



INTERNATIONAL INSTITUTE OF PROFESSIONAL STUDIES, DAVV

Subject: System Analysis And Design

Open Source Study
Topic: Virtual Clinic

Project report

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Abstract

“Virtual Clinic” is based on the concept of integrated care system. Stakeholders for the system are Doctors, Patients, Labs and Chemists. A patient makes his/her consultation request to the system either by creating an offline or an online appointment by entering the symptoms, the system forwards the consultation request to a doctor of the concerned speciality. Doctor generates a prescription comprising of Diagnosis, Medicines and Lab Requests(if needed) based on the symptoms provided by the patient. The prescription is received by patient, localized chemist and localized labs. Using the prescription Chemists provide medicines to the patient via offline delivery. Labs, too, use the same prescription to collect specimen from patient and upload the lab reports based on lab tests. For Chemists and Labs, only need to know information will be displayed thereby protecting the Patient’ confidentiality.

The technologies used to develop the software are MySQL database, Django 2.0 for backend, HTML, Bootstrap, Javascript, jQuery, libraries like flatly, datatables etc. for the frontend development. For Continuous Integration and Continuous Deployment(CI/CD), TravisCI and Heroku are used.

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Introduction

Purpose:

Virtual Clinic is an application that integrates the different stakeholders involved in medical profession. The concept of the project is as follows, a patient can make a consultation request to any registered hospital and doctor in the system by entering the symptoms, the system forwards the consultation request to the doctor across the concerned speciality. The consultation request can be offline or online. Doctor after consultation generates a prescription comprising of Diagnosis, Medicines and Lab Requests(if needed) based on the symptoms provided by the patient. The prescription can be viewed by the patient, and is sent to nearest local chemist (for medicine delivery) and nearest local lab (for lab tests). Using the prescription, the assigned chemist provides medicines to the patient via offline delivery. Assigned Lab uses the same prescription to collect specimen from patient to perform lab tests and update the report on the system to view for the patient anytime. Fully customized admin panel to view the activity of the users to monitor, change the roles of the registered candidates will be some core features for the admin panel. The system will be one of the best of it's kind and will be used for any city by the government for various hospitals across for better healthcare towards the society.

Objective :

A Multi-speciality Hospital has created a vision to provide 24/7 Primary Care at Doorstep of Patients using a panel of high quality doctors. Further, the Hospital has decided to provide quality medicines vide authorized Pharmacies at the doorstep at discounted prices as well as give doorstep Laboratory services wherever possible vide specimen collection. The aim is to help elderly and infirm people as well as people who need regular monitoring services to get access to quality healthcare services at affordable prices at the Door-step. It is envisaged that preventive and regular monitoring services can reduce the hospital admissions and reduce the suffering in General. As per Chairman' directive, the services have to be operationalized in a short span of 4 months within a budget of Rs. 50 Lakhs. Further, the system must be available round-the-clock with 10 minutes outage per month and should be highly stable and reliable with very low maintenance costs.

Requirement Analysis and specifications

The aim of the system is to develop “Virtual Clinic” software, which should automate the process of healthcare, and make it easier for every stakeholder involved in the process. The system is supposed to be used in any city with availability 24x7. Therefore, the proposed system must be able to function under all circumstances.

Software Requirements

- Database : MySQL has proved to be the database for web based applications, because of its performance and scalability, reliability, availability. From the perspective of database administrator, it's perfectly reliable and easily maintainable.
- Web Server : Nginx (web server which can be used as reverse proxy, load balancer, HTTP Cache), Gunicorn (python web server gateway)
- Automated testing : Travis CI (Hosted, distributed continuous integration system used to build and test software projects)

Our development platform was Django and the following tools and languages were used :

- Django - Backend python programming language web framework
- Javascript - Front End scripting language
- HTML - Markup language for creating web pages and web applications.
- CSS(Bootstrap, Flatly theme) - Stylesheet language for styling the documents
- Sqlite3 - Default database for django based development

Other Development Software:

- Ubuntu 18.04 LTS operating system
- Lucidchart for UML diagrams
- PyCharm Professional IDE
- Postman for testing APIs

Hardware Requirements

- Web Server: We need a reliable web server for the system. The machine must be fast and must show high performance in all situations. Atleast 512MB RAM and Pentium 4 2000 MHz processor seems to be minimum requirements for the machine.
- Database Server: Since the system will be used across all cities and huge amount of data will be stored, a machine will be needed which can serve as a database. Atleast 40 GB storage capacity is needed for the system, and the machine must be high performance machine.

Database Design

ER Diagram

This ER diagram represents the model of Virtual Clinic system entities. The entity-relationship diagram of Virtual Clinic System shows all the visual instruments of database tables and relationship between different users, appointment, prescription etc. It used structured data and define relationship between structured data groups of Virtual Clinic System functionalities. The main entity of Virtual Clinic are user, account, profile, appointment, prescription, medical test.

Virtual Clinic entities and attributes:

- Location Entity :

Attribute Name	Meaning	Value
id	Unique number of a location	11
address	Address of the location i.e. street no, building no.	50
zip	Zip code of area	50
city	City of the location	50
state	State of the location	50
country	Country of the location	50

- Hospital Entity :

Attribute name	Meaning	value
id	Unique number of a hospital	11
name	Name of the hospital	50
phone	Phone no. of hospital	10

- User Entity

Attribute name	Meaning	Value
----------------	---------	-------

id	Unique number given to a user	11
username	Username chosen by user	128
password	Password set by user	150
first_name	First name of user	30
last_name	Last name of user	150
email	Email of user	254

- Symptom Entity

Attribute name	Meaning	Value
symptom_id	Unique id associated with a symptom	11
symptom_name	Name of the symptom	50
symptom_description	Description of the symptom	100

- Speciality Entity

Attribute Name	Meaning	Value
speciality_id	Unique id associated with speciality	11
name	Name of speciality	50
description	Description of speciality	100

- Account Entity

Attribute name	Meaning	Value
id	Unique number associated with an account	11

role	Role of the user i.e. doctor, patient, lab, chemist	patient,doctor,admin,lab,chemist
archived	Tells whether the account is archived or not	true/false

- Profile Entity

Attribute name	Meaning	Value
id	Unique number associated with a profile	11
First name	First name of user	50
Last name	Last name of user	50
sex	Sex of user	1
birth date	Birth date of user	date
phone	Phone no. of user	10
allergy	Allergy of user	250
created	Time at which profile is created	date

- Appointment entity :

Attribute Name	Meaning	Value
id	Unique number associated with an appointment	11
description	Description about the appointment	200
status	Status of appointment whether active or closed	50
appointment_type	Type of appointment - online / offline	20
Start time	Start time of appointment	date

End time	End time of appointment	date
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- Prescription entity

Attribute name	Meaning	Value
id	Unique number associated with a prescription	11
instruction	Instructions given by doctor	200
medicine	Medicine prescribed	100
date	Date when prescription is generated	date
active	Tells whether prescription is active or not	true/false

- Medical Test Entity :

Attribute name	Meaning	Value
id	Unique number associated with a medical test	11
Name	Name of the medical test	50
description	Description of the test	200
completed	Whether test is completed or not	true/false

Description of Entity and Relationships

The entity is a concept or object in which the piece of information can be stored. There are three types of relationship between entities. They are as follows:

- One to One(1-1): This relationship specifies that one instance of an entity is associated with another instance of an entity.

- One to Many(1-N): This relationship specifies that one instance of an entity is associated with zero or many other instances of another entity.
- Many to Many(N-N): This relationship specifies that one instance of an entity is associated with zero or many other instances of another entity.

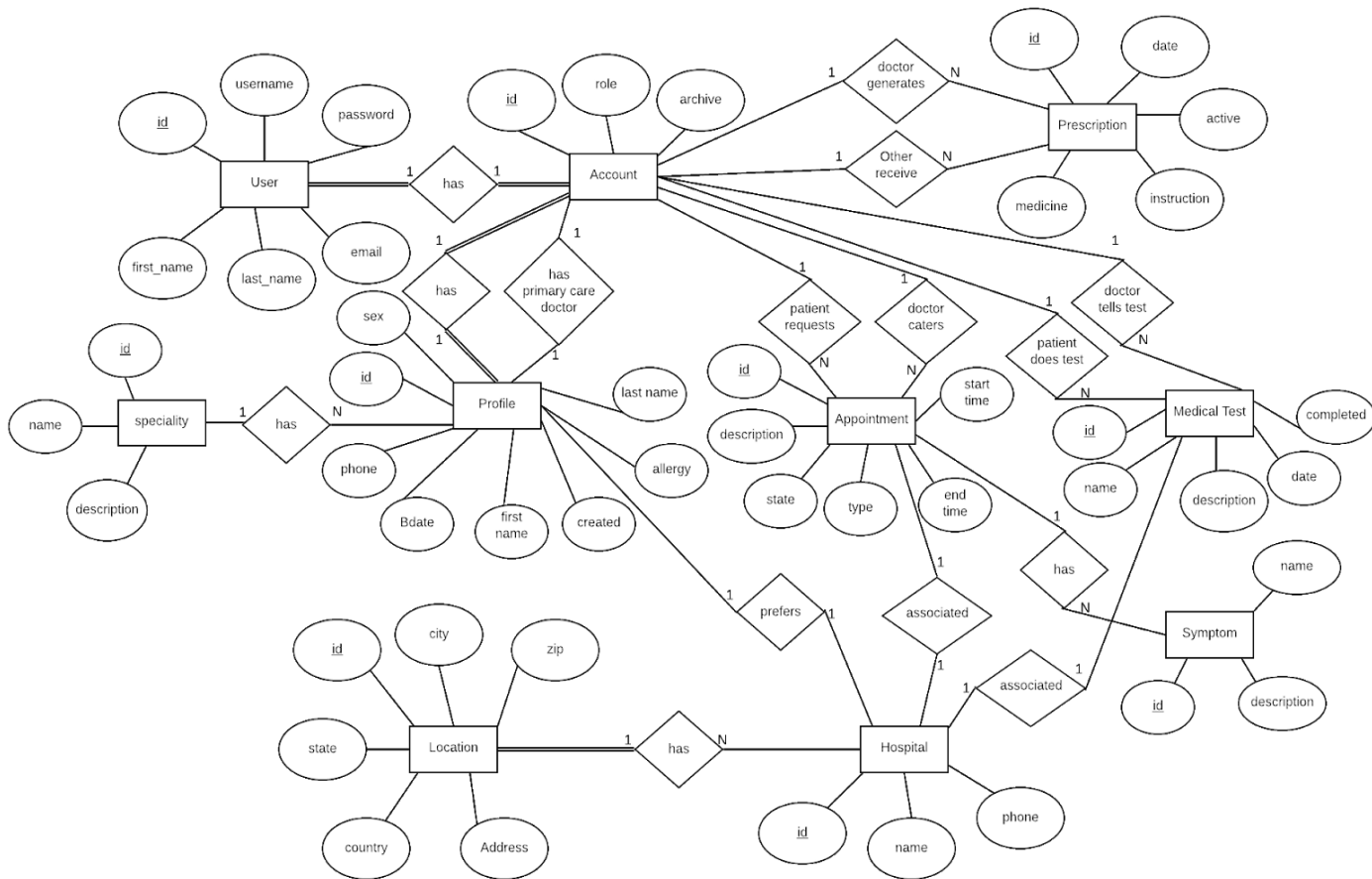


Fig. 1. ER Diagram

Description of ER Diagram

The application will be used in several locations that are uniquely identified by an id given to it and contain address, city, zip, state and country as its features. One location can have many

hospitals associated with it and each hospital is uniquely identified by its id. There are 5 users of the application namely admin, doctor, patient, lab, chemist and each of them are identified by an id and have their username and password. Each user has exactly one account that shows user's role and whether its archived or not. And from each account we can make a user profile that contains information about each user. A speciality can be associated with many doctor profiles. One patient account can request for many appointments, each appointment has a description,status,appointment type,start and end time as its attributes. One appointment can have many different medical symptoms associated with it.

Doctor account caters to one or many appointment requests. One doctor account generates many prescriptions. Each prescription has an associated id, instructions, medicine, date and active status. Patient, lab, chemist can receive one or many prescriptions. Chemist on seeing prescription can update its status and lab can perform many medical tests related to a patient account.

Relational Database design

A relational database schema is the tables, columns and relationships that make up a relational database. There are two steps to creating a relational database schema: creating the logical schema and creating the physical schema. The logical schema depicts the structure of the database, showing the tables, columns and relationships with other tables in the database and can be created with modeling tools or spreadsheet and drawing software. The physical schema is created by actually generating the tables, columns and relationships in the relational database management software.

(RDBMS). Most modeling tools can automate the creation of the physical schema from the logical schema, but it can also be done by manually.

Steps to map ER diagram to Relational Schema :

- Step 1 : For each strong entity make a relation with all its simple attributes.
- Step 2 : For multivalued attribute make a separate relation with primary key of the associated relation and multivalued attribute as its attribute. Both attribute together act as key.
- Step 3 : for weak entity include all its attributes as well as key of its owner entity. Combination of weak entity's partial key and owners key act as key for relation.
- Step 4 : To map 1:1 relation we can either merge relations or add key of one relation to other relation or make a separate relation that has keys from both the relations which together act as key for it.
- Step 5 : To map 1:N relationship on N side relation put other relation's key so that it acts like foreign key.
- Step 6 : To map M:N relationship make a separate relation and add keys of the associated relation in it. Together they act as key and act as foreign keys.
- Step 7 : If its n-ary relationship then make a separate relation that has keys of all the n relation as foreign keys.

Below diagram depicts the relational schema of the Virtual Clinic :

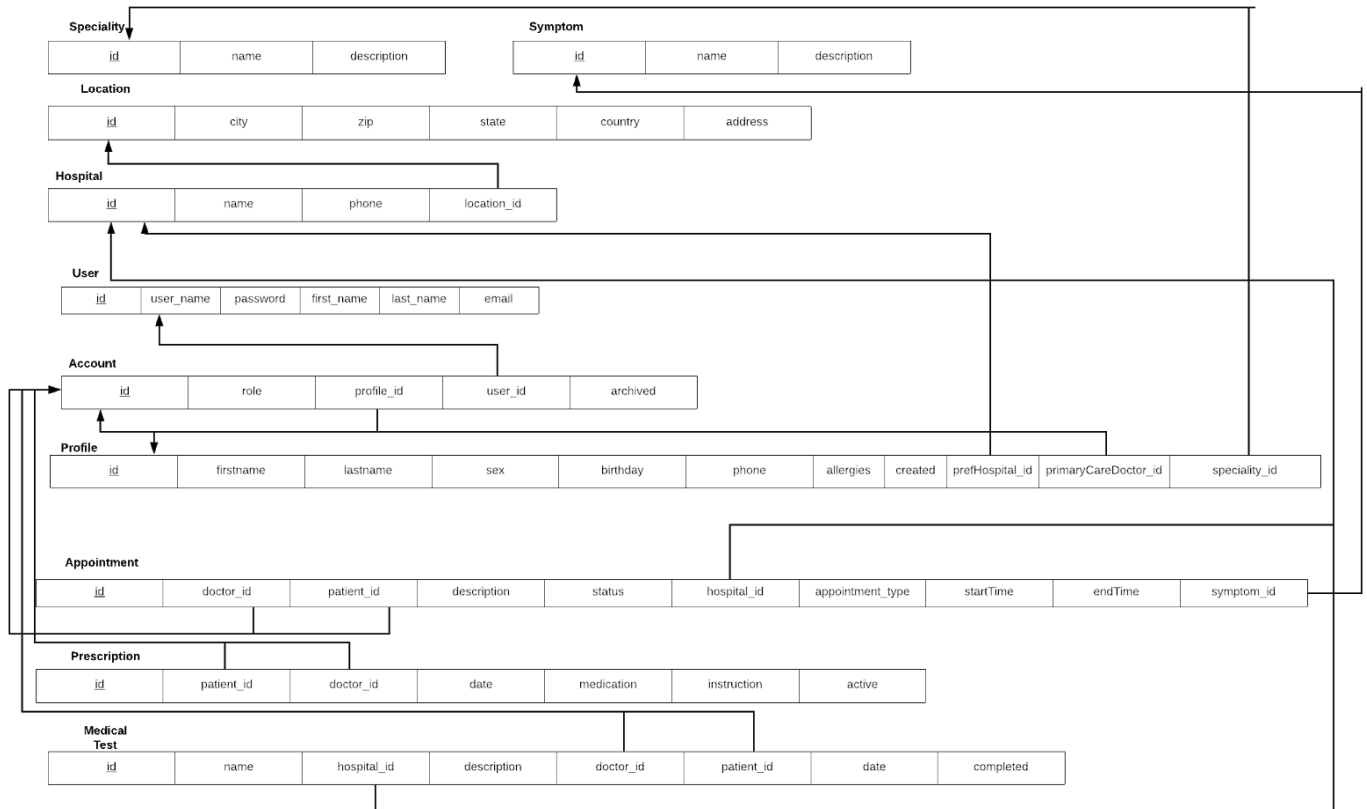


Fig.2. Relational Schema

Description of Relational Schema :

The above diagram shows the relational schema corresponding to the ER diagram drawn above. Steps written above are followed to draw this schema. Additional feature of this database design is that all the schemas have ids that act as primary key and identify a tuple uniquely. According to requirements analysis there are no further functional dependencies except that each attribute in a relation is functionally dependent on the attribute id. Thus the above relational schema is in BCNF (Boyce Codd Normal Form) and hence having low redundancy. This is so because according to definition of BCNF a relation is in BCNF if for all functional dependency $X \rightarrow Y$ X has to be a superkey. This property is followed by above relational schema.

Constraints in relation Schema:

- Key constraint : each entity has an unique id that identifies it. It is set as primary key hence it does not accept duplicate values and also is not NULL.
- Cardinality Ratio :
 - Each location can have many hospitals hence cardinality ratio is 1:N for location-hospital relationship.
 - Each user will have 1 account associated with it and hence cardinality ratio is 1:1 for user-account relationship.
 - Each account will have 1 profile hence it has 1:1 cardinality ratio.
 - A patient account can request for many appointments hence cardinality ratio is 1 : N
 - Each doctor can cater to many appointment requests hence cardinality ratio is 1:N
 - A doctor can generate many prescriptions hence cardinality ratio is 1:N
 - Each user can receive many prescription hence cardinality ratio is 1:N
 - Each speciality can have many doctors hence cardinality ratio is 1:N
 - Each appointment can have many symptom hence cardinality ratio is 1:N.
 - Each patient account can have many medical tests hence cardinality ratio 1:N
- Participation constraint :
 - Locations participation should be total as there needs to be a location for project to deploy, whereas for hospital its partial as one location might not have any hospital.
 - Both user,account has total participation as they both need to exist.
 - Similarly both account and profile have total participation.
 - All relationships associated with appointments and prescription are partial because its not mandatory for a patient to request for an appointment and receive a prescription.

Project Components

Front End Design:

All the modules showed on the user side have a corresponding view written in the server side code, which has the necessary business logic for what content to show based on authorization, permissions and necessary content.

Framework Used:

Django : Django is a python based framework which allows full stack website development. Following the MVT(Model-View-Template) architecture, it makes the code more readable and modular.

Security Measures:

Below there are a list of possible vulnerability that may occur while creating an application:

1. HTTPS

HTTP using SSL (Secure Sockets Layer) encrypts the traffic between your web server and it's clients. This means the traffic, even if intercepted, can not be decoded by an attacker. This is important if there is any kind of confidential information on your site, so basically any site that uses logins.

We ran a test on our deployed site, and the results are shown in the diagram below:

You are here: [Home](#) > [Projects](#) > [SSL Server Test](#) > virtual-clinic.herokuapp.com

SSL Report: virtual-clinic.herokuapp.com

Assessed on: Mon, 29 Oct 2018 09:14:45 UTC | [Hide](#) | [Clear cache](#)

[Scan Another >>](#)

	Server	Test time	Grade
1	35.170.37.11 ec2-35-170-37-11.compute-1.amazonaws.com Ready	Mon, 29 Oct 2018 09:00:22 UTC Duration: 107.892 sec	A
2	35.175.30.164 ec2-35-175-30-164.compute-1.amazonaws.com Ready	Mon, 29 Oct 2018 09:02:10 UTC Duration: 108.788 sec	A
3	52.4.95.228 ec2-52-4-95-228.compute-1.amazonaws.com Ready	Mon, 29 Oct 2018 09:03:59 UTC Duration: 107.550 sec	A
4	52.45.22.48 ec2-52-45-22-48.compute-1.amazonaws.com Ready	Mon, 29 Oct 2018 09:05:46 UTC Duration: 108.561 sec	A
5	52.4.86.246 ec2-52-4-86-246.compute-1.amazonaws.com Ready	Mon, 29 Oct 2018 09:07:35 UTC Duration: 106.505 sec	A
6	35.169.120.211 ec2-35-169-120-211.compute-1.amazonaws.com Ready	Mon, 29 Oct 2018 09:09:21 UTC Duration: 107.926 sec	A
7	35.170.227.83 ec2-35-170-227-83.compute-1.amazonaws.com Ready	Mon, 29 Oct 2018 09:11:09 UTC Duration: 107.83 sec	A
8	35.169.241.252 ec2-35-169-241-252.compute-1.amazonaws.com Ready	Mon, 29 Oct 2018 09:12:56 UTC Duration: 108.331 sec	A

SSL Report v1.32.0

Fig.3. SSL Report

2. Heartbleed Bug

The Heartbleed bug is a very serious vulnerability in OpenSSL 1.0.1 versions prior to OpenSSL 1.0.1g. It can allow an attacker to retrieve memory contents, without leaving a trace. It can reveal private SSL keys, session IDs, passwords and other sensitive information. It's not a theoretical risk, but practically possible.

3. Debug Mode

The Django Debug mode helps in debugging, mainly by showing very detailed error pages. These error pages contain very detailed tracebacks, most settings and all sorts of other data about your environment that can be helpful in debugging. You should not enable this on production site, as it gives out lot of internal information.

Keeping this in mind, the debug mode is kept off in production mode to avoid debugging

information/content visible to any of the user.

4. Clickjacking protection

Clickjacking is an attack where one website is transparently overlayed on top of another website. The user thinks they are manipulating the website they see, but in reality their actions go to the invisible website. This depends on the invisible website being placed in a HTML frame. To prevent this, you set the X-Frame-Options header. This tells your browser not to permit your website to be embedded in HTML Frames.

This is taken care by Django by a middleware named clickjacking.

5. Trace Method

Avoids Cross-site scripting attacks, it asks the web server to return exact request as it was received. This can be used to retrieve the session cookie.

This is taken care mainly by performing all server side input validations, and not performing any validations on the client side.

6. SQL Injections

SQL injection is a type of web application security vulnerability in which an attacker attempts to use application code to access or corrupt database content. If successful, this allows the attacker to create, read, update, alter, or delete data stored in the back-end database. SQL injection is one of the most prevalent types of web application security vulnerabilities.

To avoid any SQL Injection, we have made sure not to use any RAW SQL queries in any of server side code.

7. Cross Site Scripting

Cross-site scripting (XSS) targets an application's users by injecting code, usually a client-side script such as JavaScript, into a web application's output. The concept of XSS is to manipulate client-side scripts of a web application to execute in the manner desired by the attacker. XSS allows attackers to execute scripts in the victim's browser which can hijack user sessions, deface websites, or redirect the user to malicious sites.

Our website doesn't have any page modification javascript code running on the client side, making it invulnerable to any XSS attacks, moreover the test result also couldn't perform any XSS attack on the webpage.

8. Broken Authentication & Session management

Broken authentication and session management encompass several security issues, all of them having to do with maintaining the identity of a user. If authentication credentials and session identifiers are not protected at all times an attacker can hijack an active session and assume the

identity of a user.

To make sure broken authentication and session management doesn't occur, we have made sure the passwords are saved using hashing, and none of the session ID or ID of users are shown in the URL, and passwords, session IDs, and other credentials are shared over HTTPS encrypted connections, thus preventing broken authentication and session management.

9. Insecure Direct Object References

Insecure direct object reference is when a web application exposes a reference to an internal implementation object. Internal implementation objects include files, database records, directories, and database keys. When an application exposes a reference to one of these objects in a URL hackers can manipulate it to gain access to a user's personal data.

10. Security Misconfiguration

Security misconfiguration encompasses several types of vulnerabilities all centered on a lack of maintenance or a lack of attention to the web application configuration. A secure configuration must be defined and deployed for the application, frameworks, application server, web server, database server, and platform. Security misconfiguration gives hackers access to private data or features and can result in a complete system compromise.

We have made sure not to expose the security key used in production.

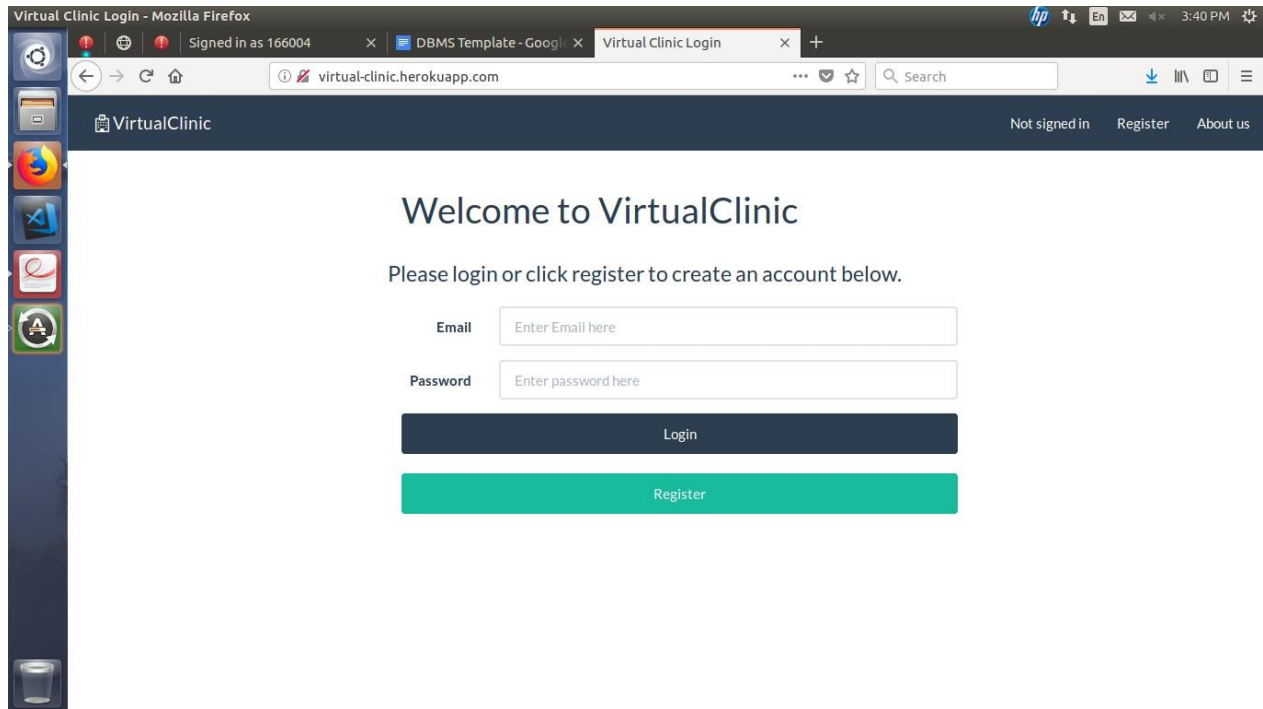
11. Cross Site Request Forgery

Cross-Site Request Forgery (CSRF) is a malicious attack where a user is tricked into performing an action he or she didn't intend to do. A third-party website will send a request to a web application that a user is already authenticated against (e.g. their bank). The attacker can then access functionality via the victim's already authenticated browser. Targets include web applications like social media, in browser email clients, online banking, and web interfaces for network devices.

Csrf_token is used in various forms to prevent cross site request forgery, the django middleware csrf.CsrfViewMiddleware provides support for it.

Results & Discussion

1. Login Page



Above screenshot shows the homepage of application. Top left shows navbar button to get to homepage. Top right shows signing information, registration button, and about us button. If already registered user can login by entering valid username and password or he/she can register.

2. Admin homepage

Virtual Clinic Overview - Mozilla Firefox

Signed in as 166004

virtual-clinic.herokuapp.com/profile/

VirtualClinic

Account Management About us

Welcome Mishal Shah

Navigate through the VirtualClinic system using the bar on the left-hand side of the browser.

All System Statistics

Statistic	Count
Users logged in	74
Users logged out	43
Appointments created	0
Medical tests created	0
Users registered	18

[For a more detailed statistics view, click here](#)

Recent messages

Show 10 entries Search:

From	Subject	Options
	new	Reply Read Archive

Showing 1 to 1 of 1 entries

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

[For a more detailed message view, click here](#)

Above picture shows homepage for admin. It shows system statistics, messages exchanged and left sidebar shows message management, manage specialty, symptom, user, view activity, view system statistics and csv management.

3. Manage symptom

The screenshot displays the 'View Symptom' page in the Virtual Clinic Speciality admin interface. The page features a table with two entries, each with a 'Delete' button. The interface also includes a search bar, a 'Show 10 entries' dropdown, and pagination controls.

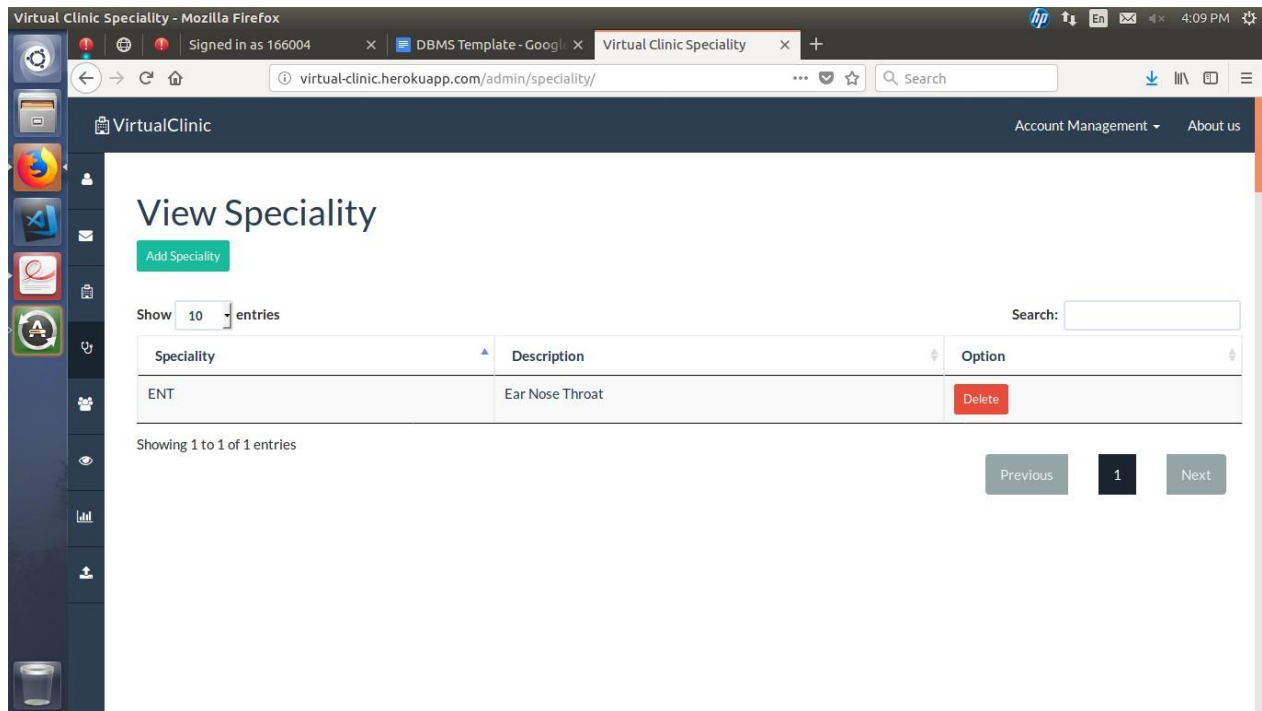
Symptom	Description	Option
Cold & Cough	Fever	Delete
fever	high fever 104	Delete

Showing 1 to 2 of 2 entries

Previous 1 Next

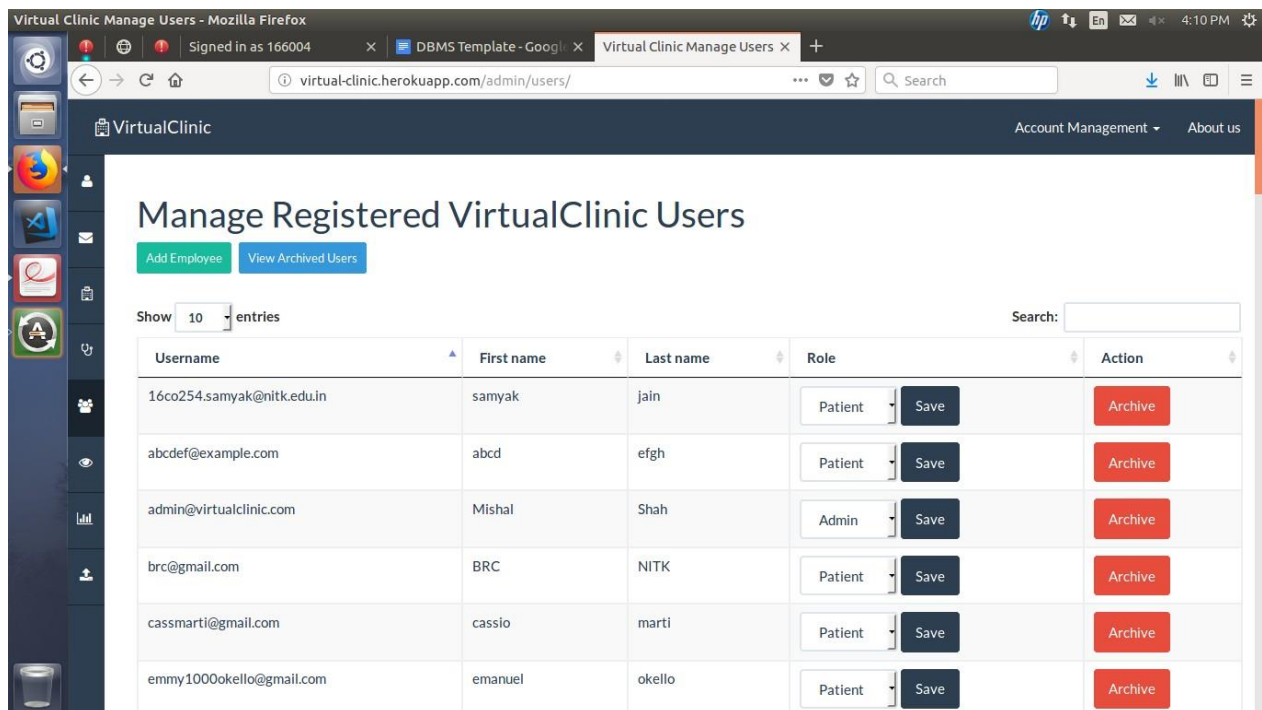
Above picture shows how admin can manage symptoms. He/she can add or delete the symptoms.

4. Manage speciality



Above picture shows how admin can manage specialty. He/she can add or delete the specialty.

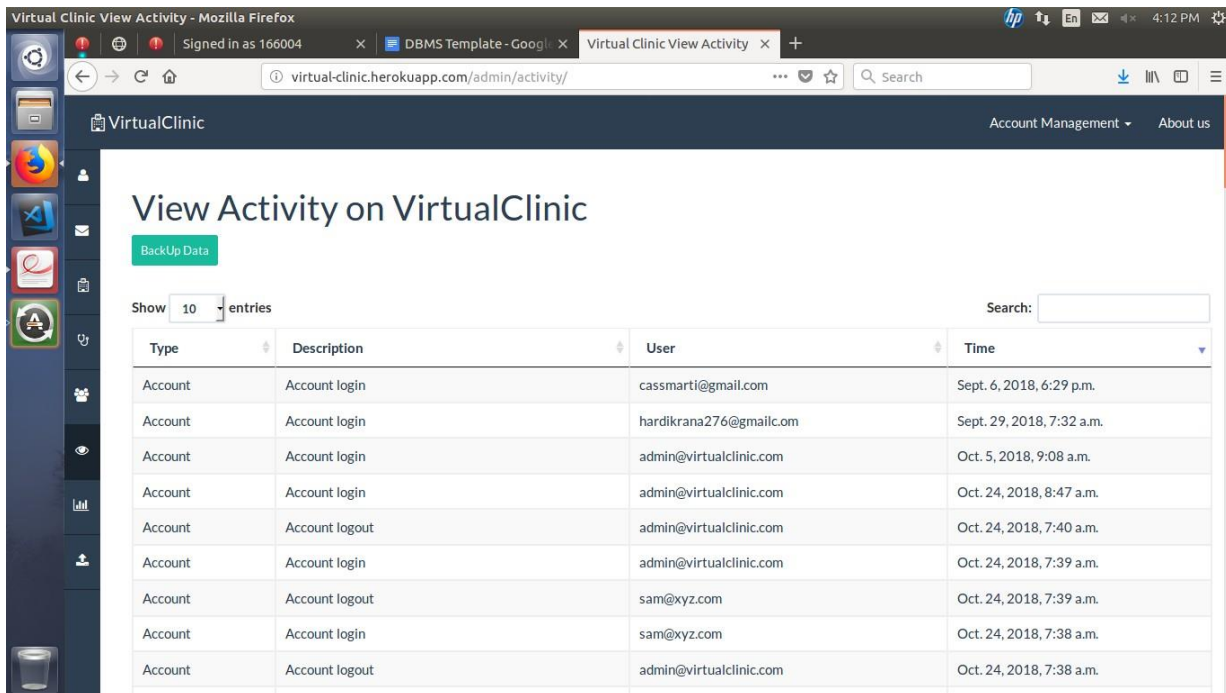
5. Manage Users



Above picture shows the page admin uses to manage users. He/she can add user, archive user or

view archive user.

6. Activity

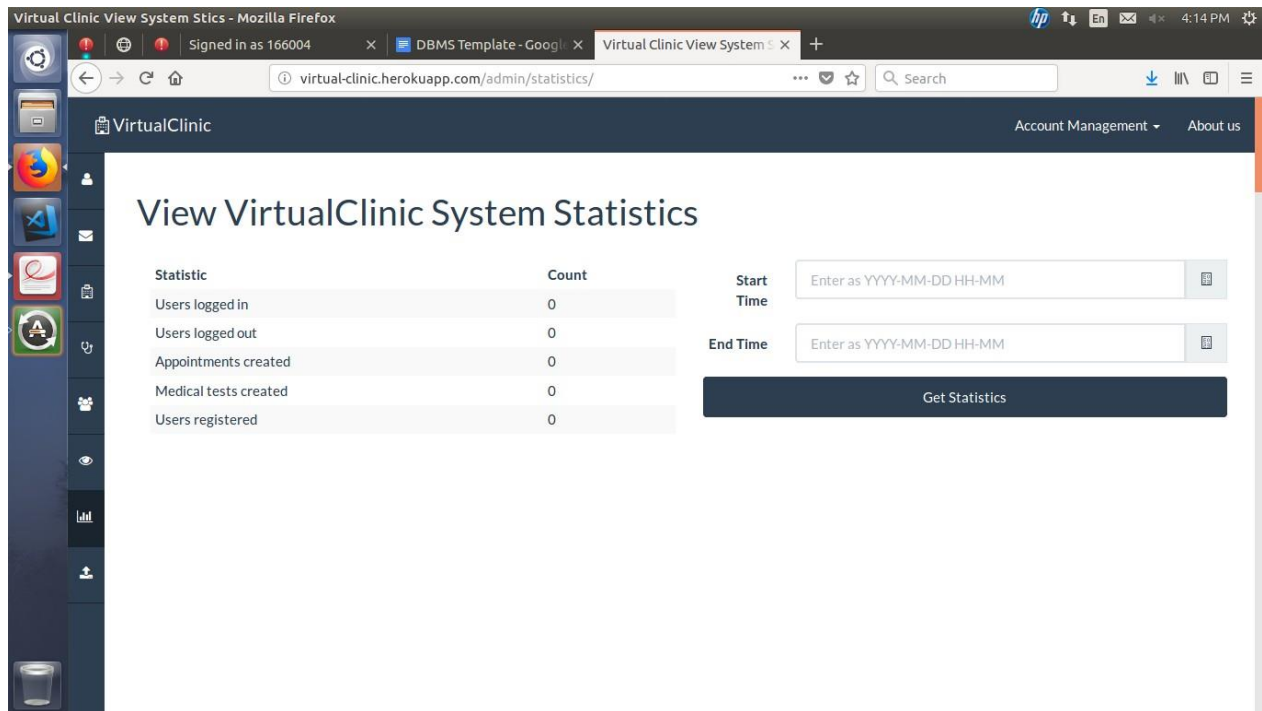


The screenshot shows a web browser window titled "Virtual Clinic View Activity - Mozilla Firefox". The address bar displays "virtual-clinic.herokuapp.com/admin/activity/". The page header includes "VirtualClinic" and navigation links for "Account Management" and "About us". The main content area is titled "View Activity on VirtualClinic" and features a "BackUp Data" button. Below this, there is a "Show 10 entries" dropdown and a search bar. The activity is listed in a table with the following data:

Type	Description	User	Time
Account	Account login	cassmart@gmail.com	Sept. 6, 2018, 6:29 p.m.
Account	Account login	hardikrana276@gmail.com	Sept. 29, 2018, 7:32 a.m.
Account	Account login	admin@virtualclinic.com	Oct. 5, 2018, 9:08 a.m.
Account	Account login	admin@virtualclinic.com	Oct. 24, 2018, 8:47 a.m.
Account	Account logout	admin@virtualclinic.com	Oct. 24, 2018, 7:40 a.m.
Account	Account login	admin@virtualclinic.com	Oct. 24, 2018, 7:39 a.m.
Account	Account logout	sam@xyz.com	Oct. 24, 2018, 7:39 a.m.
Account	Account login	sam@xyz.com	Oct. 24, 2018, 7:38 a.m.
Account	Account logout	admin@virtualclinic.com	Oct. 24, 2018, 7:38 a.m.

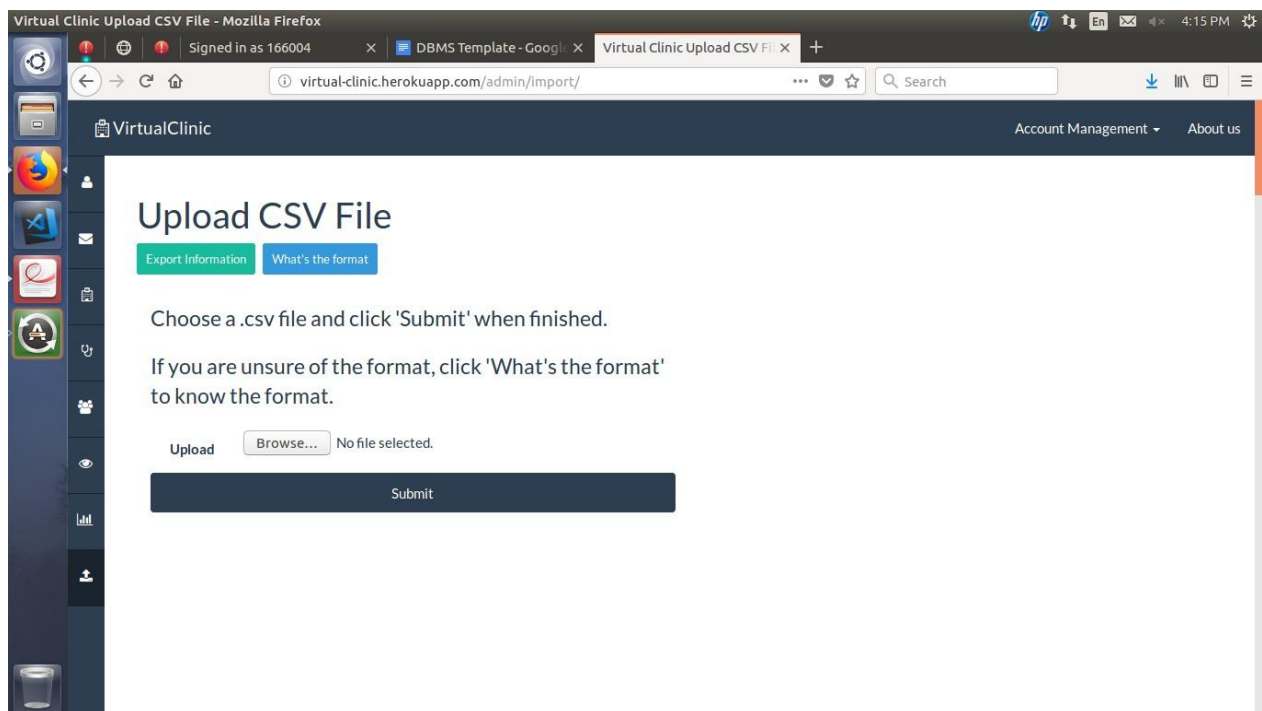
This page shows all the recent activity to the admin. Backup data can be clicked to backup the data.

7. Statistics



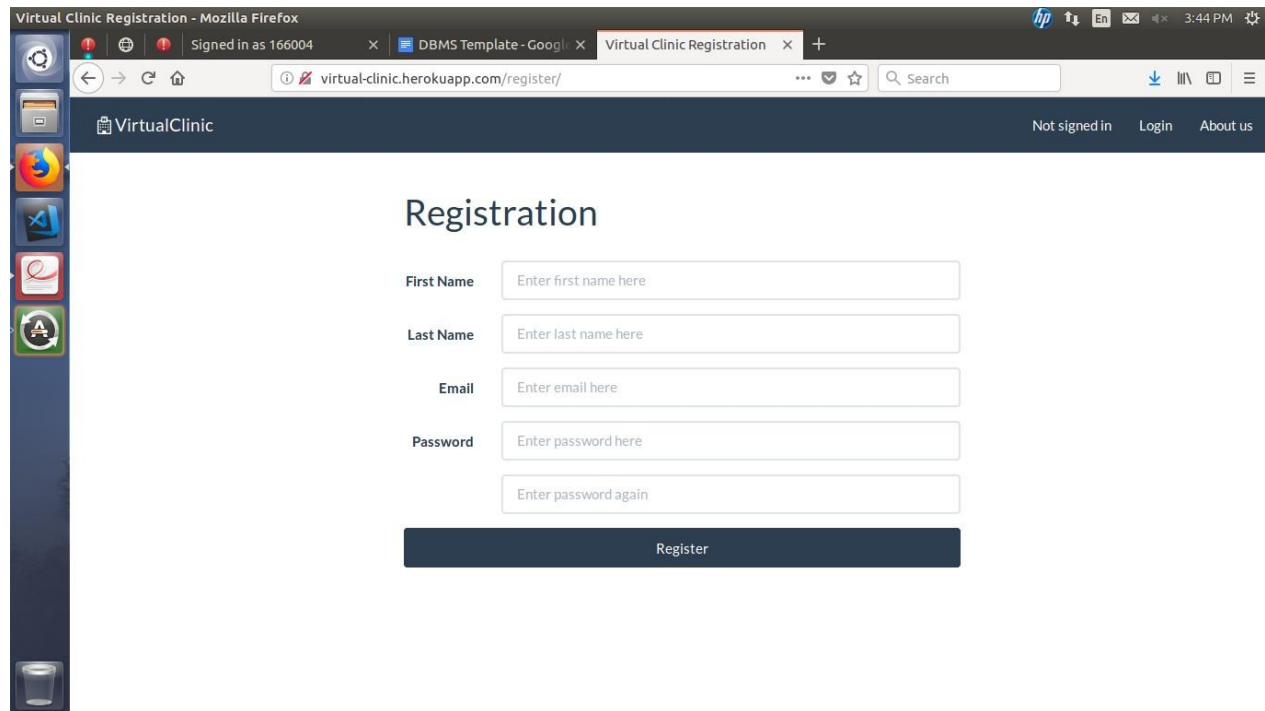
Above picture shows how to get statistics for a particular time interval.

8. CSV



Above picture shows how can we upload or download data in .csv files.

9. Registration (Patient)



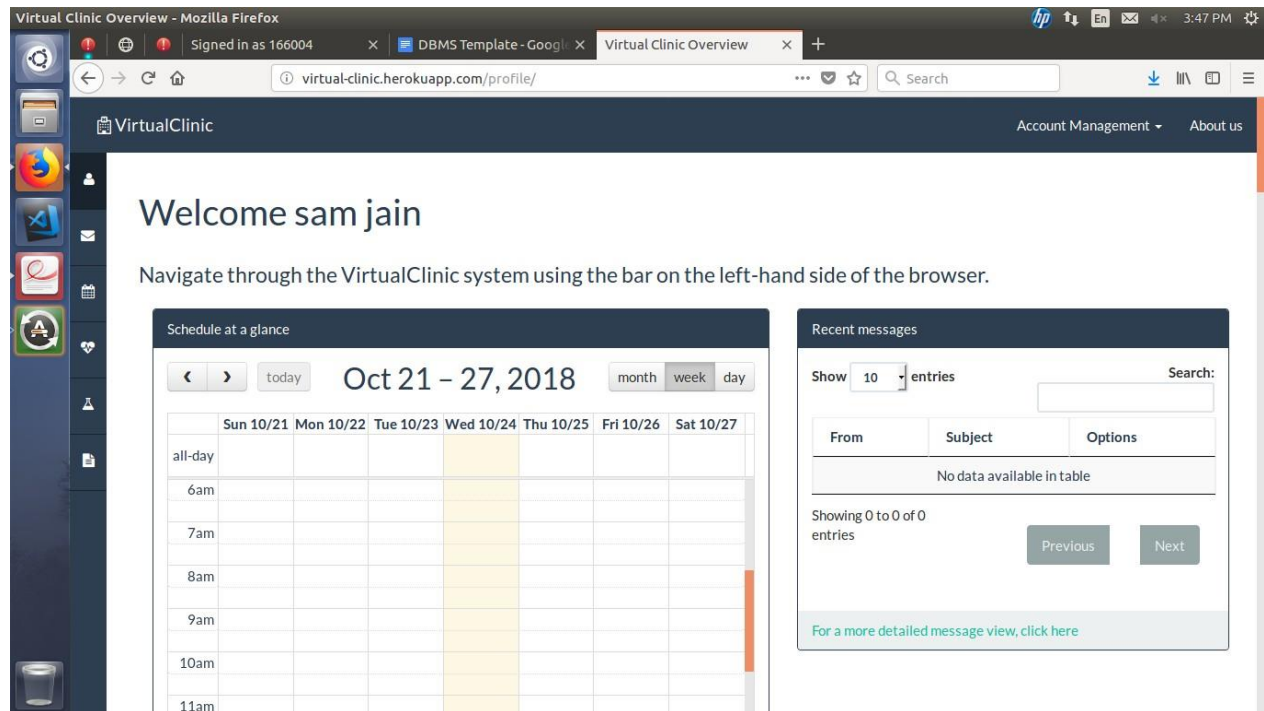
The screenshot shows a web browser window with the title "Virtual Clinic Registration - Mozilla Firefox". The address bar displays "virtual-clinic.herokuapp.com/register/". The page header includes the "VirtualClinic" logo and navigation links: "Not signed in", "Login", and "About us". The main content area is titled "Registration" and contains a form with the following fields:

- First Name**: Input field with placeholder text "Enter first name here".
- Last Name**: Input field with placeholder text "Enter last name here".
- Email**: Input field with placeholder text "Enter email here".
- Password**: Two input fields, the first with placeholder text "Enter password here" and the second with placeholder text "Enter password again".

At the bottom of the form is a dark blue button labeled "Register".

Above page shows registration form that the user can fill in order to register himself. (we can get to this page by clicking register button on homepage)

10. Patient home page



Above picture shows homepage for a patient. Navbar shows account management button via which patient can change the settings. It also shows schedule and messages. Left sidebar helps to send/receive messages, set appointments, update medical information, see medical test results and see prescriptions.

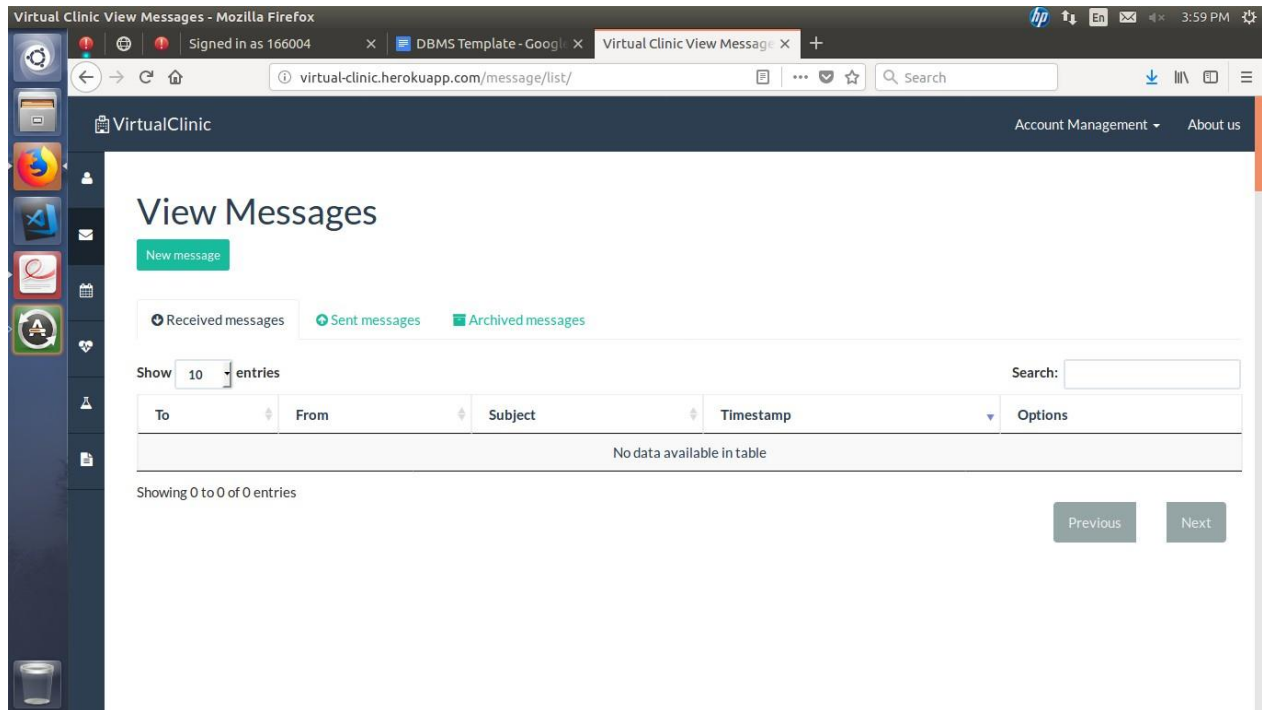
11. Update profile page

Above picture shows the form that a patient can fill to update his/her profile.

12. Change Password

Above picture shows the form required to be filled to change the password.

13. Message



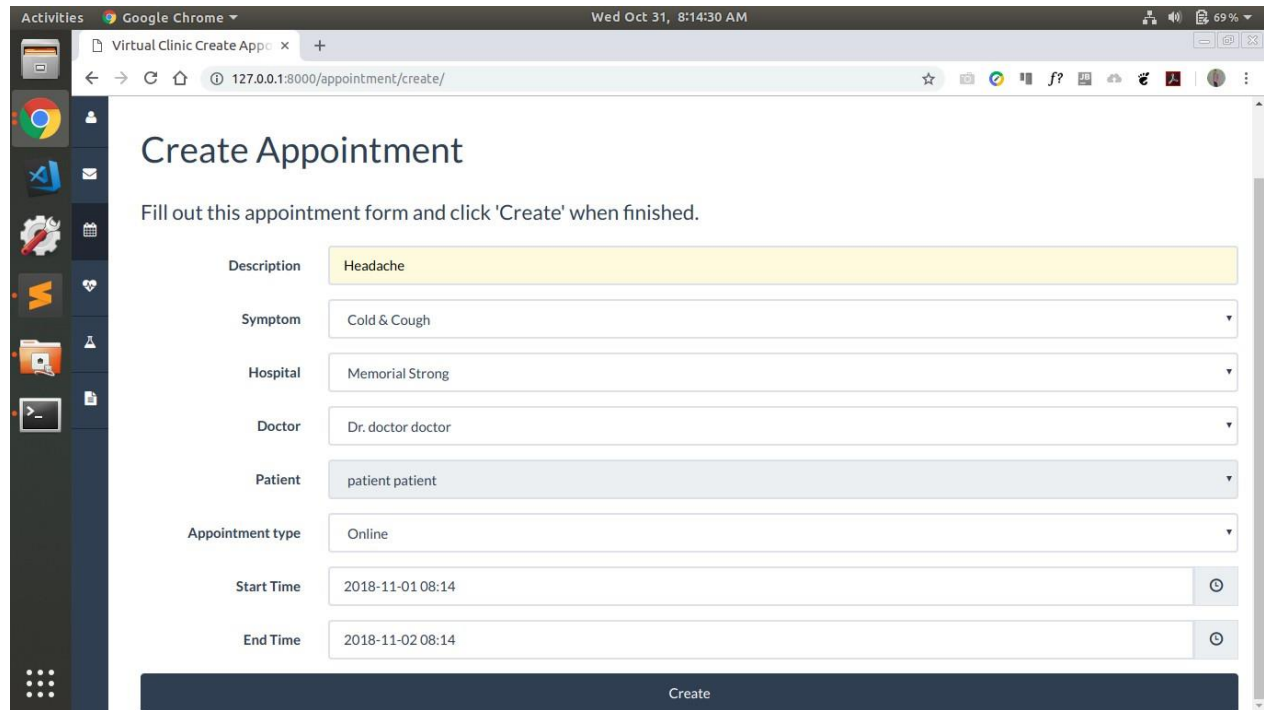
Above picture shows the page to see sent messages, receive messages and archived messages. We can create a new message by clicking on new message button.

14. Update Medical Information

A screenshot of a web browser showing the 'Virtual Clinic Update Medical Info' page. The browser's address bar displays 'virtual-clinic.herokuapp.com/medicalinfo/patient/'. The page has a dark blue header with 'VirtualClinic' on the left and 'Account Management' and 'About us' on the right. The main content area is titled 'Update Medical Info' and includes the instruction 'Make changes to your medical info and click 'Update Medical Info' when finished'. Below this are several form fields: 'Patient' (a dropdown menu showing 'sam jain'), 'Blood Type' (a dropdown menu showing 'A+ Type'), and 'Allergy' (a text input field with the placeholder 'Enter allergies here'). At the bottom, there are four rows of medical conditions with corresponding checkboxes: 'Alzheimer', 'Asthma', 'Diabetes', and 'Stroke'. All checkboxes are currently unchecked.

Above picture shows the form that can be filled by patient to update its medical information.

15. Appointment



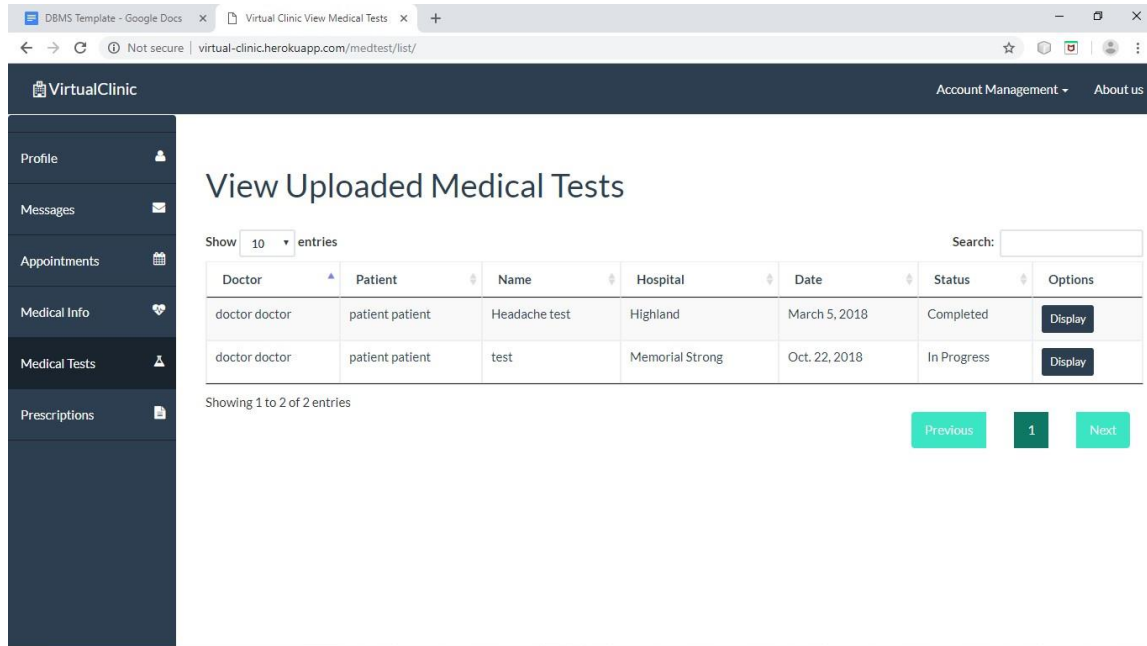
The screenshot shows a web browser window with the title 'Virtual Clinic Create Appo'. The address bar shows the URL '127.0.0.1:8000/appointment/create/'. The page content is titled 'Create Appointment' and includes the instruction 'Fill out this appointment form and click 'Create' when finished.' The form contains the following fields:

Description	Headache
Symptom	Cold & Cough
Hospital	Memorial Strong
Doctor	Dr. doctor doctor
Patient	patient patient
Appointment type	Online
Start Time	2018-11-01 08:14
End Time	2018-11-02 08:14

At the bottom of the form is a dark blue button labeled 'Create'.

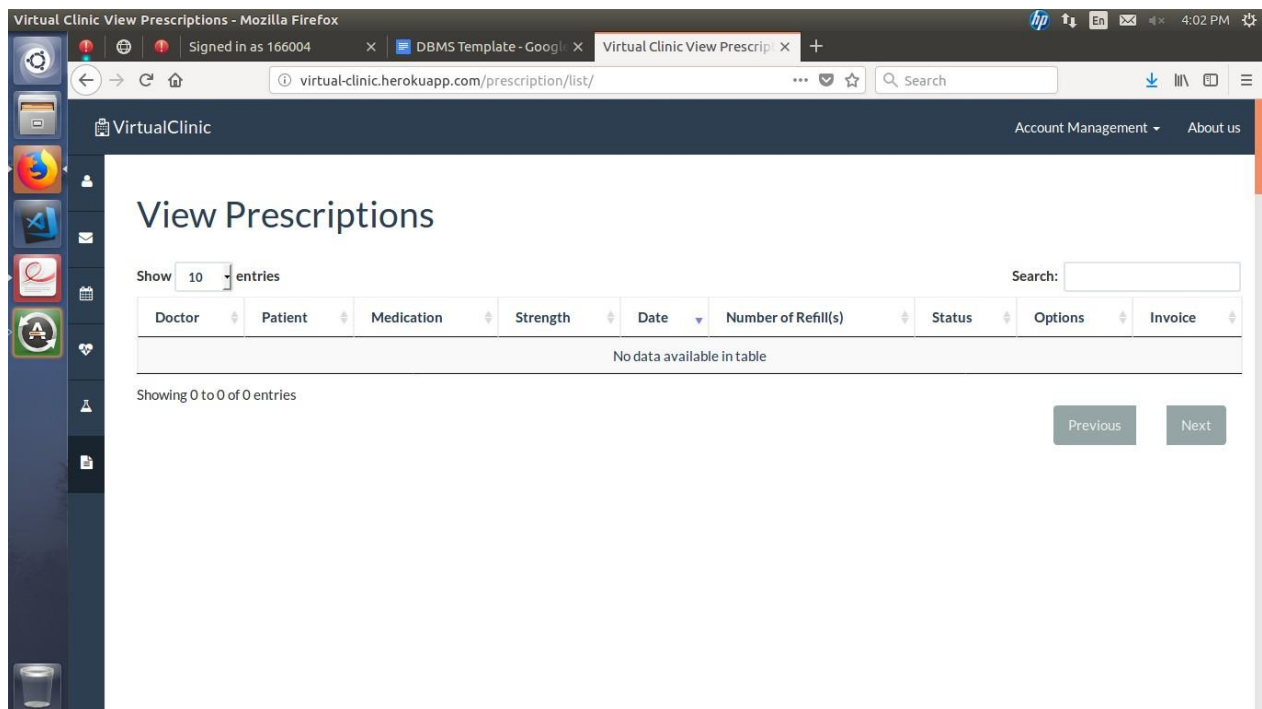
Above picture shows the form patient needs to fill in order to make an appointment

16. View uploaded medical tests



Above image shows the page used to display the medical test results to patient

17. View prescription



Above picture displays the prescriptions given to patient.

18. Doctor homepage

The screenshot shows a web browser window with the URL `virtual-clinic.herokuapp.com/profile/`. The page is titled "Virtual Clinic Overview" and displays a welcome message for Dr. Sam Jain. A navigation bar on the left side of the browser contains icons for various system functions. The main content area includes a "Schedule at a glance" section with a calendar for the week of October 21-27, 2018, and a "Recent messages" section showing a table with columns for From, Subject, and Options. The table is currently empty, displaying "No data available in table".

Welcome Dr. Sam Jain

Navigate through the VirtualClinic system using the bar on the left-hand side of the browser.

Schedule at a glance

Oct 21 - 27, 2018

	Sun 10/21	Mon 10/22	Tue 10/23	Wed 10/24	Thu 10/25	Fri 10/26	Sat 10/27
all-day							
6am							
7am							
8am							
9am							
10am							
11am							

Recent messages

Show 10 entries

Search:

From	Subject	Options
No data available in table		

Showing 0 to 0 of 0 entries

Previous Next

[For a more detailed message view, click here](#)

Above page shows homepage for any doctor.

19. Medical Information of patie

Virtual Clinic View Medical Info - Mozilla Firefox

Signed in as 166004

virtual-clinic.herokuapp.com/medicalinfo/list/

View Patient's Medical Information

Show 10 entries

Search:

Patient	Blood Type	Allergy	Options
ABC XYZ			
abcd efgh			
BRC NITK			
cassio marti			
emanuel okello			
Hardik Rana			
hi bye			
joel reyes			
Mishal Shah			
Mishal Shah			

Above picture shows the medical information for a particular patient as seen by doctor.

20. Prescription

Virtual Clinic View Prescriptions - Mozilla Firefox

Signed in as 166004

virtual-clinic.herokuapp.com/prescription/list/

View Prescriptions

Add Prescription

Show 10 entries

Search:

Doctor	Patient	Medication	Strength	Date	Number of Refill(s)	Status	Options	Invoice
Sam Jain	Mishal Shah	Crocin	30 mg	Oct. 10, 2018	6	Active	Delete Update	Generate Invoice

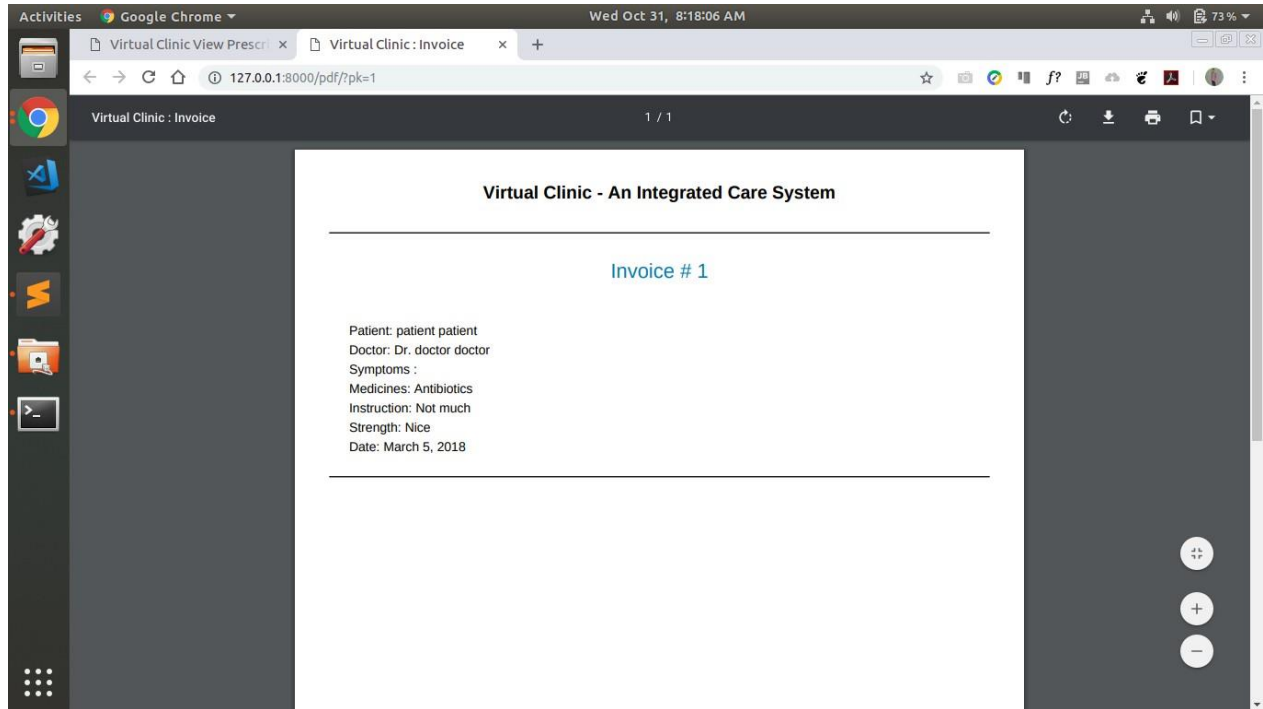
Showing 1 to 1 of 1 entries

Previous 1 Next

Above shows prescription details that doctor sees. He / she can add prescription by clicking on

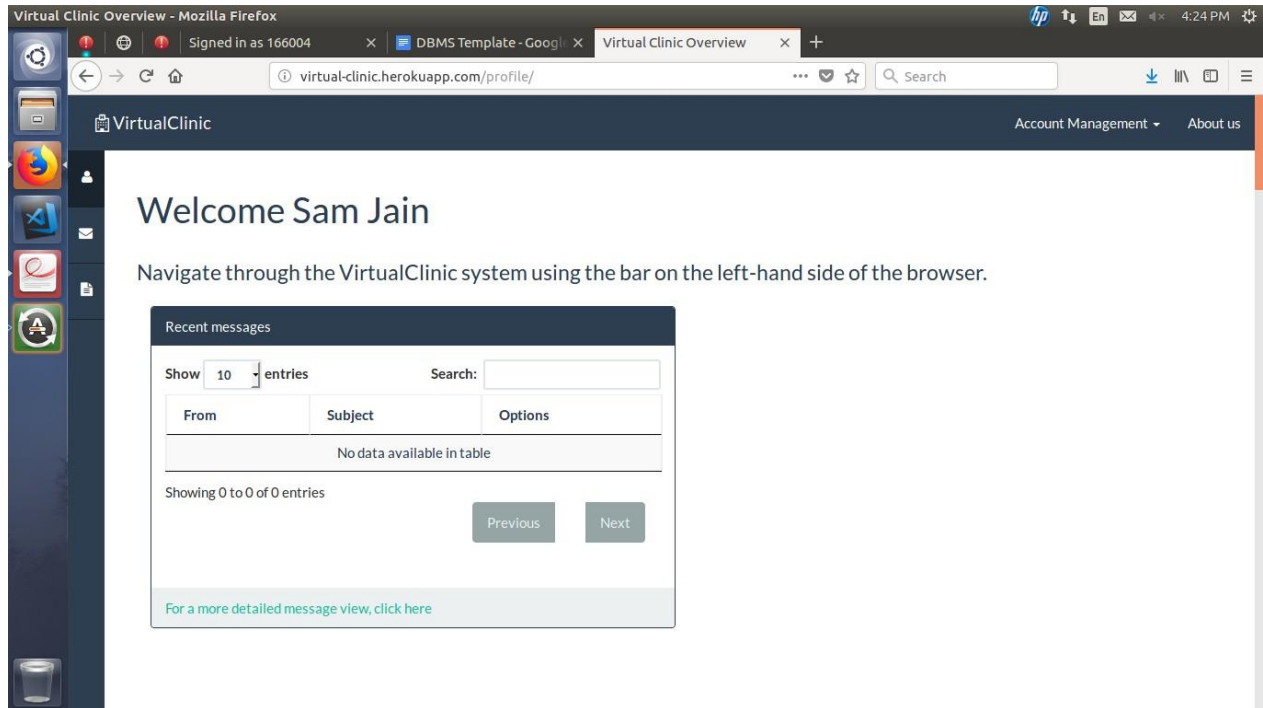
add prescription and delete or update it, also invoice can be generated.

21. Invoice Generated



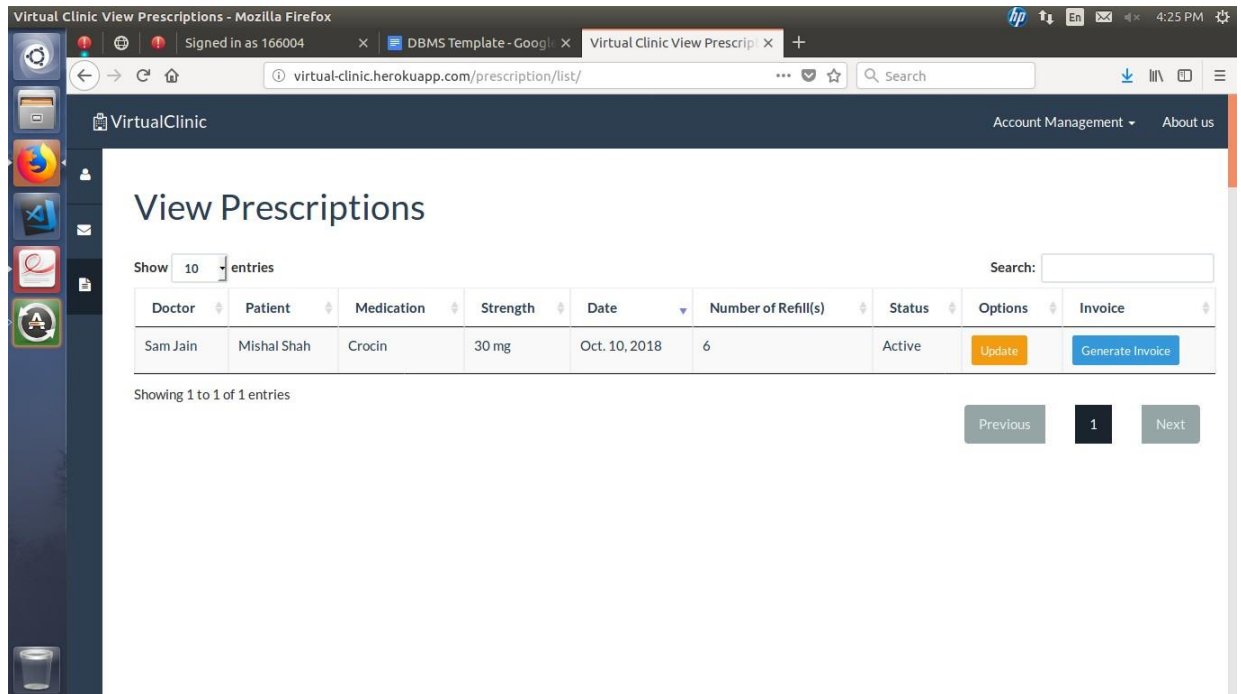
This is the generated invoice from the prescription

20. Chemist homepage



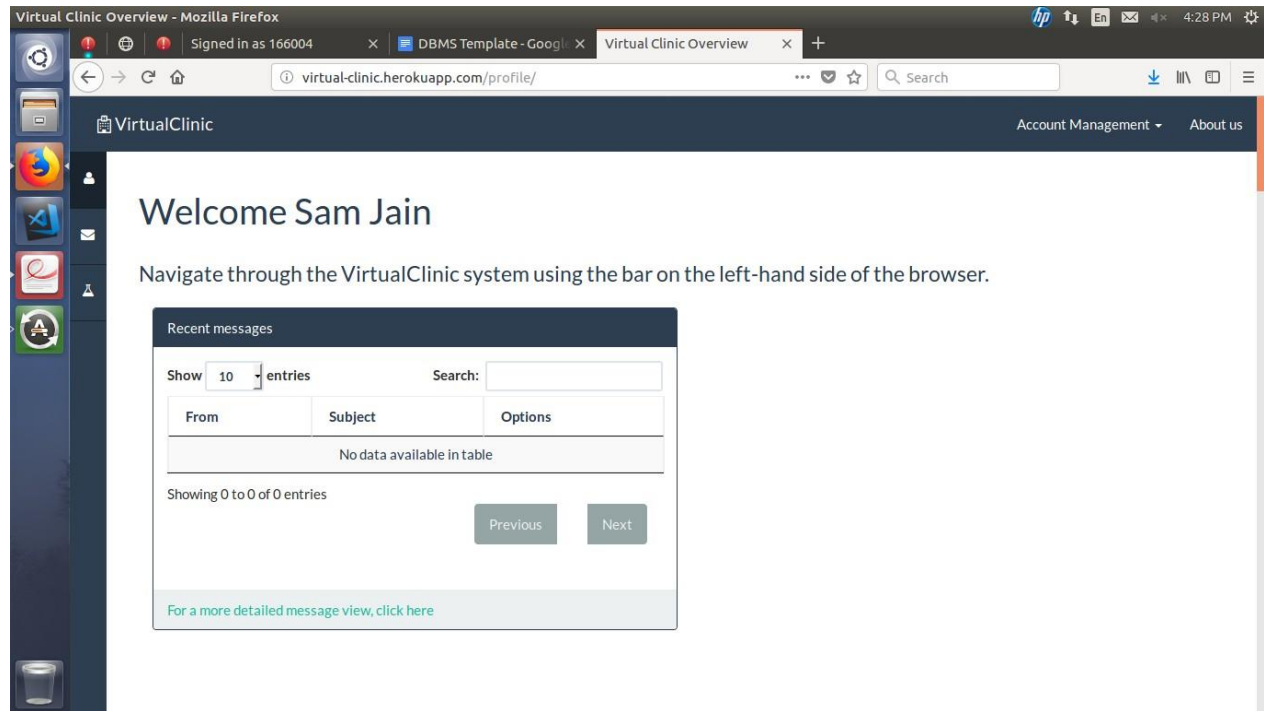
Above picture shows the homepage as seen by chemist.

21. Chemist prescription



Above picture shows how chemist sees prescription and updates it when medicines are delivered.

22. Lab home page



Above shows the homepage as seen by lab technician

23. Medical test upload

Activities Google Chrome Wed Oct 31, 8:20:06 AM

Virtual Clinic View Medical x +

127.0.0.1:8000/medtest/list/

VirtualClinic Account Management About us

View Uploaded Medical Tests

Upload Medical Test

Show 10 entries Search:

Doctor	Patient	Name	Hospital	Date	Status	Options
doctor doctor	patient patient	Headache test	Highland	March 5, 2018	Completed	Display Update
doctor doctor	patient patient	test	Memorial Strong	Oct. 22, 2018	In Progress	Display Update

Showing 1 to 2 of 2 entries

Previous 1 Next

Above picture shows the medical test screen as seen by lab, and by clicking on upload medical test he/she can upload the test results.

CONCLUSION

This report completely defines the Virtual Clinic application that visions to transform the modern healthcare system. Section 1 outlines the purpose and the objective of the application. Section 2 describes various software specifications required to build the application. Section 3 describes the database design techniques adopted to design the application, first entity relationship diagram was drawn and then it was mapped to the corresponding relational model following the rules of conversion. In section 4 front end design was explained along with various security measures that were considered. In last section results showing the snapshot of the application along with a description of them are highlighted. Finally we can say that Virtual Clinic is the go to application for modern healthcare that will connect various lives and save many by making the process stronger and easier by involving all the stakeholders in one system.