Quantum Informatics

Business Analysis

04.10.2018

–

Oliver O'Brien, Joeri Sprengers, Steven Zegers

Quantum Informatics

Geldenaaksebaan 335

Heverlee (Leuven), 3001

Contents

1. Contract

Quantum Informatics

CONTRACT

BETWEEN: Steven Zegers r0593798

Joeri Sprengers r0663695

Oliver O'Brien r0606606

WHERE AS, the team will work together under the agreed terms in order to complete the OSA-project. Violations of these terms will be punished by one of the penalties that have been agreed on further in this contract. Refusing to perform said punishments will be met with a low score on the peer-assessment.

TERMS OF AGREEMENT:

These terms apply to the upcoming services. These terms cannot be changed unless the contract receives an update and gets signed by all members.

- This agreement will start on the date it has been signed by all the parties.
- The contract will end once the assignment has been finished.
- Every student will always meet the deadlines given by the leader and time manager, under special circumstances the person who may not make the deadline has to notify the other members in time.
- Facebook, Discord and Google Docs will be used as main communication tools.
- Failure to meet promises that have been made will be met with appropriate punishment as stated below.
- Infighting that can't be solved by the group itself will be met with a custom court session at the end of the next class of OSA with mrs. Barrezeele as judge.
- Everyone needs to attend every practicum lesson or when you are not there because of ailment you need to tell everyone on osa that you won't attend the practicum lesson.
- Failure to meet the deadlines that have been made will be met with appropriate punishment as stated below.

GROUP ROLES:

- Joeri Sprengers: team leader and communication manager, the main person in charge who will look after the general progression of the assignments and make sure everybody knows what is expected of them at all times.
- Steven Zegers: time manager, make sure appropriate deadlines are set for each assignment so the team members don't become swamped with work at any time
- Oliver O'Brien: quality manager, make sure that standards are met, motivate the team members to give their 100% for the assignment.

FEES AND PAYMENTS:

- The payment received for the completion of the project will be equally divided by the team members.
- Any team member who violated the contract, and thus received a bad peer-assessment, will not receive payment.
- You won't be paid with money. Deal with it.

RESOURCES:

Facebook, discord, Visual Paradigm and ArgoUML will be used for communication and the creation of diagrams

FAILURE TO MEET AGREED TERSMS:

- One violation of the terms will receive one punishment.
- The week before the end of the project, any violation of the terms of agreement will be met with 2 punishments.
- The rest of the team will decide the punishment of the violator.
- Only the punishments mentioned next can be chosen.
- Punishment 1: The violator of the terms will buy coffee (or any other drink a member would prefer) for the whole team.
- Punishment 2: The violator of the terms will buy chocotoffs for everyone in class.
- Punishment 3: The violator of the terms will buy lunch for the whole team
- Punishment 4: The violator of the terms will sing a song right before next class.

TERMINATION:

- Any member can stop taking this course, in which case the contract will no longer apply to them.

- Any member who stopped taking the course will hand over everything they worked on regarding the project, if this has not already been done.
- Ending the contract will mean the student will not receive payment.

IN WITNESS WHEREOF, the parties execute this Agreement starting by the date of signature.

Date of signature: ____/____/_____

Steven Zegers R0593798 Signature:

Joeri Sprengers R0663695 Signature:

Oliver O'Brien r0606606 Signature:

2. Business Analysis

1. The business

Colruyt is a multi-venue, family-business supermarket based in Belgium, that focusses on being the most accessible and provides the best products for the lowest price. The company is the most highly-rated in Belgium and has the full support of its stakeholders, something they take pride in. They strive to be environmentally clean which is also something we will take into account when it comes to our business.

AS-IS: A customer goes to the shop, browses the aisles and grabs the items they need. The person has to spend some time walking around the store. When the person has everything they need, they proceed towards the cash register to purchase their goods. Often times, primarily towards the early evening, there an increase in customers. Thus, the waiting time at check-out increases as well. This is often very inconvenient; the employee is pressured and the customers irritation rises. This can be streamlined by implementing a web-shop, where the customer can select their products online and come and collect it and leave. Collect&Go (C&G), if you will. There are a lot of shops available on the internet to order your products which lead to some customers requesting Colruyt to open a web shop of their own.

2. The stakeholders

- Trade unions/civil society groups: protect the rights of the employees and the community
- Investors: they want to make sure their investment is used well and expect a return said investment.
- Employees: They would want an acceptable work-load.
- Community: A less busy shop improves community rating and trust. Higher trust means increase in use.
- Government: Colruyt is important for the economy of the country and the well-being of the habitants
- Families of the employees: the families of the employees are dependent on the wage of the employee and can also influence the decisions of the employee (for example if they settle in a new place)
- Competitors: the competitors and Colruyt are inter-dependent, they influence each other's decisions (for example the prices of products)
- The bank: an increase in customer use will result in an increase of bank-balance. Which provides the banks more opportunities to invest in their own projects.

3. The PIECES framework

Performance:

- Customers sometimes go to the shop but don't know if the product is available, the web-shop on the other hand will always have an up to date overview of the available products. An easy to use overview on the web-shop will be a solution for this.
- Collect&Go: long queues in the stores and collecting stuff yourself is time consuming, this will be partly solved by our web-shop as there will be less customers at the cash registers and customers can collect their order without having to collect every item their self in the shop.
- Most customers don't know the location of all the products in the shop so they end up searching through multiple aisles to find certain products which leads to a waste of time, this can be solved by ordering on the web-shop as your products will be ready for you to collect in one spot and searching for items is really easy.

Information:

- On the web-shop it's easier to provide the customer with extra information about sales and promotions that are currently ongoing. This means that the web-shop will make it easier for customers to find the on-going sales and promotions.
- After surveying customers, we noticed that they would like some extra information about products, especially the ones that are not as well-known. We can more easily provide this extra information about the product on the web-shop.

Economy:

- For companies there is always the opportunity of expanding its client base. The web-shop will attract extra customers because the web shop is very flexible and good for people who don't have a lot of time.

Control and security:

- By carefully monitoring new members and making sure their credentials are correct it will be easy to supervise the new orders and make sure that all the orders are correctly paid for. In the physical shop there is a bigger chance of items being stolen.

Efficiency:

- Feedback is more easily given online than in person, customers can simply rate a product with a "star system" to let other customers know whether the product is good or not. The introduction of a "star system" will make it easier for Colruyt to collect data about which products are highly rated by customers and thus have a high chance of being ordered.

Service improvement:

- The web-shop gives the opportunity to shop in a different way, if people don't have as much time they can just shop online and choose a collection time which is suitable for themselves. This will solve the struggle for busy people that sometimes don't seem to find the time to physically go to the shop.

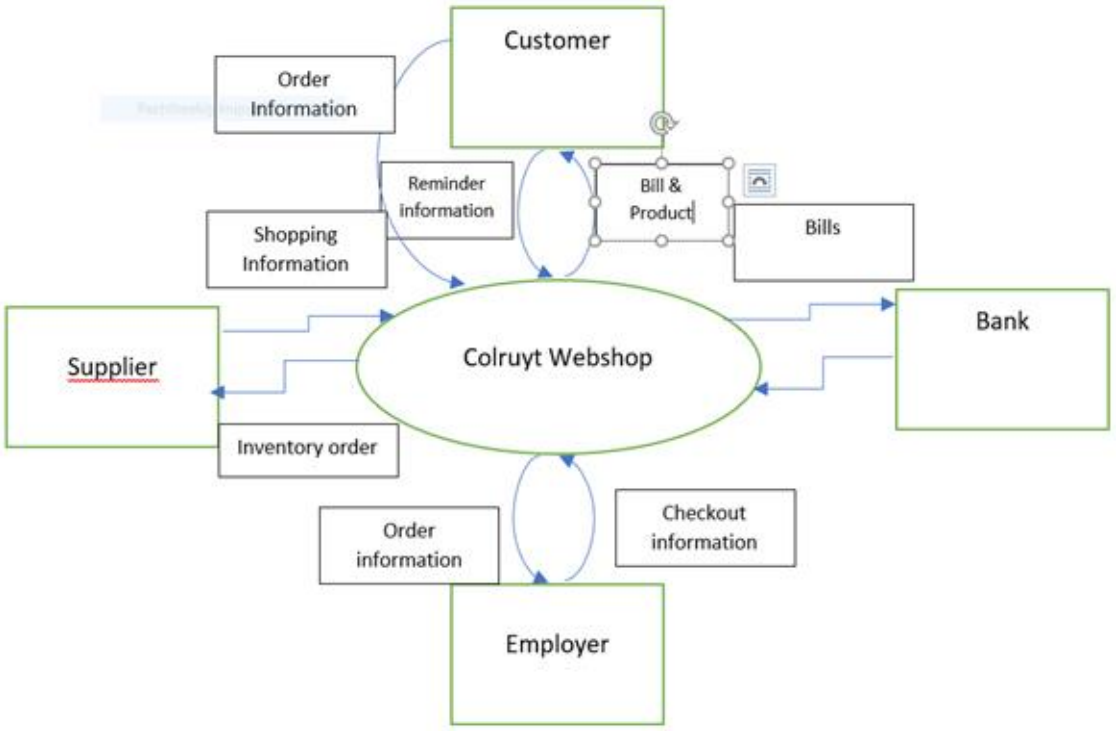
4. The business events

Recap: a business event is something that happens in real world at some moment in time and your business has to respond to or something that is triggered by time

- MEMBER[1] checks out their order
- MEMBER modifies their order
- MEMBER deletes their order
- MEMBER collects their order
- WEB TEAM adds product to web shop
- SUPPORT handles the return of items
- WEB TEAM adds promotions to certain items
- SUPPORT resolves questions by members
- STOCK MANAGER creates overview of packages yet to be collected
- COLLECT&GO EMPLOYEE packages the order at the shop
- COLLECT&GO EMPLOYEE handles the payment and transfer of goods at the shop
- DATA ANALYST creates sales report of past month
- MEMBER asks question
- MEMBER collects order

[1] A member is our definition of a customer online. They are people with a membership to our Colruyt group. When we use the term "customer" we use it as a blanket-term referring to both the member and the customers in the physical shop.

5. Context diagram



6. Business use-cases

- Checkout of order
  The business receives the order, contacts the selected store. Which in turn contacts an employee to collect all the items of the order for the member to collect at the specified moment.
- Add item to order
  The member adds an item to their order, web-shop sends confirmation and adds item to order-list.
- Delete item from order
  The member removes item from their order, web-shop removes item from order and sends confirmation.
- Add product to web-shop
  The web-shop adds a new product, sends notifications to email-addresses of members who have chosen to get these sorts of updates.
- Handle the return of items
  Member returns purchased product, Employee checks the state of the product. If the product is damaged then sends the member a notification. Else returns to the shop and updates the web-shop.
- Add promotion to certain Items
  Business updates product to reflect the promotion promise.
- Stays aware of the contender prices
  Receives notification on contender prices of certain articles. Alters prices to compete.
- Resolve questions posed by members
  Q&A Employees receives questions from member. Employee files and replies with a short but concise response.
- New members register themselves on web-shop.
  People register themselves, Business retains member information.
- Stock runs low
  Business is notified by low stock of certain items. Business notifies stock-warehouses. Stock-warehouse possibly contacts producers if their stock is too low.

7. TO-BE Situation

Because of the high demand in our services, customers frequently have to deal with traffic within the shop (primarily at the checkout stations). After surveying customers and careful analysis of customer data. We have noticed a steady growth of customer visits. If this trend continues, our throughput of customers will not be able to handle the increase and customer satisfaction will decrease. After recent polls we have come to the conclusion that customers already suffer with the current traffic. We also have uncovered recently an increase in customers wanting to view which products are available.

As a solution we decided to open a web-shop. A to-be member could browse the wares found in our stores. They would be able to see the prices and active promotions. The user would be able to register themselves, becoming a member of the Colruyt family. Only then would the user would be able to add items to their virtual shopping cart[2]. As soon as the member has selected all of the wares they require, or desire, they can then choose the date when they would come to collect their wares (at least one day later). Then they select one of the many Colruyt stores as collection point (using the address, linked to the member's account, we would show the nearest stores). First only a select few stores will be available, though gradually each store will have a Collect&Go collection point. The member will be able to pay online or in the store (payment by bank transfer only). The order is then sent to the designated store. On the selected day, the order's items are collected and made ready for the member to collect. The member can collect their order any time after their selected time of day. If the order is not collected on the chosen date, a warning message is sent to the member. When the order has not been collected by the next day, the order is canceled and the member is notified. If the member fails to collect a few times, they are blacklisted.

For this improvement we will have to designate and construct, per store, an area as well as a specific employee to assist the member. This is a small expense for the gains that will improve our income. Improved familiarity, increase in customer trust and satisfaction, a new source of income and decrease in labor costs are but a few of these gains.

The web-shop itself will be a well-structured and organized website, while simultaneously having a high ease-of-use. The web-shop will also be deployed on multiple servers, if one server fails, we will still have another to fall back upon. It will also require a database to hold all the information about the products, our members and all purchases made. The maintenance of the database will be outsourced.

Analyzing this data, we could see the demand of products. With this data, and the data from the stores we can design our wares to meet member desires. Using the addresses of our members we can designate areas where our stores are frequently used. This data would be used to locate primary targets for satisfaction maintenance. Where Colruyt and Collect & Go services are used

[2] We use the term "shopping cart" here, as well as throughout the document, as a reference to the state of the order, "being ordered". For readability sake, we find it apt to use the term instead of the name of the state.

the least will also be acquired through this data. With this information, we could derive where we need to improve our commercial effort and representation.

3. Requirements Model

1. The scope of this project

Out of scope:

- Local shop is not part of the scope, since it has already a functional method of operation. It has no effect on the development of this project.
- Resupplying low-in-stock products, this operation is provided for by the shop.
- Financial transaction with the bank.
- Managing the item price
- Creating promotions

In scope:

- Process of Collect&Go:
  A person can browse the web-shop and view which products are available in the shops. A member, a person with a membership, can add items to a cart. When the member is satisfied, the member proceeds to a review of the selected items. If the user confirms their cart the member then choses the method of payment, collection date and time and store. The member can only collect the earliest a day later. They can only pay by transfer, online or in the selected store.
- Create account:
  This is required when people want to order their products, they need to create one, and become a member. The person must fill in their name, sir-name, email address, confirm the email address, their address (street, number, postal-code, city/town) telephone number, password, confirm the password and agree to the terms and services.
  When all required information is given and is validated, then the user gets an email to confirm the registration. After the user gets designated a membership number and their membership card is sent to the given address.
- Member creates order:
  Here the member creates their orders. A person can view products on the web-shop, only if they sign in, using their membership-card number and their password. Now the person is known as a member. The member can then select required items, and its desired amount, putting it in their virtual web-cart. The member can also deselect items in their cart, removing it, or change the amount of the item. Once the desired items are selected; the member is shown an overview of their cart, where final alterations might be made. A satisfied member that has an order that contains items then selects a shop from a map, displaying the closest collection points, and a collection time which is at least one day in the future. The member proceeds to select if they pay via transfer or pay, only by credit/bank card, as soon as they collect the order within the shop.
- Member collects order:
  When the orders are ready, they can collect them at their designated Collect&Go point. The

C&G employee handles the payment, and hands the purchased items to the member. The C&G employee then confirms the order as handled.

- Collect&Go employee collects products of order:
  At the beginning of the day the C&G employee has a list of all the orders that will be collected that day, in chronological order. The employee then collects all the order's items from shops wares and prepares orders for collection. We need to know who collected the order if errors
- Support employee handles returned items:
  if an item is not what the member ordered or is in a faulty condition. When returned then he handles the returned items. This is confirming if the members return claim. If so, then returning the item to stock as well as providing the correct or functional item in its place.
- Data analyst creates sales reports of web-shop:
  A data analyst acquires the data from the web-shop. The data is analyzed to view which products are in higher demand on the web-shop, which customers tend to use the C&G service more often, from which areas in Belgium our customers come from and which areas are low in customer density. This information is used to, for example, find out which products would get specific promotions and which should be commercialized more. Another application of this sale information would be that we would find out which areas the marketing department would apply more focused commercialization.
- Member can block their membership card:
  If a member loses their card or it has been stolen a user can block their card. The member logs on the website and choses the option block membership. The user then gets a new membership number and a new card will be produced and sent to their address.
- Web-team adds items to the web-shop:
  The web-team gets an overview of all the products to be added to the web-shop. An employee then adds all the information (name, price, photograph, tags, etc.). The new items get displayed on the "New page".
- Web-team changes availability status of item:
  A web-team gets a list of items which are no longer available. An employee then changes the state of the item to "unavailable". The item is no longer shown on the web-shop.
- Adding existing promotions to items:
  When certain items have a low sale report, we have to combat this trend by adding promotions to create product demand. Thus items will get certain promotions such as "2+1 free".

2. The functionalities

- Person registers an account and becomes a member
- Person can get an overview of the products and promotions
- Member can place an order
- Member can modify their order (add/remove)
- Member collects their order
- Support handles the returning of items (process)
- Collect the order products (Collect&Go employee?)
- Collect&Go employee handles the order at the shop

- .Data analysist retrieves data of monthly sale-reports
- Collect&Go employee is notified if a change in an order occurs
- Web-team adds promotions to certain items
- Web-team adds new items to web shop
- Web-team changes the availability of an item
- Member can block their membership card

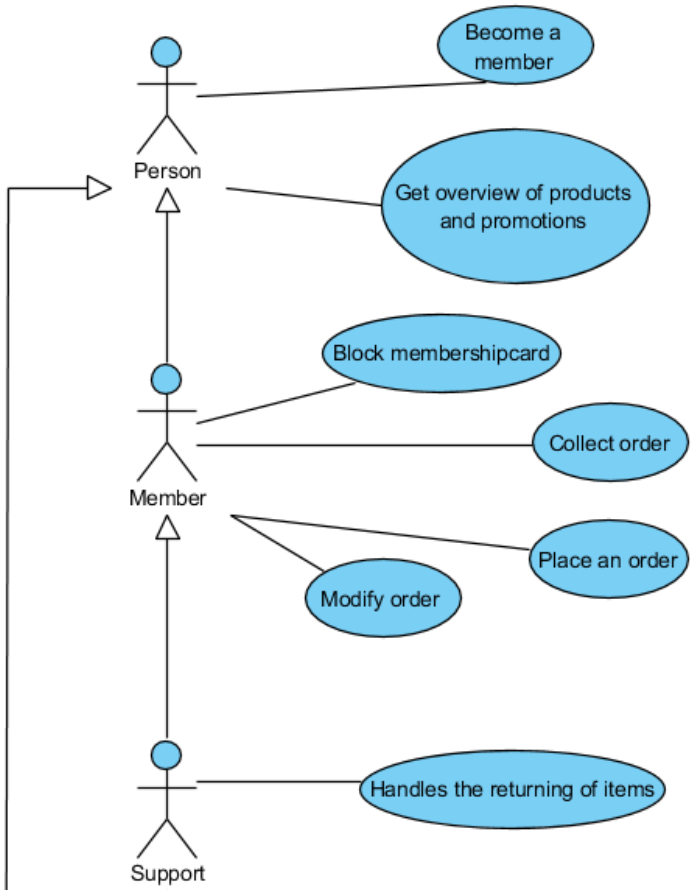
Support inherits from member, Collect&Go employee inherits from support

Member <- support <- Collect&Go employee

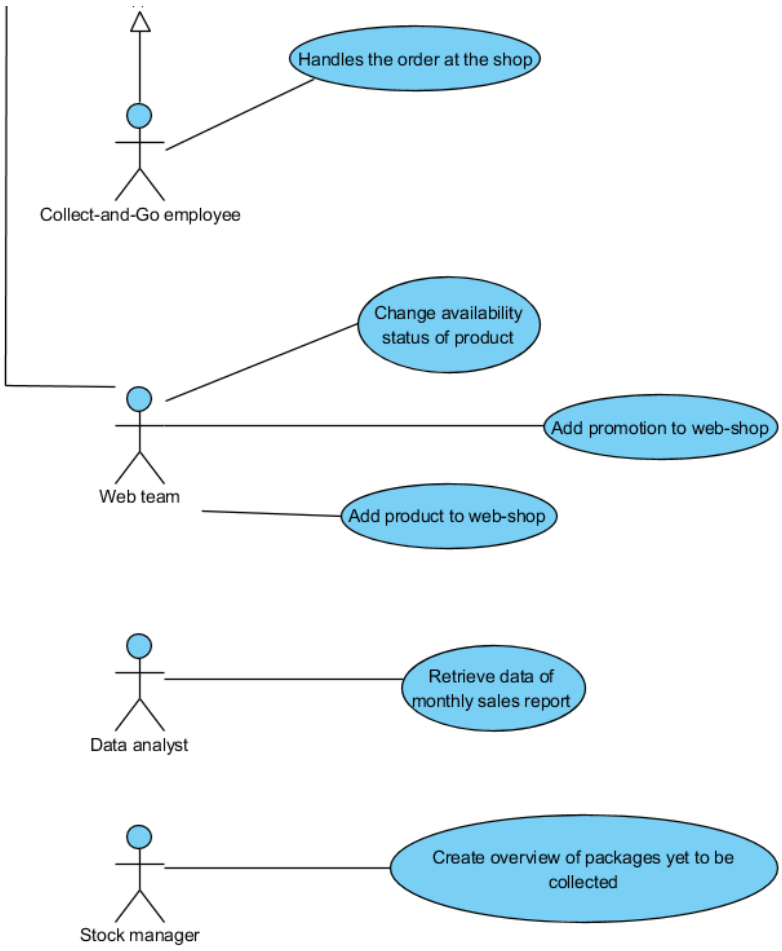
3. The actors

- Member
- Collect&Go employee
- Support employee
- Web team
- Marketing representative
- Stock manager

4. The use-case diagram



(continues on next page)


Handles the order at the shop
Collect-and-Go employee
Change availability status of product
Add promotion to web-shop
Web team
Add product to web-shop
Retrieve data of monthly sales report
Data analyst
Create overview of packages yet to be collected
Stock manager

5. Use-case descriptions

Name	Person becomes a member
Summary	Person signs up, creates an account on the web-shop and becomes a member
Actors	Person
Precondition	None
Scenario	Person fills in the webform, if the person does not enter any of the required information or enters a phone number or e-mail that is not in the correct format -> exception 1 If the person is already a member -> exception 2 Otherwise the person presses the submit button and becomes a member
Exceptions	1: Person gets an error message that he has filled in incorrect information and that he has to fill in the form again with correct information 2: Person gets an error message saying that an account for this e-mail address already exists
Postcondition	The person is now a member and has a web-shop account

Name	Person can get an overview of products and promotions.
Summary	Person can look at the different products available on the web-shop
Actors	Person
Precondition	None
Scenario	Person browses the web-shop and can look at the descriptions of all the items and the available promotions to see if they are interested in buying or which products are available.
Exceptions	None
Postcondition	Person can continue to browse the web-shop or add items to their order

Name	Member places an order
Summary	Member has selected a few items and places the order
Actors	Member
Precondition	Member has items in their shopping cart

Scenario	When the member has added everything they desire, they can proceed to the check-out. The member then choses their collection point and time. The member can only select times when the stores are open. The member is given the option to either pay now, with a transfer, or pay in the selected collection point. If the member choses to pay by transfer the member fills in their bank information. If the given information is invalid, no such bank account is found with the given bank account number and the expiration date -> exception 1 If an error occurs during the transfer process, due to an error between the bank and the system -> exception 2 The member then is redirected to the transfer page of their bank, they use their required payment method (this is bank specific, thus out of scope) If insufficient funds are available -> exception 3 If everything goes correctly the order will be placed and the money will be transferred from the member to the company's bank account.
Exceptions	1: The member will be redirected to the order page with an error stating that no account has been found with the information given 2: The member will be notified of this and taken back to the order page. With an error stating that an error has occurred, to try again later, a notification has been sent to the IT support and that the cart details have been saved for future attempts. 3: The member will be redirected back to the transfer page with an error stating that they possess insufficient funds.
Postcondition	Order is placed and forwarded.

Name	Member can modify their order (add/remove)
Summary	Member can remove or add more items to their order
Actors	Member
Precondition	None
Scenario	Member selects an item and quantity to add to their list -> exception 1

	The quantity can only be numerical -> exception 2 If the member has items in their list they can remove an item from there
Exceptions	1: quantity is less than 0, an error message will be shown and the item won't be added. 2: An error message is shown; the item is not added.
Postcondition	The item will either be added to the order or deleted from it

Name	Member collects their order
Summary	Member can get their order from the collection point
Actors	Member, Collect&Go employee
Precondition	None
Scenario	Member asks the Collect&Go employee to collect their order. If there is no order for this member that hasn't been collected yet -> exception 1 If there is an order for this date and time by this member the order will be handed over -> exception 2
Exceptions	1: Collect&Go employee notifies the member that no such order has been placed for collection on the current date and time. 2: order has not been paid for, the member will be asked to pay by card.
Postcondition	The member can go home with their order. The order is marked as complete.

Name	Member can block their card
Summary	If a member loses their card or it is stolen, the user can block their card
Actors	Member
Precondition	None
Scenario	A member has an option to block their membership card. The member is directed to a page asking for confirmation if they really want to block their card. If accepted, the user's card is then blocked. A

	new membership number is given to the member, an email with a temporary card is sent to the member. A new physical card will be sent to the members address.
Exception	None
Postcondition	The member can continue to shop with the temporary card.

Name	SUPPORT handles the return of items
Summary	Unsatisfactory products are returned to the C&G point, Support handles the process as is expected.
Actors	Support, Member
Precondition	Member opens an issue with support to for the return of the items
Scenario	Member returns a product that does not meet expectations -> exception 1 Support confirms members complaint and returns product to suppliers
Exceptions	1: Product is damaged by member or complaint does not meet standards
Postcondition	Member exchanges for product that meets standards or is reimbursed.

Name	Collect the order products
Summary	Collect&Go employee collects the ordered products and packages them
Actors	Collect&Go employee
Precondition	Order is placed by member
Scenario	Collect&Go employee receive products of members and set these ready for them.
Exceptions	none
Postcondition	After that he can do other work

Name	Collect-and-Go employee handles the order at the shop
Summary	Collect-and-Go employee helps the member collect their order at the collecting station
Actors	Collect-and-Go employee, member
Precondition	None

Scenario	The member goes to the shop to collect the items they ordered on the web-shop -> exception 1 Otherwise the member will collect the complete order, if the order has not been paid for online it can be done at the collection station
Exceptions	1: the product was not in stock, the collect-and-go employee notifies the member which of his products weren't in stock and tells the member a date when his products will be available
Postcondition	Member has collected his products and the order is deleted from the yet to be collected list

Name	WEB TEAM adds product to web shop
Summary	New product item is made available on the web-shop
Actors	WEB TEAM
Precondition	None
Scenario	Colruyt makes a new product available. Web team gets a list of all the new products. They proceed to add the products on the web-shop.
Exceptions	None
Postcondition	Web team maintains the products information

Name	Web team adds promotions to certain items
Summary	A promotion is added to one or more products on the web-shop
Actors	Web team
Precondition	None
Scenario	A certain product on the web-shop has a promotion for a certain amount of the time. The web team will be notified by Colruyt which items need to have a promotion added to them -> exception 1 The web team will add the promotions in the correct places
Exceptions	1: the item already has an active promotion, the web team will update it accordingly
Postcondition	The promotion is added to the item, if a member orders the item the promotion will be accounted for in the order

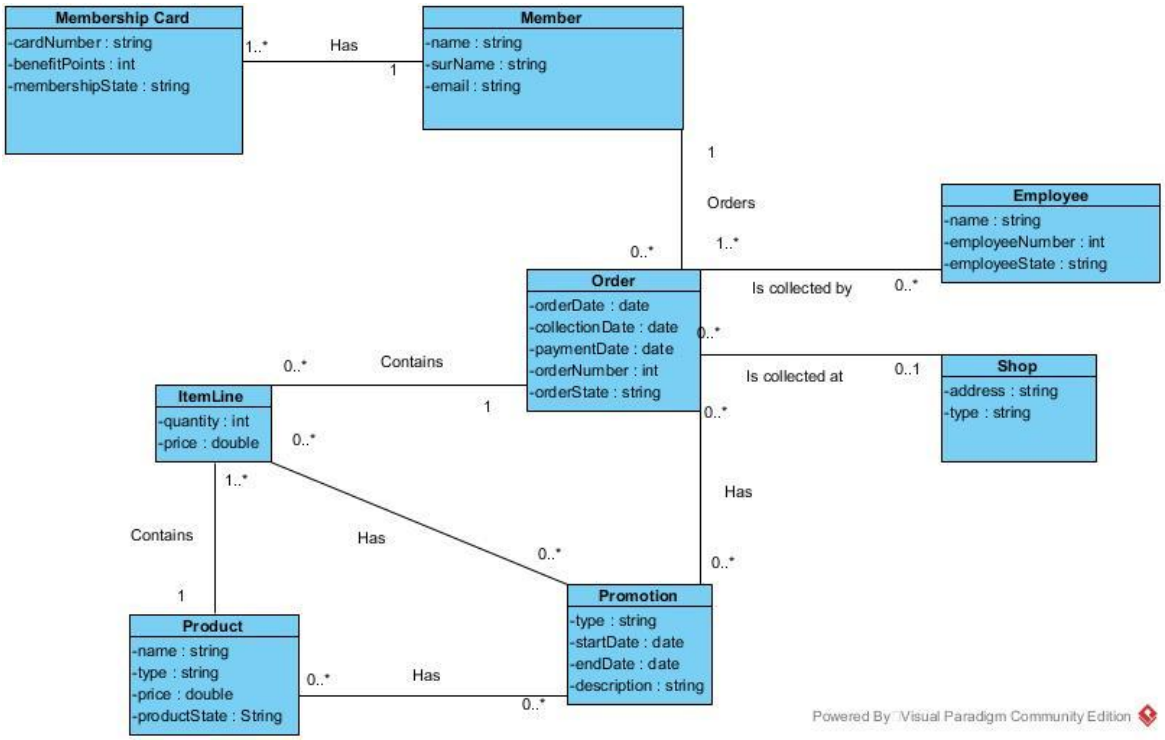
Name	STOCK MANAGER creates overview of packages yet to be collected.
Summary	Overview is made for that day's orders
Actors	Stock manager
Precondition	None
Scenario	Stock manager gets the overview of that day's orders, and re-arranges them to fit the schedule. If there are no orders that day -> exception 1 Passes that information to the Collect&Go employee of the day.
Exceptions	1: The employee works in the store instead.
Postcondition	Updates the C&G employee if any updates occur

Name	Marketing representative retrieves data of monthly sale-reports
Summary	The marketing manager receives data of how well the web-shop is doing
Actors	Marketing manager
Precondition	None.
Scenario	At the end of the month, the marketing representative acquires data on use of web-shop and of which products are purchased more often
Exceptions	Not applicable
Postcondition	Data is used to update prices and stock

Name	Web-team changes the availability of and item
Summary	If an item becomes unavailable, the web-team needs to remove the item from the web-shop
Actors	Web-team employee
Precondition	Item becomes unavailable
Scenario	If an item becomes unavailable, the web-team is notified. The item is set to unavailable.
Exception	None
Postcondition	The item is no longer available on the web-shop and cannot be found

4. Business Model

The class diagram



The model dictionary

Product:
All the products that are available in the web-shop. One or more of these products (item line) can be ordered from the web-shop by adding them to their order and checking them out. Promotions can apply to certain items.

Item line:
The item line is the combination of the amount and product that is being added to their order since it is possible to order more than one instance of a product at a time. It is possible that a promotion is added to a specific item line (for example if you buy at least three of a certain product then you get a fourth of that product for free).

Promotion:
A promotion is an activity to advertise certain products or combinations of products.

There are different kinds of promotions of different magnitudes. Firstly, a promotion can be applied to a certain product, this means that the price of this product will be lower for a certain time period. Secondly, a promotion can be added to a certain item line, this means you get some sort of benefit by ordering more than a certain amount of a product at once for a certain time period. Lastly, a promotion can be added to an order, this means that when an order exceeds a certain total price that a promotion will be activated.

Order:
This is a list of item lines, see above, that the member has selected. The order has many states. When the member is browsing the items on the web-shop, selecting what they desire, the order has the state “being ordered” (as mentioned, this is referred to as a “shopping cart”). When the order has been confirmed by the member, it has the state “ordered”. When an employee is collecting the order, it is “being collected”. When that process is complete the order is “ready”. After the member has come to collect, we refer to the order as “collected”.
The order contains data such as when it has been placed, collected and payed as well as the status mentioned above

Employee:
This is the employee who handles the order in the shop, the important new we keep is his name and surname. So, we can see if there were things done wrong during the handles process.

Shop:
This is the shop where the member can get his order. We keep the address and name of the shop. For example, if they collect it from a sub business like okay.

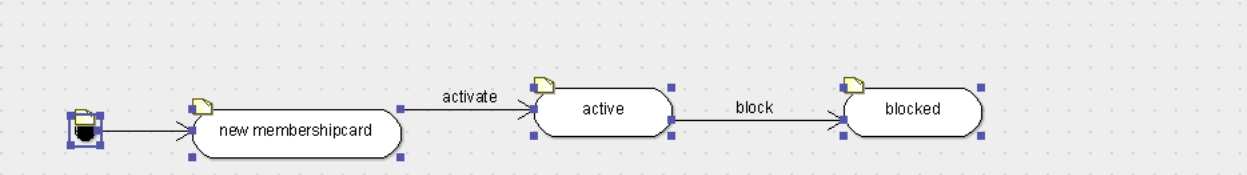
Membership card:
Each member has a number designated to their membership. The membership contains the members points that the user accumulated, which they can use to get certain benefits. If a member loses their membership card, they member will get a new card while the other becomes void.

Member:
This a person, who has a membership. This gives the member more functionalities. When logged on, this person can, when satisfied with the content of their order, confirm their shopping cart, process the purchase details and create an order.

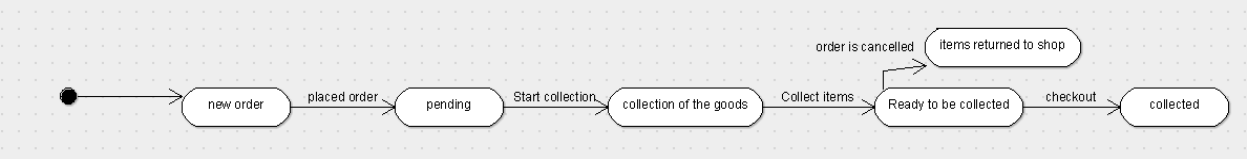
5. Dynamic layer

1. State diagram: name class

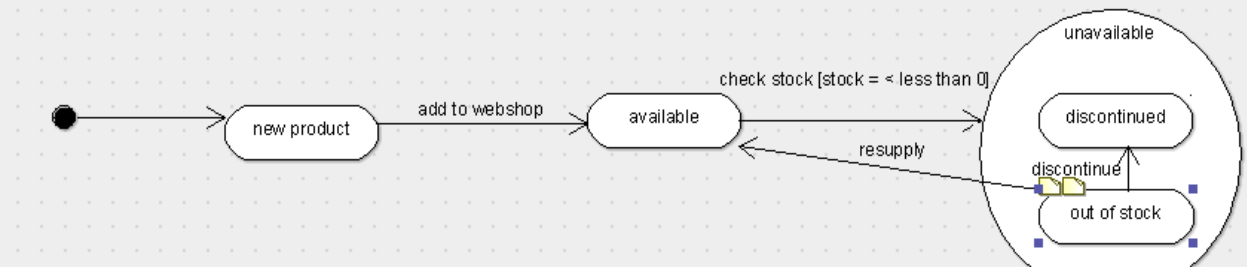
Membership class



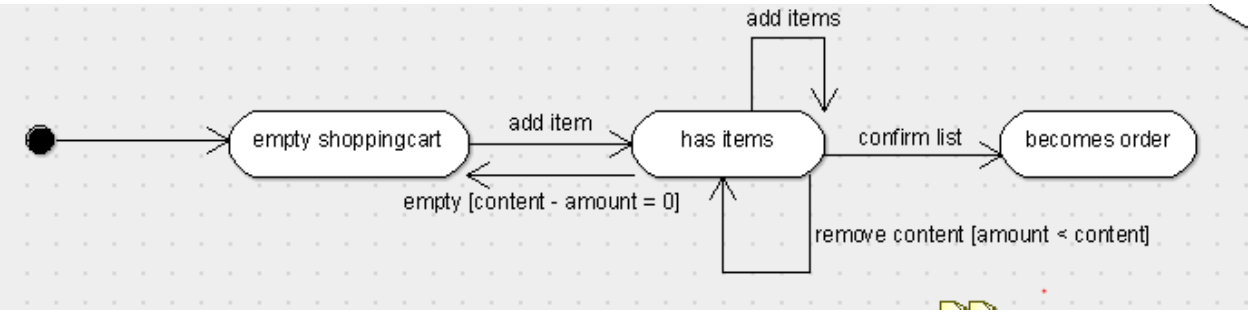
Order Class



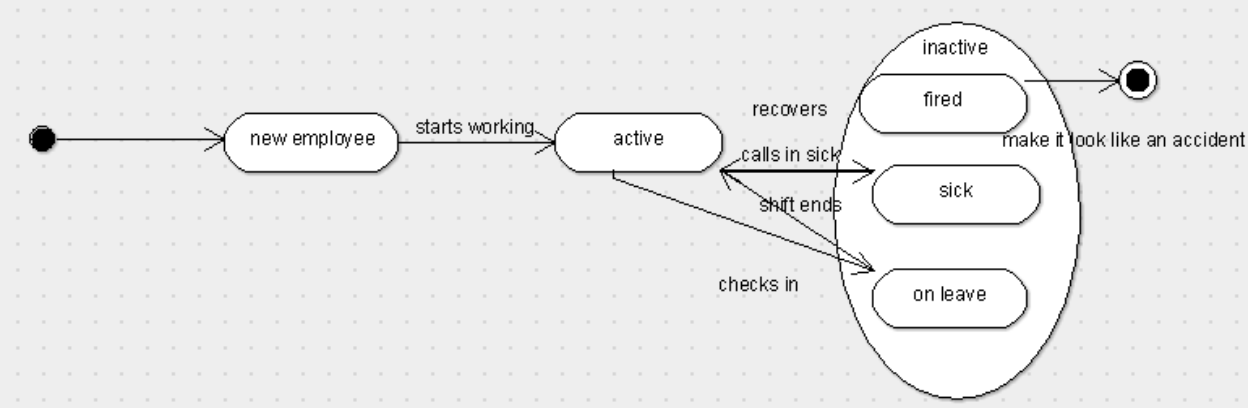
Product Class



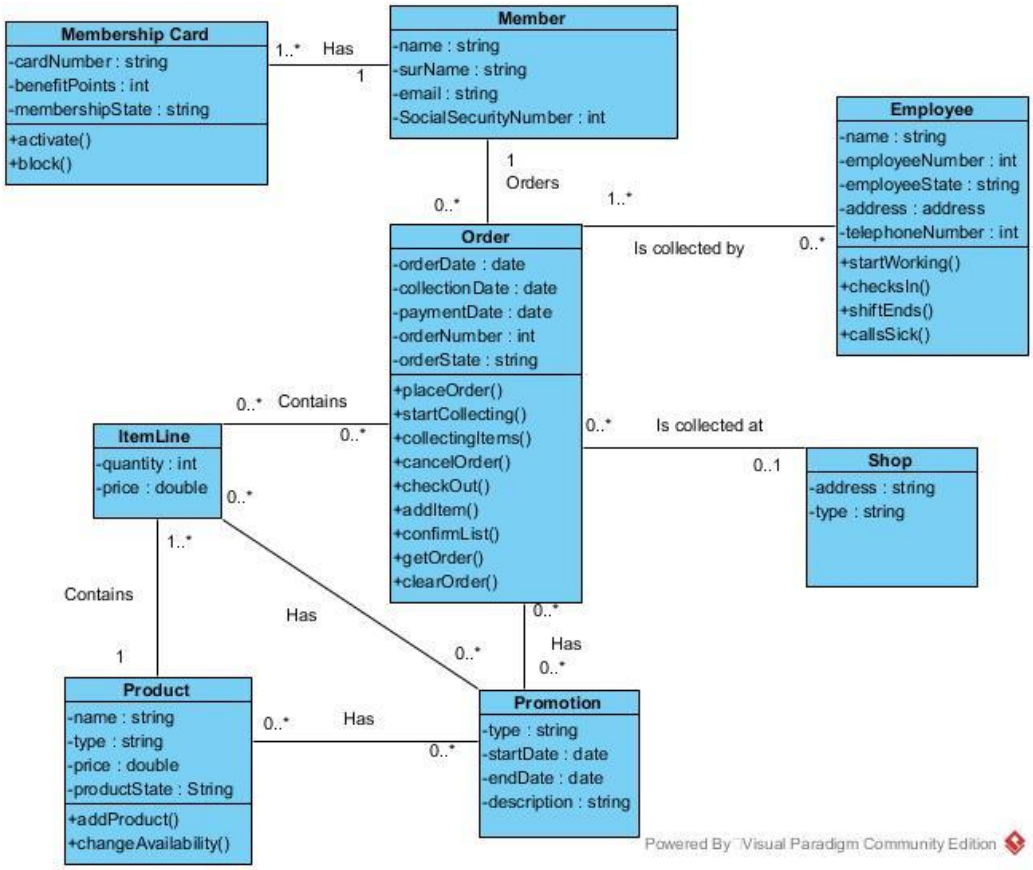
Shopping cart Class



Employee Class

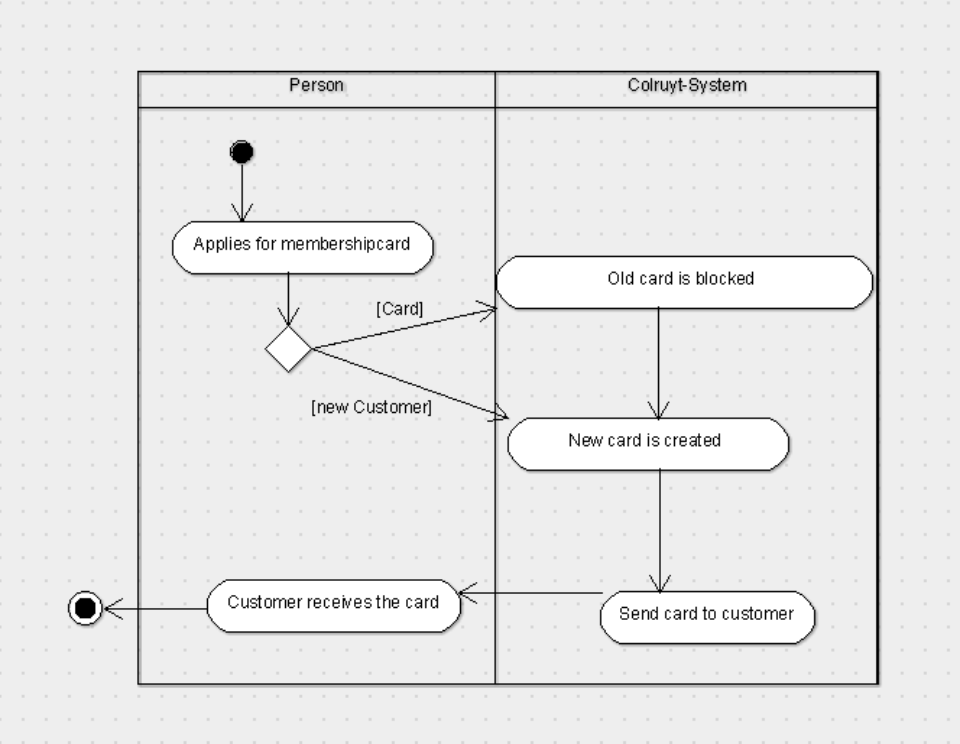


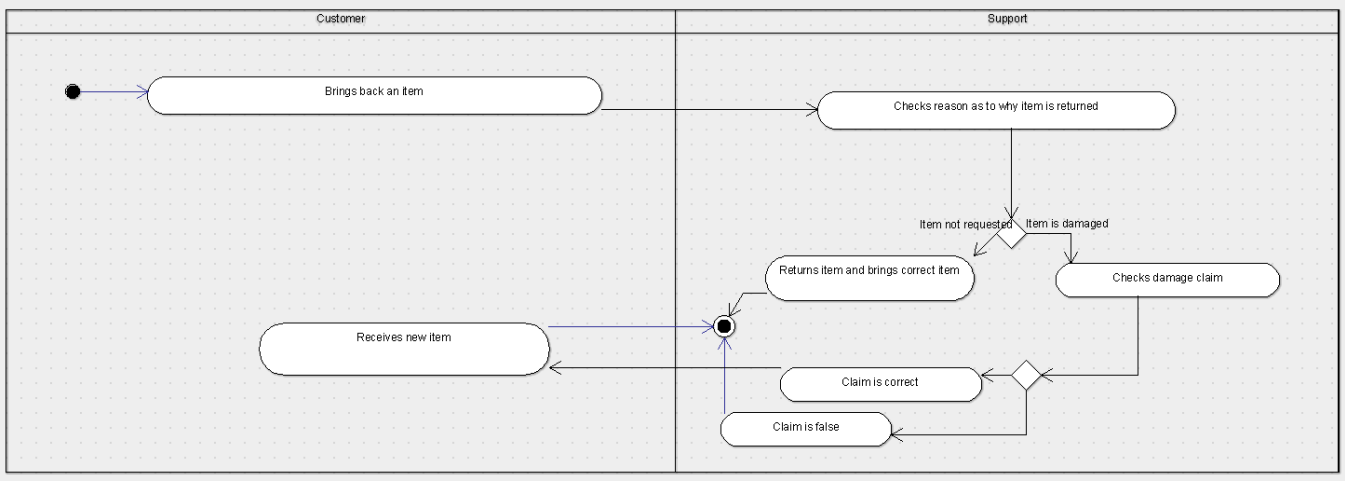
2. The class diagram V2[3]

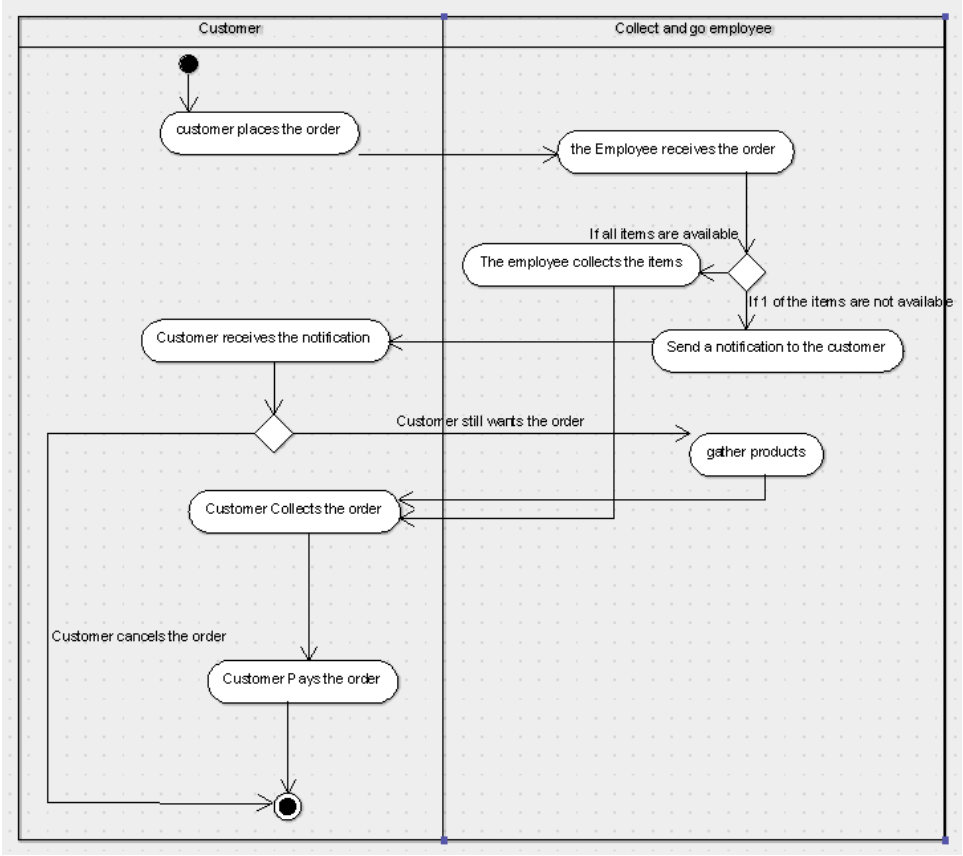


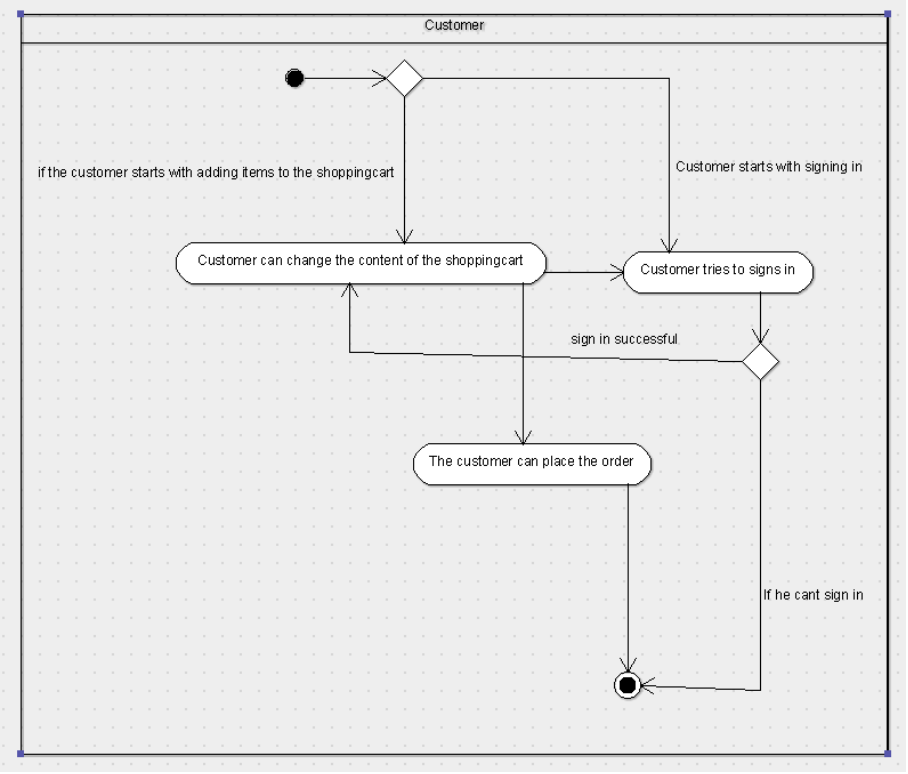
[3] The relation between ItemLine and Order should be 0..* to 1 like in the previous and following version, but because we didn't keep the class diagram after the states we sadly cannot change it without having to make the entire model again.

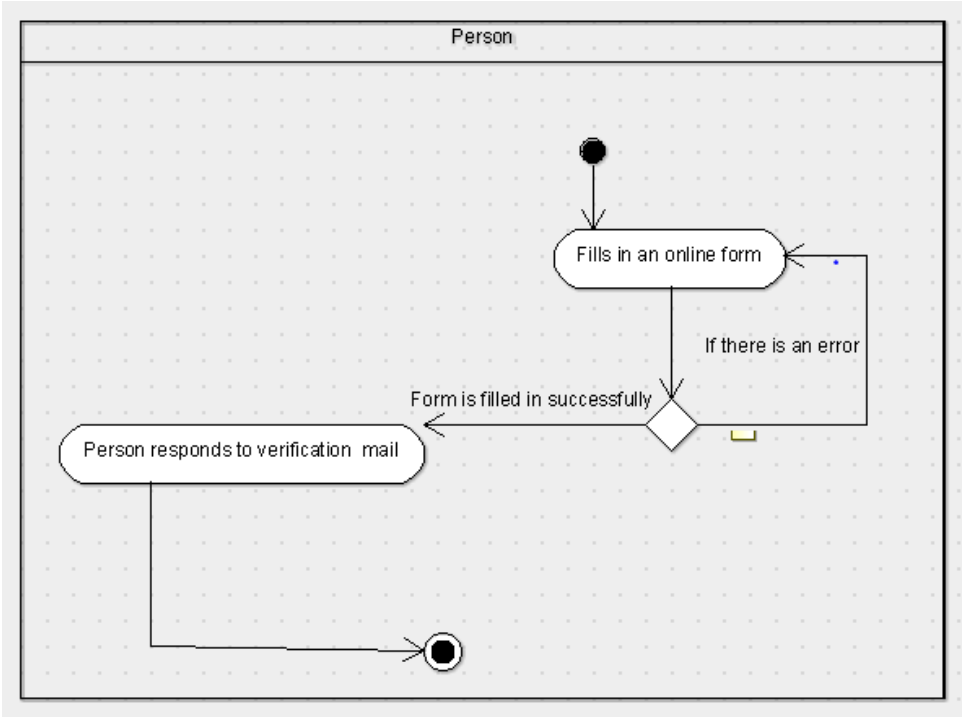
3. Activity diagram: name workflow

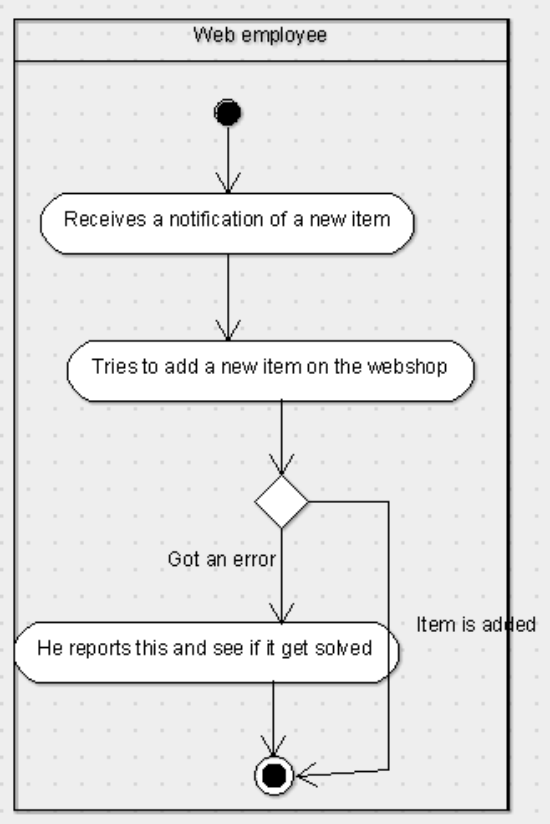





Customer
Collect and go employee
customer places the order
the Employee receives the order
If all items are available
The employee collects the items
If 1 of the items are not available
Customer receives the notification
Send a notification to the customer
Customer still wants the order
gather products
Customer Collects the order
Customer cancels the order
Customer Pays the order


Customer
if the customer starts with adding items to the shoppingcart
Customer starts with signing in
Customer can change the content of the shoppingcart
Customer tries to signs in
sign in successful
The customer can place the order
If he cant sign in

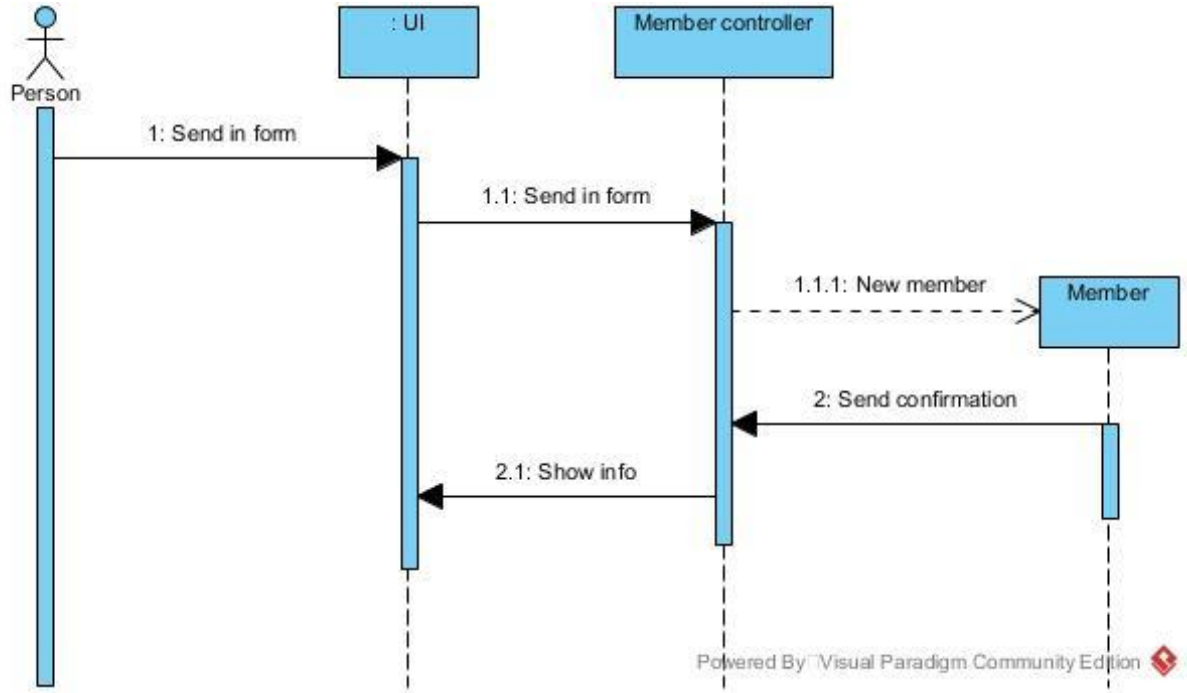

Person
Fills in an online form
If there is an error
Form is filled in successfully
Person responds to verification mail


Web employee
Receives a notification of a new item
Tries to add a new item on the webshop
Got an error
Item is added
He reports this and see if it get solved

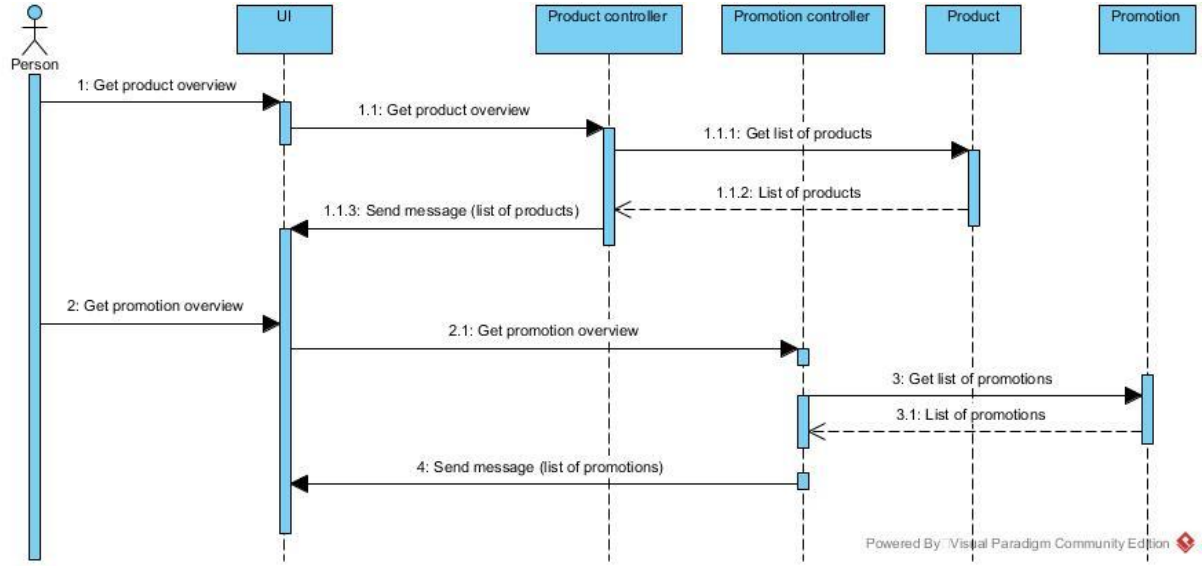
6. Application layer

1. Sequence diagrams:

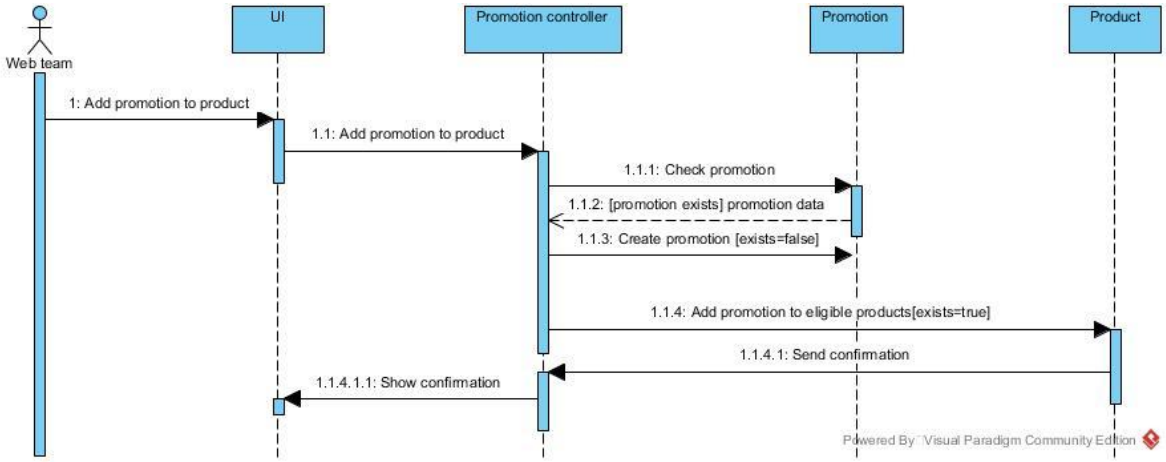
Person becomes member



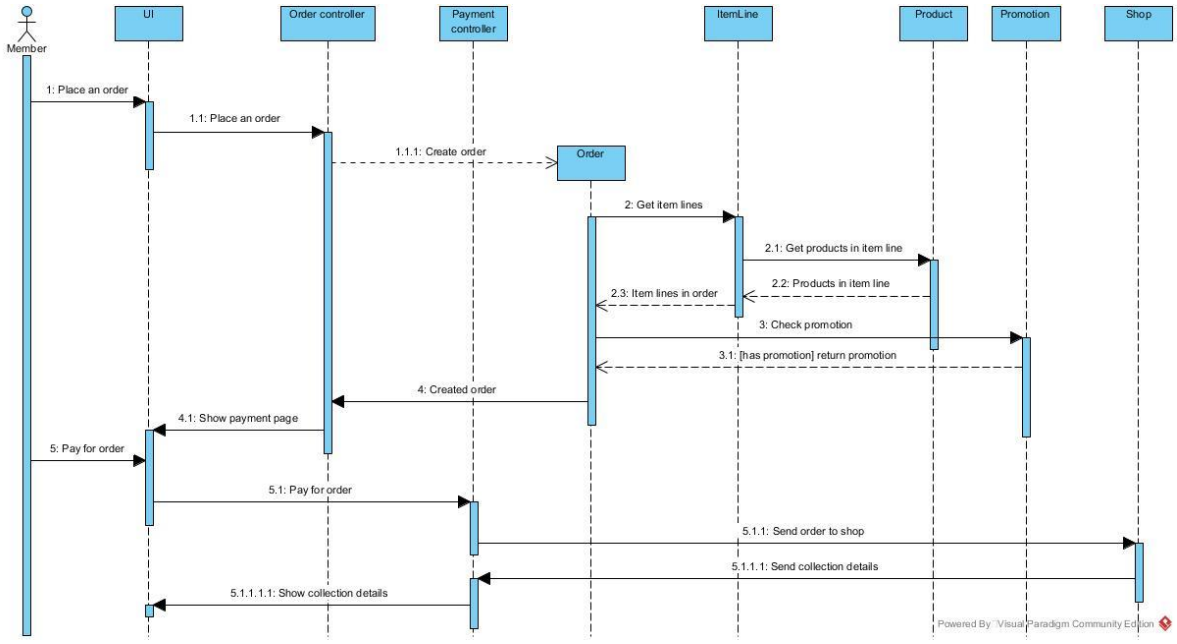
Person gets overview of products and promotions



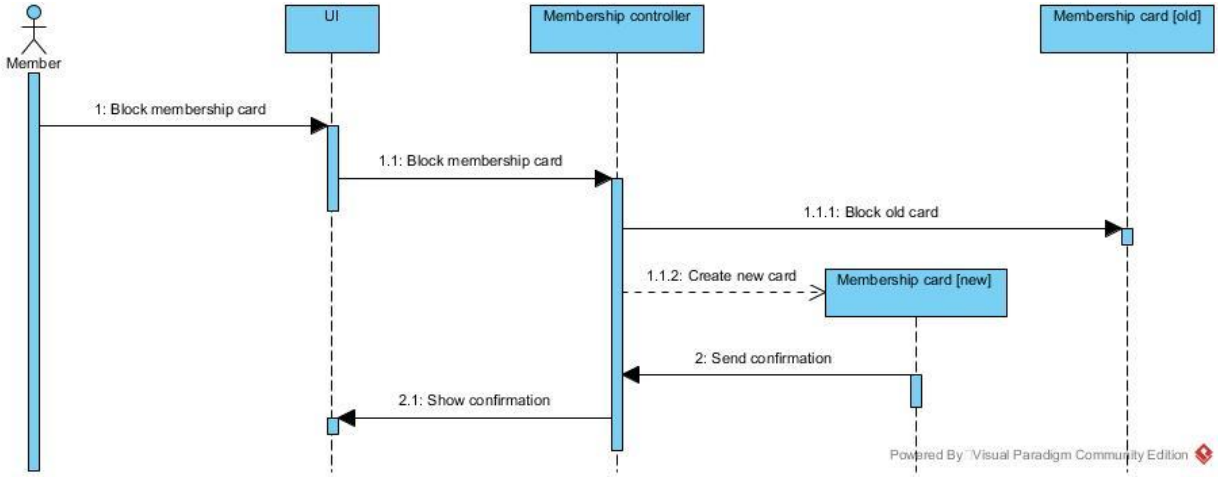
Web team adds promotion to product



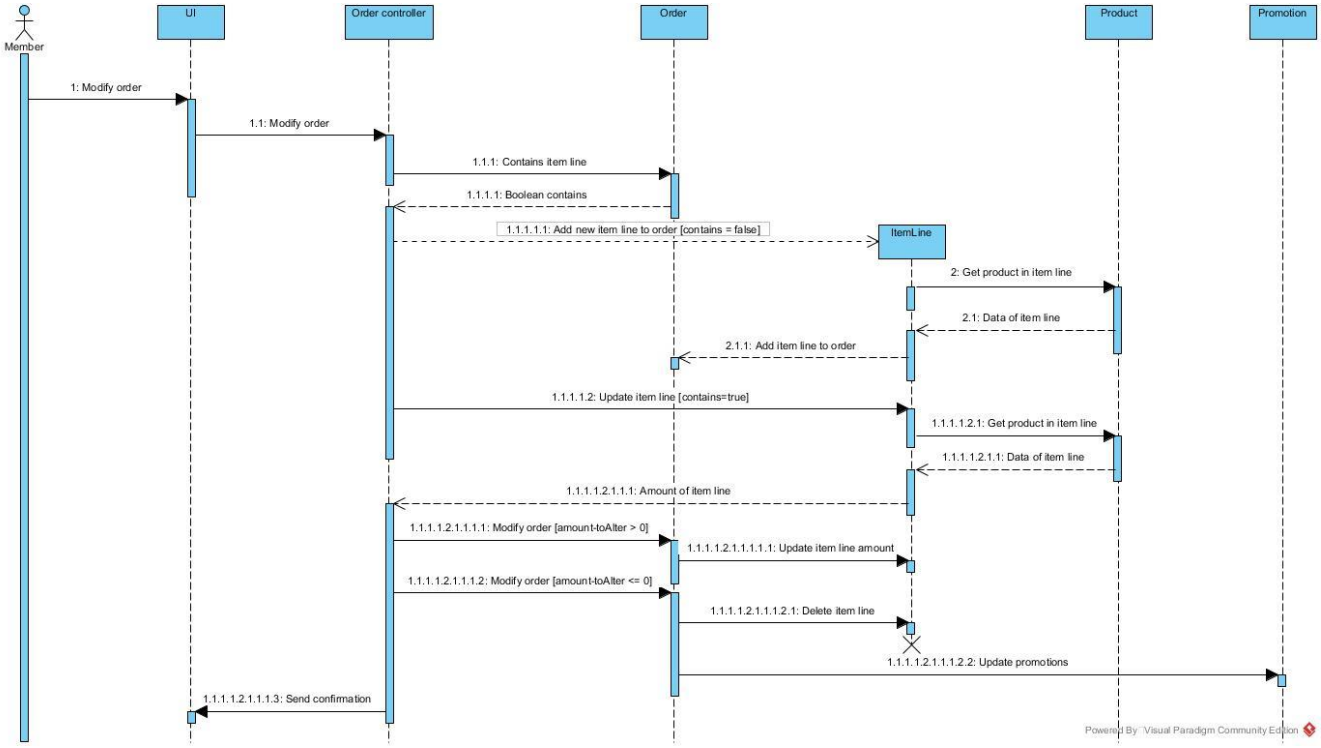
Member places order



Member blocks membership card

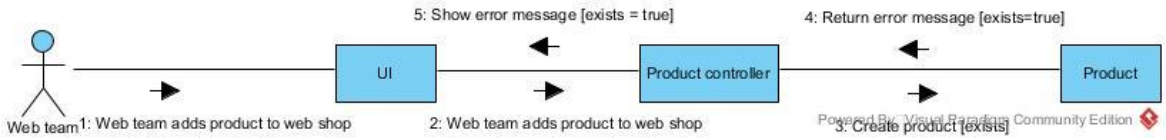


Member modifies order

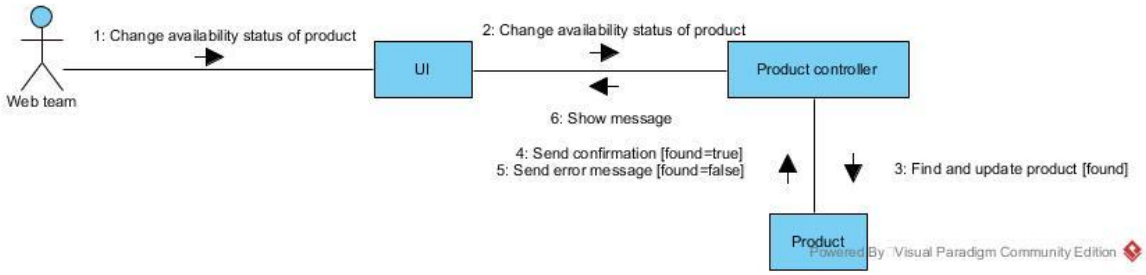


2. Collaboration diagram:

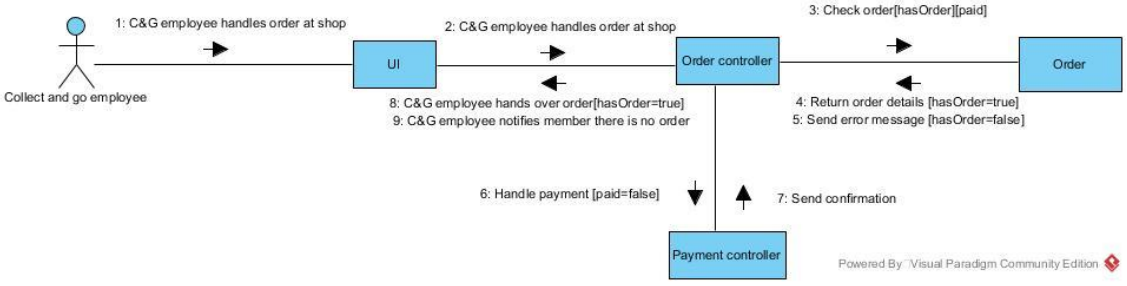
Web team adds product to web shop



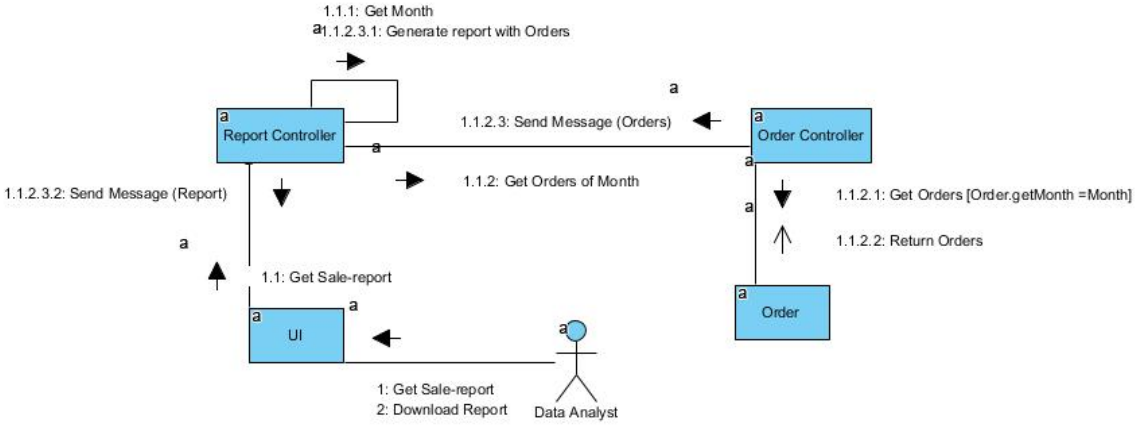
Web team changes availability status of product



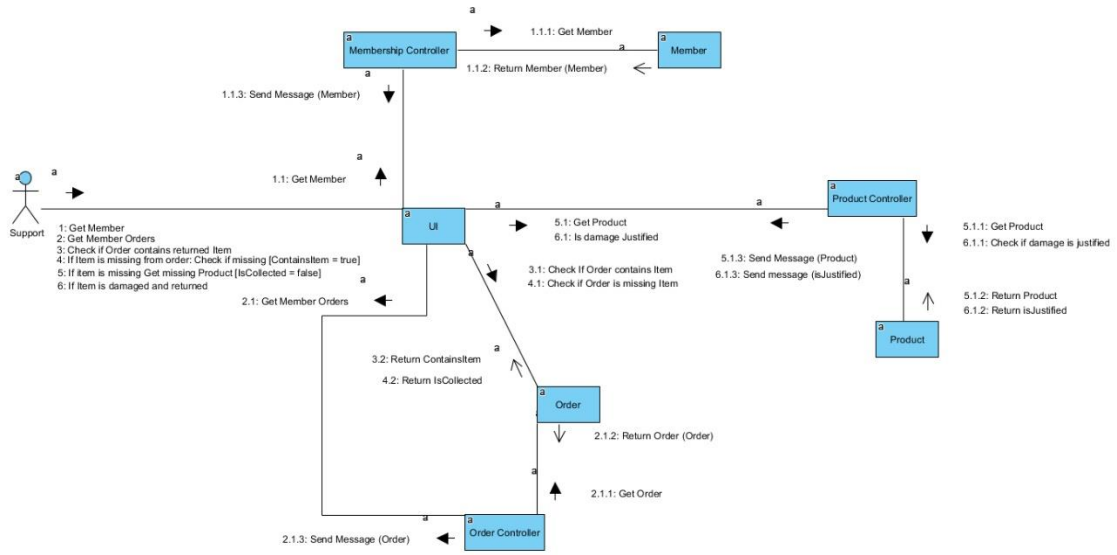
C&G employee handles order at the shop



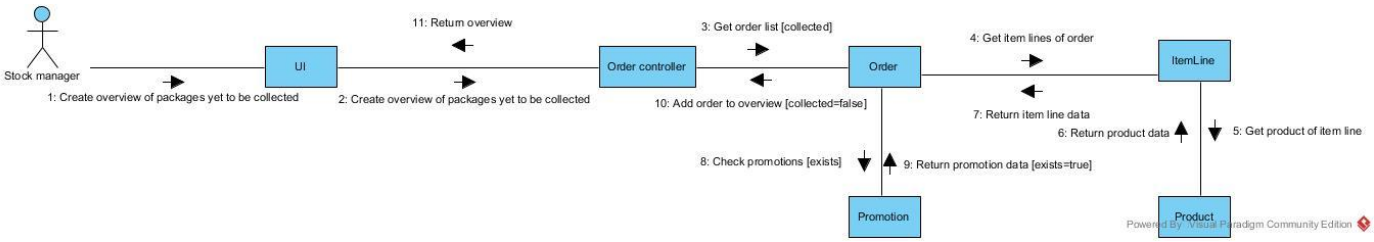
Data analyst retrieves monthly sales report



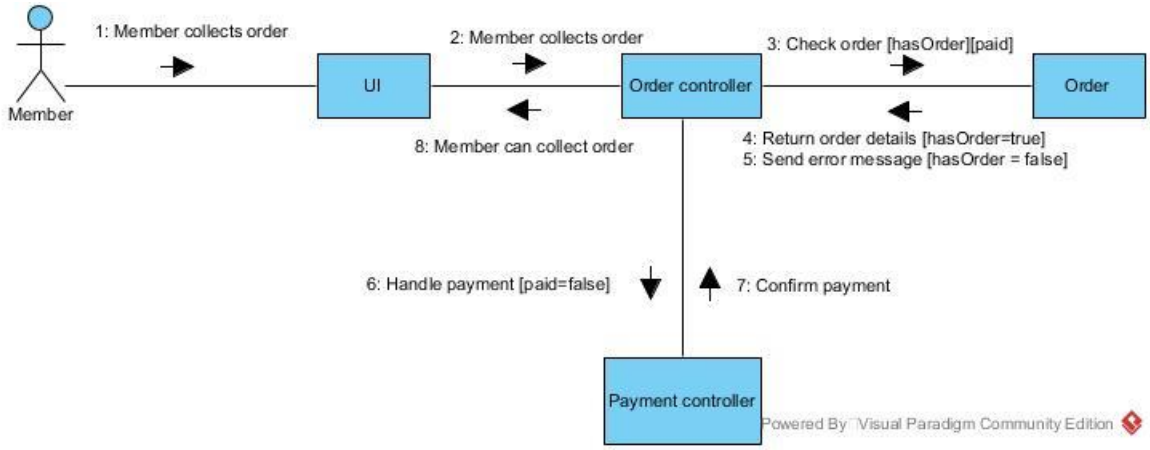
Support handles the return of items



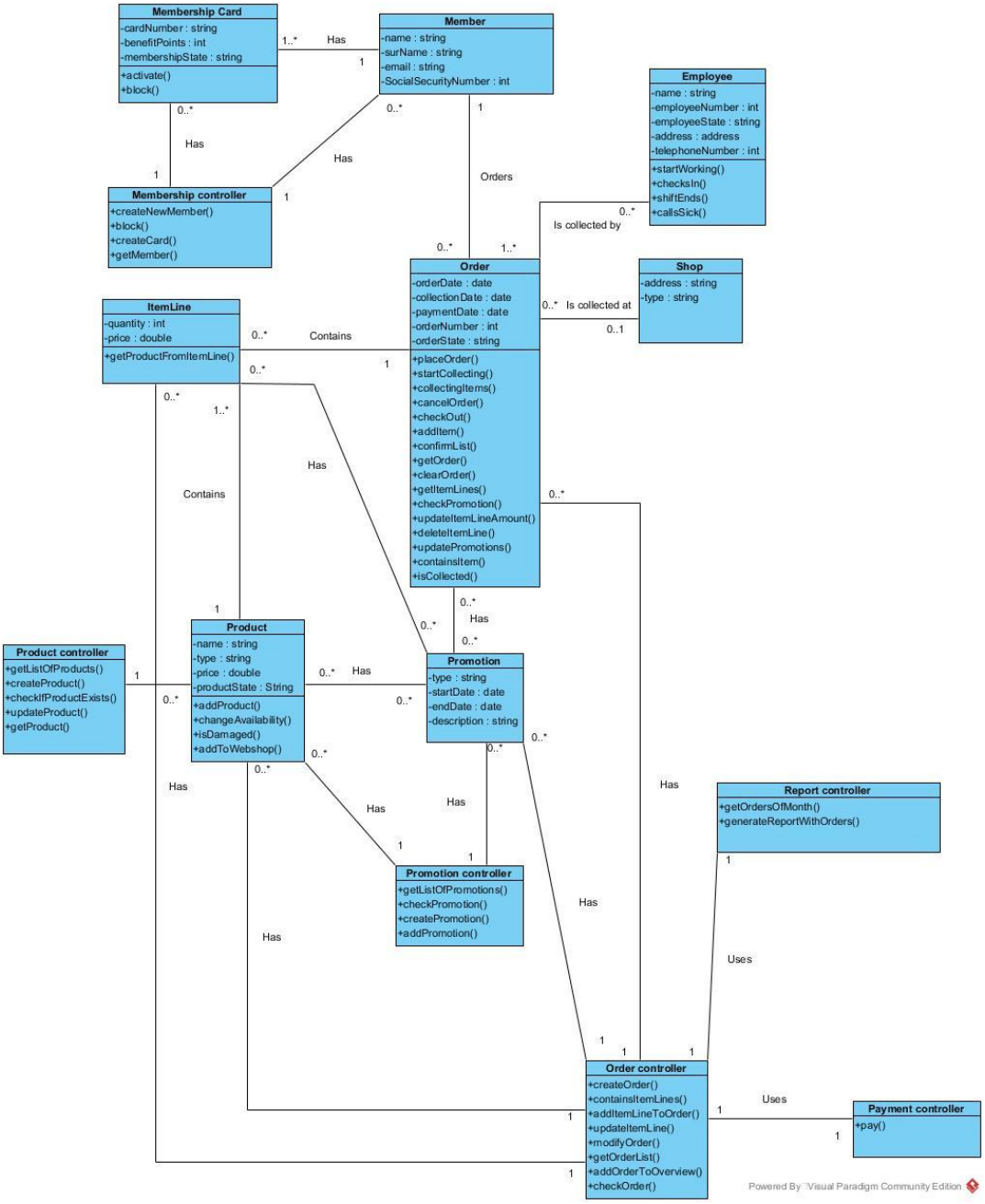
Stock manager creates overview of to-be-collected orders



Member collects order



3. The class diagram for application layer



4. The model dictionary for application layer

Item line:

The item line is the combination of the amount and product that is being added to their order since it is possible to order more than one instance of a product at a time. It is possible that a promotion is added to a specific item line (for example if you buy at least three of a certain product then you get a fourth of that product for free). Also, there is a function where we are going to get the product from a certain item line.

Product:

All the products that are available in the web-shop. One or more of these products (item line) can be ordered from the web-shop by adding them to their order and checking them out. Promotions can apply to certain items. There is also a change of availability function that you can see if the product is still for sale. We are also going to check when the product is sent back that the status of the product is damaged or not so that we can determine whether the return is justified or not. We can also add products to the web-shop with the addToWebshop operation.

Promotion:

A promotion is an activity to advertise certain products or combinations of products. There are different kinds of promotions of different magnitudes. Firstly, a promotion can be applied to a certain product, this means that the price of this product will be lower for a certain time period. Secondly, a promotion can be added to a certain item line, this means you get some sort of benefit by ordering more than a certain amount of a product at once for a certain time period. Lastly, a promotion can be added to an order, this means that when an order exceeds a certain total price that a promotion will be activated.

Shop:

This is the shop where the member can get his order. We keep the address and name of the shop. For example, if they collect it from a sub business like okay.

Product controller:

The controller is going to handle the function that is going to give us the list of products but its handling the creation of products. While it is going to create a product it will also check if the product already exists in our database. There needs to be a possibility to update the product and we want also a function that's going to give us a specific product.

Promotion controller:

This controller will handle a few operations that revolve around the promotions and the adding of those promotions to products etc. The first operation is getListOfPromotions which will returns a list of all the promotions that are currently available so that we can give an overview of the promotions on the web-shop itself. The checkPromotion operation will check if the promotion that this operation is called on already exists or not. The createPromotion operation will then create a promotion in case it does not yet exist. The addPromotion operation will add promotions to certain products.

Report controller:

The report controller is used when the data analyst wants to create the sales reports of the last month. There are only a few operations, the first one being a getter operation that will return a list of all the orders of a specific month, the generateReportWithOrders operation will then in turn generate the report of said month.

Order:

This is our most important class. This holds all of the orders the members make. The object holds the information regarding the times the order has been placed, collected and payed for as well as it's state ("being-collected", "ready", "collected", etc.). The order can be found using the orderNumber parameter.

When a member adds an item to their order, the addItem method is called. They can then modify that order ('updateItemLineAmount') or delete the line entirely ('deleteItemLine'). With the above methods the updatePromotions method checks if the item the member selected, the item-line or the whole order might have a promotion. The member can also empty out their cart (order with state "new-order") with the 'clearCarth' method.

When a member is satisfied with their order and places it, the 'placeOrder' method is called it is sent to the selected shop to be collected on the selected date and a confirmation is sent to the member. If the member wishes to cancel their order: the method: 'cancelOrder' is called. As soon as an employee select the order to be collected at the shop, the 'startCollecting' method is called, changing the state to "being collected". When done, the 'isCollected' method is called changing the state to "ready". When the member comes to receive the order, the method 'checkOut' is called, and the state is then set to "collected".

If a member returns with a collected order, claiming to be missing an item or an item is damaged. The method 'containsItem' is called to check if the order contains the item, respectively, to be found or replaced.

Order controller:

To create and modify orders and the itemlines/products the orders consist of we will be using an order controller. Ofcourse this order controller will have an operation that can create an order, retrieve the itemlines that the order consists of and adding or removing itemlines to or from it. As we also need a list of all the orders that will be collected on a certain date we also have a getOrderList and addOrderToOverview operation. The checkOrder operation is used to see if an order in fact exists and if it has been paid or not.

Payment controller:

This controller will be used in the payment process, the customer can either pay online or at the shop. Based on the method of payment the correct steps will be executed by either the web-shop or the collect and go employee.

Member:

This is how we define a customer who uses the web-shop. Here their data is stored, such as their name, sir-name, email, etc.

Membership Card:

Each member has a membership code designated to them. This holds the points collected by the member for eventual promotions. A member can have multiple memberships, though only one active. This is because if they require a new membership, because of loss or theft. We can block, as well as activate, the cards in our system with the same-name methods.

Membership Controller:

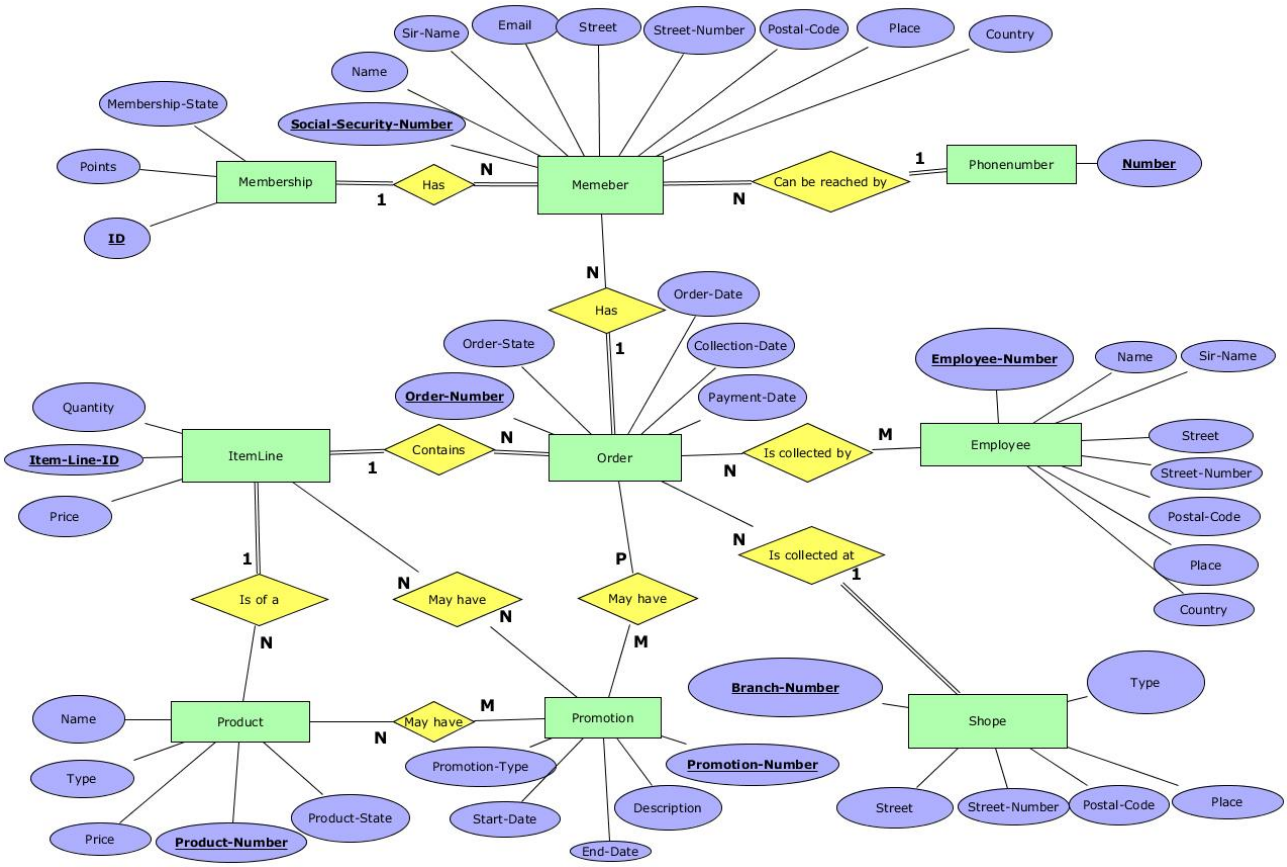
This provides the functionality to create the member and the membership cards. When a web-shop user registers themselves, the createNewMember method is called. If am member loses their card, it is stolen or the member fails to collect orders they have placed: the membership is blocked using the method of the same name. If a member wants to renew their card, the createCard method is called. Here we also provided functionality to get a specific member.

Employee:

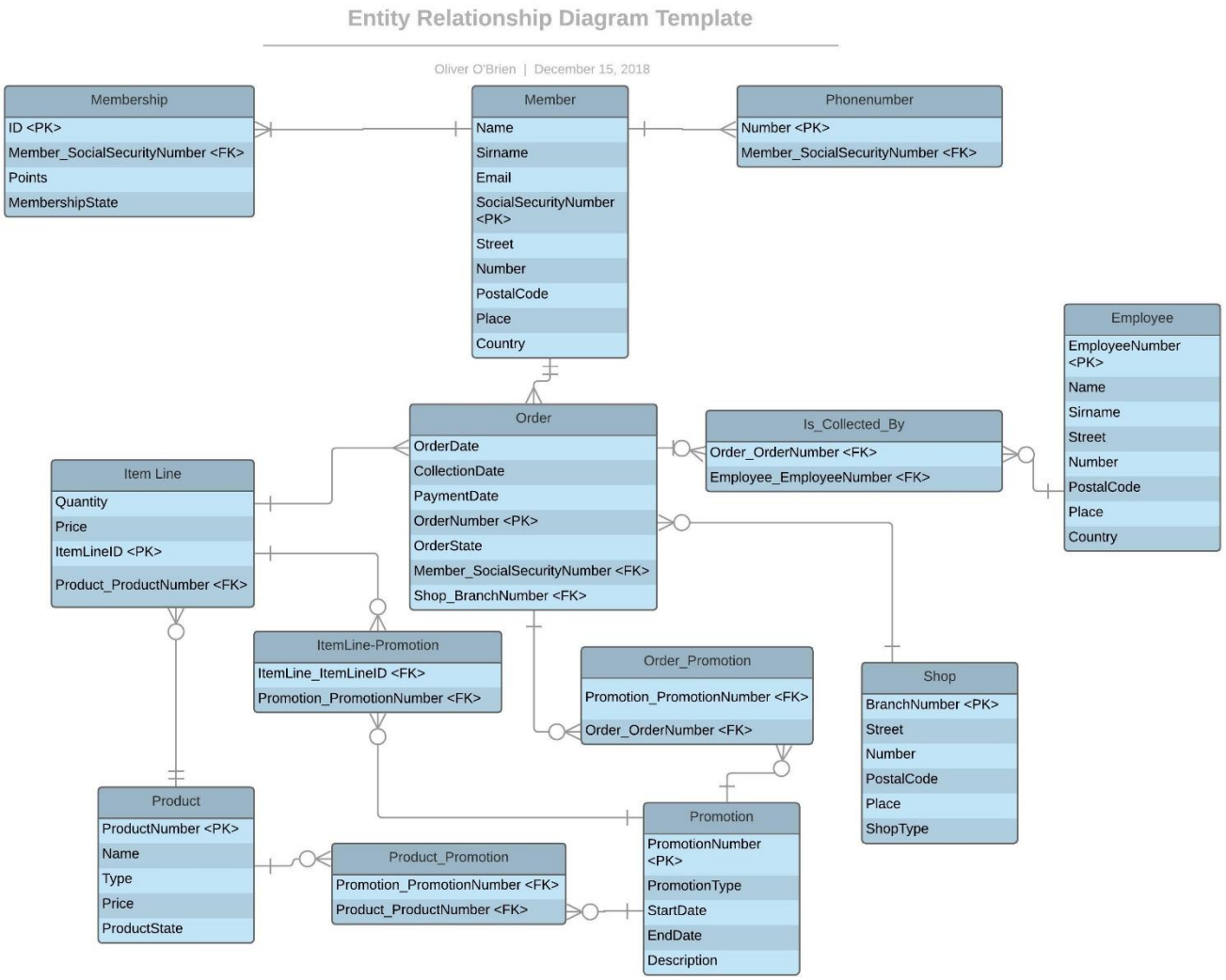
This is the class that holds information of the Employee whom collects the orders. Their base information is stored (employeeNumber, name, state, etc.). When a new employee starts working, the startsWorking method is called. Each time the employee starts their shift, the checksIn method is called. When the shift is done, a call to the shiftEnds method is made. If the employee is sick, the method callsSick is called to notify the system that they are not available for collection.

7. Data model

1. Conceptual data model



2. Relational data model



3. Design patterns

Strategy:

we will use strategy in various places, one example is for the handling of promotions. As there are many types of promotions that each have different effects on the price this will be hidden by the promotion interface and implemented by the concrete promotion strategy's.

MVC pattern:

to separate UI and business logic we will use the MVC pattern, the controller will be the intermediary between the two. This means that specific changes in either business logic or UI won't have an effect on the other party.

Façade:

we will use a façade to hide the complexity of the business logic, our webpages and controllers won't have to know the specifics of our model classes, they just communicate with the façade.

Factory:

we will use the factory design pattern for our handlers in our controller package, so that we can easily use the correct handlers when certain webpages are opened or forms are submitted.

State:

we will use this for our dynamic classes as they have certain states and of course during the life of the application they will change states.