



Online Appointment Reservation and Scheduling for Healthcare- A Detailed Study

Irin Sherly. S¹, Mahalakshmi. A², Menaka. D³, Sujatha. R⁴

Assistant Professor, Dept of IT, Panimalar Institute of Technology, Chennai, Tamilnadu, India¹

U.G. Student, Department of IT, Panimalar Institute of Technology, Chennai, Tamilnadu, India²

U.G. Student, Department of IT, Panimalar Institute of Technology, Chennai, Tamilnadu, India³

U.G. Student, Department of IT, Panimalar Institute of Technology, Chennai, Tamilnadu, India⁴

ABSTRACT: Appointment reservation and scheduling systems in healthcare are used to maintain and manage the access to service providers which are the hospitals. In many aspects it might affect the administration of appointment scheduling systems which includes the arrival time and consultation time variance, doctor preferences, dates and other information relating to the technology and the maturity level of the administration staff. Hence an appropriate scheduling and reservation system has to be developed by considering necessary factors and features which will elevate the patient hope and satisfaction, which in turn increases the profit margin. An online reservation and scheduling system will allow individuals to securely and safely make their appointment reservations online. Comparing to the existing scheduling methods, the web-based appointment and reservation system could powerfully escalate patients' satisfaction with initial registration and reduced waiting time. This paper majorly focuses on analytical study of online appointment reservation and scheduling system with its architecture and benefits.

KEYWORDS: Online Appointment Reservation System, Software Architecture, Scheduling

I. INTRODUCTION

The word "appointment" indicate duration of time apportioned in the schedule to a peculiar patient's visit and time to be spent with the medical practitioner is stated early so the doctor absolutely concentrates with the patient (the specified duration and original consultation time might vary)[1]. As established on Cayirli and Veral [2], Appointment arrangement can be categorized into two, Dynamic and Static. In later category appointment reservation accord must be made earlier to the onset of the sitting, which is the prevailing appointment system in hospitals. In former category appointment reservations will be an itinerary of forthcoming advents which are adjusted progressively everyday depending on the current situation of the system. This is implementable when patient shows up to the clinic space so that they can be coordinated dynamically, which broadly comprises of patients previously admitted to a clinic or hospital. The appointment scheduling procedure will either be dynamic or static can be noticed as difficulty in hospitals that can be disposed using an efficient doctor patient portal which manages online appointment reservation and schedules them. The prosperity of exercising this system will reach everybody who took part in the scheduling process. Staffs and administrators can handle their duties further accurately and efficiently, while patients have the capability to fix their reservations and appointments conveniently and more quickly. Online appointment fixing and scheduling system is by which an end user or directly, a patient can approach the website or web application and connect to the doctor, and by the online software system, the patient can conveniently book their appointments. Along with that, patient can also contribute supplementary details to the medical practitioner, composing the doctor more familiar of their position and offering the doctor duration to draw up the significant data for when the patient's visits or appears. In this way, online appointment reservation and scheduling system can help the patients, the doctors, and the office staffs. There are considerable online scheduling tools in the internet, a few of which are trait loaded, simple to setup and economical.



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For practitioners, online appointment reservation and scheduling delivers a lot of merit added benefits and services, like captivating the patient, composing the patient to feel welcomed, and being capable to save patients' details safely for future information. But the most admirable and useful preference is that online appointment reservation and scheduling is remarkably inexpensive. [3]. Both doctors and patients can access the portal through their unique ID's.

II. LITERATURE SURVEY

Here we present an interaction system for doctor and patient communication. It has an exceptional administration of several nodes through which doctors and patients interact with each other. The patients can easily access the hospital server nodes. Here the patients are allowed to interact with the doctors about their symptoms. The doctors can list and track their patients who are geographically dispersed and provide a diagnosis on the needful. Proposing a new system from where the patients can easily book their appointments online and the doctors can view and manage them. Here the patients book their appointments online depending on the doctor's availability and their time feasibility. The doctors on the other hand can either extend or reduce their working hours depending on the number of patients arriving for that day. In addition, the approximate time of arrival for the patients is also approximately calculated and notified to the registered number. Any other information can also be fabricated at installation and hence removes the need for a technician install the software.

III. DIFFERENT TYPES OF APPOINTMENT SCHEDULING

Numerous methods are feasible for scheduling appointments in a hospital. They might include the following: [4]

Double booking: In this method, appointments uses a primitive approach for reducing the waiting time by assuring that there is always a patient accessible to be seen when the doctor or physician is accessible. It escalates the physician or doctors' productiveness and builds a motivation for patients to visit on schedule (First Come First Served). But the hindrance is that it extremely depends on the physician's instinctive capacity to harmonize time shortcomings on the entire day and to "get back on track" as desired to accomplish on time.

Like Visits Together: It efficiently tries to hike when patients with comparable chronic conditions or health status are timed close together. Management long ago found that recurrence of the similar functions permits continuous work-flow accelerates process speed and eradicates set-up time. This technique is a profitable way to arrange the monotonous services and it is highly effective for reserving certain classifications of patients back to back.

Ten Minute Increments: Medical specialists generally layout schedules around 15 minute span adjuncts, thus generating definitive appointments of 15, 30 and 45 minute time intervals. In contradiction, paediatric uses, and certain general family physician practice groups, tend to use 10 minute span with culminating prepared patient arrivals at 10, 20 and 30 minutes. In this approach, medical practitioners is able to cut down time and the demand for double booking by calculating anticipated time nearer to the original visit time. But it raises the complication for organizing people.

Modified Wave Scheduling: In this system, visitors' appointments imbricate so that when one of the patients completes quickly, another patient remains waiting to be seen by the doctor. By this way a consistent discharge of patients can be effortless and washes out any imbalances in the duration of the visits.

So, no patient will be deferred by more than the aforementioned schedule time.

Staggered Starts: In case of modified wave technique it is not purely applicable, some of the existing advantages can be accomplished by staggering visits in 5 or ten minute time intervals.

One patient can be expected to consult the physician for a 15 minute interval starting at 8 a.m. and the second one will be at 8:05 a.m. If the initial patient visits last minute, only 5 minutes are strayed before the second one visit. If the later slot of patients is arranged to be scheduled at 8:20 and 8:25, the practitioner confidently can endeavour in the late patient without postponing anyone else by more than 5 or 10 minutes. This method is particularly adopted at the inception of a session to prohibit the foremost patient from flinging off the entire day's schedule by entering late, or not visiting at all. It might be beneficial in the rest of the day in habit ambience where patients may likely to be delayed or

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the duration of consultations are specifically uncertain. Arrivals might still overlap, but the scheduling is ranged to spread out to certain extent and patients are not completely apprehensive of double bookings.

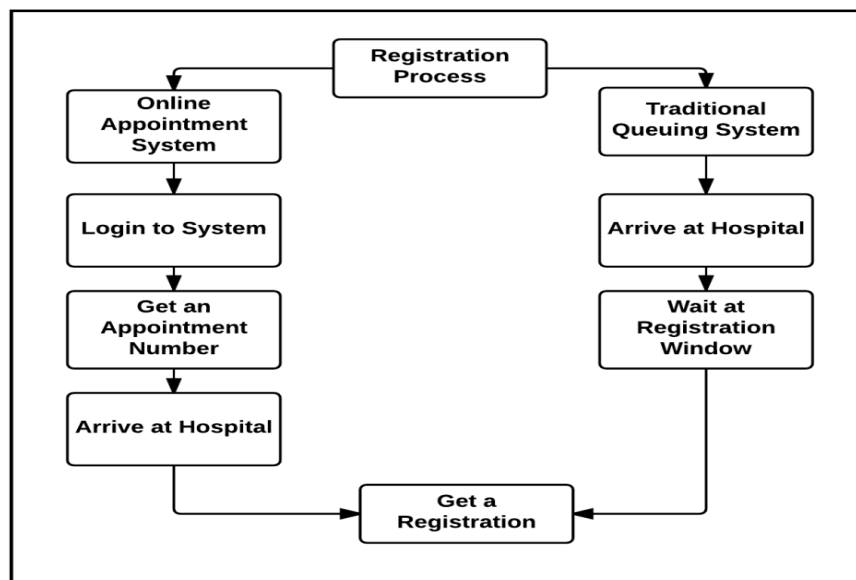
Group Meetings: Group meetings are a substitute technique of handling patients with identical, mostly chronic, situation. By viewing such patients as a herd, some practitioners have discovered they can salvage time, make a tremendously supportive surrounding, and spend more occasions to patient literacy and health concerns that would be achievable amongst standard clinic arrivals.

IV. STUDY BETWEEN TRADITIONAL AND ONLINE APPOINTMENT RESERVATION AND SCHEDULING SYSTEM

In classical system patients has to go to the hospital and wait in a queue at the appointment desk to make the reservation and get an appointment. But they generally finish up waiting endlessly for very long time intervals. The patient might choose to fix an appointment, but this choice is not possible at all times and does not likely work well for all people involved in the system. People involved are as follows: The medical personnel, the hospital and the patient. The patient longs for effortlessly convenient and accessible times.

When they cannot discover a quick enough appointment they feel like waiting endlessly (Duration between scheduling and the appointment being made available).The patient also expects to be seen all of a sudden or within few minutes of their visit to the hospital or clinic (whether an appointment has been scheduled earlier or not).

Overall view of Online Appointment Reservation and Scheduling System:



The duration a patient waits from the given time of their schedule to the time that they must actually receive the service is known as direct waiting time. The patients use this technique and waste much waiting time just by standing in queue at the registration counter to make sure a successful registration of the appointment has been made with a certain doctor.

The Doctor desires to have some charge over the insanity in the count of patient appointments in a day and the mix of appointments on any given day. These aspects can change their income as well as their carrier comfort levels. The hospital desires to use its resources (staff and apparatus) in the maximum potent way. Therefore the hospital doesn't desire for the doctor to have long cycle of "wasted time".

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So the challenge is to afford a solution that grant patients to reduce both explicit and erratic waiting time, also to afford some charge over doctor appointments and lastly to afford the ultimate skilful use of the hospital's expensive resources.[5]In Online Appointment Reservation And Scheduling System are given an appointment count .

At the nominated appointment time, patients reach at the hospital and get the registration that is allotted to their appointment number. These patients need not queue at the registration place. In this way both reduced and hospital's expensive resources can be idolized readily.

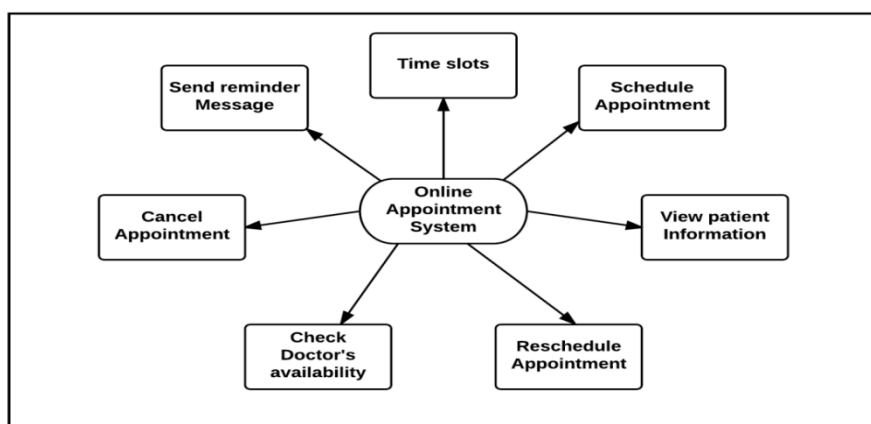
The registration can be either done by traditional queuing system or by online. In order to book through traditional system we need to arrive at the healthcare facility and wait near registration window. While online saves time so we can book appointment on the go by simply using handheld devices. These are two known ways to get an appointment in hospital.

V. SOFTWARE ARCHITECTURE FOR ONLINE APPOINTMENT RESERVATION AND SCHEDULING SYSTEM

Some key features listed:

- Organize daily appointments ballots of patients.
- Panorama patient's propaganda.
- Shelve the appointments.
- Enrol time groove to every patient.
- Abort the appointment.
- Audit Doctors vacancy for patient's appointment.
- Shoot dregs SMS to patients.

Features of Online Appointment System:



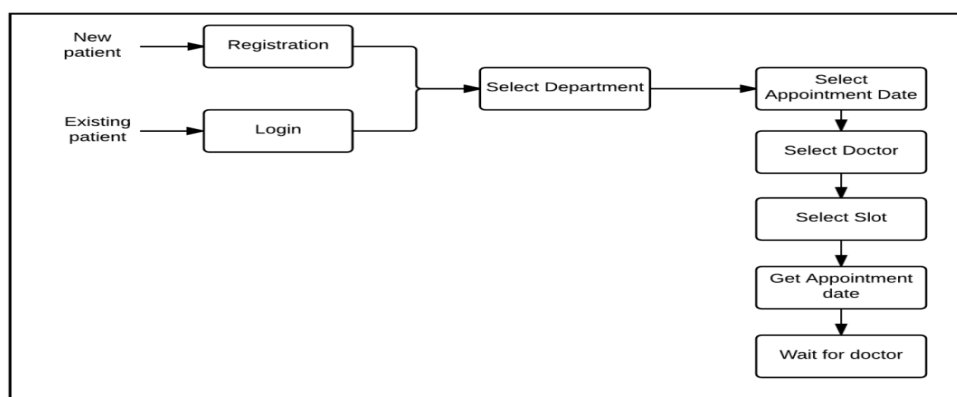
As per Server/Browser exemplary an Online Appointment Reservation And Scheduling System contains of two sets of activities .[7]The first set of activities are online registration activity along with register and login selection of department, date, doctor and other registration booking activities. It provides options to choose preferred time slots, choose doctor on our preference, we can cancel or reschedule the appointment according to our convenience. Doctor can view patients' EHR and get to know patients medical history, which helps better understanding.

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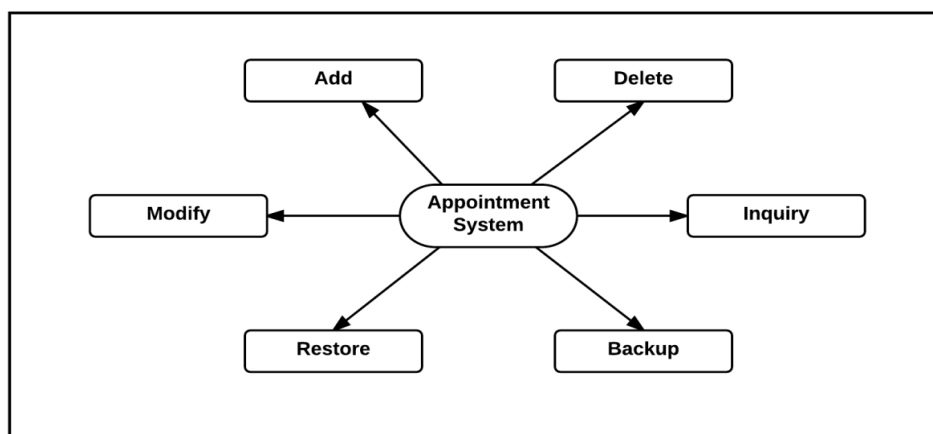
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Practical flow diagram of an online appointment structure:



Other grade service are managing data services avowing the database executive for adding, deleting, modifying, inquiring, restoring and backing up of data. Adding, deleting, modifying and inquiring are primitive exertion of managing data. They can efficiently uphold the liability of database that helps to meet the definite demand. Backup and recovery of data allows enhancement of data and security provided to the system. If data is lost, it can be retrieved easily as shown in database diagram.

Functionality of the appointment system:



Making an appointment with preferred date and timings is the main feature of doctor-patient system. A well-integrated online appointment reservation and scheduling technique enables the software to run on different platforms. The ultimate goal of the system is to integrate several scheduling procedures to achieve a consistent and easily accessible web-application. Web application works on all platforms and does not consume more storage space

A 2-tier structure is mentioned in detail and it is well differentiated form of a 3-tier structure explained through [9]. This miniature comprises of a 2-tier, in which the first tier the patients get access to appointment material from Internet through a web browser. The 2-tier architecture gets connected with the first tier architecture for data exchange by means of web service. The 2-tier architecture values the use of a web server to connect to the Internet by handling all HTTP request completely for the static contexts, like images and files. It retorts to user's request through HTTP protocol, like granting back pages of HTML code.

In the event the HTTP inquiry is to impart patient appointment reservation and scheduling service, the web server will forward the dynamic reply to a different server side application situated at the application server to apply a technique to

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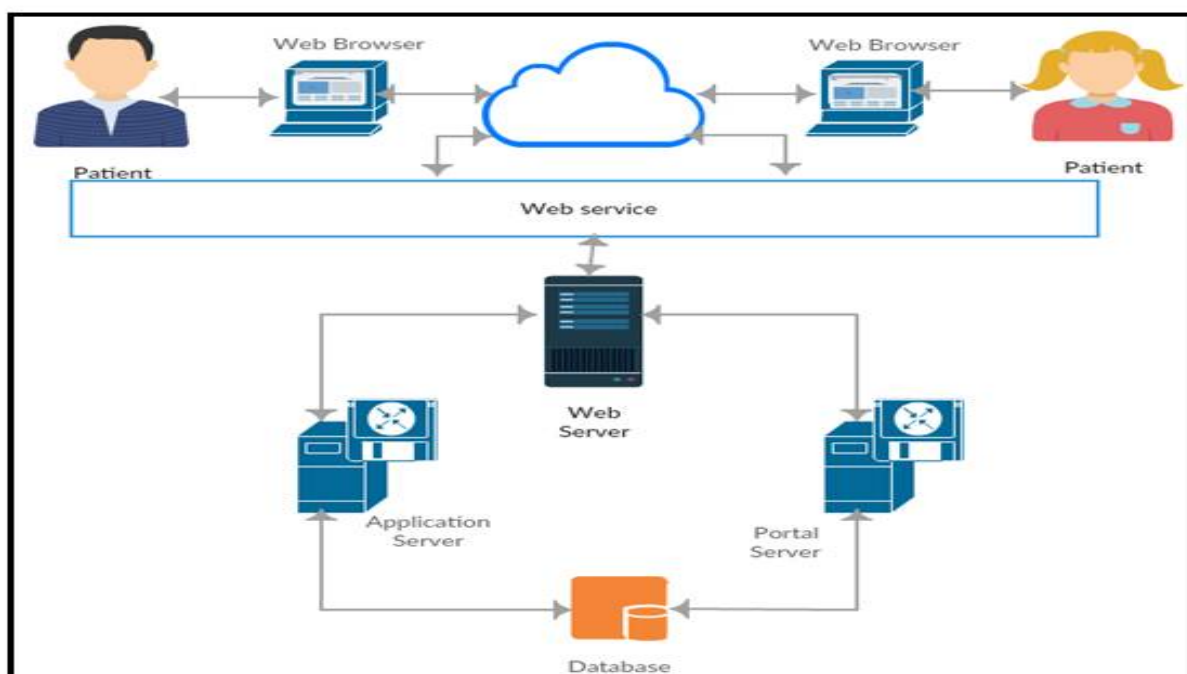
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process the inquiry. The consequent feedback of application server will be reformed to HTML format from web server and will be advertised in the regulated HTML Web Page format. [9]

The registration inquiry and user login are refined by the gateway server situated in second tier. The application server is an element that supervises the entire end-to-end appointment scheduling services and tracking service. The prime functionality of the application server has: (1) motley-practitioner scheduling services, (2) central and fortified patient appointment tracking facility, (3) available appointment search, (4) rescheduling appointments, and (5) confirmation and cancellation of appointments. Comprehensive data of scheduled appointment slots, like contact information and patient login, is hoarded in the two-tier database. [9]

Data travelling through the system:



Online appointment Structure offers certain benefits such as:

- Chart patients for different medical procedures like tests and treatments
- Prospect patient's schedule.
- Generate Patient Electronic Health Records (EHR) and Appointment summary.
- Track Patient Flow established on their visit, arrival and departure.
- Avoiding no-show, miss, over-booking of patients.
- Email appointment schedule reminder.
- Giving daily appointment schedule reports.

The adaptability of online scheduling structure enhances it being used for different services such as:

- All the appointment can be assembled from website, phone direct inquiries.
- Scheduled patient appointments, services and treatments.
- Booking vaccine appointments.

VI. CONCLUSION

Prime lucidity that online appointment scheduling is attaining popularity every day is that it assists the patient to make appointments to different doctors, clinics or hospitals in a much flexible manner. It can be easily performed by using computers, accessing a software or website and making an appointment, rather than going to the hospital, waiting in a



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queue for longer hours only to make an appointment for the forthcoming weeks or months. From this, patients can indulge in decisions made. Making an appointment to a doctor is made by nothing more than a click.

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BIOGRAPHY

Irin Sherly.S is an Assistant Professor in the Information Technology Department, Panimalar Institute of Technology, Chennai. She received Master of Engineering degree in Computer Science in 2007 from affiliated college of Anna University, Chennai, India. She had around 9 years of teaching experience and presented many papers in National and International conferences. She published paper in Annexure II Journal. Her research interests are Computer Networks, Big Data, Data Mining, Network Security etc.

Mahalakshmi .Ais a student in Information Technology Department, college of Panimalar Institute of Technology, Chennai. She is currently doing her final year in Bachelor of Technology. Her research interests are Data Mining and Warehousing, Cloud Computing.

Menaka.Dis is a student in Information Technology Department, college of Panimalar Institute of Technology, Chennai. She is in her final year of Bachelor of Technology. Her research interests are Big Data, Grid computing, Computer Networks.

Sujatha .R is a student in Information Technology Department, college of Panimalar Institute of Technology, Chennai. She is currently pursuing her final year in Bachelor of Technology. Her research interests are Internet of Things, Big Data, and Cloud Computing.