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Faculty of Electrical Engineering and Computer Science
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Individual Professional Practise in the Company

Individuální odborná praxe ve firmě

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Zadání bakalářské práce

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Individual Professional Practice in the Company

Zásady pro vypracování:

1. Student vykoná individuální praxi ve firmě: ABB s.r.o.
2. Struktura závěrečné zprávy:
 - a) Popis odborného zaměření firmy, u které student vykonal odbornou praxi a popis pracovního zařazení studenta.
 - b) Seznam úkolů zadaných studentovi v průběhu odborné praxe s vyjádřením jejich časové náročnosti.
 - c) Zvolený postup řešení zadaných úkolů.
 - d) Teoretické a praktické znalosti a dovednosti získané v průběhu studia uplatněné studentem v průběhu odborné praxe.
 - e) Znalosti či dovednosti scházející studentovi v průběhu odborné praxe.
 - f) Dosažené výsledky v průběhu odborné praxe a její celkové zhodnocení.

Seznam doporučené odborné literatury:

Podle pokynů konzultanta, který vede odbornou praxi studenta.

Formální náležitosti a rozsah bakalářské práce stanoví pokyny pro vypracování zveřejněné na webových stránkách fakulty.

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I hereby agree to the publishing of the bachelor's thesis as per the *Study and Examination Regulations for Bachelor's Degree Programmes at VŠB-Technical University of Ostrava, Art. 26, Par. 9.*

In Ostrava 7th May 2015

..... Jan Kordik

I hereby declare that this bachelor's thesis was written by myself. I have quoted all the references I have drawn upon.

In Ostrava 7th May 2015

..... Jan Kordik

I would like to give thanks to Ing. Ján Mináč for giving me an opportunity to have a practice in ABB, and for having faith and patience with me. I would also like to thank to my supervisor Ing. Martin Kot, Ph.D. for his advices and remarks.

Abstract

This bachelor thesis is dealing with my professional practise in the multinational company called ABB. I have been working at the position of Sharepoint developer in a newly created team with little experience with Sharepoint. My role was to continuously come up with new possibilities and inventions in Sharepoint and primarily to use them in our projects. This thesis shows my contribution I had on the progress and increasing complexity of our projects and capabilities. I have started the usage of web technologies and combined them with Sharepoint APIs and libraries. I have also regularly shared my knowledge and trained other team members and employees. The process of getting projects is also mentioned in this thesis.

Keywords: ABB, Sharepoint 2013, HTML5, SASS, JS, JSOM

Abstrakt

Tato bakalářská práce se zabývá mou stáží v nadnárodní firmě ABB. Pracoval jsem tam jako Sharepoint vývojář v nově vytvořeném týmu, který měl se Sharepointem malé zkušenosti. Moji úlohou bylo stále přicházet s novými možnostmi a invencemi a hlavně je poté aplikovat na našich projektech. Tato práce ukazuje můj přínos, který jsem měl na pokrok a zvyšující se složitost našich projektů a schopností. Začal jsem používání webových technologií, které jsem zkombinoval s Sharepoint API a knihovnamy. Také jsem pravidelně sdílel své vědomosti a školil členy týmu i zaměstnance. Proces, jakým jsme získávali projekty je rovněž zmíněn v této práci.

Klíčová slova: ABB, Sharepoint 2013, HTML5, SASS, JS, JSOM

List of symbols or abbreviations

CZOPC	- Czech Operational Centrum
HTML	- HyperText Markup Language
CSS	- Cascading Style Sheets
SASS	- Syntactically Awesome StyleSheets
JS	- JavaScript
CAML	- Collaborative Application Markup Language
REST	- Representational state Transfer
SQL	- Structured Query Language
GUID	- Globally Unique Identifier
PDF	- Portable Document Format
DOM	- Domain Object Model
KPI	- Key Performance Indicators
JSOM	- JavaScript Object Model

Table of contents

Introduction	4
Professional specialization of the company	4
My working placement	5
Sharepoint 2013	5
SCRUM	6
1 List of projects and roles with time consumption	7
1.1 Projects	7
1.2 Roles	7
2 Description of projects and roles	8
2.1 Project Portal of Issues for CZOPC	8
2.2 Key Performance Indicators for ABB Oil and Gas Sector	10
2.3 Customer Satisfaction Survey for CZOPC	14
2.4 PDF convertor for Electronic Injury Book	16
2.5 Marine catalog library for Finland	17
2.6 Being a Sharepoint specialist	19
2.7 Being a researcher	20
3 Theoretical and practical knowledge and skills	22
3.1 Known and used	22
3.1.1 Communication in English	22
3.1.2 Ability to present and defend my work	22
3.1.3 Programming knowledge and experience	22
3.2 Missing and gained	22
3.2.1 Sharepoint knowledge	22
3.2.2 Soft skills and team work	23
3.2.3 Planning and solving the unsolvable	23
4 Achievements and appreciation	24
4.1 Sharepoint 2013	24
4.2 Professional achievements	24
4.3 Personal conclusion	25

List of figures

2.1	Designed view	10
2.2	Designed view of dashboard with hand-written dynamic charts	13
2.3	Part of the workflow	15
2.4	Current view of the Marine portal	19

List of Source codes

1	Getting data from content query and displaying them	8
2	Bindings of DOM elements with KnockoutJS	9
3	Drawing into canvas view	11
4	Retrieving data using CAML query	12
5	Example of structure using table layout	17
6	Dynamic queries using CAML	18
7	Using SPServices to get attachments	18
8	REST method to get data	21

Introduction

We have been given an opportunity to enroll for professional practise in the company instead of making of regular bachelor thesis. The practise represents an ideal opportunity to get working experience before graduating the university. Student has an opportunity to try out his theoretical knowledge in company business as well as improving his soft skills such as working in a team, dealing with customers, demonstrations of his work and many more. In today's world companies require employees, who already have solid working experience and a professional practise might be helpful in that case as well.

These were significant reasons why I have enrolled for a bachelor practise. I have went through all the offers, which were given in our information system called Katis. I have focused on multinational companies, in which I would have a chance to actively use English on a daily basis. I also required something, which is not being ordinary. I did not want to do anything which would be very common.

These requirements filtered all the offers but one. It was an offer from a multinational company called ABB with an operational centrum in Ostrava for a position of Support Portal Programmer in Sharepoint 2013. I had never heard of Sharepoint before, I have just looked it up on the Internet and got to know, that it is a huge web platform with many uses and many ways of working with. This was very tempting for me.

I have sent my curriculum vitae and read a book and several articles about Sharepoint as a preparation for the interview. I have also prepared few demos for the interview, which were accepted very successfully. During the interview I got to know, that I could be put into a newly created team consisting of just two people and that nobody has any developer experience with Sharepoint 2013. This means that innovation and further direction of the evolvment of team and work would be highly dependent on me. I was very pleased with the amount of possibilities and challenges. The past worries that I would be just a mindless worker were dismissed immediately and I confirmed my desire to work in ABB with Sharepoint.

Professional specialization of the company

ABB is a multinational company which has its representation in 100 countries all over the world and employs 140 000 people. It operates in area of energetics and automa-tization. ABB is split into 5 divisions: power products, power systems, automatization of production and propulsion, low voltage products and process automatization. There are more than 3400 people employed in the Czech Republic spread into 8 locations, the most important are research centers and factories in Prague, Brno, Ostrava, Trutnov and Jablonec. Operational centrum called CZOPC is located in Ostrava, which is a global en-gineering centrum as Process Automation Division. It employs more than 220 employees, who perform engineering for units across Europe in several industrial sectors [1].

Introduction

My working placement

I was placed into CZOPC in Ostrava, in which there is located Software department formed mostly of students of Technical University of Ostrava. I have started my work approximately a month after migration from Sharepoint 2010 to Sharepoint 2013. In my new team called SIT (Sharepoint Innovation team) were only two other people: C# programmer and a multimedia trainee, who was also in lead of our team and served as a Scrum master. The reason for such a mix of different areas of knowledge combined with me as a web developer, was due to not having awareness of required skills in Sharepoint. We were mostly known as a probationary team using a technology no one really knows. There was no one capable of teaching us and we did not know what could be Sharepoint capable of in our configuration. We had to reach all our goals by ourselves, which was very challenging but promising. To simplify my desire, it was trying to get to web code, wherever it was possible.

Sharepoint 2013

Sharepoint [2] is a web framework, which integrates common tools for bigger companies to manage data, documents and integrate all of Microsoft services into one intranet. The possibilities of functionalities already prebuilt and provided by Microsoft are limited and there is need for Sharepoint developers to program and adjust Sharepoint to the business model and business needs for the company. There are several configurations for Sharepoint, we have been using one in Office 365, which is accessible online and is possible to use web technologies for programming. There is an extension, which provides programming in C#, but this was not accessible in ABB during my practise. Actually, this is not an issue, because web technologies can be highly integrated into Sharepoint and their influence is still on raise. Sharepoint provides space, where client-side application can be stored and they communicate via libraries and calls with the framework.

There are two main features Sharepoint provides to us and all the developers are using at most.

List

A list can be imagined as a table. You can specify columns and their types and you can insert data and even attach a file. There are many possibilities how to work with data in the list, you can use CAML [3], REST [4], exporting to Access (SQL), exporting to Excel and jQuery [5] selectors when list is displayed on same page. It is also possible to directly modify data online. This is a core functionality and there is no other way how to store data in Sharepoint (there is also a library, which is basically same as a list). When a list is created there are also automatically created forms for inserting, updating and displaying the items in the list. Lists has no connection to other lists, such as keys. It is also possible to display these lists with specified view on any page in Sharepoint.

Introduction

Workflow

Workflow is to be assigned to the list. It can be defined as a set of actions, which triggers after a defined condition. These conditions are: when an item is created, when an item is changed or it can be manually fired. This provides very valuable automatization. There are about 40 actions, which can be used in workflow and combined for a desired process.

SCRUM

From the beginning I was being taught to work using this agile method [6]. We had a SCRUM master, product owner and I was a developer. We also held the proper meetings and techniques defined in SCRUM such as: sprint planning meetings (where we defined backlog with estimations for a 14 days long sprint), daily meetings (where we briefly discussed our work and our plans) and retrospectives (which served for evaluation and review of the work). We used Team Foundation Server for planning our tasks. These principles were held mostly during first months in the company, where we needed to cooperate at most. In the present our individual work and aim of focus diverse too much, we are all responsible mainly for our solo projects and we have only longer daily meetings.

1 List of projects and roles with time consumption

1.1 Projects

This is the list of projects I was completely responsible for or I was making a key functionality for. It is listed with defined time consumption. All the projects are described in detail in Chapter 2.

- Project Portal of Issues for CZOPC (64 hours)
- Key Performance Indicators for ABB Oil and Gas Sector (104 hours) – Partially finished
- Customer Satisfaction Survey for CZOPC (56 hours)
- PDF convertor for Electronic Injury Book (56 hours and 32 hours)
- Marine catalog library for Finland (64 hours) – In Progress

1.2 Roles

I have stood for two major roles among being a developer. This benefited a team and me as well. All my duties and workloads are described in Chapter 2.

- Being a Sharepoint specialist (40 hours)
- Being a researcher (permanent)

2 Description of projects and roles

This chapter will be dedicated to my projects and roles held in the company. I will shortly introduce the project, the motivation and I will show key parts of the solution. I will also mention the result, whether it met requirements or not.

2.1 Project Portal of Issues for CZOPC

About the project

This was one of the first assignments and I was the only developer involved in this project, so this project required lot of research and testing. My leader Jan Mináč asked for a portal, where he could oversee all the teams, he is in charge of. All of these 12 teams have new requirements/bugs/features (together called issues) on a daily basis. He and even the team has to have an overview over new issues and over the work already done on the old ones.

Each of these teams has its own list, which was being filled by them or by their customer. List consists of several columns such as: Title, Type of Issue, Priority, Estimated hours, Hours spent, Status and internal columns are Date modified and Author.

All data had to be gathered on one page, where the issues would be ordered by the newest first. It is also necessary to implement metrics, which would distinguish by a color individual issues. Whether there are grey (newly added), yellow (already few days in) or red (for a long time present and still not solved). The view has to also provide all required filters, sorts and paging for large amount of issues. The reusability has to be also secured, in the meaning of possibility to save and load the selection and to export data and charts for a usage in other programs or presentations.

Key parts

Loading Data

In the first place, there is a need to load data from several sources at once. For this purpose I have discovered and used the tool called Content Query. This tool is being used two times, firstly you have to specify the query (lists GUID, columns and their types). You can also specify CAML query, but this was not needed for this assignment as I wanted all the rows to be loaded. Secondly you have to display this data gathered by the tool into xls template. I have written the template consisting of classes as well. I used jQuery selectors to focus and gather the data from the template, because it would be hard to make the view directly in it. All the data I load, I put into the JSON [7], which I can comfortably work with.

```
1 <td><div class="item TypeOfIssue"><xsl:value-of select="@TypeOfIssue" /></div></td>
2 <td><div class="item SharepointSite"><xsl:value-of select="@SharepointSite"/></div></td>
3 <td><div class="item Priority"><xsl:value-of select="@Priority" /></div></td>
```

Source code 1: Getting data from content query and displaying them

Description of projects and roles

Processing

I have chosen the tool called KnockoutJS [8] for the data processing such as filters, sorts and view itself. It is a pure JavaScript library, which mostly benefits from bindings and observables. You can easily associate DOM elements with data bindings, which could link the element with a variable, function or event. And observables are variables, whose state is continuously being watched and if there is any change, it could trigger your defined action. These features and properties allowed me to create view with many options and without any loading screens.

All the settings can be saved into LocalStorage for reusability. Libraries called fileSaver [9] and canvasToBlob [10] were used for saving the charts. Data, both filtered and unfiltered, can be saved in .txt formatted in JSON.

```
1 <div data-bind="foreach: dynamicRows, event: { mouseover: charts, mouseout:
  charts}">
2 <div class="row" data-bind="css: {borderYellow: color=='yellow', borderRed:
  color=='red', borderGrey: color=='grey' }">
3 <a target="_blank" data-bind="attr: {href: url}">
```

Source code 2: Bindings of DOM elements with KnockoutJS

View

After consultation with my leader, we have agreed on a specific layout and functionalities. Thanks to the fact that this page could be shown to other managers or customers, there was a need for more sophisticated view. Design was inspired by new Microsoft applications, therefore it has rectangular elements with one element color. Dominant color was chosen the same as the one used in Sharepoint. There were not any special requirements for charts, so using the library ChartJS [11] was sufficient.

As a developer tool for this and for other projects was used NetBeans with compilation from SASS [12] to CSS3. SASS gives us new possible constructions in CSS code, which should rapidly speed up the development of a website. This includes nested elements, variables and mixins (similar to functions). HTML5 was used for the layout.

Description of projects and roles

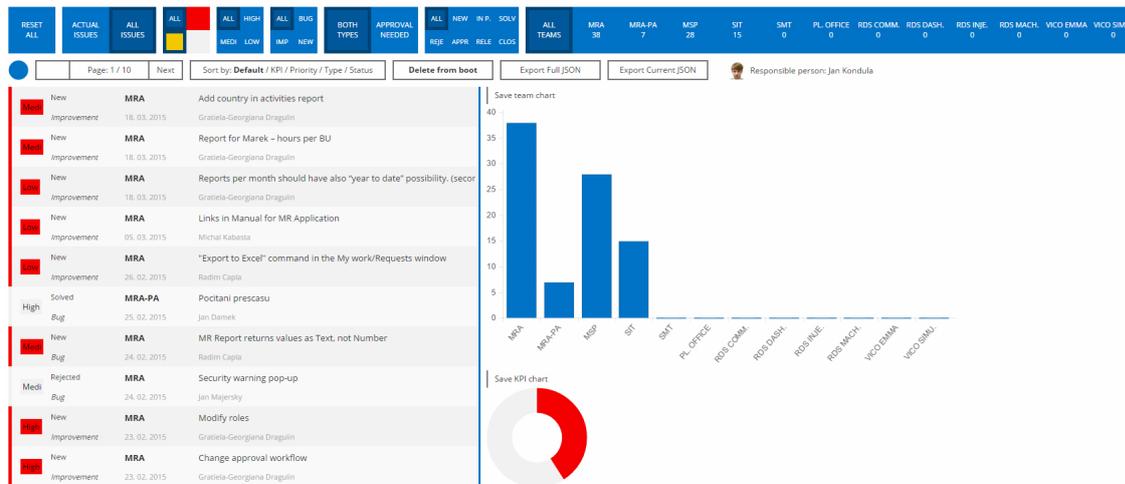


Fig. 2.1: Designed view

Result

With this solution the required functionality was achieved and my customer – my leader was satisfied. For some time this was the most in depth solution I was able to make in Sharepoint. Luckily after few months I have discovered much better approach for working with lists. This approach was due to its complexity, long development time and lack of speed with large amount of data abolished and replaced with a better one in upcoming projects. But at that time, it was the best I knew and it still serves good.

2.2 Key Performance Indicators for ABB Oil and Gas Sector

About the project

As well as the previous project I have started this task during my first days in the company. Due to numerous new requirements and changes this project is still not finished. I have spent biggest amount of hours working on it. I have been assigned to this project as the only developer, while other people backed me up with non-technical modifications (such as changes in metrics, layout, etc.).

It is a very important project for a customer in Norway with very important data involved. Top Management in ABB Norway is making decisions and oversee the targets and results for several departments across many areas of interest. They need a dashboard, which would display overviews based on input and defined metrics. These overviews has to be divided into defined departments and categories (it means 126 charts). All of this has to be displayed in precisely looking charts and KPI indicators as they request. Data has to be accessible and modifiable in Sharepoint. In the future, a proper administration view has to be implemented.

Description of projects and roles

A partially working solution for this task was made in Excel and in old Sharepoint 2010 before I came. It was almost impossible to sustain such a solution and it contained lot of bugs. There was a need for a fast replacement.

Key parts

Communication

All the communication with our customer was held in English including presentations, meetings and phone calls to Norway.

Fast solution (16 hours)

First of all, there was a need to deliver something really quickly. Decision was made to use the prebuilt feature of Sharepoint. It allows us to load and display Excel or its part online without programming. So new Excel file with proper table, charts and KPI indicators was made. This was satisfying as a quick and working replacement.

Loading data

I started the programming solution. Eight lists were created for data storage. The approach with Content query from the previous project was not used due to its complexity and length of needed development. Much easier approach was used by displaying these lists on same page and using jQuery selectors to collect data.

Charts

They have requested exactly same looking charts as they used in previous version using Excel. Due to this, I could not have used any existing libraries for displaying charts and I had to come up with another solution. I decided to go with an innovative, and until that time unknown, solution to me. It would mean writing these libraries myself. I had to count with many parameters and possible settings to make this charts universal for all possibilities in this solution (such as KPI metrics, labels, ranges and so on). I found out that the best way would be if I draw this charts in HTML canvas element. I have created two libraries, one for Line chart and one for Tacho chart.

```
1 drawTachoPart(115, 100, 60, 1, 2, 24, "black");
2 function drawTachoPart(x, y, shape, start, end, width, color) {
3   c.beginPath();
4   c.arc(x, y, shape, start * Math.PI, end * Math.PI, false);
5   c.lineWidth = width;
6   c.strokeStyle = color;
7   c.stroke();
8 }
```

Source code 3: Drawing into canvas view

Description of projects and roles

Parametrizations

There were many changes going on in previous solution in Excel. I have noticed the most common ones and those are written in one file as parameters, which is easily modifiable for everyone. For example in previous version there had to be changed hundreds of references to change quarter, in my version it is only one variable.

Administration

There was a need to make a proper administration view for managers. For this purpose I have used newly discovered library called SP namespace (sp.js) [13] using JSOM [14], which is integrated into Sharepoint. It allows us, among others, communication and data transfer from Sharepoint lists.

For the queries I use CAML, which is the way, how to select data. The results are stored in an array, which is possible to iterate. The similar principle is used for an update query. The possibilities, which were discovered by existence and usage of this library, were absolutely crucial for us. This changed all the approach we had towards our projects and the way of work in Sharepoint. Usage of web technologies became dominant and by far most powerful. Summarizations of values are computed after update and are immediately accessible to charts.

```
1 function retrieveListItems(tableName, department) {
2   var clientContext = new SP.ClientContext(siteUrl);
3   var oList = clientContext.get_web().get_lists().getByTitle(tableName);
4
5   var camlQuery = new SP.CamlQuery();
6   camlQuery.set_viewXml(
7     '<View><Query><Where><Eq><FieldRef Name=\'Title\' />' +
8     '<Value Type=\'Text\'>' + department + '</Value></Eq></Where></Query>' +
9     '<RowLimit>1</RowLimit></View>'
10  );
```

Source code 4: Retrieving data using CAML query

View

As in previous project, HTML5, SASS (into CSS3), JS, jQuery and KnockoutJS was used. This became a standard of web technologies I use and I suggest to other developers to use in our Sharepoint projects.

Description of projects and roles

Targets for Q1, 2015

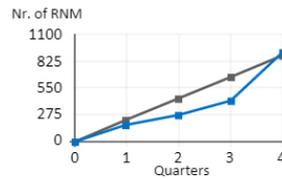
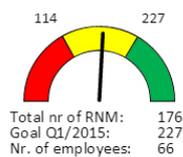
Updated per March 12th, 2015. Results for Q1, 2015 will be published here April 20th, 2015.

This page shows the results for Lifecycle Services and Brownfield Projects. Links to the results for the different departments can be found in the menu on the left hand side of this page



Overview of all departments

1A. HSE: 2 Reported RNM (report of near miss) each employee per year



Department	Target	Result	Status
ABM - Modifications - Bergen	60	40	Yellow
ABP - Projects - Bergen	34	0	Red
AD - Project & Modifications - Stord	21	35	Green
AG - Operations Support Services	19	60	Green
AH - Modifications Hammerfest	8	7	Yellow
AP - Integrated Operations	39	60	Green
AR - Projects & Modifications - Stavanger	39	0	Red
AS - Projects & Modification Oslo	31	0	Red
ASO - Training Services	4	10	Green

Green: $\geq 100\%$. Yellow: $\geq 50\% < 100\%$. Red: $< 50\%$ of target achieved.

Increased from 1 to 2 reported RNM per number of employees per department to be aligned with PA OGC targets 2015.

Measured by total number of reported RNM, not measured per number of employee reporting like in KPI 2014.

All reported RNM is counted, including those from consultants.

1B. HSE: Processing time for HSE reports (average) < 40 days



Department	Target	Result	Status
ABM - Modifications - Bergen	40	55	Red
ABP - Projects - Bergen	40	38	Green
AD - Project & Modifications - Stord	40	0	Green
AG - Operations Support Services	40	0	Green
AH - Modifications Hammerfest	40	0	Green
AP - Integrated Operations	40	0	Green

Fig. 2.2: Designed view of dashboard with hand-written dynamic charts

Result

This solution surpassed by far previous version made in Excel. It does not have any problems with different view in different browsers. It is many times faster (previous version had to be spread into 8 pages for each of the departments, this one works perfectly in one). It also minimizes human faults (a user does no longer modify hundreds of references in Excel to perform desired action). There are easier changes (most of them is to be made in one file with parameters). And it was possible to made proper administration for managers with automatic calculations.

It has also defined new way of working with Sharepoint. These web technologies has widened our possibilities and I think it will ensure us new and more challenging projects.

These solutions pleased our customer and our team received another project from Norway.

2.3 Customer Satisfaction Survey for CZOPC

About the project

This project went through all stages. I had to have presentations and demonstrations of possibilities and showcases, before we even got this project. Both presentations were held in English, first was to department manager and second was to the head of CZOPC. After that we gained official task and amount of hours to come up with a solution. In the beginning we have had several meetings and planning with my team, after that I became the only developer responsible for this project. I regularly consulted the approach, tasks and new discovers on our meetings.

The project meant to be an automatization of a process of getting the feedback from all customers of CZOPC. This used to be done by sending and receiving Excel files and by telephone calls, which was highly ineffective. Task was to create a database for projects held in CZOPC. At a defined time, it has to send email to a customer involved to this project with a survey, whether he was satisfied with the services. When he fills the survey, his answers are saved and are ready to export to Excel for further examination. If he does not fill the survey, there has to be another notification after a specified time. All of this has to be fully automatized, without any user interaction. But there has to be also possibility to manually resend, fill and delete entries.

The approach and technologies used in this project are completely different, that are developers used to.

Key parts

Data storage and surveys

As always, a list with specified columns was used for data. The survey was created using web technologies with appending of the prebuilt input fields.

Automatization using workflow

Workflow is set of actions, which can be triggered and launched on the list. A developer does not write any code manually (maybe except REST calls), but he uses and combines a set of actions. This is the way how I solved this task. I have created 8 workflows which work without any human interaction and take care of everything required.

The most complex one loops through all the items in the list and decides what action to take. Whether it should send survey, send reminder or do nothing. After looping all the items, it sleeps for a day and repeats this action afterwards.

I have also created list, which contains logs from workflows. This became a standard for other projects and their complex workflows, because without this, we have no information of the state and current actions happening in the workflows.

Description of projects and roles

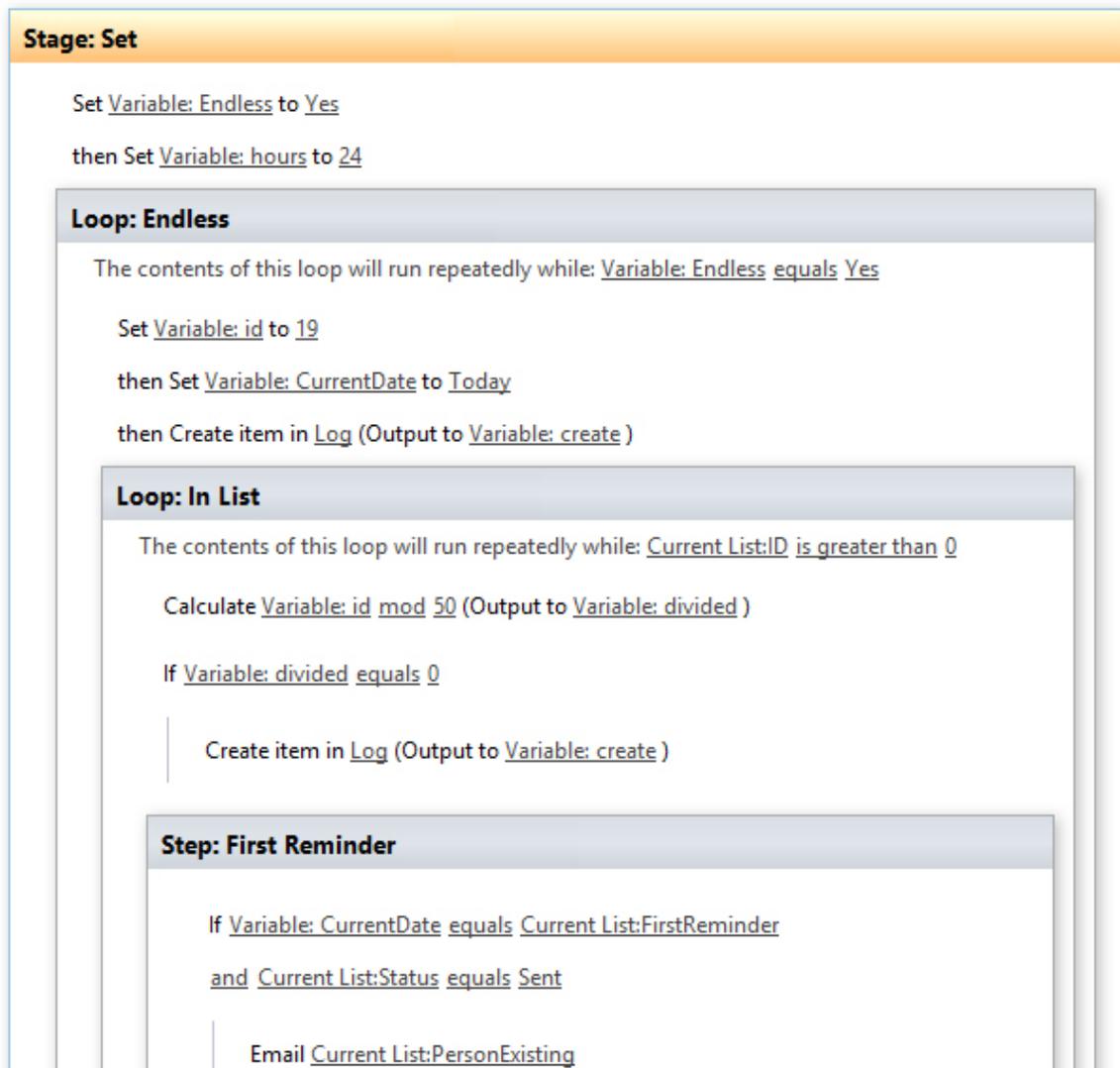


Fig. 2.3: Part of the workflow

Result

This solution is deployed and it has already gathered the surveys from the projects realized previous quarter. It has successfully lowered amount of the time spent by persons taking care of this survey gathering. They only copy data into list and export the data to Excel afterwards, when they need them.

It is very interesting and very used way of solving tasks in Sharepoint. Processes in the company can be rewritten to the workflow with just logical thinking. It reduces the employees overload.

2.4 PDF convertor for Electronic Injury Book

About the project

This project is being developed for Czech Occupational Health and Safety. I was not in the main team of developers involved in this project. I have just provided several JavaScript and workflows advices and made a plugin, which allows to create well-structured PDF files directly from Sharepoint using just client-based technologies.

Task was to create a PDF convertor, which would be able to load data from Sharepoint item in the list and put them into desired looking PDF file. There was a request to come up with a solution not using anything, which requires additional servers (therefore without C#).

Key parts

HTML to PDF Convertor

I have programmed in JavaScript a convertor, which is able to load all the properties from elements in HTML, processes them and forwards them to a library called jsPDF [15]. Using this library it is possible to create PDF file from web browser. It contains few functions such as create rectangle, text and image. It does not use any layout definition, just X and Y coordinates. Basically my solution consists of the transfer of HTML elements into the set of functions jsPDF is using.

I have also counted with a possibility that non-technical people might want to create the structure of PDF themselves. Therefore, I removed the common HTML structure and replaced it with just a set of elements with defined properties. This was the first step to create drag and drop tool for creating a structure of PDF.

During the development I got to know that they require Czech diacritic characters. I have been working on all the projects and documents in English, so I did not count with that. My tool does not support UTF-8 coding, so this approach was abolished for this project. On the other hand it is a fast working solution. It might be useful in upcoming projects.

2.4.0.1 Creating structure of PDF

I had to come up with another solution. I had found new library called pdfmake [16], which uses specific layout definition, so there could not be any convertor made, but it supports Czech diacritic characters. This was the key reason, why I decided to use this library.

This library uses fully declarative structure. It is common to the structure of HTML pages years before, when tables were used for layout. In its JSON structured code, we can put and format text, tables, pictures, paragraphs and others. The creation of this structure is quite difficult and any fault leads to fail and not creating a file. I have created about 6 pages that were needed for this project. I have used NetBeans with live generation of document for faster development. That removed the necessity to download the file after every change of the new document. This was done in jQuery and using iframe.

Description of projects and roles

```
1 pageBreak: 'before',
2 margin: [0, 10, 0, 0],
3 fontSize: 9,
4 table: {
5   widths: [140, 260],
6   body: [
7     [{text: 'Za odborovou organizaci' }],
8     {
9       table : {
10        widths: [250],
11        body : [
12          [ '\n\n'],
13          [ 'datum, jmeno, prijmeni a podpis']
14        ]
15      },
16      layout: {
17        hLineWidth: function(i, node) {return (i===1) ? 0.1 : 0;},vLineWidth: function() {return
18          0;}
19      }
20    ]
21  }
```

Source code 5: Example of structure using table layout

Implementation to list item

The implementation into Sharepoint is not difficult. I have suggested to use the prebuilt view form of item. It is sufficient to put classes there and use jQuery selectors to gather data.

Result

This solution has been implemented and will be used for generating documents of injured employees in whole Czech ABB. It is appreciated that this JavaScript solution replaced the plan of C# implementation for generating documents. This reduced the cost and maintenance time needed for the new server.

2.5 Marine catalog library for Finland

About the project

This project seems to have same stages as Customer Satisfaction Survey. We are trying to get this project for us by showing our possibilities and demos towards our customer. I was asked to supervise the preparation of the demo by chosen approach by my leader for a new team member. But I suggested, in my opinion, a better solution, which I will demonstrate and I will try to get this valuable project to our team.

Our potential customer asks for a place, where he could save the files with many mixed categories and other filled in properties. It has to count with more than 1500 files and big

Description of projects and roles

amount of properties. There has to be advanced filtering options with combination such as: vessels, categories, services and everything they ask. They will not be satisfied with a raw possibilities and design options from Sharepoint. Customizable design will take a place.

Key parts

Loading data

Data will be stored in list. For this large amount of data I could not have used the approach from CZOPC Issues portal and not even the approach from KPI for Norway. I had to come up with more sophisticated solution. This would mean, I have to be able to generate CAML queries dynamically. Constructing CAML query in a string is almost impossible task. I found out library called CamlJS [16], which allows to create this queries with much less pain. I also had to get the link for attachment included, for this purpose I used new library called SPServices [18]. It is very slow, but it is able to get the link to file. This is the reason, why I do not try to gather all the links at once, but I wait for click request by user.

User is given a set of all attributes with checkboxes in the view, which are dynamically loaded from Sharepoint using JSOM. He fills them by clicking. When he clicks the Apply button, dynamic CAML query is created and results are printed out.

I had combined and united almost all the knowledge I have in Sharepoint of web technologies after months in ABB in this project. So even if we do not get this concrete project, this might be a good example of possibilities in Sharepoint.

```
1 var vesselsBuild = CamlBuilder.Expression();
2 var productBuild = CamlBuilder.Expression();
3 var serviceBuild = CamlBuilder.Expression();
4
5 var caml = new CamlBuilder().View().Query().Where().All(
6   vesselsBuild.All.apply(vesselsBuild, vesselsExp),
7   productBuild.All.apply(productBuild, productExp),
8   serviceBuild.All.apply(serviceBuild, serviceExp)
9 ).ToString();
```

Source code 6: Dynamic queries using CAML

```
1 $.SPServices({
2   operation: "GetAttachmentCollection", async: false, listName: listName, ID: listItemId,
3   completefunc: function(xData, Status)
4     {
5     var attachmentFileUrls = [];
6     $(xData.responseXML).find("Attachment").each(function() {
7     var url = $(this).text();
8     attachmentFileUrls.push(url);
9     });
10    attachment = printAttachments(attachmentFileUrls);
11    }
12  });
```

Source code 7: Using SPServices to get attachments

Description of projects and roles

View

The combination of HTML5, SASS, JavaScript, jQuery and KnockoutJS turned out to be the best, so I stick with it. Design is very similar to KPI and fully customizable, so it can easily fit the requirements. I have also created a gif animation of a ship in Sharepoint colors and with ABB logo floating in the see, which serves as a loading element.

Vessel

Dry Cargo Vessels

Ice Going Vessels

Passenger Vessels

LNG and Tankers

Oil and Gas Exploration

Product

Automation

Drives

Motors & Generators

Switchgear & Breakers

Transformers

Motors & Generators

AMD

AMG

AMI

AMK

AML

AMZ

3BM

Service

Service Agreements

Installation & Commissioning

Training

Spares & Consumables

Maintenance

Repairs

Engineering & Consulting

Advanced Services

Extensions Upgrades & Retrofits

Spares & Consumables

Parts

Parts Kits

Capital Spares

Consumables

Exchange Units

Extended Warranty

Apply [Reset selections](#)

These items fit your selection

ID	Title with link	Download	Vessel	Product
566	angelus		Ice Going Vessels Passenger Vessels LNG and Tankers	Motors & Generators Switchgear & Breakers Transformers
556	yttria		Dry Cargo Vessels Ice Going Vessels Passenger Vessels	Automation Drives Motors & Generators

Fig. 2.4: Current view of the Marine portal

Result

I expect creating and preparing a presentation supplementing this work made so far. Me and my team will try to get this project. The results so far are very promising.

This quality of work is incomparable with the work made on CZOPC Issues Portal. My knowledge and skills has increased a lot. The time required for development of this kind of task had been minimized and the approach of working with Sharepoint has been changed completely. I am no longer dependent on jQuery selectors with view changes. I can make a solid project using web technologies and dynamic CAML queries serves for the communication with database.

2.6 Being a Sharepoint specialist

About the role

I was the only person, who has been focused only on Sharepoint and was in charge of development. Therefore I had to regularly forward my knowledge in several ways such as: on daily scrums, on weekly checks, by writing to our Knowledge database or personally. It usually was by helping, keeping an eye on other projects or suggesting solutions. I was

Description of projects and roles

also partially responsible for training of newcomers, I led whole day long training and so on.

Key parts

Trainings

I led one whole day long training of one newcomer to team, of our new project manager and of employee from different department. On this training I focused on two key areas of Sharepoint. One is the area of what is possible to do without the knowledge of programming and the second is the usage of web technologies in Sharepoint. I also prepared demos, tasks and other showcases. Usually I helped newcomers just by sittings next to them and by helping them with their tasks or as an email support.

Guidance and suggestions

I knew about the state on other projects and suggested solutions in case of hesitations or problems. If there appeared something they were not able to solve, it was assigned to me. This was the reason, why I was working on PDF plugin on different project.

Result

I think I helped to newcomers to get involved in Sharepoint tasks and not to being that lost as we were first weeks in. I am also glad, that I could participate in other projects with my guidance and suggestions.

2.7 Being a researcher

About the role

This was my key role, of course among working on assigned projects. By new discovered possibilities, we could have more and better projects. So this is the reason I really tried not to get stuck on one spot, but I was trying to improve the solution or to look for other ways of solving. When I had a possibility I have read articles, blogs and held a discussions on Yammer, where ABB has their social network, about Sharepoint.

Key parts

Web development

I was the only one in team knowing technologies used in web development. After several researches, tries and tasks it turned out that this knowledge is the key for the most complex projects in Sharepoint. Therefore I focused mostly on this area and most of my projects use its knowledge.

Description of projects and roles

Teaching

For every week I prepared short demo, which showed something new. It could be anything from a prebuilt feature, I found in Sharepoint to really complex solutions using web technologies. I usually explained it and when it was necessary, I wrote a documentation. This ensured that our team knowledge of Sharepoint was still expanding.

REST and Workflow demo

The last demo I have prepared for my team consists of functionalities, which we have been missing so far. It is quite difficult to create CAML query even using CamlJS library and this query can not be used in the workflow. I have found out that Sharepoint offers another way of communication called REST endpoints.

```
1 var objects = [];  
2 $.ajax({  
3   url: "https://abb.sharepoint.com/sites/TestingPage/RestWorkflow/_api/web/  
        lists(guid'259E3DCF-DF29-40FE-933E-83F72956B81D')/items?$filter=  
        Status eq 'Initiated'&$top=5&$orderby=Value desc",  
4   method: "GET",  
5   headers: {  
6     "Accept": "application/json;odata=verbose"  
7   },  
8   success: function (data) {  
9     ...  
10  },  
11  error: function (data){  
12    ...  
13  }  
14 });
```

Source code 8: REST method to get data

REST is not used only for GET methods, but can be used for changes on site as well. The second part of my demo was to show how to start workflows with JavaScript. I expect that we will use these functionalities soon in our projects.

Result

This research moved us from knowing basically nothing, except how to set some settings in Sharepoint, to fully web based projects using CAML or REST to query Sharepoint. We also have a possibility to combine our solutions with workflows. And I think, that it is not our maximum by far, we will continue in exploration of JSOM and REST. I really appreciate the amount of influence I had on the way, we are working on and working with.

3 Theoretical and practical knowledge and skills

3.1 Known and used

In this chapter I will mention the knowledge and skills, I have gained during my studies and which I was able to use in business environment.

3.1.1 Communication in English

Thanks to the fact, that I had almost all the subjects in my university held in English and that I have spent a year stay in Belgium in Erasmus program, I was able to participate in this multinational company. I had to be prepared to lead the presentation in English, when there was a foreign employee involved. Also all the documents were written in English. This language is absolutely necessary and I could not imagine working in this company without knowing it.

3.1.2 Ability to present and defend my work

Luckily we had to present and defend our projects several times in the university. Usually it was before whole class, so I could have tried presenting skills. I have to also highlight the studies in Belgium, where the presentations were much more common and there have not been always describing just the technical aspects. In the subject Rich Internet Technologies we presented our work to the real customer, to whom we have been creating a mobile application.

3.1.3 Programming knowledge and experience

My university gave me insights into several programming languages and approaches. I have mostly used knowledge from Development of Information Systems and Introduction to Software engineering, where the whole process of development of the project is described with their stages. In this practise I have mostly used the knowledge from Web design and Rich Internet technologies, which gave me the core knowledge required in Sharepoint. I had both subjects in Belgium.

3.2 Missing and gained

This chapter consist of the knowledge and skill I missed before I started to work in the company. But I was obtaining and improving them during the practise period.

3.2.1 Sharepoint knowledge

I have never encountered Sharepoint before or any similar technology to that. In the university I have built my projects on a green land. I did not solve any problems with integration. Also I did not learn about existing information systems and their usage.

Theoretical and practical knowledge and skills

Learning this technology and its possibilities was something I had to focus on at most during my stay.

3.2.2 Soft skills and team work

I have not led enough discussions and other activities in team to be able to say that I am used to work in team and that I am able to perfectly deal with all the people involved. Our study system is more focused on individual work. On the other hand in Belgium, it is considered normal to work in team of 2 up to 6 people.

3.2.3 Planning and solving the unsolvable

Every task I have been given in school was meant to be solved and was usually solved by many students before me. So I have never had any hesitation, whether it is possible to solve it, it always was. All the tasks in school were required, I knew what approach to take and I had enough time to do it. This was completely different mostly during first months in the company, where we did not have such a knowledge about what is possible. We had to choose in which direction we will go and we had to plan everything in advance. Everything was being made in time pressure, where we could not get stuck on an unsolvable task.

4 Achievements and appreciation

These are the achievements I appreciate the most.

4.1 Sharepoint 2013

I am glad that I could have worked with this technology, which I would never encounter in my studies or by myself. I have found out that Sharepoint is a great tool for bigger companies, as ABB is. It can be used so many ways, there are plenty of possibilities for non-programmers as well as huge possibilities for web developers and in other versions for C# programmers.

Sharepoint can be used for several different areas such as database system, automatization of processes, file storage, social network and information system with many features. It also greatly implements other Microsoft products such as Word, Excel, Access, Outlook and Lync. So in combination with Office 365 it could be sufficient for the most of the things a company would need.

It is also great that I have not been developing for a small group of those who has Sharepoint. Each employee in ABB has his email account, which also serves as an account in Sharepoint. It was great to see all the services from Microsoft set up correctly and working in Sharepoint, which links them all together and serves as the major information system in whole ABB.

To be fair it is needed to say that Sharepoint, due to its cloud based solution, is sometimes very slow and sometimes throws unexpected errors. These are additional reasons, why not to stick with prebuilt solutions and try to write your own using web technologies, which are way faster.

4.2 Professional achievements

It is great that my university and ABB offered me a work in this multinational company as a practise. This was my first real working experience and from the beginning I worked as an employee with all the responsibilities and privileges involved.

With the knowledge and experience obtained, I had raised my chance of getting a good job on the market. I have experienced a full working process and learned the usage of web technologies not many people know of.

It is very satisfying that my work is contributed in real business of CZOPC and my projects are up and working. That I have trained others in Sharepoint and that I made and shared numerous results of my research. This could be taken as a level, which other developers can further improve and build their projects upon this knowledge. It is great that I was not just a developer, but I had a real impact of the direction on our Sharepoint Innovation Team.

4.3 Personal conclusion

It was a really good decision to apply for a Sharepoint developer in ABB. Even though it was very time consuming, mainly because of all the research and my home preparation. I would like to highly recommend a practise in ABB. It is definitely a valuable experience.

I was firstly worried that I would do only additional helping services or support, but these worries disappeared already during the interview. It is great on how many projects I have been working on, what I have been responsible for and what were the requirements I had to met. It was also welcomed that I could improve my presentation skills and negotiations with customers.

It is very motivating to look backwards and see the progress we have made. We have started from almost nothing and turned it into strong team, which is capable of delivering complex solutions. The projects I have led or I contributed on are working and used regularly. They track teams in our Software department, follow the KPI indicators in Norway, gather all feedbacks from CZOPC customers, export PDF files of injured employees in Czech Republic and soon they might store documents of Marine in Finland.

This practise only encouraged me that I would like to work with robust information systems. I am going to cooperate with ABB in the future in the same position as was my practise. Next academic year I would like to apply for a position of Sharepoint developer in Finland, where I am going to study for another academic year. If it would not be possible, I would like to continue learning myself about other possibilities and approaches in Sharepoint and try to improve the current ones. I think I have a great start for that.

References

- [1] About ABB [online]. 2015 [cit. 2015-04-26].
Available on: <http://www.abb.com>
- [2] Sharepoint product page [online]. 2015 [cit. 2015-04-26].
Available on: <https://products.office.com/en-us/sharepoint/collaboration>
- [3] CAML query schema [online]. 2015 [cit. 2015-04-26].
Available on: <https://msdn.microsoft.com/en-us/library/office/ms467521.aspx>
- [4] REST services in Sharepoint [online]. 2015 [cit. 2015-04-26].
Available on: <https://msdn.microsoft.com/en-us/library/office/fp142380.aspx>
- [5] jQuery library [online]. 2015 [cit. 2015-04-26].
Available on: <https://jquery.com/>
- [6] About SCRUM [http\[online\]](http://www.scrumalliance.org/why-scrum). 2015 [cit. 2015-04-26].
Available on: <https://www.scrumalliance.org/why-scrum>
- [7] JSON [online]. 2015 [cit. 2015-04-26].
Available on: <http://www.json.org/>
- [8] KnockoutJS library [online]. 2015 [cit. 2015-04-26].
Available on: <http://knockoutjs.com/>
- [9] FileSaver library [online]. 2015 [cit. 2015-04-26].
Available on: <https://github.com/eligrey/FileSaver.js/>
- [10] CanvasToBlob library [online]. 2015 [cit. 2015-04-26].
Available on: <https://github.com/blueimp/JavaScript-Canvas-to-Blob>
- [11] ChartJS library [online]. 2015 [cit. 2015-04-26].
Available on: <http://www.chartjs.org/>
- [12] SASS [online]. 2015 [cit. 2015-04-26].
Available on: <http://sass-lang.com/>
- [13] Sharepoint namespace [online]. 2015 [cit. 2015-04-26].
Available on: <https://msdn.microsoft.com/en-us/library/office/jj246996.aspx>
- [14] JSOM [online]. 2015 [cit. 2015-04-26].
Available on: <https://msdn.microsoft.com/en-us/library/office/dn268594.aspx>
- [15] jsPDF library [online]. 2015 [cit. 2015-04-26].
Available on: <https://parall.ax/products/jspdf>
- [16] pdfMake library [online]. 2015 [cit. 2015-04-26].
Available on: <https://github.com/bpampuch/pdfmake>

- [17] camlJS library *[online]*. 2015 *[cit. 2015-04-26]*.
Available on: <https://camljs.codeplex.com/>
- [18] SPServices library *[online]*. 2015 *[cit. 2015-04-26]*.
Available on: <https://spservices.codeplex.com/>