

Software Engineering Lab Implementation Report I - Build I

Virtual Clinic

Mishal Shah - 16CO125

Samyak Jain - 16CO254

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1. Introduction

Programming languages used:

- Python (Django Framework),
- jQuery,
- CSS,
- HTML,
- MySQL

APIs: No APIs have been used

Libraries:

- Datatables - To give more advanced functionality to tables
- Full Calendar - A full-sized, drag & drop event calendar.
- Moment JS - Parse, validate, manipulate, and display dates and times in JavaScript.
- Date Time Picker - A JavaScript Component for choosing date ranges

Theme used : Flatly

IDE : PyCharm Version 2017.3, Sublime Text Editor

Tool : Github for Version Control

Setup:

Installing Dependencies on your PC:

- `sudo apt-get update`
- `sudo apt-get install mysql-server`
- `sudo apt-get install python3-pip`
- `sudo pip3 install virtualenv`
- `sudo apt-get install libmysqlclient-dev`

Setting up the Database

Open a new terminal and type: `mysql -u root -p`

MySQL monitor opens up

1. `CREATE DATABASE virtual_clinic CHARACTER SET UTF8`
2. `CREATE USER admin@localhost IDENTIFIED BY 'Admin@vc1';`
3. `GRANT ALL PRIVILEGES ON virtual_clinic.* TO admin@localhost;`
4. `FLUSH PRIVILEGES;`

Setting up the Virtual Environment

- `virtualenv ENV`
- `cd ENV`
- `source bin/activate`
- `pip install --upgrade setuptools`
- `pip install django`
- `pip install mysqlclient`

How to Run?

- `python manage.py makemigrations`
- `python manage.py migrate`
- `python manage.py runserver`

2. Functional Requirements (Implemented)

FRID	NAME	Description
Req-1	Maintain Specialities	This functionality will Maintain different types of Specialities.
Req-1/1	Add Speciality	Add a new (unique) Speciality
Req-1/3	Delete Speciality	Delete the Speciality - A Speciality can be deleted only if no doctors are attached to it
Req-2	Maintain Doctors	This functionality will Maintain Doctors and Associate them with the Speciality
Req-2/1	Add Doctor	Add a new (unique) Doctor - Name, Age, Sex, Qualification, Experience, Speciality
Req-2/2	Edit Doctor	View and Update the details of an existing Doctor
Req-3	Maintain Chemist & Labs	This functionality will Maintain Chemist and Lab Details
Req-3/1	Add Chemist / Lab	Add a new Chemist or a Lab - There can be ONLY 1 lab in a Pincode
Req-3/2	Edit chemist/Lab	View and Update the details of an existing Chemist/ Lab
Req-5	Maintain Patients Profile	This is Patient Registration Functionality
Req-5/1	Create Patient Profile	Register a new Patient
Req-5/2	Edit Patient Profile	Patient can update its profile.
Req-6	Consultation Request	Registered Patients shall have the ability to raise Consultation Requests - 2 Modes would be available - Appointment and Offline Consultation
Req-6/1	Create Consultation Request	Patient creates a Consultation Request by entering the Symptoms, uploads reports, if any and defines the mode of request (Offline/Appointment)
Req-6/2	Create Appointment-Online	For Appointment Requests, an entry shall be created in the Patient Appointment File if the appointment is for next day
Req-6/3	Create Appointment -	This is batch program that will be run by Administration

	Batch	every night to create Appointment File for next 5 days. It will purge the existing files
Req-8	Provide Consultation	Doctors shall see the prioritized consultation requests and provide diagnosis, prescribe medicines and suggest lab requests, if any
Req-15	Maintain Users (Doctors, Patients, Chemist/ Labs)	The system shall have a login functionality. Once the Doctor, Chemists and Labs have been set-up with default passwords by Admin, individual Doctors/ Chemists and Labs can change the password and login using their own credentials. For Patients, while registering a Patient will have to first create a User-id/ Password, which will then be used for authentication purposes.
Req-16	System statistics	All statistics related to system will be generated.

3. Functional Requirements (Not Implemented)

FRID	NAME	Description	Reason
Req-3/3 Req-5/3	Delete Patient , Doctor, Admin, Lab Profile	Delete the patient profile if required by the admin	Account (User) is related with Foreign Key to almost all classes of a model, because of which on deleting that user, the activity done by a particular user was also getting deleted which shouldn't happen, hence the requirement could not be implemented properly within the time frame, hence not completed. Delete patient profile will only occur when patient has not consulted for a long time and admin deletes its record. It was not an immediate requirement, hence not stressed on it to implement.
Req-4	Maintain Symptoms	This is a master list of Symptoms that can be selected by Patient during Consultation Request	This requirement was creating redundancy as during consultation the patient was describing its symptoms. Hence not implemented.
Req-4/1	Add Symptom	Add a new Symptom	Due to redundancy factor this requirement was not implemented.
Req-4/2/3	Edit /Delete Symptom	View and Update the details of an existing Symptom i.e. description.Delete the Symptom Details - A Symptom can be deleted if and only if no Consultation request ever raised has used this symptom	Due to redundancy factor it was not implemented.
Req-11	View/Generate	Patient shall have the facility	For generating the PDFs we

	Prescription/ Print Invoice	to view the Prescription and print the invoice. Alternately, Admin can print and email the Prescription and Invoice	<p>had to rely on third party app, it was rendering the whole page on the website, hence other unnecessary sidebars/topbar were also getting printed in the PDF, hence we couldn't complete up the proper implementation of the requirement.</p> <p>Its priority is lower than other requirements, primary function is to make appointment and get consultation.</p>
Req-9	Deliver Medicines	Chemist shall be able to view the open prescriptions assigned to them (based on Pincode) and have the facility to update the status. Medicines shall be delivered offline to Patient by Chemist	It is secondary functionality of the system and its priority is lower than other functional requirements.
Req-10	Perform Lab Tests	Lab In-charge shall be able to view open lab-requests and have the facility to update the status- Actual Sample Collection and lab tests shall be offline. Labs shall also submit reports to Patient offline	<p>Our primary aim was to that lab incharge can upload the lab test pdf, though it was working properly, it wasn't configured through nginx or similar web server, because of which the files were easily accessible without any authentication also. Hence we had to roll out the requirement.</p> <p>It is also a secondary functionality of the system and its priority is lower than other functional requirements.</p>
Req-7	Predict Disease	This is a batch program that will run periodically on new Consultation Requests to predict diseases based on machine learning Algorithm and prioritize the Requests (Critical/ Medium/ Low)	To keep the batch program running, we need a system having atleast 16 GB RAM, and a seperate VM through which we can directly provide read and write facility for the data, hosting the batch program on

			the Django server reduces it efficiency and also needed some configurations settings. We weren't able to figure out that also, our batch program wasn't giving the desired results so it wasn't possible for us to integrate
Req-12	Housekeeping Patient Profiles and Consultation Requests	Quarterly all Patient Profiles which have not raised any Consultation Request for last 3 years will be archived. Also, every quarter, Consultation Requests that are more than 3 years old shall be archived. This will improve the performance	This functional requirement had least priority amongst all hence it was not implemented in the first build.
Req-13	Daily Back-up	Every night, full back-up of the system (both Database and Code) shall be taken and sent to remote site for safekeeping. The back-ups shall be rotated every 30 days.	Daily backup requires one more slave database, where all the entries from the master database can be directly written into the replicate database, for which knowledge of distributed/replica systems was required, and also needed to host the app. Also when one database was down it should automatically start using the Database-2. It was out of scope for us, hence couldn't be implemented.
Req-16	Reports	The System will generate following reports: a) Doctor wise Appointment file for next 5 days b) Speciality wise - Number of Consultations by Doctor per month/ quarter/ year (run on last day of the month)	A part of it is implemented by us, by logging all the activity by each user, which can be seen in the profile of the admin. Though we haven't added the features of payment portal hence the revenue generated wasn't possible to be calculated. Also we aren't logging anything into the database, hence we couldn't query anything onto our

		<p>c) Speciality wise - Revenue Earned per month/quarter/year (run on last day of the month)</p> <p>d) Patient History File - For a patient, history of consultations done in last 3 years.</p>	<p>database to get the desired results. The problem of using third party pdf generating service was also being faced here.</p>
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4. ScreenShots

- Maintain Speciality

The screenshot shows a web application titled "Virtual Clinic Speciality" running in a Mozilla Firefox browser. The browser's address bar displays the URL "127.0.0.1:8000/admin/speciality/". The application's interface includes a dark blue sidebar on the left with a menu containing items like "Profile", "Messages", "Manage Speciality", "Manage Users", "View Activity", "View Statistics", and "CSV Management". The main content area is titled "View Speciality" and features a green "Add Speciality" button. Below this, there is a table with columns for "Speciality", "Description", and "Option". The table contains one entry: "ENT" with the description "Ear Nose Throat". A red "Delete" button is positioned to the right of this entry. Above the table, there is a "Show 10 entries" dropdown and a "Search:" input field. At the bottom of the table, it says "Showing 1 to 1 of 1 entries". Navigation buttons labeled "Previous", "1", and "Next" are located at the bottom right of the table area.

Speciality	Description	Option
ENT	Ear Nose Throat	Delete

- Add speciality

The screenshot shows a web browser window with the title 'Virtual Clinic Add speciality - Mozilla Firefox'. The address bar shows the URL '127.0.0.1:8000/admin/add_speciality/'. The page has a dark blue header with the 'VirtualClinic' logo and links for 'Account Management' and 'About us'. A left sidebar contains navigation links: Profile, Messages, Manage Speciality, Manage Users, View Activity, View Statistics, and CSV Management. The main content area is titled 'Add speciality' and contains two input fields: 'Name of speciality' with the value 'cardiac' and 'Name of description' with the value 'heart specialist'. Below these fields is a dark blue button labeled 'Add Speciality'.

Virtual Clinic Add speciality - Mozilla Firefox

Signed in as 166004 x Virtual Clinic Add speciality x SRS - Google Docs x SE Lab Implementation x +

127.0.0.1:8000/admin/add_speciality/ Search

VirtualClinic Account Management About us

Profile Messages Manage Speciality Manage Users View Activity View Statistics CSV Management

Add speciality

Name of speciality

Name of description

Add Speciality

- Delete Speciality (Before deletion)

VirtualClinic Speciality - Mozilla Firefox

Signed in as 166004 x VirtualClinic Speciality x SRS - Google Docs x SE Lab Implementation x +

127.0.0.1:8000/admin/speciality/ Search

VirtualClinic Account Management About us

Profile Messages Manage Speciality Manage Users View Activity View Statistics CSV Management

View Speciality

[Add Speciality](#)

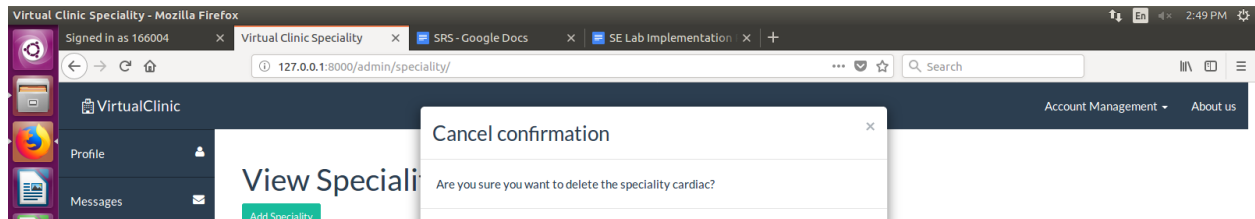
Show 10 entries Search:

Speciality	Description	Option
cardiac	heart specialist	Delete
ENT	Ear Nose Throat	Delete

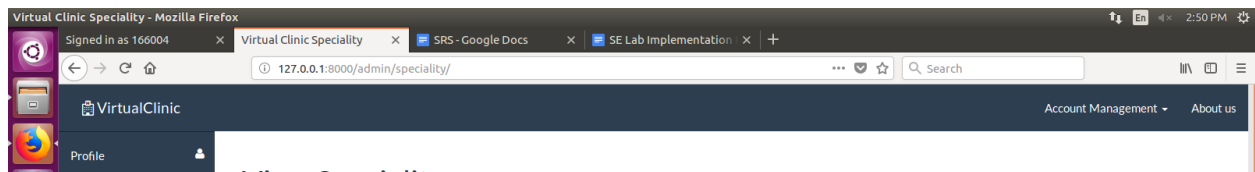
Showing 1 to 2 of 2 entries

[Previous](#) **1** [Next](#)

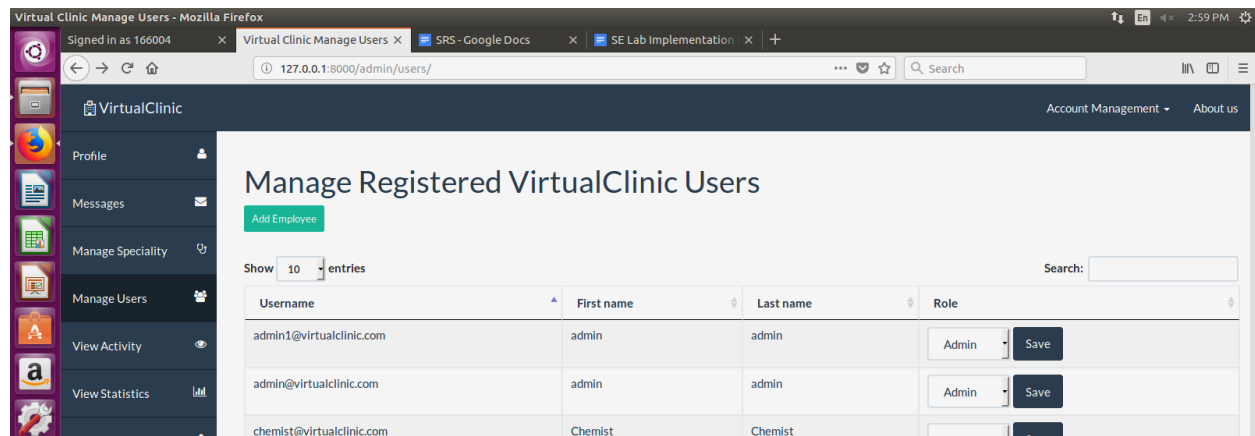
- Delete Speciality (During deletion)



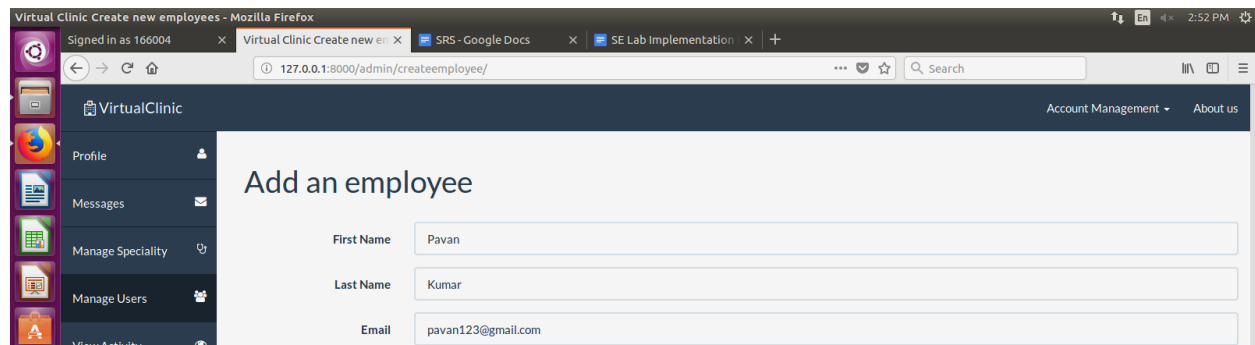
- Delete Speciality (After deletion)



- Maintain Doctor (Note: There is a same page to maintain doctor, chemist & lab)



- Add doctor



- Edit doctor

Virtual Clinic Update Profile - Mozilla Firefox

Signed in as 166004 x Virtual Clinic Update Profile x SRS - Google Docs x SE Lab Implementation x +

127.0.0.1:8000/profile/update/

Update Profile

Make changes to your profile and click 'Update profile' when finished.

First Name

Last Name

Sex

Birthday

Phone

- Add Chemist

Virtual Clinic Create new employees - Mozilla Firefox

Signed in as 166004 x Virtual Clinic Create new en x SRS - Google Docs x SE Lab Implementation x +

127.0.0.1:8000/admin/createemployee/

Add an employee

First Name

Last Name

Email

Password

Employee

- Edit Chemist

VirtualClinic Update Profile - Mozilla Firefox

Signed in as 166004 x VirtualClinic Update Profile x SRS - Google Docs x SE Lab Implementation x +

127.0.0.1:8000/profile/update/

VirtualClinic Account Management About us

Update Profile

Make changes to your profile and click 'Update profile' when finished.

First Name Chemist

Last Name Chemist

Sex Male

Birthday Enter birthday as YYYY-MM-DD

Phone Enter phone number here

Allergies Enter any allergies here

Preferred Hospital

Primary Care Doctor

Speciality

Update profile

- Add Lab

VirtualClinic Create new employees - Mozilla Firefox

Signed in as 166004 x VirtualClinic Create new en x SRS - Google Docs x SE Lab Implementation x +

127.0.0.1:8000/admin/createemployee/

VirtualClinic Account Management About us

Add an employee

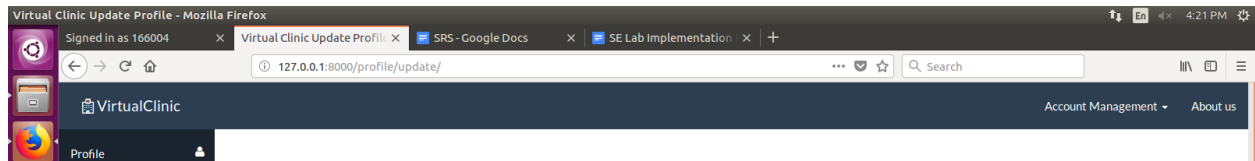
First Name Lal Path labs

Last Name Enter last name here

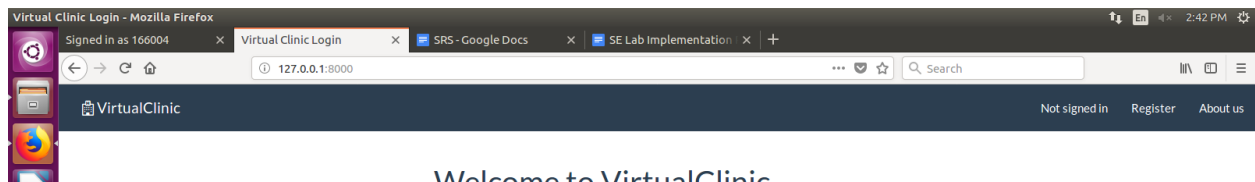
Email lalpath@labs.com

Add employee

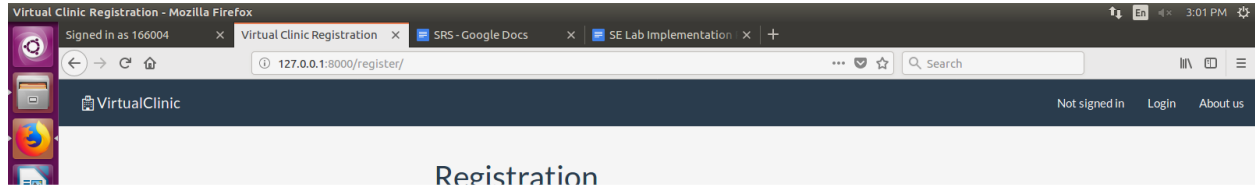
- Edit lab



- Patient Registration (new patient needs to click on register from homepage)



- Patient Registration (Patient fills registration form to register itself and a patient profile is created)



- Update Profile

Virtual Clinic Updat x MISHAL

127.0.0.1:8000/profile/update/

Update Profile

Make changes to your profile and click 'Update profile' when finished.

First Name	patient
Last Name	patient
Sex	Male
Birthday	1998-08-23
Phone	9328978348

- Consultation Request (offline-appointment/before adding consultation)

VirtualClinic Views x

127.0.0.1:8000/appointment/list/

VirtualClinic Account Management About us

View Appointments

New Appointment Calendar View

Active Appointments Cancelled Appointments

Show 10 entries Search:

Doctor	Description	Hospital	Start Time	End Time	Status	Options	Type
doctor doctor	Headache	Memorial Strong	March 5, 2018, 2 p.m.	March 5, 2018, 2:15 p.m.	Active	Update Cancel	Offline
doctor doctor	StomachAche	Highland	March 12, 2018, 9:21 p.m.	March 12, 2018, 9:29 p.m.	Active	Update Cancel	Offline

Showing 1 to 2 of 2 entries

Previous 1 Next

- Create Appointment

VirtualClinic Create x

127.0.0.1:8000/appointment/create/

VirtualClinic Account Management About us

Create Appointment

Fill out this appointment form and click 'Create' when finished.

Description Enter description here

Hospital -----

Doctor -----

Patient patient patient

Appointment type Offline

Start Time Enter as YYYY-MM-DD HH:MM

End Time Enter as YYYY-MM-DD HH:MM

Create

- Consultation Request form

The screenshot shows a web browser window with the address bar displaying '127.0.0.1:8000/appointment/create/'. The page title is 'VirtualClinic' and the URL is '127.0.0.1:8000/appointment/create/'. The page content is titled 'Create Appointment' and includes a sub-header 'Fill out this appointment form and click 'Create' when finished.' The form consists of several fields: 'Description' (text input with 'High Fever'), 'Hospital' (dropdown menu with 'Memorial Strong'), 'Doctor' (dropdown menu with 'Dr. doctor doctor'), 'Patient' (dropdown menu with 'patient patient'), 'Appointment type' (dropdown menu with 'Offline'), 'Start Time' (text input with '2018-03-17 21:25'), and 'End Time' (text input with '2018-03-17 21:40'). A 'Create' button is located at the bottom of the form.

VirtualClinic Account Management About us

Create Appointment

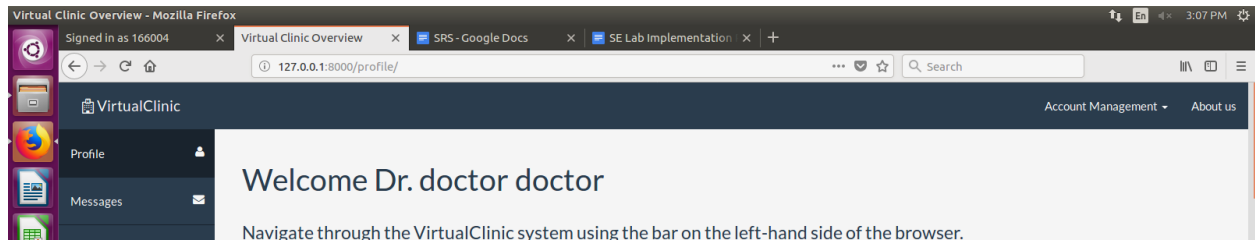
Fill out this appointment form and click 'Create' when finished.

Description	High Fever
Hospital	Memorial Strong
Doctor	Dr. doctor doctor
Patient	patient patient
Appointment type	Offline
Start Time	2018-03-17 21:25
End Time	2018-03-17 21:40

Create

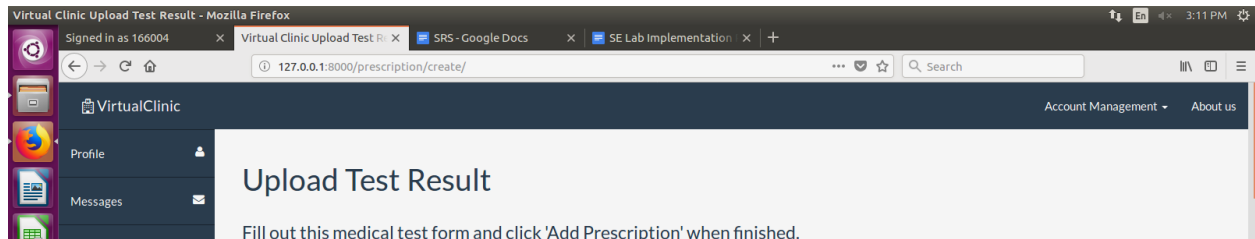
- Provide Consultation (Doctor provides consultation and generates prescription)

The below screenshot is the dashboard that the doctor sees from this he/she can get the necessary appointment and provide consultation for it.



- Provide Consultation

Doctor fills the diagnosis results and generates prescription.



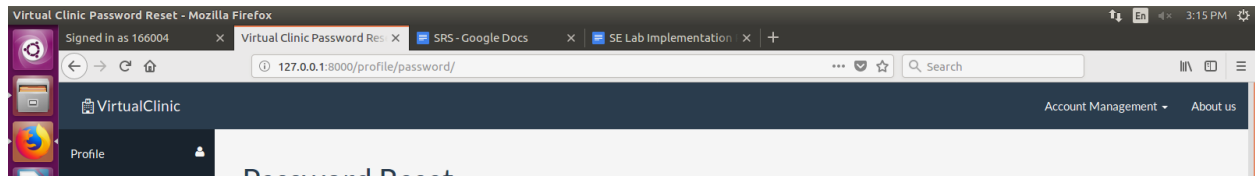
- Maintain Users (doctors, chemist and lab have power to change password after being added by admin)

In the below screenshot doctor can move to account management and then to change password option.

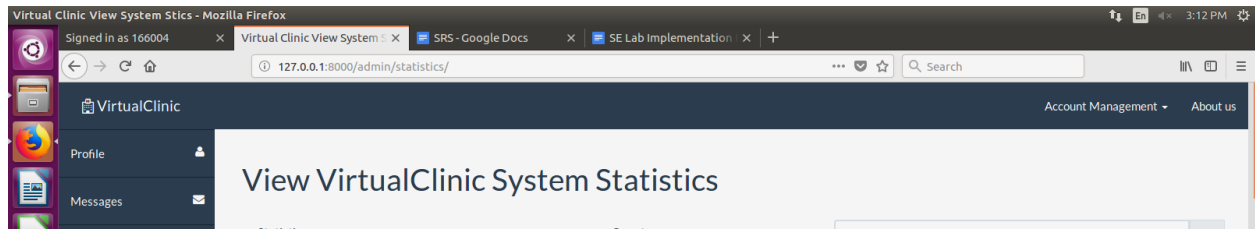


- Maintain users

After that doctor can change its password



- System Statistics



5. Plan for Next Build/Release

- Functional Requirements that will be added are delete patient profile, patients who have not consulted for a very long time can be deleted by the admin. Admin will have the power to generate invoice of the consultation request and send it to the patient. Chemist can perform medicine delivery and update its status. Labs can also perform lab tests and update the status etc. Non-functional requirement that will be added is that both chemist and lab will be allowed to view a part of prescription that is required by them thereby catering to a very important non-functional requirement i.e security.
- Currently, we are using the MYSQL database along with Django, but Heroku provides only PostgreSQL in production, so we will be migrating it to PostgreSQL to be used for production. Also some of the security features like images were accessible without any authentication, hence we need to secure it by using Nginx or Gunicorn.
- We will also be hosting our server and the web application on PaaS (Platform as a Service) Heroku, we will also be integrating Travis CI build check for continuous integration with Github.

6. Summary

The report outlines the key features of implementation of the system. In section 1 information about programming languages used, libraries involved in development , different IDEs used are presented. Along with them information is also given of how to run the application. In section - 2, a table is made to illustrate all the functional requirements implemented in the first build of the project. Section-3 describes the functional requirements that were not implemented in the first build and the reasons to do so, like generating invoice for consultation, medicine delivery and lab tests are key functional requirements that were not implemented in first build. Section-4 shows screenshots of the application illustrating the various functional requirements implemented in the first build. Section-5 describes the plan for next build.