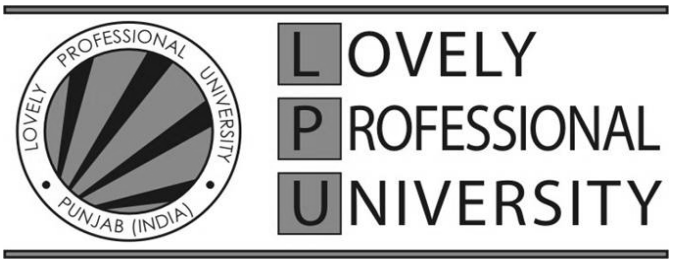

"Cookie-session a new state management technique"

A Dissertation Submitted

By

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To

Department of Computer Science and Engineering

In partial fulfillment of the Requirement for the

Award of the Degree of

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Under the guidance of

(Mr. Kuldeep Kumar Kushwaha)

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CERTIFICATE

This is to certify that Mr. Malkiat Singh has completed M.Tech dissertation proposal titled **"Cookie-session a new state management technique"** under the guidance and supervision. To the best of my knowledge, the present work is the result of his original investigation and study. No part of the dissertation has ever been submitted for any other diploma or degree.

The dissertation is fit for the submission and partial fulfillment of the conditions for the award M.Tech Computer Science & Engineering.

Date: 06/12/2014

Signature of Advisor

Name: Mr. Kuldeep Kumar kushwaha

DECLARATION

I hereby declare that the Dissertation entitled, **"Cookie-session a new state management technique"** submitted for the M.Tech Degree is entirely my original work and all ideas and references have been duly acknowledged. It does not contain any work for the award of any other degree or diploma.

Date: 06/12/2014 **Malkiat Singh**

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1. INTRODUCTION

In the current state of affairs information systems is the most necessary part of any group or organization or even big country's economy is rely mostly on information system .Almost every system is software controlled. In comparison with 1970's and 1980's, they're changing into increasingly more complicated and advanced [12]. In the early years i.e., 1940's, software development is assumed as a dependent discipline, as an alternative it is assumed as a substitute or an extension of the hardware. Prior programs or applications have been written largely in assembly language and weren't so complicated. The individual's or users programming them have been the only one who also perform testing and fix the issues, errors within the tool software.

Now, these days software's are becoming more complicated and as a result almost every organization is now dependable on them According to a survey conducted by the researchers in 70's most of the organizations using a very poor quality of software, they spending more money and time on maintenance of software They come to the conclusion that software are very much different than hardware systems as they were to be developed and are mainly not wear-out as in case of hardware product. unlike other products which are to be made from scratch every time software products are made only once, this copy can be used for producing multiple copies of next updated versions having some changes as compared to prior version each time new one is created. The changes taken should take care as if they are not accommodate carefully they with led to failure of the product. The main reasons for software failure are over budget, completed late than scheduled time, user requirements are not met regarding functionality or performance.

1.1 SOFTWARE ENGINEERING

Software development is not only coding a program instead it starts before the actual programming is started and continues even after the first release of the software. It consist of additional activities than programming. Software engineering is known as an engineering discipline that deal with all aspects of the software development. It provide systematic development of the software and its maintenance.

Software engineering is also explained as a strategy for developing economical, quality and reliable products that are worked efficiently on real machines using sound engineering principles. In short it is the discipline that provide tools and techniques for the systematic development of product [12].

Software engineering enable software engineers to use well organized and systematic approach using appropriate tools and techniques according to the complexity of the problem to be solved and the resources available to complete the project within limited budget and within the deadline of the project, in the context of changing user requirements. Developing a software without software engineering is like building a home by just grabbing some bricks and material and building it.

1.1.1 ADVANTAGES OF SOFTWARE ENGINEERING

Software engineering as explained above the study and application of engineering to complete the software project's design, development and maintenance has many advantages:

- As in software engineering the software is made systematically, any failure in unit testing or emergence of bugs, made it easy for developers to revert back to a bug free state without wasting any time
- Software are checked before the release of complete project, through which developers can find the bugs and problems and get solutions to fix them continuously, avoiding last time chaos
- All the changes undergone unit testing immediately
- Early warning of the conflicts in the changes
- Software are made available for testing, demo constantly
- If the code is incompatible or broken it is found at early state
- It gives early response to developers about the functionality, reliability and quality of software
- As the software is created using modular approach the code less complex
- Team momentum is increased
- It saves both time money over the lifespan of a project
- Changes can be done at any stage easily

1.1.2 DISADVANTAGES OF SOFTWARE ENGINEERING

- Time is required for initial setup
- For achieving the advantages of automated testing well developed test suites are required
- Continuously changing code base may result in troublesome in large scale refactoring
- Hardware cost for machine building is significant

1.1.3 ELEMENTS OF SOFTWARE ENGINEERING

The software engineering is divided into following elements:

- **Software engineering**: It is the main part of software engineering in which software requirements are collected from the end users by different ways, then every user requirement gathered is analyzed, requirement specification is created then the validation of software requirements is done
- **Software Design**: In this part the detailed design of software is discussed i.e. what should be the architecture, what are the components and interface and other characteristics of system etc.
- **Software construction:** In this part of software engineering actual software coding starts which is followed by verification, unit testing then integration testing and finally debugging
- **Software testing:** Test cases for behavior of program are created in this phase through which dynamic verification is conducted from the infinite domains of execution against the user expected behavior according to software specifications
- **Software maintenance:** The maintenance of software for providing the cost effective support is done in this part
- **Software configuration management**: In this part system configurations at distinct point for systematic changes to configuration, maintenance of traceability and integrity of configuration throughout the life cycle of system is identified
- **Software engineering management:** For ensuring the systematic, quantifiable and disciplined development and maintenance of software, activities of management i.e. planning, measuring, coordination and reporting is done

- **Software engineering process:** In this part definition, assessment, implementation, measurement, change, management and improvement of software is done
- **Software quality management:** The quality of software by checking the degree of fulfillment of inherent characters of requirements is done in this this part of software engineering

1.2 SYSTEM SOFTWARE

System software is defined as a kind of computer software which provide an infrastructure to operate various programs having different purpose and function i.e. it controls and manage computer hardware to provide a platform for running application software to operate operating systems like GNU, Mac OS X, Microsoft Windows and Linux

System software was made for the purpose of automation of following regular tasks for ease of end-user

- Allocation of several programs to main memory
- Loading of programs which carry on routines to control peripheral devices
- Program execution

System software provides a means of standardizing the different activities performed during the execution of these tasks.

System software is composed of various programs and files that make the operating system of our computers These files contain various library files of deferent functions, drivers for sound, printers and other hardware, system services, system preferences, utilities and configuration files System software provide a way for application programmers to abstract away from memory, hardware and other internal complexity of the computer system The main purpose of the system software is to provide insulation to application programmers from details of complex computers being used particularly memory and some other hardware characteristics and devices like printers, displays, communications, keyboards, readers etc. in other words system software allow the parts of the computer to work together, that why we can say that a computer system is unable to operate by itself as a single unit without a system

software System software is automatically installed on our computer when we install operating system on our computer.

System software term is different from software and computer program, as a computer software is generally refer to sequence of instructions runs to perform some particular task, whereas a system software refers to a concept having various components like test results, specifications, maintenance records and documentation for end user etc.

System software contains various different programs and associated documentation files, configuration files etc., which operate together for program simplicity. System software is more active research area for software engineers and system engineers.

System software runs on the low levels of the computer system and provide an interface to user for providing an environment for operating system to interact with the hardware. System software always runs in back-end of the system thus a user don't have worry about its working As compared to system software, a software which makes it easy to do things such as play games, surfing the web, create a text document and listening to music is known as application software Application programs are software enabled end users to execute some specific and productive tasks for e.g. image manipulation and word processing etc.

1.2.1 TYPES OF SYSTEM SOFTWARE

Specific types of system software are:

- Loader
- Linkers
- Utility Software
- Graphical user interface/ Desktop environment
- BIOS
- Shell
- Boot loaders
- Hypervisors

1.2.2 WEBSITES

A website or simply said site is defined as a set of similar web pages served from single domain. We can access a website which is hosted at any location in the world on any web server through internet, while sitting at home. All the websites which are publicly accessed are collectively composed of "World wide web" also known as WWW as a short form.

We can access website through a special software on our computers, laptops, tablets and smartphones, known as "web browser". A web browser interpret the web pages normally written in plain text with hypertext markup language also known as HTML. Websites may include data from different sites with the help of suitable markup anchors. A website is transported between different browsers with the help of a protocol known as "Hypertext transfer protocol (HTTP)". Which is not a secure, if used as is. For security purpose websites optionally used encryption to provide privacy and security to the users who accessed the sites, this is also known as HTTPS.

All websites has unique web address, usually accessed with the help of "uniform resource locator (URL)". A website's web pages are organized with the help of URLs. A normal website has different webpages interlinked to perceive the users site structure and guide them in navigation of website.

Some sites need a user to subscribe to their site to access some or all the content on the website. Social networking sites, business sites, file sharing websites, academic journal sites, news sites, message boards are some of the examples of websites which require a user to subscribe to their website to access the content.

A website is very useful and needed product in today's life, it has many functionalities and can be used at small to big platform. A website ranges from a personal website to commercial website, non-profit organization site to a government website. It is created by a single person, business or an organization, which is completely devoted to specific purpose or topic.

A web server is a computer system which host different websites from different locations of world, also known as HTTP server. IIS and Apache are two most popular web servers used

by websites. Other web servers such as: lighttpd, Cherokee, Nginx or Hiawatha are light weighted and fully functional alternatives.

1.2.3 STATIC AND DYNAMIC WEBSITES

All websites on the internet must fall in one of the two categories either static or dynamic. Each one has its own advantages and disadvantages. People made websites according to their need and, purpose and needed functionality decide the nature of website to be made, as both static and dynamic have some cost and time differences. The brief introduction of them is as follows:

Static Websites: The simplest type of website is static website. A static site means not changing or constant content site, every time a static site is loaded shows the same prebuilt date. If you surf any site on the internet and it looks same each and every time then it means it is static website.

If a website looks simple and basic and is for a small company or for a single person, and it simply outputs some information without any whistles and bells, then it will be static website. Static websites share the elements like company logos, images etc. between webpages, HTML elements should be duplicated on each and every page which like to share the elements. Static websites are cheaper to build and host and require less time to complete, that's why many small companies or organizations use static websites to show their presence and information worldwide on internet.

The content of a static website changes only if the developer change its content. For the purpose of giving a site different look the website needs to be updated periodically by manually changing the content like text, images which require basic knowledge of software and web development basic skills. A standard HTML page is an example of static website.

Basically 20 web pages managed effectively on static websites. For managing more number of webpages web developers use dynamic websites.

Dynamic websites: Websites which display dynamically variable content by way of software systems like Php, JSP and Asp.net and usually received content which is stored in

the database on the server is called dynamic website. The software system used in dynamic websites to make them dynamic also known as scripting languages. The content on web pages in a dynamic website varies depending on certain criteria, based on either user input or some predefined rules. For example a news website shows latest news on home page of their site by checking the current date but if a user can select some previous date to read that day's news then the news is picked from the database. The main purpose of the dynamic website is to automate the process of displaying content on webpages. A dynamic website is easy to maintain, update and expand, as it is simple and easy to build template and database to show changing content periodically than building hundreds of static individual web pages as in case of static websites.

A dynamic website uses scripting languages like Php, asp.net contain server side code which allows web server to generate dynamic and unique content by fetching the values stored in the database on the server that's why these kind of websites are also known as database driven websites.

Almost every dynamic website on the internet makes owners of the website to upload information like text or images themselves by using dynamic dashboard also known as CMS (Content management system) with which end user does not required to have any knowledge of HTML to update their specific account on a website.

1.3 ASP.NET

ASP.NET is abbreviated as "Active server pages" .NET. It is an important part of .NET framework of Microsoft which is used for developing dynamic websites and web applications. This technology is most usable tool used by web-developers for developing dynamic websites in asp.net using .Net framework languages like VB and C#. ASP.NET is also used for creating server-side web applications.

In the early days i.e. 1997 when IIS (Internet information services) was not released for the Web, the web pages content was mostly static. Web-pages in static websites required to update time to time manually. This was the time to build dynamic web pages which would update automatically, as web grows rapidly and almost every business depends on internet for online marketing and advertisement for e.g. E-commerce sites.

Microsoft introduces Active Server Pages .net (ASP) for accomplishing the needs of the market. ASP.net executed on the server side, whereas its results displayed on the web browser of user, thus it allows the server to produce web pages with dynamic content depending on user actions who access the website. eBay.com, Amazon.com are build using ASP.NET for the site framework.

ASP.NET applications are compiled through 2 compilation stages. In the first stage of compilation, intermediate language code is generated from C# code. In second stage low level machine code is generated from intermediate language code generated in first stage, before the page execution. IL code in stage one is generated only once and is generated again only if source was changed.

Whenever user request a webpage by entering a URL of the page into browser address bar, the server will check the extension of the requested webpage, if extension is *.aspx*, then server will processes the page and then return a plain html into user browser. With *.aspx* page instruct the server to create basic HTML page which is rendered by user browser with set of instructions. An ASP.net page has page directive defined on the very first line which is processed by ASP.NET at runtime. In the page directive we can provide page specific

information for compiler to process the webpage, examples of page directive information are language and code-behind file, and Page class.

<%@ Page Language="c#" AutoEventWireup="true" CodeFile="test.aspx.c#" Inherits="_test" %>

Controls plays an important part in ASP.net web development for creating web pages, allowing users to create web pages by drag and drop of various controls available in Asp.net. There are many controls present in Asp.net like validation controls, which allow user to manipulate and validate data.

There are several types of web controls:

- AJAX controls
- User controls
- HTML controls
- server controls
- custom controls

Master page is very important feature of Asp.net used for giving same look to all the pages in a website.

Example of Master Page

Master page (named "research.master") for a corporation and a Content page called "mission statement." The first shaded line designates the Master page, and the second shaded area is a control that defines a content placeholder, where the content developed on a Content page will be inserted:

```
<%@ Master Language="C#" %>
<html>
    <head runat="server">
        <title>Corporate Master</title>
    </head>
    <body>
        Company Name
```

```
        <form id="comp" runat="server">
            <div>
                <asp:contentplaceholder id="cp1" runat="server">
                </asp:contentplaceholder>
            </div>
        </form>
    </body>
</html>
```

1.3.1 ASP.NET's STATE MANAGEMENT

In today's world with evolvement of the computer technology, an internet become a necessary part of the life. Internet dependency is increased very rapidly day by day. We need internet in almost every field of life to make our life easy. Today we don't need to go market for shopping, for paying of mobile bills, electricity bills, and for reservation of train and so on. This can be achieved with the help of internet and web applications and services in the form of websites which provide us very great help to make our day to day life easy.

These functionalities of websites in the internet is provided by world wide web, in which web browsers and the web applications can communicate with each other with the help of a hypertext transfer protocol(HTTP) [17]. In HTTP a web browser send requests to the server through HTTP for resources and the web server provide those resources to the web server through the HTTP protocol. Today HTTP is responsible for huge part of internet traffic. Although HTTP is a very good protocol for web applications but Http is stateless protocol which means the state of the website is not maintained in request response cycle. Each time the user send a request to the server through browser, the server treat it as a new request, user has to give all information again and again. There is no standard in HTTP protocol to retain the state of the web session or state. In general, Web applications are stateless i.e. the objects in web application wont persist its state across request to the web application [15]. A new page is created on every request without retaining the previous page information regarding user request. Thus, the main problem is how to make a website which retain the user

information and differentiate between the old client's requests and new client's requests and user's preferences.

The solution to the problem is provided by asp.net as an important technique, known as state management, there are two main type of state-management techniques applied according to the preference of the developer of the web site. The web developer will choose either server side or client side state management technique for maintaining the state of user. The Client-side way of maintaining state is applied on client side, thus uses no server resources, which are the main advantage of client side state management; server has no load, whereas in case of server side state management state is managed on the server side. Server-side state-management technique is more secure but as the state is managed on the server side it uses server resources, it puts the entire load on the server.

Classification of state management in Asp.net

In Asp.net the state of content in the webpages throughout the post backs is managed by using hidden fields. The hidden field created in asp.net's post back will attach to client results, which is carried by client just like any other field in the page during request and response. Multiple hidden fields will be used for forms and control values to manage the state of different elements on the web page.

View State: In view-state technique of managing the state of content all the data is stored in same field which is used to store the page view. The information in view state is stored as a string in the hidden field after base64 algorithm encoding is done for security purpose. In view state almost any kind of data is stored as it is of object type. As the view state store the information on client side, it puts no load on web server thus provide good performance. The main disadvantages of the view state is mobile devices not have memory capacity of storing large amount of data in view state, also storing large values using view state may case the page to load slowly as the data is stored in the webpage itself.

Ex: ViewState ['name'] ="Vishnu" stores the value 'Vishnu' in variable name.

Control State: Another way of managing the control information is control state, introduced to overcome the limitations of view state. The main working of control state is almost same to view state with only difference it provide persistent data during the post backs. The control

state store the control specific data and has the advantage over view state as it cannot be switched off as in case of view state. The only disadvantage of control state is it require some programming knowledge to write code to load and save the control state as it is a custom state mechanism.

Hidden Field: Hidden field is used to store page specific data information as a way of storing state of the webpage. It is best to store small amount of data which is changed frequently on the client side. Almost all the basic web browsers and devices supports hidden fields in forms, this control requires no complex programming logic. Hidden field is not secured as the value is easily tampered by viewing the page source, the data in the hidden field need to be manually encrypt and decrypt to secure the data which require overhead of extra coding. Some firewalls and proxies will prevent webpages with large amount of hidden fields to access the webpages.

Cookies: Cookies are another way of maintaining user state on client side across pages. Cookie store small amount of information on client system in the form of a small file, a cookie value is stored in the file as a variable in key-value pair.

Persistent cookie is used to store the data offline, which means when user visit again the webpage next time the data is retrieved from the cookie stored on the browser memory in its temporary files location, on the other hand In- memory cookie exists only till the user is working on the application.

Cookies are not secured as it is stored on the browser and thus may be changed by user or deleted. There is no guarantee of cookie existence, so every time checking for existence of them is required while using them.

Query string: Query string is used to transfer values within page requests, by appending the information to be submit to another page at the end of the URL of page.

Ex: welcome.aspx?user=”malkiat” &r_no=”23”

Query string is supported by almost all the browsers and client devices to pass values. Disadvantage of query string is that the value is visible directly in the interface of user’s browser and some browsers impose a character limit of 2083 characters.

Server-side options server side controls for maintaining state information on server side are more secure than client side controls. As the state is managed on server side more server resources are used as a result scalability is reduced. Server-side state-management in ASP.NET is as follows:

1. Application state
2. Session state

Application state: Application state is used for managing global data specific to entire application provided by asp.net via the HttpApplicationState class. Application state is consistent with all .Net framework classes thus easy to use. As the data stored on application-state is accessible to all web pages in website, only single copy of information is used to be stored. The data stored in application state is global and volatile, therefore the data will be deleted whenever the web-server process containing data is destroyed as a result of shutdown, system crash or even on system up-gradation. This state management technique have worse performance effect of scalability on the server as this state requires server memory.

Session state: Another way of maintaining user state specific to particular session is session state, using HttpSessionState class. Asp.net session state verify the requests during a limited time in particular user session from same browser, providing the ability to store values for that session. Data maintained in session-state will be preserved even through the restart of IIS (Internet Information services) and worker process without losing data as the data is stored on other process space. Session state is useful on browsers where HTTP cookies are disabled or not supported.

Variables in session state stayed in memory unless or until they are removed or replaced thus may degrade the performance as the session is kept on server, they increase server load time

1.3.2 SESSION STATE MANAGEMENT IN ASP.NET

As we know web is working under stateless protocol known as HTTP, each time a web page is posted a request, new instance is created losing user information or state. The HTTP protocol is unable to store user information on pages in web application. If a user enter some value on a page and transfer a request to another page, he is unable to retrieve these values when he comes back to the origin page. Session state in Asp.net plays a prominent role for solving this problem, because it store user specific session on server memory. It support any type of data to store along with custom object. Session state is secure and transparent from users. Unlike Query string values are not visible on the user browser thus provide security. Every user who access the website assigned a different session-id for particular session. A unique 120-bit Session ID string with ASCII characters is created whenever a user logins for web application [14].

A global file called Global.asax is used to store session. Default timeout for particular session is twenty minutes, but a web developer can increase or decrease the value as needed by changing time-out property in Web.config file.

By default session state for all the web pages is stored in Global.aspx file, but a web developer can disable it like: <%@ Page EnableSessionState = "False" %> Session will be destroyed or killed by using a method Session_Abandon.

Advantages:

- Information is hidden from the user.
- Session is stored throughout the web-application for every user until or unless user explicitly logout or his session Expires

Disadvantages:

- Session state result in degradation of performance of web server.
- Whenever the Web Server stopped or IIS is restarted session state information is lost.
- The process of retrieving information is slow as compared to client side as they are stored on the server.

INPROC Session Management.

The InProc session management mode is useful for small single server hosted applications. This model of session management is the default and most common method to store session specific information. In this mode session is stored inside the application process.

Advantages:

- It is fastest way of storing session sate.
- Configuration is simple.

Disadvantages:

- Session data is not permanent.
- Not ideal for web farms and web gardens.
- If the IIS get restarted then all the session variables will be gone. Then there is no chance for data recovery if it crashed when it is running.
- As the application recycled timely it is not suitable for critical-applications.
- It limits scalability of the Web site.
- Configuring multiple servers to handle requests is not possible.

Out-of-process mode

This mode of session management is ideal for highly available and scalable applications. It is also known as state server mode. In this mode session state was stored in aspnet_state.exe windows service process.

Advantages

- Data was persisted within application domain cycle

Disadvantages

- It require serialized data

Sql-Backend session state

In this mode of session management data is maintained in the SQL Server. The data stored in the SQL server's resilience which provide sessions to large no of web farms which retained even after the IIS restart.

Advantages

- It support web garden & web farms.
- Session information is maintained within application domain cycle & even restart of IIS.

Disadvantages

- Serialization is required.
- View-State values need to be encoded.
- Not suitable for storing sensitive data

1.3.3 COOKIES

Cookie is way of storing data on client side about user in a small file reside in the browser memory. The information in the cookie is stored in the name value pair. In the websites which uses cookies for managing user state, whenever the user visits the site first of all cookies existence is checked. If there are cookies present on the system, they should be used to identify and verify the user. A cookie mechanism is used by web servers to manage their own information about the user visiting the website on browser memory. Cookies store the page specific information sent by server along with output displayed on client browser. A cookie will be used to manage information about particular session, client or application. The information stored in the cookies on client side is submitted to the server along with the page request to web server [13]. In response the server then authorize the values passed to it in the form of cookie by extracting them. Each cookie stored will contain domain specific information which creates them. There are two types of cookies:

Temporary cookies: Temporary cookies also called non-persistent cookies as they are stored in the browser memory for particular session of user on the site for particular time, which will be deleted as soon as the session is expired or when the user close the browser.

Persistent cookies: persistent cookies have the same functionality and purpose as of temporary cookies except the time they reside on the system, they can be stored on the client system instead of browser memory and have defined expire time. A persistent cookie may reside on the client system for a week, month or some specific time in days according to defined expiration time.

Advantages

- Cookies are light weight
- Complexity of cookies is less
- Cookies are very simple to use and implement.
- Use no server resources

Disadvantages

- Can't use for more data.
- Users may block cookies.
- Information can be changed in cookies by editing.
- With the increase in number of Cookies performance of webpage is decreased.

1.3.4 ADVANTAGES AND DISADVANTAGES OF ASP.NET

ASP.NET is a server side technology used for creating dynamic websites is an important member of .NET framework. It is an essential tool used by developers and programmers by providing various features like rich set of server controls, Ajax controls, validation controls and custom controls. It has huge no of advantages and few disadvantages:

Advantages

- Amount of code used for building large applications is reduced with introduction of Asp.net.
- Applications are more secure and safe with the presence of built-in Windows authentication provided by Asp.net.
- Features of Asp.net such as early binding, native optimization, caching services and just-in-time compilation increase the performance.
- The .NET framework provide features like toolbox for drag-and-drop having server controls, Ajax controls, validation controls etc.
- Performing repeated tasks in ASP.NET like, form submission, client authentication and other common tasks is easy as it provide the functionality of creating custom controls and use them by registering them when needed.
- Asp.net web pages are more flexible as the program logic and presentation of page reside on different file within the project.
- In Asp.net, the application available constantly to handle every request.
- Before displaying the results on browser code is executed on server.
- Developer is free to choose any language of his choice as .net framework provide many options.

- Deployment in ASP.NET is very easy.
- Web server checks pages, applications and components continuously which makes it able to notice if there is any memory leaks, or any other illegal activities, as result if it detects any problem it immediately destroy all the activities which create problem and restarts itself.
- Asp.net uses Ado.net which has many advantages.

Disadvantages

- Limited control over HTML.
- Large data in the view state.
- Limited support for testing
- Complicated Page Life cycle

1.4 PHP

PHP is an "Interpreted Server Side Language" means the code is processed on server. The server display the results on the user browser which it encounters in the document. A PHP page is recognized by its extension, as a document which contain PHP code is normally has extension ".Php", however the extensions of Php through which server recognize them can be changed by tampering the .htaccess file.

PHP may be contained within html file having .php extension. Server interpret the code contained within the opening php tag <? php closing php tag ?>, the server parse the data within these opening and closing tags. These pair of tags may be used several times as the need within the html document, result of every pair of code was placed in html by server. This way php code is never displayed to the user.

Full form of PHP *is* – Hypertext Preprocessor, php is used to generate dynamic html pages. Security is the main advantage of PHP. As there is no script in the web which would be safe from the hackers, the hackers will gains access to the server by injecting their own scripts by detecting the weak points in the server, they use their scripts when a user submit data in the form which is returned to server for processing by PHP script.

Once the webpage is completely loaded on the browser no Php code can be processed then. Php is also used to create desktop applications which will run completely on PHP [25].

PHP Tools were created originally by Rasmus Lerdof in 1994. It was originally made by Lerdof to maintain his resume online keeping track of visitors on the website. Two Isreali developers made changes to parser by rewriting it.

PHP is server side scripting language used for creating good looking and dynamic websites. In Php most of the syntax was borrowed from java, C, and Perl. With the help of PHP web developers create dynamically generated web applications efficiently and rapidly.

For executing php code on the server, PHP must be installed on the server. The server first parse the code, then executes it, then finally sends the formatted HTML page to browser screen of the user requesting the page. Browser will receive the output from the script, without determining the internal logic behind the result.

Advantages of PHP

- As it is open source, community support is very large.
- It is faster than other server side scripting languages.
- It is relatively easier to use as it uses syntax similar to C language.
- It is more stable.
- Library support is very powerful.
- It can connect with variety of databases.
- It will run on all the operating systems.
- Websites created in Php are cheaper.

Disadvantages of PHP

- It is less secure
- It is not best for larger projects.
- Implicit conversion is main disadvantage.

1.5 JAVA

Java is an object oriented server-side language used for developing dynamic websites. Java was introduced by Sun Microsystems in 1995. In 2006 Sun microsystems introduce under GPL license, as an open source but complete source-code was released in 2007. Java is very useful language for making dynamic and good looking websites. Java plays the same role as ASP & PHP. It is basically used for developing larger and complex projects where security is the main requirement. Syntax of java was related to C++ and C languages. In other way java enhances the object-oriented approach used by C++. Java can be used to create desktop applications and web based applets. An application developed in java runs on the computer whereas applets run on browser by downloading it from the network to make webpages look interactive and dynamic. Applets help the server to get user input and display required results fetched from the server to the browser screen. Applets are included in the web page for making it interactive and good looking for ex: weather map or video game embedded in a web page. Java is platform independent means a program written in java runs on every operating system, with the help of byte code, which is generated as result of compiled java class files. Java Virtual Machine or JVM is a runtime environment execute the byte code. Example of java program

```
/*
This is a Java program. "Exam.java".
*/
// Java program
class Exam {
public static void main(String abc[]) {
System.out.print("Hello how are you.");
}
```

To compile the **java** program, execute the compiler, **javac**, specify name of the code file on the command line: C:\>javac Exam.java

This will create byte code of the program, for running the compiled program it will be interpret as follows.

C:\>java Exam

But with the evolvement of new technologies use of java is continuously decreased. Flash and Shockwave replace it completely for making interactive animations. Microsoft also exclude the Java platform from windows and Internet Explorer.

In Java applications the code is compiled to byte code (.class files). The byte code is a pre-compiled version of java program. The byte code is platform independent, means once the byte code of application is created it can be executed on any system, which may be transferred to one computer to another.

Advantages of java:-

- Java is simple language,
- It is robust,
- Its architecture is neutral,
- It is platform independent,
- It is interpreted,
- It use threads for making multi-tasking systems,
- It is dynamic in nature

This means that it has the capability to perform several tasks simultaneously within a single program.

2. TERMINOLOGY

GNU: - GNU is a free software developed by GNU Project and is similar to UNIX systems.

GPL: - GPL is abbreviated as "General Public License". It is mostly used with open source and free software which permit the end user of the software to study, use, modify and share it with friends and publish it as an update to software.

HTTP: - HTTP is the protocol used on internet network for webpages to communicate with each other. It is stateless protocol, means every time new page is opened old page's info is lost.

HTTPS: - It is also known as secure HTTP protocol as it add security to the stateless HTTP protocol, used for secure communication over the network.

URL: - A "uniform resource locator" abbreviated as URL also called web address, is the specific character string used for accessing the site on the network. URL is shown in the address bar of the browser.

IIS: - "Internet Information Services" is a web server produced by Microsoft for using with Windows technologies like Asp.net for executing server side website code. IIS works with all the famous protocols like HTTP, FTP, HTTPS, FTPS, NNTP, and SMTP.

HTML: - HTML or "Hyper Text Markup Language" understand by browsers. Static web pages having static data are mostly created using html.

ASP.Net: - Asp.net also known as "active server pages .net" is server scripting language introduced by Microsoft for developing dynamic and interactive websites.

PHP: - Php Officially called "Personal Home Page" is used for creating dynamic web pages by including server side scripts for processing user input within html tags. The code written in Php processed on the server and the results transferred to the user browser.

JSP: - JSP abbreviated as "Java Server Pages" (JSP) is server side technology for creating dynamic and secure websites with multiple pages.

AJAX: - Full form of AJAX is "asynchronous JavaScript and XML". It is used to create asynchronous web request to the server, with AJAX only a part of the web page is refreshed instead of complete web page. This will increase the performance of the website.

ASCII: - ASCII also known as "American Standard Code for Information Interchange", is the standard for encoding the characters in English language. It uses 7 bit binary to encode 128 characters like "a-z", "A-Z", "0-9" and some special symbols.

SQL: - SQL also known as "Structured Query Language" is introduced by Microsoft for storing data in database with relational database management.

JVM: - JVM is short for "Java virtual machine" (JVM) is a runtime environment used for executing a byte code generated from compiled java code, it helps java to be platform independent.

SOAP: - SOAP, abbreviated for "Simple Object Access protocol", is used as a specification for exchanging the structured information in implementation of the web services in a computer network.

SSL: - SSL also known as "Secure Sockets Layer", is a protocol developed by Netscape for private transmission of documents within the network on the Internet.

HMAC: - HMAC is a short form of "hash message authentication code". It is used for generate keyed hashed code for the authentication purpose using cryptographic functions.

HOTP: - HOTP is short for "HMAC-based One Time Password". This algorithm is used for authenticating a user on the server with authentication server.

3. LITERATURE REVIEW

Joon S. Park and Ravi Sandhu (2002), "Secure Cookies on the Web"

In this paper they proposed a secure cookie mechanism for managing the cookies encryption keys.

For providing continuity and state in stateless HTTP protocol various websites and browsers use cookies to store state of user navigating through different web pages on the website. Although cookies give way of storing state but their use in e-commerce websites has limits because cookies are not providing a security in storing sensitive information. Cookies are used in different ways on websites, like maintaining user's shopping-cart selections, storing identification data of user and selecting display mode.

Three type of cookie threats which makes them insecure are:

- Network threats
- End-system threats
- Cookie-harvesting threat

Different techniques for securing cookie data are needed for having a tradeoffs between convenience and security for system administrators, end users, and application developers. In this paper three ways are stated for providing secure cookies [1]:

- **Address-based (IP_Cookie),**
- **Password-based (Pswd_Cookie),**
- **Digital-signature-based (Sign_Cookie).**

Address-based authentication: In address based authentication an "IP_Cookie" is used to get the IP address of the user, which is used for authenticating the user who access the server. If the web server accepts IP_Cookie, it will authenticate the user by comparing the IP addresses of IP_Cookie and users current IP address.

Password-based authentication: password based authentication avoids IP spoofing as this technique supports dynamic IP addresses. Passwords are transferred through secure SSL

from browser to the server. Then the user will type the password stored in the cookie for authentication in the server. If hash of the password is matched with Pswd_cookie the user is authenticated.

Digital-signature –based authentication: In digital-signature technique DSA and RSA will be used for authenticating the users through cookies, with the help of public key of user. In this technique a user required a software for generating signed timestamp for cookies, which will sent to the server along with page request for authentication.

DonghuaXu, Chenghuai Lu and Andre Dos Santos (2002), "Protecting Web Usage of Credit Cards Using One-Time Pad Cookie Encryption",

In this paper they proposed a scheme known as one-time pad for cookie encryption to managing the storage of important information [2]. Today as the internet is become very popular more and more people are using internet for online shopping, online payment etc., the rapid growth of internet make people realize the efficiency and convenience of internet brought by E-commerce. Most of the transactions are carried out using credit card; most of the e-commerce websites store the customer's credit card in their database for saving the customer's time for avoiding repetitive process of entering credit card information again and again in future. If a hacker hack the merchant's website, he can easily access the database which have various customer's credit card numbers. In this paper a One-Time Pad HTTP cookie encryption protocol scheme is introduced for storing sensitive information [2]. The credit card information is encrypted using One-Time Pad, and stored this encrypted information as cookies on customer's computer and the one time key of the cookie is stored in the central database of the website. So even if the hacker break the system security and access the database he obtain only one-time key, which is useless for him as it is a random string to him and he don't know to which cookie this one time key is correspond. If he breaks into the customer's personal computer and get the encrypted cookie, even this also worthless for him as don't know the key to encrypt it. For every time a new cookie created and any update on the old cookie a new random key is generated for encrypting the cookie. When the server receives the cookie, it checks if there is key is present in the database which correspond to the encrypted cookie sent by user and then decrypt the cookie information to

use for transaction. The main advantage of this approach is it will limit the key attacks by using disposable and single use cookie for each cookie

Clay Lehman, "Secure Authentication and Session State Management for Web Services":

Web services as a latest technology used for client-server communication over the network. In web services a user will use HTTP protocol for sending messages to server for the purpose of communication. Web services are growing very quickly, mostly in case of e-commerce websites. As web services use stateless HTTP protocol for communication between server and client, there is need for some technique for managing the state or information of user accessing the web services. In this paper various techniques for managing the state of user and authentication of user to allowing him/her to access web services. Web services deal with every client individually maintaining the information based on each and every clients last transaction [3]. Today web services are important part of ecommerce websites where user can compare and buy different products from no. of websites available on the network. Web services are used on these online marketing site for making the user experience easy and comfortable by saving the commonly used information of user to save the user time to accessing the same site in future by using the information stored, which leads to the security issues. Web applications which use the web services also require great security for preventing the important information being tampered or misused by the attackers on the network.

Microsoft introduce various standards for giving security to web services using important researches, known as WS-Security. Simple Object Access Protocol (SOAP) messages are sent throughout the network in the internet for invoking the web services. SOAP messages traveled on the network in the form of XML-based documents. Server receives SOAP messages from the user and then on the server side special web services process the client requests by performing particular tasks and send responses back to user. In SOAP message the data is traveled in the form of header and body. Header part of the message consist of extra information about the message in the form of metadata whereas body consist of original message.

S k Sood, A K. Sarje, and Kuldip Singh (2011), "Inverse cookie based virtual password authentication",

In this paper an authentication protocol is introduced which is used to avoid online dictionary attacks known as inverse cookie virtual password.

As the web underlying protocol HTTP is state-less, every client accessing the site is strange to web-server. Statelessness of web makes financial transactions on the e-commerce sites very troublesome for the users. Every site on the internet use different methods for storing the user state but cookies are used most of the servers for this purpose by maintaining connection between the user and web server. Web servers create a cookie to store the user specific information and send it to the client computer though browser. But these cookies are not secured, a secure way of storing the user information is needed.

Passwords are most common way of authentication of user accessing the website. But main problem with method is, it is more vulnerable to the dictionary attacks with the help of robotic software or programs since maximum users chose passwords restricted to his/her particular domain. This paper introduces an inverse cookie protocol which is based on virtual password authentication conserves the benefits of simple password authentication increasing struggle for the hackers for online dictionary attacks [4]. A user will receive different passwords for every session. This protocol is very simple and easy for using, by removing certain shortages in previous protocols used for password authentication. It provides better protection against different type of attacks like online dictionary attack.

Two authentication protocols are proposed in this paper [4]. Protocol one does not require cookies for user authentication whereas protocol 2 uses cookies for user authentication. The user has to follow the protocol 1 if the user has no cookies on his computer otherwise he can follow the protocol 2.

Juels, A.; Jakobsson, M.; Jagatic, T.N. (2006)," Cache cookies for Browser Authentication" introduces a cache cookie memory to secure information stored in cookies.

Cache cookies are stored on the web browser memory by the server [5].

A lot of users on the network block predictable cookies as a security measures in their browsers. In this research paper authors introduce a cache- cookie tool that can restore the missing usability and ease of such users however preserving the confidentiality. Different type of cache cookies are there however they use Temporary Internet Files (TIFs). Data objects, like images stored in the browser's cache are known as TIFs. Browser display data object that are present by means of a TIF, stored in the form of local objects, instead of fetching the data from the web server. Cookies vulnerable to Pharming attacks as these are completely reachable by domain which create them. In this paper the author introduce a new structure which they call cache-cookie memory [5]. Cache cookies are built on TIFS limit the read privileges. In TIF based cookies the site having control of domain for an object will notice the existence of object, but their limitation is that they cannot manipulate over SSL. Cache cookies can support privacy sensitive user identification. User authentication is increased helping to protect users beside Pharming and phishing attacks.

Liu, A.X.; Kovacs, J.M.; Huang, C.-T.; Gouda, M.G. (2005); "A secure cookie protocol" introduces a secure cookie mechanism in which HMAC function is applied on cookie attributes.

The widely used HTTP protocol for server browser communication works request-response manner. As the HTTP is stateless, cookies perform very important role in storing user's state in stateless HTTP protocol. But cookies are not secure so many applications demand a secure cookie protocol. This paper proposed a secure cookie protocol which is efficient, effective and easy to organize and install [6]. This protocol offers verification, secrecy, confidentiality, reliability and anti-replay. This protocol will not comprise any of the database lookup and public key cryptography. This protocol is simply set up on existed server having no need of changing the specification of internet cookie. In this paper HMAC (user name| expiration time, sk) are used as encryption key. The advantage of this approach is that every time a

different and unique encryption key is generated based on user-name and expiry time. Every time a new cookie is generated expiration period is incorporated within the cookie. The encryption key is unforgeable because the server key is kept secret. Encryption key of every cookie calculated by server dynamically thus need of storing the encryption key on server or within the cookie is eliminated. This way secure cookies plays an important role in storing the data in the cookies securely.

Pujolle, G.; Serhrouchni, A.; Ayadi (2009), "Secure session management with cookies", proposes a secure cookie management to provide security by ensuring end-to-end protected connection within the browser & server on the network. In this paper the proposed secure cookie mechanism is founded on cryptographic meanings [7].

Http is a stateless protocol responsible for server-browser communication is built on request and response operation prototype. Cookies have been used widely to maintain state information of the transactions, but cookies are not secure so there is need of securing it.

In this paper authors proposed a secure-cookie management providing security by ensuring end-to-end safe connection among the browser & server in system architecture established on Reverse Proxy application [7]. This approach offers integrity and reliability control, confidentiality, and authentication of sources etc. Users on the internet use Http reverse proxy as midway for accessing inner servers, for sending indirect requests to the server. Every request is delivered through the reverse proxy. It can provide robust security policies and filter every HTTP request as a result only safe requests will arrived at the inner web server. Further, an important advantage of this approach is that addressing the traceability subject for the purpose of keeping track of client's actions & behavior.

Chuan Yue; Mengjun Xie; Haining Wang (2007);"Automatic Cookie Usage Setting with Cookie-Picker" proposes a new system called cookie picker to manage the cookies on behalf of user by identifying usefulness of various cookies.

Although cookies plays very important role of identifying and storing user information, they have certain major privacy and security issues. The capability of monitoring the browsing and surfing behaviors, as well as probably associating "what you've observed on by way of who you are" is the core of security worry that cookies rise.

In this paper, a system is presented, called Cookie-Picker, which maintain settings about usage of cookies automatically on behalf of user [8]. Cookie Picker is used to recognize the practicality and efficiency of cookies. The Cookie-Picker detect the differences between the webpages with or without cookies by using an algorithm which will identify the pages by permitting and restricting cookies on the webpage. Cookie Picker categorizes the cookies which will cause viewable variations on webpages as valuable, disabling others as impractical. Cookie Picker is used as Firefox extension. As Cookie Picker helps user in managing the cookies automatically, it will maintain the balance between privacy risks and usefulness of cookies. Cookie Picker has been used widely, for its completely automatic behavior, great accurateness, and small overheads.

Ayadi, I.; Serhrouchni, A.; Pujolle, G.; Simoni (2011),"HTTP Session Management: Architecture and Cookies Security" proposes a new approach for cookie security with integrity and confidentiality services.

As with increase in usage of web-applications these days, there are significant chances for attacks related to security. Maximum of the web-applications used today manage state of the user with the help of cookies, however cookies are unsafe. In this paper, a technique for securing cookies is proposed [9]. The technique imposes cookies by confidentiality and integrity services. In this paper a new approach is proposed, called encapsulation/ de-capsulation process [9]. The solution provided in this paper for managing the HTTP session with the help of cookies improving the performance of webpages. In this technique RP-cookie is generated allowing the reverse proxy for handling the state between client and the server.

The core cookies are managed by this technique using four steps [9]: in first step, Reverse Proxy connect all the cookies received by the server. Then, encryption of the concatenated

value received from step one is done using the secret key. In third step, a definite attribute is used to encapsulate the encoded value of RP-cookie. In the final step, the Reverse Proxy combine RP-cookie with Set-cookie header as well as directs the reaction to user.

4. RATIONALE AND SCOPE OF THE STUDY

The state management is the technique to maintain state of the software and it increase ratability of the software. Whenever a company or an organization wishes to made a fresh software, it will make use of existing components. However the key difficulty happen in size of the final software. At times the size of software build is lesser than the size of the modules used to make it. In this type of case, it is very difficult to maintain state of the project which reduce efficiency of the project. Sometime the software developers will use the existing software modules to develop new software. If these software modules have low coupling various problems arises for state management. The state management is the building blocks of the system software. It consist of the components of reprocess in architecture of software. The primary functional-unit in this is components it contain. High-level model of software is represented by the user with the help of these components. Components should be standard enough for working in variation of circumstances. The state management of two components is decided by performance at their boundaries. Services of the two components need to be well-matched which wishes to interconnect with each other. If software modules are compatible, it is easy to maintain state of the software. In this work, we will enhance state management for reusable software components

5. OBJECTIVES

Following are various objectives of this thesis

1. To study various decomposition techniques for software state management in system software
2. To propose enhancement in state management to increase efficiency of the software
3. The propose enhancement will be based on knowledge based learning of neural networks
4. To implement traditional and enhanced technique results of both the technique will be compared in terms of efficiency

6. METHODOLOGY:

Reverse engineering is the process used to analyze the software. It analyzed the software with the objective, which are used to recover its design and specification. In the reverse engineering process, the source code of the existing components is available. The source code acts as the input in reverse engineering. The reverse engineering is differ from the reengineering as, in the reengineering a new product is produce. This product is highly maintainable. The working of reengineering is shown by a diagram, as:

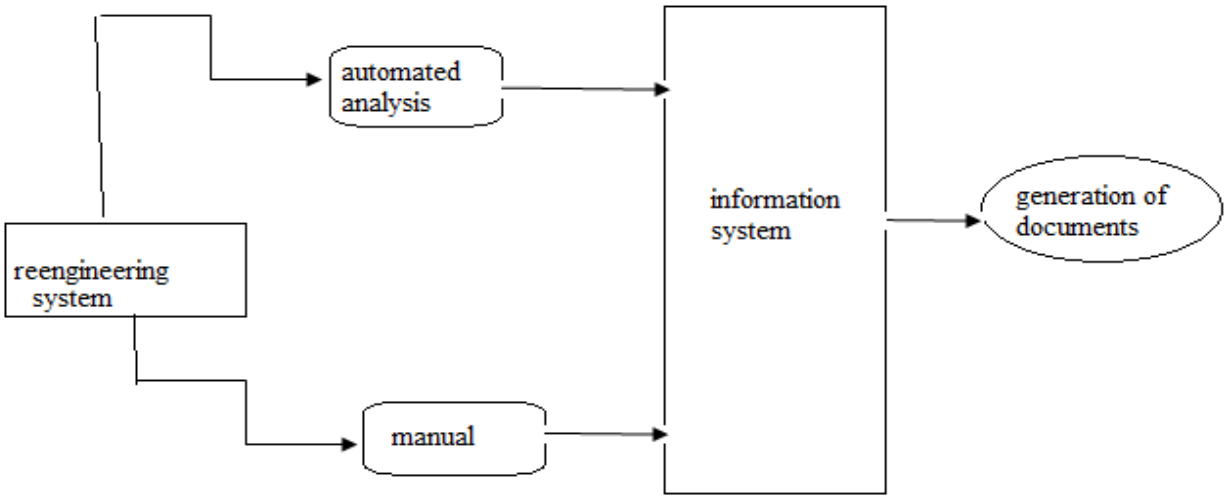

Fig 1. Reengineering diagram

In the reengineering various modules are used. The reusable modules are also used to design and develop the new software. When the modules are reused the concept of plug in and plug out is came into picture. Here to increase the efficiency of the software the modules are integrated. These modules are integrated in that manner so that the compatibility of the system remains the same.

When modules of the existing software are integrated to develop a new software, there exist objects. Object is basically the instance of anything. The objects may be of two types:

- Faulty objects
- Un-faulty objects

The un-faulty objects are helps to increase the performance and efficiency of the system. The faulty objects harm the system badly. The faulty objects may create some problem in the system and it may affect the maintainability, scalability and efficiency of the system. When the components are integrated in the system, it make a class hierarchy. In this hierarchy it

maintains the several objects. In this hierarchy the information regarding the each object is saved. The information of the each object I saved in the parent object, known as the composite object. The composite object helps to maintain the class hierarchy. It also helps in update the information about the objects. At the time of integrated the components of the software the problem of state management is occur. So to remove this problem a new tool is develop to test state management which is based on neural networks

A neuron is an information-processing unit which is important to the operation of neural. The neural model has following three basic elements, they are:

1. Synaptic Weights
2. Activation function
3. Linear Combiner

The brief study of these elements is given below:

1**. Synaptic Weights**: A set of synapse which is characterized by the strength or weight of its own. It is also known as connecting links.
2. An adder for summing the inputs signals, weighted by the respective synapse of the neuron. The operation is called **linear combiner**.
3. An **activation function** for limiting the amplitude of output of the neuron. Sometimes it is also called squashing functions

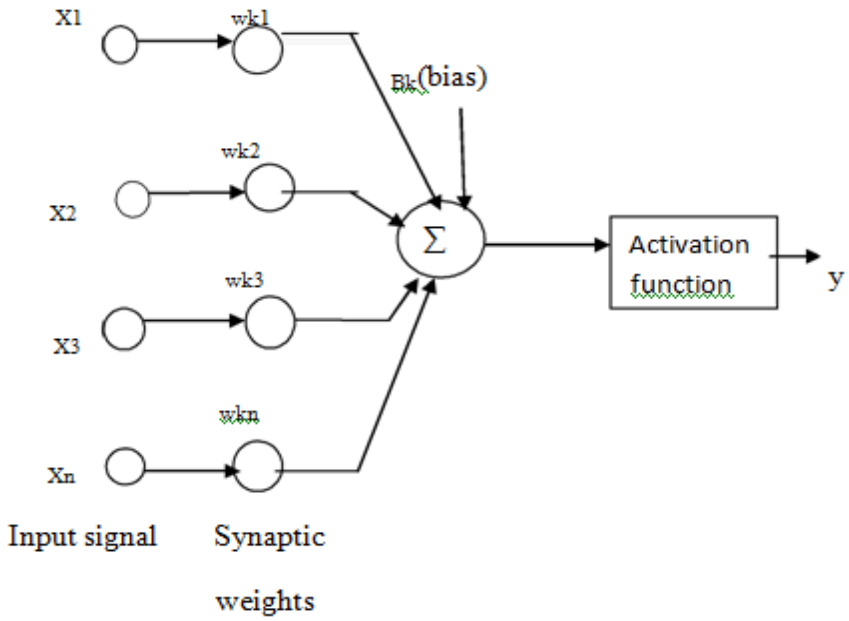

Fig 2: Neural Networks

It is a learning in which synaptic weights are correct according to the error of the neuron output. Here the output generated is compared with target output and desired response.

Error= Desired response-Actual output

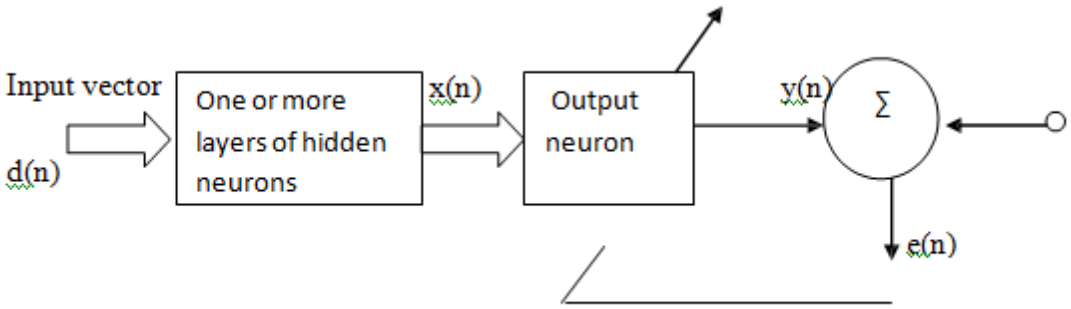

Fig 3: Error correction diagram

Here the inputs to the network are the coupling values of the software modules and cohesion values are weights on the input values. To apply estimated values which gave least error and calculate accurate compatibility the knowledge based learning is applied. In this type of learning all the past practices are deposited in huge memory of properly categorized input output samples (x_i,d_i) where xi means an input vector and di represents the equivalent preferred response.

7. RESULTS AND DISCUSSION

Idle State

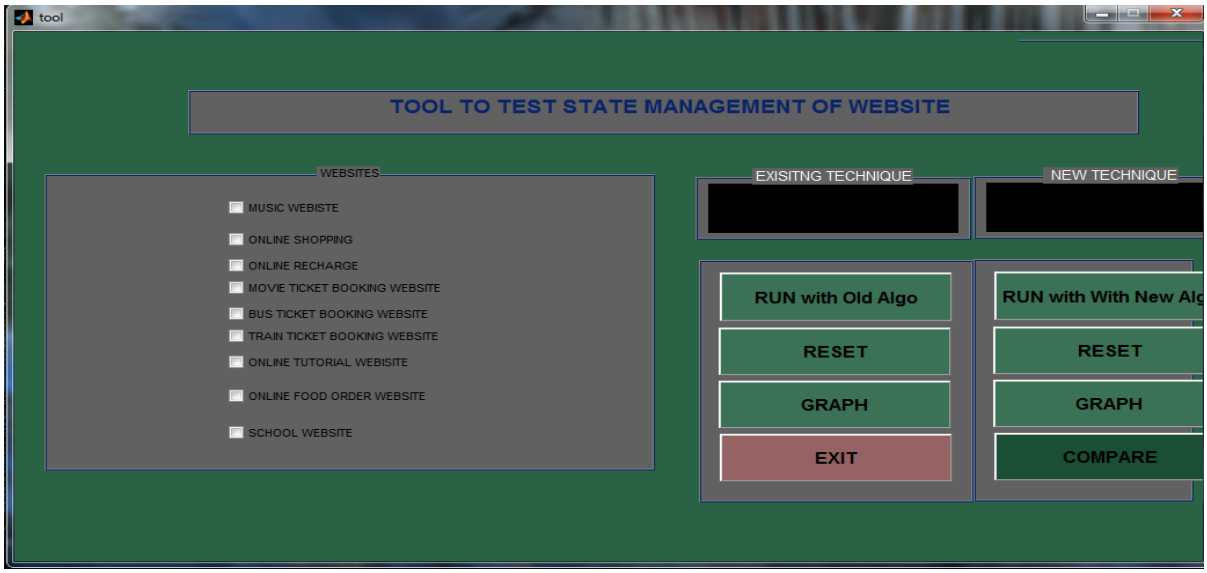

Figure: 4 in this figure, software is in idle state. Here on left side, various type of websites are shown whose state management's efficiency is calculated and/or compared by buttons on right hand side.

Calculating efficiency of old technique

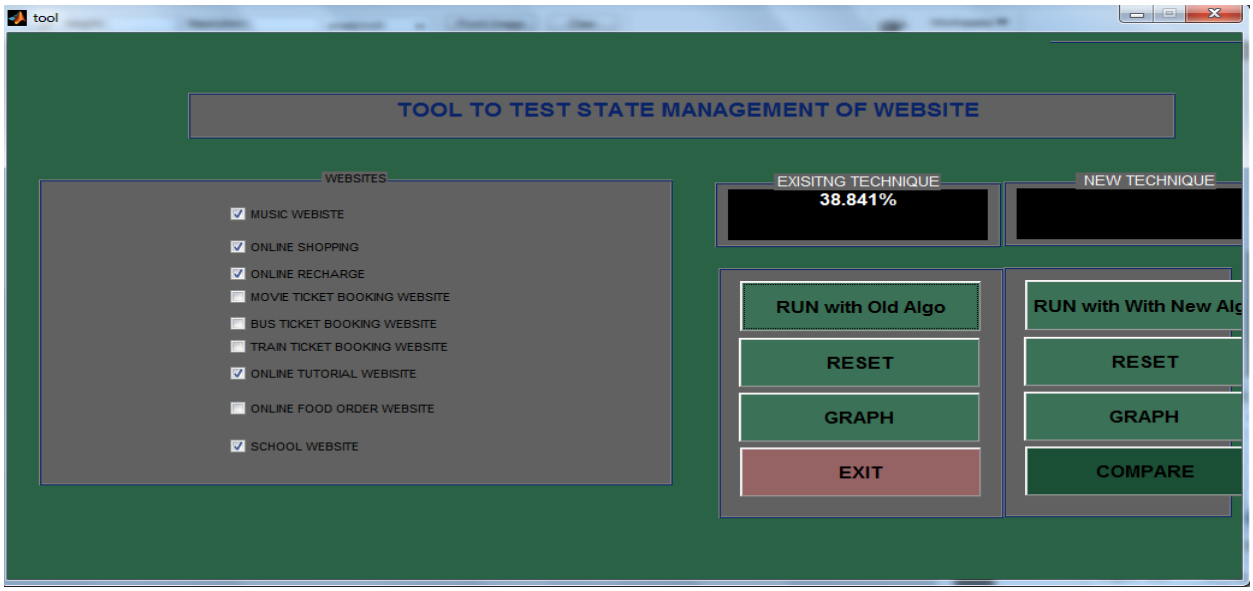

Figure: 5 in this figure efficiency of some of the websites on the left side is calculated which used old state management technique.

Calculating efficiency of new technique

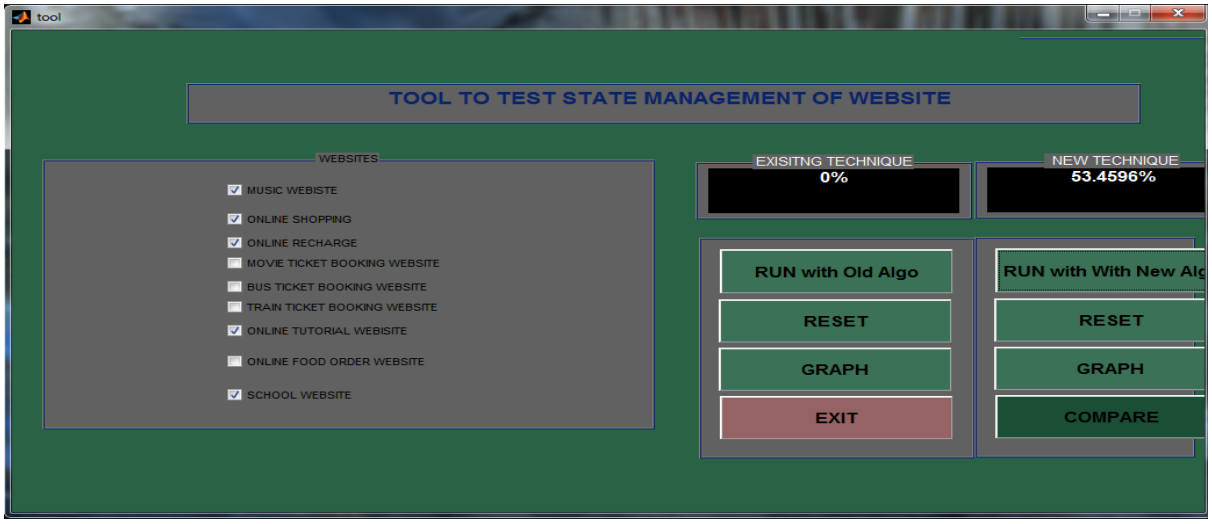

Figure: 6 in this figure efficiency of new state management technique is calculated

Comparison of both state management techniques

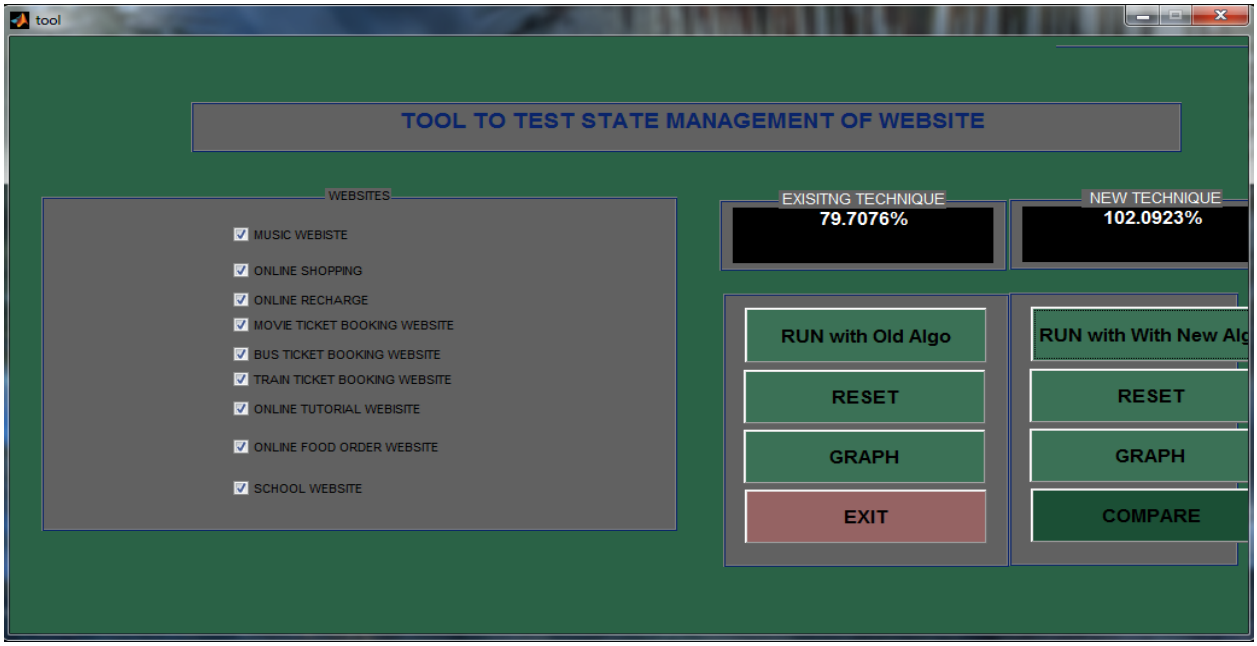

Figure: 7 in this figure all the websites on the left side are checked and efficiency of both the state management techniques i.e. old and new state management technique is calculated

Graph-1 of old state management technique

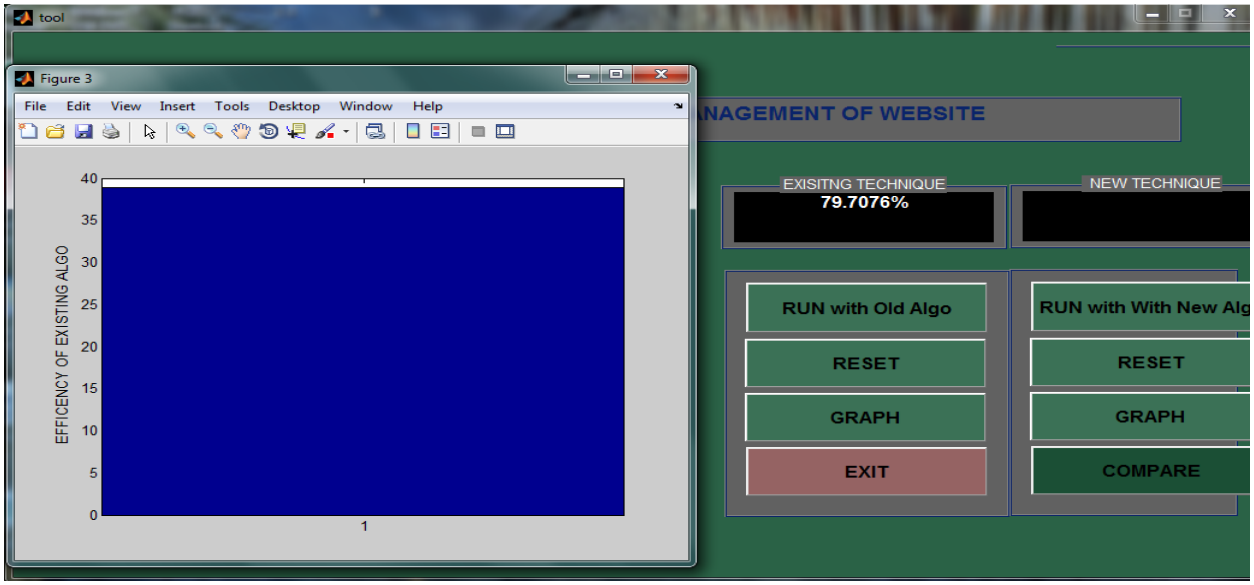

Figure: 8

Graph-2 of old state management technique

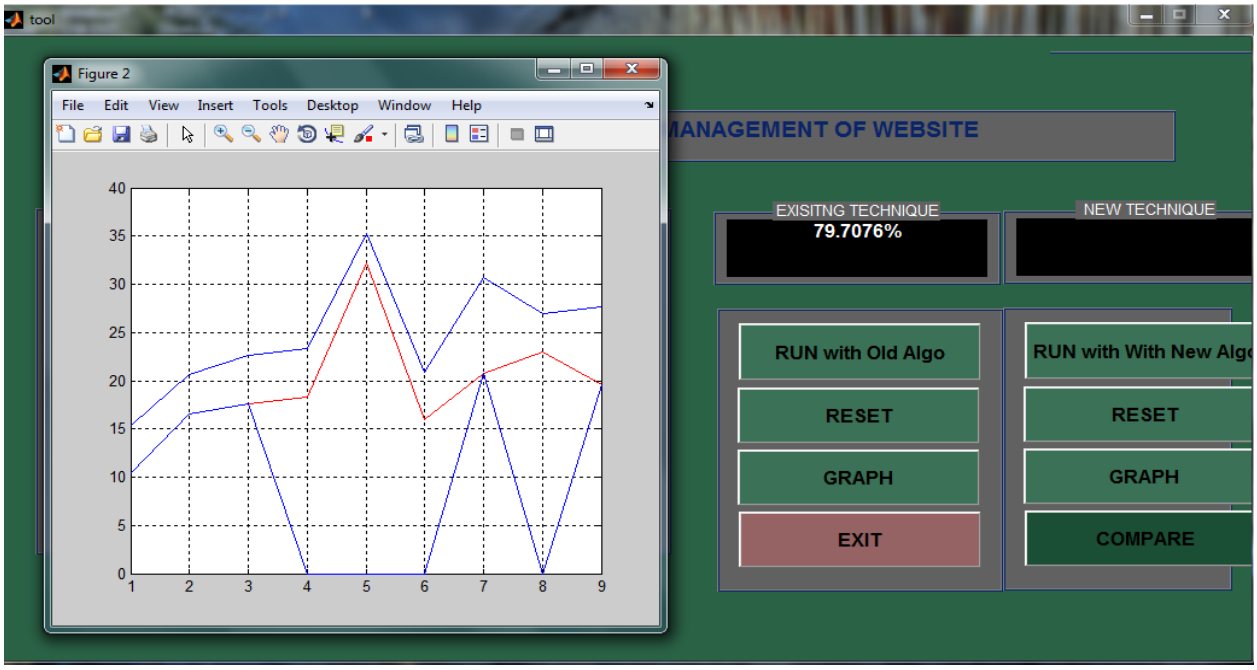

Figure: 9

In this figures, figure: 7 and figure: 8 efficiency of old state management technique is shown in form of graphs

Graph-1 of new state management technique

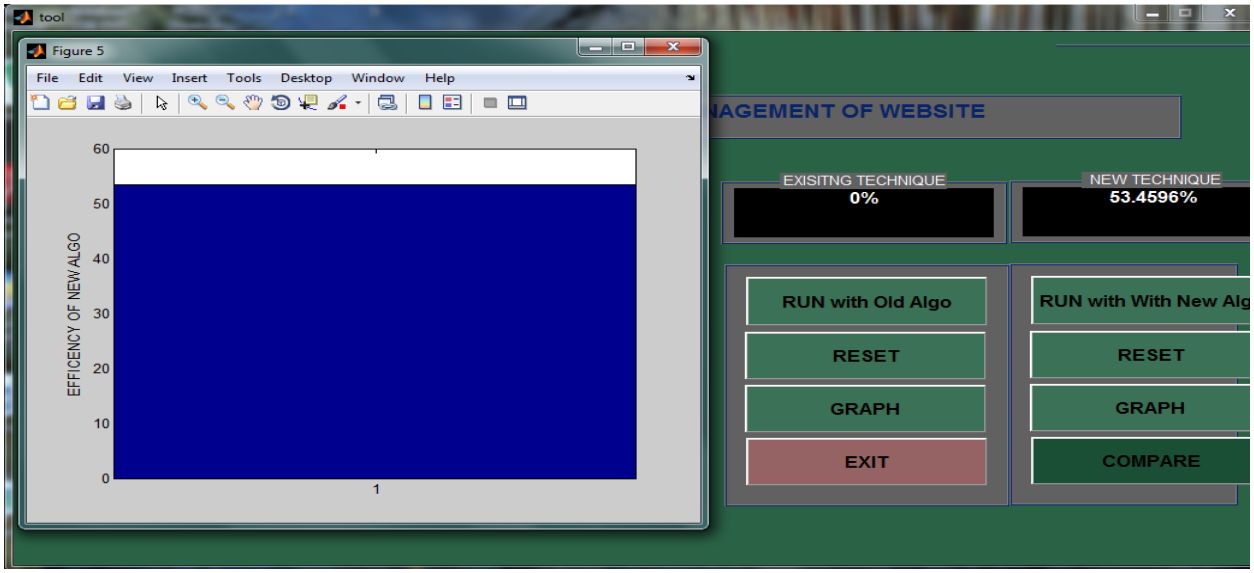

Figure: 10

Graph-2 of new state management technique

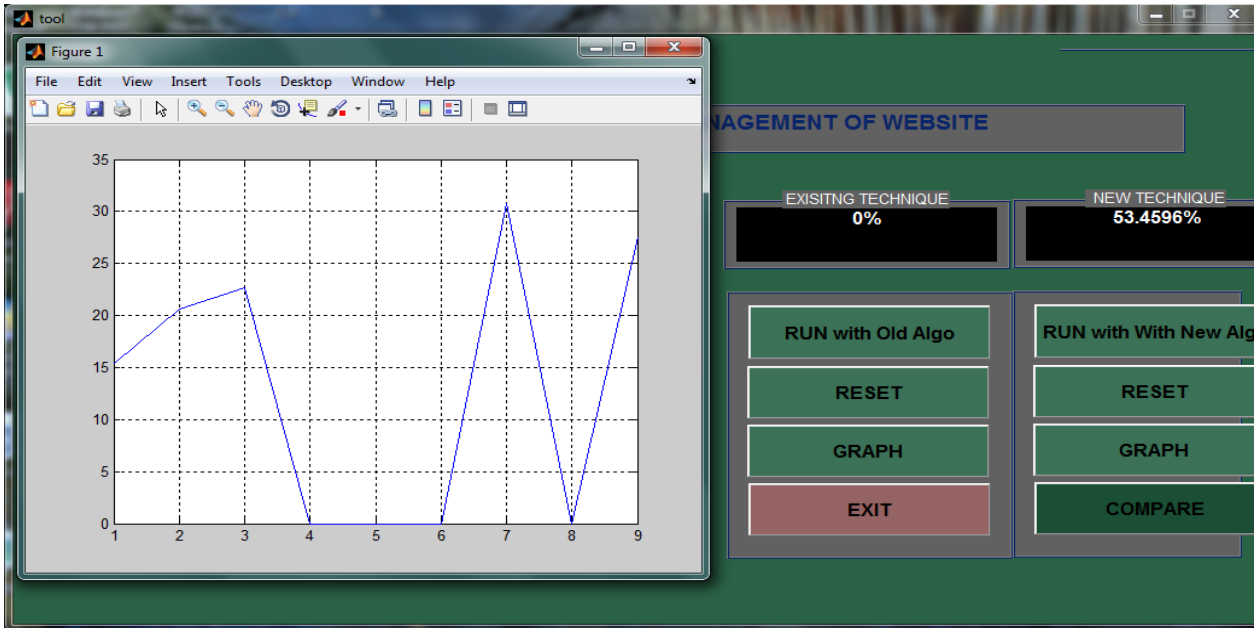

Figure: 11

In figures, figure: 9 and figure: 10 efficiency of new state management technique is shown in the form of graphs

Graph-1 of comparison of both state management techniques

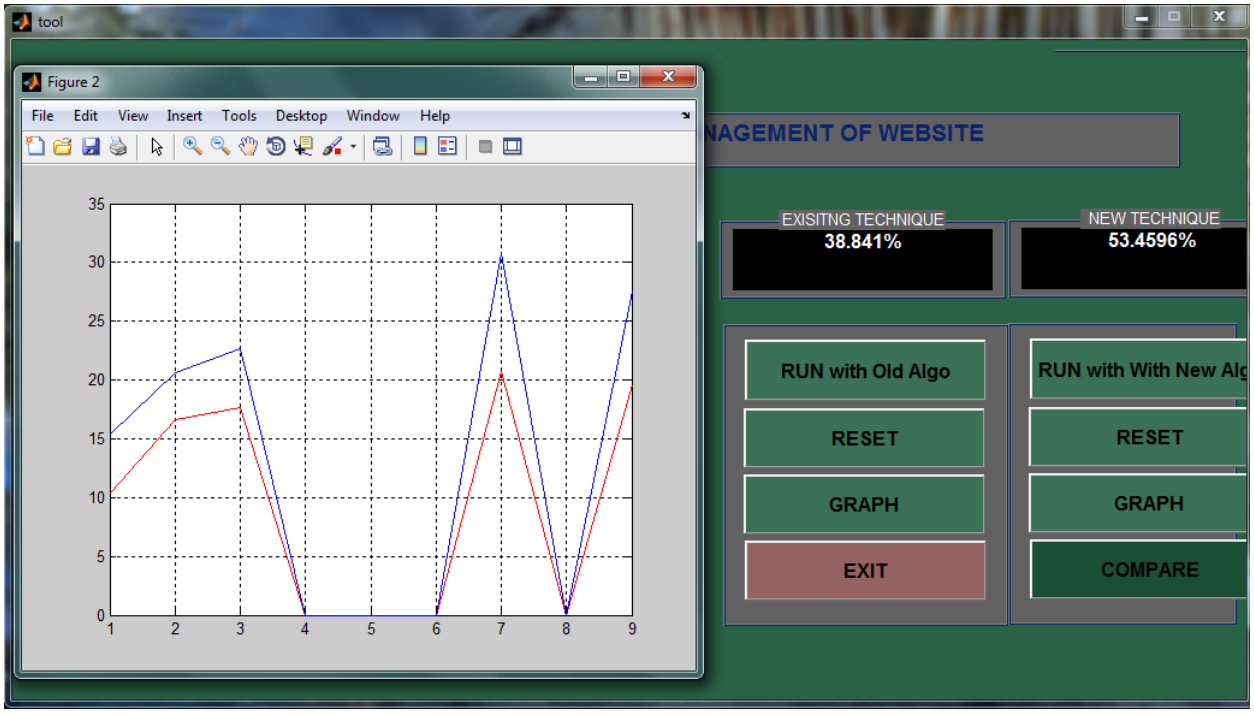

Figure: 12

Graph-2 of comparison of both state management techniques

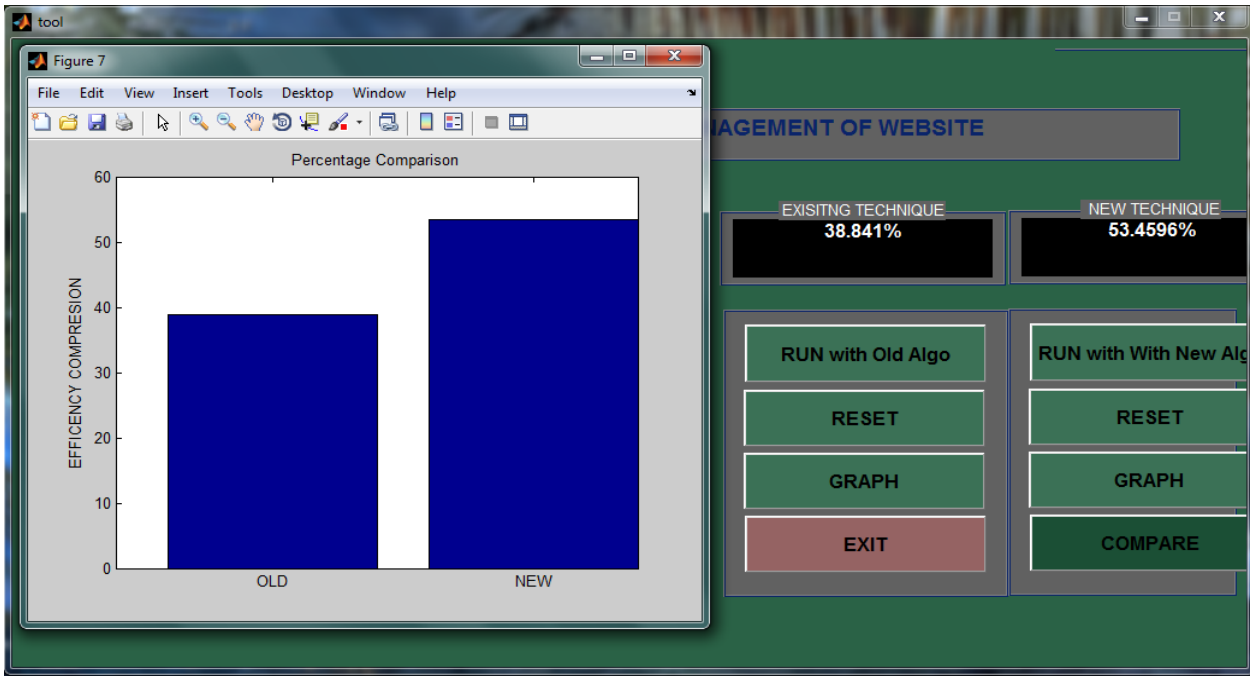

Figure: 13

Graph-3 of comparison of both state management techniques

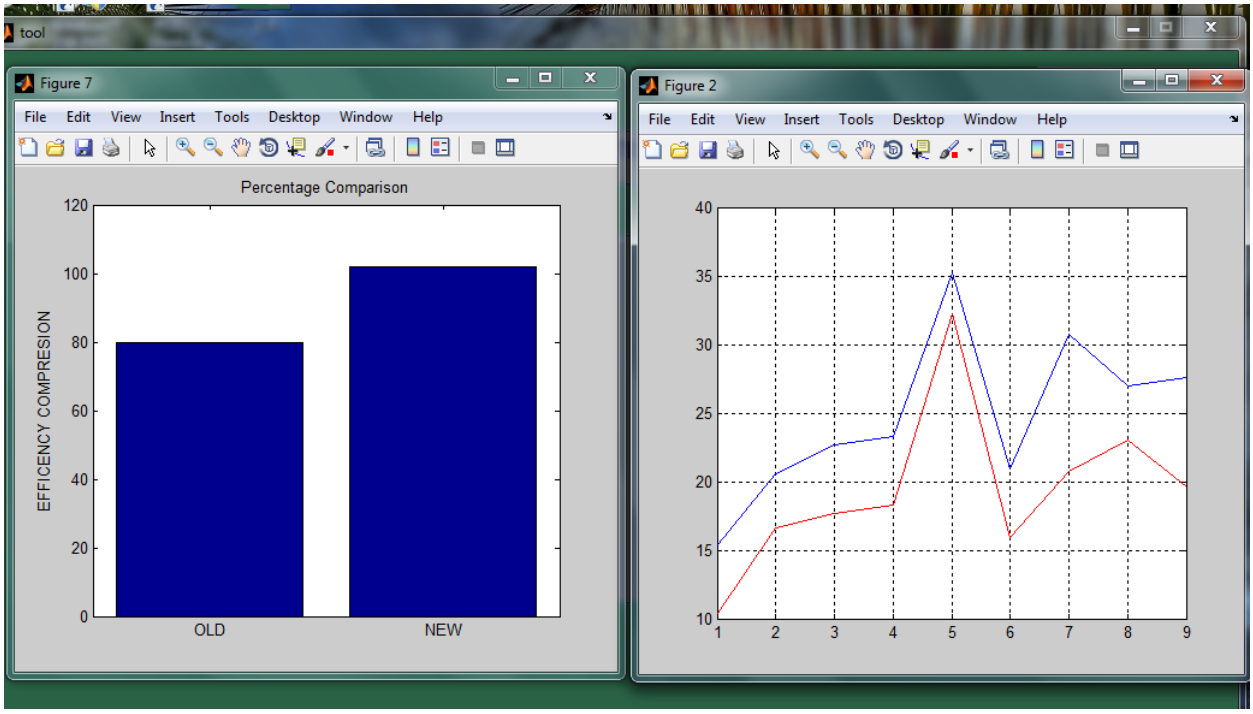

Figure: 14

In figures, figure: 11, figure: 12 and figure: 13 the efficiency of old state management and new state management technique is compared in the form of graphs

8. CONCLUSION AND FUTURE SCOPE

As we know that Http is stateless protocol the state of user is lost on every request, Asp.net use various state management techniques for maintaining the state of user but every technique have its own advantages and disadvantages. Most of the companies use existing software modules to build a new software, in this scenario sometime modules are bigger than the resulted software, which will result in reduction of efficiency of software. If the software modules are compatible, it is easy to maintain state of the software. In this work, I have proposed a system which used knowledge based learning of neural networks to enhance state management for reusable software components.

The research I have presented here is one early step into the promising enhancement in the state management techniques for managing the user state and I hope that other work will follow.

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