Chapter 1: Model

A picture containing diagram

Description automatically generated

Chapter 2: Entities & Relationships

**2.1. Customer**

2.1.1. Meaning and key

The customer is the person who defines the attributes of the order and receives it. Every customer has its own primary key which is his or her id.

2.1.2. Relation and cardinality

One customer can request n orders. Many customers are serviced by one robot.

2.1.3. Textual description

Customer(customer\_id, fname, lname, city, bday, loyaltyp)

PK: customer\_id

**2.2. Order**

2.2.1. Meaning and key

The order describes the set of items ordered by a customer. The primary key of the order is a unique order\_id value.

2.2.2. Relation and cardinality

Many orders may belong to one customer. Many order iteams belong to one order.

2.2.3. Textual description

Order(order\_id, customer\_id, item\_id, robot\_id, order\_date, addloyaltyp, total)

PK: order\_id

FK: order\_id ◊customer\_id

FK: order\_id ◊ item\_id

FK: order\_id ◊ robot\_id

**2.3. Robot**

2.3.1 Meaning and key

There are several robots fulfilling different cyperphysical tasks. The robot\_id is the primary key for this instance.

2.3.2. Relation and cardinality

The interaction\_manager, which is a robot, is the single point of contact to the customer. There are many robots working in parallel on many orders to process customer orders.

2.3.3. Textual description

Robot(robot\_id, rname, rtype, rfunction, rlocation, rage)

PK: robot\_id

**2.4. Delivery**

2.4.1 Meaning and key

In order to ensure a working supply chain, the robots automatically reorder stock units which are ingredients that flow into sellable items.

2.4.2. Relation and cardinality

The stock\_manager which is a robot, orders many deliveries. Many deliveries refill many stocks of ingredients.

2.4.3. Textual description

Delivery(delivery\_id, stock\_id, ddate, vendor, damaount, dcost)

PK: delivery\_id

FK: delivery\_id ◊ stock\_id

**2.5. Stock**

2.5.1 Meaning and key

Stock represents the possibility to store ingredients which were gained through deliveries. The primary key is the stock\_id with a foreign key from the ingredient entity.

2.5.2. Relation and cardinality

Many deliveries are associated with many stocks. There is one stock object related to many ingredient objects.

2.5.3. Textual description

Stock(stock\_id, ingredient\_id, scurrent, snew, smaxcapa, slocation)

PK: stock\_id

FK: stock\_id ◊ ingredient\_id

**2.6. Ingredient**

2.6.1 Meaning and key

Ingredients such as potatoes or coca\_cola are the very core of purchased raw material which is transformed into food that is represented as order items. The primary key of an ingredient is the ingriedent\_id.

2.6.2. Relation and cardinality

Many ingrediencies are stored as one stock item. One order item consists of many ingredients.

2.6.3. Textual description

Ingredient(ingredient\_id, inname, incal, inalergic, incolor, intype)

PK: ingredient\_id

FK: ingredient\_id ◊ item\_id

FK: ingredient\_id ◊ stock\_id

**2.7. Order Item**

2.7.1 Meaning and key

An order item is a sellable beverage or food product which was produced by the robot as the robot transforms ingredients into order items.

2.7.2. Relation and cardinality

One order item consists of many ingredients. Many order items are part of one order.

2.7.3. Textual description

OrderItem(item\_id, ingredient\_id, itname, itsize, itcost, ithealthf)

PK: item\_id

FK: item\_id ◊ ingredient\_id

Chapter 3: Examples

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Customer** |  |  |  |  |  |
| customer\_id | fname | lname | city | bday | loyaltyp |
| 1094 | Heidi | Horten | Vienna | 01.05.33 | 3802 |
| 43 | Mohammed | Abdulla | Istanbu | 15.02.89 | 34 |
| 74 | Piere | La Croissant | Paris | 09.08.99 | 255 |
| 271 | Walter | Müller | Berlin | 27.09.79 | 38 |
| 92 | Ying | Su | Hong Kong | 29.11.96 | 288 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Order** |  |  |  |  |  |  |
| order\_id | customer\_id | item\_id | robot\_id | order\_date | addloyaltyp | total |
| 9251 | 1094 | 4 | 1 | 24.03.21 | 1 | 12,5 |
| 9252 | 43 | 2 | 2 | 24.03.21 | 2 | 22,3 |
| 9253 | 74 | 3 | 3 | 24.03.21 | 4 | 45,8 |
| 9254 | 271 | 9 | 4 | 24.03.21 | 0 | 9,6 |
| 9255 | 92 | 13 | 5 | 24.03.21 | 0 | 6,6 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Robot** |  |  |  |  |  |
| robot\_id | rname | rtype | rfunction | rlocation | rage |
| 1 | Joe | interaction\_manager | customer communikcation | 6182:1294 | 2 |
| 2 | Sandra | stock\_manager | ordering | 5762:3921 | 2 |
| 3 | Barney | burger\_chef | produce burger | 3123:5821 | 1 |
| 4 | Alice | drink\_mixer | produce baverage | 3789:7241 | 1 |
| 5 | Bob | fries\_expert | produce fries | 6256:8962 | 1 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Delivery** |  |  |  |  |  |
| delivery\_id | stock\_id | ddate | vendor | damount | dcost |
| 1254 | 23 | 24.03.21 | PotatoFarmer | 25 | 25 |
| 1256 | 21 | 24.03.21 | WholeFarmer | 3 | 6 |
| 1232 | 6 | 24.03.21 | DrinksDirect | 20 | 10 |
| 1212 | 33 | 23.03.21 | DrinksDirect | 40 | 20 |
| 1093 | 2 | 21.03.21 | WholeFarmer | 55 | 6 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Stock** |  |  |  |  |  |
| stock\_id | ingredient\_id | scurrent | snew | smaxcapa | slocation |
| 23 | 23 | 23 | 25 | 150 | 9182:9294 |
| 21 | 5 | 82 | 90 | 150 | 9762:9921 |
| 6 | 1 | 14 | 20 | 80 | 9123:9821 |
| 33 | 3 | 21 | 34 | 60 | 9789:9241 |
| 2 | 8 | 51 | 58 | 200 | 9256:9962 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Ingredient** |  |  |  |  |  |
| ingredient\_id | item\_id | stock\_id | inname | innalergic | intype |
| 3 | 4 | 23 | sparkwater | n | meat |
| 5 | 2 | 21 | potato | n | veggis |
| 5 | 3 | 6 | potato | n | veggis |
| 3 | 9 | 33 | sparkwater | n | drink |
| 8 | 13 | 2 | tomato | n | veggies |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **OrderItem** |  |  |  |  |  |
| item\_id | ingredient\_id | itname | itsize | itcost | ithealthf |
| 4 | 23 | cola | m | 2,5 | c |
| 2 | 5 | fries | l | 3,3 | c |
| 3 | 5 | wedges | s | 3,3 | c |
| 9 | 3 | soda | m | 1,8 | a |
| 13 | 8 | tomatos | u | 0,5 | a |