Designing A Web Based Hospital Management System For MOUAU Clinic

Ilo S.F, Igbajar Abraham, Acholonu Joyce .C.
Computer Engineering Department Michael Okpara University of Agriculture, Umudike, Abia State, Nigeria

Abstract: This paper is proposing an efficient web-based real-time system for the betterment of medical research and analysis, this will bring about ease of accessing medical record and the ease of getting treatment. Today some problems persists in the hospital such as loss patients medical record and other important files, this paper is going to tackle these problems. This system will help to replace the manual method, then speeding up the processing, storing and retrieval of information, which will greatly assist the medical personnel in performing their duties. Above all the hospitals will benefit from constant cost savings as a result of increased productivity and overall efficiency. The system is web based and is designed with mysql database and C# programming language.

Keywords: Database, C#, Diagnoses, MYSQL, Encrypting, Scryping

I. INTRODUCTION

Over the years there have been issues regarding fast and easy hospital management, ranging from Managing healthcare quality improvement and compliance documentation, workflow, and analytics, Healthcare workflow and task management solution with pre-surgical workflow, pre-arrival and patient status management functionality,Being that these professions are in the increase day-by-day and there are lots of jobs done just to improve the services rendered to patients that visit the hospital, there is need for Application that addresses the administrative needs of health care practices, ambulatory surgery centers and surgical hospitals, Computers have improved the accuracy, speed and reliability of many of the administrative and technical tasks traditionally involved in patient care besides improving the service offered to patients. This paper proposes a Web based frame work for health care industries that orchestrates all activities performed in hospitals.

A. Aim of The Study

This paper is aimed at designing an efficient web-based real-time system for the advancement of medical research and analysis, which will make it easy to follow up a patient's medical record from any system at is linked on the hospital site. It will also help to eliminate certain irregularities in hospital record managements like; loss of the patient entry form, sometimes appointment with the doctors are not maintained properly due to lack of good record model.It will help to curtail these, this paper will devise a system that will eradicate these problems and improve medical services to the citizens. This computerization process is believed to be capable of not only solving these problems but many more to be encountered. This system will help to replace the method of one point of entry and retrieval that exist in non-web-based systems, help in speeding up the processing, storing and retrieval of information, which will greatly assist the medical personnel in performing their duties. Above all the hospitals will benefit from constant cost savings as a result of increased productivity and overall efficiency.This is a web based system and is implemented on a local server. In this system, files and records will be computerized for easy access and portability, this system is also capable of recording patient's information, so as to view or retrieve important records for usage at all times.

B. Scope of The Paper

The focus of this paper will be on a web-based hospital management system that will be managing appointments, billing statements and official receipts as well as the medical prescriptions and medical certificates which will be automated. In this system, files and records will be computerized for easy accessibility and portability, it is also capable of recording patient's information, so as to view or retrieve important records for usage at all times.There will be a new account created whenever a new patient is admitted into a hospital. This system has been designed to give more integrated patient services and administrative control and monitoring over the system, with the help of integration this software is cost and time saving. Each level of working environment is benefited with this system.

II. REVIEW OF RELATED LITERATURE

The literature search brought to the fore contextual issues and brief historical overview of hospital

information systems. The government has taken steps to promote the development of a basic national primary care program in the villages, but concerns abound about serious lack of specialized health care facilities (Ouma and Herselman; 2008). Web-Based Hospital Management information Systems include strategic decision support systems and clinical documentation systems. Some of the clinical support systems include Laboratory Information Systems (LIS), Radiology Information Systems (RIS) and Computerized Order Entry (COE). Others are pharmacy information systems and personal data analysis systems with important added feature for messaging between providers and staff, and the ability to share data with other medical facilities (Keenan et al; 2006).According to Zhejiang chiyan (2014) Grassroots healthcare institutions (GHIs) are the smallest administrative levels of medical institutions, where most patients access health services.

III.   SYSTEM ANALYSIS AND DESIGN METHODOLOGY

In the development of this system, the spiral software Development model was adopted and used for this system.For the purpose of this paper, the spiral Software development model was adopted.
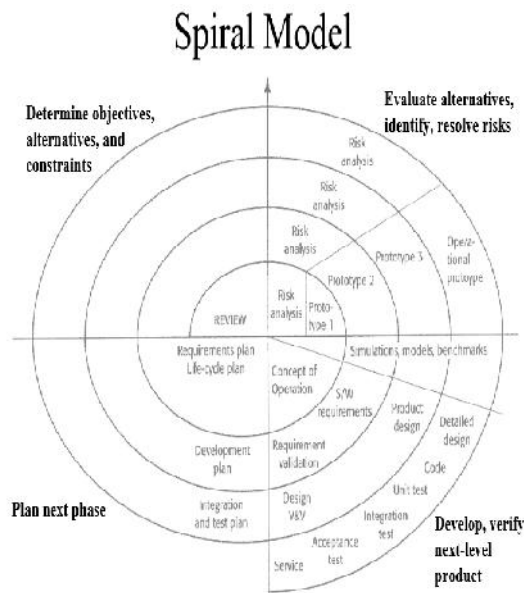

Figure 1: Spiral Software Model

The spiral model has four phases planning, risk analysis, engineering and evaluation. It emphasis more on risk analysis. In this model the research undergoes each phases repeatedly called *spirals.*
The planning phase is the baseline spiral and each subsequent spiral is build on spiral model

These type of model is used in risk analyzing research for e.g in space crafts.

1. **Advantages**
    - Importance is placed more on risk analysis
    - Software is produced in the early stage.

2. The System Design Process

System design in this paper develops the architectural detail required to build a system or product. The process used in the design encompasses the following activities:

- Partition the analysis model into subsystems.
- Identify concurrency that is dictated by the problem.
- Allocate subsystems to processors and tasks.
- Develop a design for the user interface.
- Choose a basic strategy for implementing data management.
- Identify global resources and the control mechanisms required to access them.
- Design an appropriate control mechanism for the system, including task management.
- Consider how boundary conditions should be handled.
- Review and consider trade-offs.

A. Design of the Input Details

Input design is a part of overall system design, requires the very careful analysis of the input data items. The goal of the input design is to make the data entry easier, logical and free from errors. The user controls input data. The commonly used input, output devices are mouse, keyboard and the visual display unit (Monitor). The well designed, well organized screen formats are used to acquire the inputs. The data accepted is stored on database file.
Our system is classified into subsystem such as
- Admission
- Staff Details
- Billing
- Consultation Details
- Ward Details
- Ambulance Service
- Data Report

B. Design of the Output Details

Output is the most important and direct source of information to the user. Efficient & intelligent output design improves the system relationships with the users and helps in decision-making. The output is collected in

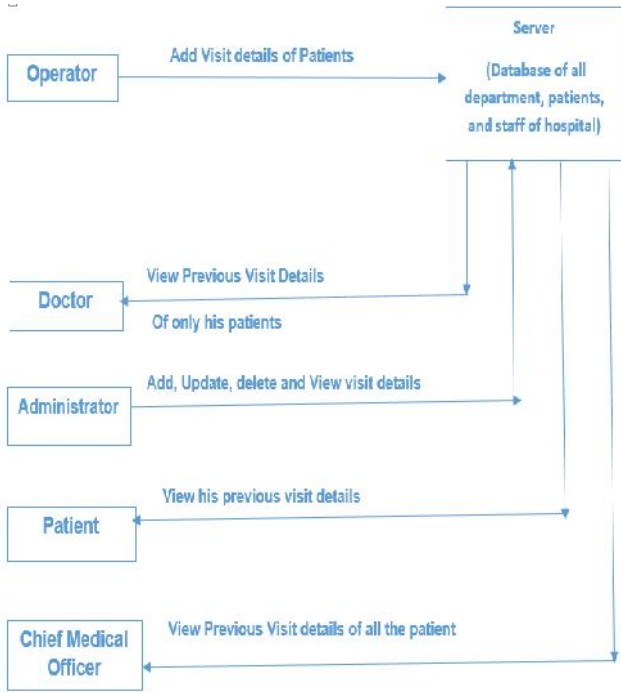order to help the user to make a wise decision. It is normally presented in oral and paper form.

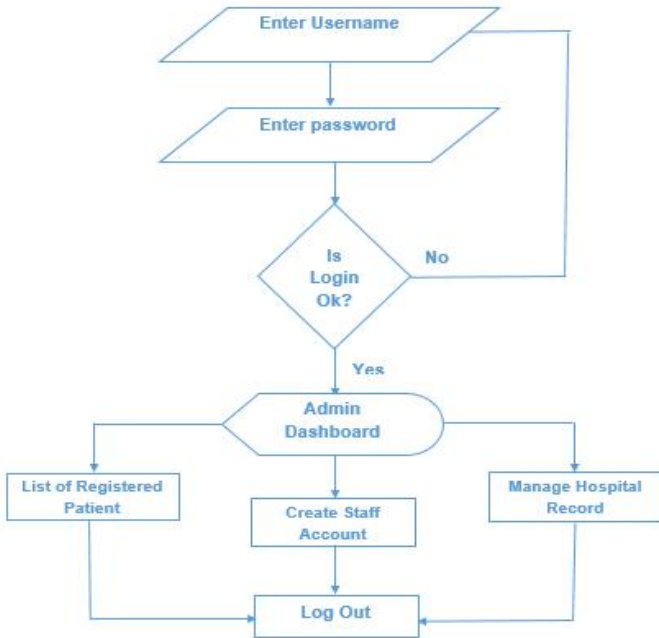Figure 2: Envisaged System Block Diagram

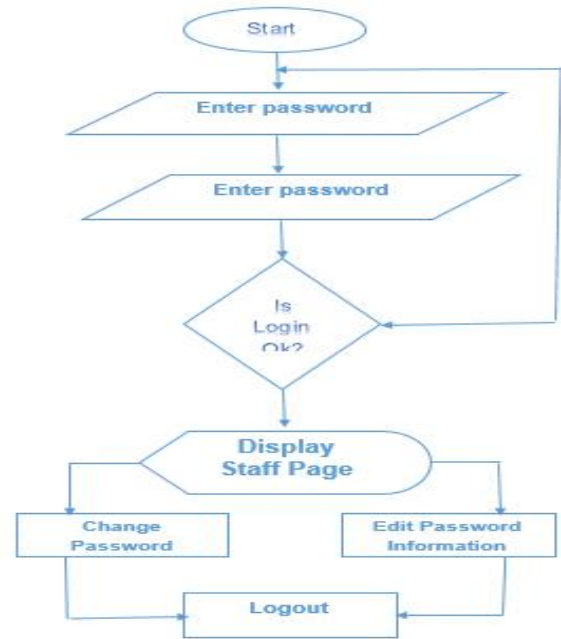Fig 3.2 The Administration Module (Login) Flowchart
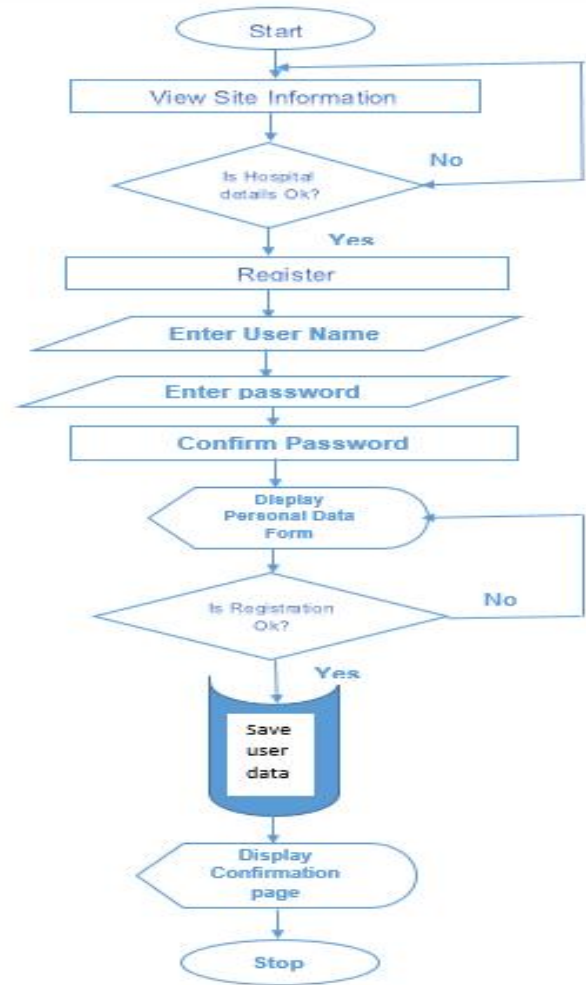

Figure 3: The Staff Module
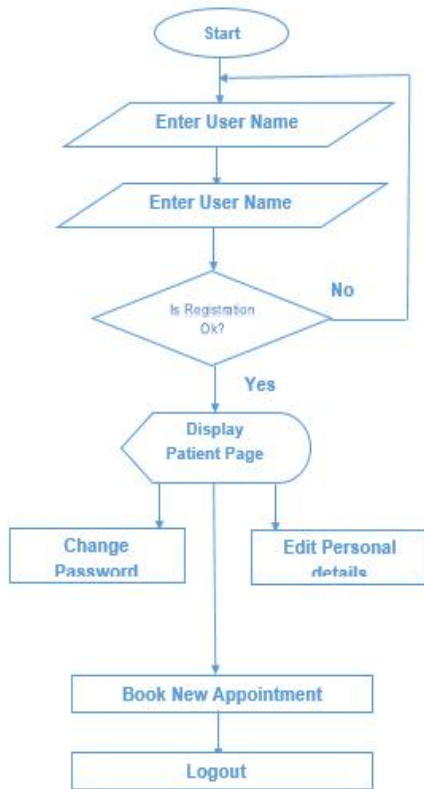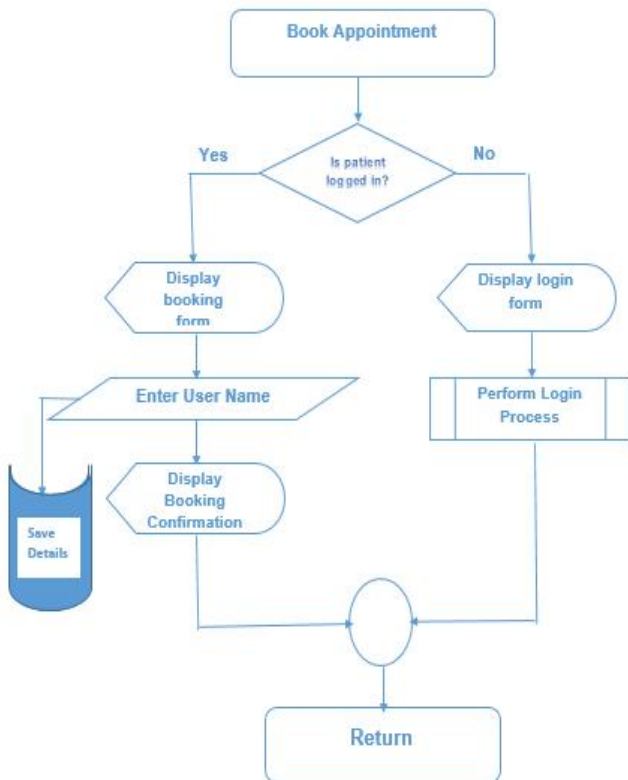

Figure 4: User Module

Figure 5: Returning User

Figure 6: Booking Appointment Module

The System Design

The system has two aspect, the programming aspect and the database area. The system was Graphical user Interface was designed using C#

The software is designed to have several menus and pages in C# scripting, this tend to create the unique interaction between the patients and system to support them into achieving their task. The form has been simplified to have various object representing certain identity that enable the medics accomplish their task in due time. The forms and object feature have been elaborated below. Login form code

- public string Username
- {
-     get { return UserName.Text; }
- }
- public string Passwordtext
- {
-     get { return Password.Text; }
- }

Other few codes used in the system

```
using System;
using System.Data;
using System.Data.SqlClient;
using System.IO;
using System.Security.Cryptography;
using System.Text;
using System.Windows.Forms;

namespace daniweb
   {
publicpartialclass frmLogin : Form
   {
///<summary>
/// Key for the crypto provider
///</summary>
privatestaticreadonlybyte[] _key = { 0xA1, 0xF1, 0xA6,
0xBB, 0xA2, 0x5A, 0x37, 0x6F, 0x81, 0x2E, 0x17, 0x41,
0x72, 0x2C, 0x43, 0x27 };
///<summary>
/// Initialization vector for the crypto provider
///</summary>
privatestaticreadonlybyte[] _initVector = { 0xE1, 0xF1,
0xA6, 0xBB, 0xA9, 0x5B, 0x31, 0x2F, 0x81, 0x2E,
0x17, 0x4C, 0xA2, 0x81, 0x53, 0x61 };

public frmLogin()
   {
   InitializeComponent();
   }
```

```
#if (DEBUG) //Only compile this method for local
debugging.
///<summary>
/// Decrypt a string
///</summary>
///<paramname="Value"></param>
///<returns></returns>
privatestaticstring Decrypt(string Value)
    {
    SymmetricAlgorithm mCSP;
    ICryptoTransform ct = null;
    MemoryStream ms = null;
    CryptoStream cs = null;
byte[] byt;
byte[] _result;

    mCSP = new RijndaelManaged();
try
    {
    mCSP.Key = _key;
    mCSP.IV = _initVector;
    ct = mCSP.CreateDecryptor(mCSP.Key, mCSP.IV);


    byt = Convert.FromBase64String(Value);

    ms = new MemoryStream();
    cs = new CryptoStream(ms, ct,
CryptoStreamMode.Write);
    cs.Write(byt, 0, byt.Length);
    cs.FlushFinalBlock();

    cs.Close();
    _result = ms.ToArray();
    }
catch
    {
    _result = null;
    }
finally
    {
if (ct != null)
    ct.Dispose();
if (ms != null)
    ms.Dispose();
if (cs != null)
    cs.Dispose();
    }

return ASCIIEncoding.UTF8.GetString(_result);
    }
#endif
///<summary>
```

```
/// Encrypt a string
///</summary>
///<paramname="Password"></param>
///<returns></returns>
privatestaticstring Encrypt(string Password)
    {
if (string.IsNullOrEmpty(Password))
returnstring.Empty;
```

C. Database Design

A relational database design was used to design the database. A Relational Database Management System (RDBMS) is an excellent tool for organizing large amount of data and defining the relationship between the datasets in a consistent and understandable way. A RDBMS provides a structure which is flexible enough to accommodate almost any kind of data. Relationships between the tables were defined by creating special columns (keys), which contain the same set of values in each table. The tables can be joined in different combinations to extract the needed data.

In the design and development of this system, we used mark-up language, cascaded style sheet, programming language and a database platform.

- **Front end:** Html (Hypertext mark-up language) enables the construction of an easy and intuitive user interface for accessing the database and any browser can display an html document.
- **Middle end:** C-sharp enables links of the text entered in the created graphic user interface to be sent to the database.
- **Back end:** SQL is easy to use, inexpensive database language, it can be run on a variety of operating systems such as windows, Linux, UNIX's/2 and others, its secures with technical support widely available on the internet but most of all it supports large database.

IV. SYSTEM IMPLEMENTATION AND TESTING

The system can be implemented as a standalone, the system can be implemented online or on a locally host server, the system can be part of a cloud network of different hospitals.

A. Functional Requirement

The following are the desired functionality of the new system.

- The system can accept and have submissions in form of patients supply at the submitting point and direct addition of bills and prescription into the database..
- The system can authenticate the users of the system.
- The system can only allow the administrator to make changes in the database.

Figure 7: The Patient Registration Form

Figure 8: The List Of Registered Patients

B. Software Requirements

C-sharp (Hypertext pre-processor)

Visual C#, pronounced C sharp, is a new object-oriented programming language that is an evolution of C and C++, providing a simple and type-safe language for developing applications.

C-sharp is a server-side scripting language designed specifically for the web. The goal of the language is to allow web developers to write dynamically. C-sharp allows interface interfacing too many different database systems that provides an open database connectivity standard (ODBC) such as SQL, Oracle, Microsoft products and others. Other advantages are low cost and availability. C-sharp is portable across multiple platforms and is created as an open-source.

C. System Requirement

The hardware and software requirements needed for the effective and efficient running of the system are described here.

Table 4.1: Hardware Requirement

Hardware	Minimum System Requirement
Processor	1GHz speed
Memory (RAM)	2G Ram
Hard Disk Drive Space	10G hard drive
Display	Any monitor can serve

The table above shows the hardware components of the machine that allows the system to function as required for using Hospital Management System.

Table 4.2 Software Requirement

Software	Minimum System Requirement
Programming Language	C-sharp (Visual C#)
Database Management System	Microsoft SQL server 2012
Runtime Environment	Visual Studio. Net
Operating System	Windows 7
Web Browser	Any Web browser e.g. Mozilla Firefox, Google Chrome, Internet Explorer.

The table above shows the software requirement recommended to enable the system to run as required for using Hospital Management System

D. Prescription, Test and Billing Record

In this system prescription, test and billing records are not as easy as task, they are a little bit stressful. The information is recorded directly into the database by an authorized administrator because of security reasons of illegal manipulations.

When a patient is admitted into a hospital, he/she is referred to the medical laboratory for a test or several tests as requested by the doctor. When the result is out, the doctor administers treatment to the patient according to the result gotten from the test carried out. He prescribes medications for the patient and the prescription is taken to the pharmacy department. The patient is advised to take the drugs according to the prescriptions whether still in the hospital or discharged. The bills charged for the treatment and the drugs are written and paid for. A receipt is been issued to the patient in case if needed. The records of this processes are been recorded in the database directly and is been displayed whenever a doctor or a patient accesses his or her account when required. This information is important for the new doctor and the patients' new treatment when he or she falls ill again.

E. System Implementation

This describes the tools used to implement the graphical user interface (GUI) and the database. SQL was used to create and connect relational tables to the database. Html was used to develop the GUI. C-sharp was used to process queries and request flash to integrate sounds and interfaces was done to develop the models that meets all the requirements of this system.

F. System Testing and Validation

Testing was done after the system was put in place. This was carried out in different ways: Implementation and Unit Testing was carried out on individual modules of the system to ensure that they are fully functional units. We examined each unit which we checked to ensure that it functions as required and that it adds client's data and other details and also ensured that this data is sent to the database. The success of each individual unit gave us the right to carryout integration testing. All identified errors were dealt with. We carried out integration and system testing after different modules had been put together to make a complete system. Integration was aimed at ensuring that modules are compactable and they can be integrated to form a complete working system. For example we tested to ensure that when a user is logged in, he/she is linked to the appropriate page, and could at the same time access the database.

As one of the final specific objectives of this study, validation of the system is very important. Validation of the system was done by comparing it to the questions asked by the users in my computer test laboratory.

SUMMARY

Having reviewed the challenges encountered through the use of manual systems of information documentation in our modern hospitals, this proposed system is believed to help eradicate the problems associated with the manual system by the introduction of an online system which will make documentation more efficient and effective for serving the patients better and to have a more developed way of carrying out hospital operations. The hospital management system adds amazing values to the lives of both staff and patients as it aids in reduction of workload, thereby helping in data entry error reduction. It can capture data, store, and view, add and delete records into the database when required. On the long run during the development of this system, some challenges where encountered, some of them includes;

- Lack of sufficient sensitive information, reference books about patients and hospitals.
- Lack of steady power supply for collection of data, research purposes and in system testing phase.
- Error-debugging and suitability of C-sharp and SQL codes for different tasks were a bit challenging due to the fact that the codes were large and numerous, especially in linking all the Model-View-Controllers (MVC).
- Inadequate financial support to facilitate the research.

CONCLUSION AND RECOMENDATION

The paper "Hospital Management System (HMS)" is for computerizing the daily works carried out in a hospital. The software takes care of all the requirements of an average hospital and is capable of providing easy and effective storage of information related to patients that come up to the hospital.

It generates test reports; provide prescription details including various tests, and medicines prescribed to patients by doctors. It also provides injection details and billing facility on the basis of patient's status for both indoor and outdoor patients. The system also provides the facility of backup as per the requirement.

The system integrates technology advantages of Visual Studio 2013 and C#.NET (C-sharp .Net) development environment to design and develop a web based hospital management system. Since 2010, it has been used as an experimental teaching program for "Medical Informatics" and "Hospital Information System" classes for students majored in computer science and Engineering with orientation of medical informatics in our various institutions. This has led to satisfactory teaching

accomplishment. Because of the inadequate teaching equipment, the functionality of online credit card payment cannot be implemented. We will continue to improve and develop the system with goals that are suitable to be used in small, medium and large-size hospitals for managing their hospital information and to be used for managing outpatient medical records for data mining. It is recommended that the government and hospital management board consider adopting electronic process to ease work and save time and resources, therefore in adopting this method it is recommended that full training be organized for the staff of the hospitals, notwithstanding letting them understand the need of this very system for the rebirth of our hospital management.

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WEB SOURCES

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