantity
Product
PK
productId
name
cost
quantity

Interesting source code snippets:

The following function is interesting as it handles most of the login of the user, checking the username and password and creating the session id if the user has successfully logged in.

Used as soon as the user is logging in.

```
/**
     * Checks both the username and password inputted
     * If the username and password are found then
     * Create / Update the session id and upload it into the database
     * @param username
     * @param password
     * @return (PacketResult.SUCCESS and sessionId) if successful
     */
    private static Packet requestLogin(String username, String password) {
        Packet accountIdPacket = getAccountId(username); // Does username exist
        if (accountIdPacket.getResult() != PacketResult.SUCCESS) { // Check if packet was
successful
            return accountIdPacket;
        }
        int accountId = (int) accountIdPacket.getInformation();
        if (accountId > 0) { // Verify if account username exists
            Packet canLoginPacket = canLogin(username, password); // Attempt login with
username and password
            if (canLoginPacket.getResult() == PacketResult.SUCCESS) {
                String sessionId = UUID.randomUUID().toString(); // Create session id
                DatabaseHandler handler = DatabaseHandler.getInstance();
                if (handler.isConnected()) {
                    Object[] info = {username, password};
                    // Attempt to get session id from username and password
                    List<List<Object>> result = handler.get("Application.SessionId.sessionId
FROM Application.SessionId JOIN Application.Account ON Application.Account.accountId =
Application.SessionId.accountId AND Application.Account.username = ? AND
Application.Account.password = ?", info, 1);
                    if (result.isEmpty()) { // No session id exists
                        if (handler.isConnected()) {
                            Object[] args = {accountId, sessionId};
                            boolean success = handler.insert("SessionId(accountId,sessionId)
VALUES (?,?)", args);
                            // Create session id
                            if (success) {
                                return new Packet(PacketResult.SUCCESS, sessionId);
                            } else {
                                return new Packet(PacketResult.DATABASE_ERROR);
                            }
                        } else {
                            return new Packet(PacketResult.CONNECTION_ERROR);
                        }
                    } else { // Session id already exists
                        Object[] args = {sessionId, accountId};
                        if (handler.isConnected()) {
                            // Update session id
                            boolean success = handler.update("SessionId SET sessionId=?
WHERE accountId=?", args);
                            if (success) {
                                return new Packet(PacketResult.SUCCESS, sessionId);
                            } else {
                                return new Packet(PacketResult.DATABASE_ERROR);
                            }
                        } else {
                            return new Packet(PacketResult.CONNECTION_ERROR);
                        }
                    }
                } else {
                    return new Packet(PacketResult.CONNECTION_ERROR);
                }
            } else {
                return canLoginPacket;
            }
        }
        return new Packet(PacketResult.ERROR_OCCURRED); // No account exists??? (This should
never happen)
    }
```

The following function is interesting as it handles the session id checking of the user and is called in every login action

Checking if the session id and account id exists inside of the session id DB

```
/**
     * *
     * Checks if account id and session id matches inside of the SessionId
     * database table. [USED TO CHECK IF USER IS SIGNED IN OR ACCOUNT EXISTS]
     *
     * @param accountId Account Id of user
     * @param sessionId Session Id of current session
     * @return (PacketResult.SUCCESS) if the session id exists
     */
    private static Packet checkSessionId(int accountId, String sessionId) {
        Object[] info = {accountId, sessionId};
        DatabaseHandler handler = DatabaseHandler.getInstance();
        if (handler.isConnected()) {
            // Check if session id with account id exists in Session id table
            List<List<Object>> result = handler.get("accountId FROM
Application.SessionId WHERE accountId = ? AND sessionId = ?", info, 1);
            if (result.size() >= 1) {
                return new Packet(PacketResult.SUCCESS);
            } else {
                return new Packet(PacketResult.BAD_REQUEST);
            }
        }
        return new Packet(PacketResult.CONNECTION_ERROR);
    }
```

The following function is interesting as it handles the deletion of an invoice.

Looping through every one of the invoice items before deleting the invoice. This is to preserve the quantity count of the product

```
/**
     * Deletes an invoice with the given invoice id
     * @param invoiceId
     * @return
     */
    public static Packet deleteInvoice(int invoiceId) {
        Packet companyVerify = Account.companyVerify();
        if (companyVerify.getResult() == PacketResult.SUCCESS) {
                DatabaseHandler handler = DatabaseHandler.getInstance();
                if (handler.isConnected()) {
                    Object[] args = {invoiceId};
                    // Check if there is any invoice items
                    List<List<Object>> invoiceItemList = handler.get("productId FROM 
Application.InvoiceItem WHERE invoiceId=?", args, 1);
                    if (invoiceItemList.size() == 1) {
                        List<Object> invoiceItems = invoiceItemList.get(0);
                        for (int i = 0; i < invoiceItems.size(); i++) { // Loop through 
invoice items and remove them
                            Company.deleteInvoiceItem((int)invoiceItems.get(i), invoiceId);
                        }
                    }
                    boolean success = handler.delete("Invoice", "invoiceId = ?;", args);
                    if (success) {
                        return new Packet(PacketResult.SUCCESS);
                    }
                    return new Packet(PacketResult.DATABASE_ERROR);
                }
                return new Packet(PacketResult.CONNECTION_ERROR);
            }
        return companyVerify;
    }
```

Lastly, the following function is interesting as it handles the adding of items into an invoice and subtracting from the quantity of the product.

This function really highlights the use of the class Packet to provide feedback to the user.

```java
/**
     * Adds invoice item to invoice by checking the quantity requested and the
     * quantity in stock After that, reduce product quantity and add invoice
     * item to invoice. If another invoice item exists inside of the invoice
     * then increment it
     *
     * @param quantityRequested
     * @param product
     * @param invoice
     * @return
     */
    public static Packet addInvoiceItem(int quantityRequested, Product product, int
invoiceId) {
        DatabaseHandler handler = DatabaseHandler.getInstance();
        if (handler.isConnected()) {
            Packet quantityPacket = product.getQuantity(companyId);
            if (quantityPacket.getResult() != PacketResult.SUCCESS) {
                return quantityPacket;
            }
            int productQuantity = (int) quantityPacket.getInformation();
            if (productQuantity >= quantityRequested) {
                if (handler.isConnected()) {
                    // Reduce
                    Object[] args_1 = {productQuantity - quantityRequested,
product.getProductId()};
                    handler.update("Application.Product SET quantity=? WHERE productId=?",
args_1); // Update quantity


                    Object[] args_2 = {invoiceId, product.getProductId()};
                    // Check if already exists inside of invoice
                    List<List<Object>> qInformation = handler.get("invoiceItemId, quantity
FROM Application.InvoiceItem WHERE invoiceId=? AND productId=?", args_2, 1);
                    if (qInformation.size() == 1) {
                        List<Object> information = qInformation.get(0);
                        int invoiceItemId = (int) information.get(0);
                        int invoiceItemQuantity = (int) information.get(1);
                        Object[] args_3 = {invoiceItemQuantity + quantityRequested, 
invoiceItemId};
                        boolean success = handler.update("Application.InvoiceItem SET 
quantity=? WHERE invoiceItemId=?", args_3);
                        if (success) { // Add item
                            return new Packet(PacketResult.SUCCESS);
                        }
                        return new Packet(PacketResult.DATABASE_ERROR);
                    } else {
                        Object[] args_4 = {0, invoiceId, product.getProductId(), 
quantityRequested};
                        boolean success = handler.insert("InvoiceItem(invoiceItemId, 
invoiceId, productId, quantity) VALUES (?,?,?,?)", args_4);
                        if (success) { // Add item
                            return new Packet(PacketResult.SUCCESS);
                        }
                        return new Packet(PacketResult.DATABASE_ERROR);
                    }
                }
                return new Packet(PacketResult.CONNECTION_ERROR);
            }
            return new Packet(PacketResult.BAD_REQUEST);
        }
        return new Packet(PacketResult.DATABASE_ERROR);
    }
```

Tests:

Test Case – Sign up Company

Name	TC-01
Requirements	Secure
Precondition	User must be connected to database
Steps	User enters login screen User enters the username and password User submits the information System brings user to company menu
Expected Results	User has logged in and is in the company menu
Actual Results	User has logged in and is in the company menu

Test Case – Login Customer

Name	TC-02
Requirements	Secure
Precondition	User must be connected to database
Steps	User enters login screen User enters the username and password provided by the company User submits the information System brings user to customer menu
Expected Results	User has logged in and is in the customer menu
Actual Results	User has logged in and where the company menu is supposed to be

Test Case – Add Invoice

Name	TC-03
Requirements	Fast, Correct
Precondition	User must be connected to database, User must be logged into a company account
Steps	User clicks "Create new Invoice" button User selects a customer from the customer combo box User enters in a date User submits the information by pressing "Ok" System updates and shows newly created invoice
Expected Results	Newly created invoice inside of invoice table
Actual Results	Newly created invoice inside of invoice table

Test Case – Amend Invoice

Name	TC-04
Requirements	Fast, Correct
Precondition	User must be connected to database, User must be logged into a company account, User must have selected an invoice
Steps	User clicks "Amend" button User changes the customer in the customer combo box User changes the date box User submits the information by pressing "Ok" System updates and shows invoice information changed in DB tables
Expected Results	Shows invoice information changed in DB tables
Actual Results	Shows invoice information changed in DB tables

Test Case – Edit Product Information

Name	TC-05
Requirements	Fast
Precondition	User must be connected to database, User must be logged into a company account
Steps	User clicks on a slot for the product (eg. Click on a slot at the column called quantity) User changes the quantity amount. User unselects the quantity slot. System updates and shows the new value
Expected Results	Shows product value changed in DB tables
Actual Results	Shows product value changed in DB tables

Test Case – Add Invoice Item

Name	TC-06
Requirements	Fast
Precondition	User must be connected to database, User must be logged into a company account, User must have selected an invoice, An invoice item must have already been added into the invoice
Steps	User clicks "Amend" button User on "Add new" button User chooses same product from product combo box and puts a quantity of 5 User submits the form. System updates and invoice item's quantity increased by 5
Expected Results	Invoice item's quantity increased by 5
Actual Results	Invoice item's quantity increased by 5