



FINAL SEMESTER ASSESSMENT (FSA) B.TECH. (CSE)
VI SEMESTER

**UE18CS355 – OBJECT ORIENTED ANALYSIS AND DESIGN
WITH SOFTWARE ENGINEERING LABORATORY**

**PROJECT REPORT
ON
VIDEO STREAMING APPLICATION**

SUBMITTED BY

NAME	SRN
Rahul Kata	PES1201802018
Aditya D N	PES1201800315
Manohar D	PES1201800305

JANUARY – MAY 2021

**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
RR CAMPUS, BENGALURU – 560100,
KARNATAKA, INDIA**

TABLE OF CONTENTS

Sl.No	TOPIC	PAGE No
1.	Abstract	2
2.	Software Requirements Specification (SRS)	3 - 20
3.	Project Plan	21 - 26
4.	Design Diagrams	27 - 29
5.	Module Description	30
6.	Test Cases	31 - 41
7.	Screenshots of output	42 - 46

1. ABSTRACT

Streaming media is an emerging force in the way that we produce, consume, and distribute media. Streaming is increasingly imperative to the smooth functioning of the Internet because it allows users to experience mediated content without downloading all of the files or information before usage.

In our project we build a site to stream videos. The site includes features to group videos based on Most trending, most liked etc. Upon streaming a video we allow the user to like and comment on the video. The last and most important feature is for users to be able to make playlists of the videos they like or wish to rewatch later.

2. SOFTWARE REQUIREMENTS SPECIFICATION

Revision History

Name	Date	Reason For Changes	Version
Video Streaming platform	06/02/2021	SRS building	01

1. Introduction

1.1 Purpose

The purpose of this document is to deliver detailed instructions, descriptions and requirements of an online streaming platform. It describes the purpose, features, scope and use of the system, the interfaces of the system, and constraints that it must operate.

1.2 Intended Audience

This system is a broad platform that has multiple users and uses. It has widespread demography intended to be viewed by people of all age groups, particularly viewed more often by younger visitors aged 18 to 24.

We can find blacksmiths, prop makers, artists, DIYers, gamers, game developers, hackers, PC specialists, movie and film producers, product reviewers, vloggers, comedians, tutorials, health professionals, religious persons, musicians and many more, people who intend to make a create and share a video are the audience of this system.

1.3 Product Scope

This system will be an online video streaming platform for uploading and sharing of videos by the users. Millions of users around the world make accounts on the platform that will allow them to upload their videos or view various videos with preferred filters already existing. Through this platform, users can upload video, stream video, share videos and even download them.

1.4 References

1. <https://digiday.com/media/demographics-youtube>.(describes the demography of video streaming platforms (youtube)).
2. <https://creatoracademy.youtube.com/>.(describes the features of youtube platform)
3. <https://en.wikipedia.org/wiki/YouTube>

2. Overall Description

2.1 Product Perspective

We have to build the system from scratch. It allows the users to upload, stream, share, review, rate, like and comment on videos and even subscribe to other channels. Every user is allowed to upload videos, so the user is here either to upload their domain-specific videos or to stream already existing videos. The system contains a wide variety of user-generated or corporate generated videos. Available content includes TV show clips, music videos, reaction videos, educational videos, live streams, movies, recordings and other content videos.

2.2 Product Functions

The system signs in a user with credentials. It allows the user to create their personal channel, search for and watch videos of interests, upload videos, like/share/comment on other videos, subscribe to other channels and users. Create a playlist to organise videos and group videos together. It even allows the user to create their community of followers and raise funds.

2.3 User Classes and Characteristics

The system attracts a wide range of users, users of all age groups. Also attracts an even split of male and female audiences. We aim for the younger visitors to spend more time on this platform although the streaming content is not biased for just them, but the younger visitors are more susceptible to streaming and sharing videos over the internet. The users on the platform can be bifurcated either as a viewer or a publisher, the viewer searches for content to stream, the publisher publishes their domain-specific videos. It also has corporates to manage and publish ads over the videos that provide revenue for the publishers.

2.4 Operating Environment

The platform is operational by any system that has the most up-to-date browser (Ex: newest version Google Chrome, Firefox, MS Edge, Safari, or Opera), operating system, and a decent internet connection (with 500+ kbps).

Minimal requirements: For PC/Laptop

- RAM: 128mb with 64mb video card

- Space: 80Gb Hard Drive
- Core: Pentium IV 500Mhz or more
- Cache: 512kb
For Android/IOS
- RAM: 128mb with 64mb video card.
- Space: 500mb
- Cache: 200kb

For streaming few premium videos on platforms -- like movies, TV shows, and livestreams -- require a faster connection and greater processing power for optimal streaming speeds.

Here's what it needs:

- Newest version of Google Chrome, Firefox, MS Edge, or Safari
- Operating system: Windows 7+, Mac OS X 10.7+, or Ubuntu 10+
- Internet connection with 1+ Mbps

2.5 Design and Implementation Constraints

Designing a user interface which is robust and easy to use is a challenge. Storing and handling large amounts of data can be a challenge. When the application is getting large number of hit requests, balancing the load can be a challenge and here hardware constraints can come into role. Hardware Constraints include configuration characteristics, what devices are to be supported, how they are to be supported, and communication protocols, any applicable characteristics or limits on primary and secondary memory or memory storage, any hardware interfaces that are to be supported by the software, including logical structure, physical addresses, expected behavior, etc. Taking care of intuitive navigation that involves placing elements where people expect to see them and developing a convenient menu structure and simple content search. Additionally by providing the accessibility of viewing videos across all location and across all devices will give a good experience to the user.

2.6 Assumptions and Dependencies

The demography of viewers depends on the content type of the videos, so we assume that the publishers upload videos with different contents i.e., it adds to the number of publishers with different domains and that we get enough ad corporates so that the publishers' videos are funded. We assume that the user has minimal software requirements as specified above to use this platform.

3. External Interface Requirements

3.1 User Interfaces

The platform shall be very user friendly and easy to use. Video publishers or viewers shall not face any difficulties while navigating through different areas in the platform. Alerts and pop up will be implemented wherever necessary to keep the users and publishers in the right track. For example, a publisher will be alerted when he tries to upload a .mp3 file rather than a video file. Providing accurate search results is one of the goals. The system will provide an easy interface for the publishers to upload and modify videos , engage with their subscribers. Interface to analyse the videos uploaded, which includes details of the reach of the uploaded video, ad revenue, watch time, shall also be implemented.

3.2 Software Interfaces

The system uses the Dynamic Adaptive Streaming over HTTP protocol an adaptive bit-rate HTTP-based streaming solution optimizing the bitrate and quality for the available network. Supports MOV, MPEG4, AVI, WMV, MPEG PS, FLV, 3GPP WebM, MP4 and other formats for video and MP3, linear PCM, AAC, FLAC, Vorbis, Opus, and Dolby Digital formats for audio. MP4 video format along with H. 264 video codec and AAC audio codec gives a high-quality video and a small file size. System uses AI and data analysis to provide a personalised content to the users based on their activities and also creates a page of trending videos with a higher number of views in a short time. The user can upload videos with duration as long as 12 hours and more but can be at most 128gb in size. The system uses speech recognition technology to auto generate captions but since this is not accurate enough, it even has several options of manually entering captions for greater accuracy. There is also an option to stream at multiple quality levels. The system offers users the ability to view its videos on web pages outside their website. Each video is accompanied by a piece of HTML that can be used to embed it on any page on the Web.

3.3 Communications Interfaces

System lets the user upload and publish video, so the user uploads a video and adds descriptive details which can help viewers to find this video. Before publishing he even adds some other details like title, description and thumbnail, which act as a metadata to find the video. Further behind the curtains, the system creates chunks of this video processes it to get a compatible format, stitches it back and makes it available for all users.

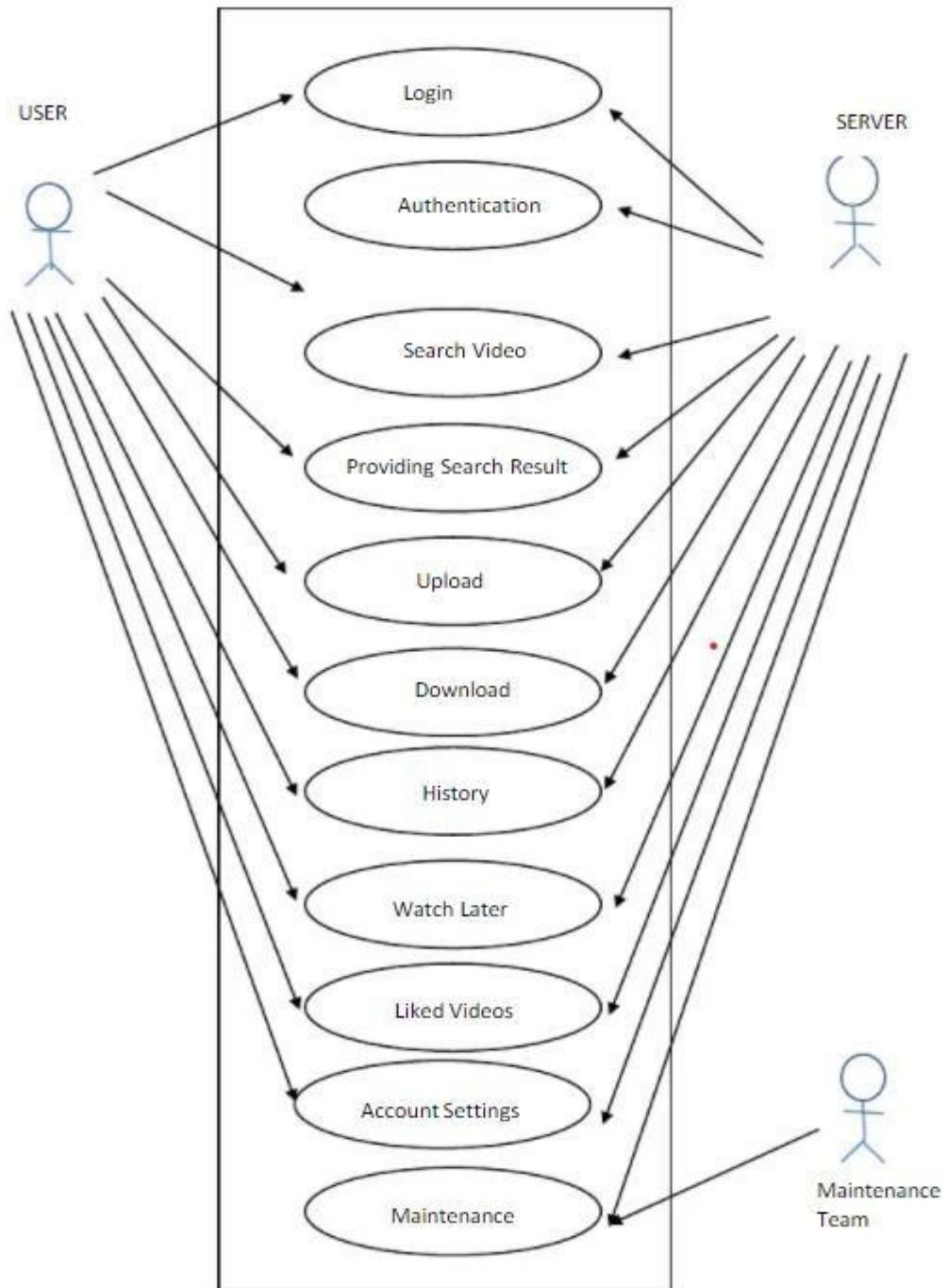
When a user plays a video system will use the technology called adaptive bit-rate HTTP-based streaming for delivering an optimised continuous streaming video that adjusts to your broadband.

As for the communication between the viewer and the publisher, multiple options like like streaming, comments, community page(to upload stories), short video uploading windows are provided.

4. System Features

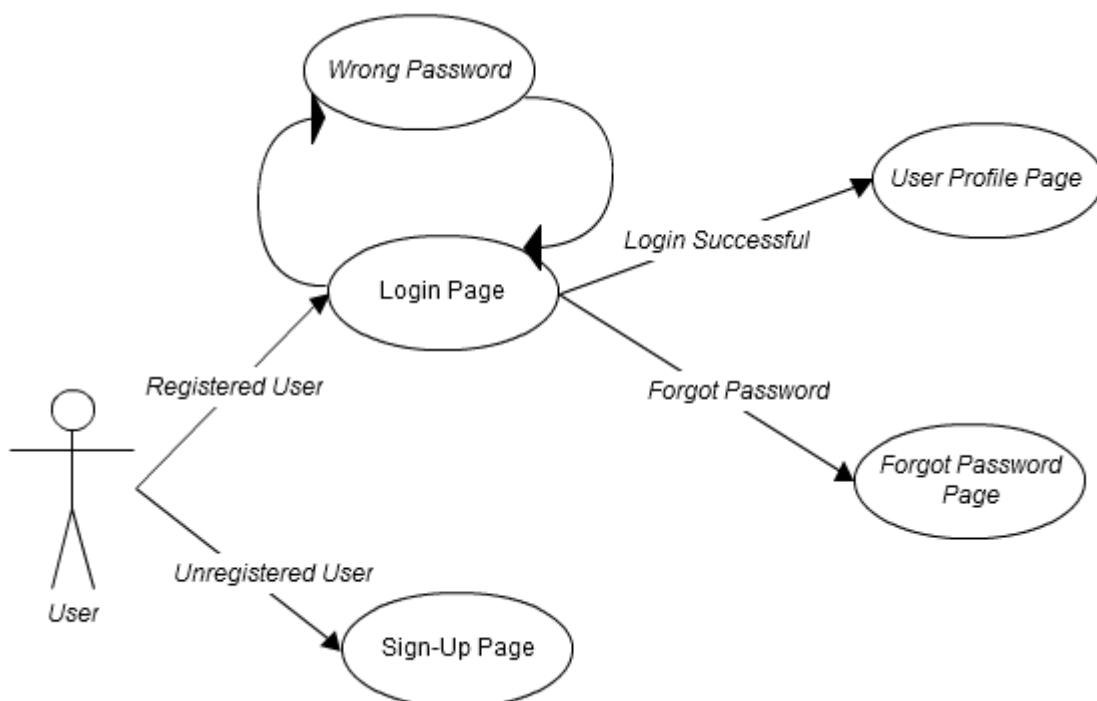
Prevailing features are Login , Search Result, Share Videos, Upload Videos, Streaming, History, Subscription, Notifications, User profile, User Settings, Library, Likes and comments, Home,Trending

Use Case diagram of the platform



4.1. Login

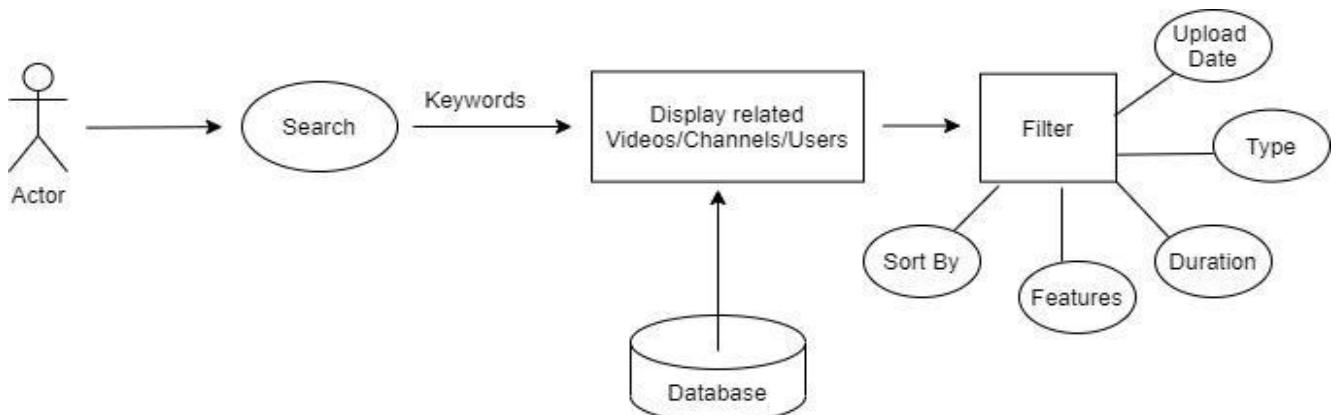
Use case name	Login
Description	A user login to access all the features of the platform
Actors	Viewers, Publishers
Pre-conditions	System must be connected to the internet , Users should have valid username and password.
Post conditions	After successful login, alert users through a pop up.
Input	Users (viewers and publishers) need to enter username and password
Output	Access to all the features of the platform including user profile.
Basic Flow	Users enter username,password to log in to the platform and get privilege to access all features.



4.2. Search Result

Use case name	Search Result
---------------	---------------

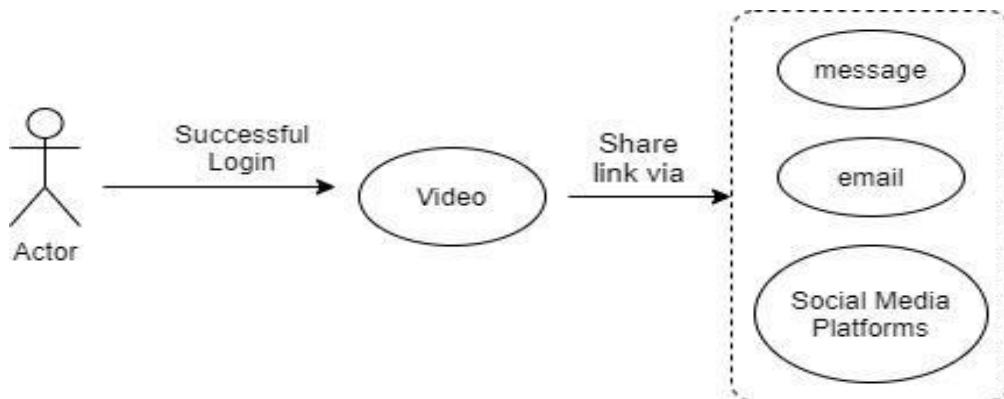
Description	Allows user to search any video through entering keywords
Actors	Viewers, Publishers
Pre-conditions	System must be connected to internet
Post conditions	Display all the results in a structured manner
Input	Input keyword
Output	Display videos related to the keyword
Basic Flow	Users type in the search section and then the platform displays all the videos related to the keyword. Users ,then choose a video they are looking for.



4.3. Share Videos

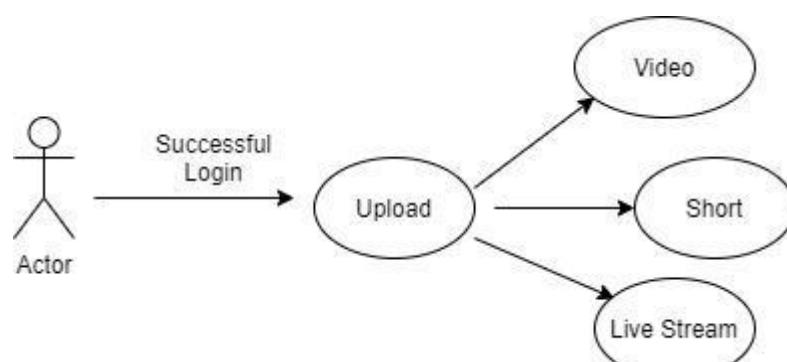
Use case name	Share Videos
Description	Users can share the video link to anyone
Actors	Viewers, Publishers
Pre-conditions	Internet connectivity, Decide the mode of sharing
Post conditions	Displaying the status of the shared video (successful or unsuccessful)
Input	Click on share icon and choose the way to send the link to the person

Output	Alert user with a pop up , displaying that the video was shared successfully
Basic Flow	Users share video links by clicking on the share icon present below the video and will be prompted with the status of sharing.



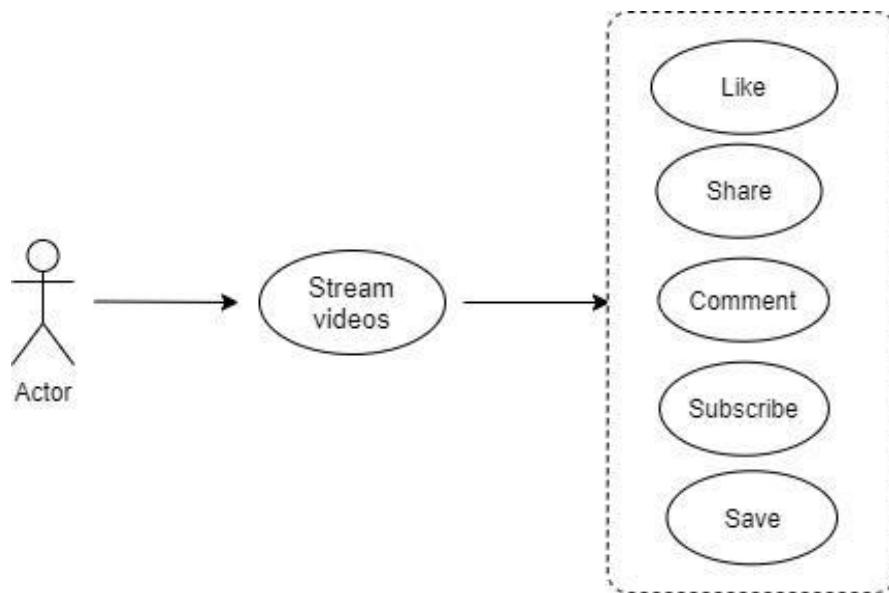
4.4. Upload Videos

Use case name	Upload Videos
Description	Allows users to upload videos
Actors	Publishers
Pre-conditions	Publisher should have logged in, and the video must be ready with all editing and preferred format to upload.
Post conditions	Pop up showing the status of the uploaded video
Input	Click on upload button, upload video, add title,description
Output	Video available in the platform to be accessed via public or private mode
Basic Flow	Publishers upload videos by giving necessary details, the uploaded video then can be accessed in the platform



4.5. Streaming

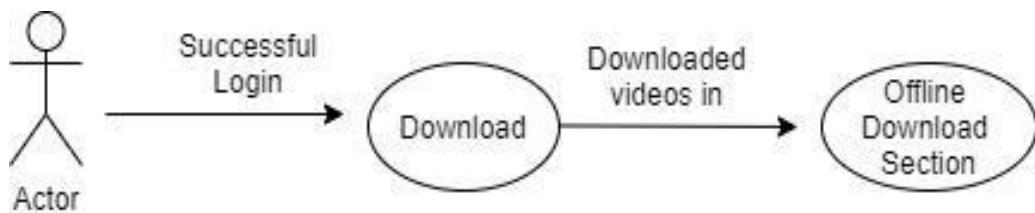
Use case name	Stream videos
Description	Allows the user to view and perform some actions.
Actors	Viewers
Pre-conditions	The viewer should have minimum software requirements specified above and may or may not be logged into the system.
Post conditions	The viewer can stream a video of choice.
Input	Searches for videos of interest or streams from live feed.
Output	Finds the video and views it.
Basic Flow	User searches a video of interest or finds a video from his live feed or from trending or shorts and streams it.



4.6. Download Videos

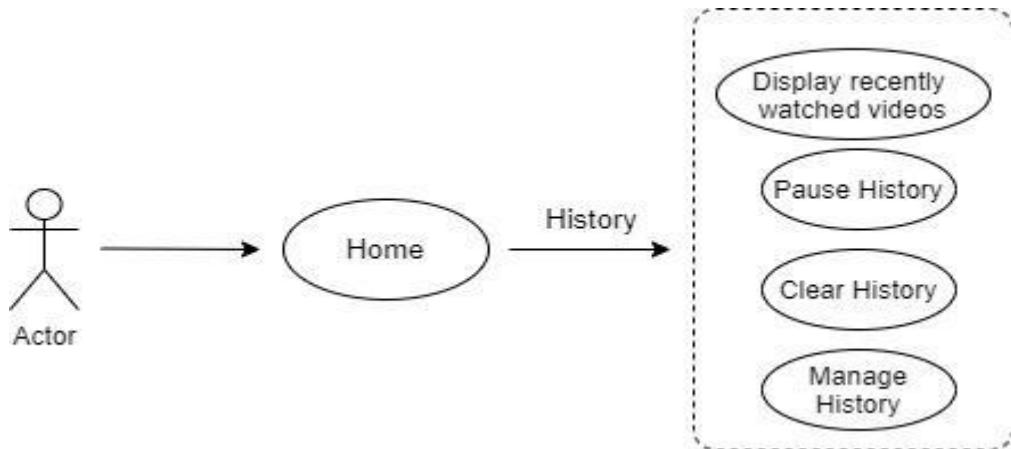
Use case name	Download Videos
Description	Allows users to download videos

Actors	Viewers, Publishers
Pre-conditions	Users should have logged in and must use mobile application
Post conditions	Pop up showing the download status (successful or unsuccessful) Input Click on download icon present below the uploaded video
Input	Click on download icon present below the uploaded video
Output	Video downloaded available in offline section of the platform
Basic Flow	Users who wish to see the videos offline, will click on download icon and get the video available in offline mode



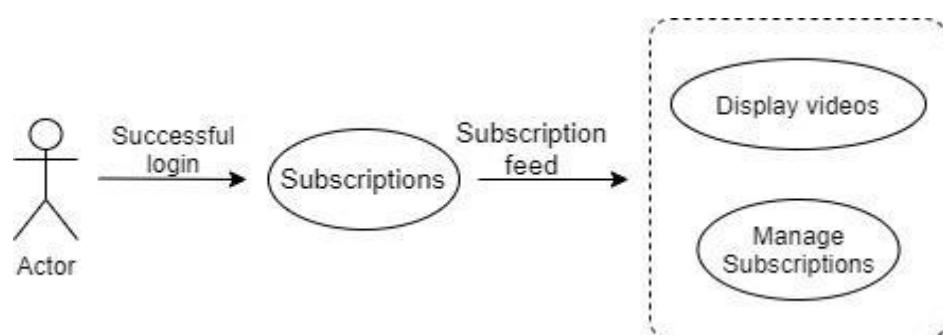
4.7. History

Use case name	History
Description	Shows the users , the list of videos which are viewed before
Actors	Viewers, Publishers
Pre-conditions	Users must be logged in to see the history
Post conditions	Display videos according to last opened
Input	Navigate and click on History button
Output	View history
Basic Flow	Users go to the history section and see the list of videos present in a sequential manner ordered by last opened time.



4.8. Subscription

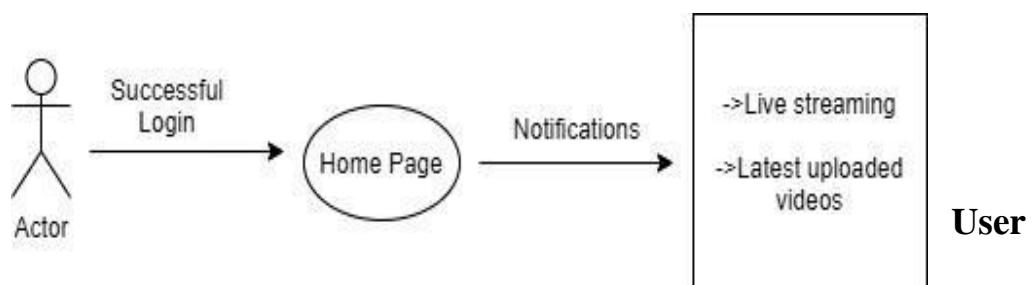
Use case name	Subscription
Description	Viewers can subscribe to channels in order to keep track of the videos posted by the publisher easily
Actors	Viewers
Pre-conditions	User should have signed in before pressing the subscribe button
Post conditions	Notify user about the new subscription through popup
Input	Click on subscribe button present in the interface
Output	Quick access to the videos as viewer has now subscribed to the channel
Basic Flow	Viewers who want to access videos of a particular channel and want to support the publisher will subscribe to that channel.



4.9. Notifications

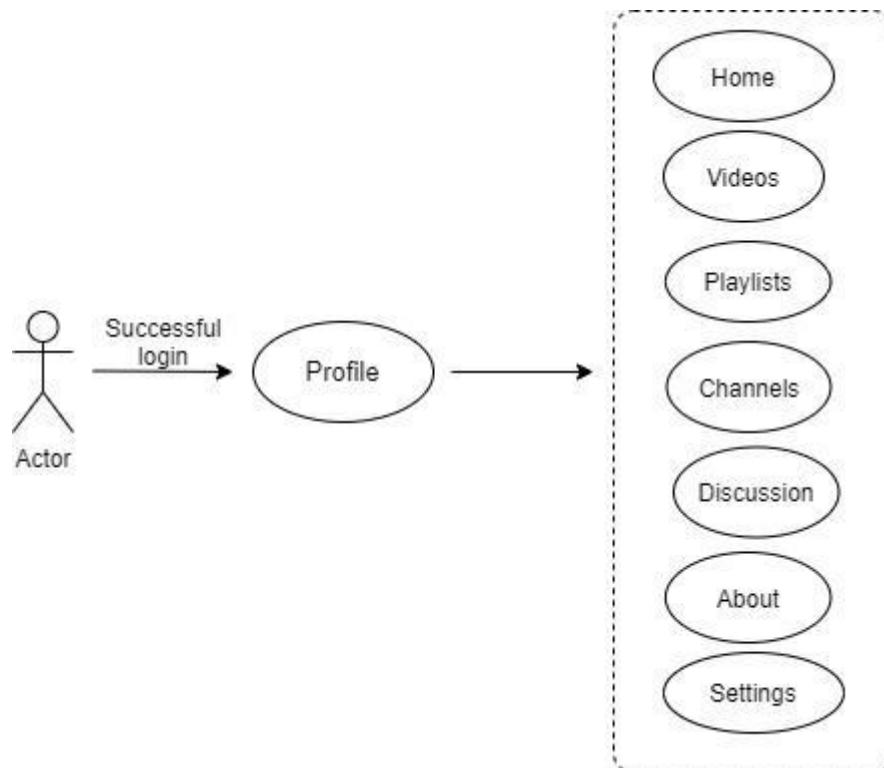
Use case name	Notifications
Description	Users get notified based on subscription, also can get notified by showing recommended videos based on watch history
Actors	Viewers
Pre-conditions	User should have signed in before pressing the subscribe button
Post conditions	Notify user about the new subscription through popup
Input	Click on subscribe button present in the interface
Output	Quick access to the videos as viewer has now subscribed to the channel
Basic Flow	Viewers who want to access videos of a particular channel and want to support the publisher will subscribe to that channel.

4.10. Profile



Use case name	User Profile
Description	Display the user activity in the platform
Actors	Viewers, Publishers
Pre-conditions	Users should have logged in to access the features present in the platform
Post conditions	Display various options in a neat manner

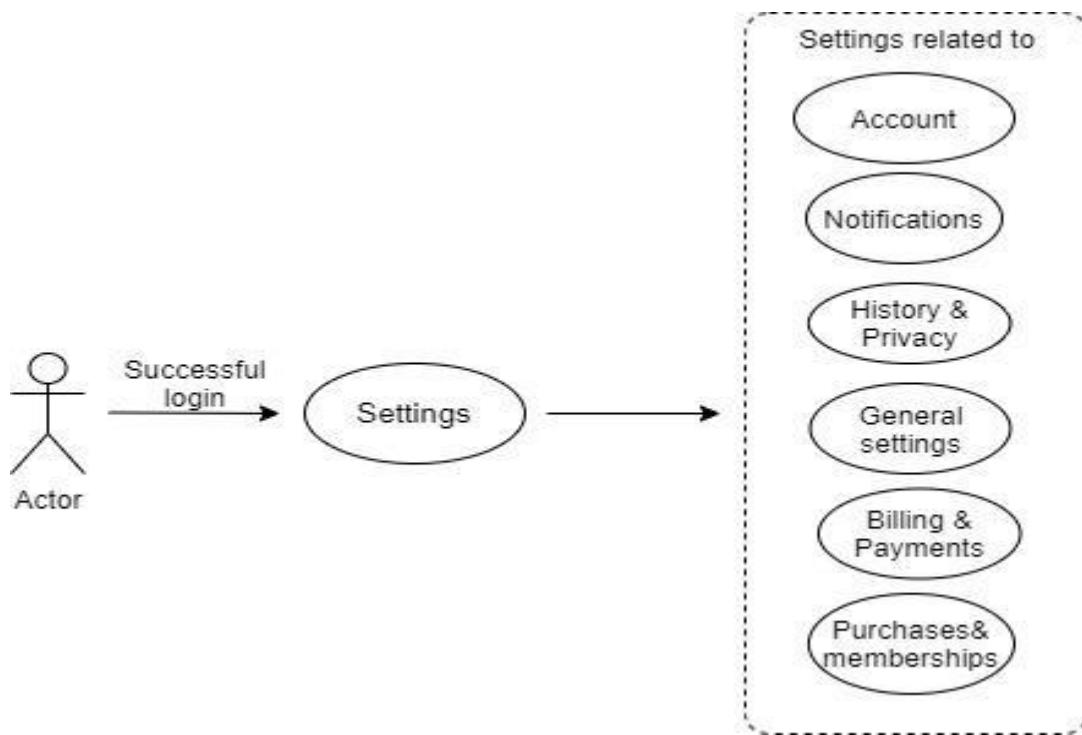
Input	Click on profile section
Output	Access to various options regarding video analytics, channel videos,saved or created playlists ,subscriptions details, etc
Basic Flow	Users who want to know about details such as video analytics, list of saved or uploaded videos, list of subscriptions, etc will click on the profile section and access the same.



4.11. User Settings

Use case name	User Settings
Description	Helps to access and modify privacy , payments , notifications,general settings , etc
Actors	Viewers, Publishers
Pre-conditions	Users should have logged
Post conditions	Display options

Input	Click on settings under profile section
Output	Access to the various settings available such as history and privacy, billing and payments, notifications, general settings and so on.
Basic Flow	Users once logged in can see or modify the settings available in the platform as per their desired requirement.



5. Other Nonfunctional Requirements

5.1. Performance Requirements

There are various requirements when we consider the performance of the video or the website. Some of these important metrics for better performances are as follows

Play Length of Video

The total amount of data consumed by the user, which includes every second, minute and hour of the video streaming. This parameter is equally important in understanding and planning out the infrastructure and capacity intake for streaming. With play length, you can make a rough estimate of the overall demand for the streamed data. These data volumes become quite useful to understand if the quality of content needs work.

Buffer

The time the user spends buffering when a video begins is really important. This helps you understand the duration of time a user has to wait before a certain video actually starts to play. Drawback can be if a user waits for a moment longer than usual, they will abandon watching the video before it even starts.

Lag Length

Once there is no buffer, the video will automatically begin to play. At this stage if the streaming is smooth, which also takes into account the right balance between download rate and bit rate, the viewer can watch the video. However, this might not always be the case. Sometimes the buffering may be extended and the playback will eventually stop. The time spent while the video buffers until it begins to play is together known as lag length. This metric helps you understand the users experience when they begin watching a video. The lag length should not be much longer than the buffer fill time, but if it does happen, that means the video streaming quality is extremely bad and needs a performance check.

Play Rate

With bit rate, we can understand the quality of the video a user is experiencing. It's one of the most important metrics to measure the performance of video streaming. If a video has more bit rate than average, it typically means a higher resolution (quality) image. This means bitrate helps identify the number of bits of a video that can be transmitted over a certain period of time. An HDTV typically transmits between a bit rate of 8–15 Mbps, while for many video streaming apps it is 6-8 Mbps. This also has a direct impact on the play rate of a particular video that helps further estimate the percentage of visitors who clicked on a particular video and began playing it. The combination of both the bit rate and play rate helps you understand how well a particular type of content is doing in a particular location, and what could be the success rate in the future. All videos do not have equal play rate.

5.2. Safety Requirements

Keeping in mind the extensive damage to a wide portion of the database due to catastrophic failure, such as a server crash, the cover method restores a past copy of the database that was backed up to archival storage (typically tape) and reconstructs a more current state by reapplying or redoing the operations of committed transactions from the backed-up log, up to the time of failure. And in the meanwhile, the server switches to the backup servers to keep the site working.

5.3. Security Requirements

Video streaming has been increasing and is in demand in the current world. But along with its wide usage the threats are also increasing leading to various security issues, hacking, piracy, etc. Security systems need database storage just like many other applications. However, the special requirements of the security market mean that owners must choose their database partner carefully. All the Private data uploaded by the user is absolutely confidential to the other users. Users can also report if they find any suspicious activity on the website, so the security department can take care of that.

HTTPS protects the users from so-called “man-in-the-middle” attacks. These attacks are relatively common with video streaming, especially when people use open networks at schools, malls, hotels and libraries.

Hackers can use vulnerabilities in these public networks to steal data as it's being transmitted to the viewer.

Through the use of digital certificates and encryption keys, HTTPS delivery encrypts a user's connection with the website and prevents this sort of attack.

HTTPS wraps all communication between the server sending your videos and the viewer in a layer of secure encryption. This provides additional protection to your content.

Encrypted paywall

Whenever customers enter payment details into the website, you need to ensure their data security. The best way to do this is via SSL/TLS. In fact, this is the same type of encryption that banks use to protect your financial data. A secure paywall ensures that you are protecting your customers' data at all times. Therefore, it's essential to use a secure paywall protected by SSL/TLS whenever we are trying to make transactions for account.

5.4. Software Quality Attributes

AVAILABILITY: The site is available for the users 24x7 across the world.

MAINTAINABILITY: The developers and a team of software engineers work on the maintenance and the updates of the site.

USABILITY: The site can be used anywhere if the connectivity to the internet and a device.

When you broadcast streaming video, you need sufficient internet speed to sustain the streaming. For live video, your upload bandwidth should be at least twice your broadcast bit rate.

Although they are related to encoder settings, resolution and video aspect ratios are very important. Choosing the perfect resolution requires a bit of a trade-off. Naturally, to use the best video resolution possible so that viewers have a crystal clear view of your video. However, the highest resolution does not equal the "best resolution" when it comes to video streaming. You want a resolution that provides a clear image without being too big to transmit without lagging. Professional broadcasters typically opt for 1280 x 720 pixels (720p) or 1920 x 1080 pixels (1080p).

5.5. Business Rules

Webinars:

Live video streams not only diversify business presentations. They reduce the distance between the seller and buyer. That's especially valuable for businesses that do not engage with the public directly. Most B2B companies need a platform to provide online consultations or Q&A, share materials, and get an immediate response from the customers.

Logistics:

Companies can use live video streaming services to control the delivery process. A webcam installed in a truck's luggage space would stream video for the shipping agents, customers, or other stakeholders. Geolocation and IoT integration will add value to such an application.

Healthcare:

Live video streaming technology can facilitate patient support, education and training of interns, conferences with colleagues, interviews, presentations, etc.

Retail:

Marketing in this industry largely depends on the visual appeal of goods. A demonstration of, say, luxury clothing details in real time can be very alluring. A live-streamed launch of a new product is a great start. Retailers can enhance sales by enabling users to make purchases while watching live video streams.

6. Other Requirements

APPENDIX: A Glossary

1. HTTP: HyperText Transfer Protocol
2. HTTPS: HyperText Transfer Protocol Secure.
3. RAM(Random Access Memory): Computer Memory that can be changed in any order.
4. Mbps: Megabits per second.
5. Cache: is a hardware or software component that stores data so that future requests for that data can be served faster.
6. MPEG: Moving Picture Experts Group.
7. MP4: is a digital multimedia container format most commonly used to store video and audio.
8. AVC: Advanced Video Coding, referred to as H.264
9. Adaptive bit-rate: technique used in streaming multimedia over computer networks.
10. Publisher: user who uploads videos.
11. Viewer: User streaming the videos on the platform.
12. SSL/TLS: Secure Socket Layer/ Transport Layer Security
13. Codec: A codec is either a hardware device or a software-based process that compresses and decompresses large amounts of data used in voice over IP, video conferencing and streaming media.
14. AAC(Advanced Audio Coding): is an audio coding standard for lossy digital audio compression.
15. WMV: is a video format which is compressed with Windows Media compression and contains a video encoded with one of Microsoft's Windows Media Video
16. FLV: file that uses Adobe Flash Player or Adobe Air to transmit video or audio over the internet.

Appendix B: Requirement Traceability Matrix

Sl. No	Requirement ID	Brief Description of Requirement	Architecture Reference	Design Reference	Code File Reference	Test Case ID	System Test Case ID
1	REQ_01	Recommend similar videos and list top videos on home screen(recent, most liked, most viewed).	sys_arch.png	figure 2	github	UT-01, UT-02, UT-03, UT-04, UT-05, UT-06, UT-07, IT-01	ST-01, ST-02
2	REQ_02	Manage Video(All interactions with the video including like,comment,share or open the channel)	sys_arch.png	figure 3	github	UT-08, UT-19, UT-10, UT-11, UT-12, UT-13, UT-14, IT-02	ST-03, ST-04
3	REQ_03	Manage Playlists and play video.	sys_arch.png	figure 4	github	UT-15, UT-16, UT-17, UT-18, UT-19, UT-20, UT-21, IT-03	ST-05, ST-06

3. PROJECT PLAN

1: Identify the lifecycle to be followed for the execution of your project and justify why you have chosen the model.

For our Video Streaming project, we are going to use the Agile model in which tasks are divided to smaller time frames(sprint of 2 weeks) to deliver specific features for a release.

The approach we will be taking is both iterative and incremental in nature and working software is built and delivered after each iteration. The build is incremental in terms of features. The final build holds all the features required by the customer. The features including video uploading, streaming, subscription, community building, video commenting and many more will be incrementally included in the system. Users will be initially provided with priority requirements such as features to upload and stream videos. The system will further include an option of feedback by the users. So that the development team can consider, develop and deliver the features in demand. Hence, for each requirement, we sprint for 3-4 weeks to develop and deliver it. Then again build a product backlog including all the features in demand and the once left from the previous sprint, sprint over the new requirements develop and deliver. This cycle continues till the complete development of the product which can be again iteratively modified based on the users' feedback.

Further, each time when a product backlog is built, sprinted through the development phase, there will be a stand-up meeting among the developers for checking the credibility and progress of the developed requirement. This requirement is reviewed and made available to the users. Since the requirement is completed after iteratively being modified and inspected based on feedback and reviews is updated as done(completely developed and deployed) on the SCRUM table.

Also, users need not wait for the complete product to be built. Since we will be delivering the working software with certain requirements after every sprint, if the client is okay with the current features, he/she can inform the team to deploy the application.

Since we are a team of four members, agile models come in handy and agile experts say that smaller team sizes usually work better as smaller teams tend to gel more quickly, are much more transparent, and tend to organize more quickly.

2: Identify the tools which you want to use at different phases of SDLC like planning tool, design tool, version control, development tool, bug tracking and testing tool

- Planning tool: Jira software by Atlassian

Jira Software is the project management tool for agile teams. We can stay focused on delivering iterative and incremental value, as fast as possible, with

customizable scrum boards present in this platform. Platform also provides rich toolkit for developers ,robust integration support , accessible data , flexible deployment options,etc

- Design tool: Creately,draw.io

Creately is a visual software to draw and collaborate on ideas, concepts and processes. We can use it as a chart and diagram maker/collaboration tool/visual space. draw.io is a free online diagram software for making flowcharts, process diagrams, org charts, UML, ER and network diagrams.

- Version control: Git

Git is software for tracking changes in any set of files, usually used for coordinating work among programmers collaboratively developing source code during software development. Its goals include speed, data integrity, and support for distributed, non-linear workflows. So we will be using git version control system during development.

- Development tool: Visual Studio Code, Jira

Jira software , mentioned earlier , helps in developing the environment. Apart from this, we will also use Visual Studio Code as a developer environment tool . Visual Studio Code is a free source-code editor made by Microsoft for Windows, Linux and macOS. Features include support for debugging, syntax highlighting, intelligent code completion, snippets, code refactoring, and embedded Git.

- Bug tracking and testing tool: Bugzilla

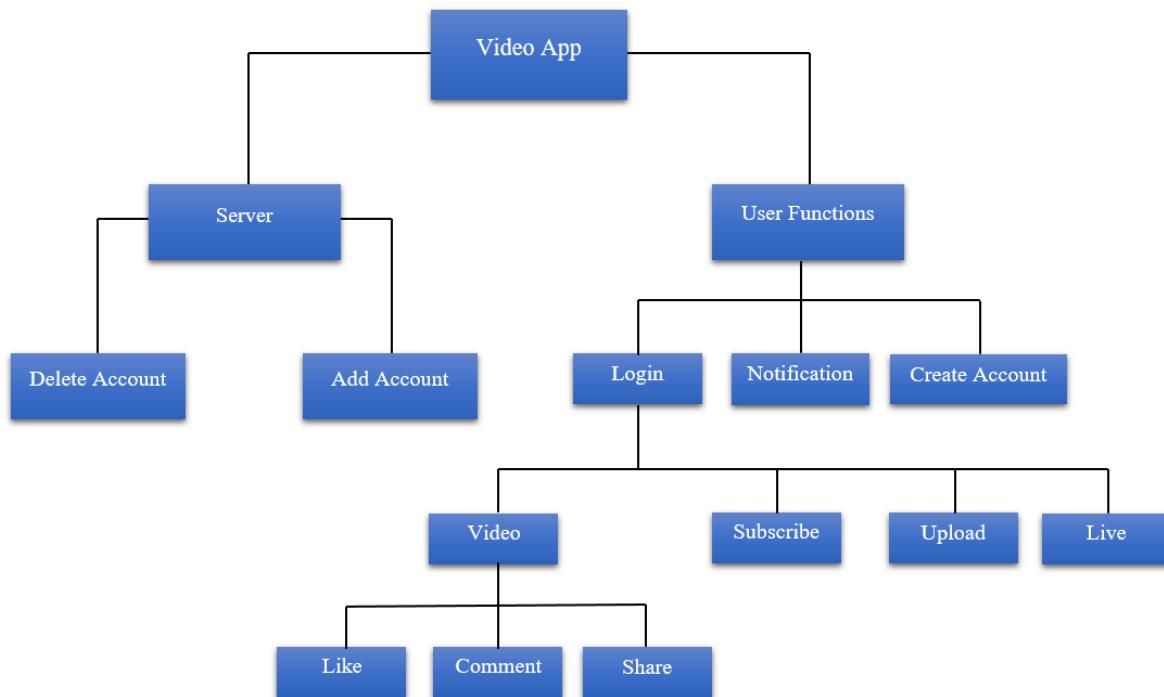
Bugzilla is an open-source issue/bug tracking system that allows developers to keep track of outstanding problems with their product. Bugzilla is a Defect tracking tool, however, it can be used as a test management tool as such it can be easily linked with other Test Case management tools like Quality Center, Testlink etc.

3: Create a Work Breakdown Structure for the entire functionalities of your project in detail.

- Video App:

- server: manages application
 - delete account: On users request terminates the account.
 - add account: registers a user by requesting the user to fill essential credentials.

- User functions:
 - Login: users after registering can log in to either upload or stream a video.
 - Video: users can stream and download videos.
 - Like: a viewer if he likes a video can like/dislike a video.
 - Comment: a viewer can upload his review for the video under the comments section.
 - Share: The user can share a video of his liking to anyone using any applications.
 - Subscribe: A user here to stream video can subscribe to channels they are viewing.
 - Upload: A user here as a publisher publishes videos into his channels.
 - Live: the publisher can even go live or upload shorts.
- Notification: a user receives a prompt on the windows whenever there is any action committed related to any video of interest.
- Create Account: A user registers into the system, there are two kinds of actors in this platform. Publisher and viewer: Publisher, publishes videos into the system; Viewer, views shares likes and comments the video.



4: Determine all the deliverables and categorise them as reuse/build components and justify the same.

The system is an amalgamation of a set of readily available and to be built components. Based on the customer's feedback the development team checks for the requirement, whether it is readily available or to be built. Later builds the requirement and publishes it for iterative improvements based on reviews and inspection by the scrum team and users.

The initial deliverables for the system include:

- Management features
 - Register: It's a one time option provided to a user, to register with the required credentials into the system. Whereas for the developer end, this feature can be easily seen in many systems hence they can easily reuse the available libraries.
 - Log-in: It's a privilege given to users registered to the system. A user can log in and out of their accounts as many times as they wish, making it a reusable feature. For the developer can reuse any readily available library of the same.
- User Features
 - Upload: For the user can reuse the function whenever he/she is willing to upload a video to the platform. A developer may have to build certain requirements for this feature after having adopted the prevailing methods of development.
 - Stream: the user whenever taps onto the video, it plays. All the users registered for viewing videos uploaded reuse this feature.
 - Subscribe: here the user can subscribe to multiple channels on the system hence a user reuses the feature several times once registered. Developer may have to build the requirement and modify it based on feedback.
 - Like: The user can like/dislike a video they stream hence it becomes a reusable component of the system.
 - Comments: This component acts as a means of communication between the publisher and viewer of the video, so a viewer can upload as many comments as he wants unless disabled by a publisher so this feature is reusable by a viewer unless granted by the publisher.
 - User settings: Users can use this multiple times to reconfigure their settings to match their requirements.
 - Share: A user can share the video of their liking to any contact via any platform multiple number of times, hence making it a reusable component of the system.

5: Do a rough estimate of effort required to accomplish each task in terms of person months.

Since the system consists of several features and requirements to be fulfilled and as we conquer it using the scrum framework. The product development will be managed by a series of sprint works.

Phase 1: The developer team initially provides a basic system with features upload, stream register, log-in and user profile of the user. Based on the COCOMO model for an estimation of 1.5 kilo LOC. This will take the scrum team around 3.67 person months and 4.09 months to develop. As it includes product designing and team development.

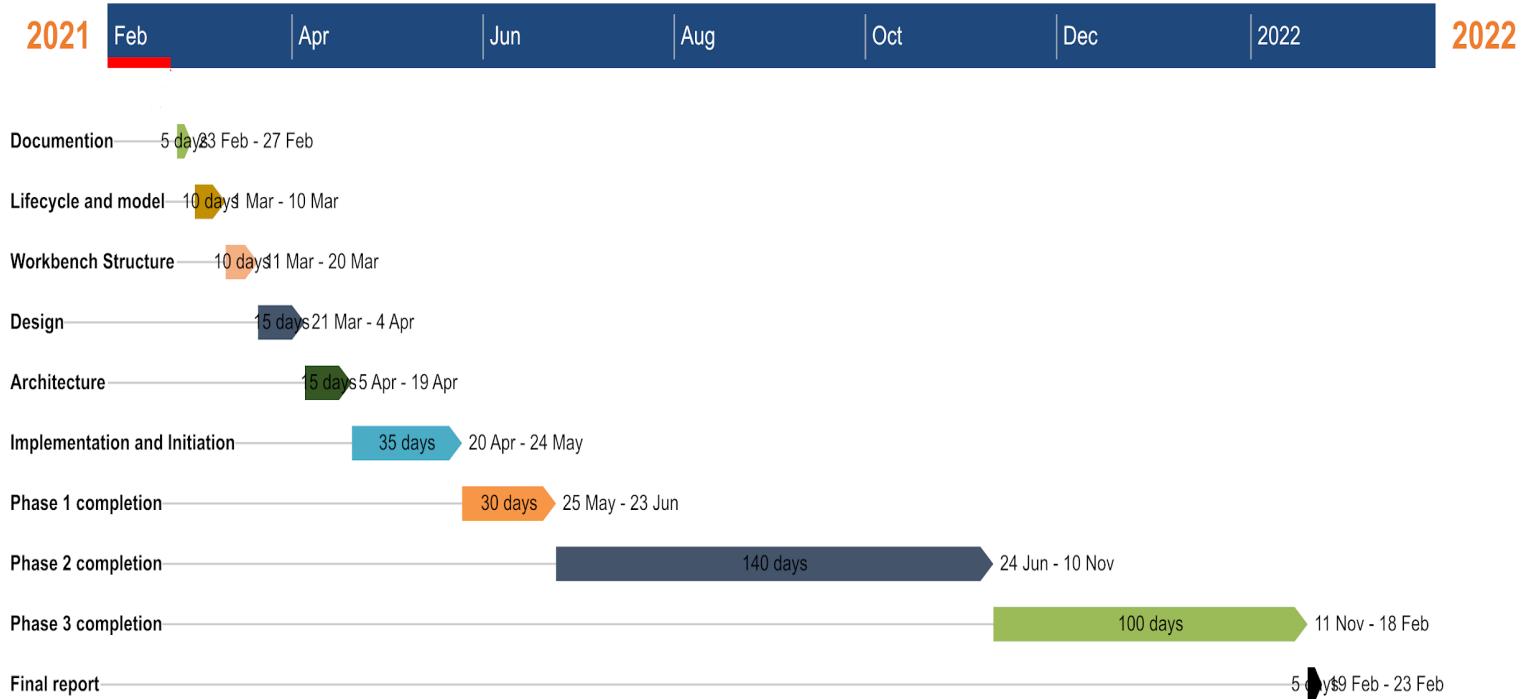
Phase 2: Here the scrum team receives the feedback from the users and also concerned higher-ups, creates a product backlog that includes new requirements based on the feedback and also the one's leftover from the previous sprint. So, here the scrum team includes extended features such as Video player ,subscribe feature, comments section, like and dislike videos , displaying videos on the home page sharing videos, inspects and delivers it. With an estimated LOC of 2kilo, the team will take about 4.46 person months and 4.59 months.

Phase 3: The team incrementally includes several features to the system considering the feedback and reviews by the users and owners. At this stage the team is mostly done with the product and its features now the maintenance team comes into picture that inspect the features and propose certain improvements based on feedback. To fulfill this the scrum team may take around 2.4 person months and 3.4 months with an estimated 1kilo lines of code.

These phases can be considered as several sprints fulfilling particular requirements. Since we are using an agile method several sprints with smaller time intervals can be included based on the efficiency and agility of the scrum team.

For the product to be completed and delivered with all the features functioning may take the team around 10.53 person months and 12.08 months, this final product includes all the changes iteratively proposed by the users and owners.

6: Create the Gantt chart for scheduling the defined tasks.



4. DESIGN DIAGRAMS

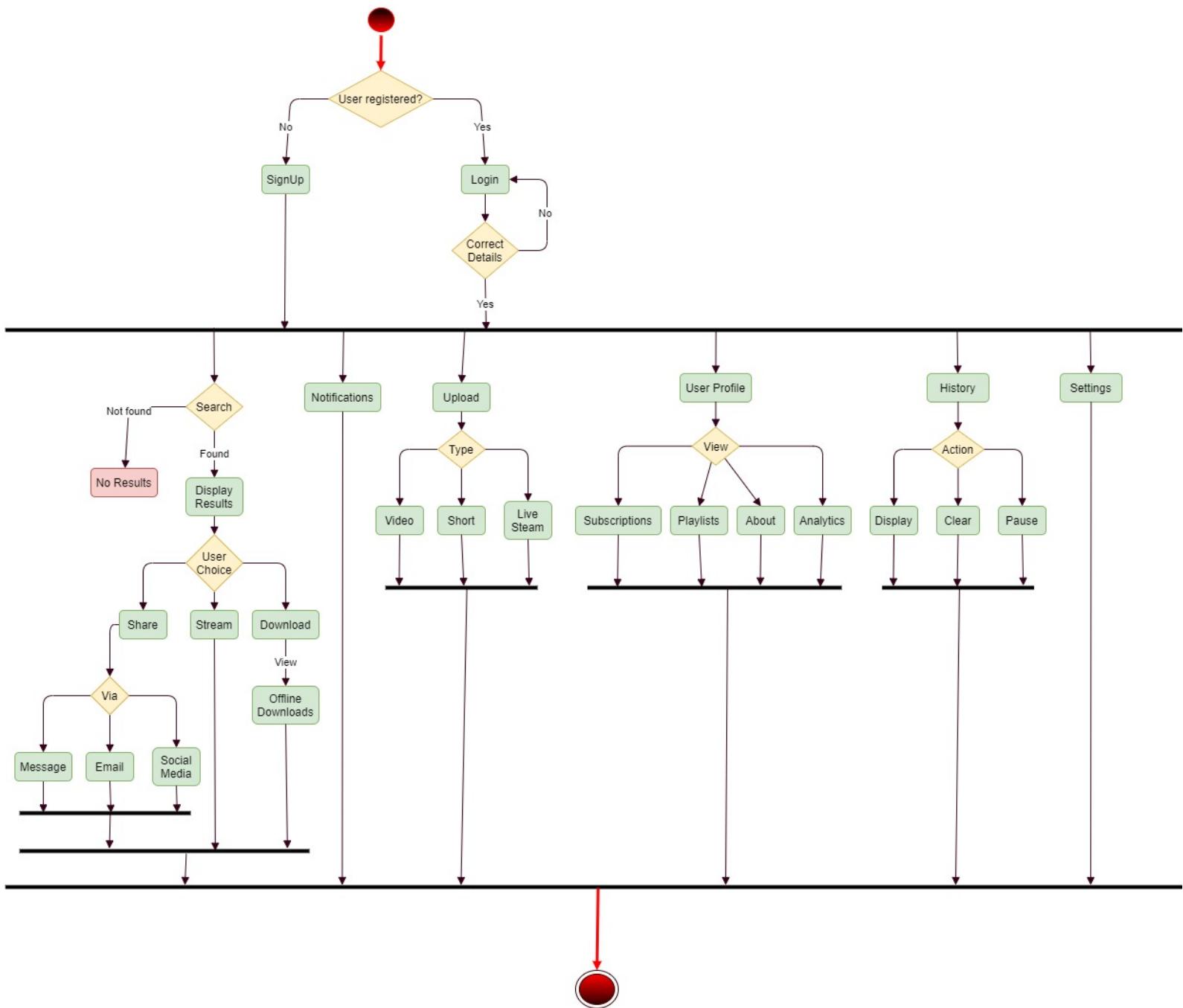


fig1: Activity Diagram for the whole application.

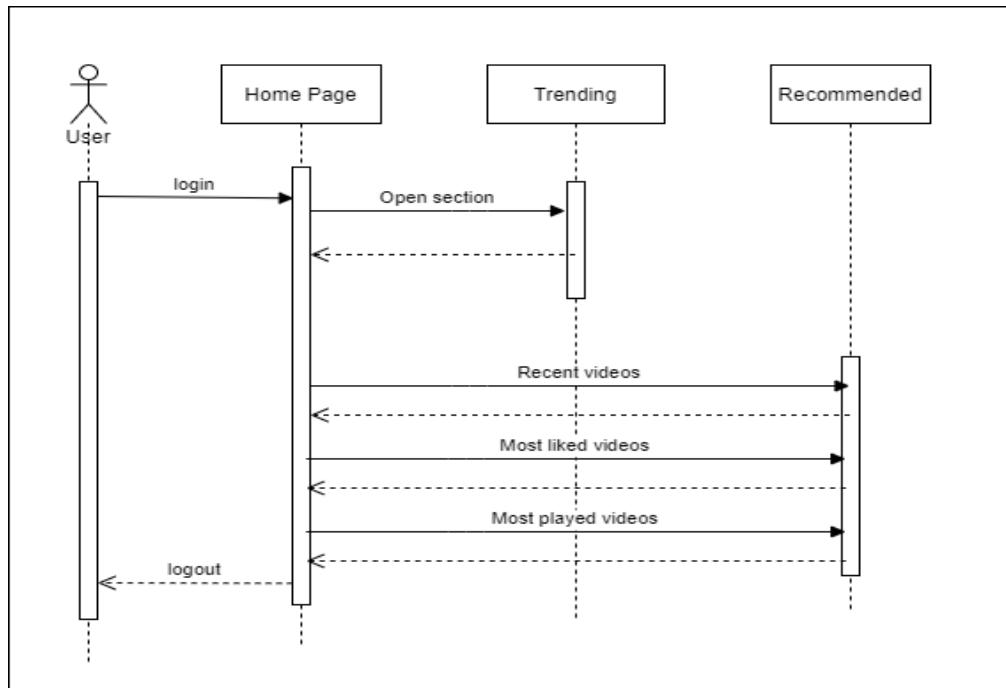


fig2: Sequence Diagram for Recommending videos

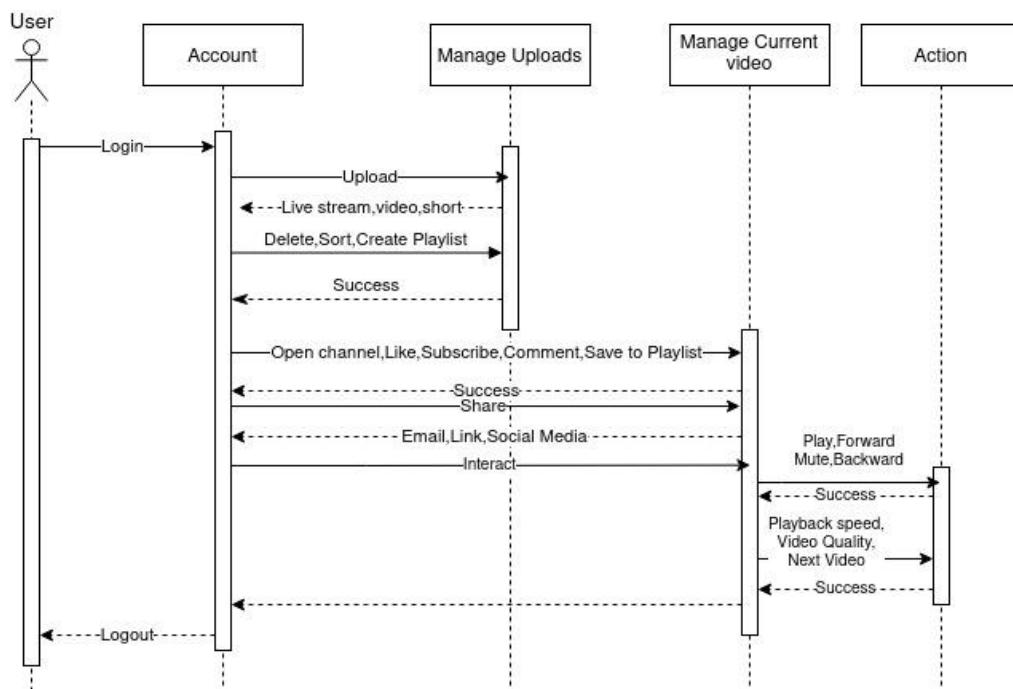


fig3: Sequence Diagram for Managing Videos

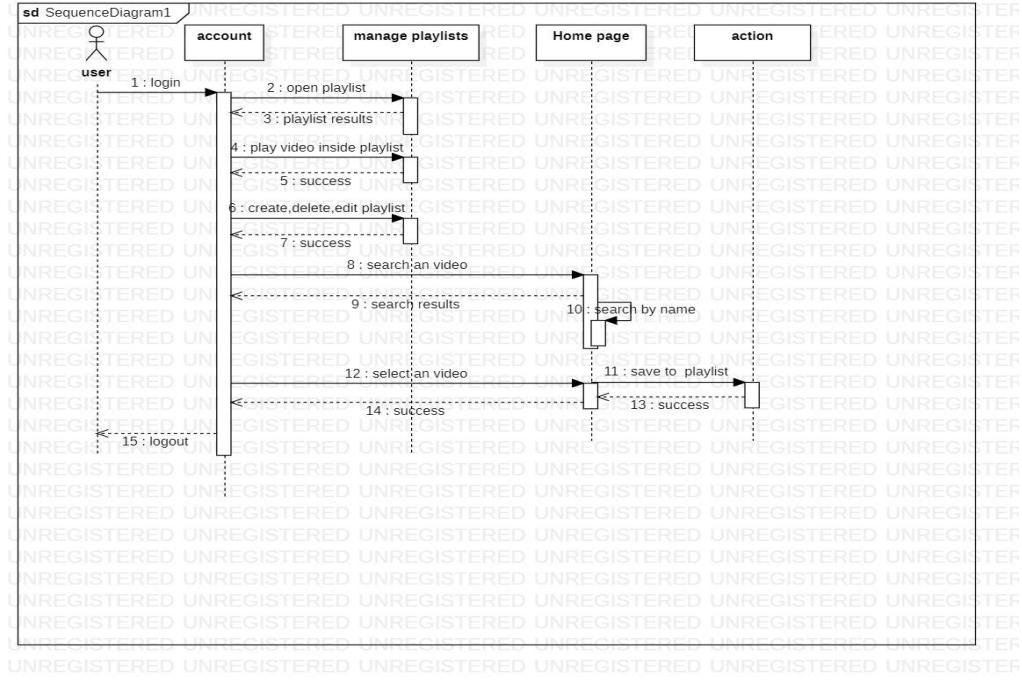


fig4: Sequence Diagram for Managing Playlists

5. MODULE DESCRIPTION

Module Name	Description
View Trending Videos	Navigate to trending videos section
View Most Viewed Videos	Navigate to most viewed videos section
View Most Liked Videos	Navigate to most liked videos section
View Latest Videos	Navigate to latest videos section
View Recommended Videos	Navigate to recommended videos section
Return to Homepage	Navigate to homepage
Return to Top	Navigate to top of the homepage
Play/Pause Video	Start playing the Opened video or pause it while playing
Like	Like the video that is being watched
Share	Share the selected video by various social media
Open channel	Open the channel who posted the video
Volume controls	Control the video volume and mute it.
Forward or Backward	Move the video progress forward or backward
Comment on Video	Add comments to the video

6. TEST CASES

Name	Rahul Kata
Class	6 I
Use Case	Recommend similar videos and list top videos on home screen(recent, most liked, most viewed).
Team ID	I10

There are a total of 7 Unit tests, 1 Integration Test and 2 System tests which I have performed. All these tests have been explained in a detailed manner in the table below. The screenshots for the corresponding test cases are fig5 and fig6.

Test Case ID	Module Name	Description	Pre-conditions	Test Steps	Test data	Expected Results	Actual Result	Test Result
UT-01	View Trending Videos	Navigate to trending videos section	Access to an internet browser and a good internet connection	[1]Navigate to the website [2]Scroll down to the trending videos section. (or) [2]Click on the hamburger menu icon then click on <i>Trending Videos</i> .	Scroll Mouse or Swipe Up or Click on Menu	Display a set of trending videos	A set of trending videos displayed	Pass
UT-02	View Most Viewed Videos	Navigate to most viewed videos section	Access to an internet browser and a good internet connection	[1]Navigate to the website [2]Scroll down to the most viewed videos section. (or) [2]Click on the hamburger menu icon then click on <i>Most Viewed Videos</i> .	Scroll Mouse or Swipe Up or Click on Menu	Display a set of most viewed videos	A set of most viewed videos displayed	Pass

UT-03	View Most Liked Videos	Navigate to most liked videos section	Access to an internet browser and a good internet connection	[1]Navigate to the website [2]Scroll down to the most liked videos section. (or) [2]Click on the hamburger menu icon then click on <i>Most Liked Videos</i> .	Scroll Mouse or Swipe Up or Click on Menu	Display a set of most liked videos	A set of most liked videos displayed	Pass
UT-04	View Latest Videos	Navigate to latest videos section	Access to an internet browser and a good internet connection	[1]Navigate to the website [2]Scroll down to the latest videos section. (or) [2]Click on the hamburger menu icon then click on <i>Latest Videos</i> .	Scroll Mouse or Swipe Up or Click on Menu	Display a set of latest videos	A set of latest videos displayed	Pass
UT-05	View Recommended Videos	Navigate to recommended videos section	Access to an internet browser and a good internet connection. Open the desired video page.	[1]Navigate to the website [2]Click and open the desired video thumbnail [3]Scroll down to the recommended videos section.	Scroll Mouse or Swipe Up	Display a set of recommended videos	A set of recommended videos displayed	Pass
UT-06	Return to Homepage	Navigate to homepage	Access to an internet browser and a good internet connection. Navigate to the desired video page.	[1]Click on the toggle icon on top right corner. (or) [1]Click the back button on the browser or app.	--NA--	Display Homepage	Homepage displayed	Pass

UT-07	Return to Top	Navigate to top of the homepage	Access to an internet browser and a good internet connection. Scroll past the Hero section.	[1]Click on the red arrow on the bottom right corner. (or) [1]Scroll to the top.	--NA--	Display hero section	Hero section displayed.	Pass
IT-01	Manage Videos	Access video player controls and like, comment, share features.	Access to an internet browser and a good internet connection. Navigate to the desired video page.	[1]Click on <i>Watch Video</i> .	--NA--	Open Video Player	Video Player opened in new tab	Pass
ST-01	Functional tests	Check if all the functionalities are present and working.	Access to an internet browser and a good internet connection. Working website	Test all the unit test cases from UT01 to UT06.	--NA--	All test cases function properly.	All test cases function properly.	Pass
ST-02	Usability tests	Check if the website is easy to use.	Access to an internet browser and a good internet connection. Working website	Explore the website from the perspective of a completely new user.	--NA--	Easy to use website for first timers.	website can be used by first time users.	Pass

Name	Aditya D Naik
Class	6 I
Use Case	Manage Video(All interactions with the video including like,comment,share or open the channel)
Team ID	I10

There are a total of 7 Unit tests, 1 Integration Test and 2 System tests which I have performed. All these tests have been explained in a detailed manner in the table below. The screenshots for the corresponding test cases are fig 7.

Test Case ID	Module Name	Description	Pre-conditions	Test Steps	Test data	Expected Results	Actual Result	Test Result
UT-08	Play/Pause Video	Start playing the Opened video or pause it while playing	Access to an internet browser and a good internet connection	[1]Navigate to the website [2]Open a video [3]Click play	Mouse Click	Start Playing the video, if playing already then pause it instead.	Start Playing the video, if playing already then pause it instead.	Pass
UT-09	Like	Like the video that is being watched	Access to an internet browser and a good internet connection.	[1]Navigate to the video [2]Scroll down to the likes button [3]Click the like icon or number	Click on like button/ number	The likes count of the video increases by 1.	The likes count of the video increases by 1.	Pass
UT-10	Share	Share the selected video by various social media	Access to an internet browser and a good internet connection.	[1]Navigate to the website [2]Scroll down to the share button..	Mouse click cut,copy & paste	Display a dialog box of the link to share and social media icons	Display a dialog box of the link to share and social media icons	Pass

UT-11	Open channel	Open the channel who posted the video	Access to an internet browser and a good internet connection.	[1]Navigate to the website [2]Scroll down to the Channel name.	Mouse click	Open the channel page	Open the channel page	Pass
UT-12	Volume controls	Control the video volume and mute it.	Access to an internet browser and a good internet connection. The video playing	[1]Navigate to the website [2]Click and play the video [3]Click the speaker icon (or) [3]drag the input range beside the speaker icon.	Mouse click or mouse click and drag	Change Volume as desired or mute the video	Change Volume as desired or mute the video	Pass
UT-13	Forward or Backward	Move the video progress forward or backward	Access to an internet browser and a good internet connection. The video playing.	[1]Navigate to the website [2]Click and play the video [3]Click on any point on the video progress bar (or) [3]Click and drag the current played symbol on the progress bar to the desired position	Mouse click or mouse click and drag	Change the point at which the video is being played	Change the point at which the video is being played	Pass
UT-14	Comment on Video	Add comments to the video	Access to an internet browser and a good internet connection. Navigate to below the video	[1]Enter user name [2]Enter the comment [3]Upload optional display picture [4]Click Comment	Keyboard button presses and mouse click	User's comment is added along with their name, display picture and date-time of adding	User's comment is added along with their name, display picture and date-time of adding	Pass
IT-02	Return to Homepage	Navigate to homepage	Access to an internet browser and a good internet	[1]Click on the website name on the navigation bar. (or)	Mouse click	Move to the selected page on	Move to the selected page on	Pass

			connection. Navigate to the desired video page already.	[1]Click explore [2>Select and click a page from the dropdown list		the website	the website	
ST-03	Functional tests	Check if all the functionaliti es are present and working.	Access to an internet browser and a good internet connection. Working website	Test all the unit test cases from UT01 to UT06.	--NA--	All test cases function properly.	All test cases function properly.	Pass
ST-04	Usability tests	Check if the website is easy to use.	Access to an internet browser and a good internet connection. Working website	Play and manage the video as new user.	--NA--	Easy to use website for first timers.	website can be used by first time users.	Pass

Name	Manohar D PES1201800305
Class	6I
Use Case	Manage Playlist and play video
Team ID	I10

There are total of **7** unit tests, **1** integration test and **2** system test.All of the test cases are explained in detailed manner.

Test Case ID	Module Name	Description	Pre-conditions	Test Steps	Test data	Expected Results	Actual Result	Test Result
UT-15	User registration	To test registration functionality	Access to an internet browser and a good internet connection	[1]Navigate to the website [2] Click on the login but at the right corner [3] Click registerme option [4] Enter username and password [5] Click submit	Username: user3 Password: binary team	Registration should be successful with “registration successful message”	Registration successful with “registration successful message”	Pass
UT-16	Login module	To test login functionality	Access to an internet browser and should have registered	[1]Navigate to the website [2] Click on the login but at the right corner [3] Enter username and password [4] Click submit	Username: user3 Password: binary team	Login successful with “login successful” message	Login successful with “login successful” message	Pass

UT-17	Search bar module	To test search functionality	Access to an internet browser and a good internet connection	[1] Navigate to the website [2] Enter the query in search bar [3] Click enter	Test data: Cricket	Display a set of videos related to query	Displayed a set of videos related to query	Pass
UT-18	Add to playlist module	To test the add playlist functionality	Access to an internet browser and displayed set of videos.(user should have logged in)	[1] Navigate to the website [2] Enter the query in Search bar [3] Below the video Click add to playlist option	Click Add playlist button (Test data: h)	Display a pop up window with "add to created playlist and watch later option"	Displayed a pop up window with "add to created playlist and watch later option"	Pass
UT-19	Watch later module	To test create watch later functionality	Access to an internet browser ,displayed popup widow	[1] Navigate to the website [2] Below the video Click add to playlist button [3] Click save to watch later option	Click save to watch later option	Save the video to watcher later with" Added to watch later message"	Save the video to watcher later with" Added to watch later message"	Pass

UT-20	Edit Playlist module	To test edit playlist functionality	Access to an internet browser and should have created atleast one playlist	[1]. Navigate to the website [2]click edit or delete playlist option [3]Select the playlist you want to update [4]Click update button	Click Update option	Update the playlist name	Updated the playlist name	Pass
UT-21	Delete Playlist module	To test delete playlist functionality	Access to an internet browser and should have created atleast one playlist	[1]Navigate to the website [2] Click edit or delete playlist option [3] Select the playlist you want to update [4]Click delete button	Click Delete button	Delete the selected playlist	Deleted the selected playlist.	Pass

IT-03	Open playlist module	To test create playlist integration functionality	Access to an internet browser and a good internet connection. Open the desired page.(user should have logged in)	[1]Navigate to the website [2] Click on playlists option [3] Click on created playlist option Click on the image inside the create playlist	--NA--	Display a Saved video inside the created playlist	Display a Saved video inside the created playlist	Pass
ST-05	Functional test	Check if all the functionalities present and working	Access to an internet browser.	Test all the unit test	--NA--	All test cases function properly	All test function properly	Pass

ST-06	Usability tests	Check if the website is easy to use	Access to internet browser and good internet connection and working website	Explore the website from the perspective of a completely new user.	--NA--	Easy to use website for first timers	Easy to use website for first timers	Pass

7. SCREENSHOTS OF OUTPUT

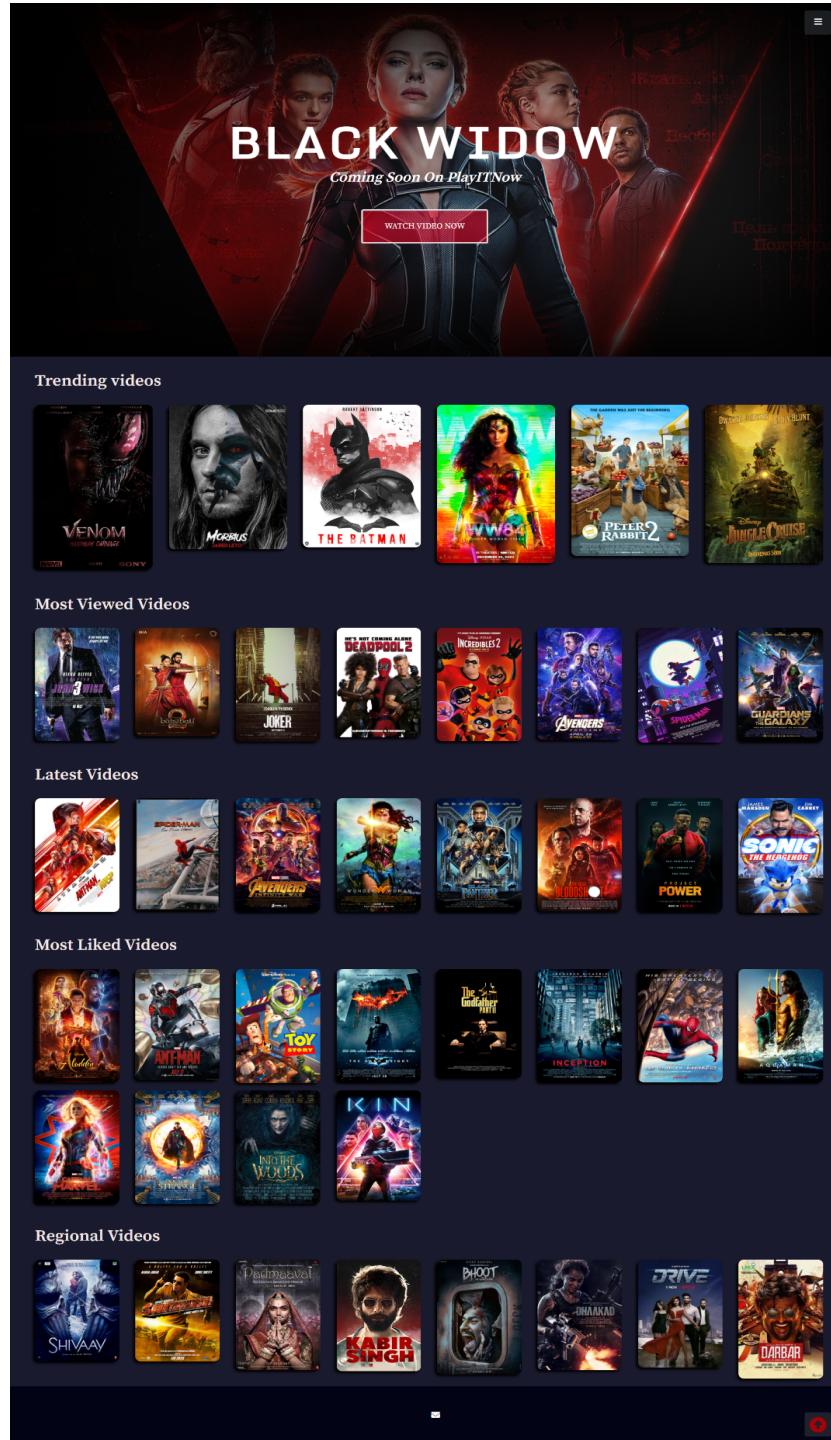


fig5: Video streaming application homepage with all the top videos section wise.

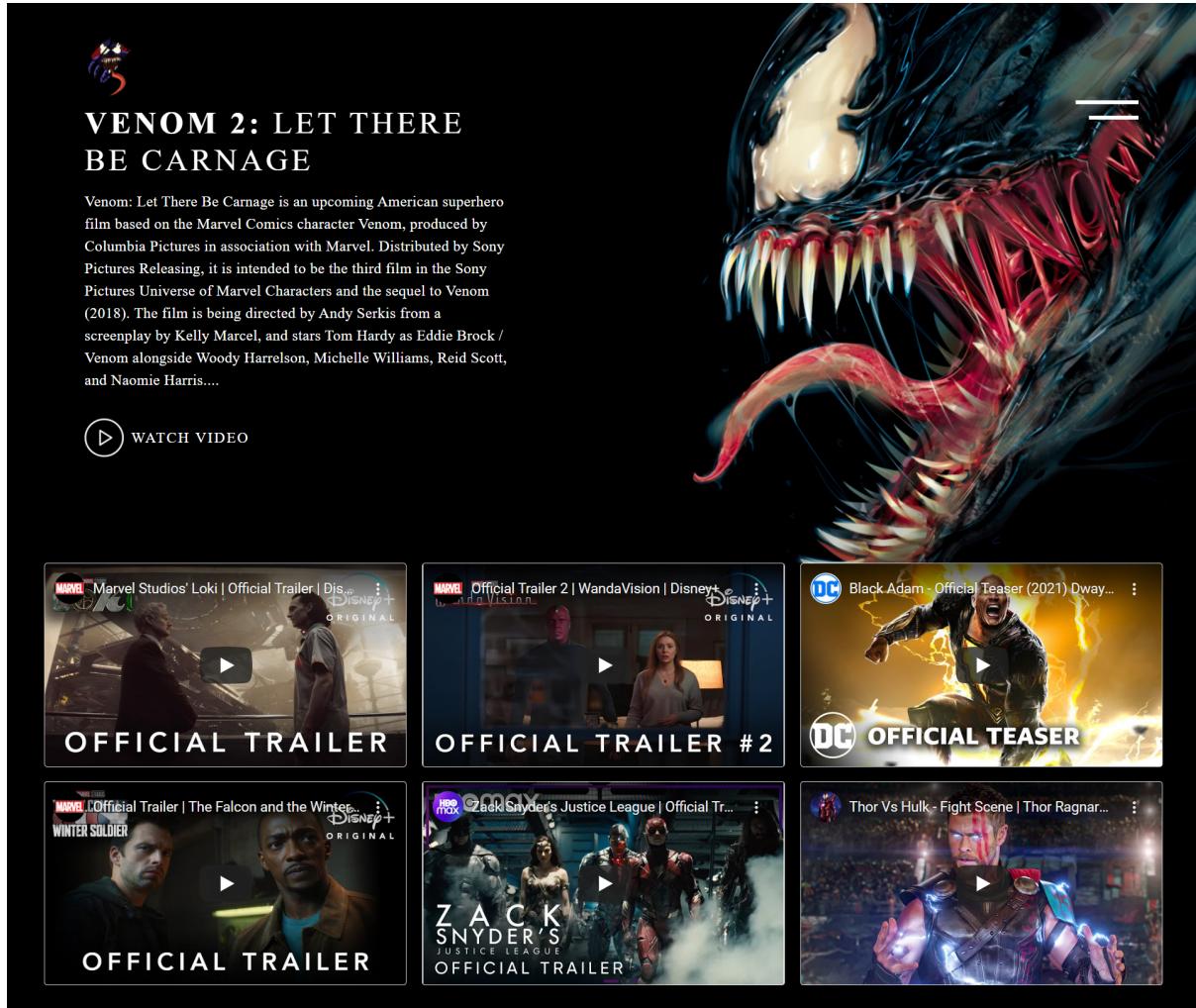


fig6: Similar Video Recommendations

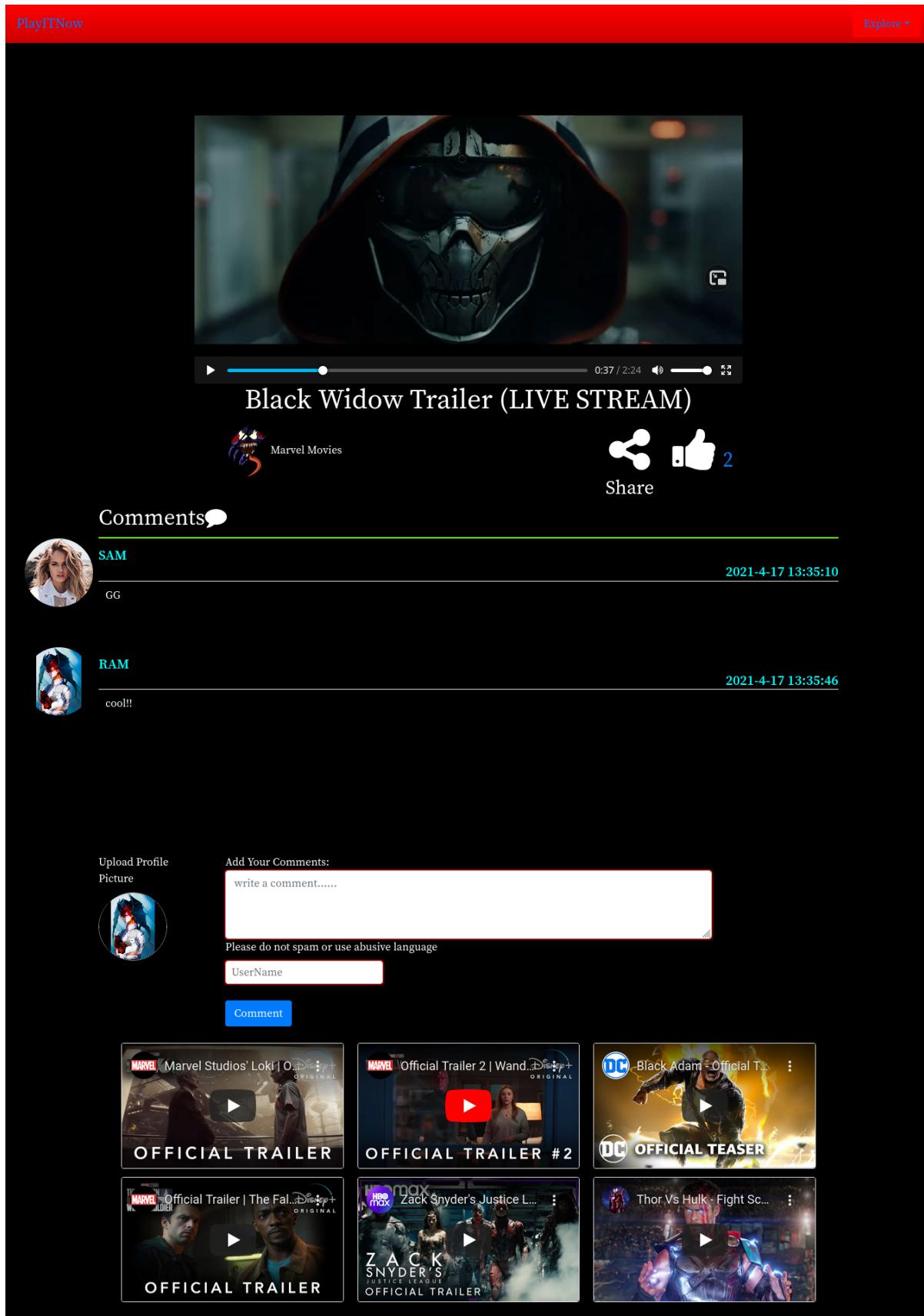


fig7: Video streaming with like,comment and share.

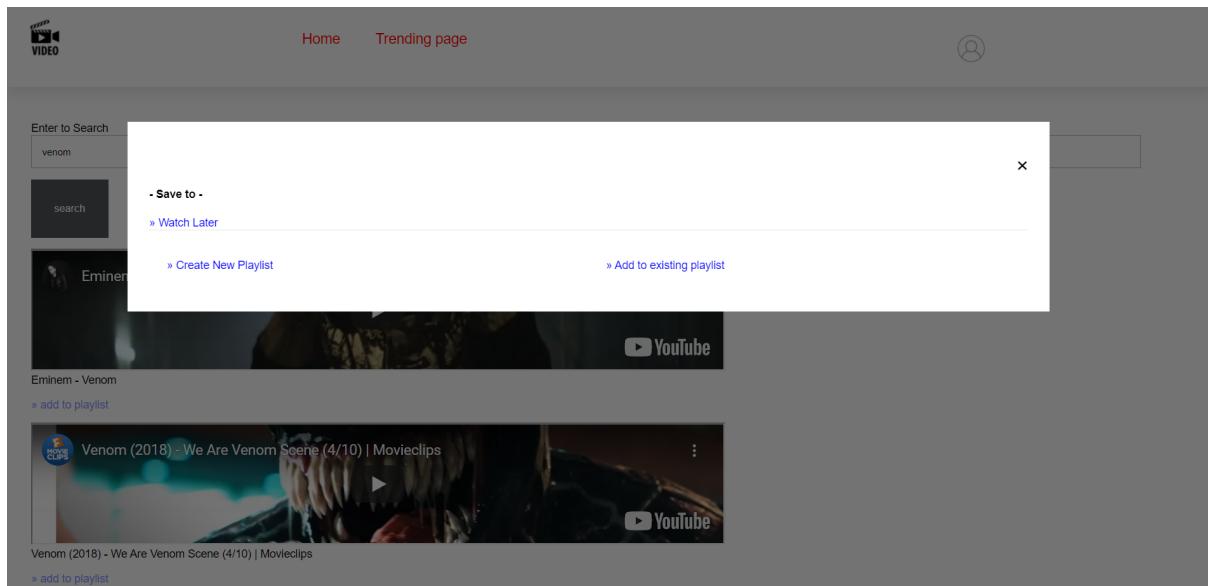


fig8: Adding video to playlist

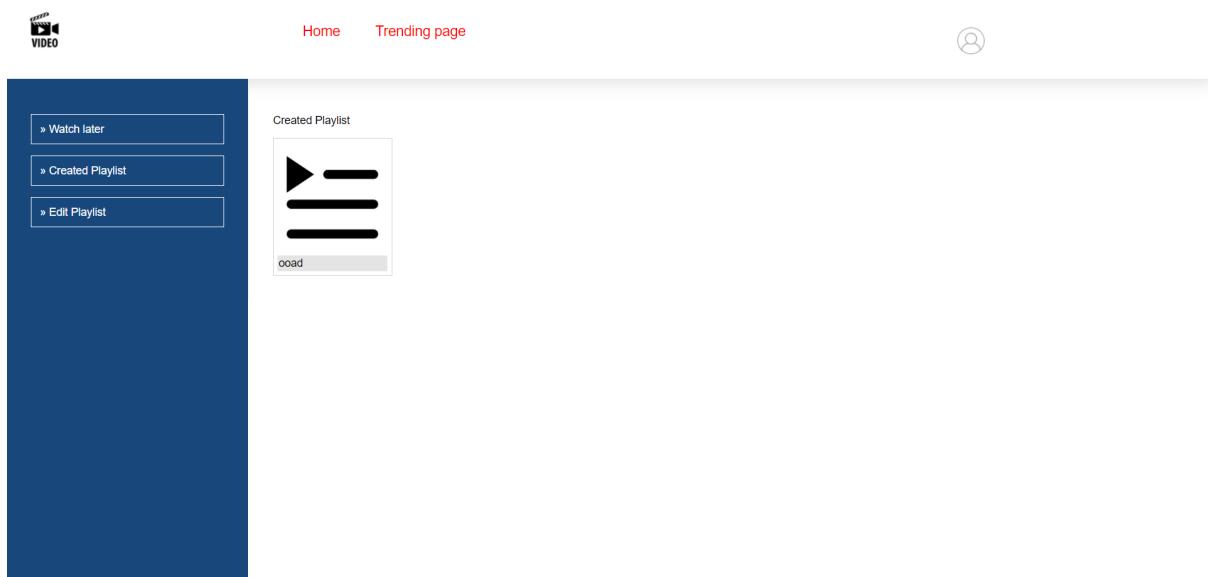


fig9:Created playlist with name

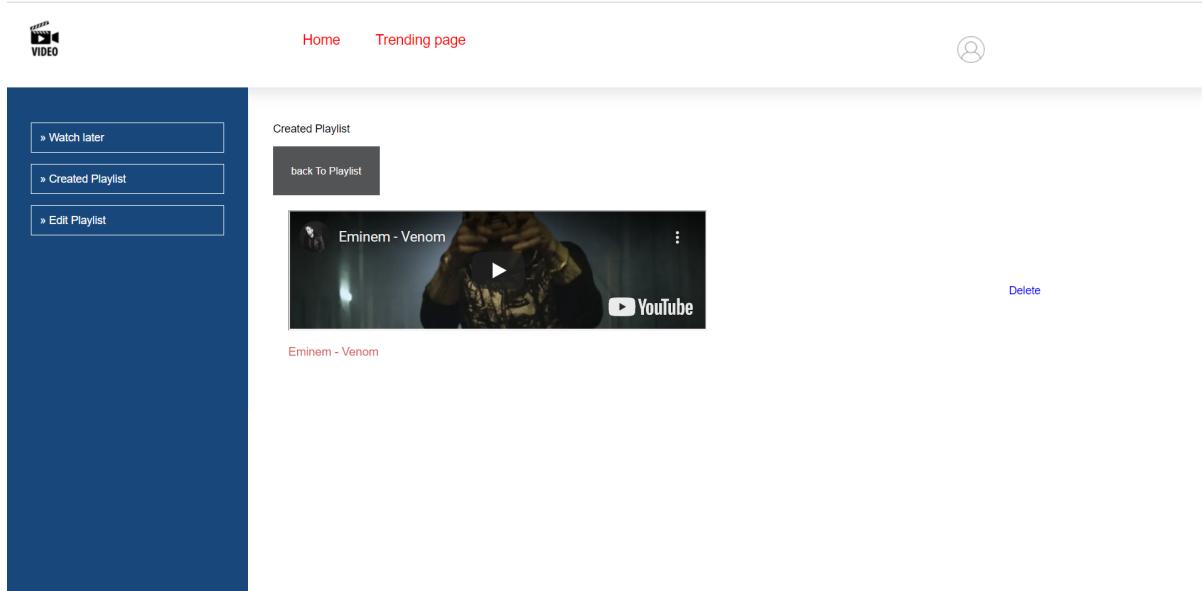


fig10:Added video inside the created playlist