DEVELOPMENT OF MANAGEMENT INFORMATION SYSTEM FOR TV-CHANNEL “KNB” USING ASP.NET

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“___”___________ 2017

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Head of the department,
Dr. Sci., Prof.
__________ L.B. Sokolinsky
“___”___________ 2017

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2. The deadline for the completion of the work: 01.06.2017.

3. The source data for the work
4. The list of the development issues
   4.1. Analyze the domain of the problem.
   4.2. Analysis of modern technologies of web application development and choose which technology for project development was made.
   4.3. Design database scheme, and system functions requirement.
   4.4. Implement the system Development of Management Information System For TV-Channel “KNB” Using ASP.NET MVC.
   4.5. Test the system.

5. Issuance date of the task: 09.02.2017.

Supervisor
Senior Lecture. K.Yu. Nikolskaya
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The task is taken to perform M.A. Jasim
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ABSTRACT

Globalization, IT technologies and the variations in Web users and businesses demands are challenging the Web development market. Current Website development approaches vary from ad hoc practices to complex formal disciplined methods where the majority of developers use the ad hoc methods. This approach, though good for small Website, is leading the Web market into a state of distress. This is true when Web projects increase in size and complexity while developers continue to use traditional techniques to handle the growing demands of such Web application.

The project is implementation of the Web application for a News TV channel in Iraq in Kirkuk city. The objective of the Web application is to provide visitors last news that happened locally or globally, the news is send out by every user who register in the application but not show only after approval from administrator of the application, with information on weather of the city. Though partially implemented, the project provides a documented infrastructure for completion, future expansion and improvements.

Objectives are achieved by implementing ASP.NET MVC framework. web forms focus on rapid application development and provides a modern rich appearance to user interfaces and improves user interaction experience. The development approach is to conform to Software Engineering and Web standards to improve quality, accessibility and usability.

For implementation, an IDE is used. Microsoft Visual Studio.NET 2015, C# and the integrated MS SQL Express 2016 are the main development tools.

The final product is a research on ASP.NET MVC and frameworks for creating web applications: Web Forms, ASP.NET MVC, and ASP.NET Web Pages. Web development approaches, a full system lifecycle document and a partially implemented News web application.
INTRODUCTION

ACTUALITY

Technology has incredible power to improve people’s lives, foster economic growth, and create opportunities for individuals, companies, and nations around the globe [1].

In 2015, The National Statistics site confirms site sales of £215 billion contributed 40.4% to the total e-commerce sales in 2015 for businesses an increase from 36.2% in 2014. Internet access for UK household shows an increase of 36 percent since 2002 and Internet sale records annual increase of 29.1 percent in 2005. In 2015 83% of all enterprises have internet access, 80% of all companies use fixed broadband connection and 55% used a mobile broadband internet connection [2].

Thus, businesses are racing towards acquiring websites and in turn people are getting more reliant on the Internet. This indeed leads to greater demand for web application development.

As to modern news media sources, an American New modern news consumers survey reveals 26% of the Americans read news by their traditional journalism, 59% reads news by online (desktop, laptop, mobile), 10% by TV and 4% by Radio. Also, the survey reveals 56% of online readers uses mobile and 44% prefer desktop or laptop. These figures indicate news web site or web application will have a growing market in the near future. The survey was done by Pew Research Center in February 8-12, 2016 [3].

Research verify businesses do not normally intervene in the development process. They are mainly concerned with achieving their goals within time and budget. Therefore, quality of websites falls on the shoulders of developers. some novice developers use the ad hoc approach. Websites of that category, on average, launch quickly but sacrifice flexibility, scalability and maintainability. Such inflexible and expensive to maintain websites offer little benefit to the ever-changing businesses and users’ needs in the long run [4].
Research goal and objectives

The goal of the research is the development of a management information system for “KNB” TV channel.

For the reaching this goal we must achieve following objectives:
1) analyze the subject area;
2) analyze of modern tools that used for development web application and choose tools for project development;
3) design the system:
   a) design the system function requirement by using case diagram;
   b) design database scheme;
4) implement the system (coding);
5) test the system.

The practical significance

This project is beneficial to all local TV channels in Kirkuk city and online news portal, because they all have a similar object in the news industry its credibility in spreading the news with speed in access to the events.

This project useful, because it contains important features to assist online news portal:
1) allow every register user to submit news, that’s take advantage of user maybe near the event more than channel reporter;
2) enhancing credibility by ensuring that only approved news display to the visitors of the page;
3) ensuring that there is no duplication when viewing news, by not allow duplication when register user submit new news;
4) including the individual identification at the site for all users;
5) easily dealing with the site for its friendly-User Interface design that characterized by simplicity, consistency and use common elements;
6) unlimited number of users could access the application;
7) ability for the following development of the web application.
Structure of the thesis

The thesis comprises of four chapters, introduction, conclusion and reference list.

In chapter one, the analysis of the subject area is represented that’s include domain of problem. Also, there is the overview of what are the best current web development technologies, which we used to develop the project, cost effectiveness to develop the project.

In chapter Two, there is a description of functional requirements, non-functional requirement use case diagram, database scheme and the design the application interfaces.

In chapter Three, we show the project solution, several fragments of ASP.NET MVC code for implementing basic functionality of the system and implementation in the web-application, fragment of ASP.NET MVC code for implementing the nonfunctional requirement (output cashing) and deployment digram for the system.

Chapter Four is devoted to the functional testing of the application, and testing for JSON “Get” method.

The thesis has 51 pages; the list of references contains 20 resources.
1. THE ANALYSIS OF THE SUBJECT AREA

This chapter investigates, analyses and discuss why needing this application, what is the problem domain, what are best current web development technologies available, which technologies used to development the project, and cost effectiveness for developing the project.

1.1. The problem domain

First news is more than just facts and information; it is information that affects us. News affects how we live our lives, how we perform our jobs, how we function as students, and how we make decisions. We determine whether carry an umbrella or not based on weather reports. We look to the media for sports scores, stock market reports and details about entertainment events. Information we have learned from news broadcasts may affect our choice of a college or a major field of study. More importantly, we learn about candidates for public office, election results and the winners through media reports. Advertisements about new industry, new jobs or on the contrary, about plant closings and layoffs come to us through the media [5].

Second, I made research about all news broadcast channel in my city and news websites I found that:

1) Kirkuk TV channel has no official website on the internet the users could not find news and global news from official web site;

2) Kirkuk Provincial Council which is the official governmental institution has web site its URL http://kirkukcouncil.iq but it’s not work;

3) independent news website there is only one web site called “Kirkuk now” and its URL http://kirkuknow.com/english/ give good information and news its build by using PHP language, and its static web page web site its provide only information and not allow post news from users who maybe near the events before any reporter;

4) all news you need to find must use social media application like “Facebook” the problem many of this news are not official and you don’t sure from
its correctness or it’s has ambiguates because there are no editors who writes it also foreign citizen when need know news they use web search engine not social media.

For all these reasons, it’s very good investment to develop news web application use new platform more secure, good design, Illustration for the pages. And Iam sure I will find place in this empty market to sell my application to my city local government or to local TV broadcast channels.

1.2. The best current web development technologies

Web technologies like programming languages, frameworks, web crawlers, content management services and more, can be distributing according these categories:

1) browsers are the interpreters of the web. They request information and then when they receive it, they show us on the page in a format we can see and understand;

   a) Google Chrome – Google’s web browser;
   b) Safari – Apple’s web browser;
   c) Firefox – Mozilla Foundation web browser;
   d) Microsoft Edge – Microsoft’s browser.

2) HTML (Hypertext Markup Language). Is a presentation markup language for describing web documents, it provides structure of a website so that web browsers know what to show;

3) CSS (Cascading Style Sheet). “CSS” let's web designers change colors, fonts, animations and transitions on the web, they make the web look good;

4) Programming languages are ways to communicate to computers and tell them what to do;

5) Frameworks are built to make building and working with programming languages easier. Frameworks typically take all the difficult, repetitive tasks in setting up a new web application and either do them for you or make them very easy for you to do like: -
a) WordPress - a CMS (content management system) built on “PHP”. Currently, about 27.3% of all websites run on this framework;

b) .NET - a full-stack framework built by Microsoft about 15.3% of all websites run on this framework;

6) Libraries (packages) are collections of code snippets to enable a great deal of functionality without having to write them all on your own like “JQuery”;

7) Web servers and server products is any computer which hosts a website is called a web server. A web server is linked directly to the web and on requests from a client, sends the hosted web pages to them using the hypertext transfer protocol “HTTP”. If you want to host your own website through an internet service provider (ISP), a web presence provider “WPP”, or a web host provider (WHP), you may have access to several different sorts of web servers. The most well-known web servers at present accessible are:

a) Windows-based servers running Microsoft Internet Information Services (IIS);

b) UNIX-based servers running Apache;

c) Open source server running NGINX the fast-growing server;

8) Databases are where all your data is stored. Databases come mainly in two types: SQL and NoSQL. SQL provides more structure which helps with making sure all the data is correct and validated. NoSQL provides a considerable measure of flexibility for building and maintaining applications:

a) MongoDB - is an open-sourced NoSQL database and is currently the only database supported by Meteor;

b) MySQL - is another popular open-sourced SQL database. MySQL is used in WordPress websites;

c) Oracle - is an enterprise SQL database;

d) SQL Server - is an SQL server manager created by Microsoft;
9) Client is one user of an application. It’s you and me when we visit http://google.com. Clients can be desktop computers, tablets, or mobile devices. There are typically multiple clients interacting with the same application saved on a server;

10) Front-end is comprised of “HTML”, “CSS”, and JavaScript. This is how and where the website is shown to users;

11) Back-end is involved of your server and database. It’s the place where functions, methods, and data manipulation happens;

12) Protocols are standardized instructions for how to pass data forward and backward among computers and gadgets;
   a) HTTP (Hyper Text Transfer Protocol) - This protocol is how each website gets to your browser. Whenever you type a website like “http://google.com” this protocol requests the website from Google’s server and then gets a response with the “HTML”, “CSS”, and JavaScript of the site;
   b) DDP (Distributed Data Protocol) - is a new protocol created in connection with Meteor. The DDP uses web sockets to create a consistent connection between the client and the server. This constant connection let’s websites and data on those websites update in real-time without refreshing your browser;
   c) REST (REpresentational State Transfer) - is a protocol mainly used for API's. It has standard methods like “GET”, “POST”, and “PUT” that let data be swap between applications.

13) API is an application programming interface. It is created by the developer of an application to allow other developers to use some of the applications functionality without sharing code. Developers expose “end points” which are like inputs and outputs of the application. Using an API can control access with API keys. Examples of good API’s are those created by Facebook, Twitter, and Google for their web services.

14) Data formats are the structure of how data is stored like XML [6].
1.3. Technology used to develop the project (software requirement)

In point 1.2 page 12 we discuss what are the most of web technology’s that we have these days. Software requirements list seems to grow bigger as I discover more plug-ins for the Visual Studio.net. Table 1 list’s all software utilized for development of this application.

Table 1. Software Requirement

<table>
<thead>
<tr>
<th>Name</th>
<th>Source</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microsoft Visual studio 2015</td>
<td>Free Microsoft download</td>
<td>Main IDE</td>
</tr>
<tr>
<td>community edition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASP.NET MVC 4.6</td>
<td>Free Microsoft download</td>
<td>Web development framework.</td>
</tr>
<tr>
<td>MSSQL server 2016 Express edition</td>
<td>Free Microsoft download</td>
<td>Database development environment.</td>
</tr>
<tr>
<td>SOAPSonar 7.0.4</td>
<td><a href="https://www.crosschecknet.com/">https://www.crosschecknet.com/</a></td>
<td>Platform for JSON test.</td>
</tr>
<tr>
<td>JQuery 3.1.1</td>
<td>Free NuGet download</td>
<td>much easier to use JavaScript on website</td>
</tr>
<tr>
<td>Bootstrap</td>
<td>Free NuGet download</td>
<td>Web design improvement</td>
</tr>
<tr>
<td>Knockout</td>
<td>Free NuGet download</td>
<td>create rich, responsive display</td>
</tr>
</tbody>
</table>

1.4. Development tools

1. Project type, this project is about developing an information News web application by utilizing “ASP.NET MVC”.

2. Visual Studio is development environment consist of tools used for building “ASP.NET MVC” Web applications.

3. Open source and community focused.

4. Its free environment for community edition and for users who register as student (not cost anything).

5. C# the main language in education in master program for foreign student in College Computational Mathematics and Informatics of South Ural State University.
1.5. Database management system

SQL Server 2016 is the latest addition to Microsoft’s data platform, it is database management system with a variety of new features and enhancements that deliver breakthrough performance, advanced security, and richer, integrated reporting and analytics capabilities. Built using the new rapid-release model, SQL Server 2016 incorporates many features introduced:

1) compatibility: The web application develops by .NET environment so it’s better to use MS SQL server because is full Visual Studio support;

2) better security: SQL Server 2016 provide new security features:
   a) always Encrypted with Always Encrypted, SQL Server can perform operations on encrypted data and best of all, the encryption key resides with the application in the customers trusted environment. Encryption and decryption of data happens transparently inside the application which minimizes the changes that have to be made to existing applications. a feature designed to save critical data such as numbers of credit card, it’s allows clients to encrypt sensitive data inside client applications and never uncover the encryption keys to the Database Engine (SQL Database or SQL Server);
   b) Row-Level Security (RLS) allows you to configure tables such that users see only the rows within the table to which you grant them access;
   c) dynamic data masking When you have a database that contains sensitive data, you can use Hide dynamic data to blur a portion of the data unless specifically authorizing the user to view the unconvincing data [7].

3) faster queries: SQL Server 2016 includes several options for enabling faster queries:
   a) enhancements in -Memory OLTP (Online Transaction Processing) that help speed up transactional workloads by moving data from disk-based tables to memory-optimized tables faster, that’s provide 30x faster transactions processing than “SQL Server 2014”, all these operation and data are fully durable save on the disk [8];
b) Real time Operational Analytics by adding support for column store, indexes on memory-optimized OLTP tables when create an updateable column store index on a memory-optimized table, the database engine creates a separate copy of the data that your analytics workload uses while your OLTP workloads continue to run on the table data. That way, resource contention between the two workloads is significantly reduced when they run simultaneously. As changes happen in a table, the database engine automatically manages changes to the index to ensure that it remains current with the underlying table [7];

4) Stretch Database: This new technology authorized you to dynamically expand your transaction data to Microsoft Azure, so your operational data is always at hand, regardless of size, and benefits from the depress cost of Azure. Using encryption with a database extends provand’s greater comfort in the mind [8].

1.6. Cost Effectiveness for develop the application

The cost important factor in developing the project we could see from the table 2 how much software cost for developing this project. I don’t take into account the price of laptop because it’s own by me and salary of programmers.

Table 2. Cost of Development

<table>
<thead>
<tr>
<th>Components</th>
<th>Price in USA $</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual Studio 2015 Community Edition</td>
<td>0</td>
</tr>
<tr>
<td>SQL server express 2016</td>
<td>0</td>
</tr>
<tr>
<td>Visual Paradigm 13.1 Community edition</td>
<td>0</td>
</tr>
<tr>
<td>BootStrap3.3 library</td>
<td>0</td>
</tr>
<tr>
<td>SOAPSonar 7.0.4 Personal edition</td>
<td>0</td>
</tr>
<tr>
<td>Knockout and JQuery</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total Cost</strong></td>
<td><strong>0</strong></td>
</tr>
</tbody>
</table>
2. DESIGN OF MANAGEMENT INFORMATION SYSTEM
   FOR TV-CHANNEL “KNB”

2.1. Functional requirements

   This application must contain the following basic functions requirements:

   1) view the news for every user using the system;
   2) authorize the users;
   3) register new users to the system;
   4) submit a new news;
   5) prove or reject new news submitted by registered users;
   6) verification to ensure second copy of news will not create;
   7) create, delete, view category;
   8) view, delete register user;
   9) sort function for sorting news, categories and users;
   10) search function;
   11) display the weather status of Kirkuk city.

   The requirement “Authorize the users” means to have an opportunity for users to log in and log out the site. It is a special type of protection from the unauthorized access.

   The system must view only the approved news to all users of the system, the news that submitted by registered users its waiting in pending list the administrator approve news or reject it after he ensure of its accuracy.

   There are three types of users:

   1) administrator;
   2) register User;
   3) unregister User.

   Administrator of the system can submit new news, create new category, display it and delete it, he also able to view the email of registered users and de-
lete who violates publishing laws, and one of the most important task he response is approve news or reject it.

Register User can view the news and also to submit new news.

Unregister User can see the same news of register user except he could not submit news.

2.2. Non-functional requirements

This application contains the following basic non-functions requirements:

1) using this web application is only available when there is internet connection;

2) this web application is compatible with almost all browsers like Microsoft Edge, Google Chrome that’s run on different devices;

3) performance optimization (output cache).

2.3. Use case diagram for design system functions requirement

Unified Modeling Language (UML) is a standard set of diagramming techniques its objective was to provide a common vocabulary of object-oriented terms its rich enough to model any systems development project from analysis through implementation.

The diagrams are broken into two major groupings:

1) modeling the structure of a system Structure diagrams provide a way to represent the data and static relationships in an information system. The structure diagrams include class, object, package, deployment, component, composite structure, and profile diagrams [9].

2) modeling behavior of the system. Behavior diagrams provide the analyst with a way to show the dynamic relationships among the instances or objects that represent the business information system. They also allow modeling of the dynamic behavior of individual objects throughout their lifetime. The behavior diagrams support the analyst in modeling the functional requirements of an evolving information system. The behavior modeling diagrams include ac-
tivity, sequence, communication, interaction overview, timing, behavior state machine, protocol state machine, and use-case diagrams [9].

A use case diagram is type of UML diagrams. Capture business requirements for the system and illustrate the interaction between the system and its environment its used to describe the basic functions of the information system [9].

Use-case models have two primary constructs: actors and use cases. An actor represents a role that a user of the system plays, not a specific user, A use case represents a major business process that the system will perform [5].

I develop use case diagram to illustrate the most important functional requirements fig. 1. Use case diagram has three actors (“Administrator”, “Register User”, and “Unregister User”) and 7 use cases.

Fig. 1. Use case diagram
2.4. Database scheme design

Databases are where all your data is stored. It’s like a bunch of filing cabinets with folders filled with files. Databases come mainly in two flavors: SQL and NoSQL [10]. In common parlance, the term database refers to a collection of data that is managed by a DBMS.

A database management system (DBMS) is a software package designed to define, manipulate, retrieve and manage data in a database. A DBMS generally manipulates the data itself, the data format, field names, record structure and file structure. It also defines rules to validate and manipulate this data. A DBMS relieves users of framing programs for data maintenance. Fourth-generation query languages, such as SQL, are used along with the DBMS package to interact with a database [11].

From the domain of problem, we have three objects for our project are:
1) Users;
2) News;
3) Category.

So, the project will have three tables:
1) “tbl_User” contain information about users whose registered to the system its consist of 4 fields see table 3. The primary key is the field “UserId”, it is automatically incremented, and every column must have value not null every user have user id, name and password.

Table 3. Structure of the table “tbl_user”

<table>
<thead>
<tr>
<th>Column Type</th>
<th>Data Type</th>
<th>Allow nulls</th>
</tr>
</thead>
<tbody>
<tr>
<td>UserId</td>
<td>int</td>
<td>Unchecked</td>
</tr>
<tr>
<td>UserEmail</td>
<td>varchar (320)</td>
<td>Unchecked</td>
</tr>
<tr>
<td>UserPassword</td>
<td>varchar (50)</td>
<td>Unchecked</td>
</tr>
<tr>
<td>UserRole</td>
<td>varchar (50)</td>
<td>Checked</td>
</tr>
</tbody>
</table>
2) “tbl_News” contain information about news that registered users submit it and display by the web application. Its consist of 10 fields see table. 4. These fields have different types of data: nvarchar, varbinary, smalldatetime, we used varbinary to have ability to add news in different language not only in English but Arabic also to represent image in database must define column varbinary(MAX) not text the traditional way to represent images in database because Microsoft announced remove the support in a future version of SQL Server. The primary key is the field “NewsId”, it is automatically incremented, and we could see there are two foreign keys “UserId” and” CategoryId” that are used to connect this table with “tbl_user” table and “tbl_category” table.

Table 4. Structure of the table “tbl_news”

<table>
<thead>
<tr>
<th>Column Type</th>
<th>Data Type</th>
<th>Allow nulls</th>
</tr>
</thead>
<tbody>
<tr>
<td>NewsId</td>
<td>int</td>
<td>Unchecked</td>
</tr>
<tr>
<td>NewsTitle</td>
<td>nvarchar (100)</td>
<td>Unchecked</td>
</tr>
<tr>
<td>NewsDescription</td>
<td>nvarchar (500)</td>
<td>Unchecked</td>
</tr>
<tr>
<td>NewsDetails</td>
<td>nvarchar(MAX)</td>
<td>Unchecked</td>
</tr>
<tr>
<td>NewsPostedBy</td>
<td>nvarchar (50)</td>
<td>Unchecked</td>
</tr>
<tr>
<td>NewsPostedDate</td>
<td>smalldatetime</td>
<td>Unchecked</td>
</tr>
<tr>
<td>NewsImage</td>
<td>varbinary(MAX)</td>
<td>Checked</td>
</tr>
<tr>
<td>NewsApproveStatus</td>
<td>varchar (1)</td>
<td>Checked</td>
</tr>
<tr>
<td>UserId</td>
<td>int</td>
<td>Checked</td>
</tr>
<tr>
<td>CategoryId</td>
<td>int</td>
<td>Checked</td>
</tr>
</tbody>
</table>
3) “tbl_Category” contain information about different types of categories of news. Its consist of 3 fields, see table. 5. The primary key is the field “CategoryId”, it is automatically incremented field “CategoryDescription” could have null value.

Table 5. Structure of the table “tbl_Category”

<table>
<thead>
<tr>
<th>Column Type</th>
<th>Data Type</th>
<th>Allow nulls</th>
</tr>
</thead>
<tbody>
<tr>
<td>CategoryId</td>
<td>int</td>
<td>Unchecked</td>
</tr>
<tr>
<td>CategoryName</td>
<td>nvarchar (50)</td>
<td>Unchecked</td>
</tr>
<tr>
<td>CategoryDescription</td>
<td>nvarchar (256)</td>
<td>Checked</td>
</tr>
</tbody>
</table>

The scheme of the database is shown in the fig. 2. It consists of 3 tables, between “tbl_category” and “tbl_News” one to many relationship and between “tbl_User” and “tbl_News” one to many relationships also.

Fig. 2. Database schema
2.5. Interface design

Providing a successful web application is required a good user interface, UI design can make or break the success of your website or application in web design, great user interface, or UI design, is all about helping the user to accomplish a given task as simply and efficiently as possible [12].

We will implement future views of an application. Fig. 3 shows the main page for the web site of a system. It contains the navigation bar in the top of the page: “Home”, “News”, “Registration”, “Login” and contain Logo for Channel in the left side and in the right side we see search box with bottom to submit search. a container for display status of weather appear in the top of page under the navigation bar, slider in the middle of the main page that show in it photo of the last events happened, a table contain the news and footer in the end, Its accessible by all users.

![Diagram of Home page]

Fig. 3. “Home page”
Fig. 4 shows the page for “browseNews”. It will show all news and all its details with custom paging. It's accessible by all user.

![Image of Browse News Page]

Fig. 4. "Browse news page"

Fig. 5 shows the page for “Login”. The user must enter his email, password after that press bottom “Login”. It’s accessible by all user.

![Image of Login Page]

Fig. 5. "Login page"
Fig. 6 shows the page for “Registration”. The user must enter his email, password and confirm password after that press bottom “Create”, Its accessible by all user.

![Registration page](image)

Fig. 6. "Registration page"

Fig. 7 below show the page of “create category” in it administrator could create new category and write description on it, he after that press bottom “Create”, Its accessible by administrator only.

![Create category page](image)

Fig. 7. "Create category page"
Fig. 8 shows the page for “Submit news”. The page that accessible by register user only and administrator to add new news after register user select category he select category for the news that he submit and writes news title, description, details, source and could select image if there is and after that press bottom “Create” to upload the submit news to app database in server and could be read by administrator to prove it or reject, Its accessible by administrator and registers users.

![Submit News Page Diagram](image)

**Fig. 8. "Submit news page"**

Fig. 9 below shows the page for “View Categories”. The page that on it could view on it all the categories and its details with ability to delete one or more of categories and administrator could sort all categories by click on “category name” in head of table. Its accessible by administrator only.
Fig. 9. "View categories page"

Fig. 10 shows the page of “Manage User” in it administrator could view all the users who resisted in the system and he could delete the user who violates publishing laws. Its accessible by administrator only.

Fig. 10. “Manage user page”

Fig. 11 shows the page of “Manage News” in it administrator could approve or reject news that submitted by the register user and in pending tab, there
are three tabs for pending, approved and reject news, its accessible by administrator only.

Fig. 11. "Manage news page"
3. IMPLEMENTATION OF MANAGEMENT INFORMATION SYSTEM FOR TV-CHANNEL “KNB”

3.1. Project Solution

I used Visual studio 2015 with MVC 4.6.1 to implement this web application, my solution consists of 4 projects on it because I develop according 3 tier architectures, these projects are:

1) KirkukNews that represent the project we develop contain four areas [20], “Administrator”, “Register User”, “Unregister User” and “Security” each area has its controllers and views, and also its contain all the files from JavaScript to CSS and images that help us in development;

2) DAL (Data Access Layer) its contain all operation that I do to database like “add”, “delete”, “get by id”, “get all” and “update”, the reason I develop it is use idea of “Repository design pattern” that’s help me if in future I want to develop new class I do not need made change in UI or in (BOL) only add in it, fig. 12 shows implementation of “tbl_newsDb.cs” file that contain partial operations could done on “tbl_News” table;

```csharp
private KNewsDBEntities db;

public Newsdb()
{
    db = new KNewsDBEntities();
}

public IEnumerable<tbl_News> GetAll()
{
    return db.tbl_News.ToList();
}

public tbl_News GetByID(int Id)
{
    return db.tbl_News.Find(Id);
}

public void Insert(tbl_News news)
{
    db.tbl_News.Add(news);
    Save();
}
```

Fig. 12. “tbl_newsDb.cs”
3) BOL (Business Object Layer) contain all tables of database that I developed in “SQL Server 2016” I used entity framework (EF) to access database and uses Object/Relational Mapper (O/RM) to Mapp data in relational database into object over application [14]. That help us work in higher level of abstraction also (EF) provide class “DbContext” which is getaway to our database each one have 1 or more “Dbset” present table in database, fig. 13 shows the implementation of the “tbl_News” table as objects;

```csharp	namespace BOL {
  using System;
  using System.Collections.Generic;
  public partial class tbl_News {
    public int NewsId { get; set; }
    public string NewsTitle { get; set; }
    public string NewsDescription { get; set; }
    public string NewsDetails { get; set; }
    public string NewsPostedBy { get; set; }
    public System.DateTime NewsPostedDate { get; set; }
    public byte[] NewsImage { get; set; }
    public string NewsApproveStatus { get; set; }
    public Nullable<int> UserId { get; set; }
    public Nullable<int> CategoryId { get; set; }
    public virtual tbl_Category tbl_Category { get; set; }
    public virtual tbl_User tbl_User { get; set; }
  }
}
```

Fig. 13. “tbl.News.cs”

4) BLL (Business Logic Layer) its develop to pass the data of operation from (DAL) to (BOL).
3.2. Functions Implementation

3.2.1. Submit News

Figures 14, 15 show development of submit news function in “SubmitNews” controller in Area “RegisterUser”, as response to our “create” ActionResult.

```csharp
// allow post to database
[HttpPost]
//allow us to upload and deal with image
[ValidateAntiForgeryToken]

// the Action result of press the bottom Create in View
public ActionResult Create(tbl_News MyNews, HttpPostedFileBase upload)
{
    try {
        // give initial value p thats not allowed news display on news directly
        MyNews.NewsApproveStatus = "P";
        // record time of submit new news and transfer to newspostdate in database
        MyNews.NewsPostedDate = System.DateTime.Now;

        // in BOL Build NewsValidation.cs that to ensure that the fileds is required and unique
        if (ModelState.IsValid)
        {
            if (upload != null && upload.ContentLength > 0) // there is load picture
            {
                MyNews.NewsImage = new byte[upload.ContentLength];
                // this part to read image as byte
                upload.InputStream.Read(MyNews.NewsImage, 0, upload.ContentLength);
            }
            objBS.Insert(MyNews);
            //message in server side that operation is OK
            TempData["Msg"] = "Created Successfully";
            return RedirectToAction("Index");
        }
        catch (Exception e1)
        {
            //message in server side that Error happend with message of error
            TempData["Msg"] = "Create Failed : " + e1.Message;
            return RedirectToAction("Index");
        }
    }
}
```

Fig. 14. Submit news method

Fig. 15. Submit news method
3.2.2. Create Category

Fig. 16 shows development of Create new category in “Create Category” controller in Area “Admin”, as response to “create” ActionResult it will insert new category that user enters it in the view after ensure from its validation and display message of success or failed when function done, the method of type httpPost that allow upload the data to the database.

```csharp
[HttpPost] // allow post to database
// press the bottom Create in View
public ActionResult create(tbl_Category category) {
    try
    {
        // categoryValidation Category name is set to be required and unique
        if (ModelState.IsValid)
        {
            objBs.categoryBs.Insert(category); //insert create categoryvto database
            TempData["Msg"] = "Create Successfully"; // message in server side that operation is OK
            return RedirectToAction("Index");
        }
        else
        {
            return View("Index");
        }
    }
    catch (Exception e1)
    {
        TempData["Msg"] = "Create Failed: " + e1.Message; // show message error
        return RedirectToAction("Index");
    }
}
```

Fig. 16. Create new category method

3.2.3. Approve Reject News

Fig.17 shows development of Approve news in “ManageNews” controller in Area “Admin”, This action “ApproveOrRejectALL” take two parameters first one is List of integers that’s represent the Id’s of selected check boxes that checked in the manage news view by the administrator, the second is status that what we want to change to it and its take its value according Ajax calling function, we view our page partially [19]. That useful for encapsulating UI, which reduces (or eliminates) repeating code.
Fig. 17. Approve reject method

Fig. 18 shows calling JQuery library “I used Nuget package manager” to add it to my project and writing JavaScript for implement Ajax (Asynchronous JavaScript and XML) [17]. “approve” in view of our page that required to prove news in pending or reject list, fig. 19 shows Ajax function.

```csharp
[HttpPost]
// take tow parameter
public ActionResult ApproveOrRejectAll(List<int> Ids, string Status, string CurrentStatus)
{
    try
    {
    // this method is implemented in AdminBS.cs in BLL
    objBs.ApproveOrReject(Ids, Status);
    TempData["Msg"] = "Operation Successfully";

    var news = objBs.newsBs.GetAll().Where(x => x.NewsApproveStatus == CurrentStatus).ToList();
    // partial view for only news that checked for change value
    return PartialView("pv_ManageNews", news);
    }
    catch (Exception e1)//to avoid error when happened
    {
        TempData["Msg"] = "Operation Failed" + e1.Message;
        var news = objBs.newsBs.GetAll().Where(x => x.NewsApproveStatus == CurrentStatus).ToList();
        return PartialView("pv_ManageNews", news);
    }
}
```

Fig. 18. JQuery calling and JavaScript

```html
<script src="/Scripts/jquery-3.1.1.js"></script>
<script>
$(document).ready(function () {
   BindSelectAll();

    $(document).ajaxStart(function () {
    $("#loading").show();
    });

    $(document).ajaxStop(function () {
    $("#loading").hide();
    });
</script>
```
Fig. 19. Ajax calling

Fig. 20 shows continue implementation of Ajax function “successFunc” and “errorFunc”

```javascript
function successFunc(data, status) {
  // for show only partial view in the grid we made not reload all the page
  $('#Data').html(data);
  BindSelectAll();
}

function errorFunc() {
  alert('error');
}
```

Fig. 20. "SuccessFunc" & "errorFunc" Ajax function

Fig. 21 shows implementation of “ApproveOrReject” method we implemented using Transaction to ensure everything is done without lose any data because a lot of change’s done hear.
using (TransactionScope Trans = new TransactionScope())
{
    foreach (var item in Ids)
    {
        var myNews = newsBs.GetByID(item);
        // here change the status to Approve or reject
        myNews.NewsApproveStatus = Status;
        newsBs.Update(myNews);
    }
    Trans.Complete();
}

Fig. 21. ApprovedOrReject method

3.2.4. Login

Fig. 22 shows implementation of login method in “Login” controller in Area “Security”.

```csharp
[HttpPost]
public ActionResult Login(tbl_User user)
{
    // variable count will contain all info about user email, and password
    var count = objBs.GetAll().Where(x => x.UserEmail == user.UserEmail
    && user.UserPassword == user.UserPassword).Count();
    try
    {
        if (count == 0) // the user not enter his email or password
        {
            TempData["Msg"] = "Login Faild.";
            return RedirectToAction("Index");
        }
        else // user enter email and password
        {
            // false to not keep password by system thats remove danger password maybe hack
            FormsAuthentication.SetAuthCookie(user.UserEmail, false); // here login
            return RedirectToAction("Index", "Home", new { area = "UnRegisterUser" });
        }
    }
    finally
    {
        TempData.Clear();
    }
}
```

Fig. 22. Login method
3.2.5. Register

Fig. 23 shows the implementation of register new user to the system.

```csharp
public ActionResult Create(tbl_User user)
{
    try
    {
        if (ModelState.IsValid)
        {
            user.UserRole = "U"; // give each register user role value U
           письмоBs.Insert(user); // insert to our database
            TempData["Msg"] = "Created Successfully"; // message
            return RedirectToAction
            ("Index", "Login", new { area = "Security" }); // go to page login
        }
        else
        {
            // stay in register page if not complete registration
            return View("Index");
        }
    }
}
```

Fig. 23. Register new user method

The login and register methods require ensure that the information the user enter as email address is really right email address and unique “not two person with same address” [18]. Also in registration must be “confirm” edit box to ensure that the password user enter is also correct, when we developed our database we did not perform such that field, fig. 24 shows implementation of this class called “Uservalidation.cs”.

```csharp
// this method to check the email address is unique in database
protected override ValidationResult IsValid(object value, ValidationContext validationContext)
{
    KNewsDBEntities db = new KNewsDBEntities();
    string userEmailValue = value.ToString(); // Convert email value to string format
    int count = db.tbl_User.Where(x => x.UserEmail == userEmailValue).ToList().Count();
    if (count != 0)
        return new ValidationResult("User Already Exist with This Email ID");
    return ValidationResult.Success;
}

public class tbl_UserValidation
{
    [Required] // to ensure user email filed not empty from user
    [EmailAddress] // accept value only in email form
    [UniqueEmail] // call function
    public string UserEmail { get; set; }
}

[MetadataType(typeof(tbl_UserValidation))]
public partial class tbl_User
{
    // create confirm password filed
    public string ConfirmPassword { get; set; }
}
```

Fig. 24. User validation method
3.2.6. Delete

Fig. 25 shows the implementation of delete function for category according category Id but I also implemented it to delete user only change name of table.

```csharp
//take category id as number from view
public ActionResult Delete (int id)
{
    try
    {
        objs.categoryBs.Delete(id); // here delete done according id
        TempData["Msg"] = "Deleted Successfully";
        return RedirectToAction("Index");
    }
    catch (Exception e1)
    {
        TempData["Msg"] = "Delete Failed : " + e1.Message;
        return RedirectToAction("Index");
    }
}
```

Fig. 25. Delete category method

3.2.7. Custom paging

Fig. 26 shows the implementation of custom paging for categories, shows in each page only 10 categories, this done in controller “ViewCategory” in area “Admin”.

```csharp
//put in viewpag number of pages by count numbers of all categories and divided by 10.0 because I want every page show 10 categories, ceiling is Math function to give small integer value
ViewBag.TotalPages = Math.Ceiling(objs.categoryBs.GetAll().Count() / 10.0);

// to process situation first page when create first category
int page = int.Parse(Page == null ? "1":Page);

ViewBag.Page = page;
// need it to store on index page number
categories = categories.Skip((page - 1) * 10).Take(10); // if page 0 then will skip and display first 10 record
return View(categories); // display view
```

Fig. 26. Custom paging method
3.2.8. Sort

Fig. 27 shows the implementation of sort function for “Category” according category name, the action result takes three parameters first and second is important for sort order ascending or descending and sort by and here by name of category the third parameter is for paging.

```csharp
public ActionResult Index(string SortOrder, string SortBy, string Page)
{
    ViewBag.SortOrder = SortOrder;
    ViewBag.SortBy = SortBy;
    var categories = objBs.categoryBs.GetAll();
    switch (SortBy)
    {
    case "CategoryName":
        switch (SortOrder)
        {
        case "Asc":
            //Ascending order
            categories = categories.OrderBy(x => x.CategoryName).ToList();
            break;
        case "Desc":
            //Descending order
            categories = categories.OrderByDescending(x => x.CategoryName).ToList();
            break;
        default: break;
        } break;
    }
    return View(categories);
}
```

Fig. 27. Sort method

3.2.9. Search

Google custom search, its search engine help user’s and visitors to find information they search in it inside the site and also outside the site. Only you need to sign Up to this service that provided by “Google” and have web services “API” (Application Programming Interface) key to enable integration of third party application [15].

and use it with code they provide, Fig. 28 shows the implantation of this service in “Search” view “Unregister User” area.
3.2.10. Weather information

One of the services that the system provide is weather information of city Kirkuk, to develop this service I used Knockout (JavaScript library that helps you to create rich, responsive display and editor user interfaces with a clean underlying data model), with JSON (JavaScript Object Notation). this required implement on the level of Model, Controller and View in the project.

Fig. 29 shows the method “GetWeather” that implemented in controller “Home” in “UnRegisterUser” area that’s retrieve info from JSON class which we will call it by using jQuery call in our view

```java
public JsonResult GetWeather()
{
    Weather weath = new Weather(); //Create weather object

    //retrieve from json getWeatherForcast
    return Json(weath.getWeatherForcast(), JsonRequestBehavior.AllowGet);
}
```

Fig. 29. GetWeather method
Fig. 30 shows the implementation of JSON class that’s get the JSON information from open weather map site and download it.

```java
public Object getWeatherForcast() {
    string appid = "XXXXXXXXXXXXXXXXXXXXX"; //this is ApplicationId key from open weather map
    string url = "http://api.openweathermap.org/data/2.5/weather?q=Kirkuk, IQ&APPID=" + appid + "&units=Metric";
    //synchronous client.
    var client = new WebClient();
    //here will be download from URL which is open weather map address
    var content = client.DownloadString(url);
    var serializer = new JavaScriptSerializer();
    //convert from Json string to .net object
    var jsonContent = serializer.Deserialize<Object>(content);
    return jsonContent;
}
```

Fig. 30. Get weather JSON class

Fig. 31 shows the implementation of jQuery knockout [16]. In our view with html that’s show the temperature, humidity of weather in Kirkuk city.

```html
<div class="container-fluid col-sm-12">
  <b>The Weather now in: <span data-bind="text:name"></span></b>
  <img alt="Brand" src="http://openweathermap.org/images/flags/iq.png">
  <p>Temperature is <span data-bind="text:main.temp">&deg; C</span></p>
  <p>Humidity is <span data-bind="text:main.humidity"></span> %</p>
</div>

<script>
    var weather = Object();
    $(document).ready(function () {
        $.get("@Url.Action("GetWeather", "Home")", function (response) {
            //response
            console.log(response);
            weather = ko.mapping.fromJS(response);
            //populate the weather object,Ko is Knockout
            ko.applyBindings(weather);
        });
    });
</script>
```

Fig. 31. knockout jQuery function to view weather in home page
3.2.11. Display images in main page

Fig. 32 shows the code how we could display any image in our web application.

```html
<td>
    
    var imgsrc = "url_to_your_default_image"; // useful when image is not available
    if (item.NewsImage != null)
    {
        var base64 = Convert.ToBase64String(item.NewsImage);//convert from byte to string
        imgsrc = string.Format("data:image/jpg;base64,\{0\}" , base64);//save it in imgsSrc to display
    }

    <img src="@imgsrc" style="max-width:200px; max-height:200px" //display in size we want
</td>
```

Fig. 32. Display image in main page

3.3. Nonfunctional function (output caching)

Fig. 33 shows the code we develop to enable output caching for our home page that’s improve loading speed because render page will put in the cache after first user request and after that the page will be serve from cash so query will not execute again only if we put duration time, the cache is done in the client side could also done in server side with ability to change time to lower value if the site have a lot of visitors.

```csharp
//its enable caching use output cache
//time for refresh we could change it by Duration according number
//the caching location will have done on client side
//varybyparam will take how many parameter in ours actions here we want all parameters so put *
[OutputCache(Duration = 50, Location = OutputCacheLocation.Client, VaryByParam = "*")]
```

Fig. 33. “Page caching” function
3.4. Deployment Diagram for KNB web application

Fig. 3.4 shows deployment diagram for our system, that show the hardware for your system, the software that is installed on that hardware, and the middleware used to connect the disparate machines to one another.

![Deployment Diagram](image)

Fig. 3.4. UML deployment Diagram
4. TESTING OF THE WEB APPLICATION

4.1. Functional testing

Functional testing is a type of testing which verifies that each function of the software application operates in conformance with the requirement specification. This testing mainly involves black box testing and it is not concerned about the source code of the application. [13].

Each and every functionality of the system is tested by providing appropriate input, verifying the output and comparing the actual results with the expected results. This testing involves checking of User Interface, APIs, Database, security, client/ server applications and functionality of the Application Under Test. The testing can be done either manually or using automation [13].

Functional Testing Process:

1) identify test input;
2) compute the expected outcomes with the selected test input values;
3) execute test cases;
4) comparison of actual and computed expected result

According to a recent info, our system functional testing has done by comparing the actual results with the expected results manually (tab. 6).

Table 6. Black box functional testing

<table>
<thead>
<tr>
<th>No.</th>
<th>Function</th>
<th>Expected result</th>
<th>Obtained result</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>view the approved news for every user using the system</td>
<td>Any visitor can view home and news page</td>
<td>Any visitor can view home and news page</td>
<td>Passed</td>
</tr>
<tr>
<td>2.</td>
<td>Authorize the users</td>
<td>visitor authorized</td>
<td>visitor authorized</td>
<td>Passed</td>
</tr>
<tr>
<td>3.</td>
<td>Register new users to the system</td>
<td>Any unregistered visitor can view the “Registration” page and register</td>
<td>Any unregistered visitor can view the “Registration” page and register</td>
<td>Passed</td>
</tr>
<tr>
<td>4.</td>
<td>Submit a new news</td>
<td>Only register user could submit news</td>
<td>Only register user could submit news</td>
<td>Passed</td>
</tr>
</tbody>
</table>
Continuation of tab. 6

<table>
<thead>
<tr>
<th>No.</th>
<th>Function</th>
<th>Expected result</th>
<th>Obtained result</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.</td>
<td>Prove or reject new news submitted by registered users</td>
<td>Administrator could prove or reject that submitted by register user</td>
<td>Administrator could prove or reject that submitted by register user</td>
<td>Passed</td>
</tr>
<tr>
<td>6.</td>
<td>Verification to ensure second copy of news will not create</td>
<td>register user will not able to submit repeated news</td>
<td>register user will not able to submit repeated news</td>
<td>Passed</td>
</tr>
<tr>
<td>7.</td>
<td>Create, delete, view category</td>
<td>The administrator could create, view and delete categories</td>
<td>The administrator could create, view and delete categories</td>
<td>Passed</td>
</tr>
<tr>
<td>8.</td>
<td>View list of register users and delete user’s</td>
<td>The administrator can view list of register user to system and delete selected users</td>
<td>The administrator can view list of register user to system and delete selected users</td>
<td>Passed</td>
</tr>
<tr>
<td>9.</td>
<td>Sort function for news, news’ categories, register users</td>
<td>The all users can sort list of news according “News title, source, date of publish and editor”. Administrator can sort User according username or user role and could sort categories according its name</td>
<td>The all users can sort list of news according “News title, source, date of publish and editor”. Administrator can sort User according username or user role and could sort categories according its name</td>
<td>Passed</td>
</tr>
<tr>
<td>10.</td>
<td>Search function</td>
<td>Every user of the system could use Search service which is Google custom search</td>
<td>Every user of the system could use Search service which is Google custom search</td>
<td>Passed</td>
</tr>
<tr>
<td>11.</td>
<td>Display the weather info of Kirkuk city</td>
<td>Every user of the system could see weather info of Kirkuk city which is service from open weather map</td>
<td>Every user of the system could see weather info of Kirkuk city which is service from open weather map</td>
<td>Passed</td>
</tr>
</tbody>
</table>
4.2. API testing for “Get” method JSON

Is testing for services utilizing JavaScript Object Notation (JSON), and ensure its functionality work correctly and bring data that we request.

In this type of testing I used automated environment (SOAPSonar 7 free API Testing for SOAP, XML, REST, and JSON), that’s testing JSON Representational state transfer (REST) and insure it’s retrieved all information about weather from https://openweathermap.org that’s provide this service.

In Fig. 35 shows the testing environment, only I need to write the same line of code that written in “weather.sc” file see Fig. 30 page 41, in URI edit box where request will be send and select “Get” from method dropdown list, and send current request to server.

![Fig. 35. Weather JSON request test using SOAPSonar 7](image)

In fig. 36 shows results that we get as response to our request after (0.40s) in Extensible Markup Language (XML) file format, that’s mean our JSON request is passed the test.
Fig. 36. JSON testing results for our request as XML file

```json
{
    "weather": [
        {
            "id": 800,
            "main": "Clear",
            "description": "clear sky",
            "icon": "01d"
        }
    ],
    "base": "stations",
    "main": {
        "temp": 309.691,
        "pressure": 972.71,
        "humidity": 21,
        "temp_min": 309.691,
        "temp_max": 309.691,
        "sea_level": 1016.28,
        "grnd_level": 972.71
    },
    "dt": 1494853876,
    "sys": {
        "message": 0.0034,
        "country": "IQ",
        "sunrise": 1494813450,
        "sunset": 1494864034
    },
    "id": 94787,
    "name": "Kirkuk",
    "cod": 200
}
```
CONCLUSION

News every day became more and more important and effects our decisions in this world, the rapid pace of life led to increases in events that every person could see it or maybe himself is part of it and many of these events required fast deployment and reliability publishing.

To achieve this target, it’s important to build online news portal that could be used by any TV-channel to shows for all visitors for this web site the last news that happened locally or around the world, also take benefit from made the user who see or involved in events as reporter could submit this event in form of news, with achievement of reliability through not allowed direct publication only after verification and accuracy by the administrators of the web site.

This what we could do it by development of this project

The goal of the research was the development of management information system for TV-channel Kirkuk News Broadcast “KNB”.

For the reaching this goal we resolved following objectives:

- the domain of the problem was analyzed;
- analysis of modern technologies of web application development and choose which technology for project development was made;
- use case diagram for the system was designed;
- database scheme was designed;
- web application user interface was design;
- the management information system for TV-channel “KNB” by ASP.NET MVC was implemented;
- all functions and “JSON” Get method for the system were tested.
Future development and improvement

For future development and improvement for the project could done by:

- create RSS (Rich Site Summary) feed for KNB;
- save user feedback comments for the news in a table;
- add live TV show streaming;
- upload video when submit new news by the register users;
- separate news stories so they display in separate pages such as Sports news, Art news, etc.;
  - provide ability to send and receive email from inside the web application;
  - improvement in home page design.
REFERENCE LIST


