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Ferrometal-prerada

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Abstract: Planning and implementing new system for company. Company already has system but it's not good has some issues which influence on company's work. For that reasons company need new and better system to continue work and has more influence on markets

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1. Introduction

Setting up a new business is quite a challenge, it requires a lot of determination and hard work. However, it is really rewarding when developed properly and carefully.

There are lots of factors that can affect the company's development therefore it is really easy to neglect them and let the company slowly fall apart. Nowadays, the majority of the companies in order to maximise their income reduce price of the materials they use, but maintain the same price for the lower quality products.

A huge amount of private businesses is overtaken by the commonly known companies. It is difficult to be unique, gain and keep customers while there is such a wide competition.

The subject for the project is a Croatian company called "Ferometal-prerada" which is run by Ivan Rašić. The enterprise focuses on producing and selling metal parts for train and agriculture industries. All of the orders are first discussed either in person or through a phone call and are created by managers afterwards. This way, they ensure that there is no mistake in order and that the customer has almost no involvement in sail creation. Sometimes, the person responsible for gathering the necessary products and materials for orders finds it hard to manage them in the storage. There are a lot of outdated materials which could have been used and ones that are unnecessary which leads to a waste of money.

1.1. Problem Area

Unfortunately, there are some serious drawbacks and inconveniences connected to mentioned features. The first thing that is troubling managers is the user interface which is quite complicated to use and it is difficult to navigate in. This increases the time of managing the orders and forces both customer and employee to wait.

The second issue is a lack of knowledge on what and where is held in storage which extends the time needed to prepare the delivery and makes it harder to keep the track of the products that has been already created for a certain order.

All of these problems occur on a daily basis, causing stress and misconceptions. The employees are not fully focused on a work and are distracted by the extra tasks that they have to remember about. This may lead to neglecting the most significant activities by the employees and lowering their efficiency and motivation to work.

1.2. Problem Statement

We hope we can deliver a product that will meet the requirements of our customer. We would like to ensure the reliability of it whenever it comes to managing goods that the company has to offer as well as the finance accounting. Certainly, we will implement all of that features, however the questions remain - To what degree? How convenient is it going to be? What extra features with business value can be implemented? Is the new system going to be flexible enough to remain for the next 5 years? Or, how can we make it faster and more safe to use?

1.3. Structure of the report

Project has been decided to be split into 6 parts where each of them focuses on a completely different topic to ensure stable and precise product development.

First part will emphasize on the feasibility of the project by analysing business. Second section will describe the methodology and on our choices that have lead to the project creation. Third part introduces Unified Process and goes through all of its sub sections. Fourth part presents the discussion and settlement on the project. Fifth section describes our feedbacks on each other. The last one, presents all of the appendices which appeared throughout the report.

1.4. Project Plan

The project plan gives an idea and a description of the whole project's scope in a chronological order. That way we can be certain that the objectives has been met and that the system is properly implemented and tested.

Detailed explanation of report setup

The report follows the structure presented by the Unified Process. According to which, we will divide it into 6 different parts, so that is shows the development process in detail. Below we present the descriptions of the contents included in all of these parts.

1st Part - Feasibility Study:

First part of the report presents the business analysis on the company. That includes: mission, vision, organisational structure/culture and chain management. Once these are ready, we can create nicely detailed SWOT analysis, well thought Stakeholder analysis and make Porter's 5 Forces model.

2nd Part - Methodology:

This part of the project is supposed to focus on explaining the Methodology that we have followed and used. That includes: explanation of the Methodology, juxtaposition of the possible choices and clarification on the final choice.

3rd Part - Unified Process:

Unified Process consists of the analysis and description of each, different stage of UP that are significant for fully designing and writing the system. There are 4 sub-sections that all together create unified process. Each one of them focuses on a different topic. We distinguish: Inception, Elaboration, Construction and Transition.

3.1 - Inception:

This section mainly focuses on providing all of the necessary requirements for our system. First, the Activity Diagram and Employee-Task-Goal Table are created. Next, we can identify the Use Cases and go through Risk Analysis. That leads us to the System Vision and Mock-Ups which reflect the design of the system's interface.

3.2 - Elaboration:

Elaboration section introduces the Fully Dressed Description of the Use Cases that has been presented in the Inception part. On top of that, Elaboration includes Test Cases created according to the use cases and Domain Model which is also the foundation for Relational Model. In order to sum up the analysis of the project - we introduce System Sequence Diagrams which show the interaction between the user and the system and Operation Contracts that describe said interaction. Ultimately, we create Sequence Diagrams to present interactions within the system and Design Class Diagram that reflects the final appearance of the system with its 3-Layer Architecture.

3.3 - Construction:

This part of the Unified Process focuses on code's standard and architecture that has been mentioned previously. Additionally, it includes the description on which Use-Cases have been implemented and explanation of our decisions that have been made.

3.4 - Transition:

Transition section focuses only on describing what steps we have taken to deliver the project.

4th Part - Discussion & Conclusion:

This part presents only a discussion on the development process and a conclusion.

5th Part - Group Evaluation:

This section includes the description of the group contract and feedback on each other.

6th Part - Appendices:

The last part is a set of all appendices that has inspired or has been used during the report writing and system creation process. First, we present explanation of the used terms in the report, then we list all of the references. Below, we are including logistical information, inter alia, SVN/Database location, as well the revision number of the project.

Logistical Information:

Information on where to find database, revision number as well as the SVN location, can be found below.

SVN and SQL-Database:

SVN & SQL-Database link SVN: https://kraka.ucn.dk/svn/dmai0918_1sem_projekt_1/2nd_semester_project

SVN-Version: Revision Nr.x'

SQL-Database: kraka.ucn.dk/dmai0918_1074262:1433

username: dmai0918_1074262

password: Password1!

1.5. Project Risk Analysis

Figure 1 represent table with all possible risks and their probability, severity and way how to handle that risks.

Risk	Probability	Severity	Total	Handling
<i>Complex and wide scope of the project</i>	4	5	20	<i>Detailed planning, feasible goals</i>
<i>Not meeting the requirement</i>	3	5	15	<i>Detailed interviews, continuous feedback from the customer</i>
<i>Too ambitious features</i>	3	4	12	<i>Implementing the most necessary stuff first</i>
<i>Issues with accessing database</i>	3	4	12	<i>Precise and thoughtful testing</i>
<i>Issues regarding SVN's compatibility</i>	2	3	6	<i>Informing on new updates, manual fixing</i>
<i>Group members dropping out of the project</i>	2	3	6	<i>Sharing the tasks, working in iterations</i>
<i>Lack of communication between group members</i>	2	3	6	<i>Following given tasks and contract</i>
<i>Inconsistent teamwork because of the extra activities</i>	3	2	6	<i>Early project schedule, setting rational deadlines</i>

Figure 1 table for project risk analysis

Feasibility Study:

A feasibility study is an analysis that takes all of a project's relevant factors into account—including economic, technical, legal, and scheduling considerations—to ascertain the likelihood of completing the project successfully. Feasibility studies also can provide a company's management with crucial information that could prevent the company from entering blindly into risky businesses(Kenton, 2019). Feasibility study is very important cause in this part we see business side of company and see all strengths and opportunities which company can use but also, we see all weaknesses and threads which pose a threat to our business.

2. Organizational structure and culture

This chapter explain structure of company “Ferometal-prerada” and gives idea in which way company works which is very interest because company has more than 30 employees and also describes organizational culutre to see relations inside company.

2.1. Organizational Structure

Organizational structure is a set of organizational positions, smaller organization units and their connections within the company. This allows to specify dependency and the distribution of rights and responsibilities. Functional structure which is used in Ferometal-prerada(Figure 2), is very often used by other smaller organizations. It mainly relies on dividing work to specialized sectors and unites employees by performing functions, allowing them to concentrate fully on their role as a specified department. Each sector has a person with high experience and skills, who helps in managing nearby employees.

When we look at the Ferometal-prerada company, it becomes clear that the reliability of departments and the quality of their work is very important. To fulfil this role, employees should be properly trained and experienced in their profession. A good solution is to divide work into separate areas and tasks. At the top of this structure is the Chief Executive Office Ivan Rašić. He takes the most important decisions and lead the company, all sectors are under

his management. However, Ivan decided to transfer ownership of his company to his two sons. When they both turned eighteen, they expressed their will that father should stay CEO and represents the company still. The implementation of the functional structure, which has been done, assumes grouping of employees due to their related tasks. To do this, the division into sectors should be applied, so that each sector would focus on clearly defined activates. The advantages of such an approach are high skills of employees, clear career growth path in future, high efficiency, clear hierarchy, good cooperation and communication in the sectors. However, there may be some disadvantages of such a solution as boredom and loss of enthusiasm of employees due to repetitive work and the risk of difficulties that may occur when making major changes to this type of structure. The Technical sector will be contained with appropriate tools and specialized machines (including CNC, measuring 3D faro arm, KASTO sawing machine, FRONIUS welding machines and etc.).Trained employees will be responsible for production, preparation and assembly of all elements. The Commercial sector will be divided into two smaller units. First the Procuration, holding two employees, which will deal with granting power of attorney to act linked with our company. The same employees have the task of acquiring materials form various sources for company, that later we collect and process into new products. Next the Sale sector, also for only two free places, focused on product sales, market and price analysis, staying in touch with customers, acquiring new ones and controlling all customer orders and payments. Smaller sectors such as financial affairs, human resources or quality control will play an equally important role.

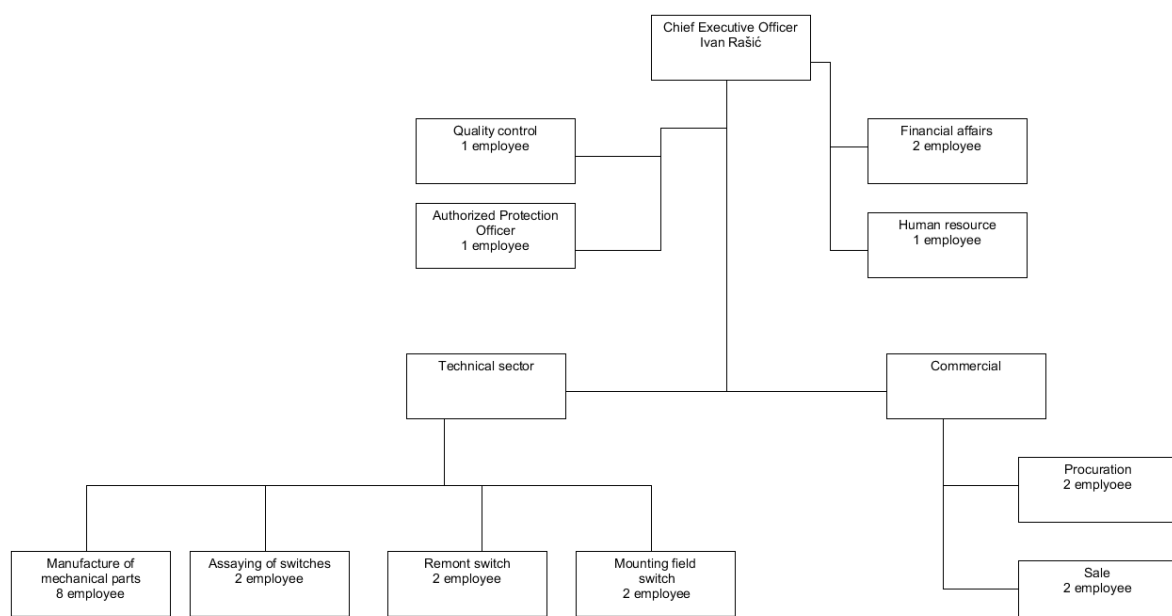


Figure 2 Structure of Ferometal-prerada

2.2. Organizational Culture

Culture in this company takes the form of a culture of roles, also known as the Apollo culture. (Gods of Management (1985), Charles Handy) Greek temple is used as a represent of this type of culture. Pillars holds the temple, they are foundation. Same as sectors and divisions in company. This type of organization can be successful and it is great to implement in a stable environment, when market is easy to predict, controllable or stable. Characterized by clearly defined roles and hierarchy, high levels of bureaucracy and formality. Such culture presents very static characteristics, employees can expect high stability, security and opportunity to become specialist in their work environment. It is a culture with strong structure that is constant and difficult to cope with change. Needless to say how essential is credibility, fulfilment of agreements and deadlines, and no promise of something that is currently impossible to fulfil. Building good relationships with customers and employees is a crucial factor in achieving business success.

3. Mission, Vision and strategic goals

Purpose of this section is to see mission(existing reason), vision(future picture) and main strategic goal and other long term goals which company want to achieve.

3.1. Mission

A mission statement defines what an organization is, why it exists, its reason for being. At a minimum, your mission statement should define who your primary customers are, identify the products and services you produce, and describe the geographical location in which you operate. (Entrepreneur Media, Inc., n.d.). The mission of Ferometal-Prerada is:

“ Constant investment in equipment and development and maintenance of good business relations with domestic and foreign business partners, ensuring high quality standards in the field of production. ”

3.2. Vision

A vision statement is sometimes called a picture of your company in the future but it's so much more than that. Your vision statement is your inspiration, the framework for all your strategic planning. What you are doing when creating a vision statement is articulating your dreams and hopes for your business.(Ward, S., 2018). The vision of Ferometal-prerada is:

“ We see us as a powerful metalworking company that is always one step ahead of others, ready to conquer new markets based on long-standing tradition, knowledge and reliability. ”

3.3. Strategic goals

The strategic goal of Ferometal-Prerada is quality. Buyers' requirements must be fully recognized, and when fulfilling the contractual obligations, they can all contribute to overcoming customer expectations, both in the immediate execution of the service, and in the culture of behaviour and behaviour towards the buyer.

Long-term goals are as follows:

- full customer satisfaction in terms of meeting all requirements
- business cooperation and development with suppliers-partnership in achieving customer requirements
- motivation of employees and their full engagement in quality improvement

- Steady improvement of the quality management system

Employee education will be a permanent task of the company, and the director will provide all the necessary preconditions for its realization.

4. Digital Business and Supply chain management

This chapter go into digital sphere of business(E-commerce and E-business) and into supply chain management and how its managed. Digital business involves every aspect of the business that is managed through digital technologies and media, for example optimising and improving competitiveness and internal processes with online and traditional channels to market and supply(Chaffey, 2015, p. 15). While Supply chain management involves every aspect of buy side(upstream supply chain) and sell side(downstream supply chain).

4.1. E-commerce and E-business

E-Commerce, or the short for “Electronic Commerce” is the process of selling and buying which done via the web or the internet. Unlike the physical store, in E-Commerce, there is no need for the buyer and the seller to meet with each other in order to do the whole selling and buying process. E-Business or Electronic Business refers to the use of internet, extranet, web, and intranet to conduct businesses. E-Business is quite similar to E-Commerce, but it is more than just a simple act of buying and selling products and services online. E-Business includes a wider kind of business processes, such as electronic ordering processing, supply chain management, customer relationship management, etc. So basically, E-Commerce is a part of E-Business. (Magento Expert, 2017.)

Ferometal-Prerada should include E-Commerce as part of their company because E-Commerce has six types and company can use some of them for example B2B(Business-to-Business) E-Commerce, main characteristic of this type is that include all transaction between two organisations and Ferometal-Prerada can use it to provide all raw material and good necessary for continuous production and in that way reduce time and people required for procurement raw material and goods. Second type that company can use is B2A (Business-to-Administration) which encompasses different services such as fiscal measuring, social security, taxes, etc. which also can be used to reduce time required to deduction these things. Company also should include Intranet and Extranet. Intranet as private network for communication inside the company can help in making communication, doing stuff, collaboration a lot easier and also help develop culture of company. Extranet as controlled private network can help Ferometal-Prerada make communication with suppliers faster and also company can exchange huge volume of data using Electronic Data Interchange(EDI).

Intranet and Extranet they have a lot advantages but also have disadvantages most important are security(if company have some important data or information it can easy be stolen cause all computer are connected and just need to find someone who will accidentally download spyware or malware) and also implementation and maintain cost within an organization.

4.2. Supply chain management

This chapter focuses on the Supply Chain Management (SCM) which, according to (Chaffey, 2015, p.248) can be described as follows: “the optimisation of material flows and associated information flows involved with an organisation’s operations... supply chain management can be enhanced through buy-side e-commerce internal communications, relationships with partners and sell-side e-commerce”. Figure 3 represent a more detailed Upstream and Downstream supply chain for the B2B Company model with more or less.

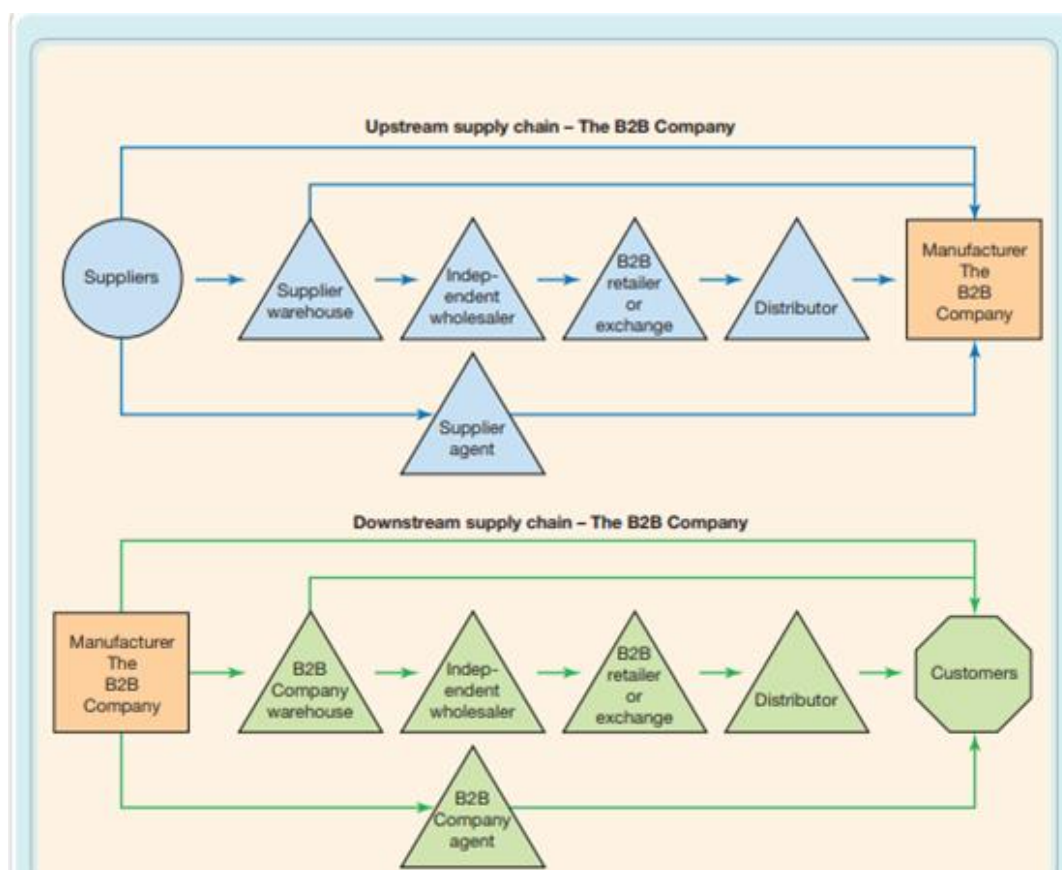


Figure 3 Supply chain

Upstream supply chain:

Upstream supply chain includes all activities involved in buy-side of e-commerce with suppliers and intermediators(distributor).Ferometal-Prerada as multi-national market oriented company also has suppliers from different countries e.g. Croatia(SET Bjelovar, Strojopromet, Onimerkur I.I.c...), Slovenia(Aluc), Germany(Thales Transportation System, Bikar-Metalle, Damstahl). Raw materials are always bought from same supplier while some semi-finished products can be bought from different suppliers. Intermediators for Ferometal-Prerada are suppliers itself.

Downstream supply chain:

While upstream supply chain is oriented on buy-side of e-commerce downstream supply chain is oriented on sell-side of e-commerce. Ferometal-Prerada sells their products to other company and that company finally to customers. Ferometal-Prerada well as their suppliers distribute their products themselves.

5. Stakeholder Tables

This stakeholder analysis will show all the stakeholders present within the project to help the team to develop and understand various individuals within the project. As described by (Bloisi, Cook, & Hunsaker, 2006, pp. 45,46) stakeholders are: “definable clusters of people who have an economic and/or social interest in the behaviour and output of an organization.” Down below, figure present a table analysing their stakeholders goals and interests, how they are expected to behave and etc.

Stakeholder	Their goals	Past reactions	Behaviour expected	Positive or negative to changes	Likely reactions
Ivan Rašić(CEO)	To run the company smoothly as possible.	Annoyance due to the waste of money and space.	Accepting the changes to current program.	Positive	Happy that the system provided is working as intended.
Commercial Department	To provide smooth transaction between customer and company.	Inability to track the stock amount, delivery and if it's being sent or not.	Accepting the changes to the current system.	Positive	Happy that the system provided makes everything simpler and easier.
Technical Department	To produce and manufacture various products.	Making too much of a product.	To have proper stock-management from superiors.	Positive	Not having to overwork or underwork for a certain job.
Customers	Purchasing the company's products.	No information whether it's been sent or delivered.	Able to see their products being sent or delivered.	Unknown	Probability of having them seeing being disappointed due to the quality.
Suppliers	Selling products to the company.	Unknown	Unknown	Unknown	None

Stakeholder Map

The stakeholder map shows that the company's in the centre and has the stakeholders who are interested in the company. As we can see in Figure 4 below, the most relevant stakeholder presented is the company's CEO, Ivan Rašić. The shorter the length of the line is, the more influential it is for the project. Technical Department and Suppliers play the least part in stakeholder map.

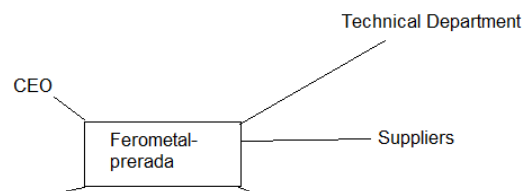


Figure 4 stakeholder map

Relationship Map

The relationship map gives an overview on how these stakeholders work together. The workload shows on how it is affecting each other – we can see in Figure 5 below that CEO keeps the main communication with project team and suppliers – also close communication with commercial department. The commercial department keeps the communication flowing with customers, to sell various products from the company's inventory, while technical department is manufacturing various goods, but does not interact with Commercial Department.

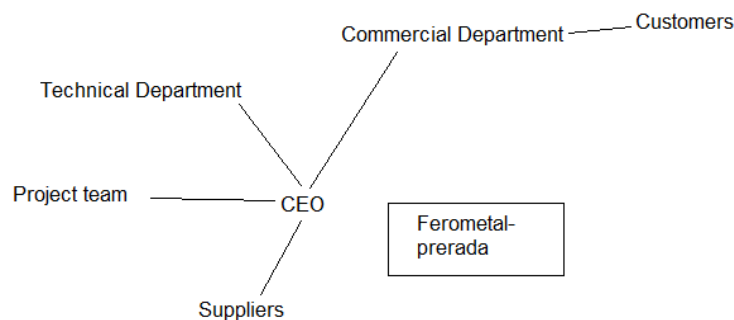


Figure 5 relationship map for stakeholders

6. SWOT analysis

SWOT Analysis is a simple but useful framework for analyzing your organization's strengths and weaknesses, and the opportunities and threats that you face. It helps you focus on your strengths, minimize threats, and take the greatest possible advantage of opportunities available to you (Mind Tools Content Team, 2018). Strengths and Weaknesses are internal factors and company can influence and change them while Opportunities and threats are external factors and company can't influence on them, company can try to use them or reduce their influence on company. SWOT analysis is also powerful tool which helps in crafting strategy some small business can craft few strategies that can simply be made from SWOT these strategies are: Strengths–Opportunities(SO strategy) use internal strengths to take advantage of opportunities, Strengths-Threats(ST strategy) use strengths to reduce threats, Weaknesses-Opportunities(WO strategy) improve your weaknesses by taking advantage of opportunities and Weaknesses-Threats(WT strategy)Eliminate weaknesses to avoid threats.

Strengths

One of most important strength of company is keep track with the most modern technology. That helps with production speed make it faster and make production cheaper. Thales Rail Signalling Solutions Stuttgart made Ferometal-Prerada only authorized for importing, repairing, servicing and installation of electro-hydraulic point machines for their company. Liquidity as one of most important strength help company to prove good financial status for future partners and customers. Twenty eight year experience gives company advantage in front of some other competitors because they know how trends changed on markets and can maybe in future predict something better that competitors with less experience in this area of business.

Weaknesses

Poor communication between departments inside the company results in non-existing. Also, extranet is weakness because it doesn't exist and if company introduce extranet that can help with reduce time with procurement of raw materials. In this day and age not using of e-business and e-commerce can be considered as weakness because these two things make whole production and business a lot faster and easier. No history tracking of quantity of

material is problem because company have problem with material and every time before new procurement employee must count/ weigh the raw material.

Opportunities

Expanding into auto industry can increase profit and help Ferometal-Prerada to be more recognisable and have more power and potential in metal industry. New technology as one of most important opportunities can help with reduce of cost, time and employees that need to work on some project or new order. Advertising as the most appreciated opportunity can help company to spread her name and get more power and influence one of most important fair in Croatia is SASO fair with more than 7,000 visitors.

Threats

One of most important threat are competitors, but in this metal industry competitors aren't so much competitive as in others industrial areas but in the end they are biggest threat. Tax law which Croatian government wants elect will influence on price of raw material and in that way will influence on final price of product and then customers can pick companies in other country. The fall in production and sales caused by the crisis is one of threat which is very hard to predict and the fall can be very big depends on the strength of the crisis and crisis don't influence on all markets same so that is problem if customer start choosing other markets in other countries where crisis is not so powerful.

	Helpful	Harmful
	Strengths	Weaknesses
Internal origin	<ul style="list-style-type: none"> - the most modern production equipment - the only authorized for the railway equipment by Thales Rail Signalling Solutions Stuttgart - liquidity - 28 years' experience in metal industry 	<ul style="list-style-type: none"> - no e-business and e-commerce - no intranet and extranet - no history tracking of quantity of material
	Opportunities	Threats
External origin	<ul style="list-style-type: none"> - expanding into auto industry - new technology - Advertising 	<ul style="list-style-type: none"> - raw material costs - the fall in production and sales caused by the crisis - other competing companies - new tax law

Figure 6 SWOT analysis

7. Porter's 5 forces

Porter's Five Forces is a business analysis model that helps to explain why different industries are able to sustain different levels of profitability. The model is widely used to analyze the industry structure of a company as well as its corporate strategy. Porter identified five undeniable forces that play a part in shaping every market and industry in the world. The forces are frequently used to measure competition intensity, attractiveness and profitability of an industry or market. These forces are: Competition in the industry, Potential of new entrants into the industry, Power of suppliers, Power of customers, Threat of substitute products(Kenton, S., 2019).

Power of suppliers

Ferometal-Prerada has more than 15 suppliers from different countries e. g. Croatia, Slovenia, Germany, this fact gives company more choice from which supplier buy equipment and material. In that way can easily affect on price and request lower prices. Some machines are bought from just one supplier, which gives that supplier a lot of power over those machines.

Potential of new entrants into the industry

Possibility of new entry to this market is very low, because it is very expensive, risky to start and maintain business in the metal industry market.

Power of customers

The market is very big and in case of Ferometal-Prerada it is very expensive because the company does not sell a small amount of products, all is sold in large quantities due to expensive machines because otherwise it does not pay to produce, so buyers have big financial power but don't have big power to influence on price because there is not so much substitution.

Threat of substitute products

Threat of Substitution is bigger on north side of Croatia than the south, because northern Croatia is closer to Germany and other Highly Developed Countries so it's easier to find substitution than in southern Croatia which is surrounded by not very developed countries e. g. Kosovo, Albania, Bosnia and Herzegovina which are not completely in the post-transition phase and have some internal problems so the product that can find in these countries aren't high-quality.

Competition in the industry

Some of companies e.g. Pružne građevine Ltd., Bijuk HPC I.I.c., Vibaz I.I.c. are competitors to Ferometal-Prerada but how this is expensive market there isn't a lot of competitive fighting as it exists in other markets, but still exists and if Ferometal-Prerada wants to keep competitive power it must continue to use new technologies and research market to see are they new customer wishes.

8. Business case

This chapter describe the business case of company(Ferometal-prerada) in relations with implementing new system. Current system has some issues like statistics and it is not user friendly. The system can be used but long term it will cost more money than implementing new one. Figure 7 present table with cost and benefit analysis.

Cost		Benefit	
Tangible	Intangible	Tangible	Intangible
Learning period (Time)	Frustration while learning (Happiness)	Shorter administrative time (time)	Les frustration while learning (Happiness)

Figure 7 Cost-Benefit table

Implementation of new system is dangerous cause lot of work is done with system. Also implementation is risky because new system can has some missing functions and bugs can have negative stroke on Ferometal-prerada. The recommendation is to implement new system because all this problems with non user friendly system will be even worse in future cause of growing of business and in future.

Methodology

“A system development methodology refers to the framework that is used to structure, plan, and control the process of developing an information system.”

(*The Centers for Medicare & Medicaid Services, 2008*). Without a doubt, finding and applying a proper methodology to the system development process of the project is one of the most crucial things. There's many factors that has to be taken into consideration when it comes to choosing said methodology. The decision is unique for every system, because each of them is much different from another. With introduction of this section we would like to present other possible methodologies with a short description and comparison.

The types of methodologies

Unified Process (UP) - is a really evolutionary and versatile methodology that can be easily applied to many various projects. It includes some of the best practices in a present system development. Because of that, developers get a better understanding of what customer actually needs. The aim of that methodology is to deliver a quality software to the customer without exceeding the budget and the deadlines.

Waterfall process - a methodology which relies on dividing project into sequences, setting goals, targeting deadlines and in-detail planning. This ensures a great control over the development process by slowly but successfully finishing each of the sequences as well as creating precise documentation and reliable reviews.

Agile Modelling (AM) - is based on a collection of principles which assume the simplicity of the software as well as adjusting to oftenly changing requirements.

It requires a continuous feedback in order to precisely reflect needs of the project stakeholders. Agile Modelling heavily relies on good communication rather than documentation.

Prototyping - is an iterative methodology which attempts to reduce project risks by breaking them into smaller segments. With the small mock-ups following modification process and the customer's participation in the project, the end result lives up to future users' expectations and acceptance. However, most of the time it ends up being just a prototype. This methodology requires a basic understanding of a business problem.

Comparison

Unified Process (UP) is an iterative and incremental methodology. Its main 4 sections (Inception, Elaboration, Construction, Transition) are divided into smaller iterations to ensure the best way of handling risks associated with a certain section of a system development. Each of the iterations result in an increment, in other words, a newer version of the system - improved documentation/implementation, expanded functionality and corrected mistakes. This methodology is a key for developing big projects where goals are clear and easy to identify. Moreover, by following this process it is granted that the documentation of the system is going to be precise and expansive. That way, the project group has no troubles maintaining a proper and progressive development. It is unlikely for problems to occur in a late phase what prevents team members from fixing big chunks of the software. All of the requirements should be met and the quality satisfying.

Waterfall methodology is a really good approach (even for the inexperienced) due to its predefined requirements, goals, deadlines. Its schedule is really clear and simple what makes it easy to follow and control. It allows to save resources while maintain a high-quality product. However, the development process is really slow and inflexible. It may be difficult to define in the beginning what developers will need and so it may negatively affect/delay identification of the resources. On top of that, there is a great risk of problems appearing not before system testing, which takes place after the whole system is coded. This in turn may cause a huge problems when correcting the software. The most proper way to use it is when there is no need for immediate implementation, when it has clear objectives and goals and whenever the system is complex and expensive.

In contrast to previous methodology there is a more flexible one - **Agile Modelling (AM)**. Its flexibility is derived from common requirement changes. The small amount of documentation makes it easier to correct and focus on implementation. Everyone in the project group is involved in the planning, coding and testing what makes communication between project members much simpler and faster. Lack of the documentation may lead to detecting serious issues later on or simply missing on something important. Additionally, every new project member or a person analysing the system can easily get lost due to system's short documentation and they may find it really hard to adapt and co-operate.

Prototyping is not fully a methodology, but "An approach to handling selected portions of a larger, more traditional methodology" (*The Centers for Medicare & Medicaid Services, 2008*). What is different about this process is that the customer is firmly involved in the development process in form of a feedback. Prototyping is useful whenever there is a pressure for quick implementation, the goals are unclear and requirements will probably change. On the other hand, it is not recommended to use if the project team composition is unstable, objectives are clear or the project is associated with web e-business.

Methodology used in “Ferometal-prerada” software

After a brief discussion on what our internal and external resources/advantages/disadvantages are we have decided to choose Unified Process as our system methodology. We will undeniably need some feedback from our customer as well as detailed documentation on the product therefore we are sure this is a proper choice.

Unified Process (UP)

Unified Process consists of nine iterations within four sections, which are Inception, Elaboration, Construction and Transition. In the diagram below(Figure 8¹) there are six categories Business Modelling, Requirements, Analysis & Design, Implementation, Test, Deployment. **Business Modelling** is included in the Inception and Elaboration phases. **Requirements** are presented in the Elaboration part. **Analysis & Design** is a longer process due to its significance, but its core is made in Elaboration and continues in Construction. **Tests** are done at the same time as the **Implementation** and so both of them are included in one section which is Construction. The last one, **Deployment**, takes place in the Transition part.

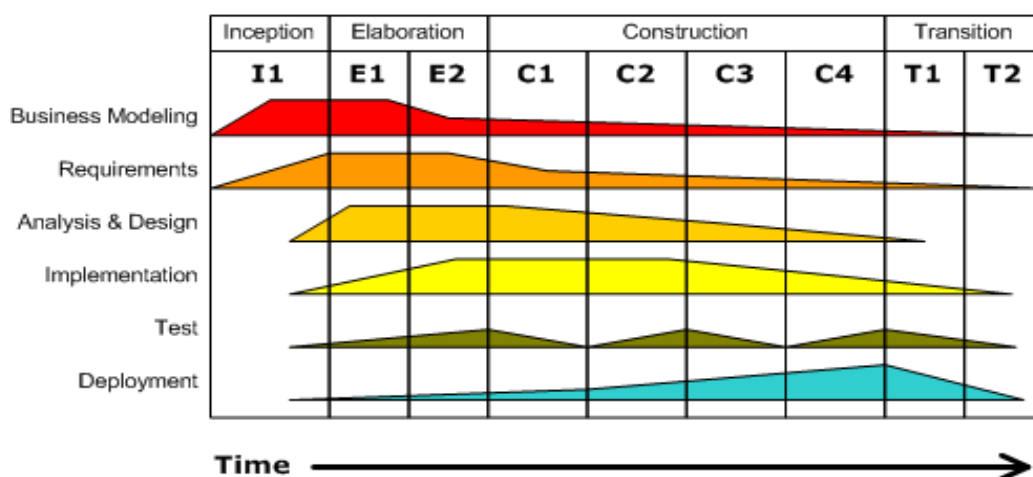


Figure 8 phases of unified process

¹ Source: https://en.wikipedia.org/wiki/Unified_Process

9. Use case

According to (Larman, 2004, p. 63) use case is: “a collection of related success and failure scenarios that describe an actor using a system to support a goal ” Figure 9 shows Use cases for new system and we have actors(they can be persons, computer system, organizations) in this case actors are departments inside company, two most important use case we decide to focus on are Manage materials and Manage orders use case.

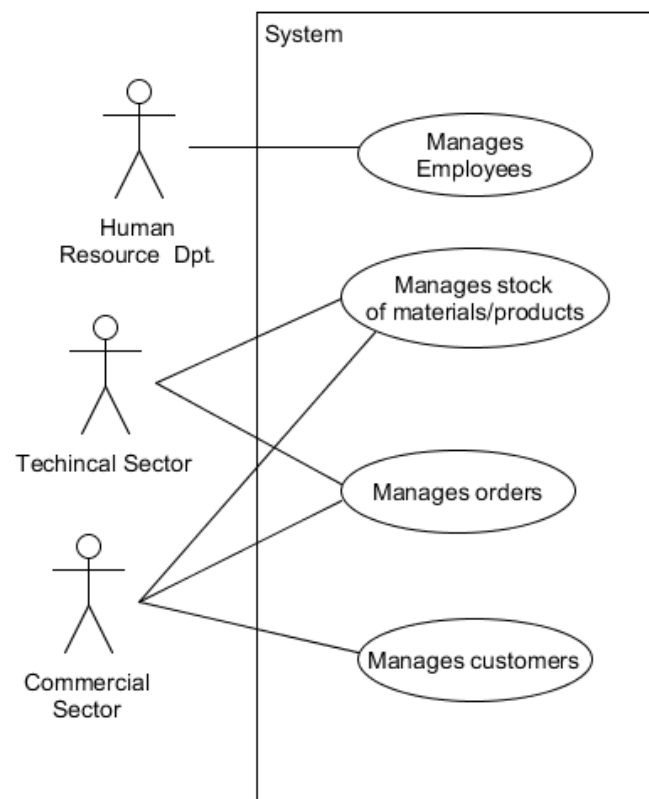


Figure 9 use case

10.Domain Model

The diagram(Figure 10)below represents domain model. The main role of this diagram is to show the relations between classes in the system. It is supposed to give an idea on the interactions within the system, what elements of reality the classes refer to and how the certain problems have been solved. Additionally, we support inheritance which, in this case, was a way of solving the storing issue as well as making the system more flexible for adding new services.

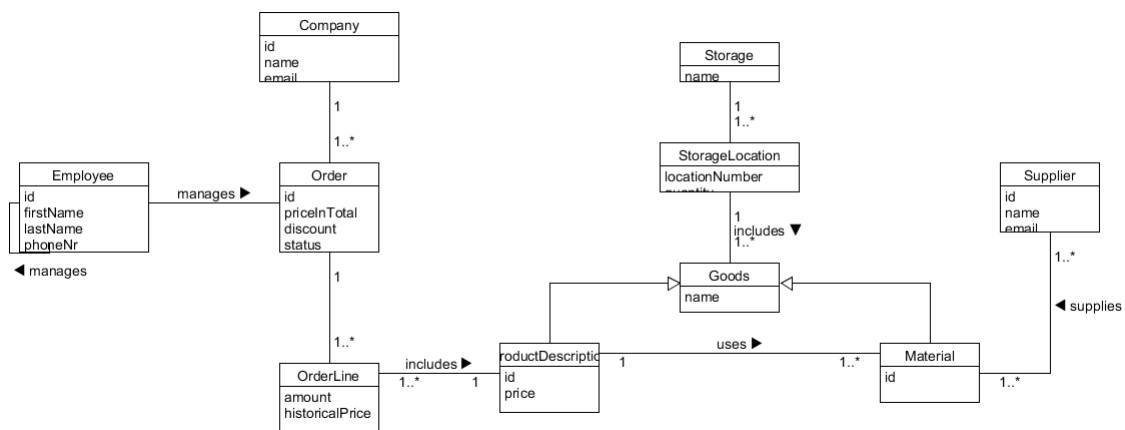
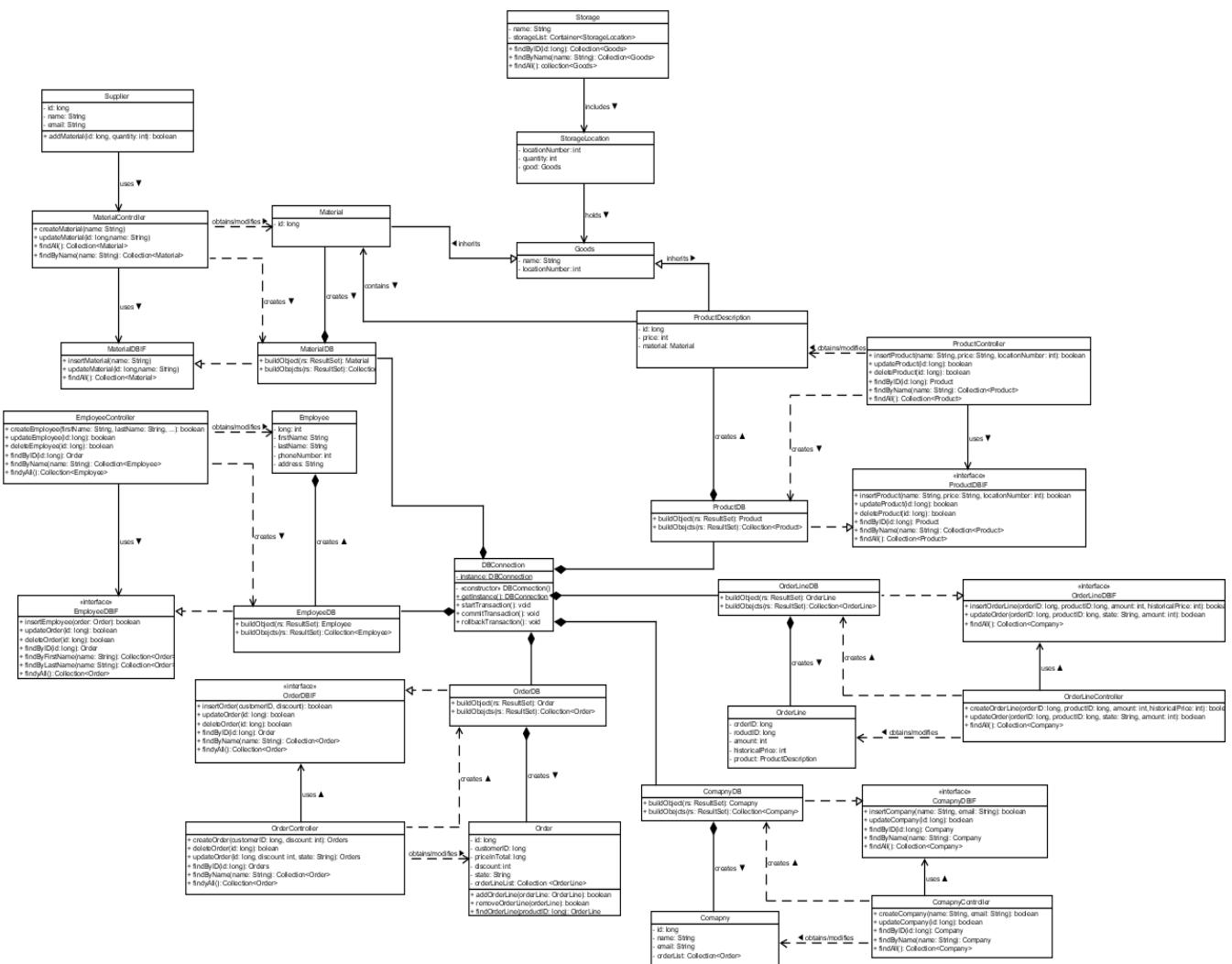


Figure 10 domain model

As simple as the diagram looks, it covers the solutions for the most necessary features of the system. However, due to the quickly approaching deadline, we have assumed some conditions for different scenarios, as well as resolving problems in real life. For instance, the storage places should be labelled by employees, so that they are synchronized the way they want them within the system. Secondly, we are not including material information other than name and id, because supplier is responsible for delivering materials properly shaped beforehand.

Design Class Diagram's purpose is to show the relation between the classes, their methods and attributes. It also gives us better understanding of an architecture that has been used within the system. Diagram is continuously being improved, due to the fact that we, as a project team, change our minds and come up with different solutions as the system's development progresses over time. Since the diagram is very extensive, we haven't included setters and getters as it would be unnecessary and would only make it unreadable. The diagram should give us a good understanding on how the system works.



12. Activity Diagram

A UML activity diagram shows sequential and parallel activities in a process. They are useful for modelling business processes, workflows, data flows and complex algorithms(Larman, 2005, p. 477).

Create Order

One of the most important and crucial features of the system is it being capable of managing orders by an employee. The most complex action is creating said orders. It is an extensive use-case, because it has a lot of side scenarios as well as it has to interact with different parts of the system, including database. Although, it does not sound complex, we have to keep in mind that there are multiple ways of approaching the problem. Figure 12 shows activity diagram for create order.

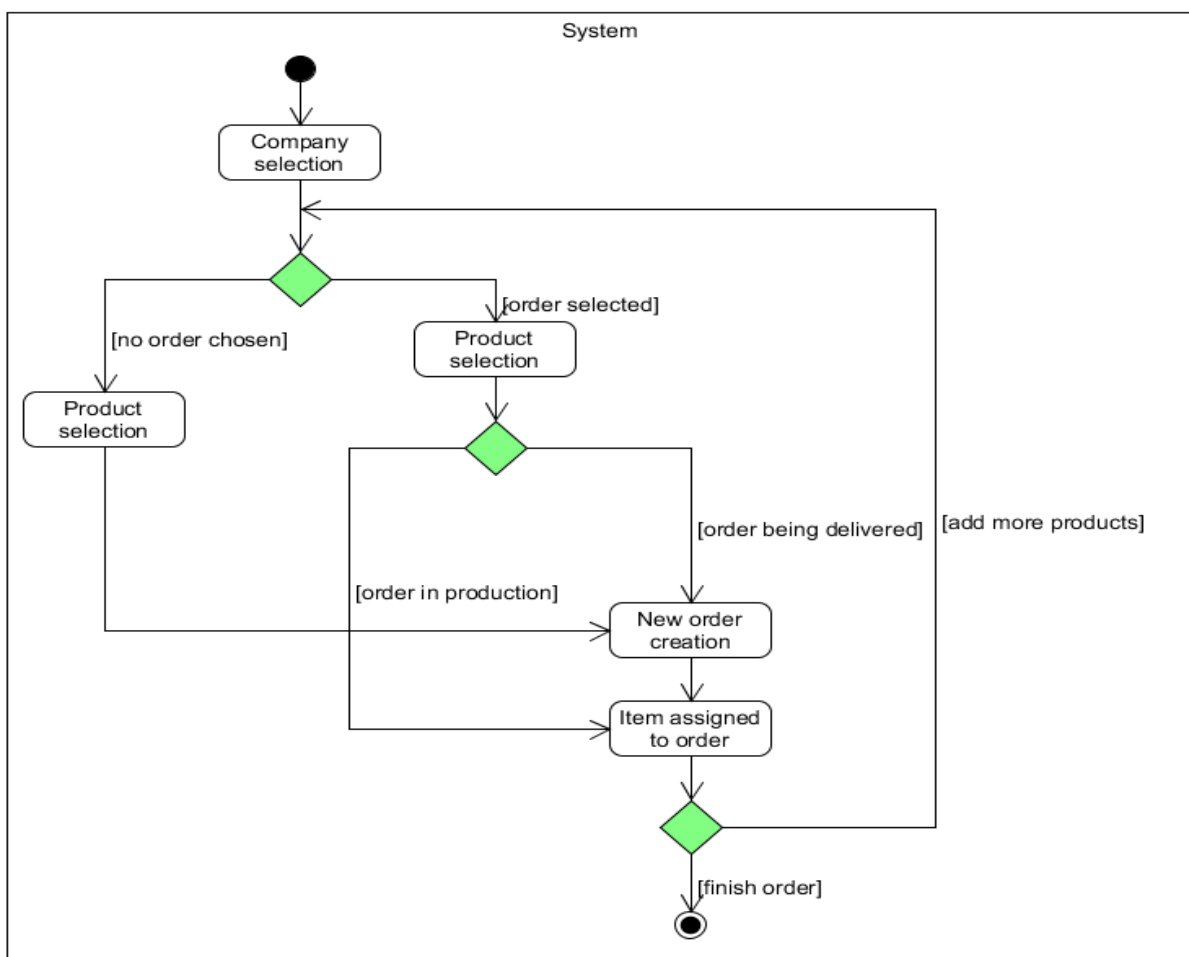


Figure 12 activity diagram for create order

Update Order

Another important feature and a part of order management is possibility to update the orders. In case of any mistake or misunderstanding employees should be able to edit orders according to customer's wish. It is achieved by selecting a company from a list of all customers and proceeding to its orders. From there employee is capable of changing the quantity of a certain product, applying discount, removing or adding extra products as long as the order still have not reached production phase. Figure 13 below represent activity diagram for update order.

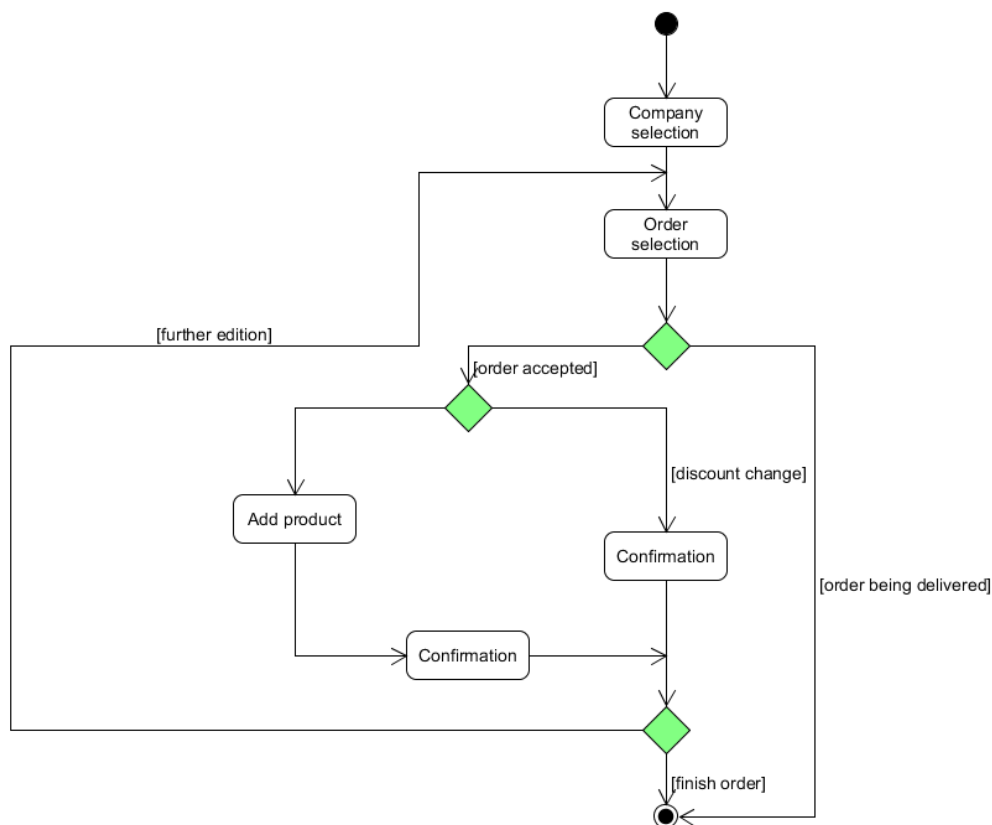


Figure 13 activity diagram for update order

13.Relation model

Relational database model consists of nine tables. The diagram(Figure 14) below shows how the tables and data are connected and what information each table consists of. Our biggest guideline when creating this model was a previously prepared domain model. We applied the third form of normalization to prevent redundancy and the problem of anomalies when modifying and deleting information. We have put efforts to create the database as clear and efficient as possible. Order table has a primary key ID, which is a numeric value that is assign to every order we have in the system. This ID is also a foreign key in Orderline table. CompanyID is used as primary key reference from Company. ProductDescription uses ID column as a primary key, when in Orderline table exists foreign key for that. In ProductDescription is also materialID column which is foreign key to Material table. Material table has ID as a primary key and supplierID which is related to Supplier table as a foreign key. StorageLocation has three columns, first is a locationNumber as a primary key, last one is supplierID which is foreign key to table Storage.

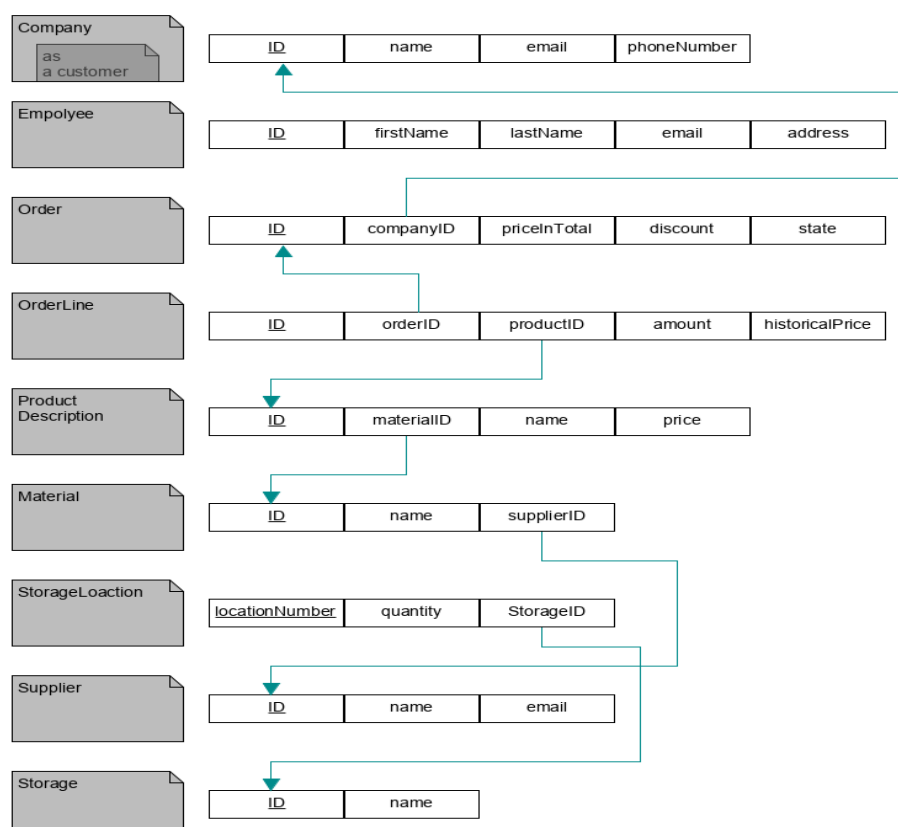


Figure 14 relation model

14.Database

In this section we go through the database details, its script and use of it in the system. A relational database handles the redundancy by making relations in between tuples of certain tables. MS SQL is a database that has been provided for our system

The first part, is the indication of the existing database on which we want work, and also the code which has the task to drop tables, if identical tables already exists. Thanks to this, we can be assured that the database is clean up and ready to set.

```
USE dmai0918_1074281;
GO

IF OBJECT_ID ('Orderline') IS NOT NULL DROP table Orderline;
IF OBJECT_ID ('StorageLocation') IS NOT NULL DROP table StorageLocation;
IF OBJECT_ID ('Product') IS NOT NULL DROP table Product;
IF OBJECT_ID ('Orderr') IS NOT NULL DROP table Orderr;
IF OBJECT_ID ('Material') IS NOT NULL DROP table Material;
IF OBJECT_ID ('Storage') IS NOT NULL DROP table Storage;
IF OBJECT_ID ('Supplier') IS NOT NULL DROP table Supplier;
IF OBJECT_ID ('Employee') IS NOT NULL DROP table Employee;
IF OBJECT_ID ('Company') IS NOT NULL DROP TABLE Company;
```

Figure 15 SQL Clean-up scripts

The next step is fully focused on creation of all nine tables and connections between them. Assigning to tables proper attributes and adding primary and foreign keys. On columns which are primary key we assign IDENTITY property, that causes each next record is unique and automatically incremented.

```
create table Company(
    id decimal(6,0) IDENTITY(1,1),
    name VARCHAR(30),
    email VARCHAR(30),
    phoneNumber decimal(10,0),

    CONSTRAINT pk_CompanyID PRIMARY KEY (id)
)

create table Orderr(
    id decimal(6,0) IDENTITY(1,1),
    companyID decimal(6,0) FOREIGN KEY REFERENCES Company(id)
    on update cascade on delete set null,
    priceInTotal decimal(10,2),
    discount INT,
    State VARCHAR(30),

    CONSTRAINT pk_OrderrID PRIMARY KEY (id)
)

create table Product(
    id decimal(6,0) IDENTITY(1,1),
    materialID decimal(6,0) not null foreign key references Material(id),
    name VARCHAR(30),
    price decimal(5,2)

    CONSTRAINT pk_ProductID PRIMARY KEY (id)
)
```

Figure 16 SQL create table

After that, we make sure that the data is properly stored in the database and run tests on it. For this purpose, we used the INSERT INTO instructions which one after the other puts piece of data and fill the tables. The full script with all instructions can be found in the 'DBscript.sql' file.

```
INSERT INTO dbo.Company (name, email, phoneNumber) VALUES ('railway company','railwayco@gmail.com',123123123);
INSERT INTO dbo.Employee (firstName, lastName, email, address) VALUES ('John','Smith','jsmith@gmail.com','denmark');
INSERT INTO dbo.Supplier (name, email) VALUES ('SteelAssociation', 'SteelAssociationCo@gmail.com');
INSERT INTO dbo.Storage (name) VALUES ('Storage area #1');
INSERT INTO dbo.Storage (name) VALUES ('Storage area #2');
INSERT INTO dbo.StorageLocation (quantity, storageID) VALUES (1000, 1);
INSERT INTO dbo.Material (name) VALUES ('mild steel');
INSERT INTO dbo.Material (name) VALUES ('stainless steel');
INSERT INTO dbo.Material (name) VALUES ('carbon steel');
INSERT INTO dbo.Product (materialID ,name, price) VALUES (1,'milling part type A', 60);
INSERT INTO dbo.Product (materialID ,name, price) VALUES (2,'milling part type B', 100);
INSERT INTO dbo.Product (materialID ,name, price) VALUES (3,'milling part type C', 150);
INSERT INTO dbo.Orderr (companyID, priceInTotal, discount, state) VALUES (1,999 ,999, 'ACCEPTED');
INSERT INTO dbo.Orderr (companyID, priceInTotal, discount, state) VALUES (2,999 ,999, 'ACCEPTED');
INSERT INTO dbo.Orderr (companyID, priceInTotal, discount, state) VALUES (1,999 ,999, 'ACCEPTED');
INSERT INTO dbo.Orderline (orderID, productID, amount, historicalPrice) VALUES (1, 1, 10, 60);
INSERT INTO dbo.Orderline (orderID, productID, amount, historicalPrice) VALUES (2, 2, 5, 100);
INSERT INTO dbo.Orderline (orderID, productID, amount, historicalPrice) VALUES (2, 3, 5, 150);
```

Figure 17 SQL insert data

15.Mock-ups

Mock-ups helps developer in creating graphical user interface because mock-ups is photos or scratches of whole GUI or usually most important and complicated part. To create mock-ups choice was made to work with Pencil Project² tool version 3.0.4. Figure 18 shows our mock-up for create order.

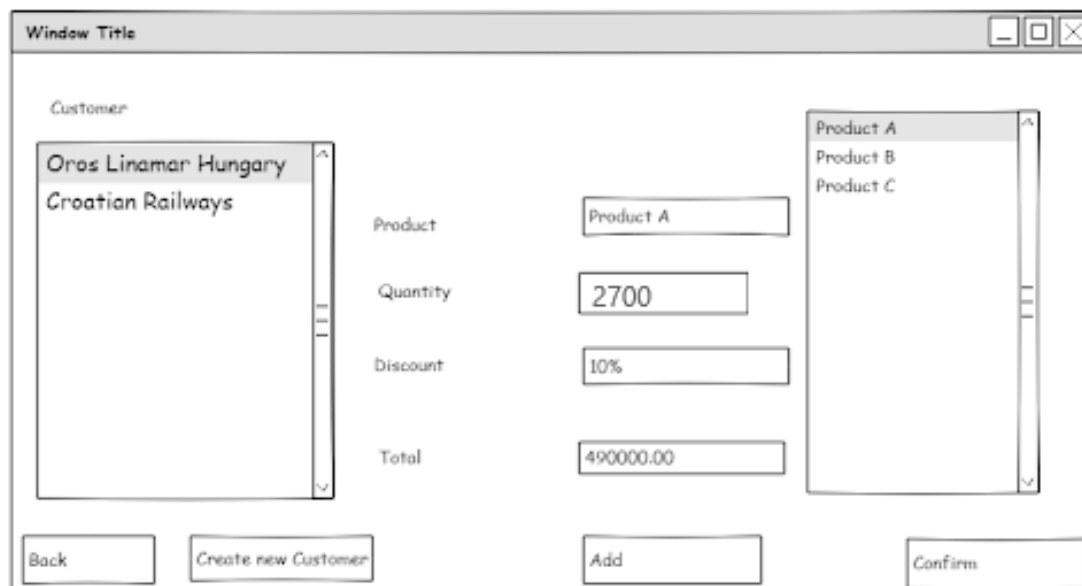


Figure 18 Create order(mock-up)

On the left side of window there is list box with all customers where employee picking one for whom they are making new order, if customer doesn't exist employee press Create new Customer button and going into new window(Figure 19) for creating new Customer where he need to add customer name, email address and phone number.

² <https://pencil.evolus.vn/>

Create customer

Name: AD plastic

Email: procurement@adplastic.hr

Phone number: +385 95 776 356

Exit Confirm

Figure 19 Create customer(mock-up)

After employee choose customer, he choose product form list on the right side of windows and when employee choose product, product name is automatically displayed in the middle of the create order window and then employee input quantity of product and press add to add product to order if he/she needs to add more products he/she does the same thing and if order is done employee add discount and finish order by pressing confirm button.

16. Fully dressed use-case

Fully dressed use case as name say is detailed explanation of use case. It contains use case name, who has role in that use case(actors), pre- and post-condition, frequency how many times actors perform that action, main success scenario and alternative flows. Figure 20 shows fully dressed use case for manage order. Main success scenario is create new order while alternative flows are update order or some possible errors that can happened such as order or product doesn't exist in the system and discount cannot be applied because of companies politics(customer is new, order isn't big).

Use case name	Manage Order	
Actors	Commercial Sector employee	
Pre-conditions	Customer order something	
Post-conditions	The order has been created	
Frequency	Few times a month	
Main Success Scenario (Flow of events)	Actor	System
	1. The Employee create order	2. System confirms
	3. The Employee add product by ID to order	4. System confirms
	<i>Continues 3rd and 4th step until all products added.</i>	
	5. The Employee apply discount	6. System confirm
	7. The Employee confirm order	8. System display total with discount included
Alternative flows	1a. The employee update order. 1. The employee search for order by ID. 3. The employee set amount of product. 5. The employee set discount. 2a. Order doesn't exist in system. 3a. Product doesn't exist in system. 5a. Discount cannot be applied.	

Figure 20 Fully dressed use-case for Manage order

Figure 21 displays fully dressed use case for manage material. The main success scenario is update of material instead of creating new material because it is more common that employee will update material they have in system then create new material or delete material, that is why create new material and delete material are alternative flows.

Use case name	Manage Material	
Actors	Commercial Sector employee	
Pre-conditions	The material exists in database	
Post-conditions	The material has been updated	
Frequency	Few times in week	
Main Success Scenario (Flow of events)	Actor	System
	1. The Employee searches for a material by ID.	2. System display material
	3. The Employee updates the material.	4. System confirms the material update.
Alternative flows	1a. The Employee creates a new material. 1. System confirm 3a. The Employee deletes material 4. System confirm	

Figure 21 fully dressed use-case for manage material

17.Test case

“A Test Case is a set of actions executed to verify a particular feature or functionality of your software application. The Test Case has a set test data, precondition, certain expected and actual results developed for specific test scenario to verify any requirement. A test case includes specific variables or conditions, using which a test engineer can determine as to whether a software product is functioning as per the requirements of the client or the customer.”(Guru99, n.d.) Figures 22 & 24 shows scenario matrix and figures 23 & 25 shows test cases for manage order.

Manage Order	Starting Flow	Alternate
Scenario 1 – Creating order	Basic Flow	/
Scenario 2 - The employee update order.	Basic Flow	1a
Scenario 3 – Order doesn’t exist in system.	Basic Flow	2a
Scenario 4 – Product doesn’t exist within the system.	Basic Flow	3a
Scenario 5 - Discount cannot be applied	Basic Flow	5a

Figure 22 scenario matrix for manage order

Test Case ID	Scenario	Order created	Find product by Id	Find Order	Set amount of Product	Discount	Expected Outcome
MO1	Creating order	v	v	v	v	v	Order has been created
MO2	The employee update order.	/	/	v	v	v	Order has been updated
MO3	Order doesn’t exist in system.	/	/	i	N/A	N/A	System will show error message
MO4	Product doesn’t exist within the system.	v	i	/	N/A	N/A	System will show error message
MO5	Discount cannot be applied	v	v	/	/	i	Order will be created without discount

Figure 23 test case for manage order

Manage Material	Starting Flow	Alternate
Scenario 1 – Updating Material	Basic Flow	/
Scenario 2 – The Employee creates a new material.	Basic Flow	1a
Scenario 3 – The Employee deletes material	Basic Flow	3a

Figure 24 scenario matrix for manage material

Test Case ID	Scenario	Find material	Update material	Delete material	Create material	Expected Outcome
MM01	Updating Material	v	v	/	/	Material updated
MM02	The Employee creates a new material.	/	/	/	v	New material created
MM03	The Employee deletes material	v	/	v	/	Material deleted

Figure 25 test case for manage material

18. System Sequence Diagrams and operation contracts

A system sequence diagrams (SSD) and operation contracts can be defined as “fast and easily created artefact that illustrates input and output events related to system under discussion. They are input to operation contracts and – most importantly – object design... Operation contracts use a pre- and post-condition form to describe detailed changes to objects in a domain model, as the result of a system operations.” (Larman, 2004, pp.173-181).

Create Order

Figure 26 display system sequence diagram for Create Order. Creating order start when employee press create order button. Then he enters id of product and add the same one and he do that until he adds all product for that order. After that employee apply discount if that is possible and confirm order and system returns total with discount included. Below figure 26 are operation contracts for SSD create order

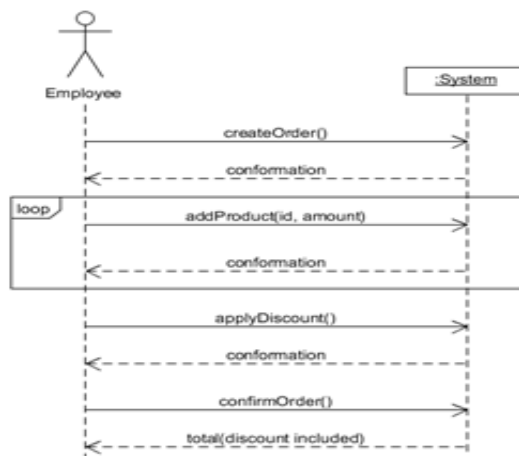


Figure 26 SSD for create order

Operation: `createOrder()`

Use case: Create Order

Pre-condition: CustomerController
CustomerDB exist.

Post-condition:

- Order instance was created

Operation: `addProduct(id, amount)`

Use case: Create Order

Pre-condition: An Order instance exist

Post-condition:

- OrderLine instance was created
- OrderLine associated with Order
- OrderLine.amount became amount
- OrderLine associated with ProductDescription, based on ID

Operation: applyDiscount()
 Use case: Create Order
 Pre-condition: Order and Order line must exist
 Post-condition:
 · Discount was applied

Operation: confirmOrder()
 Use case: Create Order
 Pre-condition: Order and Order line must exist
 Post-condition:
 · order is validated and saved

Update Order

In update order there are 2 SSD's. First one Figure 27 display updating order, employee pick order and order line and in that order line he change amount of products, and second Figure 28 display updating order where employee picks order and change discount. There is no SSD for delete order line because Ferometal-Prerada takes just big orders bigger than 15 000€, so there is contract between Ferometal-Prerada and customer which needs to be approved by employee or CEO(depends on company and price of order) of customer's company. Below figures 27 & 28 are operation contracts for SSD update order.

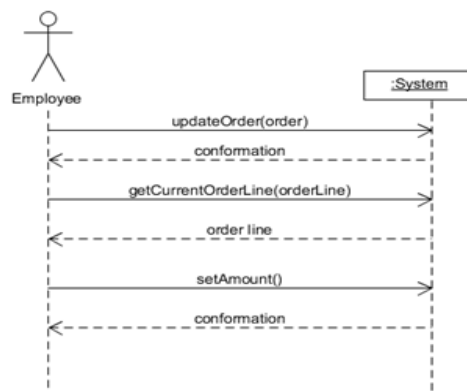


Figure 27 SSD for update order

Operation: updateOrder(order)
 Use case: Update Order
 Pre-condition: an order instance must exist.
 Post-condition:
 · Order is displayed

Operation: getCurrentOrderLine(orderLine)
 Use case: Update Order
 Pre-condition: an order instance must exist.
 Post-condition:
 · Order line is displayed

Operation: setAmount()
 Use case: Update Order
 Pre-condition: an order instance must exist.
 Post-condition:
 · order.amount become amount

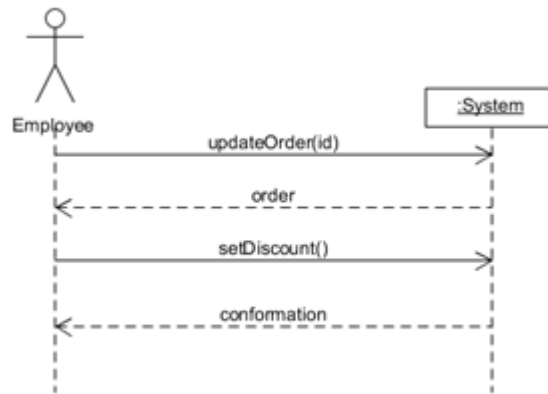


Figure 28 SSD for update order

Operation: updateOrder(id)

Use case: Update Order

Pre-condition: an order instance must exist.

Post-condition:

- order is displayed

Operation: setDiscount()

Use case: Update Order

Pre-condition: an order instance must exist.

Post-condition:

- order.discount become amount

Material-CRUD

Figure 29 display system sequence diagram for material-CRUD(Create, Read, Update, Delete). Employee first create product, input name, location number and amount, system send conformation if everything is good, after that employee search material by id, if material with that id existing system display that material, after that employee can update that material update name, location number and amount or employee can delete that material and system send confirmation. Below figure 29 are operation contracts for SSD update order.

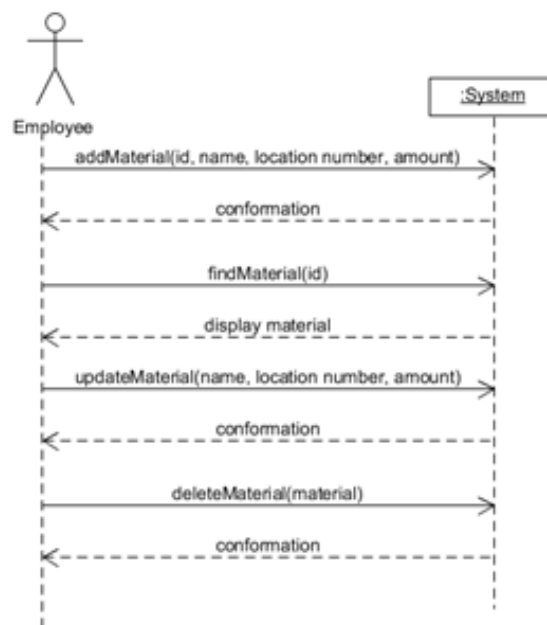


Figure 29 SSD for manage order

Operation: addMaterial(name, location number, amount)

Use case: Material - CRUD

Pre-condition: materialController customerDB exist.

Post-condition:

- A material instance was created
- material.name become name
- material.locationNumber become locationNumber
- material.amount become amount

Operation: findMaterial(id)

Use case: Material - CRUD

Pre-condition: material instance must exist

Post-condition:

- A material instance was created
- material.name become name
- material.locationNumber become locationNumber
- material.amount become amount

Operation: updateMaterial(name,
location number, amount)

Use case: Material - CRUD

Pre-condition: material instance must exist

Post-condition:

- material.name become name
- material.locationNumber become locationNumber
- material.amount become amount

Operation:

deleteMaterial(material)

Use case: Material - CRUD

Pre-condition: material instance must exist

Post-condition:

- Material is deleted

19. Interaction diagram

Interaction diagram as part of the UML help us to see how objects interact via messages. There are two types of interaction diagram: sequence interaction diagram and communication interaction diagram. "Sequence diagram illustrate interaction in a kind of fence format, in which each new object is added to the right ... Communication diagrams illustrate object interaction in a graph or network format, in which object can be placed anywhere on the diagram" (Larman, 2004, pp.222-223). Figure 30 shows interaction diagram(sequence diagram) for order creation.

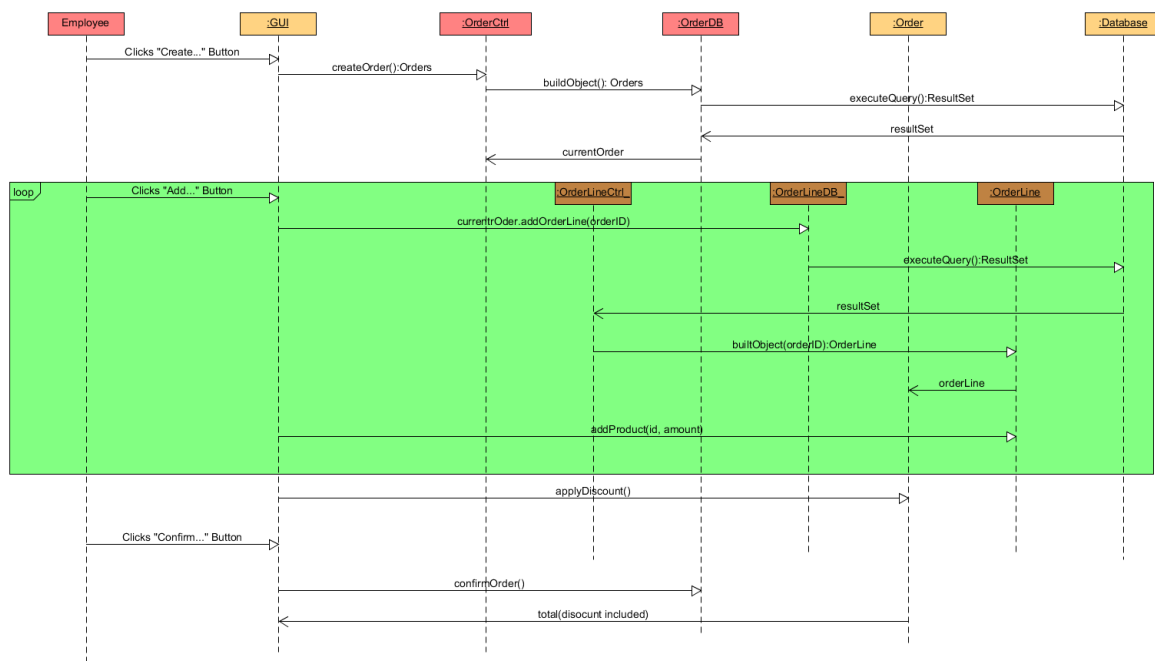


Figure 30 interaction diagram for create order

Construction

The 4th and the last phase of Unified Process focuses on ideas of implementing parts of the system and its architecture. Beside these important topics, this section includes the explanation for the design choices.

20.Code standard and architecture

This section is focused on code standard the group made before started project and also on architecture the team choose to make product. This section presents the code standards that we have followed during program construction, architecture and design choices that we have made.

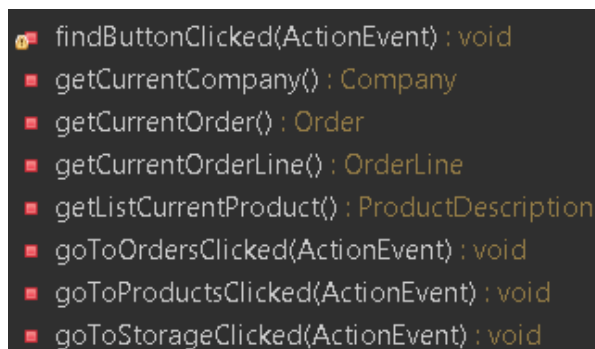
Code standards

The code has been written according to Java's standards. We have also decided to include comments on unclear sections of the program's backend. Methods and variables has been named in such a way that it is clear what purpose they serve and what they represent.

A screenshot of a code editor showing a list of variables. Each line starts with a red square icon followed by the variable name, its data type, and its category. The variables are: btnApplyChangesOrder (JButton - GUI), btnApplyChangesProduct (JButton - GUI), btnBackOrder (JButton - GUI), btnBackProduct (JButton - GUI), btnFindCompany (JButton - GUI), btnGoToOrders (JButton - GUI), btnGoToProducts (AbstractButton - GUI), btnGoToStorage (JButton - GUI), btnInsertCompany (JButton - GUI), btnInsertProduct (JButton - GUI), and btnRemoveProductOrder (JButton - GUI).

```
▪ btnApplyChangesOrder : JButton - GUI
▪ btnApplyChangesProduct : JButton - GUI
▪ btnBackOrder : JButton - GUI
▪ btnBackProduct : JButton - GUI
▪ btnFindCompany : JButton - GUI
▪ btnGoToOrders : JButton - GUI
▪ btnGoToProducts : AbstractButton - GUI
▪ btnGoToStorage : JButton - GUI
▪ btnInsertCompany : JButton - GUI
▪ btnInsertProduct : JButton - GUI
▪ btnRemoveProductOrder : JButton - GUI
```

Figure 31 variables

A screenshot of a code editor showing a list of method names. Each line starts with a red square icon followed by the method name and its return type. The methods are: findButtonClicked(ActionEvent) : void, getCurrentCompany() : Company, getCurrentOrder() : Order, getCurrentOrderLine() : OrderLine, getListCurrentProduct() : ProductDescription, goToOrdersClicked(ActionEvent) : void, goToProductsClicked(ActionEvent) : void, and goToStorageClicked(ActionEvent) : void.

```
▪ findButtonClicked(ActionEvent) : void
▪ getCurrentCompany() : Company
▪ getCurrentOrder() : Order
▪ getCurrentOrderLine() : OrderLine
▪ getListCurrentProduct() : ProductDescription
▪ goToOrdersClicked(ActionEvent) : void
▪ goToProductsClicked(ActionEvent) : void
▪ goToStorageClicked(ActionEvent) : void
```

Figure 32 method names

3-layer architecture

Choosing system architecture is also one of most important questions, because right architecture provides high cohesion and low coupling for system.

There are few types of software architecture, but at the end the group decide to work with three-layer architecture. 3-layer architecture is divided into 3 layers: GUI, Control and Model layer. Model layer is separated into Model and Database layer. Through GUI layer user communicate with system. Control layer hold all logic of the system and connect GUI layer with Model and Database layer. Control layer also taking data from user by GUI and insert it into database through Database layer.

Discussion & Conclusion

While group was doing project group was more familiar with iteration design, also front-end development(for GUI). Iteration design was divided into iteration of approximately 10 days, for front-end development we use some 10 heuristics of a good graphical use interface by Jakob Nielsen(in appendix are all 10 rules).

Group Evaluation

In this section we describes group process during project and also our group contract which was made at beginning of this semester and signed by all group members.

21. Group process

At beginning of February group has 3 members(Krzysztof, Matej and Krystian). Through February Matej and Krzysztof found company(Ferometal-prerada) and had interview with company and made problem statement. And we decide some unwritten rules for project, we tried have meeting every 10 days sometimes we did that after classes sometimes on weekend. In March group has first meeting with their supervisor Finn where we discuss problem statement and plan for this project. After mini project persistence we add new group member Mantas and continue work on project. We divide business part and give Krystian and Mantas one small part because they didn't prove other part of the group that they want finish this course. In mid of April we had another meeting with Fin, due to bad attendance of Mantas and Krystian and bad communication inside group. After meeting we continue working on system development part. We decided that we want system development part be done and put in report till 5th of May, but Mantas didn't put his part and didn't respond on message in group chat although he was online. At 9th of May we decide to kick Mantas off the group and send message to Finn. After that we needed to made Mantas part of system development and explain it because he didn't send anything that we can include in report and parallel with that we worked on programming part. Also we had problem with SVN Repository, Krzysztof uploaded code but Matej and Krystian couldn't see anything any part of code, after we realize that Matej also tried to upload code and the result was same other two couldn't see any part of code.

22. Group contract

Group contract as document is very important part of every business or project because in group contract group members determine rules that all members must keep. Below is our group contract.

This contract was made by a group where the following is defined:

1. Follow the day plan set out in the requirements of the Project.
2. Each group member must do what he/she said or assigned to him/her.
3. Each group member must to show up to class and to outside group meetings on time, if he will late he need to inform at least one of group member.
4. If a member was unable to attend, that member must inform at least one of group member of their absence.
5. A group member who is absent more than 3(three) times without letting group member/s about that will be dismissed from the group.
6. Work together as a collaboration.
7. Finish work until 1st of June so that the group would not have to convene on the final day.
8. If a member submits plagiarized material, he will be dismissed from the group.
9. No interrupting your teammate while he/she is talking.

14. 2. 2018.

Matej Ereš

M.Ereš

Krystian Jurga

Krystian Jurga

Krzysztof Jakub Ziach

Krzysztof Ziach

Mantas Skučas

Mantas Skucas

Mantas was added later, he signed 1. 4. 2019.

23. Problem statement

Problem Statement – Ferometal – Prerada	
Student names	Matej Ereš, Krystian Jurga, Krzysztof Ziach
	Ferometal-prerada is Croatian metal industry company. The company has twenty eight year experience and employs 25 employees on top with CEO and founder Ivan Rašić. Ferometal-prerada has 14 different machines thanks to whom they have a great range of services such as: cnc milling, CO ₂ welding, measuring 3D faro arm, etc. They export their own products to EU countries (Hungary, Austria, Slovenia...). Ferometal-prerada also do service maintenance and installation of the point machines on all railway lines in the Republic of Croatia.
Problem / Problem area	After initial recognition it turned out that their system is unreliable and doesn't meet their expectations. Company's main issue is that they cannot keep the track of how much of a certain material they use, therefore they find it difficult to provide suppliers with a proper information when it comes to refilling the stock. That results in the waste of money and space in stock. Another flaw that has been pointed out is that the interface isn't really user friendly and system has no information on whether it's been delivered, sent, finished or if there are still parts missing.
Problem statement	How and in what way can history statistics of material be implemented to help future business development?
Methods/procedure	<p>All UML diagrams will be made in UMLet. The system will be written in Eclipse as IDE using Java programming language, Graphical user interface(GUI) is to be made using WindowBuilder in Eclipse. Microsoft SQL Management Studio 17 will be used to construct database. SVN will be used for version control.</p> <p>All additional options, graphs, algorithm will be implemented to the wishes of the customers</p>

Appendix:

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