

Software Engineering Lab
Implementation II - Build II

Virtual Clinic - An Integrated Care System

Mishal Shah - 16CO125

Samyak Jain - 16CO254

March 30, 2018

1. Basic Information

There was no change or any new addition to the functional requirements. Only the pending functional requirements, given in the below table were implemented in build-2. Also many non-functional requirements like performance requirements, safety, security, software quality attributes and data-backup were also implemented and taken care off.

2. Pending/ New Functional Requirements (Implemented)

FRID	NAME	Pending/new	Description
Req-3/3 Req-5/3	Delete Patient , Doctor, Admin, Lab Profile	Pending	Delete the patient profile if required by the admin
Req-4	Maintain Symptoms	Pending	This is a master list of Symptoms that can be selected by Patient during Consultation Request
Req-4/1	Add Symptom	Pending	Add a new Symptom
Req-4/3	Delete Symptom	Pending	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
Req-11	View/Generate Prescription/ Print Invoice	Pending	Patient shall have the facility to view the Prescription and print the invoice. Alternately, Admin can print and email the Prescription and Invoice
Req-9	Deliver Medicines	Pending	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
Req-10	Perform Lab Tests	Pending	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
Req-12	Housekeeping Patient Profiles and Consultation Requests	Pending	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
Req-13	Daily Back-up	Pending	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.

3. Functional Requirements (Not Implemented)

FRID	NAME	Description	Why not implemented in this build?
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-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



		<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>couldn't query anything onto our 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 of Functional Requirements Implemented in this Build

Req 3/3, Req 5/3, Req 12:

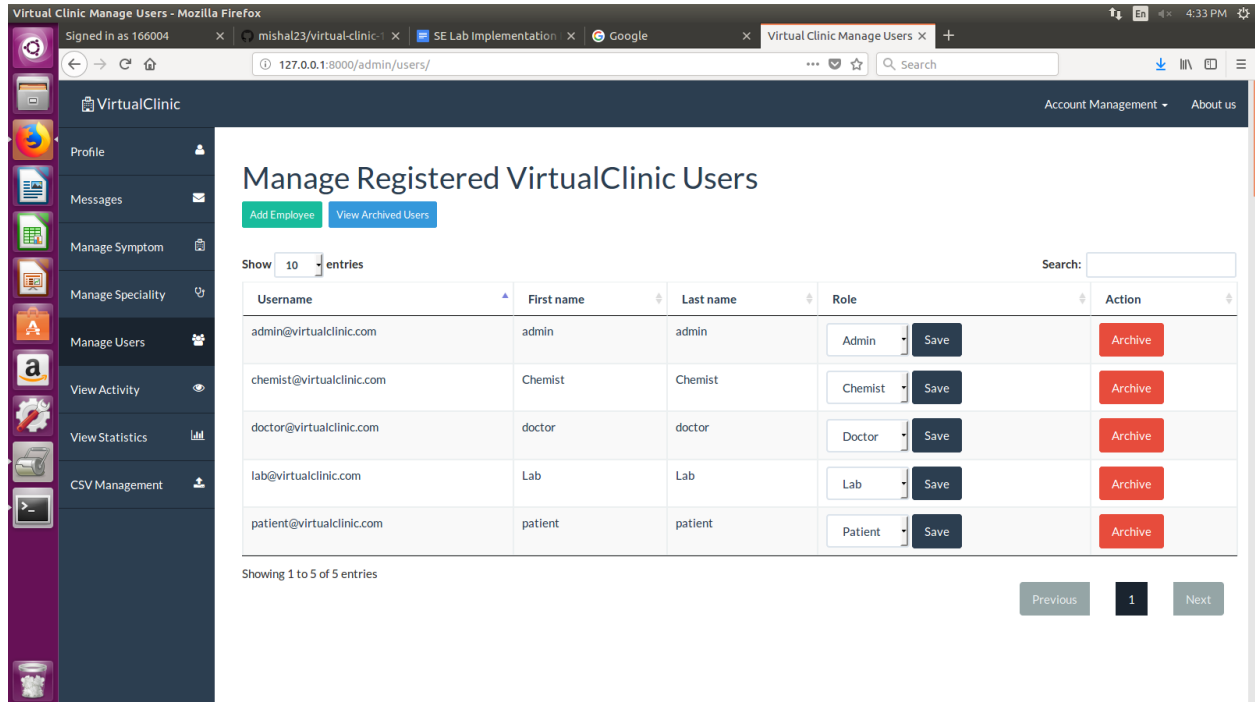
Delete(Archive) doctor/lab/chemist/patient/admin

Before deletion (archiving)

The screenshot shows the 'Virtual Clinic Manage Users' interface in a Mozilla Firefox browser. A modal dialog titled 'Archive user confirmation' is displayed, asking 'Are you sure you want to archive the admin admin1@virtualclinic.com?'. The dialog has two buttons: 'Archive the user' (red) and 'Return' (dark blue). In the background, a table lists users with columns for Username, Role, and Action. The table contains six entries, each with a 'Save' button and an 'Archive' button (red). The first entry is 'admin1@virtualclinic.com' with role 'admin'. The table is paginated, showing 1 to 6 of 6 entries.

Username	Role	Action
admin1@virtualclinic.com	admin	Archive
admin@virtualclinic.com	admin	Archive
chemist@virtualclinic.com	Chemist	Archive
doctor@virtualclinic.com	doctor	Archive
lab@virtualclinic.com	Lab	Archive
patient@virtualclinic.com	patient	Archive

After deletion(archiving)



The screenshot shows the 'VirtualClinic Manage Users' interface in a Mozilla Firefox browser. The page title is 'Manage Registered VirtualClinic Users'. There are two buttons at the top: 'Add Employee' (green) and 'View Archived Users' (blue). Below these, there is a 'Show 10 entries' dropdown and a 'Search:' input field. The main content is a table with the following columns: Username, First name, Last name, Role, and Action. The table contains five entries, each with a 'Save' button and an 'Archive' button in the Action column.

Username	First name	Last name	Role	Action
admin@virtualclinic.com	admin	admin	Admin	Save Archive
chemist@virtualclinic.com	Chemist	Chemist	Chemist	Save Archive
doctor@virtualclinic.com	doctor	doctor	Doctor	Save Archive
lab@virtualclinic.com	Lab	Lab	Lab	Save Archive
patient@virtualclinic.com	patient	patient	Patient	Save Archive

Showing 1 to 5 of 5 entries

Previous 1 Next

Req 4: Maintain Symptoms

Dashboard of maintain symptom as seen by admin

The screenshot shows a web application interface for managing symptoms. The browser window is titled 'Virtual Clinic Speciality - Mozilla Firefox'. The address bar shows the URL '127.0.0.1:8000/admin/symptom/'. The page has a dark blue sidebar on the left with various icons and labels: Profile, Messages, Manage Symptom, Manage Speciality, Manage Users, View Activity, View Statistics, and CSV Management. The main content area is titled 'View Symptom' and includes a green 'Add Symptom' button. Below this, there is a table with columns 'Symptom', 'Description', and 'Option'. The table contains one row with the text 'Cold & Cough' and 'Very common', and a red 'Delete' button. Above the table, there is a search bar and a 'Show 10 entries' dropdown. Below the table, it says 'Showing 1 to 1 of 1 entries' and there are 'Previous', '1', and 'Next' buttons for pagination.

Symptom	Description	Option
Cold & Cough	Very common	Delete

Req 4/1 : Add symptom

Before the symptom is added (Add symptom page)

The screenshot shows a web browser window titled "Virtual Clinic Add symptoms - Mozilla Firefox". The address bar displays "127.0.0.1:8000/admin/add_symptom/". The page has a dark blue sidebar on the left with the "VirtualClinic" logo and a list of navigation items: Profile, Messages, Manage Symptom, Manage Speciality, Manage Users, View Activity, View Statistics, and CSV Management. The main content area is titled "Add symptoms" and contains two text input fields. The first field, labeled "Name of symptom", contains the text "fever". The second field, labeled "Description of Symptom", contains the text "patient will have high body temperature". Below these fields is a dark blue button labeled "Add Symptom". The top right of the page includes links for "Account Management" and "About us".

Virtual Clinic - An Integrated Care System

After the symptom is added

The screenshot shows a web browser window with the URL `127.0.0.1:8000/admin/symptom/`. The application is titled "VirtualClinic" and has a sidebar menu with options: Profile, Messages, Manage Symptom, Manage Speciality, Manage Users, View Activity, View Statistics, and CSV Management. The main content area is titled "View Symptom" and includes an "Add Symptom" button. Below this, there is a table with 2 entries. The table has columns for Symptom, Description, and Option. The first entry is "Cold & Cough" with description "Very common" and a "Delete" button. The second entry is "fever" with description "patient will have high body temperature" and a "Delete" button. The table is paginated, showing "Showing 1 to 2 of 2 entries" and navigation buttons for "Previous", "1", and "Next".

VirtualClinic

Account Management About us

View Symptom

[Add Symptom](#)

Show 10 entries Search:

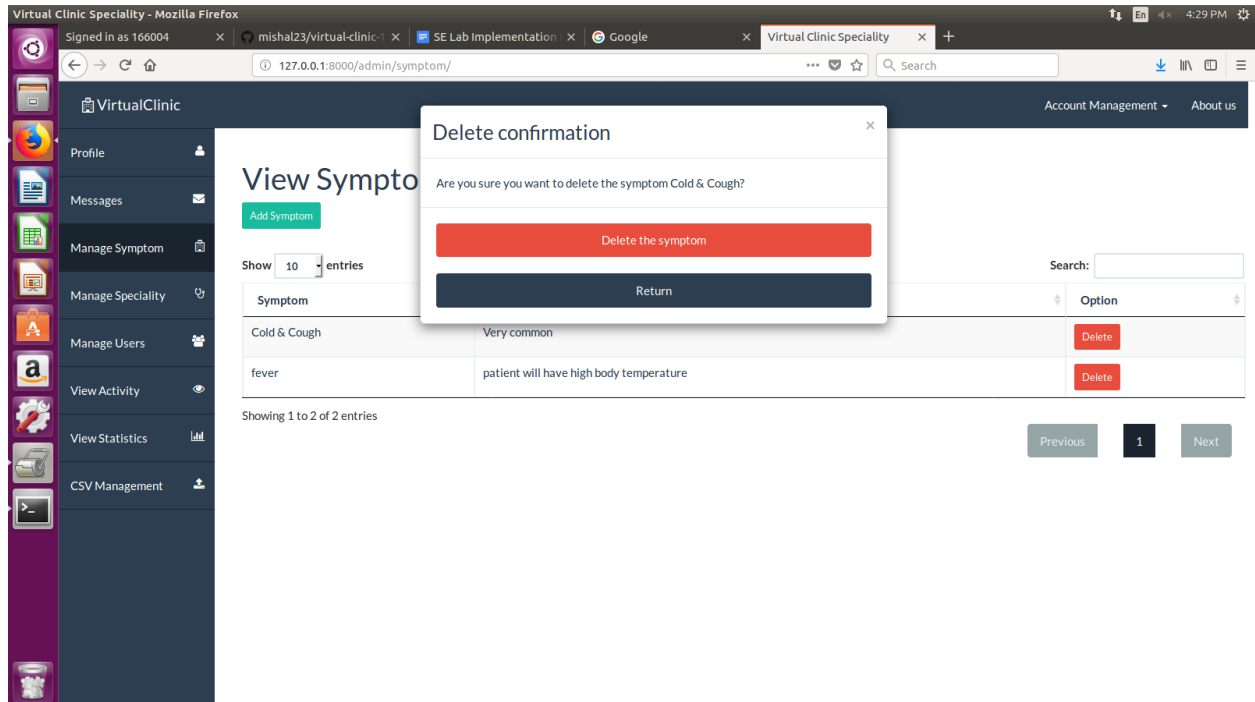
Symptom	Description	Option
Cold & Cough	Very common	Delete
fever	patient will have high body temperature	Delete

Showing 1 to 2 of 2 entries

Previous 1 Next

Req 4/3:delete symptom

Before deleting symptom



After deleting the symptom

Virtual Clinic Speciality - Mozilla Firefox

Signed in as 166004 x mishal23/virtual-clinic-1 x SE Lab Implementation x Google x Virtual Clinic Speciality x +

127.0.0.1:8000/admin/symptom/ Search

VirtualClinic Account Management About us

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

View Symptom

[Add Symptom](#)

Show 10 entries Search:

Symptom	Description	Option
fever	patient will have high body temperature	Delete

Showing 1 to 1 of 1 entries

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

Req 11: Generate invoice

Before generating the invoice (prescription page)

Virtual Clinic View Prescriptions - Mozilla Firefox

Signed in as 166004 x mishal23/virtual-clinic-1 x SE Lab Implementation x Google x Virtual Clinic View Prescrip x +

127.0.0.1:8000/prescription/list/

VirtualClinic Account Management About us

View Prescriptions

Add Prescription

Show 10 entries Search:

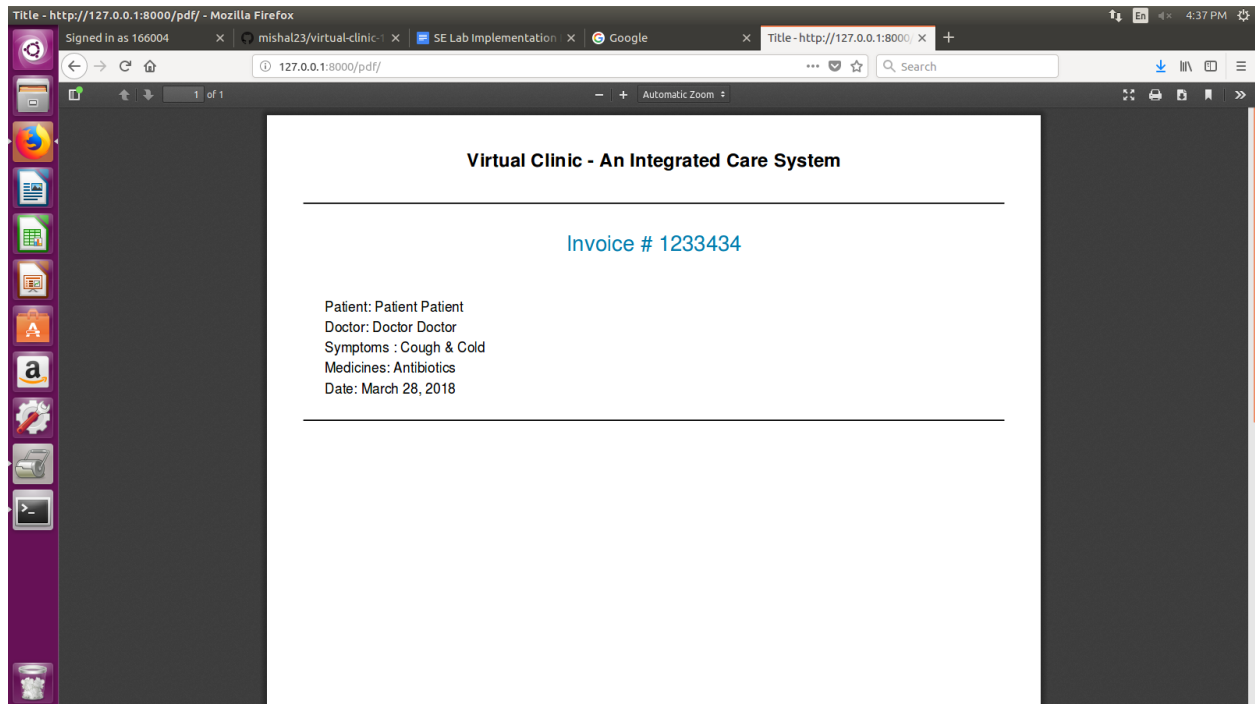
Doctor	Patient	Medication	Strength	Date	Number of Refill(s)	Status	Options	Invoice
doctor doctor	patient patient	Antibiotics	Nice	March 5, 2018	2	Active	Delete Update	Generate Invoice

Showing 1 to 1 of 1 entries

Previous 1 Next

Virtual Clinic - An Integrated Care System

After generating the invoice (invoice generated as a pdf document)



Req 9: Deliver Medicines

Chemist dashboard to view prescriptions

The screenshot shows a web browser window with the URL `127.0.0.1:8000/prescription/list/`. The page title is "VirtualClinic" and the user is signed in as "166004". The left sidebar contains links for Profile, Messages, and Prescriptions. The main content area is titled "View Prescriptions" and displays a table with one entry. The table has columns for Doctor, Patient, Medication, Strength, Date, Number of Refill(s), Status, and Options. The entry shows "doctor doctor" as the doctor, "patient patient" as the patient, "Antibiotics" as the medication, "Nice" as the strength, "March 5, 2018" as the date, "2" as the number of refills, and "Active" as the status. An "Update" button is visible in the Options column. Below the table, it says "Showing 1 to 1 of 1 entries" and there are "Previous", "1", and "Next" pagination buttons.

Doctor	Patient	Medication	Strength	Date	Number of Refill(s)	Status	Options
doctor doctor	patient patient	Antibiotics	Nice	March 5, 2018	2	Active	Update

Chemist updates its delivery status

The screenshot shows a web browser window with the URL `127.0.0.1:8000/prescription/update/?pk=1`. The page title is "VirtualClinic" and the user is signed in as "166004". The left sidebar contains links for Profile, Messages, and Prescriptions. The main content area is titled "Update Prescription" and contains a form for updating a prescription. The form has fields for Patient, Doctor, Date, Medication, Strength, Instruction, and Refill. The Patient field is set to "patient patient" and the Doctor field is set to "Dr. doctor doctor". The Date field is set to "2018-03-05". The Medication field is set to "Antibiotics". The Strength field is set to "Nice". The Instruction field is set to "Not much". The Refill field is set to "2". There is an "Update Prescription" button at the bottom of the form.

Make changes to the prescription and click 'Update Prescription' when finished.

Patient
• Select a valid choice. That choice is not one of the available choices.

Doctor
• Select a valid choice. That choice is not one of the available choices.

Date

Medication

Strength

Instruction

Refill

[Update Prescription](#)

Req 10: Perform Lab Tests

Lab dashboard to display and update medical test

Virtual Clinic View Medical Tests - Mozilla Firefox

Signed in as 166004 x Django Development E x mishal23/virtual-clinic x Virtual Clinic View Medical x SE Lab Implementation x SE Lab Implementation x

127.0.0.1:8000/medtest/list/ Search

VirtualClinic Account Management About us

Profile Messages Medical Tests

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

Showing 1 to 1 of 1 entries

Previous 1 Next

Upload Test results after performing the necessary test

Virtual Clinic Upload Test result - Mozilla Firefox

Signed in as 166004 x Django Development E x mishal23/virtual-clinic x Virtual Clinic Upload Test re x SE Lab Implementation x SE Lab Implementation x

127.0.0.1:8000/medtest/upload/ 80% Search

Upload Test Result

Fill out the medical test form and click 'Upload' when finished.

Name

Date

Hospital

Description

Doctor

Patient

Private ☒

Completed ☐

Image 1

Image 2

Image 3

Image 4

Image 5

Display test results

Virtual Clinic View Medical Test - Mozilla Firefox

Signed in as 166004 x Django Development E x mishal23/virtual-clinic x Virtual Clinic View Medical x SE Lab Implementation x SE Lab Implementation x

127.0.0.1:8000/medtest/display/?pk=1 Search

VirtualClinic Account Management About us

Profile Messages Medical Tests

View Medical Test

Name: Headache test

Date: 2018-03-05

Hospital: Highland
• Select a valid choice. That choice is not one of the available choices.

Description: Headache

Doctor: Dr. doctor doctor
• Select a valid choice. That choice is not one of the available choices.

Patient: patient patient
• Select a valid choice. That choice is not one of the available choices.

Private: ☐

Completed: ☒

Return to list of Medical Tests

Req 12: Housekeeping patient profile and consultation Request

Before archiving the details (consultation request)

Virtual Clinic Overview - Mozilla Firefox

Signed in as 166004 x mishal23/virtual-clinic-1 x SE Lab Implementation x New Tab x Virtual Clinic Overview x

127.0.0.1:8000/profile/ Search

Welcome Dr. doctor doctor

Successfully logged into VirtualClinic.

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

Schedule at a glance

Mar 25 - 31, 2018

	Sun 3/25	Mon 3/26	Tue 3/27	Wed 3/28	Thu 3/29	Fri 3/30	Sat 3/31
all-day							
6am							
7am							
8am							
9am							
10am							
11am							
12pm							
1pm							

For a more detailed schedule view, click here

Recent messages

Show 10 entries Search:

From	Subject	Options
	Appointment created	Reply Read Archive
	Appointment created	Reply Read Archive
	Appointment created	Reply Read Archive
	Appointment updated	Reply Read Archive

Showing 1 to 4 of 4 entries

Previous 1 Next

For a more detailed message view, click here

After archiving the details(consultation request)

VirtualClinic Overview - Mozilla Firefox

Signed in as 166004 x mishal23/virtual-clinic-1 x SE Lab Implementation x New Tab x Virtual Clinic Overview x +

127.0.0.1:8000/profile/ Search

VirtualClinic Account Management About us

Profile Messages Appointments Medical Info Prescriptions

Welcome Dr. doctor doctor

The message was archived.

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

Schedule at a glance

today Mar 25 – 31, 2018 month week day

	Sun 3/25	Mon 3/26	Tue 3/27	Wed 3/28	Thu 3/29	Fri 3/30	Sat 3/31
all-day							
6am							
7am							
8am							
9am							
10am							
11am							
12pm							

Recent messages

Show 10 entries Search:

From	Subject	Options
	Appointment created	Reply Read Archive
	Appointment created	Reply Read Archive
	Appointment updated	Reply Read Archive

Showing 1 to 3 of 3 entries

Previous 1 Next

NOTE: Housekeeping of patient profile was already implemented and shown in the first screenshot

5. Non-Functional Requirements Considered

NFRID	Name	Description
5.1	Performance Requirements	It includes variety of performance related requirements like robustness, response time, memory usage, load time, speed of the software etc.
5.2	Safety Requirements	The system shall be designed to comply with health care regulations as defined by Government of India.
5.3	Security Requirements	All communications between the browser and the website needs to be encrypted. Every stakeholder can login after giving the desired password and authentication.
5.4	Software quality attributes	The Key Software Quality Attributes are Availability, Reliability and Usability. As the system is expected to be 24/7 - High availability is very important. Also, since the major transaction i.e. Patient Consultation Requests has classified data/ information the system needs to be highly reliable.
5.5	Software back-ups and redundancy	All the day needs to be periodically backed up to ensure that the software runs efficiently even if there is a failure in the main system.

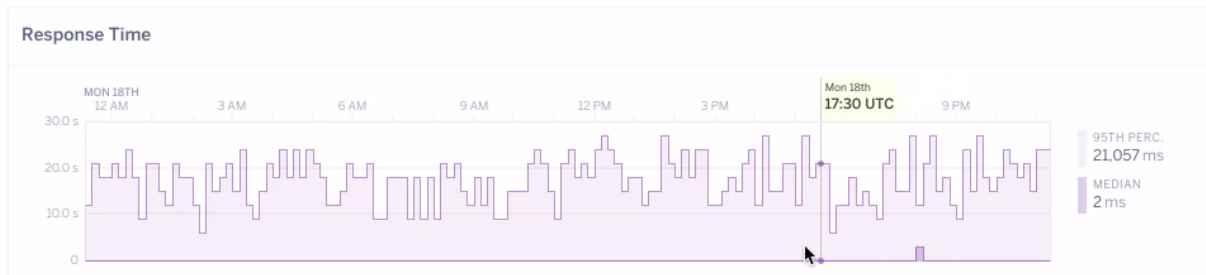
6. ScreenShots of Non-Functional Requirements

5.1 Performance Requirements

When deployed on server only, 2 requests of 22 fail in a minute



When deployed on server, approximate response time is 2 milliseconds to respond to the incoming request



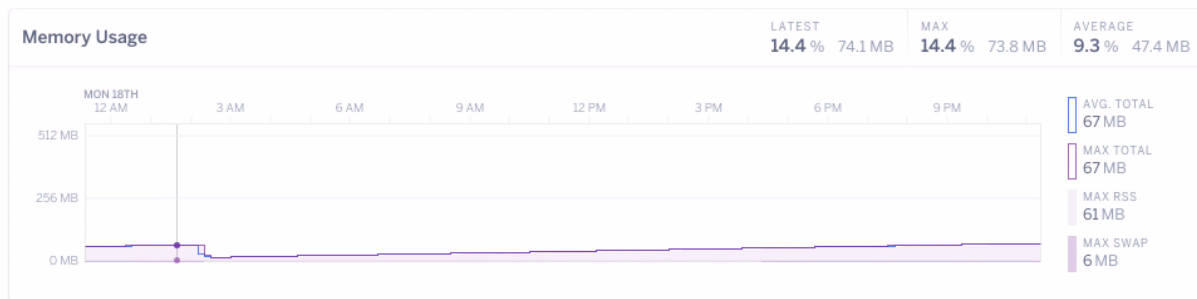
Memory Usage of the application:

Average Total : 67MB

Maximum Total : 67MB

Maximum RSS : 61MB

Maximum SWAP memory : 5MB



Upon login, the Data Object Model loading takes only 467ms, and the overall load time is 836ms.

The screenshot shows the VirtualClinic application interface on the left and the Chrome DevTools performance tab on the right. The application interface includes a header with the VirtualClinic logo, a main content area with a 'Welcome patient patient' message and a 'Successfully logged into VirtualClinic.' notification, and a 'Schedule at a glance' calendar for March 25-31, 2018. The DevTools performance tab shows a timeline of events. A specific event is highlighted, showing a 'Load' time of 836 ms. Below the timeline, the console shows a message about the Chrome 65 update.

5.2 Safety Requirements

Safety Requirements for each user are very properly taken care while implementing the software.

5.3 Security Requirements

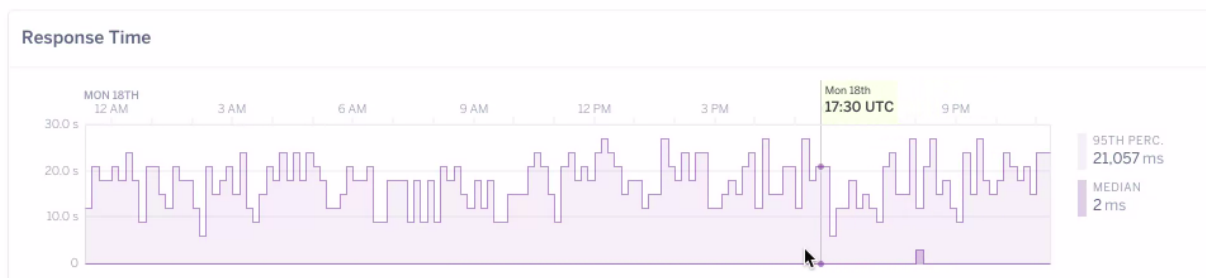
The server is deployed over https which is the secure version of HTTP, the protocol over which data is sent between your browser and the website that you are connected to. The 'S' at the end of HTTPS stands for 'Secure'. It means all communications between your browser and the website are encrypted.

HTTPS is often used to protect highly confidential online transactions like online banking and online shopping order forms. Hence the security requirements are very well taken care off.

Moreover every stakeholder can access his/her account only by logging after the authentication.

5.4 Software Quality Attributes

As it can be seen, our software when deployed on server is available throughout the day



5.5 Software Backups & Redundancy:

As the data of each user is important, data backup is done.

Data Backup: All the data is periodically backed up in JSON format and stored in a slave database

```

Open  Save
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Throat"}}, {"model": "server.location", "pk": 1, "fields": {"city": "Unicorn", "zip": "12432", "state": "NY", "country": "India", "address": "1
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"2018-03-05T06:39:19.002Z", "prefHospital": null, "primaryCareDoctor": null, "speciality": ""}}]]
JSON  Tab Width: 8  Ln 1, Col 1  INS

```

7. Summary of Test Plan

- All high priority functional requirements stated in SRS will be tested and the ones which are of low priority will not be tested in the testing phase of the project.
- Most of the functional requirements will be unit tested by unittest module.
- We will integrate Travis CI to our github repository so that all the tests are run and passed before anything is merged On it the production branch.
- Types of testing to be performed.
 - Functional Testing - BlackBox Testing
 - System Testing - Blackbox Testing
 - Performance Testing - Blackbox Testing
 - Usability Testing - Blackbox Testing
 - Acceptance Testing - Blackbox Testing
 - Beta Testing - Blackbox Testing
 - Unit Testing - Whitebox Testing
- Outcomes Expected
 - Functional Testing : We as developers of the software will be comparing our SRS and confirm that it is implemented and works correctly.
 - System Testing : For system testing, we will be installing our software on different Operating Systems and ensure that software works properly.
 - Performance Testing : We will be relying on a PaaS for speed and effectiveness of the system.
 - Usability Testing : This will be performed by the client to evaluate how user-friendly the GUI is? How easily can the client learn? After learning how to use, how proficiently can the client perform? How pleasing is it to use its design?
 - Acceptance Testing : This will be performed by the customer to ensure that the delivered product meets the requirements and works as the customer expects.
 - Beta Testing : This will be done by end users, a team outside development. This will cover some of the unexpected errors.
 - Unit Testing : This will be performed mainly by unittest module in python to ensure that all the functions are correctly implemented and working.

8. Summary

This report is divided into 7 sections each of them describing a different implementation aspect of the system. Section-1 gives the introduction about the functional requirements implemented. Section-2 depicts a table that shows the list of various functional requirement implemented in this build and states whether they were pending or new. Section-3 gives the list of functional requirement that could not be implemented in this build. Section-4 illustrates the functional requirements implemented in this build with the help of screenshots. Section-5 gives a list of Non-functional requirements considered while developing the system and is followed by the screenshots of the same. Last section gives the test plan i.e the next phase in the software development Life-cycle model.

