

Hospital Appointment Scheduling System Using Intelligent Agent Agent Based Appointment Scheduler

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Abstract—The existing scenario that undergoes in today's healthcare domain for patient registration and appointment scheduling are time too time consuming and somehow hectic. Usually, till date patients come to the hospital and have to fill out patient registration forms and have to wait to be called in for getting appointment and waits for the particular reply for an agreed date. In many places appointment can be done online but still patient has to bring the appointment card that has to be swiped by the front desk personnel before being sent to the respective doctor. However, facilities like priority appointment of patients has not been developed. Also emergency situations like accidents and so on are not take into view and the scheduling reported is only for general patient appointment only. Therefore, by taking these important factors into consideration, we here have developed an intelligent agent based system that will collaborate with the agents of doctors and the hospital for the appointment time for the respective patient which would take all mentioned factors into consideration. In these project we are using i.e. JADE-LEAP.

Keywords—Agents, JADE-LEAP, priority, aadhar number, TELEPHONIC.

I. INTRODUCTION

In today's world, where the current scenario in the healthcare domain requires efficiency and patients' satisfaction, the numbers of missed appointments that are missed and unnecessary waste of patient's appointment time have lead to an tremendous problem for healthcare institutions. Hence, there is need for an efficient healthcare system that will provide seamless care and facilities for both inpatients and as well as outpatients.

1. The proposed system will save effort, time and money of patients from waiting in the que to book appointment.
2. It schedules the appointment for patient with desired doctor to make it easier for both.
3. It also schedules the services of doctors and emergency cases properly so that facilities are utilized in effective and efficient manner which are provided by hospital.

Thus the main purpose or the motto of these project is to develop a system for Doctor Appointment to ensure smooth, safe and quicker appointment service.

II. EXISTING SYSTEM

We have seen and realized that in our country most of the people live in rural area but overwhelmingly health care service organization situated in the urban area. Rural peoples are bound to come in city to take health care service. Most of the time they don't know the schedule of doctor. So they have to visit hospital or health care service centre and often do not get doctor's appointment. As a result they fall in a troublesome situation. For this reason, they go back home with more illness and hope to return later on. But mostly they don't get any opportunity to visit the doctor as they pass away for illness.

The approach proposed in paper [2] describes that for having a appointment fixed with respect to health related applications, we usually make use of a human agent to get the work complete at the appropriate health care facility. But they have shown that such appointment system

can be put into effect in the mobile environment by employing mobile agents which would replicate the work done by human. Therefore they have implemented an Intelligent Agent Based hospital appointment system that books appointment with the hospital with help of fuzzy preference..

The approach presented in [3] uses NFC (Near Field Communication) based Mobile Patient appointment system will centralize scheduling system and would also sort the priority for fixing appointments.

So, Under manual Online appointment System, you have to first wait in queue to take appointment for the doctors and wait for your time to have scheduled meet with them and discuss on your health problems. Along with this, there is a android app available on play store but it a paid app, hence everyone cannot afford to use it.

III. PROPOSED SOLUTION

Each user is assigned a priority. User with lowest priority number is to be executed first and so on. Users with same priority are executed on the basis of shortest completion time i.e. if two users have same priority then the user which completes its task of scheduling first will be given appointment. Example:

Patients	Arrival Time	Priority	Execution Time	Completion Time
U0	0	1	7	7
U1	0	2	6	6
U3	1	2	4	5

Table. 1 Priority Scheduling

Here user U0 is telephonic appointment booking person and users U1 and U2 are online appointment booking person.

- Priority: - It is a priority given to the user to book an appointment. Patient with lowest priority number is to be executed first and so on. First priority is for patients booking appointment through Telephonic conversation. Second priority is for patients booking appointments through Online Registration System.
- Arrival Time: - It is a when user tries to book an appointment.
- Execution Time: - It is a time taken by user to schedule its appointment.
- Completion Time: - Completion Time = Arrival Time + Execution Time.

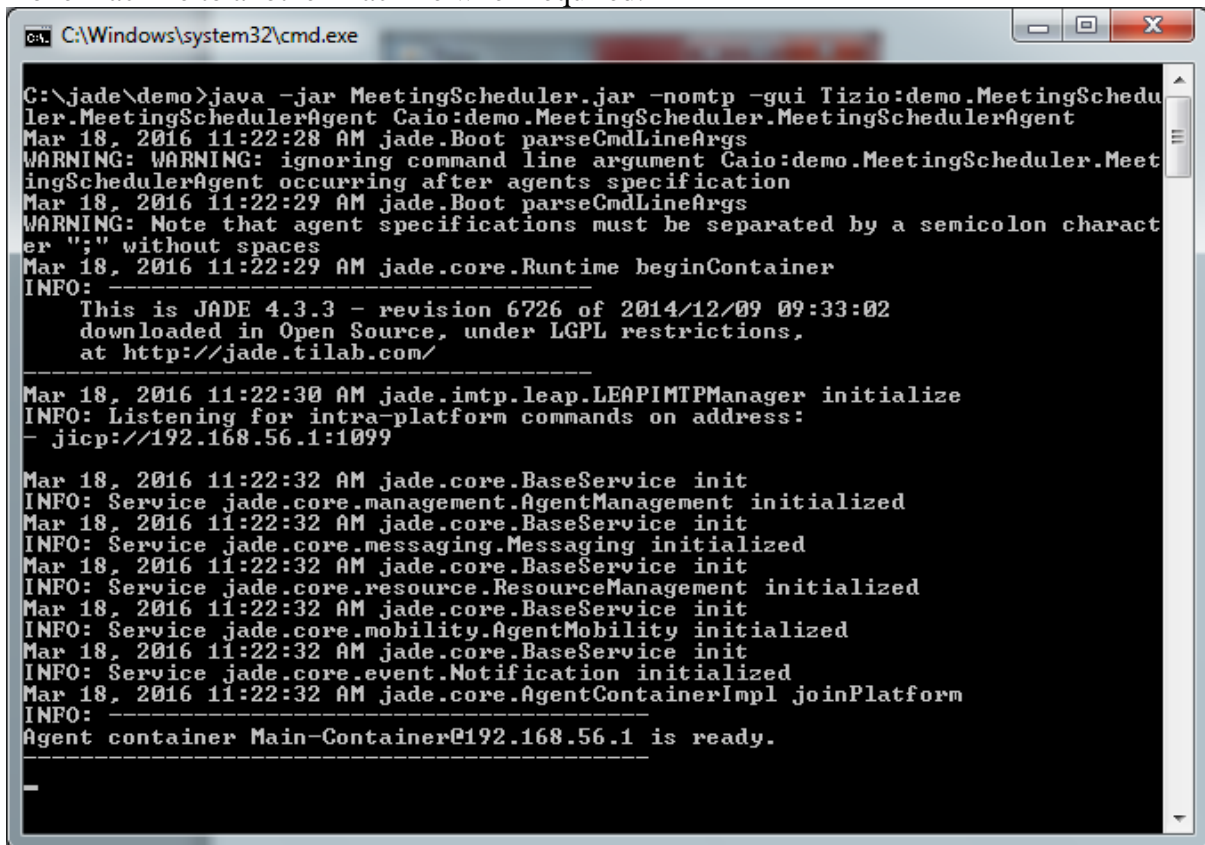
Explanation of Example:-

According to our algorithm user U0 is executed first then user U3 and finally user U2. As a user U0 is telephonic appointment booking person so first system schedules its appointment. After that among user U2 and user U3 as completion time of user U3 is less so system schedules its appointment first and then user U2 is given a priority.

IV. AGENT CREATION

For creation of Agents we are going to use JADE (Java Agent Development Environment) software framework which is fully implemented in Java language. It simplifies the implementation of multiple agent systems via a middle - ware that compiles with the JADE specification and through a

combination of graphical tools that would provide the debugging and development phases. A JADE based system can be distributed across machines and configurations can be controlled with help of remote GUI. The changes to configuration can be done at run-time as the agents can be transferred from one machine to another machine when required.



```
C:\Windows\system32\cmd.exe

C:\jade\demo>java -jar MeetingScheduler.jar -nomtp -gui Tizio:demo.MeetingScheduler.MeetingSchedulerAgent Caio:demo.MeetingScheduler.MeetingSchedulerAgent
Mar 18, 2016 11:22:28 AM jade.Boot parseCmdLineArgs
WARNING: WARNING: ignoring command line argument Caio:demo.MeetingScheduler.MeetingSchedulerAgent occurring after agents specification
Mar 18, 2016 11:22:29 AM jade.Boot parseCmdLineArgs
WARNING: Note that agent specifications must be separated by a semicolon character ";" without spaces
Mar 18, 2016 11:22:29 AM jade.core.Runtime beginContainer
INFO: -----
This is JADE 4.3.3 - revision 6726 of 2014/12/09 09:33:02
downloaded in Open Source, under LGPL restrictions,
at http://jade.tilab.com/
-----
Mar 18, 2016 11:22:30 AM jade.imtp.leap.LEAPIMTPManager initialize
INFO: Listening for intra-platform commands on address:
- jicp://192.168.56.1:1099

Mar 18, 2016 11:22:32 AM jade.core.BaseService init
INFO: Service jade.core.management.AgentManagement initialized
Mar 18, 2016 11:22:32 AM jade.core.BaseService init
INFO: Service jade.core.messaging.Messaging initialized
Mar 18, 2016 11:22:32 AM jade.core.BaseService init
INFO: Service jade.core.resource.ResourceManagement initialized
Mar 18, 2016 11:22:32 AM jade.core.BaseService init
INFO: Service jade.core.mobility.AgentMobility initialized
Mar 18, 2016 11:22:32 AM jade.core.BaseService init
INFO: Service jade.core.event.Notification initialized
Mar 18, 2016 11:22:32 AM jade.core.AgentContainerImpl joinPlatform
INFO: -----
Agent container Main-Container@192.168.56.1 is ready.
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Fig 4.1: Command Prompt

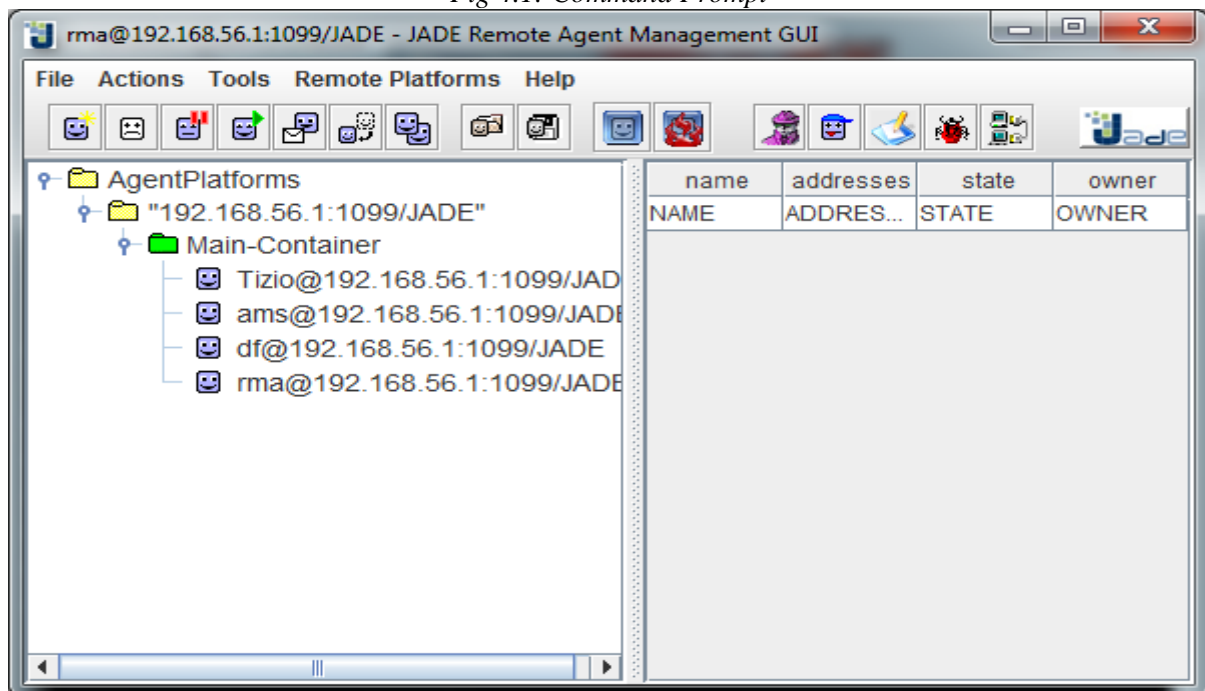


Fig 4.2: JADE GUI

V. INTELLIGENT SYSTEM

Intelligent System would be installed in every hospital's system so that it would provide specific details of the no of appointments that are booked via ORS, telephone and by direct patients

to the hospital admin. Patients who want to book appointment would provide every details required to hospital admin and based on the details of Intelligent System a response message would be send to patient regarding if appointment is available at specific time slot or not via email or sms. Patient who desires to change or even cancel the appointment that was fixed previously can do so and the changes required are carried out at intelligent system. Also details of available doctors and their time slots and also available blood samples information can be updated at intelligent system.

VI. HOSPITAL IN ORS

6.1.ADMIN LOGIN

In login area each of the hospital admin can enter username and password to get logged in. After successful login admin can enter the details of doctors, available in his hospital. The details that are added are doctor name, specialization and available time slots. In addition to this he can update the available blood samples records of the hospital.

6.2.ADMIN FUNCTION

Valid hospital admin as per his convenience can view doctors details and then admin can see the available time slots of particular doctor.

VII. PATIENT

7.1 PATIENT VIA ORS

Patient who wishes to book appointment via ORS has to register itself with help of aadhar no. After successful registration patient would select desired hospital, doctor and time slot and request for the specific appointment. For booking appointment patient has to book one day prior to the desired date of appointment. The process of whether appointment is confirmed or not is done at intelligent system's end and appropriate message or email would be sent to patient. With respect to request for appointment, patient can also cancel or change the same.

7.2 TELEPHONIC PATIENTS

In case if patient doesn't have a aadhaar card he can book the appointment via telephone in which hospital admin would carry out the process of appointment with respect to details given by patient The following shows booking a appointment via telephone number.

7.3 DIRECT PATIENT

For Direct patient appointment, priority is given over patient via ORS and telephonic patient.

IX. WORKING OF AGENT

There are mainly three agents involved in these projects:

1. MANAGER AGENT:

This agent act as a server informing hospital admin about booked appointment status i.e. this agent informs to hospital and patient that particular appointment slot is booked and it is no longer available now.

2. HOSPITAL AGENT:

This agent is responsible for telephone or direct appointment booking. Each hospital have this agent separately.

3. ONLINE AGENT:

This agent is responsible for online appointment booking. This is common for all the hospitals registering with the system.

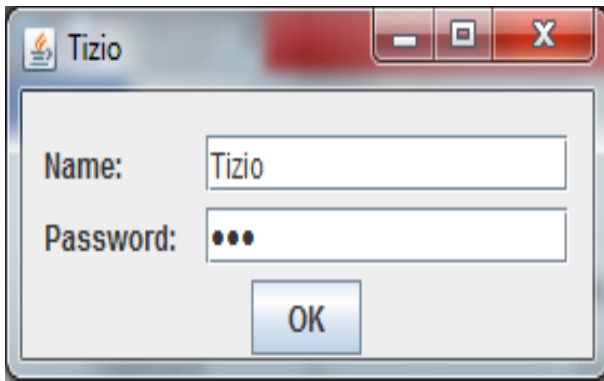


Fig. 8.1 Appointment scheduler-login

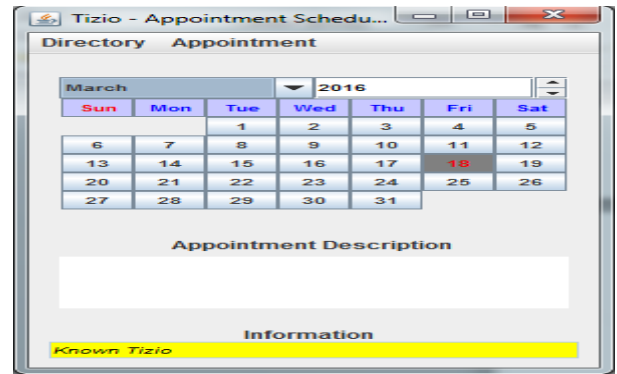


Fig. 8.2 Appointment scheduler-Date picker

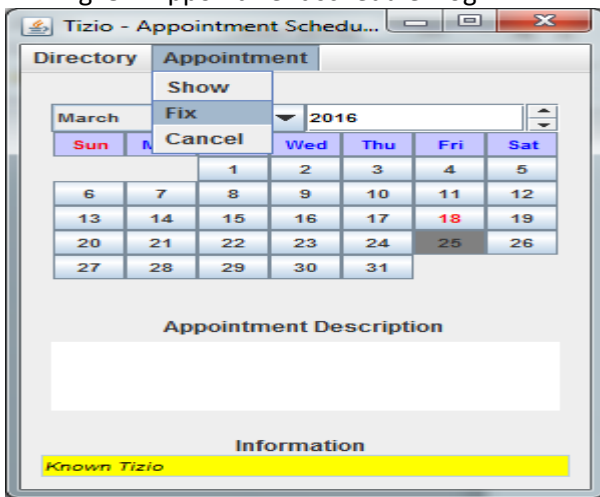


Fig. 8.3 Appointment scheduler- options

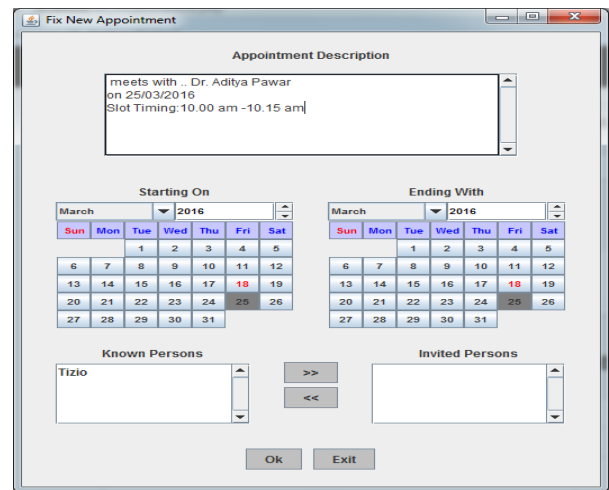


Fig. 8.4 Appointment scheduler-fix appointment

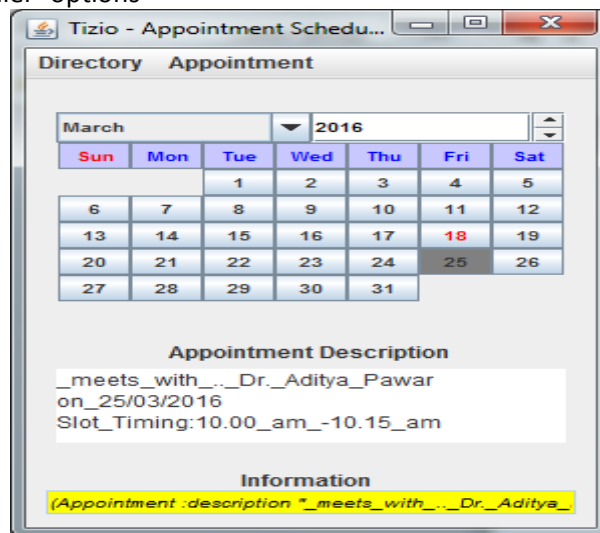


Fig. 8.5 Appointment scheduler-description

X. CONCLUSION

For booking appointments in in health care domain, we employ a human agent to get the work done . But we have now shown that such a job can be done in the agent environment by employing agents which would replicate the job of the human being.

In our system, the Agent gathers the information from the user and schedules appointment with the hospital based on priority preferences. The Agents here possess adequate intelligence to schedule the appointment.

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