# Computer Science Program

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**Semester Project**

**Implementation of IT system to “Kad Zebras Deg” Bar**

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# Table of Content

[Computer Science Program - 1 -](#_Toc420059416)

[Table of Content - 2 -](#_Toc420059417)

[1. Introduction - 3 -](#_Toc420059418)

[Preliminary investigation - 3 -](#_Toc420059419)

[Inception phase - 3 -](#_Toc420059420)

[Elaboration phase - 4 -](#_Toc420059421)

[Construction phase - 4 -](#_Toc420059422)

[2. Preliminary investigation - 4 -](#_Toc420059423)

[2.1 Company Description - 4 -](#_Toc420059424)

[3 Inception phase - 5 -](#_Toc420059425)

[3.1 Business analysis and feasibility study - 5 -](#_Toc420059426)

[Style of management - 5 -](#_Toc420059427)

[Motivation - 6 -](#_Toc420059428)

[Culture - 8 -](#_Toc420059429)

[Problem Statement - 9 -](#_Toc420059430)

[Problem description - 9 -](#_Toc420059431)

[SWOT analysis - 10 -](#_Toc420059432)

[Porters Five Forces - 11 -](#_Toc420059433)

[Stakeholder Analysis - 13 -](#_Toc420059434)

[Mission / vision - 14 -](#_Toc420059435)

[Business case for the system - 14 -](#_Toc420059436)

[Payback projection - 15 -](#_Toc420059437)

[Business case conclusion - 16 -](#_Toc420059438)

[Activity diagram on business level - 16 -](#_Toc420059439)

[Event tables - 17 -](#_Toc420059440)

[3.2 Functional Requirements - 19 -](#_Toc420059441)

[Use case diagram - 19 -](#_Toc420059442)

# Introduction

*Most good programmers do programming not because they expect to get paid or get adulation by the public, but because it is fun to program. “Linus Torvalds”*

Same was in our situation for the second semester’s final project. Our task was to develop software for a company in real life situation. As it is not always easy to make an agreement with companies to allow students to use their information for study purposes, because they don’t want to expose some important information, we tried different approach by searching for a company within circle of people that our group members is friends with or people we know. This approach was successful and we found friend of Janis that founded his own bar / restaurant “Kad Zebras Deg” (English - When zebras burn) in 2014 and he agreed to provide us with necessary information. After arranging meeting with owner in Skype, the plan for the work process where made. In order to do a good and organized job on project, the plan was divided in 4 phases – preliminary investigation, inception, elaboration and construction. For the work process we chose to follow iterative UP (Unified Process) combined with practice of Scrum.

The Unified process divides the project into 4 parts:

* Preliminary investigation
* Inception phase
* Elaboration phase
* Construction phase

### Preliminary investigation

Preliminary investigation contains interview with owner [Appendix 1 - interview], company description.

### Inception phase

Inception phase is the shortest one part where it should be set out problem description, business analysis, use cases and domain model.

### Elaboration phase

Elaboration contains use case diagram, mock-up, brief use cases, fully dressed use cases and domain model.

### Construction phase

Construction is the largest phase in the project which contains a series of iteration. The result should be an executable code and new features are added during each iteration.

# 2. Preliminary investigation

The Preliminary investigation phase starts with company description and company owner interview. That information will contribute thorough analysis of the company and based on the analysis, appropriate system requirements will be made.

## 2.1 Company Description

“Kad Zebras Deg” is a small bar/restaurant which is situated in the capital city of Latvia in Riga. It’s been founded in 2014 by Renars Bents. He is the only owner of the company and he has 6 employees. One cashier, 2 waiters / bartenders, 1 chef and 2 kitchen assistants. Renars is strongly involved in his bar/restaurant and is helping as much as he can to his employees. He is very friendly and fair to his employees as he doesn’t fire anyone without a serious reason. Bar / restaurant is quite new so it doesn’t have any IT system. He can’t afford to have a lot of employees so he is in need of IT system to make his bar/restaurant more organized and efficient. At the moment everything is done by writing down on paper and using the computer to record the income and outcome with the help of MS Word or MS Excel. Every weekend Renars is organizing all kinds of events like music bands, stand-up comedians, game nights on Xbox witch has prizes at the end, in order to attract more customers. The usual customers are mostly his friends and young people from 16 – 30 years old as it was designed to follow up with current trends.

# 3 Inception phase

Inception phase is the initial step to establish a common vision and basic scope for the project. Inceptions phase consists business analysis and feasibility study which facilitates setting out functional requirements. That will promote use case prioritization creation.

## 3.1 Business analysis and feasibility study

### Style of management

Renars Bents looks like a fair and open manager / owner according to how he was describing his bar / restaurant and the way he manages his staff. After exploring the information that was given on the interview and experience of Janis who is friend with Renars, conclusions were made. Renars follows “consults” leadership style which means that manager both identifies the problem and makes the decision, but only after listening and possibly adopting solutions that have been suggested [Tannenbaum and Schmidt]. Leadership style was identified based on the interview and the facts that Janis provided. Janis has been friends with Renars for a long time and was on the holiday in Latvia when Renars was just planning to open his own bar / restaurant. Owner was asking everyone for ideas that he could adopt when opening his bar / restaurant and slowly adopting them. It shows that he first listened to suggestions and possibly adopted them. When there is a problem in his business he tries to ask all employees how they should deal with it and tries not to make a blind decisions that could harm his business. As it is a new business everyone is involved in its growth. This means that the staff members are willing to help and try to improve the efficiency. His style of characteristics is “Achiever” [D.Fisher and W.R.Torbert]. This conclusion was made based on that he has long-term goals and he feels like initiator. He was planning to open his bar / restaurant for a long time. Only when he was completely confident that he will be able to found his business, he did it. When he was describing his business he mentioned that he opened his bar / restaurant not because to try to earn a lot of money from the very beginning but because he really loves what he is doing and that he will try to provide customers the best services as the business grows. That shows that he has long term goals. As it was described before he listens to his staff and people around him which indicates that he welcomes feedback which also means that he seeks for mutuality. Sometimes he listens too much to other people and facts that he forgets to think over everything himself and make his own decision which indicates that he appreciates complexity but is blind to subjectivity behind objectivity. He usually feels guilty if something didn’t go the way it was planned like it happened when someone suggested to make his bar / restaurants theme as first “velo bar / restaurant” in Latvia where you can come to fix your bike using the tools in his premises outside the bar / restaurant. . It failed because it coasted more than he could afford and for a while he could not come up with any new ideas and let the employees make decisions in everyday tasks. This shows that he feels guilt if falls short of his own standards.

From this analysis we can assume that the most valuable information is that his style of management includes long term goals, which means that when developed system will be implemented he will be patient until employees fully adopt to it. That’s when efficiency of his business will rapidly increase. As he takes employees feedback in consideration we can assume that they will respect his decision about implementing system as he knows that employees are getting more tired as the bar / restaurant is getting more popular and the amount of customers grows, which means that the employees work increases and they need to find a way to be more efficient and find a way to make the work easier.

### Motivation

To motivate staff in fairly small companies like bars and restaurants usually it is not that easy as the growth in that kind of sphere of business is quite small. At this point where the company is still young the promotions are almost impossible. This is the reason why owner / manager is trying different approaches to motivate his staff. Based on Herzberg’s two-factor theory Renars provides some of the extrinsic and intrinsic rewards [Herzberg 1968]. By exploring the information provided, following rewards where identified:

#### Extrinsic

* **Supervision/relationship with supervisor**
* **Working conditions**
* **Remuneration: pay, salary**
* **Relationship with peers and with subordinates**
* **Job security**

#### Intrinsic

* **Recognition**
* **The work itself**
* **Responsibility**
* **Personal growth**

Supervision/relationship with supervisor was identified by the fact that Renars has a friendly relationship with every staff member and he treats everyone equally. He doesn’t have any favorites and he respects his staff. That’s also mutual.

Considering that it is newly established business, the owner is trying to provide the staff a good working conditions. He provides staff with all the tools they require and tries to make their jobs easier. That helps to keep up a good relationship with staff and good service for customers. This is also a reason for why he would like to have a computer system in his bar / restaurant. Development of this system will clearly benefit of this factor and most likely succeed.

The salaries are quite good as the company tries to pay fair amount and it is the average salary in Latvia. Most people work for the minimum wage in the same sphere. Staff also knows that they will receive tips from customers and it motivates them to provide good service.

Relationship between staff members is really good, not only because the environment is satisfying, but also because the owner organizes parties for company, time to time. This allows staff members to be closer and also to get know each other better. In the result it builds a good teamwork and rises the team spirit.

Staff members feel secure in terms of work. Renars is always around at bar / restaurant and will help if needed. He is a reasonable man and will understand if there were any unexpected factors that led to underperformance. If there appear disatisfied customer he will listen to both sides of the parties and come up with fair resolution.

Employees know that if they will perform good, owner / manager will notice that and will always give a good feedback. If they have a good ideas he will also consider them and might even take in consideration. This covers recognition raward.

The work itself is beeing made as much satisfying as Renars can make, that includes also plans for the future coputer system. Employees know what they have signed up for and keeping in mind that there is big unemployement in Latvia, they are quite happy to work there.

Responisbility reward is seen in fact that Renars trusts his employees considering that they work in food business where customers must get the best service and avoid any kind of food poisonings.

In bar / restaurant works mostly young people which means that owner / manager gives unexperienced staff members a chance for personal growth and might increase efficiency in company as the staff will gain experince. Young staff also might show better performance in busiy days by having more energy.

### Culture

Company’s culture plays a big role in its business. Establishing what kind of culture company is practicing, it gives more knowledge of the possible reactions according to changes. For this project it was decided to use Kanter’s two types of culture to analyze behavior that will affect the business when implementing the new system [Kanter 1983]. He argued that there are, broadly, two types of culture: segmentalist and integrative. While analyzing information provided conclusion where made, that the culture of this project’s company is integrative.

#### Integrative culture

* Sees problems as related
* Views problems and responsibilities as shared and connected
* Has matrix or team/project-based structure
* Innovates and test assumptions: invites experimentation
* Invites confrontation and eventually transcends differences
* Creates mechanisms of coordination for sharing information and ideas
* Looks for novel solutions
* Is outward-looking

This project’s company is quite small and new so it has more like a team-based structure. All the problems as described earlier are solved together and they are seen as related. Company is still experimenting with approaches in services provided, time to time there might appear some minor conflicts which are solved with compromising approaches. Information and ideas are sheared and discussed in meetings, which are noted and considered for implementation. Also as described earlier ideas might come from the outside of the company. With all this analysis it was established that there shouldn’t be any big resistence against the new system and the staff will share with ideas in it’s development.

### Problem Statement

How should we design a software for a newly established bar without having previous experiences from the customer’s side?

### Problem description

The problem description gives us a better insight, why the project needs to be made, what is it for, what problems are needed to be solved and can be solved.

The main problem with the company “Kad Zebras Deg” Bar that it is newly founded and does not have an IT system yet. The processing of orders, bookings, the event handling and all service related processes are manually done (per say, written on a piece of paper).

A bar in 2015 has to have an IT system to show quality and prestige in front of the customers. With an IT system it is easier for the customers to reserve a table, it is easier for the employees to register and process orders and to keep track of them. Because there was no previous system existing, there is no previous experience, no software to update, therefore a brand new system needs to be implemented.

If the bar wants be competitive with the rest of the bars in the city it needs to develop and improve continuously in order to meet with modern day standards.

By completing the project and creating the IT system, the bar should have an easy system to use, facilitating the everyday work of employees and let the customers have better accessibility and engagement for the bar (easy and fast way of reserving a table or buying tickets for concert events for instance).

### SWOT analysis

“Kad zebras deg” bar / restaurant

|  |  |
| --- | --- |
| **Strengths**   * Popular among young adults * New and fresh * Unique design | Weaknesses   * Unexperienced management * The lack of advertising * The lack of “brand loyalty” * Limited budget * The lack of an IT system |
| **Opportunities**   * Expansion * Hiring more experienced staff * Demand for organizing bigger and better events | **Threats**   * Competition in the city * Economic situation (Crisis) * The threat losing in a price competition |

Source: Self-made

Business goal: Provide high quality bar service for the middle class society.

“Kad zebras deg” bar / restaurant has been a very popular pub among young people ever since it’s opening. This opinion was formed mainly because of the new design and the fresh look. A new and improved selection of drinks could also be considered an advantage.

Even though the pub is a popular place the lack of experience for the manager is a great disadvantage. Because of a small budget advertising is not an option. What makes it even hard to manage is the lack of an IT system which is needed in order to ensure a nice flow for transactions and very easy management.

Depending on the success and the income of the company the owner could decide to expend the scale of business and to enter new markets. This is a very important step in this case too as the pub needs more clients and more employees. In most of the cases the more clients we have the more profit we can have. If the clients ask for it then the pub could organize bigger and better events.

The biggest threats are losing in a price competition against another pub which can afford to offer better offers or which has a bigger capital, an economic crisis and opening of a huge number of pub in the same area.

SWOT analysis was made based on studies of [Bloisi].

### Porters Five Forces

This section is used to analyze all five Porter’s forces to explain the connection between the new entrants and how their represent a threat for the client’s business. This section also explains customer’s purchase power and what a substitute product is.

#### Threat of new entrants

* Easy to purchase a propriety and get started with a similar pub in a very short time.
* New clubs, bars or restaurants can also be open nearby and it can affect the way the business is evolving.
* Very difficult to predict or anticipate new entrants on the market.
* It is important to create a brand and to maintain.
* It is easy to gain permission from the authorities.

#### Determinants of supplier power

* Multiple suppliers can be used to provide the same articles. Low influence
* High number of alternatives
* The liberty of ordering online or directly
* Working with global known brands

#### Rivalry among existing firms

* Medium rivals in the nearby area
* Bigger and better pubs or highly known competitors can open anytime
* Marketing partners and using customer to promote
* Innovation is very important because of better and newer products can attract more clients

#### Determinants of buyer power

* Vast selection of drinks and foods available
* Buyers don’t have bargaining power since prices are set
* Buyers determine the theme for parties/events

#### Threat of substitute products

* New and better events can be regarded as substitutes
* Difficult to stay in the top of all similar/substitute products

The threat of new entrants is a very serious one. At any given moment a new pub or bar could open in the neighborhood since it’s very easy to purchase a propriety and transform it into a bar. Most of the client could take advantage of this. Since is very hard to predict new entrants is it better to focus on creating brand and a very high stats since the very beginning.

The supplier does not have that much power since the products they deliver can be offered from more than one supplier. This way the manager can choose the supplier according to delivery and product quality, price and so on. A good advantage is having a brand and a very good reputation. The order can be done online or directly.

Innovation is very important regardless of area. The business needs to keep improving in order to keep the customers and acquiring new ones. Every small new entrants can be a threat. Existing rivals could also improve and the competition can become bigger is no measures are taken. The use of marketing partners and promoting using t-shirt or cups can help a lot.

The customers have no influence regarding the price of the place. They are very influent when it comes to parties and events themes or singers. They can also influence the products in the menu.

Some substitute products can be specific food restaurants. They can appear any time and there is nothing to do to prevent their launch. Also, it’s very difficult to predict they appearance. The only solution is to race with them and stays in top when talking about customer satisfaction and number of services offered.

Porter five forces analysis was made based on studies of [Lauritzen and Krogager].

### Stakeholder Analysis

A stakeholder analysis gives an overview about the interest groups in connection with the project. The two main groups are those who are interested in the success of the project and those who are interested in the failure of the project.

Those who are interested in the success of the project are:

* The owner of the bar: The owner wants to have a successful business.
* The employees of the bar: They want to have a solid workplace.
* The potential customers: They want to have a successful bar with good quality service.
* The suppliers: The more bar they supply to, the more order and income they can receive.

Those who have disinterest in the success of the project are:

* The other bars in the city (Competitors): There is a big competition in the city and they don’t want new bars carrying away the customers.
* Possible old people living in the area (negative external effect): They don’t want to have a noisy place at night and drunken people disturbing the area.

### Mission / vision

The mission vision of the company defines its primary sets of goals, their main objective for the long-term. The vision of the company is how the company wants to see themselves, how they want the customers to think and feel about the company Mission

Mission

*The mission of “Kad zebras dag” is to ensure the high quality, delicious, remarkable food as well as professional and friendly service. Assure that clients are provided the fair price. Always work according to customer’s expectations and believes.*

#### Vision

*We believe that friendly and wonderful service affects person’s emotional and physical state. Our vision is to make people happy and deeply satisfied by giving them unforgettable taste and excellent service.*

Mission / vision were made based on studies of [Bloisi].

### Business case for the system

Almost every company and organization in 21st century has its own system no matter if its open source or custom made to meet all the necessary requirements in order to profit financially and to gain efficiency on daily operations. System that is proposed to “Kad zebras deg” will succeed in many ways. As it doesn’t have any system at this particular time it will be custom made and will cover all of the required operations. This company is not rich and can’t afford a lot of staff so this proposal is vital to increase its efficiency by letting students to build it.

The system will be built as part of student project and will cost nothing except that the company will have to buy its own computers and acquire licenses for the necessary software. In this case it will require as a minimum of 4 computers in order to meet the minimum requirements for the system. 1 computer in the kitchen, 1 for the waiters, 1 for the cashier and one in the office. It might be expensive at first but in the long run it will profit much more than now. Considering that the company is still young and there is a lot of competition going on in this type of business, this system will help the company to be more organized and efficient as most of its competitors don’t have any system. Resistance from staff is not expected as they are tired of doing everything in the old way of registering orders and booking the tables. This will save them a lot of time, they will avoid misunderstandings and dissatisfied customers because of the long waiting time before receiving their orders.

The kitchen and the waiters will be up to date with courses and their serving order. Table bookings will be organized manually by the staff or the system if it’s a standard request, plus customers will be able to preorder courses that the chef will begin to cook as soon as they arrive to the restaurant and check in. In summary this system will gain satisfied customers and staff members to the company and will benefit in many ways. In the long run it might lead the company to grow and expand as the efficiency will rise.

### Payback projection

Table below describes payback projection [Cadle and Yeates]. Research shows that the company will profit after the first year. Calculation of prices showed that company does not require high end PCs to operate with software proposed and as a minimum it requires 4 PCs and 1 external hard drive which will allow to back up data in case of accidents. Total amount for hardware is 2540 Euros. Hardware maintenance will cost 1000 Euros a year as there will be only 4 PCs. Only software that they need to acquire is antivirus (we chose Avast) to protect PCs from viruses and malwares that could harm data on PCs. Avast license cost 150 Euros a year for all computers and requires renewal every year. Another software that will be required is MS SQL Express for data base which is free. Staff savings per year will be at least 12000 Euros which means two extra employees. As described before Bar / Restaurant can’t afford more employees so our software can save some money and increase efficiency. By paying extra 4690 Euros first year the efficiency will increase as there would be 2 more employees and save on those salaries 7310 Euros. Next year and in the future the profit will increase even more as the Bar / Restaurant won’t need to buy hardware anymore. Only costs that will be required are hardware maintenance, software support and antivirus license renewal which sums up to 2150 Euros a year. The prices and salaries where examined based on the average wages and prices in Latvia [Trading economics], [X Net].

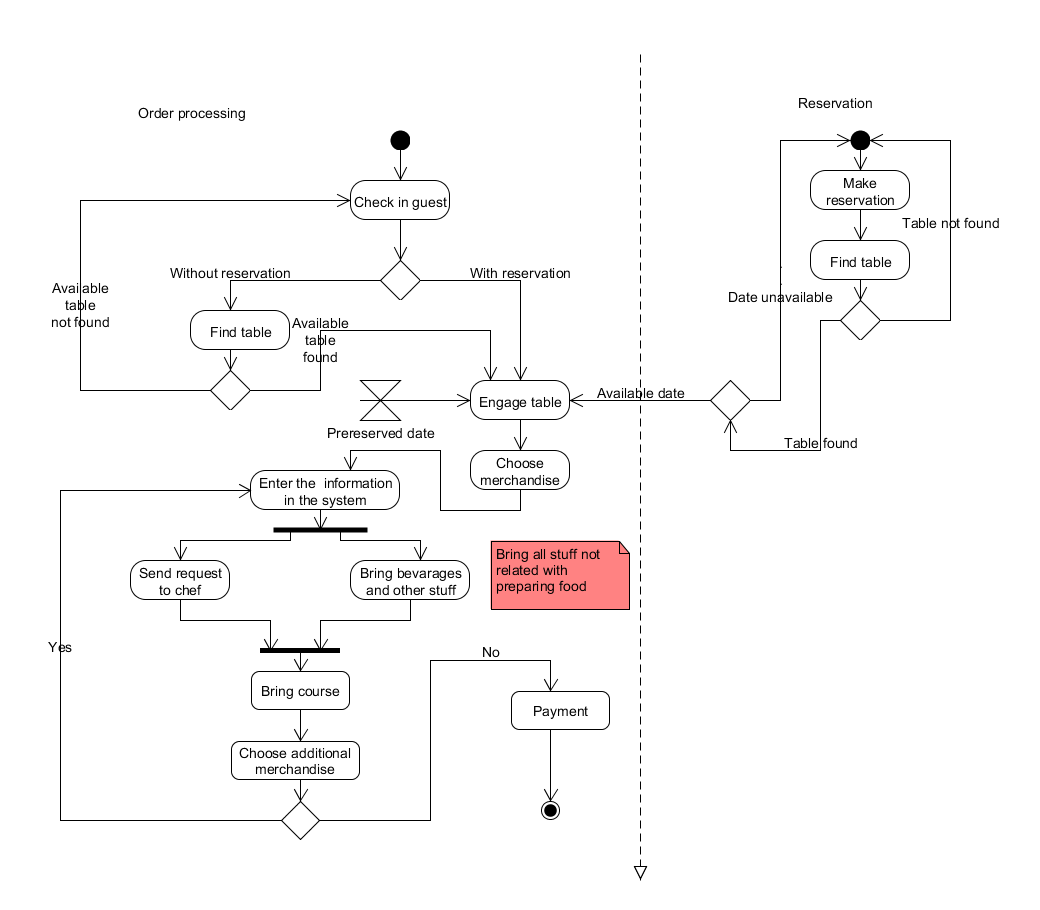
|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Item** | **Year 1** | **Year 2** | **Year 3** | **Year 4** | **Year 5** |
| **Hardware purchase** | 2540 |  |  |  |  |
| **Hardware maintenance** | 1000 | 1000 | 1000 | 1000 | 1000 |
| **Software purchase** | 150 |  |  |  |  |
| **Software support** | 1000 | 1150 | 1150 | 1150 | 1150 |
| **Cumulative total costs** | **4690** | **6840** | **8990** | **11140** | **13290** |
| **Staff savings per year** | 12000 | 12000 | 12000 | 12000 | 12000 |
| **Cumulative savings** | **12000** | **24000** | **36000** | **48000** | **60000** |
| **Cumulative savings less costs** | **7310** | **17160** | **27010** | **36860** | **46710** |

### Business case conclusion

According to our cost-benefit analysis and company analysis , the owner will already have profit and savings in the first year even after investing in the software. The following years the bar / restaurant can increase its profit and have more savings. This suggests that the benefit of the software will overcome the costs and the project is worth doing.

### Activity diagram on business level

Activity diagram is visual representation of processes occurring in the company.



Based on this workflow the use case diagram was generated as well as gained an understanding of business processes of the company.

### Event tables

The goal of the event tables is to define current business processes in the organization and clarify how exactly it works in order to determine possible changes after IT system would be implemented.

|  |  |  |  |
| --- | --- | --- | --- |
| **Event (AS IS)** | **Activity** | **Step in activity** | **Actor** |
| Merchandise is delivered to company and needs to be registered | Merchandise registration | \*Employee receives merchandise  \*Employee writes everything down on paper \*Employee records data of merchandise in MS Excel \*Selling price and name of new merchandise is recorded in the book of merchandise | Employee / Manager |
| Merchandise needs to be checked | Check merchandise | \*Employee goes to cellar or looks in the fridge for merchandise \*Employee counts how many merchandise have left or checks it's expiry date | Employee / Manager |
| Employee needs to find price of merchandise | Get price | \*Employee opens book of merchandise and finds the price or checks the price label | Employee / Manager |
| Employee needs to change information about merchandise | Update merchandise | \*Employee finds the merchandise in the MS Excell and in the book of merchandise \*Employee changes data of merchandise in the Ms Excell and rewrites information in the book of merchandise. | Employee / Manager |
| Merchandise is no more available | Remove merchandise | \*Employee crosses out merchandise from the book of merchandise | Employee / Manager |
| Order is beeing made | Make order | \*Customer sits at the table and chooses courses \*Employee / Manager writes down order in the notepad \*Employee / Manager goes to the kitchen and gives the the order sheet to chef | Employee / Manager |
| Table is beeing reserved | Make reservation | \*Customer calls Bar / Restaurant and asks for the table \*Employee manager checks the reservation list and decides which table can he assign \*Employee / Manager writes down the new reservation in the reservation list. | Employee / Manager |
|  |  |  |  |
|  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Event (TO BE)** | **Use Case** | **Step in use case** | **Actor** |
| Create merchandise on the system | Merchandise CRUD (Create) | \*Employee / manager inputs data of merchandise in the system \*Employee saves data on the system | Employee / Manager |
| Find merchandise on the system | Merchandise CRUD (Find) | \*Employee / manager inputs the name of merchandise in the system \*System returns information about the merchandise | Employee / Manager |
| Update merchandise on the system | Merchandise CRUD (Update) | \*Employee inputs the name of the merchandise in the system \*System returns information about the merchandise \*Employee enters new data in the system \*Employee saves new data on the system | Employee / Manager |
| Merchandise is no more available and is being removed from the available items, but not from the system | Merchandise CRUD (Delete) | \*Employee inputs name of merchandise in the system \*System returns information about the merchandise \*Employee removes merchandise from the available merchandise | Employee / Manager |
| Customer wants to make an order | Make order | \*Customer sits at the table and chooses courses \*Employee/Manager writes down information in the notepad \*Employee/Manager inputs customers desired course or product in the system \*Employee/Manager repeats the action until all desired courses or products are in the order \*Employee/Manager complete the order |  |
| Customer wants to reserve the table | Make reservation | \*Customer calls and specifies date and time for reservation \*Employee / manager enters information in the system \*Employees / manager save the information on the system |  |

## 3.2 Functional Requirements

### Use case diagram

