Edith Cowan University
CSG1207
Systems & Database Design
Assignment 1

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Contents

1 Task 1: Normalisation

Figure 1 below shows part of a spreadsheet used by a tavern which allows customers to book rooms for events and functions. Each row represents a booking.

Figure 1: Tavern Bookings

Booking #	Booking Date	Duration	Room #	Room Name	Room Capacity	Customer Phone	Customer Name
1241	12-08-21 18:30	4	3	Side Bar	15	0432514658	Sam Crocker
1242	12-08-21 18:30	4	1	Function Room 1	30	0432514658	Sam Crocker
1243	12-08-23 16:00	8	2	Function Room 2	50	0425748641	Joe Pardy
1244	12-08-24 17:00	5	2	Function Room 2	50	0485475265	Cameron West
1245	12-08-26 15:00	3	1	Function Room 1	30	0428654854	Jimbo Lawkins
1246	12-08-26 19:30	4	1	Function Room 1	30	0438924565	Pattie Forbes
1247	12-08-27 17:30	3	4	Garden Area	25	0425748641	Joe Pardy

1.1 Assumptions

- A room cannot have multiple bookings at the same time
- Auto-incrementing Customer# has been created, replacing CustomerPhone as customer identifier
  - Auto-incrementing identifier avoids user input error which may result in multiple customers with the same phone number
  - Allows CustomerPhone to be updated without having to update foreign keys if CustomerPhone remained as identifier
- BookingDate time element has been split into its own attribute
  - New attributes created called BookingTimeStart and BookingTimeEnd
  - Duration attribute is now derived, no longer stored on database
  - Allows system to check availability of room before a new booking can be created

1.2 0NF: Unnormalised form

R1 = (Customer#, CustomerPhone, CustomerName, Booking#, BookingDate, BookingTimeStart, BookingTimeEnd, Room#, RoomName, RoomCapacity)

1.3 1NF: First normal form

~~R1 = (**Customer#**, CustomerPhone, CustomerName, {**Booking#**, BookingDate, BookingTimeStart, BookingTimeEnd, Room#,RoomName, RoomCapacity})~~

R11 = (**Customer#**, CustomerPhone, CustomerName)

R12 = (**Booking#**, BookingDate, BookingTimeStart, BookingTimeEnd, Room#, RoomName, RoomCapacity, *Customer#*)

1.4 2NF: Second normal form

No partial dependencies, already 2NF.

R11 = (**Customer#**, CustomerPhone, CustomerName)

R12 = (**Booking#**, BookingDate, BookingTimeStart, BookingTimeEnd, Room#, RoomName, RoomCapacity, *Customer#*)

1.5 3NF: Third normal form

R11 = (**Customer#**, CustomerPhone, CustomerName)

~~R12 = (**Booking#**, BookingDate, BookingTimeStart, BookingTimeEnd, Room#, RoomName, RoomCapacity, *Customer#*)~~

R121 = (**Booking#**, BookingDate, BookingTimeStart, BookingTimeEnd, *Room#*, *Customer#*)

R122 = (**Room#**, RoomName, RoomCapacity)

1.6 Named relations

Customer = (**Customer#**, CustomerPhone, CustomerName)

Booking = (**Booking#**, BookingDate, BookingTimeStart, BookingTimeEnd, *Room#*, *Customer#*)

Room = (**Room#**, RoomName, RoomCapacity)

1.7 Physical E-R diagram

2 Task 2: Advanced normalisation

Figure 2 below depicts an invoice for an order from a store.

Figure 2: Pakoko Tax Invoice

Tax Invoice **Pakoko** *Tax Invoice*

112 St. Georges Terrace, Perth, WA 6000
Ph: 9325 2458 • **ABN:** 658475896

Invoice #: 24130
Invoice Date: 23-04-2012
Delivery Address:
52 Brook Street, Noranda, 6062, WA
Delivery Instructions:
Knock on side door not front door

Email: p.ford@gmail.com
Name: Patrick Ford
Phone: 0425874569

Item Code	Item Name	Cat. Code	Cat. Name	Cost (each)	Qty	Subtotal
SKU8789	Hunter x Hunter, volume 31	CMGN	Comics & Graphic Novels	$9.99	1	$9.99
SKU6927	Watchmen (Hard Cover)	CMGN	Comics & Graphic Novels	$29.99	1	$29.99
SKU3305	Final Fantasy Master Creatures - Kefka	AFIG	Action Figures	$34.99	1	$34.99
SKU6421	Serenity Movie Poster	PSTR	Posters	$9.80	2	$19.60
SKU3312	Final Fantasy Master Creatures - Ifrit	AFIG	Action Figures	$34.99	1	$34.99
SKU7899	Angry Birds 9" Plushies (Birds)	PLSH	Plush Toys	$35.00	2	$70.00
SKU7898	Angry Birds 9" Plushies (Pigs)	PLSH	Plush Toys	$25.00	1	$25.00
					Grand Total	$214.57

Thank you for shopping with Pakoko! Please see our return policy at www.pakoko.com.au/returns for any missing, incorrect or damaged items.

2.1 Assumptions

- Auto-incrementing Cust# has been created, replacing CustEmail as customer identifier
  - Auto-incrementing identifier avoids user input error which may result in multiple customers with the same email address
  - Allows CustEmail to be updated without having to update foreign keys if CustEmail remained as identifier
- Each item is only in one category
- Item codes are unique per item, even if the items are in different categories
- Invoice header and footer is static and is not stored in the database
  - Includes Pakoko business details header and thank you / return policy URL footer
- Derived attributes are not stored in the database
  - Includes Item Subtotal and Invoice Grand Total

2.2 0NF: Unnormalised form

R1 = (Cust#, CustEmail, CustName, CustPhone, DeliveryAddress, DeliveryInstructions, {Invoice#, InvoiceDate, {ItemCode, ItemName, CatCode, CatName, Cost, Qty}})

2.3 1NF: First normal form

~~R1 = (**Cust#**, CustEmail, CustName, CustPhone, DeliveryAddress, DeliveryInstructions, {**Invoice#**, InvoiceDate, {**ItemCode**, ItemName, CatCode, CatName, Cost, Qty}})~~

R11 = (**Cust#**, CustEmail, CustName, CustPhone, DeliveryAddress, DeliveryInstructions)

R12 = (**Invoice#**, InvoiceDate, *Cust#*)

R13 = (***Invoice#***, **ItemCode**, ItemName, CatCode, CatName, Cost, Qty)

2.4 2NF: Second normal form

R11 = (**Cust#**, CustEmail, CustName, CustPhone, DeliveryAddress, DeliveryInstructions)

R12 = (**Invoice#**, InvoiceDate, *Cust#*)

~~R13 = (***Invoice#***, **ItemCode**, ItemName, CatCode, CatName, Cost, Qty)~~

R131 = (***Invoice#***, ***ItemCode***, Qty)

R132 = (**ItemCode**, ItemName, CatCode, CatName, Cost)

2.5 3NF: Third normal form

R11 = (**Cust#**, CustEmail, CustName, CustPhone, DeliveryAddress, DeliveryInstructions)

R12 = (**Invoice#**, InvoiceDate, *Cust#*)

R131 = (***Invoice#***, ***ItemCode***, Qty)

~~R132 = (**ItemCode**, ItemName, CatCode, CatName, Cost)~~

R1321 = (**ItemCode**, ItemName, *CatCode*)

R1322 = (**CatCode**, CatName)

2.6 Named relations

Customer = (**Cust#**, CustEmail, CustName, CustPhone, DeliveryAddress, DeliveryInstructions)

Invoice = (**Invoice#**, InvoiceDate, *Cust#*)

InvoiceItem = (***Invoice#***, ***ItemCode***, Qty)

Item = (**ItemCode**, ItemName, *CatCode*)

Category = (**CatCode**, CatName)

2.7 Physical E-R diagram

3 Task 3: Entity-Relationship modelling

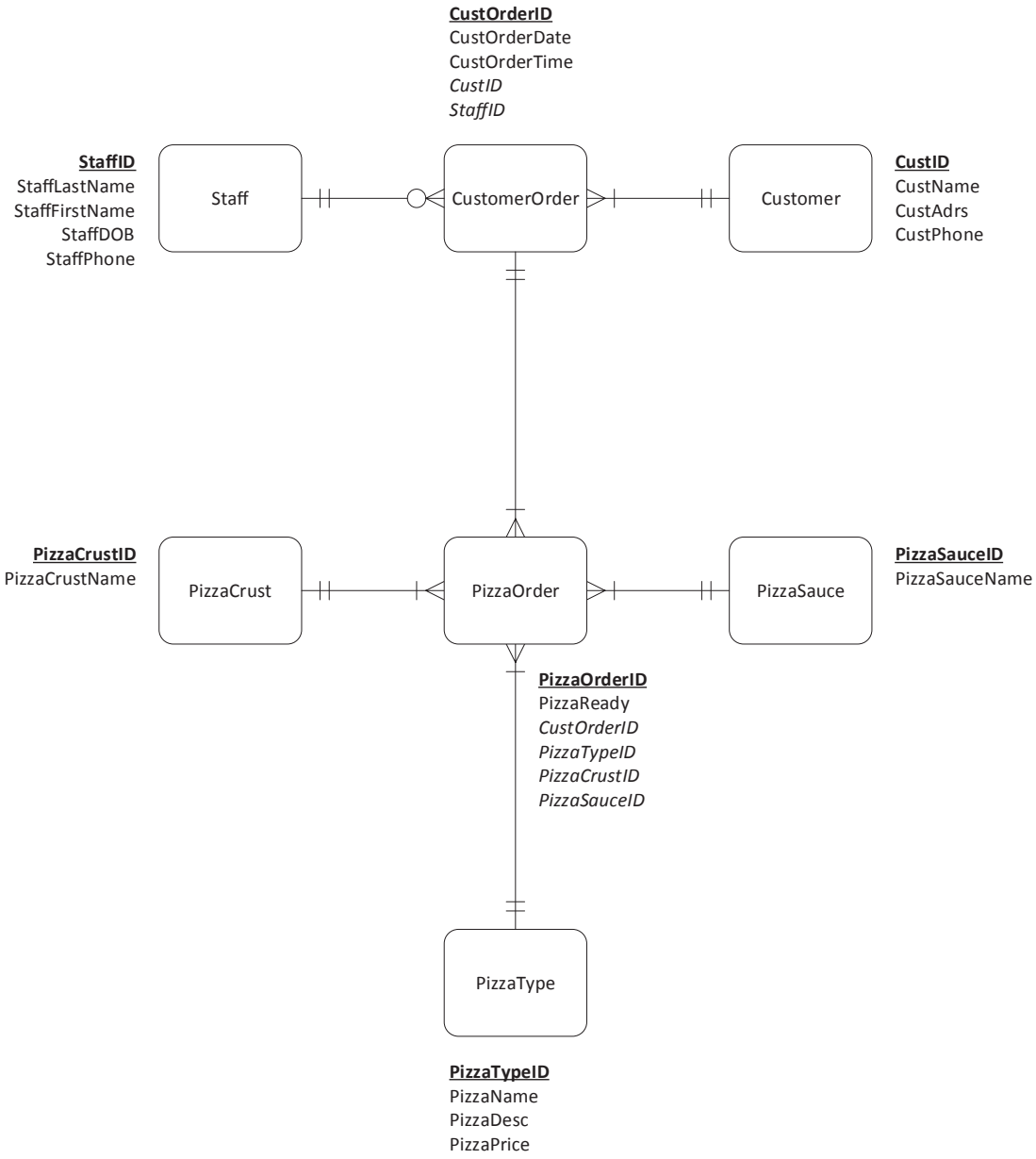
You have been hired to design a database system for a pizza store. The database must encompass the customers, staff, pizza details and the pizza orders made by customers.

3.1 Assumptions

- A customer must order at least one pizza to exist on database
- Some staff may not take any CustomerOrders
- A CustomerOrder must contain at least one PizzaOrder
- A PizzaOrder must include one PizzaType selection
- A PizzaOrder must include one PizzaCrust selection
- A PizzaOrder must include one PizzaSauce selection

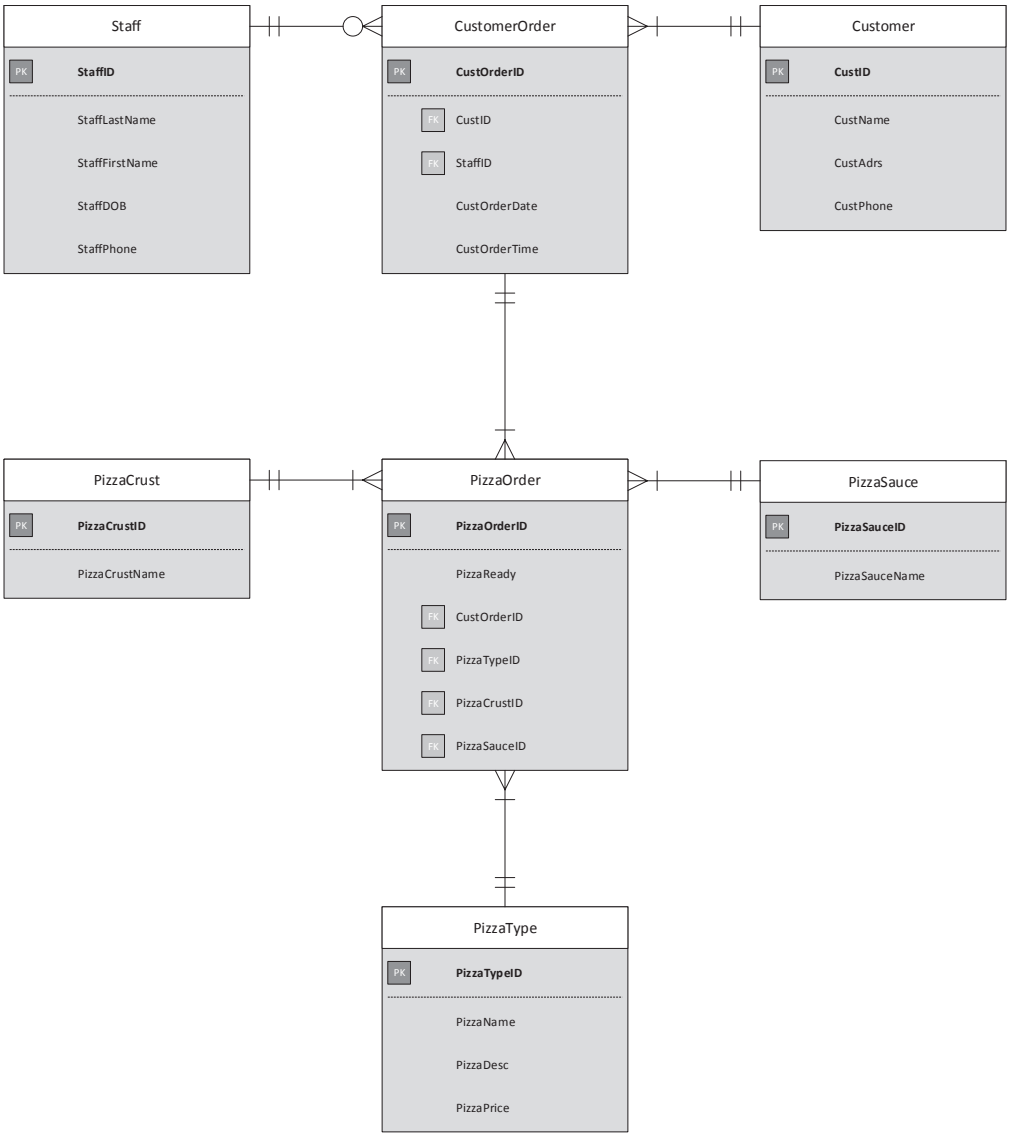
3.2 Logical E-R diagram

Figure 3: Pizza Store Logical E-R Diagram



3.3 Physical E-R diagram

Figure 4: Pizza Store Physical E-R Diagram



4 Task 4: Advanced Entity-Relationship modelling

4.1 Assumptions

4.2 Logical E-R diagram

4.3 Physical E-R diagram