Database Design Document

ThinkCube Soft Inc.

Sales and Invoicing Database

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# Introduction

This Database Design document provides detailed information regarding the Sales and Invoicing System database for *ThinkCube Soft Inc.* The document includes a detailed list of the Entities and Attributes that compromise the architecture of our database. It also includes a Logical Entity Relationship Diagram (ERD) outlining how all of the entities are related and a Physical ERD outlining the entities, attributes and relations.

Furthermore, this document will also cover the assumptions we made and constraints we identified during the design process and outline any issues that arose while designing the database.

# Assumption and Constraints

Due to the limited nature of the documentation provided, the following assumptions had to be made to design the Sales and Invoicing System database for *ThinkCube Soft Inc.*

* No “Country” entity because ThinkCube Soft Inc. only ships within Canada.
* ThinkCube Soft Inc. has multiple locations across Canada
* Subtotal is a derived attribute and calculated by the sum of all items after discounts
* Tax is a derived attribute and is at 1.13
* Total is a derived attribute calculated by the product of Subtotal and Tax
* “Job” Entity representing contractual agreements between corporations
* Orders are fulfilled by different shipping providers
* Customers can have a billing address different from the shipping address for the invoice
* The payment terms and payment due date are determined on the invoice
* Products are to have a total quantity available
* Delivery Date for shipping is determined at the time the order is placed
* A sales representative is required to process the order

The following are constraints identified during the design process of the Sales and Invoicing System database for *ThinkCube Soft Inc.*

* Customer has an email assigned to them for contact
* Customer phone number is dependent on the customer providing an address

# Identified Issues

During the final steps of reviewing the created database and entities, we noticed some minor logic issues that will be present in the proposed data model.

Here are the following identified issues when creating the Sales and Invoicing System database for *ThinkCube Soft Inc.* and the proposed solutions:

1. Product quantity is representative of all locations of ThinkCube Soft Inc. and not a single specific location
   * In a re-engineered database, we would recommend differentiating from an online seller inventory and local seller inventory.

# Personnel

* Analyst – Adam Plater-Zyberk
* Architect – Adam Plater-Zyberk
* Quality Assurance - Adam Plater-Zyberk
* Documentation Specialist - Adam Plater-Zyberk

# Entities

Database Name: ThinkCubeSales Revision: 3

Date: July 31st, 2020

Author: Adam Plater

|  |  |  |
| --- | --- | --- |
| Entity Name | Entity Type | Relates to |
| addresses | Table |  |
| customers | Table | addresses |
| invoices | Table | salespeople, jobs, sellers, customers |
| invoices\_line | Table | invoices, products |
| jobs | Table |  |
| products | Table |  |
| salespeople | Table |  |
| sellers | Table |  |
| shipping\_details | Table | shipping\_providers, invoices |
| shipping\_providers | Table |  |

Notes:

Invoices entity lists all of the necessary information for a ThinkCube Soft Inc. invoice, which includes:

* The invoice specific number
* The date the invoice was created
* The ThinkCube Soft Inc. location
* The Customer information for billing and shipping
* The Salesperson responsible for the transaction
* Any possible Job ID for contracts
* Payment Terms and Due Date
* Products ordered
* Any Discount applied

# Entity Details

## Fields form – Addresses

Database Name: ThinkCubeSales Revision: 3

Entity Name: addresses Date: July 31st, 2020

Author: Adam Plater

|  |  |  |  |
| --- | --- | --- | --- |
| Field Name | Data type | Field Properties | Relates to |
| address\_id | Serial | Primary Key |  |
| address\_street | Character varying (20) | Not Null |  |
| address\_city | Character varying (20) | Not Null |  |
| address\_prov | Char (2) | Not Null |  |
| address\_postcode | Char (6) | Not Null |  |
| address\_phone | Character varying (15) | Not Null |  |
| address\_description | Character varying (60) |  |  |

Notes:

* The addresses entity stores each unique address for customers.
* The Primary Key ‘address\_id’ allows us to identify a different billing address and shipping address in the customers entity where appropriate.
* The ‘address\_description’ attribute is used for instances where the customer is a representative from a corporation and wants to include it in the billing and shipping information.

## Fields form – Customers

Database Name: ThinkCubeSales Revision: 3

Entity Name: customers Date: July 31st, 2020

Author: Adam Plater

|  |  |  |  |
| --- | --- | --- | --- |
| Field Name | Data type | Field Properties | Relates to |
| cust\_id | Serial | Primary Key |  |
| cust\_fname | Character varying (30) |  |  |
| cust\_lname | Character varying (30) | Not Null |  |
| cust\_email | Character varying (50) | Not Null |  |
| cust\_balance | Numeric (9,2) |  |  |
| cust\_address | Serial | Foreign Key, Not Null | addresses.address\_id |

Notes:

* The customers entity stores each unique customer that makes an account through ThinkCube.
* The Primary Key ‘cust\_id’ lets us identify the customer information on the invoice.
* The Foreign Key ‘cust\_address’ relates to the ‘address\_id’ attribute from the addresses entity to allow for unique billing and shipping addresses in the invoice.
* The ‘cust\_balance’ attribute is used to identify if the customer has an outstanding balance with ThinkCube.

## Fields form – Invoices

Database Name: ThinkCubeSales Revision: 3

Entity Name: invoices Date: July 31st, 2020

Author: Adam Plater

|  |  |  |  |
| --- | --- | --- | --- |
| Field Name | Data type | Field Properties | Relates to |
| invoice\_number | Serial | Primary Key |  |
| invoice\_date | Timestamp | Not Null |  |
| invoice\_seller\_id | Char (6) | Foreign Key, Not Null | sellers.seller\_id |
| invoice\_cust\_id | Serial | Foreign Key, Not Null | customers.cust\_id |
| invoice\_sales\_id | Char (4) | Foreign Key, Not Null | salespeople.sales\_id |
| invoice\_job\_id | Serial | Foreign Key | jobs.job\_id |
| invoice\_payment | Integer |  |  |
| invoice\_payment\_DD | Timestamp |  |  |
| cust\_shipping\_id | Serial | Foreign Key |  |

Notes:

* The invoices entity stores each invoice that is processed through ThinkCube.
* The Primary Key ‘invoice\_number’ lets us identify each unique invoice and is referenced in the ‘invoices\_line’ entity.
* The Foreign Keys ‘invoice\_seller\_id’ (sellers), ‘invoice\_cust\_id’(customers), ‘cust\_shipping\_id’(customers), ‘invoice\_sales\_id’(salespeople), and ‘invoice\_job\_id’(jobs) relate to their respective entities to print out the relevant information on an invoice.
  + ‘invoice\_job\_id’ can be empty if there is no contractual agreement involved
  + ‘invoice\_cust\_id’ and ‘cust\_shipping\_id’ will allow the invoice to handle two different addresses for billing and shipping

* The ‘invoice\_payment’ attribute is used to identify the number of days until payment is due and ‘invoice\_payment\_DD’ is used to print the exact day payment is due.

## Fields form – Invoices\_line

Database Name: ThinkCubeSales Revision: 3

Entity Name: invoices\_line Date: July 31st, 2020

Author: Adam Plater

|  |  |  |  |
| --- | --- | --- | --- |
| Field Name | Data type | Field Properties | Relates to |
| invoice\_number | Serial | Primary Key, Foreign Key | invoices.invoice\_number |
| invoice\_line | Integer | Primary Key |  |
| prod\_id | Char (5) | Foreign Key, Not Null | products.prod\_id |
| line\_quantity | Integer |  |  |
| line\_discount | Numeric (9,2) |  |  |

Notes:

* The invoices\_line entity is responsible for identifying the products ordered, the quantity requested of each product, and the discount applied to each product.
* The Primary Key ‘invoice\_number’ is also a Foreign Key from the invoices entity and lets us associate the products ordered with the corresponding invoice lets us identify each unique invoice and is referenced in the ‘invoices\_line’ entity.
* The Primary Key ‘invoice\_line’ is used to identify each line in the invoice.
* The Foreign Key ‘prod\_id’ relates to the products entity to uniquely identify each product.

* The ‘line\_quantity’ attribute is used to identify the number of each product ordered and ‘line\_discount’ is used to identify the price after discount is calculated.

## Fields form – Jobs

Database Name: ThinkCubeSales Revision: 3

Entity Name: jobs Date: July 31st, 2020

Author: Adam Plater

|  |  |  |  |
| --- | --- | --- | --- |
| Field Name | Data type | Field Properties | Relates to |
| job\_id | Serial | Primary Key |  |
| job\_description | Character varying (10000) |  |  |

Notes:

* The jobs entity stores each type of contractual agreement made between ThinkCube and a corporation or sales partner. An example would be how many license keys or support that ThinkCube must provide to a corporation.
* The Primary Key ‘job\_id’ is used to reference the job description when needed and to identify the contractual agreement to each invoice.

## Fields form – Products

Database Name: ThinkCubeSales Revision: 3

Entity Name: products Date: July 31st, 2020

Author: Adam Plater

|  |  |  |  |
| --- | --- | --- | --- |
| Field Name | Data type | Field Properties | Relates to |
| prod\_id | Char (5) | Primary Key |  |
| prod\_description | Character varying (60) | Not Null |  |
| prod\_price | Numeric (7,2) | Not Null |  |
| prod\_quantity | Integer | Not Null |  |

Notes:

* The products entity is responsible for identifying the products available to purchase, the products individual price and the running inventory for the products.
* The Primary Key ‘prod\_id’ allows us to uniquely identify each product available and is used in the invoices\_line entity to identify what products are being bought.

## Fields form – Salespeople

Database Name: ThinkCubeSales Revision: 3

Entity Name: salespeople Date: July 31st, 2020

Author: Adam Plater

|  |  |  |  |
| --- | --- | --- | --- |
| Field Name | Data type | Field Properties | Relates to |
| sales\_id | Char (4) | Primary Key |  |
| sales\_fname | Character varying (30) |  |  |
| sales\_lname | Character varying (30) | Not Null |  |

Notes:

* The salespeople entity allows us to uniquely identify each salesperson responsible for the transaction on the invoice by using the Primary Key ‘sales\_id’.

## Fields form – Sellers

Database Name: ThinkCubeSales Revision: 3

Entity Name: sellers Date: July 31st, 2020

Author: Adam Plater

|  |  |  |  |
| --- | --- | --- | --- |
| Field Name | Data type | Field Properties | Relates to |
| seller\_id | Char (6) | Primary Key |  |
| seller\_description | Character varying (60) | Not Null |  |
| seller\_address | Character varying (20) |  |  |
| seller\_city | Character varying (20) | Not Null |  |
| seller\_prov | Char (2) | Not Null |  |
| seller\_postcode | Char (6) | Not Null |  |
| seller\_phone | Character varying (15) | Not Null |  |
| seller\_fax | Character varying (15) |  |  |
| seller\_email | Character varying (50) | Not Null |  |

Notes:

* The sellers entity allows us to uniquely identify each ThinkCube location in Canada.
* Using the Primary Key ‘seller\_id’ we can identify the ThinkCube location in the Invoice.

## Fields form – Shipping\_details

Database Name: ThinkCubeSales Revision: 3

Entity Name: shipping\_details Date: July 31st, 2020

Author: Adam Plater

|  |  |  |  |
| --- | --- | --- | --- |
| Field Name | Data type | Field Properties | Relates to |
| invoice\_number | Serial | Primary Key, Foreign Key | invoices.invoice\_number |
| shipping\_provider\_id | Serial | Foreign Key, Not Null | shipping\_providers.provider\_id |
| ship\_date | Timestamp | Not Null |  |
| ship\_arrival\_date | Timestamp | Not Null |  |

Notes:

* The shipping\_details entity is responsible for identifying the shipping provider, the shipping date, and estimated arrival date.
* The Primary Key ‘invoice\_number’ is also a Foreign Key from the invoices entity and lets us associate the starting position of the package based on the ‘invoice\_seller\_id’ and to track the packages unique to the invoice.
* The Foreign Key ‘shipping\_provider\_id’ is used to identify the company responsible for shipping the package. Example: FedEx, UPS, Canada Post.

## Fields form – Shipping\_providers

Database Name: ThinkCubeSales Revision: 3

Entity Name: shipping\_providers Date: July 31st, 2020

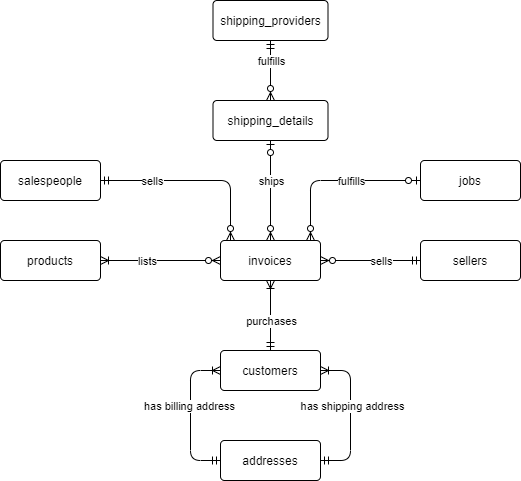
Author: Adam Plater

|  |  |  |  |
| --- | --- | --- | --- |
| Field Name | Data type | Field Properties | Relates to |
| provider\_id | Serial | Primary Key |  |
| provider\_description | Character varying (100) | Not Null |  |

Notes:

* The shipping\_providers entity is responsible for identifying the shipping providers that could be involved with the shipping process.
* Using the Primary Key ‘provider\_id’ we can identify the shipping provider.

# Basic ERD



# Physical ERD

