Abstract

This paper provides details about Technosoft's development of an Open Dental Plugin for cancelled appointments slot utilization via wait---list---patient's notification and confirmation process. We define the overall scope of the project, architecture, functional & non- functional requirements, Business Rules, and the solution provided to the client.

Technosoft has worked on the following client projects using C#, ADO dotNet, Twillio and MySQL. The Plugin was released to work with Open Dental version.

Open dental Plugin

Open dental plugin was created to avoid wastage of provider's time due to appointment cancellations. Cancellations in the dental practices are very common. And that means lots of lost revenue for the clinic. Open dental is an open---source dental clinics management software that is very popular with dentists as well as hygienists. This plugin was developed so that, in case of cancellation, a notification is sent to patients on wait---list, with an option to accept the appointment. Notifications are sent via email and SMS text messages. There are plans to incorporate IVR functionality to call in patients on wait list for this notification.

System Objectives and Background knowledge

This plugin for Open dental is developed for dental clinic's front desk staff's use. Plugin is activated while scheduling/rescheduling/cancellation of patient appointments. Plugin passes available appointment notifications to patients who are on wait list or have requested for an earlier appointment for their already scheduled appointments. A specific priority area has also been created where patients are prioritized, for new available appointment notification, according to their medical condition and their choice.

Main Features

Three main features are introduced at Open Dental plugin are:

1. Patient Centric Feature

2. Appointment Centric Feature.

3. Wait List.

Patient Centric Feature

Patient centric feature is used to mark a patient as priority/ preferred patient. This feature is used when an appointment is cancelled.

When an appointment is cancelled, patients marked as "Patient Centric" are contacted that whether they want to reschedule their appointment to the emptied slot.
First patient to respond will be allocated the newly available appointment slot.

Flow of Patient centric

1) Patient is marked as "Patient Centric" at Patient creation time. At this time, patient's notification preference (email, or SMS text) is also entered along with patients contact info.

2) Whenever an appointment is cancelled, all other preferred patients of same providers who have their upcoming appointments after 1 hour to 30 days from the cancelled appointment are notified though their preferred notification option.

3) If response is received within an hour of the appointment time it is still handled appropriately.

4) Patients of other provider's do not receive any notification even if they are patient centric and have appointment in next 30 days.

Appointment Centric

Appointment Centric feature is used to intimate that patient of this already scheduled appointment has requested an earlier appointment.

Flow of Appointment Centric

1) Appointment is marked as "Appointment Centric" when its initially booked. At that time patient contact info and notification preference is also entered in the system.

2) Whenever an appointment is cancelled, patients who have their appointments in next 48 hours to 30 days from the cancelled appointment are notified through their preferred notification option.

3) If time between cancelled slot and already scheduled appointment is less than 48 hours then notification is not sent.

4) Patients of other providers do not receive any notification even if they have priority appointment in next 48 hours to 30 days.

5) Notification is sent to Appointment centric patients as well.

6) Response is handled even if it is received within an hour of appointment time.

Wait list

Patients can be placed on wait list without any appointment created. This cancellation auto notification wait list is maintained separate from the open dental's wait list.

Flow of Appointment Centric

1) A patient is added to notification wait list and preferred time(s) of the day and day(s) of the week are asked along with notification preferences.

2) Whenever an appointment is cancelled, all patients on wait list are notified through their preferred notification option if the appointment slot falls within their available day/time of the week.

3) Response is handled even if it is received within an hour of appointment time.

All features cater patients on first response first serve basis.

Re---scheduling

1) Process of cancellation and rescheduling is same. Appointment is cancelled and then it can be rescheduled.

2) While rescheduling, user is asked whether he wants to execute the cancellation process, if user agrees, notifications are sent and if user disagrees no process is executed and notifications are not sent.

3) Whenever an appointment is rescheduled. Other appointments can be scheduled on the place of free slot. Slot of appointment which is scheduled in the place of free slot is considered as empty slot.

4) Appointment can be rescheduled and assigned to another provider.

5) Notification is not sent, if less than an hour is left in starting time of rescheduled appointment

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Select Providers

1) Process of sending notifications against any reschedule appointments works only for selected providers.

2) Notifications are provider specific: Patients of only selected providers receive notifications.

Plugin/Application Platforms

- Open dental plugin works as a Desktop Application.
- Plugin can be converted into exe format and can be installed on any server.

System Constraints

- Developed as a program using forms based C#, ADO dotNet, Twillio (SMS service) technologies
- Open Dental's Database (MySQL) was used to store plugin data.
- Open Dental runs on the dotNet Framework, a Microsoft technology. It will also run on the Mono framework, an adaptation of dotNet for Linux. So you will need to install Mono before installing and using Open Dental.
- Installation of Open Dental itself simply involves copying all files in C:\Program Files\Open Dental from a Windows computer directly into a folder on a Linux computer (e.g. /usr/local/opendental/).
- Internet is necessary for SMS/Emails services plugin.
- Intranet is required when server is not available.

Important Technical Achievements

Important technical details include implementation of

- Hooks Binding
- Twillio Service Integration
- Configurations
- Script Binding

System Stakeholders

System (plugin) is usable as desktop App and can be operated by an Administrator/Receptionist/Operator.

Flow of App and Plugin

The Overall flow is shown precisely in this Application Features diagram.

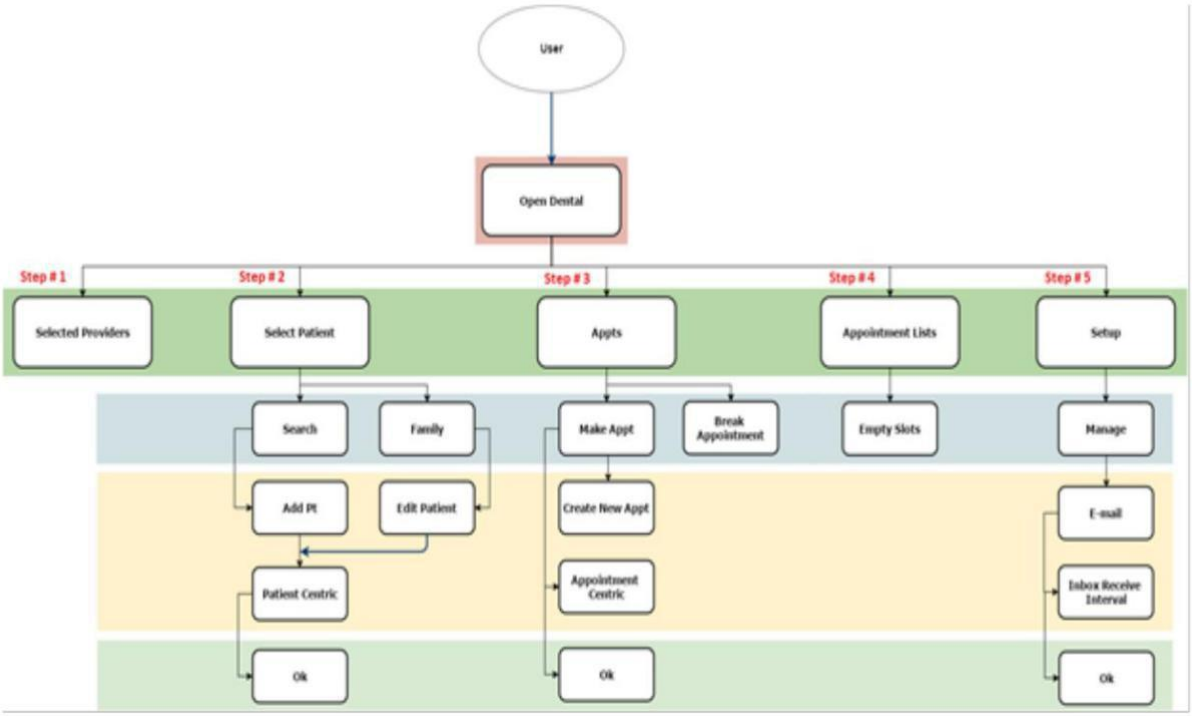

Figure 1: application feature diagram

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This Flow describes Creating Appointment Centric Appointments.

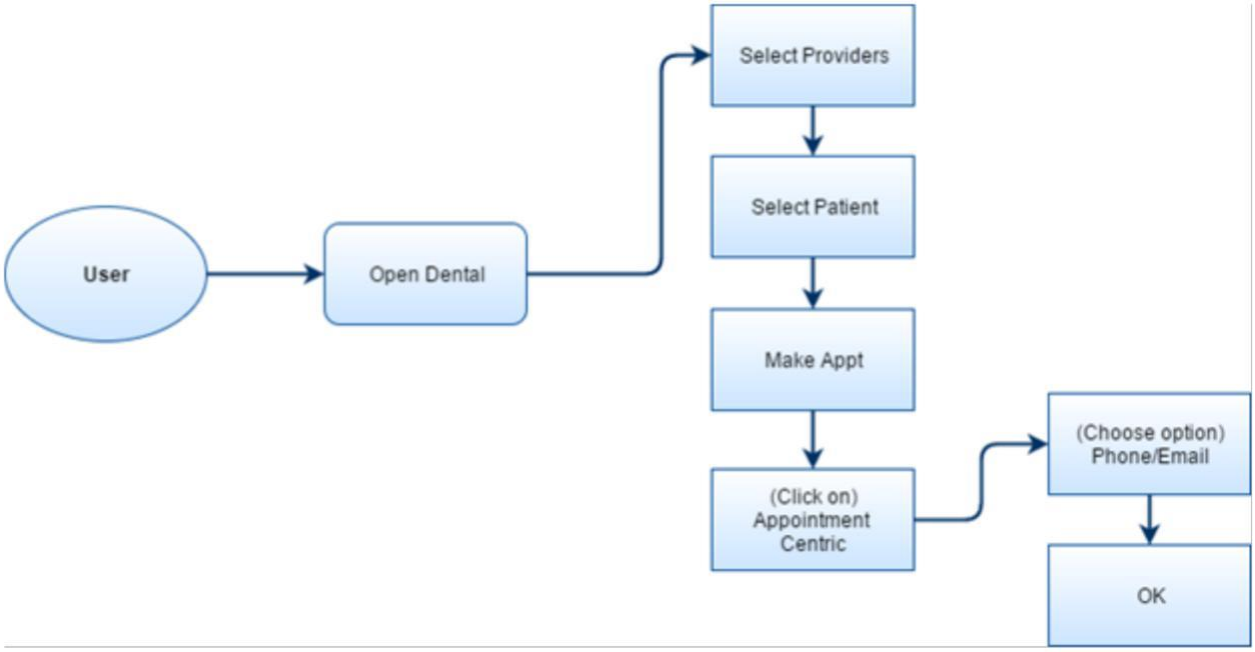


Figure 2: Flow of Appointment Creation

Description

- Clicking on the "Selected Provider" from the main menu on the top, User is able to see all provider lists. All provider lists include both hygienist and provider.
- Clicking on "Select Patient" leads to Making Appt (Appointment) and clicking on "Make Appt" leads to "Create New Appt".
- After clicking on "Appointment Centric" checked box, popup message appears asking for selecting the option for sending notification.
- Clicking on "Ok" makes to save an appointment.

Following Flow shows the creation of Patient Centric Patient.

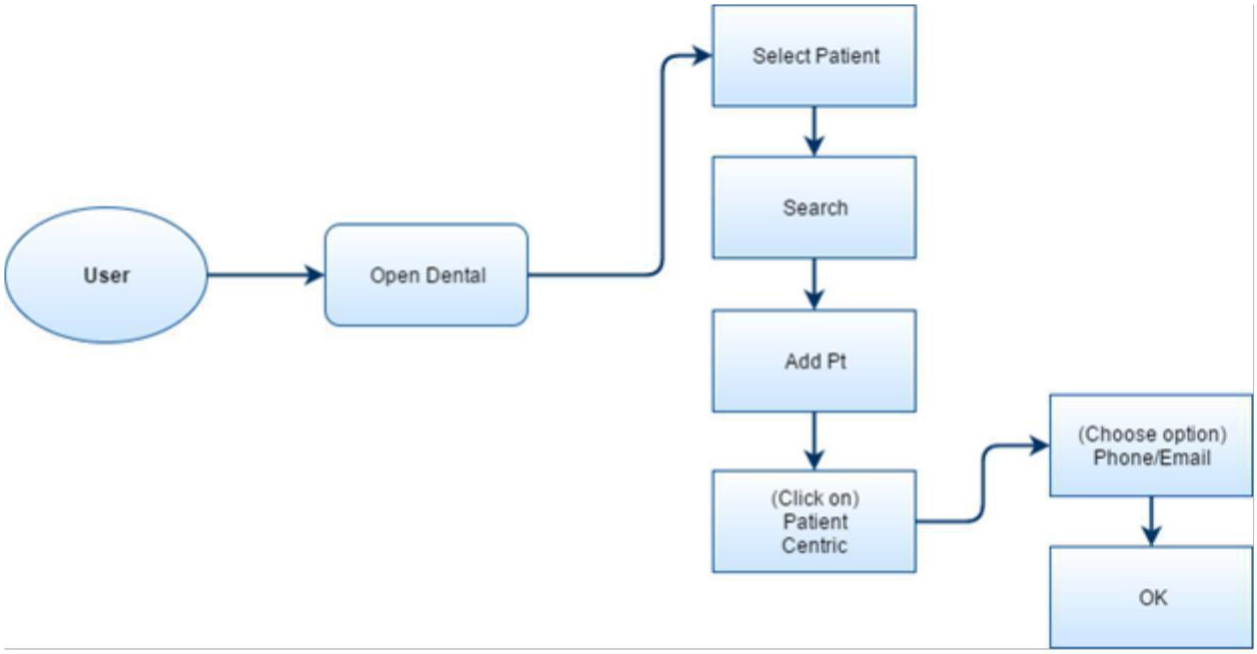


Figure 3: Flow of creation of Patient Centric Patient

Description

- After opening “Open Dental” software, user goes to “Select Patient “and search for patient first then click on “Add Pt” screen. (Add Patient) or user can search patient if it already exists.
- On creating or updating a patient, “Patient Centric” checked box is visible on the screen.
- When user Click “Patient Centric” checkbox, popup appears with notification options.

Flow of Appointment Cancellation Process (Appointment Centric)

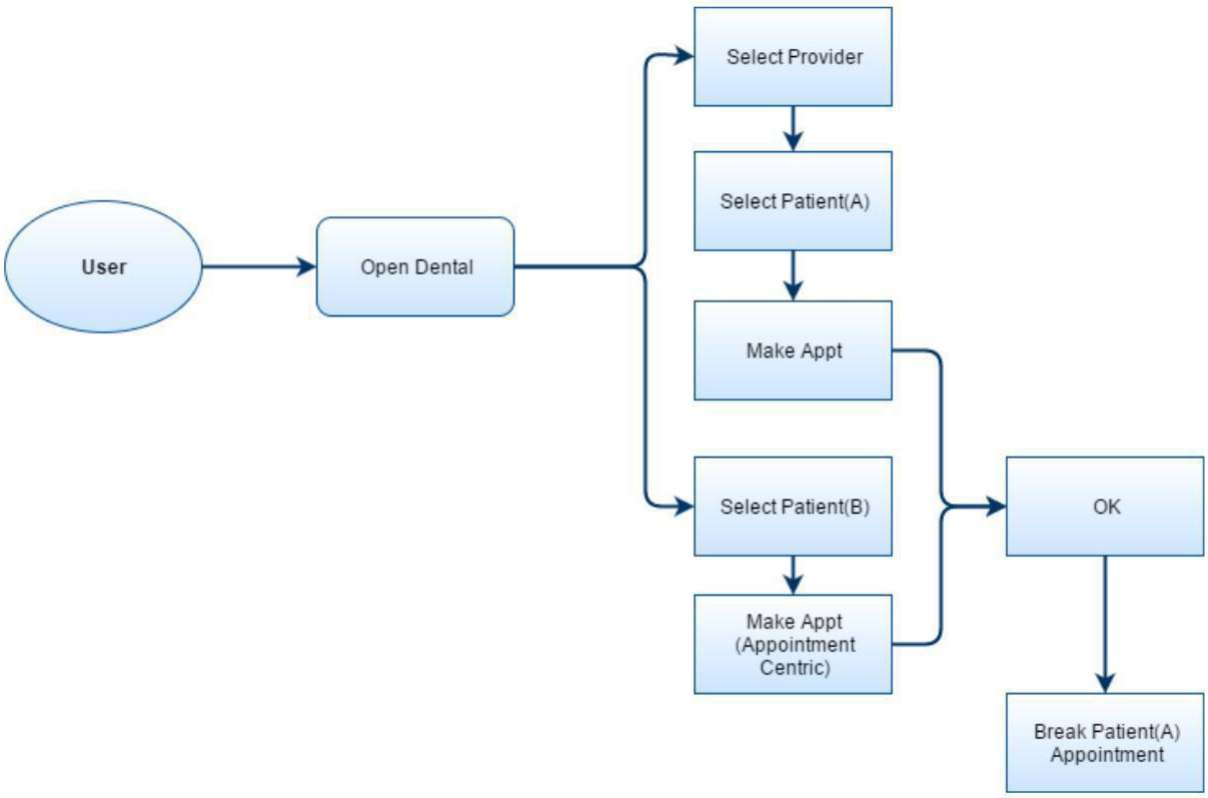


Figure 4: Flow of Appointment Cancellation Process

Description

- When user selects Patient A, he/she Creates or updates an appointment (Please NOTE that user checks Appointment Centric checkbox and select the notification option i.e. either phone or email, otherwise patient will get notified).
- Selecting Patient B, creates an Appointment Centric appointment and places created appointment with at least 48 hours difference from the current date and time.
- Further right clicking on appointment of patient A and clicking on “Break Appointment” (or either drag and drop an appointment on any other available slot under same operator/hygiene).
- Pop---up will appear , select ‘Yes’ against the pop---up.
- Notification will be sent to the patient.

This Flow shows Appointment Cancellation Process (Patient Centric)

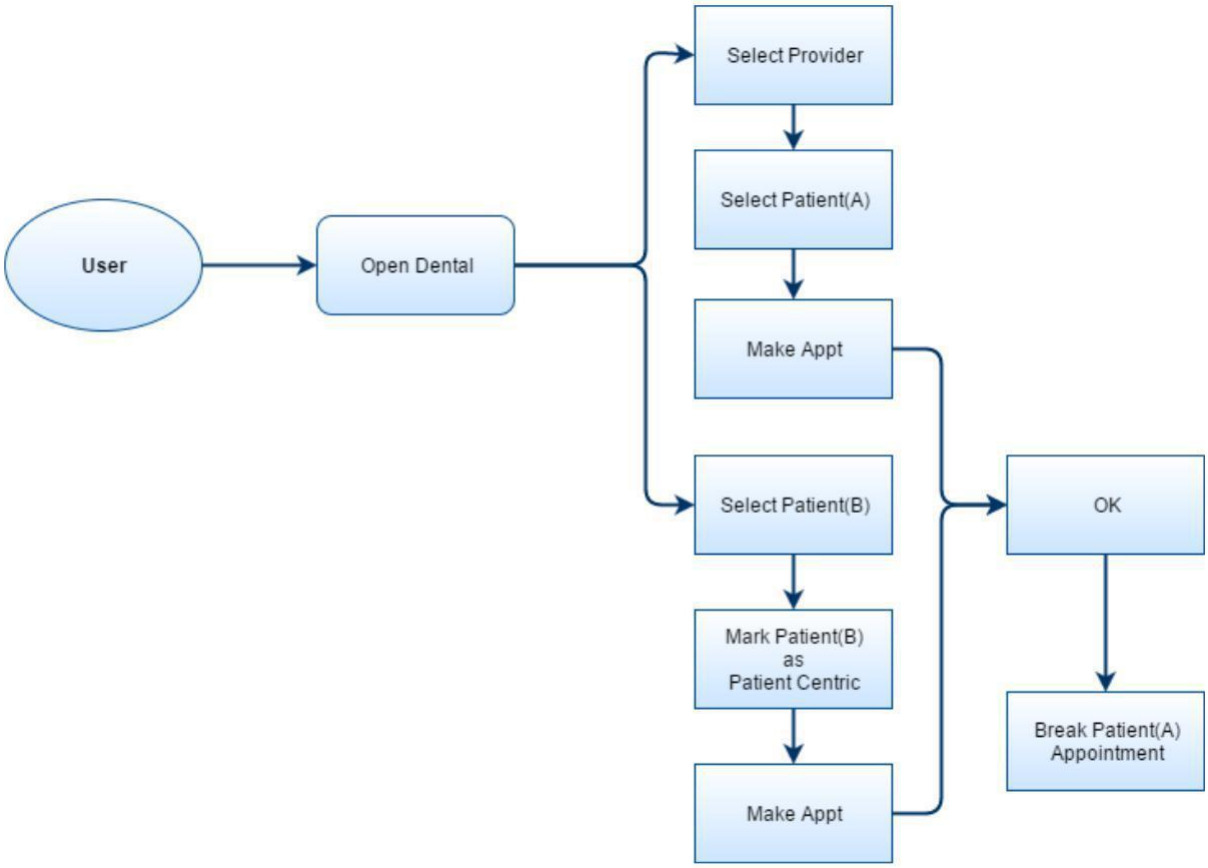
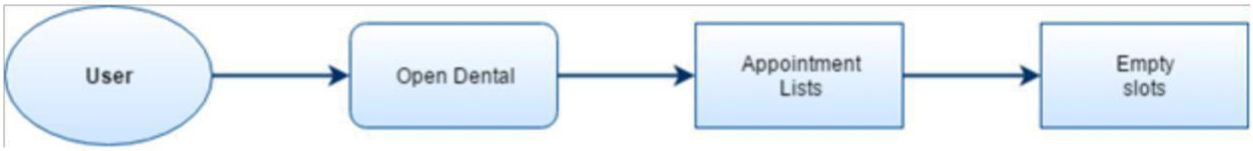


Figure 5: Flow of Appointment Cancellation Process (Patient-Centric) Description

- Selecting Patient A leads to creating an appointment.
- User selects Patient B marked him/her as “Patient Centric”.
- Creating appointment of Patient B places created appointment with at least 1 hour difference from the current date and time.
- By further right clicking on appointment of patient A and clicking on “Break Appointment”(or either drag and drop an appointment on any other available slot) a

  Pop---up will appear , select ‘Yes’ against the pop---up, Notification will be sent to the patient.

Flow of viewing Empty slots

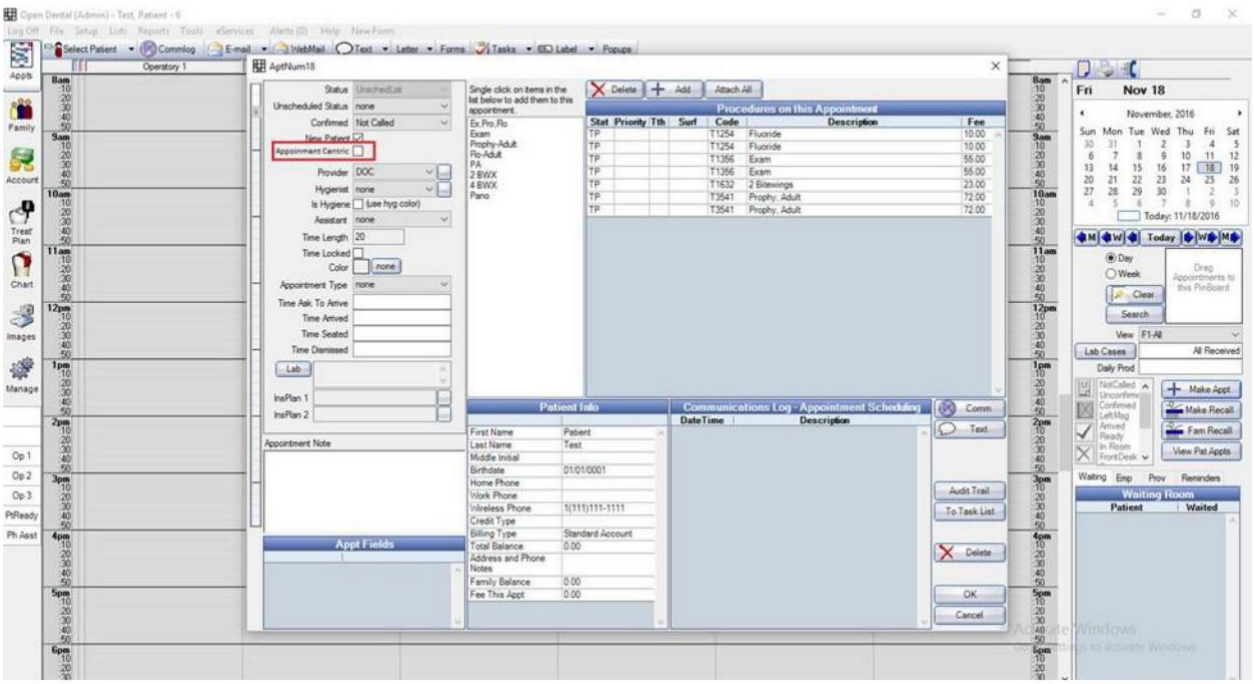


Description

Appointments slot which will become empty as a result of cancellation process. From the above example, Patient (B) appointment slot will be visible on empty slot screen.

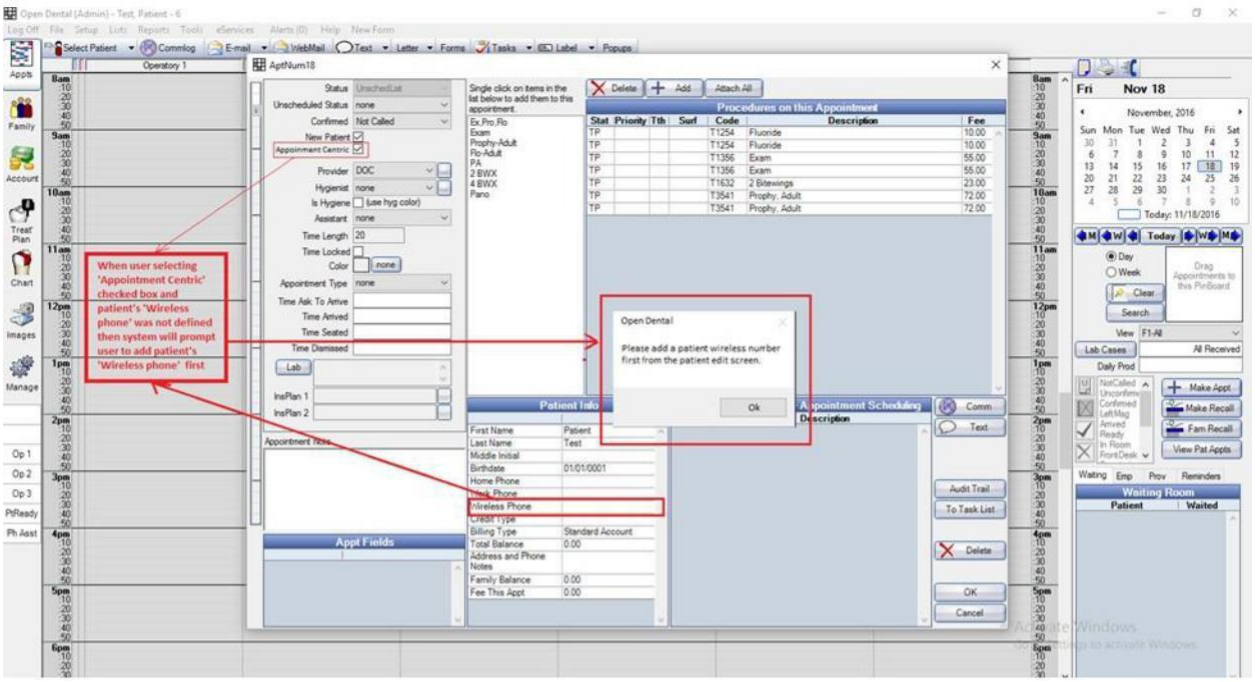
Key Screens

Appointment Centric

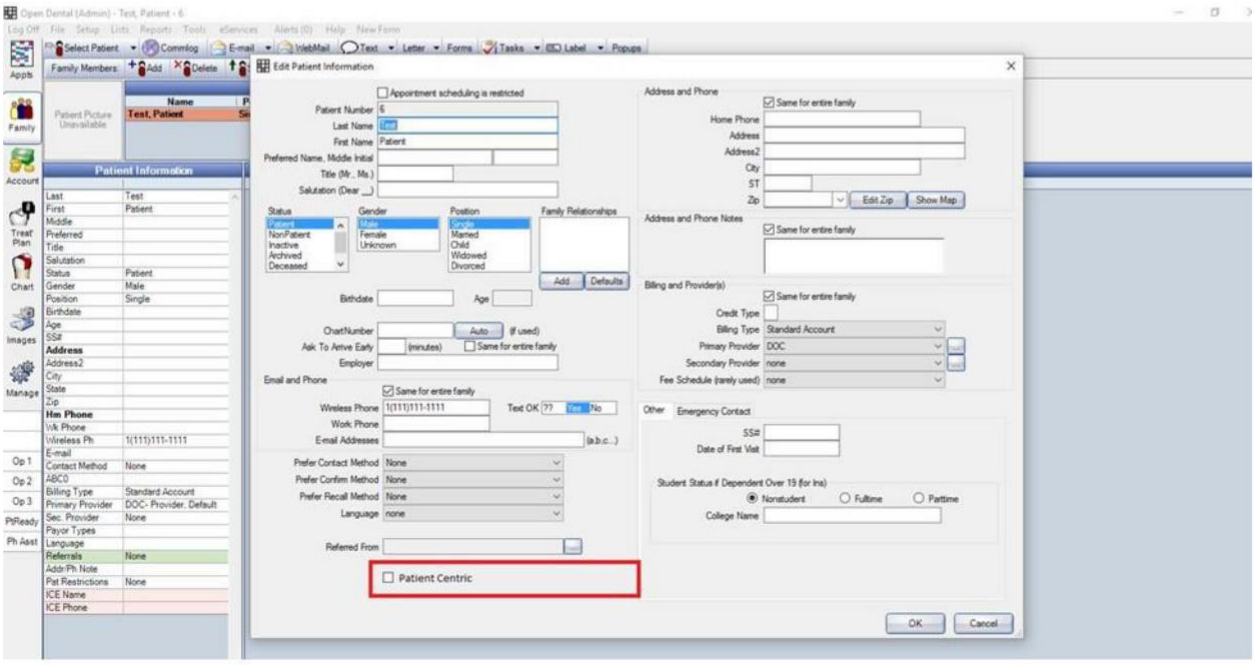


Against 'Appointment Centric' checked box clicked event system will perform below actions:

- System will check for wireless phone number of selected patient.
- If patient's wireless phone number not added before then prompt user

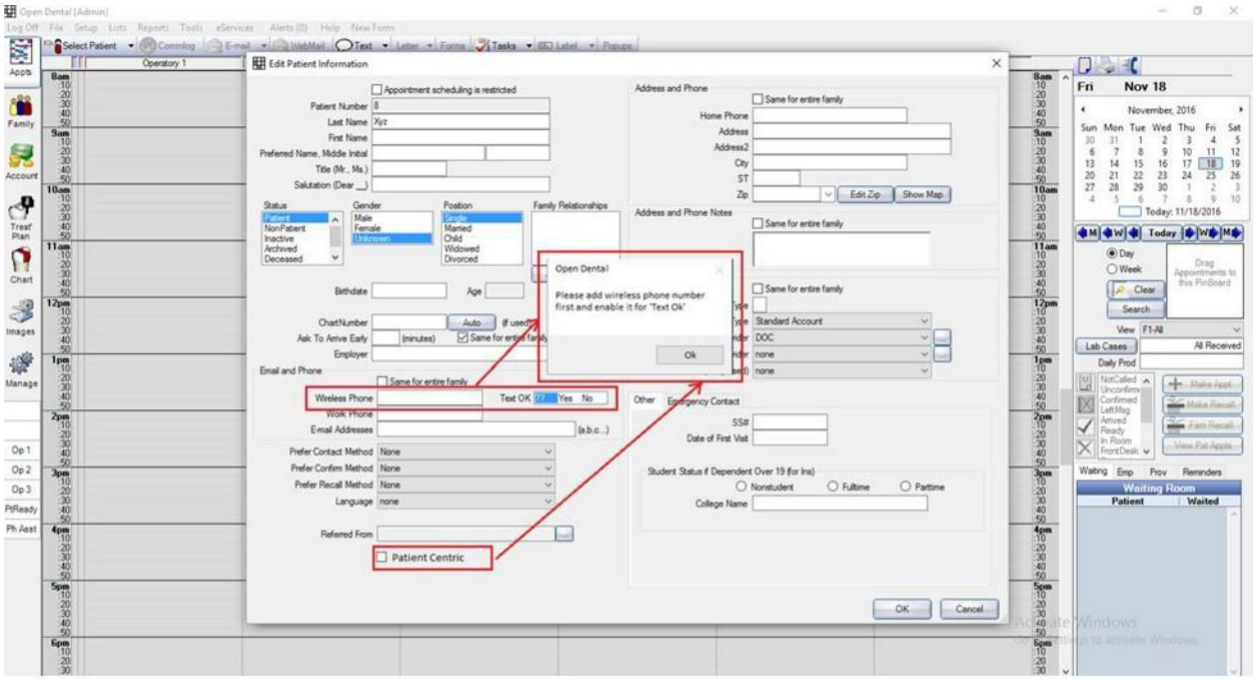


Patient Centric: On patient create and Edit screen



Against 'patient Centric' checked box clicked event system will perform below actions:

- System will check for wireless phone number is define and enabled.
- If patient's wireless phone number not defined and enabled , then system will prompt user.



Our client plans to sell this plugin to dental practices. If you are interested, we can get you in contact with our client for purchase of the plugin for your own practice. As far Technosoft is concerned , we will be happy to help our clients or help you with any Open Dental feature, or any healthcare software development or integration needs you may have.

Please contact us (203) 208 - 8866 to discuss your healthcare software development needs.

About Technosoft Solutions Inc.

Technosoft Solutions Inc. is leading outsourcing software and application development company dedicated to Healthcare Software Development and Integration Services. We are offering a full range of IT solution and support services to companies developing healthcare solution for the U.S market. For over 15 years, our commitment to providing reliable healthcare system software solutions has remained constant and stable.

Many of our clients are well versed in software development and have healthcare solutions deployed at main hospitals. We augment their resources with our Mobile, Desktop, and Web development, HL7 integration, HIPAA privacy & security services.