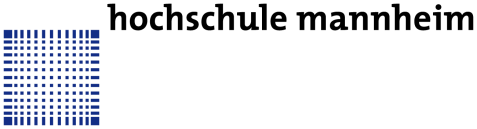
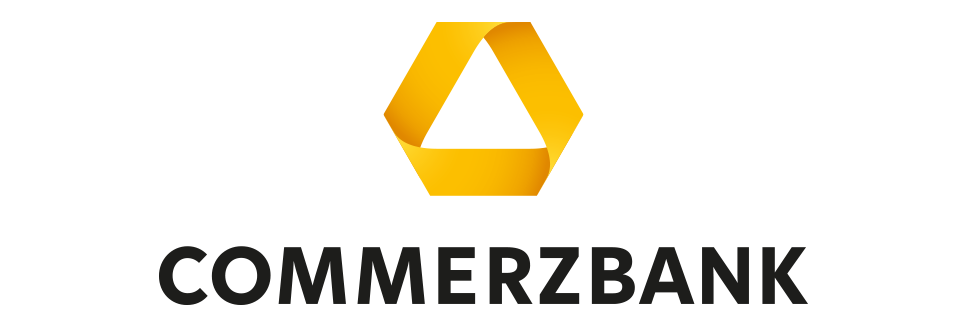
Bericht zum Praktischen Studiensemester

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| --- | --- |
| **Zeitraum:** | **01. April 2016 – 30. August 2016** |
| **Studiengang:** | **Informatik – Bachelor** |
| **Betreuer:** | **Adil El Madbouh** |
| **Student:** | **Thorsten Müller – 1312756 – SS2016** |

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| **Firma:** | **Commerzbank AG** |
| **Programm:** | **Neue-Wertpapier-Plattform** |
| **Projekt:** | **Retail-Order-Processing** |

**Sichtvermerk der Firma:**

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Anhänge

# Commerzbank – The bank at your side

The Commerzbank AG grows steadily since their foundation, in 1870. Since the Commerzbank was founded, the bank took over several banks or merged with other banks. Today the Commerzbank is one of the top leading banks in Germany, they have with around 1050 branches also one of the densest branch networks in Germany. The Commerzbank has branches and offices in over 50 countries. The bank finances over 30 per cent of Germany’s foreign trade. With the two subsidiaries “Comdirect” and “mBank”, the “mBank” in Poland, the Commerzbank owns two of the world’s most innovative online banks (Commerzbank - Überblick, kein Datum). The bank acting in the business sector as well as in the private sector and also in the stock exchange sector. The Commerzbank has as well as the Dresdner bank changed its brand several times over the years. The actual brand with the yellow color stands for fairness and competence (Commerzbank - Markengeschichte, kein Datum).

The Commerzbank sort their customer into three groups. The private clients, the business clients and the corporate clients. The private clients are the biggest profit sector of the Commerzbank. They can use the Commerzbank for a basic account maintenance, some saving offers (daily allowance or fixed deposit for a special amount of time), trading and investment with security papers, credit offers and also for live insurance as well as for property insurance (Commerzbank - Privatkunden, kein Datum). The business clients can use every offer as the private clients, additional they can use leasing offers, but they have other conditions as the private clients (Commerbzank - Geschaeftskunden, kein Datum). For their corporate clients the Commerzbank offers different products as for the private and the business sector.

Intern in the section GS-IT (Group-Service Information Technology) there are two huge areas, those are commercial banking and in investment banking. The part of the commercial banking includes account management, advice, financing, etc.. The part of investment banking contains different stock exchange activities for their clients. In the investment banking a new program to renew the investment banking system was initiated last year. This new program is “Neue Wertpapier Plattform”. It should secure the future competitive ability. In this program there will be different projects. During my internship I support the Commerzbank in the new program “Neue Wertpapier Plattform”, as part of the team in the project “Retail Order Processing”. The program is a long time project and should be completed on schedule in 2020.

# Tasks descriptions

## Welcome to your Internship

01.04.2016 & 04.04.2016-08.04.2016

My first day was really interesting/worthwhile. First I met Adil El Madbouh, my superior, he introduced me to all colleagues personally and showed me my desk. But there was one problem. I either had computer access or a telephone number or a mail account and also no identity card of the Commerzbank, which I really need to get into buildings. So my first task was to get my identity card, from another building in Frankfurt. After I came back I already had computer access. The rest of the day, I used my time to get started with the project and some of my new colleagues helped me to request needed software, telephone number and the mail account.

In my first week I immediately got a huge task. The task was to create realistic FIX-Messages, for the first “Component-Integration-Test” (CIT) in the project. FIX-Messages are orders for stock exchange trading. In the project the CIT was the first of this kind, in the project. The Goal of this test was to figure out if the connections between the operating systems (lookup chapter XY) work or don’t work. Before I could start to create FIX-Messages, I really had to learn about stock exchange trading. For solving this problem, I searched in the internet, asked colleagues and also asked my father, luckily he made an apprenticeship in the banking area and could helped me a lot. But I figured out that my growing knowledge about the stock exchange trading wasn’t enough to create FIX-Messages, which could be used for the CIT. While I talked with colleagues about my problem I heard out, that I had to consider a lot of points about what the different systems were able to interpret and what they weren’t able to interpret. I decided to firstly read myself into the project, by reading the specification of services and talk with colleagues about the project, specially how far advanced the different platforms are. During this I got a first overview how advanced this project is and which functionalities are implemented right now.

## My chance at the CIT

11.04.2016 – 15.04.2016

At the start of my second week I continued to get myself familiar with the project, by reading the specification of services. More and more I did understand at which point we are in the project and what will be realized in the near future. Because my colleague (Nathalie Goetzel) was sick and wouldn’t come to work, for the next few days, she is the responsible for the “Component-Integration-Test”, I had the task to support the CIT more intensive and I also got the chance to prove myself, by taking over more responsibilities. The task for the CIT was to create test scenarios for the End to End tests. Due to my talking to the test team I figured out the CIT at the Commerzbank is split into three parts and how they parts operate.

* Connectivity Test: Can one system talk to the system next to it
* Route Test: Can one system communicate with another system, which is not next to the system
* End to End Test: Can one system talk to another one and is the receiving system able to send an answer

The test scenarios were finished easily. After I talked with my colleague (Martin Taplick), he explained to me what the Mainframe (lookup chapterXY) is possible to answer. For each kind of order there were three kinds of answers created by the Mainframe. After I adjusted the content of the FIX-Messages there were one problem which I couldn’t solve. FIX-Messages have one field, checksum, which is automaticly created and you can’t create it on your own. My colleague (Carsten Thielecke) implemented a tool with jruby that can create a FIX-Message of the content of the FIX-Message, from an excel file. The tool had to be adjusted, because in the excel file there were some fields missing to create the message in the FIX-5.0 version. This is the actually standard for stock exchange messages. After I looked for the missing fields in his tool, I gave him a list which fields were missing and he changed his tool during the next few days.

## My first CIT and the HP-Quality-Center

18.04.2016 – 22.04.2016

In my third week I decided to do my “must do trainings”, which took a lot of time. Those trainings every employee has to pass and every has to repeat it after two years. The trainings should help the employees to estimate if somebody wants to steal secure information, if somebody has problems and should go to the company doctor, or how to sit and eat healthy, etc. Also in this week the CIT officially started and I was part of the conference calls for the CIT, which were two times a week and at least one person from the different systems. After Carsten Thielecke was finished updating the jruby tool, he helped me to install it and gave me some introductions. Also I become acquainted with the HPQC (HP Quality Center). This is an online platform for documentation of testing. As it was my part to create test scenarios it was also my part to document those tests in the HPQC. To understand the HPQC I first had to understand the organization of testing inside the Commerzbank. At the intranet was a really good tutorial about the testing inside the Commerzbank. After I figured out the different test roles and what a “Test Plan”, “Test Lab” or “Defect area”, all in the HPQC, is. I realized that I had to update my test scenarios, because I created test scenarios with i.e. ten tests per test scenario. The HPQC works design steps in every single test. Every test of mine had one design step, which gives you a lot more of documentation work than it really is. After a longer conversation with two colleagues from the test team I made up my mind and I grouped some tests in one test scenario, so that the FIX-Message sending is one test, the next is the processing of the message and the last test is to send the answer, the result after the processing, to the original submitter. After that I simplified my test scenarios. Each test scenario has between three up to five tests and each test has three or four design steps. This was a really good size to do the documentation in the CIT.

## Get a new Task

25.04.2016

Due to there was no overview about the solutions which solve the requirements, my task was to get myself familiar with the Enterprise Architect (EA). The EA is a very strong tool to manage solutions and requirements in a project. In a matrix, where all solutions and requirements are existing, you create a connection between the requirement and the solution, this can give you an overview about the project, which system delivers which solution. The EA uses a repository, so everybody has access to the project overview. So my Job was to look in the specification of services of the different systems and transfer that information into the EA. This job was great to get a more detailed overview about the solutions and the requirements. I knew that this task was really important for the project, but I found out that the theme of this task and my work until now did not satisfied me. The problem I had that this kind of work could done everybody and that I didn’t learn something. Moreover, my problem that they do something and give me a document which content should be transferred to the EA. This wasn’t the job I wanted to do for the next few months. So I decided to have a conversation with my superior. During the conversation we showed each other our expectations for the internship and also I described what I was hoping to get some challenging tasks or something to learn. The result of the conversation was, that both, he and I, will look for a second area to look in and learn something. My priority work to organize the solutions and to the requirements will still be my task, this was ok from my side if it wasn’t my only task at the Commerzbank.

## Traceability matrix pattern

02.05.2016 – 06.05.2016

Due to my superior needed some charts about the status between solutions and requirements, he gave me the task to create an excel file where you can get very fast an overview which solution resolves which requirement, which solution is already delivered, also to organize them into groups. Adil knew another tool, but to get the permission for this tool and to work into it needed to much time. So we decided to use excel as a transition solving. My problem really was that I wanted to create an excel file which would be very easy to extend. In this week I googled a lot and watched excel-tutorial, so that I was able to create a good excel pattern. I asked a colleague how I can export the matrix, which shows the connections between the solutions and requirements, after he showed me I decided to simplify my pattern again. I wanted that the export, from the EA, can be copied directly into the excel pattern and get immediately shown how many requirements are solved, for error handling: We decided that one solution cannot solve zero or more than one requirement. Also I wanted to show immediately which requirement will be solved. I finished this task at Friday, because I did a lot try an error to learn excel. During that week I find out what a strong program excel is and how many opportunities you have. For my solution I used some formulas, which show how many requirements are solved and which are solved, and I used filters, so you can sort the excel file, i.e. sort for the system or the area or at which package it will be delivered.

## Traceability matrix

09.05.2016 – 13.05.2016

At the start of the week I received modification requests for some solutions. I also had the idea to sort the solutions. The requirements are sort into groups and my idea was to sort the solutions also in those groups. During a few conversations I heard out that it was a bad idea, because every time a solution is to change, delete or add I would have to renumber all other solutions again and moreover all teams in this project will using the sheet for an overview. Due to we use packages to sort when which solutions should be delivered I also had to add this list into the traceability matrix. (Nicky Heber) A colleague from Accenture GmbH, gave me list where all necessary information stands. I also was in a telephone conference with the project manager from Pdv (Jörg Krautmacher) and some colleagues. I explained him the body of the excel file and we talked about the relation between the solutions and the requirements, also about the delivery packages. In the conference I heard that a lot of packages, in which the solutions should be delivered, has to be changed. Wolfgang Schreiber, Business Architect, have a very good knowledge in this section and together we sorted the packages new. He also told me that the Comdirect have some solutions where they only have to test. This is because Pdv changes their software and for some requirements the Comdirect have to develop a solution, by other requirements they have only to test the solution from Pdv (lookup chapterXY). Wolfgang talked in the week before a lot with Comdirect and had already created an excel where I could see which requirements relate to the Comdirect and at which requirements they have to develop and at which they have to test. I also inserted that information into the EA, as much as possible, and into the traceability excel file. The information when Comdirect has to the system from Pdv wouldn’t be very useful in the EA so we decided to add that information in an extra table-sheet in the excel file. The export from the EA is a huge matrix, which at the moment 230 lines and 119 columns. My task was to search where a solution (lines) hit a requirement (column), marked with a “X”. Whenever I got a relationship I had to write the requirements name (in line1 at the specific column). As Adil saw the excel file he gave me some tips to simplify the excel file. He also wanted that the short description of the requirements, exported from the EA, were hided and that you are able to see more information in one view. I searched in excel for functions, but for my problem none of those functions would solve the problem. So I had to learn how to develop macros excel. This was a very hard task, because VBA (Visual Basic for Application), the developing language for excel macros, is no development language, either it is not a script language and moreover it is uses a lot of pseudo code mixed with a lot of VBA specific terms. I googled a lot and needed a huge amount of time but in the end I solved my problem by creating multiple macros. The macros are cutting short description, which are too long, because the directories in the EA, search a large matrix and give the content of the first line in this column where a hit were found, this can be multiple hits. At the end of the week Wolfgang explained me that we received already some solutions which we didn’t need in this package and other solutions which are important for this packages weren’t delivered. To this point you didn’t see this information in my matrix. So we solved this missing information by adding one column, so everybody can see for which package the solution was planned and when it was delivered. Moreover, you can group the solutions into areas, this was also missing in the excel file. Again I had to extend the excel file and to fill in the content. At the end of the week I we (Wolfgang, Adil and me) finished the excel file in the first version. A lot of columns were added, to see and sort which status the solution proposal has (every solution proposal has to be accepted from the Commerzbank), at which stage the solution will be used, is it important for the first go-live, at which package the solutions should be delivered and is delivered, also you can choose the company (which delivers the solution), see some release notes and of course see which solution meet which requirement.

## Tracing in the Matrix

17.05.2016 – 20.05.2016

In this week I figured that the matrix was destroyed. Some excel sheets in the file were deleted which I used to create a selection of reasonable values in a dropdown list for almost every column. Also the format was changed to the old “.xls” but the excel file includes macros so that the “.xlsm” format is needed. I repaired the matrix, even though it took a long time to add the dropdown selection with the data verification again. The Matrix was good and gave a good overview which solution will be delivered and in which package, but we have the situation that package one and subsequent deliveries were already done. Some deliveries deviate with the planning; some solutions weren’t delivered others were delivered even they were planned for future packages. It is very important, for the future package negotiation, to see which solutions are postponed or when the solutions are preferred delivered. Due to the deliveries and the negotiations it was my task to add a possibility for tracing the planning and the delivery of the solutions in the matrix. Because Pdv delivered already solutions they had to be added to the matrix. The problem was that Pdv made horrible documentations for the deliveries. The documentations included a description about what is implemented and an issue number, to find the solution which were delivered we had to figure out the solution by reading the description in the delivery documentation. Due to both of us have a good knowledge of the solutions the result was quite good. We found almost every delivered solution only a few weren’t able to be figured out. Those which we weren’t able to find we marked and send an E-Mail to Pdv, that they can give us the correct solution. Due to a conversation between Wolfgang Schreiber and Ralf Fischer (is a Business Architect, who is responsible for our requirements and for the specification of services) there were some solution from the Pdv which mapped the wrong requirements. I decided to make a quality review and checked all mappings between the solution and the requirements. I found a lot mappings were sometimes the relationship and other times the content didn’t make sense to me. Those relationships I figured out and discovered them with Wolfgang Schreiber. During this conversation we figured out which relationships were wrong and at which time I had not enough knowledge. He explained the connections that I didn’t understand and also we corrected the mappings which were wrong. Because of the excel file is using an export from the EA we were at two desks and I corrected those mappings in the EA and changed the excel file at the same time, after that we made a new export to the excel file. Also Wolfgang and I sort the functional components to their functional areas. We used the tables for the dropdown selection, which contains the functional modules, an added a lot of empty lines.

## Finish the Traceability Matrix and start to develop a new macro for Interfaces

23.05 – 27.05

At start of the week, Wolfgang and I did a meeting with Matthias Platen. Matthias is from the testing team a needed a column, where he can see which solution belongs to which test object. Matthias wanted that the test objects has the same name as the detailed area. Due to Wolfgang sorted the Solutions into areas we were able to adjust the areas within the frame of possibilities. That Matthias don’t have to copy the most detailed area into a new column for the around 280 solutions, I extended my macros for the Traceability matrix. First I add a new column for the test objects. The main task was to create a new algorithm and write the algorithm in VBA. The algorithm was quite simple. Due to the area sorting uses four columns, the algorithm starts at the first row and at the column of the highest area. It ends if the next more detailed level column is empty or the most detailed level column is reached, in both cases the value will be copied to the test object column and the algorithm will go to the next row and to the highest level column. Those steps will be repeat until every solution processed. Also I changed the solution prefix. When I started to add the solution into the EA (in week X) I got a list where the solution has the prefix WPP-System-Number (i.e. WPP-COWIAS-026), the requirement has also the prefix WPP and a six-digit number (i.e. WPP000088). After the prefix both of them have a short description. The problem was that the solutions had the same first prefix “WPP” as the requirements, which led to a lot of confusions because the people had to though if they were talking about the solution or the requirement. That I don’t have to click every solution at his own, and to change then the prefix, I searched for an automatic function (like excel search and replace). Unfortunately, there was no such function in the EA, but I managed to get all requirements in a list where I could change the prefix and navigate with the arrow keys. At the middle of the week I was in a meeting with my supervisor, two Business Architects and one colleague of the Quality management. In this meeting I received a new task. The task was, to develop a macro which creates multiple files of one file, by filtering the correct entries. We have two excel file which describe the Interfaces for messages, which are outgoing or incoming in the view of “DECIDE”. Those two files should be extracted to several files, one per each way. The problem this time was, that I had to find a way which entry should be in the generated file and I also had to deal with several excel files and several sheets in those file in the macro. To find and copy the right entries, I just inverted that case. I copied the complete sheet into the new excel file and searched for the entries which I want to keep and which weren’t needed. Those which weren’t needed were deleted by the macro. For some ways it is possible that the fields in the message are in more than one sheet. Due to the macro copy the complete sheet, it can search in one column for the needed sheets in the target. If a sheet is required, a flag will be set. After the macro searched for the needed sheets it copies those sheets their flag is set.

## Finish the macro for the Interfaces

30.05 – 03.06

After I finished developing the new macros I saved the macros from my test files to the master-files at our share point, which got us a lot of trouble with the master files. For some reasons, after I changed the format from “.xls” to “.xlsm”, the filters were not working correctly anymore and moreover the share point allowed two or more users to write in the file at the same time. The share point is like our Moodle (at HS Mannheim), but everybody who has access to the share point is able to upload and modify all files and also everybody is able to create and delete directories or files. If somebody wants to change a file the share point allows this only if nobody else is changing the at this moment, otherwise you can see a copy of the file. In the case of master document, we figured that the access control wasn’t working anymore. So we suddenly had a huge risk that the changes we were doing in this file weren’t saved because somebody else was working at the moment and save it with his changes but without the own changes. Due to we are five up to six persons, who work on those master files, this was an annoying problem we still had to solve. Because the problems with the share point and that most of the time somebody is changing the file, I decided to develop the macros in my own directory one level lower as the master files. The only problem was if the structure of the master file would be changed, then I would have had to customize the macro. Otherwise I only had to copy three or four sheets from the master file to my file and execute the macro after I copied the sheets. After I did some bug fixing and add a new feature, that unnecessary excel sheets will be deleted and that the macro scroll automatically to the top left position (Cell A1), Nicky did a first review of my work. He was pleased with the macros, especially with the way how they work. In the week before I ask my Adil for a feedback, while we had lunch together he told me his thoughts about me until this point. Later at the day I ask the colleagues from “Software AG” to help me install WebMethods. WebMethods is a software, based on eclipse and java development, developed by “Software AG”. In this project this software is used to map the changes in the message between the different systems. Otherwise with the software you can develop some Internet services, develop User Interfaces or develop Events and Databases.

## Take care of the Traceability Matrix and give the excels for the Interfaces to the Quality Process

06.06 – 10.06

This week was all about the traceability matrix. I deleted and added some solutions in the EA and of course I had to add those new solutions in the Traceability Matrix. At the end of the week were a bigger blog to add, because the colleagues from the IL were specifying their solutions in the traceability matrix. Also there were a lot of solutions, which have to be added and also have to be renamed. During my internship I already heart that there is an intern Quality Security(QS) process, which has to be finished by every required document. The quality process for a document has different reviewer and also it has different dates. The process is that the reviewer has a specific time to review the document a send some comments and change requests to the author. After this period of time is over there is a final review where every reviewer has to accept the document. At the end of the week Adil and I had a longer conversation. He gave a more detailed feedback as before, also was included where I should improve myself. Also I had the chance to give him feedback about how I see the internship. Of course I wanted to ask for a new task, but during his feedback he already told me that I have to look for tasks more independently, if there is no specific task from him, so I thought it wouldn’t be a good idea to ask for a new task.

## Develop a web application

13.06-17.06

At the start of the week I received an E-Mail, that I have to pass different training courses. They were about money laundering, sanctions and sanctions of the OFAC (Office of Foreign Assets Control). Also I wrote a user manual for the traceability matrix, because I knew that I were leaving the Commerzbank and at least one person have to know how to use the excel file. At the second I and the colleagues from the IL received a bigger task. Pdv created an REST web service, where you can send and receive orders from Decide. Our task was to build our own web service which had those functionalities as this from Pdv, additional our web service had to be able to create Fix messages via a form on the webpage. Due to there were almost no time for this task, we have to develop the windows editor, and the colleagues had no web developer, I was the only person with a little bit of an experience in web development due to the course “web applications”, this saws to be an impossible task. After I developed a first webpage and wanted to test the XMLHttpRequest on the webpage I received a “Cross-Origin Resource Sharing” (CORS) error message. After a longer discussion we figured out that we could solve the problem by adding a command into the server header to allow me to get the resources from the server, but this was no option due to security problems. We finally solved the problem by uploading my files to the server, where I want to receive data from. The problem this solution had, was that I didn’t have server access to upload the files by myself. So our next step was to figure out a way how I can send the colleagues my data via E-Mail. E-Mail was our only option because to get an usb-stick from the Commerzbank, only they are able to use at the computers, would probably need a few weeks due to the security regulations in the Commerzbank. After we tried a few different ways to send my data via mail, we decided that I have to compromise my directory into a zip file and send this to colleagues that they can upload the files. At the end of the week, when the web application was a little bit further in process, I saw a bug as I never see before. The problem was that the XMLHttpRequest, which was working before, was working but suddenly the received data weren’t saved anymore.

## Finish the first stage of the web application

20.06-24.06

To begin the week, I still had the bug with the XMLHttpRequest from last week. I searched for the bug but didn’t was able to find it. Due to Adil needed the Demo in this week and my demo probably wasn’t to be finished the colleagues decided also to develop a demo. Due to they have a development environment and some web developers their demo was pretty fast finished. I helped to test this demo and also I showed them how they solve the errors, which we found. After another day the demo was finished and be able to be presented. Because of the knowledge I had won in the first CIT, for me it was easier to see some content-related errors, this was the main reason why I was able to help the colleagues to finish the demo. When I had time I was in the process to finish my demo, after I did a lot of work in this web application I wanted it also to finish it by myself. The but with the XMLHttpRequest I still had, but I decided to use first a response from the server in a local variable and to develop ahead. The virtual response (in the local variable) had to be shown in a table and also the user has to be able to see the details and also delete the order. So I had to implement the logic for the table and also the logic for the order, to delete a specific order or for a status request (it shows the status of one or more orders) or to create a new buy or sell order.

//future tasks of the web application

Host anbindung ->il->decide->il->host

## Solve Bugs in the web application

27.06 – 01.07

Due to I wrote the javascript file again, with the hope that somewhere was an typo which I didn't saw, the error from the week before was solved. But then I saw another bug. This time I had the problem, that after a formular (to create an OrderCreate Fix Message) was filled out the generated Fix Message should be shown and also editable before you click on a button to send the order to Decide, but the generated Fix Message were shown very short (around a half second) and disappeared suddenly. I saw that I assigned the wrong function for the button in the javascript file. Additional I know had the bug that the message were send two time to Decide, by clicking the send button. After a longer time of bug searching I realized that I used the html tag <form>, which always do something if the button is clicked. In my case I used instead of an <form> tag the <div> tag to solve the problem. Finally my web application was also working, but I thought it looks very bad, so I decided to develop further and make the web pages more beautiful. Before I developed further, I decided to clean up and sort my javascript coding, because I was under time pressure there were a lot of old commented out coding and also the functions for the different functionalities were at different places, just like the sequence as I developed, in the javascript file. To sort the code was very usefull, I should have done it before, specially because I had already 400 lines of coding, after I cleaned up. At the end of the week I got a new task, this time I should create an Exceution Report, which will be send in the future from the Mainframe to CSI. Due to only the business architects spend time with this topic there were no tools to create such an fix message, so I had to create it with an editor. The message includes around seventy fields, a lot of them I knew already but also there were a lot of fields which I didn't knew yet. So a colleague, from the business architects team, helped me to understand and fill the fields, which I didn't knew yet. After I created a sample Execution Report I send this message to the colleagues from IL and CSI, to receive a feedback if the message would be accepted by the systems or not. The target for this task was show CSI how an execution report looks like and also to test the sending of the execution report, this sending will be simulated by inserting the fix message into the specific queue to CSI.

## Try out to build a web application for the Traceability Matrix

04.07 – 08.07

At the start of the week I again was working at my own demo. I changed the html page, which shows you the orderlist for your account. My problem was for the list I was using a html table, which has no chance for a nice styling (with CSS). I figured that an unorganized list was the solution for my problem. After I styled the list correctly the page, with the orders of an account, looked really great. Also I finished, finally, the javascript coding. Due to I started to convert, via an online tool, html coding into a string variable I got a problem to regenerate the string variable after I did some changes at the html coding. My problem that I once developed at a workstation (where a firefox and notepad++ are installed), but the team from accenture needed the workstation again and so I had to switch to my personal computer. Otherwise I had to use the window editor. I finished the webapplication, I wondered myself why I didn’t write down some html and uses the css clases instead javascript strings to show or don’t show some content. Because I heart a lot that nobody knows which is the current version of the traceability matrix, I decided to make some thoughts if a web application could replace the excel file. I figured out that it is possible but it would be way much harder to develop than what I developed for web applications. I clearified the requirements for such a web application and started to try a few samples., they are a user management, insert and delete rows as well as columns, search for content in a specific column and select what you want to see (dinamcly), also every user is able to change a specifc selection of entries, I had to create the content from the excel file and an optional requirement to meet would if you are able to create solutions in the EA via the web application. I started to try a user management which works really good, I worked with a session storage. This is for security reasons, if the webpage is loaded again a new session will be opened and nobody is logged in anymore. My next step was to create the function to insert a new row or column. Due to the content will be generated dynamicly, from a JSON String, I already made my mind about the id of every cell. Due to I spend already thoughts about the id of the cells, to insert a column was harder but I got it working really soon, also to insert rows was really fast working. At the end of the week I tried the excel filter function, I got it almost fast working that the application reads all entries in one column and give you a selection, solved with a little box with shows checkboxes and the entry behind it. The function that only the selected entries will be showed was a harder, because I had to show or hide the entire row. Also this problem I solved and I really thought the application will be finished soon if I can hold on this speed.

## Extend my web application for a ‘Execution Report’

11.07 – 15.07

In the last week I got it working to create an excel filter function for one column. Due to in the excel sheet there are oft two or more filter activated I know that I had to extend the filter functionality. To make a new selection of the entries, when you filtered already once, was not so hard. The harder job really was to solve that the right rows will be displayed. I really often had the problem that some rows were showed, even if there shouldn’t be showed. I almost spend an extra day of thinking of a new concept for the functionality or how I solve it. At the end of the day I got it working, I worked a little bit at the id of the cells. The web application for the matrix was getting more realistic, a huge step was the filter functionality which is split up into different functions and around 170 lines of coding. At the next day my supervisor gave me a new task, so I stopped the Traceability matrix. My new task was to develop the demo application further, so that an Execution Report for CSI can be created. First I searched help by a BA that I can create an Execution Report for CSI. This one I used to send it to the colleagues from IL, CSI and Pdv also that I can receive feedback from then if the Fix message hast correct content. After I send the e-mail, I started to extend my demo application. One of the task was to create a logic for some fields that are grouped and can be contained several times in the fix message and as well a task was that the html form could contain the number of the fix fields in the form without showing it. The last task I solved that I created for every field an additional input option, which will not be shown but have a fixed value (the fix field number and equals). The first problem was a little bit bigger. The Execution Report can be split up into a NewExecutionReport and into a ExecutionReportCancel. Both have some fields together, which are optional to fill out, but they have also some fields which are only contained in of those two message. So I had to first look if the field is in the specific message and then decide if it will be displayed and will be contain in the created message or not.

## Finish the ‘Execution Report’ for CSI

18.07 – 22.07

At the start of the week if finished the extension for the demo application. When the user filled out the form, he has the chance to customize the fix messages before it will be send. This was an important requirement, due to the web application is developed for testing usage. I used a textbox, where the fix message is shown with all values, that the user can easily adjust the fix message before he sends it. The colleagues from Accenture helped to make the extension more worthwhile. With their work we created a web service, used from my demo extension, which forwards the message to CSI. Also we managed it to give the colleagues from CSI access to the demo application, so they can create fix messages to test if their system works right. After we finished the job my supervisor, the colleagues from Accenture and myself found it a nice idea to merge both demo applications. To this point I didn’t know with what techniques the colleagues from Accenture developed, I just knew I had a basic JavaScript code included, which doesn’t have any advantages or modern techniques. I figured out that they used for the sever application the Spring framework and build the server file with maven. For the UI application they were using React and Redux. The only framework I had heart of to this point was spring, the other three develop extensions I didn’t have any idea for what they will be used neither what an advantage they offer. So my rest of the week was about reading into those libraries and frameworks and try them out.

## Learn Maven, Spring, React and Redux

25.07 - 29.07

First I tried to develop a simple ‘hello spring & maven’ application, which should show a simple webpage. To get it done I had several problems. My first was that additional libraries where used in the spring tutorial, so I had to search a lot for a page which those additional libraries for the spring framework. After I found those I had to integrate them into my application, which is also hard to do it for the first time but it getting easier and easier by time. After I installed maven I was able to create and run the jar file successfully. Immediately after I managed to get a simple server application working I started to read into React. I found out that React is very nice extension to develop professional web applications. My hardest problem was the new syntax. React uses ‘JSX’, it is a mix of JavaScript, XML and HTML components, which makes it very hard to get familiar with React. Moreover, React uses the newest JavaScript version ES2016, which looked for my like a complete new syntax of JavaScript in comparison with the basic JavaScript. After a I was a little bit familiar with React I started with Redux. Redux is an additional library for React, together they can build a very strong web application, with a strong focus on the user interface. React seperates strictly the logic and the user interface parts (presented by React), also it has it owns lifecycle which makes it very hard to understand and learn that logic. As I understand the logic of how things work in Redux I started to understand more of the coding in Redux. The code is very structured and it is necessary that the idea and the logic of Redux is understood before you start to look at the coding. At the end of the week I managed to understand a little bit of the coding.

## Try to write an easy Redux web application

01.08 – 05.08

To get started with this week, I firstly read again a few tutorials about Redux to get my knowledge from the end of the last week. As I wanted start to try out some tutorials I figured out an enormous problem. There were some tutorials, but the coding was a little bit different structured in every tutorial which just confused me at the start. Moreover, by trying out tutorials they weren’t working at my computer. In the end I used a tutorial which I didn’t like so much, I think the structure of the coding is unnecessary hard to understand, but it was working. Moreover, my task was not to write a complete new application in React and Redux, it was to extend the demo application of the Accenture colleagues. Luckily in this week, the colleague who wrote the application was at Frankfurt for another project but he was able to spend with me two hours to explain me the application. In this meeting I received a lot of input but I was able to find out how he structured the application, the structure was based on one tutorial. Badly it was one tutorial which I didn’t liked. To understand the tutorial way, I had to read and understand more the components of Redux. At the end of the week, I set my goal to integrate into the tutorial a simple webpage without any logic, but every time to include a little bit more logic by creating and including a new webpage.

## Week 19 08.08-12.08

## Week 20 15.08-19.08

## Week 21 22.08-24.08 – Last Day

## Week 22 25.08-30.08 – Holiday

# Project Descriptions

Due to I was in a long term project (New Security Paper Platform) and I had projects to support the ongoing project I will introduce the long term project and describe my biggest projects.

## New Security Paper Platform

### Preface

This part of my internship report gives an overview over the “new security paper platform program”. Due to the large scope of the program and because the program has different projects, the information is reduced to the most important information.

### Abstract

The Commerzbank AG has for the stock exchange trading the platform COWIAS, which is in some areas more than 25 years old. Due to the study “Due Diligence WP-Platform”, in 2014, the Commerzbank decided to stay in-house for the future stock exchange trading, because of strategy- and security misgivings, and not to do a full outsourcing. The program is a large project to secure that the requirements for the stock exchange trading, will have lower costs and will be more efficiently realized. During the program a new platform, INSPIre (Innovative Securities ProcessIng), for the stock exchange trading will be developed. Every way to trade, in the Commerzbank, with stocks will be using this platform. In this platform there will be created an “Integration Layer”, which connects the different systems and forwards the messages to the target system. The orders can come from the Comdirect, Online & Mobile Banking, branches, saving Plan or blockorders and new issues (As-Is To-Be Architecture).

LB-WPP 0.90-20160406 – ORGANIGRAMM 20160509 – WPP\_Entscheidung\_Zuständigkeiten\_Integrationslayer(02\_ROP>20\_Requirements)

### Principles

Due to the project focus is at the stock exchange, process of a stock exchange will be described.

#### Stock exchange process

The process of a stock exchange process is in this program split up into three service classes. The “trigger”, the “processing” and the “ledger booking” (*Detailed Target Business Architecture*). The project “Retail Order Processing” is at the trigger. A trigger is i.e. when you send an order to a stock market. The trigger mange the section from an entered order to the forwarding to the stock market. It includes that the order will be evaluated, if a forwarding to the stock market will be succeed. If the order is entered without an explicit stock exchange market, then the system has to decide on their own to which market will be the order forwarded. Also the Retail Order Processing manage also if the order was rejected by the stock market. When the order is placed at the stock market we are at the Processing area. In this area the depot management proceed and a counterparty for the specific order will be searched. If the order is a buy-order then firstly the total amount of your order, even if it is not executed yet, will be subtracted from your deposit. If no counterparty is found the order will be deleted after a specific time, the time depends to the stock market, and the subtracted amount from your deposit will be credited to the deposit. Otherwise, if an opponent is found then the settlement will be prepared. The settlement is the process, where the owner information of the stocks will be changed. The last area is the “Ledger Booking”. After the settlement the depot and the account of both opponents have to be reckon up.

#### Smart Order Routing

With Smart Order Routing you have the chance to place an order without specify the stock exchange market in the order. The system will search for the stock market, which has the most trading actions, and send the order to this market.

### Objective

The main goals of this program are to secure and strengthen the future sustainability and the competitive position. To reach those goals the Commerzbank wants the ability to

* realize changes efficiently
* secure enhanced performances
* reduce the operating costs from the business sector
* reduce the operating risks from the business sector
* (LB1)WPP LB-ROP V1.0 (Ansprechpartner: Werner Hantschel)

Also a goal is the consolidation of all settlements processes, from the Investment Banking and the Retail Banking, at one platform by using modern und future technologies.

### Including Projects

In the early June (6th June 2016) in this program there are four projects running. The projects are

* Retail Order Processing
* CSI (Central Settlement Interface)
* Fund Processing (Investigate option to Source Funds processing services)
* SecFinance BO (Implementation of a new Back-Office Securities Finance solution)

Until the program is finished there will be more projects running and also some projects will be finished before the program will be finished.

### Retail Order Processing

#### Abstract

In part of the NWPP program is the project “Retail Order Processing”. This project includes five different systems (Comdirect, Integration Layer, Decide, Mainframe and CSI). The task of this project is to established a connection between the different systems, also to the stock exchange market and give the necessary information for the following process to the specific system. Before an order will be send to the stock exchange market it will be evaluated by Decide. Decide is an Order-Management-System which checks if the order is able to be place at the stock market, also it checks if the stock exchange market is open before the order will be routed to the market. Moreover, the task is to forward the order to the stock market, this includes to look for the stock market with the most trading and forward the order to this market, also to send block order to a stock market. The current planning involves two stages and eight packages. Stage one should be finished in the end of 2016, the stage includes four packages. The packages for the second stage aren’t planned yet.

#### Objectives

The main goal for this project is to create und integrate the new order-management-system

* Creating a new Order-Management-System(OMS) for the retail business for all assetclasses as well as Exchange-Traded-Derivatives(ETD)
* Launch of an standard software
* The standard software includes every validation of the set of rules
* The integration of the standard software into the security paper platform
* (LB2) WPP-ROP-Grobkonzept-V0-9 (06.06-Martin Taplick)

To secure that the Mainframe will not be too complicated for some maintenance work, like the actual system. It was decided that some functionalities will be realized by other systems and not by Decide.

This project also aims that every system works in area of the stock exchange process. Actual the Mainframe does almost every work in the current security paper workflow, only the routing of an order to the stock market is done by Decide. In the target architecture Decide works as first system and give the data to CSI, in the case that a trade take place. The Mainframe will act as last system and does the account statements. This has the advantage that the functionalities are clearly separated from each other, so it is now a lot easier to extend the systems or to realize changes (Bereich, kein Datum).

#### Principles

The project is planned at the moment with two stages and eight packages. Package one up to four will be delivered in stage one. The Go-Live of stage one is planned for the end of this year. In stage one the Comdirect should be integrated to the new system , Decide should be extended to an Order Management System, Decide should be extended with Smart Order Routing, Decide should be integrated to the new platform and CSI should be extended for the retail business. When stage one is completed a rough process flow should be available (LBSeite23).

One point that was new for me. In this project always the technical data and the content data are clearly separated, also they are in different documents. So for interface descriptions or for the architecture documents there are at least two documents, one for the technical information and one for the content information.

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#### Including systems

The project “Retail Order Processing” has five including systems. Every system must be able to talk via the Integration Layer to each other, except the way from the Comdirect to Mainframe and CSI to Mainframe. The Comdirect has a direct connection to Decide, to every other system they have also to use the Integration Layer. The different systems communicate with the following protocols

* UM
* MQ
* MQ & COMI3 (COMI3 is an intern Commerzbank format base on MQ).

If the message is send via the Integration Layer, it uses the FIX or FIX5.0 format (the FIX format is a specific for the stock exchange developed format), otherwise a system specific format is used.

##### Integration Layer

The Integration Layer is built by the Accenture GmbH, in Kronberg. The Layer secures that every system can send messages with each other. To secure that the message will receive their target system they use message orientated middleware and host for every way (i. e. one way is from Integration Layer to the Mainframe and back) different queues.

##### DECIDE

Decide will be delivered by “pdv Financial Software Gmbh”, in Hamburg. The system will evaluate the orders before it sends the order to the stock market. This is required because every new order sending to the stock exchange market cost a specific fee, depending on the stock. The system also gives you feedback if you send an order during the stock is closed. Moreover, Decide also give the account, depot information from the seller and the purchaser to the Mainframe, if an stock exchange take place. Decide is hosted on a “Linux Read Hat” distribution at the Deutsche Bank. For the integration of Decide into the Commerzbank system the IL uses the software WebMethods.

##### Comdirect

The subsidiary Comdirect uses for their stock exchange trading also the Commerzbank system. Because they also will use the new developed system it is required that they can send messages to the stock, via the Commerzbank system.

##### Mainframe

The Mainframe is the only system which works at the trigger and also at the Ledger Booking in the stock exchange process. It is responsible for the exchange of the stockholders as well as for the settlement. To do the exchange information are required about the seller and the purchaser (i.e. the depot number from both parties), that information will be delivered from the Central Settlement Interface

##### Central Settlement Interface (CSI)

The Central Settlement Interface is used when a stock exchange take place. In this case CSI summarize and subtract the figure at the accounts of both parties. Also CSI give information for the settlement to the Mainframe.

#### Architecture

The Integration Layer is main node in this project, because it decouples Decide from all other systems except the Comdirect. The Integration Layer is an application based on the WebMethods Integration Server, which is an established platform used for the integration of the heterogeneous enterprise applications.

* At the moment one system is used in different areas of the stock exchange process. In future this case will be inhibited. The “Order Management System” works in the area of “Retail Order Processing”, CSI and the Mainframe works in the area “Processing”. CSI works in the area “Transaction Management / Control” and the Mainframe is used after the CSI process for the “Transaction Processing”. (See LB-Page 24)
* IL (stage1)

## Traceability Matrix

My first project was, to develop an excel tool that is able to manage all requirements for the New Security Paper Project. This project was split up into two parts. The first part was to create an excel pattern and the second was to create a macro that can process with an input from the EA.

### Preface

To this point all requirements in the new security paper project were stored in the EA (Enteprise Architect, a software to manage requirements and solutions). Due to there was no chance to see the status of the requirements (i.e. the delivery status or in which area of the project this requirement take place) and they had several files for every project partner (Comdirect, Pdv, Accenture, CSI) a lot of confusion was in every meeting. The Traceability Matrix should be used that everybody can see easily which requirements are solved and delivered and which are not. Moreover, the content in the matrix should be exported from the EA and a macro should simplify the view to the macro.

### Excel Pattern

The first part of this project was to create an excel pattern.

The requirements were

* create a structured and simple to understand excel table
* use a selection of possible values for some columns
* group some columns that the user user can choose if he wants to see them
* create a pattern that the status of the solutions can be traced

### Excel Macro

The second stage of the project, was that a ‘.csv’ exmport of the EA can be imported

This time the requirements, after the import, were

* Simplify the names of the solution
* Copy all requirements, that the solution solve, ones with and ones without description into columns
* Make the excel table readable

### Conclusion

The purpose of this project was that I get familiar to manage a large project with different systems or companies. In my review I think this project was a very good way to get the thinking way how to manage a project with different companies. For this project I received a lot of positive feedback. The first project was a really success for me as well as for the project. The managers a still using the excel table to see the current delivery status of the solutions, to plan the next sprints, also our test team is using it to see what solutions was delivered and can be tested.

## Interface Makro

My second larger project was to develop a macro, which creates for every system interface his own document. The excel files should describe how the interface look when the development is finished, the current status was not important.

### Preface

The system DECIDE has five different interfaces between the systems, stored in two huge excel tables. My task was to create a macro which is able to create a file, based on the two main tables, which shows exactly one interface.

### Requirements

* Find out and copy all necessary sheets for the specific interface in the excel file
* Filter the parts, which shouldn’t be shown (i.e. development status)

### Conclusion

The project was useful, due to the two main files didn’t offer a good overview. The separated files offer the detailed view for every interfaces. They were used for the quality process, in this process were decided if the specific interface is alright designed or need some more work.

## Web application

My biggest project during the internship was to develop a web application. This project had two stages. The first was to developed a web application which can create, for test purpose, fix messages, send them to a web service, offered by Decide, and display the answer of Decide. It should be simulated how the flow in the future will look like. The second stage where to use modern web development technologies like React and Redux and merge my application with an application developed by accenture.

### Principles

The colleagues from Pdv created a service, that simulates Decide. The service is able to accept and to interpret fix messages, as well as to send the specific answer to a fix message. In the web application, we used the following fix messages to send to Decide

* CreateOrder (creates a new order)
* ModifyOrder (modify an existing order)
* CancelOrder (cancel an existing order)
* OrderStatus (receive the status of an order)
* OrderMassStatus (receive the status of all order from one account)
* Quotes (an offer from the stock market, to buy or sell a stock paper for a specific price)

Also the system CSI was included in the web application. For CSI the application should be able to send the following messages

* New Execution Report (when a trade was successful, CSI receive the data of the trade)
* Execution Modify Report (a change or a cancel of a successful trade)

All messages were send to the IL, which forwards the message to the specific system.

### Requirements

The requirements were for both web applications the same. The second stage was only to merge both applications. Due to those facts here are all requirements.

* The web application must have a branding
* The web application must be able to show all order of one account that Decide has in his system
* The information of a shown order must give the user a short overview about the order
* The application must be able to offer for every order which is shown a button that can be used to modifying, canceling or show details of one specific order
* The application must be able to show the details of a specific order
* The application must ensure that every fix message is in the fix format and can be proceed
* The application must provide a form to create and send a CreateOrder
* The application must be able to create and send a CancelOrder fix messages
* The application must be able to create and send a ModifyOrder
* The application must be able to serve a log-in function
* The application must provide a form to create and send a NewExecutionReport
* The application must provide a form to create and send a ModifyExecutionReport

### First stage

The first stage of the application was a simple web application which contained several html files, a CSS file and a JavaScript file to create and send the fix message and also to make the html content a little bit dynamic. Also the colleagues from Accenture developed parallel also a web application with modern technologies. Because my supervisor wanted to present the web application very fast firstly the application from Accenture was used. The first version, at the presentation of my supervisor, included a simple form to create and send a CreateOrder fix message, a shown list of all orders in Decide from your account, a button at the shown list to show the order details, a button to send an CancelOrder message for the order at the shown list, a button to create and send a ModfiyOrder and the log-in function. At the end of the first stage my application had the same offer of functions as the demo from Accenture but moreover I was able to implement the extension for creating and sending the NewExecutionReport and the ModifyExecutionReport.

### Technologies

#### Maven

The idea of maven was to simplify the build process of a web application, additional they wanted to set a new standard in the web application server file building. Maven allows easily to use plug-in and add-ons. They created a POM (project object model), which is stored in an xml file. In the POM there are all dependencies and add-ons written down for the completed project, this makes Maven very easy to handle the dependencies of a project (Maven - Idea, 2016).

#### Spring Boot

SpringBoot is a framework from the Spring project. In the time there were a lot of frameworks build by spring, i.e. Spring Cloud, Spring Mobile, Spring for Android or Spring Web Services (Spring Documents, 2016). All Spring products are created in Java, it is definitely a reason why Spring is so popular. Spring Boot allows to create a Java server within five or six lines of coding, the user just have to execute maven or gradle to build an executable jar file. Another huge advantage is that Spring applications don’t need to deploy a war file (Web Application Archive). The created jar file can be run either on a local machine or on a webserver. The framework offers an integrated Tomcat, Jetty or Undertow Java Servlet application (Spring Boot, 2016), which covers the server part in the web application.

#### React

React is a very young JavaScript framework, which should simplify the developing process of a user interface. The framework was created by Facebook and can be pleased that it is getting very popular (React , 2016). The most important part is that React uses components, but there is no standard which describes what is a component and what is not a component. With this fact every UI developer is free to create and group the component, which brings a huge advantage. Every developer need to be aware of what he wants to develop, if you would start without a clear idea about what do you want to build you would mess up the homepage. The components in React allows you to store are state (which are attributes of an object) and also to call a function of another component and give the called component some props (like parameters in a function call). With this principle the coding gets very structured. In example to create a list with a few entries, you should have at least need two components. The first component creates the html list and calls the second component which creates and returns the html list elements. Additional you would need a third component which stores your elements for the list, but you can use those two components (which creates the list) every time again in your web application. This is another reason why React is becoming very popular. Another reason to use React, is the reusability of the components. The example with the list brings it to the point. You create several components but using them over and over again. React uses it owns syntax, which is called JSX. This makes the start very hard, because you have JavaScript, XML and HTML elements in one file. After a short period of time the advantage of the JSX syntax is getting clear. The html page has one element. This element is the entry point for React, from there it renders the complete webpage. Every time some data changed in the webpage, React will automatically render it again without that the user sees a flickering (React Advantage, 2016). This is a huge advantage against other framework, which already tried to simplify the UI development but had always a flickering when the webpage was rendered again.

#### Redux

Add-on for React

#### JavaScript ES2016

## Summary

* EA pflege
* CIT support
* Traceability Matrix
* Macro for Interfaces
* Web application

## Perspective

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# Glossary

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| expression | Explanation |
| NWPP | “Neue Wertpapier Platform Program” - The current Program “New Security Paper Platform Program” |
| ROP | “Retail Order Processing” – One project in scope of the NWPP |
| CD | Comdirect |
| COWIAS Mainframe host | The main system in the current workflow. |
| IL | Integration Layer |
| Decide | Decide is the new Order-Management-System and will be developed by pdv Financial Software GmbH |
| CSI | System – Central Settlement Interface |
| SOR | Smart-Order-Routing |
| EA | Enterprise Architect An software used in the Commerzbank to manage requirements for a project. |
| HPQC | HP Qualitiy Center An software used in the Commerzbank to create, manage and execute your tests. The software can also be used to create report diagrams. |
| CIT | Component-Integration-Test |
| OFAC | Office of Foreign Assets Control |
| QS | Quality Security |
| REST | Representational State Transfer  It relies on a stateless, client server, cacheable communication protocoll |