SUMMER INTERNSHIP REPORT

Submitted to the Department of Computer Science at Wayne State University in Fulfillment of the Requirements for the Completion of Industrial Training (CSC 6995)

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Introduction

This report describes the activities performed during an 8-week fulltime internship as a software engineer in Inovision, Inc. This document includes information of the company and responsibilities I took throughout the period from June 27 to Aug 24, 2018.

The first part of the report is an overall description of the company I worked for, followed by an overview of the duties and responsibilities I carried out during the internship. Next, it gives details of some tasks and projects I performed. Finally, the report wraps up with some conclusion and thoughts from this experience.

Where I worked: Inovision Inc.

Inovision Inc. was founded in 1992. It offers products for closed loop fluid delivery and motion control. The services include software development, systems planning, design, maintenance and installation. Inovision Inc. also offers services to improve existing systems to make them updated and extend capital investment.

Inovision Inc. offers Turn-key Robotic Systems Integration, controls and software engineering services, robot programming and process engineering services, robotic system modular build and system testing, automation readiness audit (ARA) service. Some of the ongoing products include quality verification systems, smartsurface finishing, smartmix fluid delivery, medical equipment software. It collaborates with a lot of companies, like Ford, FCA, Zeiss, BMW, Toyota, GM, FANUC Robotics, etc.

Duties carried out in the summer internship program

My title is software engineer intern. My training supervisor is Jacob Allen, the senior software engineer in Inovision Inc.

My responsibilities include:

Develop code to add new features and/or fix bugs within internal business management systems;

Modify existing SQL Server database architecture and/or stored procedures;

Utilize technologies such as C#, MVC5, Entity FrameWork Code First, HTML&CSS, Bootstrap CSS, Javascript, and JQuery.

ASP.NET MVC

In this summer training program, the major platform I worked with is ASP.NET MVC on Visual Studio.

MVC is an HTML development environment. MVC stands for “Model”, “View”, “Controller”. The design of MVC separates the website into three layers, which results in increasing our control on the web application.

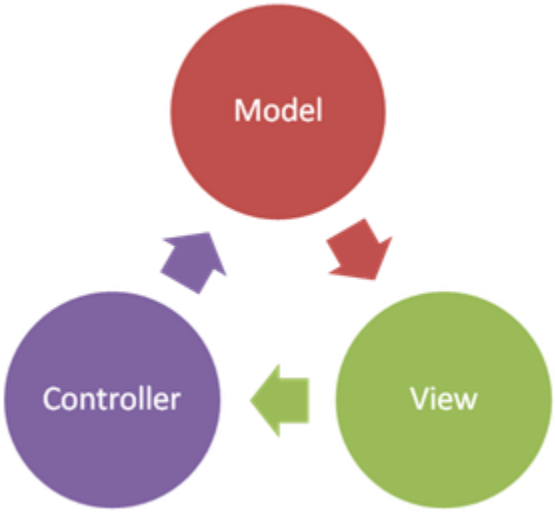

Figure 1. The scheme of MVC architecture

Model: Model is business logic and data. Model communicates with database. It can retrieve and store data in the database.

View: View is a user interface and displays data to the user. It is a set of user controls and web pages. The separation between the controller and view makes the application testable.

Controller: This is the logic layer which handles the user request. Typically, a URL request will be raised when a user interacts with View. A controller will handle the request and render an appropriate view. Controller plays a role as a coordinator between the View and the Model.

As MVC is divided into three layers, it is a loosely coupled development framework. The loose coupling has the advantage of reducing the complexity of the application and increasing the testability of the web applications.

Visual Studio

Visual Studio (VS) is an Integrated Development Environment developed by Microsoft. People use VS to develop web sites, web apps, computer programs, mobile apps and web services. VS produces native code and managed code as well. It uses Microsoft software development platforms including Windows Forms, WPF, Microsoft Silverlight, Windows API, and etc.

Intranet of Inovision Inc

My major responsibility during the internship is to maintain and improve the performance of the internal website of Inovision Inc. Via intranet, people within the company can easily share information. In intranet of Inovision, there are multiple functional sections, including daily log, time cards, purchase orders, contacts, jobs, organizations, travel, expense reports, etc. Employees can achieve almost all the tasks on this platform. For example, a purchaser can easily search for a purchase order using the order number or vendor name, and then get all the information of the purchase order details. And using searching by contact allows an administrator to easily obtain the daily log information, time card, expense reports attached to that person.

Main tasks I worked on

Task 1.

Problem defined: The intranet system detects the role of the current user, and then directs the user to the corresponding homepage. However, due to the difference in loading time of different roles' home pages, sometimes it can take more than 1 minute for certain roles to log in.

Approach: To solve the loading time problem, I took an approach of directing all the users to either employee homepage or contractor homepage. As the logging time to these two webpages is fast, this change can result in a dramatic drop in logging time. The idea is to change the logic in controller, if the identity of the current user is an employee, including accountant, administrator, engineer, purchaser…, change the webpage to employee's webpages; otherwise, change the webpage to contractor's webpage. The next step is to move the links of different homepages to the employee's homepage. In this way, the user can choose the link corresponding to his/her role. The final homepage looks like Fig. 2.

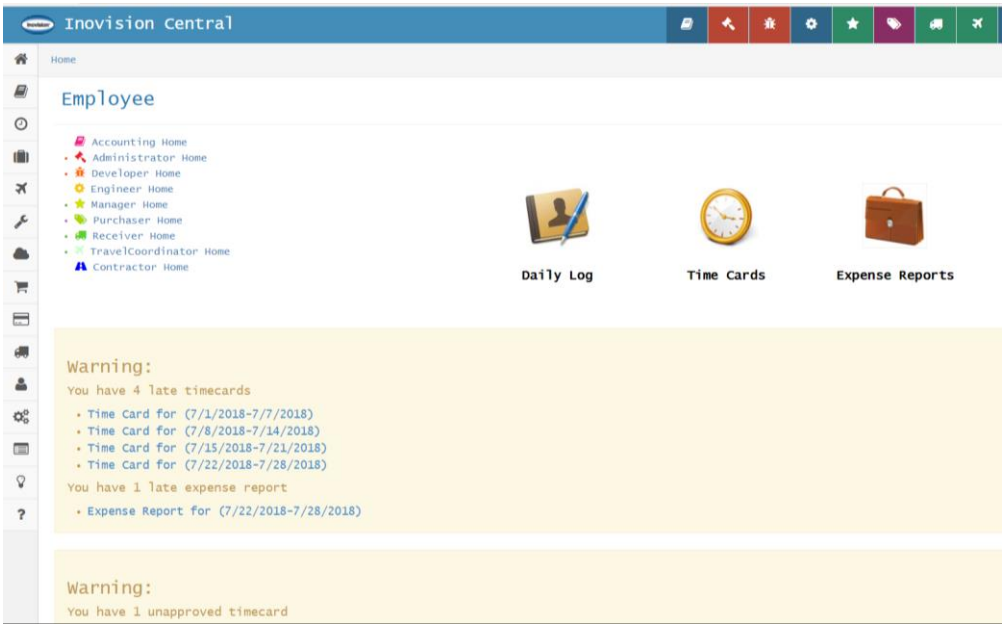

Figure 2. Employee Homepage in Inovision Intranet

Task 2.

Problem defined: Daily log section in Intranet is a section which allows people to record the schedule and plans of each day. Now user can go to previous page and next page with “previous” button and “next” button. However, as the time passes, an employee’s daily log can be as many as hundreds of pages. Thus, it is necessary to allow a user to jump to any page he wants. The task is to achieve jumping function: by entering a certain page number and pressing “enter” key, a user can go to that page directly.

Approach: I added Jquery script to the partial view page. In this page, pressing “enter” key on the input value in the text box will trigger jumping function. As the event code of “enter” key is “13”, thus pressing “enter” key will trigger the jumping page event while it is safe to input any other key in the text box. Without this statement, any inputting will result in the jumping event, which is not what we want. Another constraint implemented is the range of the page allowed to jump to. As the total number of daily log pages is fixed, any input larger than maximum page number is set to the maximum page number, and any input smaller than one is set to one. In this way, we restrict the range of page. The corresponding javascript code is shown in Fig. 3.

```
<script type="text/javascript">

                $('#pageInput').on('keypress', function (e) {
                    if ( event.which == 13 ) {

                        var pageInput = document.getElementById('pageInput').value;
                        var pageMax =document.getElementById('lastPageNumber').value;
                        var url = document.getElementById('urlLink').value;
                        if (parseInt(pageInput)<1) pageInput=1;
                        if (parseInt(pageInput)>=parseInt(pageMax))pageInput=pageMax;
                        open(url+pageInput,"_self");

                    }
                });
            </script>
```

Figure 3. Jquery code which enables page jumping funciton

Task 3.

Problem defined: In intranet, there are many textboxes that employees can input text into. Autofilling is usually the default setting in the textboxes. We take purchase order section as an example: after entering value into “description” textbox, the description field in all the following purchase order forms generated will have the same description autofilled as it has memory. This is unnecessary and can be quite annoying most of the time.

Approach: In the first approach, I added $("input[type='text']").attr("autocomplete","off") to the master page _Layout.cshtml. This approach prevents all the textboxes from autofilling. It is easy to implement and straightforward to understand. To give us more flexibility, I took a second approach in which I created attribute “AutoFillingAttribute”. The procedure is:

create Autofilling attribute class under attributes folder → add declarations to BaseFieldDefinition→ add declarations to PropertyFieldDefinition→Inputmap (connect false/true to input autofilling setting). After this declaration procedure, we add the attribute to the textbox that we want to prevent auto filling while keeping the autofilling property for the others. This approach allows us to have the whole control of when to autofill.

Task 4.

Problem defined: Daily logs of each employee will be sent to the corresponding email subscribers. And the manager of the company subscribes to the daily log emails of all the employees. The daily log entry can be either main job entry or interruptions. The manager brought up a problem: currently the daily log entries are not correctly ordered by time and interruptions and main job entries cannot be distinguished from each other.

Approach: When investigating the time ordering problem, I find that the current code tried to sort the daily log entries chronologically but failed. The reason is that "StartTime" has data type of "DateTime" and has am/pm format. To order the entries correctly, the "StartTime" has to be converted to 24 hour format using "DateTime.Parse((DateTime.Parse(dled.StartTime.ToString())).ToString("HH:mm")))".

Then it comes to the question of how to correctly relate interruptions to the main jobs they belong to. To achieve this, I added "dailylogentryID" to both main job and interruptions so that they can be related. If they have the same "dailylogentryId", the interruptions belong to the main job entry. Then add property "DailyLogEntryId" to the file DailyLogEntryDisplay.cs. One difficulty in this problem is how to have order "M1I1M2I2M3I3", where "M" represents for "main job" and "I" represents for "interruption". The solution I came up with is to first order the entries by "StartTime", then group the entries. In this way, the correctly pair of interruptions and daily log entries are grouped together, and they can have the correct chronological order as well. Then in _dailylogemail.cshtml, I added a variable called "prefix". If the entry is main job, prefix is null; if the entry is an interruption, prefix is "Interruption". A sample of the final daily log email obtained is shown in Fig. 4. From the figure we can see that the daily log entries are ordered chronologically, and interruptions and main jobs are paired correctly.


Total: 29.73 Hrs

2053 - Cirrus 11 Fixed Bid (CLOSED) Dublin, CA. (Eng Software Development) Reply
08-24-2017 Th Total: 0.50 Hrs
05:05 AM - 08:05 AM (Break: 0.50 Hrs) (Interruption: 2.00 Hrs)

-work in Flint plant

(Interruption) 2053 - Cirrus 11 Fixed Bid (CLOSED) Dublin, CA. (Eng Software Development) Reply
08-24-2017 Th Total: 2.00 Hrs
06:20 PM - 08:20 PM

Jacob called in to check the project progress

2053 - Cirrus 11 Fixed Bid (CLOSED) Dublin, CA. (Eng Software Development) Reply
08-24-2017 Th Total: 8.17 Hrs
09:05 AM - 06:45 PM (Break: 0.50 Hrs) (Interruption: 1.00 Hrs)

- Installed testing Cirrus software and solved an issue of lack of CZM.SDOCT.MontageControls.dll
- Tested Montage Angio Analysis and finished up SWTR.
- Implemented unit test for AngiographyAnalysis plugin.

(Interruption) 2053 - Cirrus 11 Fixed Bid (CLOSED) Dublin, CA. (Eng Software Development) Reply
08-24-2017 Th Total: 1.00 Hrs
08:20 PM - 09:20 PM

Go to garage to maintain car

2053 - Cirrus 11 Fixed Bid (CLOSED) Dublin, CA. (Eng Software Development) Reply
08-24-2017 Th Total: 5.98 Hrs
12:06 PM - 06:35 PM (Break: 0.50 Hrs)

-Learn from Jacob how to do calibration

2053 - Cirrus 11 Fixed Bid (CLOSED) Dublin, CA. (Eng Software Development) Reply
08-24-2017 Th Total: 0.08 Hrs
04:00 PM - 04:35 PM (Break: 0.50 Hrs)

Figure 4. Sample of the daily log subscription email

Conclusion and Reflection

Using knowledge and skills learnt from school

Working on the intranet requires a solid knowledge background of web development, database management, algorithms design and analysis, etc. The knowledge used in the company is closely related to what I learnt from the courses taught at Wayne State University. Thus, this internship is a precious opportunity for me to apply the knowledge I learnt from school to the real world.

Learning techniques and skills used in industry

What I benefited most from the experience is to get acquainted with advanced technology that the companies are developing nowadays. After this two-month internship, I became proficient in coding with C#, HTML, Javascript, Jquery, etc. The techniques used in companies are similar to what I used to practice at school, but ten times more complicated. Trouble shooting and making website run smoothly can be time-consuming. But nothing can match the happiness of solving problems and making things work. With my efforts, now the intranet has improved significantly and become more user-friendly. I also added a bunch of of useful functions to the intranet, like adding the function for purchaser to check the information of vendor; allowing people to choose between normal mode and high-contrast mode; allowing the manager to have clearer idea of employee's daily logs, achieving the function of disabling autofilling, and so on.

Enhancing communication skills

My communication skills also improved a lot owing to the internship. In order to get work done and done well, it's important to convey your message to the others as well as understand others. By discussing with my supervisor and coworkers, I learnt a lot about how to talk more efficient. One skill I learnt is to summarize the thoughts before talking. In this way, communication can be very efficient.

In conclusion, I have made notably progress owing to the precious internship opportunity. The internship experience has enabled me to gain practical experience and given me an insight into the real industry. I strongly believe the experience is helpful for my career in the future.