

Lab 1 - FlixPicks Product Description

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1. Introduction

Streaming is the most popular fee-based medium for consuming content at home. Streaming represented 34.8 percent of viewership in August 2022, surpassing cable television (Fischer, 2022). The projected annual growth rate for streaming is roughly nine percent, versus cable's projected annual growth rate of four percent (Raj, 2023). More than 200 paid streaming platforms exist as of September 2023 (Cook, 2023).

The large number of streaming platforms, combined with the large and differing media libraries, has created a time consuming browsing experience in search for content to view. A study conducted in July 2016, established that Netflix users spend an average of 17.8 minutes browsing prior to selecting something to watch (Moscaritolo, 2016). Another study conducted in August 2020 reported that users spend up to 187 hours per year searching for desirable media (Ward, 2020).

The overwhelming amount of different streaming platforms each with their own respective libraries has created a problem for users called decision fatigue. Decision fatigue is a phenomenon in which a large amount of choices or decisions hinders the ability to make further choices (Natal & Saltzman, 2022).

Modern streaming often detaches viewers from the social aspects of the movie watching experience. Socializing during movies or shows during viewing requires extra applications such as Rave - Watch Party, and others. Time wasted, decision fatigue, choice overload, and an isolating streaming experience are all common negative traits of the current streaming service user experience.

FlixPicks solves all of these streaming experience problems. FlixPicks has three built in features, each addressing one or more of the common user experience issues. FlixPicks is

designed to provide a single inventory to see all of a users' streaming services, with built-in features that provide a social experience, eliminate decision fatigue, collect user experience data to improve recommendations across all platforms, and eliminate choice overload.

2. FlixPicks Description

FlixPicks is an online webpage/application that allows users who are customers of streaming services to see an aggregated collection of their content. It also allows users who are representatives of streaming services to see analytics about live in-viewing reactions and comments from regular users. FlixPicks recommends content based on user preferences through the Taste Profile, which is linked to user accounts. The Taste Profile results from machine learning to provide users with recommendations. FlixPicks has three main features that eliminate decision fatigue, eliminate choice overload, and provide a more social experience for the user. By using FlixPicks, users save time and easily decide on media to view across all of their subscriptions. FlixPicks is accessible from any web-enabled computing device including, smartphones and computers with a web browser.

2.1 Key Features and Capabilities

FlixPicks aggregates content from all of a users' entered subscriptions and creates a combined Library for the user to view. Users choose to make an account, sign in to an existing account, or use FlixPicks as a guest. For users who create an account, a survey to set initial recommendations is required. This survey creates a user Taste Profile that is used for content recommendation, the Taste Profile uses machine learning to continuously learn a users preferences as they use FlixPicks and provides recommendations. Guests do not have Taste Profiles and have limited privileges.

Table 1*Access/User Feature Table*

Category	FlixPicks Feature	Guest	Registered User	Admin	Representative	Tester
Subscription Service Management	User Account Registration	Access	N/A	Access	N/A	Access
	Account/Subscription Service Management	Unavailable	Access	Access	Access	Access
	User Subscription Integration	Unavailable	Access	Access	Access	Access
	User Tier Level Feature Access	Unavailable	Access	Access	Access	Access
Taste Profile	Taste Profile	Access	Access	N/A	N/A	Access
	Taste Profile Survey	Unavailable	Access	N/A	N/A	Access
	Taste Profile Content-Based Filtering	Unavailable	Access	N/A	N/A	Access
	Taste Profile Collaborative Filtering	Unavailable	Access	N/A	N/A	Access
Recommendations	Recommendations	Unavailable	Access	N/A	N/A	Access
	Filtered Recommendations (Criteria based)	Unavailable	Access	Access	N/A	Access
Movie Library	Browse/Search Filtering	Access	Access	Access	N/A	Access
	HotPicks	Access	Access	Access	N/A	Access
CineRoll	CineRoll	Unavailable	Access	Access	N/A	Access
CineWheel	CineWheel	Access	Access	Access	N/A	Access
CineMap	CineMap Overlay	Unavailable	Access	Access	N/A	Access
	CineMap Commenting	Unavailable	Access	Access	N/A	Access
	CineMap Export Data	Unavailable	Unavailable	N/A	N/A	Access
	CineMap Data Analyzing	Unavailable	Unavailable	N/A	N/A	Access
Analytics	Data analytics testing	Unavailable	Unavailable	Access	Access	Access
	Analytics	Unavailable	Unavailable	Access	Access	Access
	Summary reporting for user/stakeholders	Unavailable	Unavailable	Access	Access	Access
Simulation	Simulation	Unavailable	Unavailable	Access	Unavailable	Access
Movie Info	Create/edit Movie Info	Unavailable	Unavailable	Access	Unavailable	Access
Feedback	Feedback	Access	Access	Access	Access	Access

One of the main built-in features of FlixPicks is called CineWheel. It eliminates Choice Overload by allowing the user to input potential viewing choices manually and randomly selecting from the choices. This feature is available to guests and registered users. CineWheel is most useful for when a user or a group of users already knows a few potential pieces of content for viewing but cannot decide.

Another key built-in feature is called CineRoll. When CineRoll is prompted, it accesses the user Taste Profile and selects from generated media for the user. It can be filtered with genre tags. The user can also reroll the CineRoll feature if they do not like the result and be provided with a new one. Because the Taste Profile is an integral part of this feature's back-end, users

must be registered to use CineRoll. It is most useful when a user does not know what media they want to view.

Another built-in feature of FlixPicks is called CineMap. It helps make the streaming experience for users viewing by themselves less isolating by overlaying media and allowing the user to see and post time stamped comments and reactions. All interactions are stored in the user information database and are accessed for data analysis by admins and streaming service representatives. The CineMap feature is only available to registered users. It is an optional overlay that the user is prompted to use when selecting media to view from the aggregated Library. When selected, CineMap redirects the user to the streaming platform owning their selected content and overlays the content. It is most useful when a user wants to have an interactive experience and share what other users have said live about their viewed content.

The Library of content is available for guests and registered users. For registered users this content is personalized based on registered subscriptions combined with their Taste Profile. For guests the content in the Library is HotPicks. HotPicks shows currently popular media providing Quick Click access to popular movies from all platforms. Registered Users also have HotPicks, but the Library contains recommendations from their personalized subscriptions as well. Guests only access the general Library and CineWheel features. If a guest user attempts to use other features FlixPicks prompts the user for registration. Registered users access all features and the longer FlixPicks is used the more the Taste Profile grows with the users selections. The user is able to reset the Taste Profile at any time to reset recommendations.

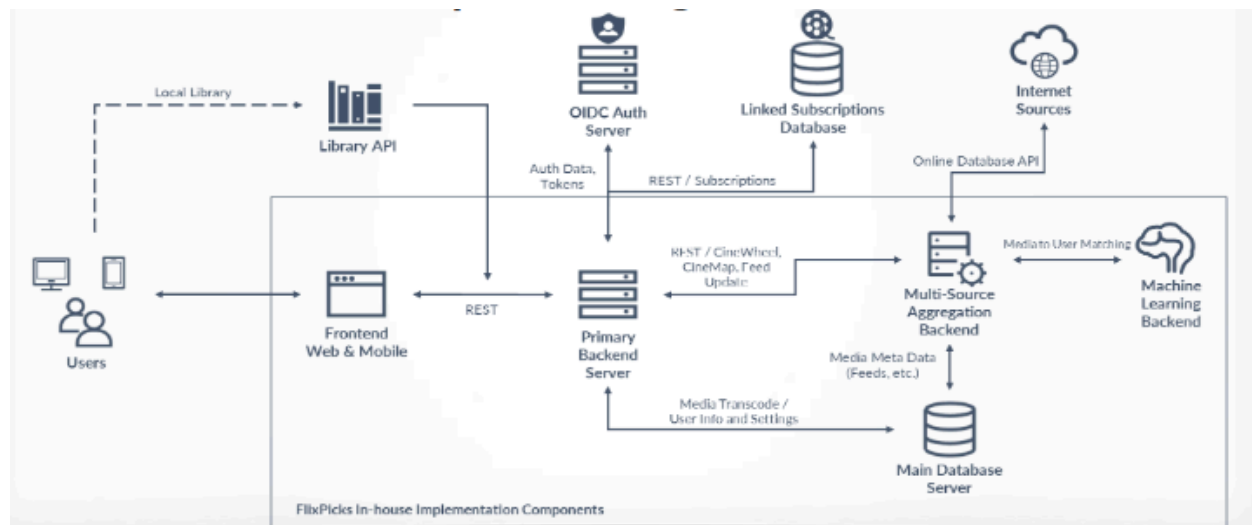
2.2 Major Components (Hardware/Software)

FlixPicks is structured with a front end user interface, the back-end multi-source aggregation back-end, storage components, machine learning, linked subscriptions database, and

third party APIs. The major function component diagram shown in Figure 1 describes the interfaces, back-end multi-source aggregation back-end, storage components, machine learning, linked subscriptions database, and third party APIs within FlixPicks and how they interact.

Figure 1

FlixPicks Major Functional Component Diagram



The user interface is accessible from any computer with internet access running a modern browser that supports the FlixPicks extension/website. Browsers such as chrome, firefox, and other modern browsers are supported. Users on internet-accessible iOS, Android devices, and Smart TVs access their interfaces using native mobile applications.

The web portal software is programmed using a mix of HTML, CSS, and Javascript combined with backend components. The CineMap browser extension is programmed using JavaScript. Swift is used for iOS and Smart TVs, and Java is used for Android devices.

The users have a Library that is available from the front-end. The connection between the multi-source aggregation backend and primary backend server enables key features and feed

updates for the user. The primary backend server accesses the main database server with user information, settings, and media transcode. The third party APIs used in the multi-source aggregation backend are YouTube Data API, TMDB API, IMDB API, and other popular streaming service third party APIs . The only other connections in Figure 1 are the OIDC authentication server and linked subscription database. These are connected with the primary backend server and provide the main database server with needed user information.

Tomcat is used for the application server, and MySQL Server is used for the database server. Databricks is used as FlixPick's machine learning platform. Version control and storing is performed using Git and GitHub features. VSCode and Eclipse are the IDEs used for project management and issue tracking.

3. Identification of Case Study

The prototype case study is a set of fake streaming service subscribers, who by design allow for demonstration of the goals, objectives, and risk mitigation. Case study details are defined in Table 1.

Table 2

FlixPicks Prototype Case Study

Name & Information	Description
John Doe, Subscriber	<ul style="list-style-type: none"> - John is subscribed to Hulu, Netflix, and Amazon Prime Video. - He constantly finds himself annoyed switching from different streaming platforms while browsing for content to watch. - Because of work, he only has a few hours left to consume entertainment at the end of the day. - He watches with his family.
Jane Plain, Subscriber	<ul style="list-style-type: none"> - Jane is subscribed to Hulu and Netflix. - She regularly hangs out with groups of friends and one of

	<p>their regular activities is watching a movie as a group.</p> <ul style="list-style-type: none"> - Her and her friends constantly find themselves disagreeing over which movie to watch together.
Tim Brown, Guest User	<ul style="list-style-type: none"> - Tim is not subscribed to any streaming services. - He regularly finds himself unsure what content he wants to watch. - He wants to find good shows to watch but doesn't know where to start without being subscribed to anything.
Jack Smith, Subscriber	<ul style="list-style-type: none"> - Jack is subscribed to Hulu, Netflix, and Amazon Prime Video. - He regularly watches movies and shows at home by himself. - After watching something he typically searches youtube reviews to see what others thought about specific parts of the movies he watches.
Nick White, Representative	<ul style="list-style-type: none"> - Nick is an advertising representative for Netflix. - He is looking for user data about the most interacted with parts of movies and shows. - Netflix doesn't provide interactions during viewing of media so he needs to outsource this data.

The real-world development of the product targets all streaming service subscribers. The target audience also includes streaming service representatives looking to collect the data FlixPicks is gathering. FlixPicks recommends users' content based on their subscriptions and preferences.

4 FlixPicks Prototype Product Description

The purpose of FlixPicks is to build a platform through which users can easily view and select from all of their subscribed-to streaming services in one place. The purpose of the prototype is to demonstrate the key and innovative functionality/features of FlixPicks. Simulation of users allows for testing, risk mitigation, and feedback to demonstrate that FlixPicks solves the problem and works.

4.1. Prototype Architecture (Hardware/Software)

The prototype for FlixPicks runs on a virtual machine provided by the Old Dominion University Computer Science Department. It uses a Docker container using Apache, SQLite DB, and Python. This prototype works on any web-enabled device that can access the webpage/extension. The prototype does not include mobile Android/ iOS application interfaces. The user interface connects to the FlixPick's backend which allows users to gain access and use the main functions. The front-end of the prototype uses HTML, CSS, JS, and Python and connects to the backend allowing use of its main functions.

Figure 2

FlixPicks Prototype Major Functional Component Diagram

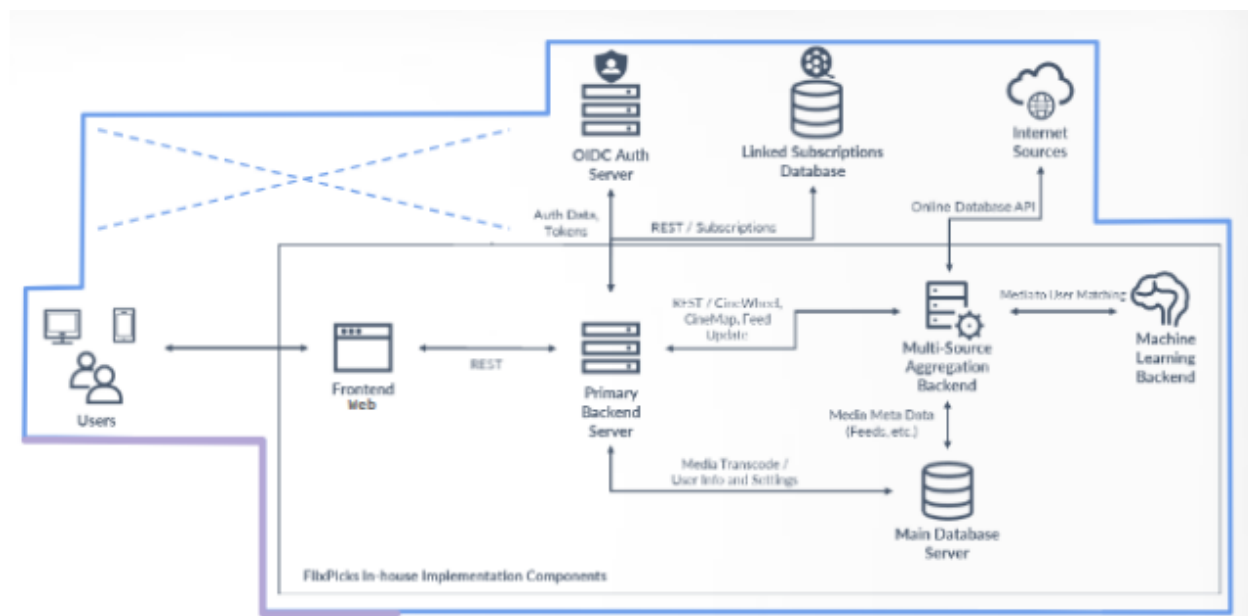


Figure 2 shows the prototype's major functional component diagram (MFCD). The MFCD nearly follows the real-world product MFCD. The main difference is the exclusion of a Library API. This change allows the developing team to focus on the key innovative components and functionality of FlixPicks during the semester.

4.2. Prototype Features and Capabilities

FlixPicks main features are all either fully implemented or partially implemented. The features implemented in the prototype are defined in Table 2 under 12 different categories: Subscription Service Management, Taste Profile, Recommendations, Filtering, CineRoll, CineWheel, CineMap, Analytics, Simulation, Movie Info, Reporting, and Feedback. The only features that are partially implemented are user subscription integration, CineMap export data, CineMap data analyzing, data analytics testing, and feedback. These features are still implemented, but not their full intended use.

Table 3

FlixPicks RWP vs Prototype

Category	FlixPicks Feature	RWP	Prototype
Subscription Service Management	User Account Registration	Fully Implemented	Fully Implemented
	Account/Subscription Service Management	Fully Implemented	Fully Implemented
	User Subscription Integration	Fully Implemented	Partially Implemented
	User Tier Level Feature Access	Fully Implemented	Partially Implemented
Taste Profile	Taste Profile	Fully Implemented	Fully Implemented
	Taste Profile Survey	Fully Implemented	Fully Implemented
	Taste Profile Content-Based Filtering	Fully Implemented	Fully Implemented
	Taste Profile Collaborative Filtering	Fully Implemented	Fully Implemented
Recommendations	Recommendations	Fully Implemented	Fully Implemented
	Filtered Recommendations (Criteria based)	Fully Implemented	Fully Implemented
Movie Library	Browse/Search Filtering	Fully Implemented	Fully Implemented
	HotPicks	Fully Implemented	Fully Implemented
CineRoll	CineRoll	Fully Implemented	Fully Implemented
CineWheel	CineWheel	Fully Implemented	Fully Implemented
CineMap	CineMap Overlay	Fully Implemented	Fully Implemented
	CineMap Commenting	Fully Implemented	Partially Implemented
	CineMap Export Data	Fully Implemented	Partially Implemented
	CineMap Data Analyzing	Fully Implemented	Partially Implemented
Analytics	Data analytics testing	Fully Implemented	Partially Implemented
	Analytics	Eliminated	Fully Implemented
	Summary reporting for user/stakeholders	Eliminated	Fully Implemented
Simulation	Simulation	Eliminated	Fully Implemented
Movie Info	Create/edit Movie Info	Fully Implemented	Partially Implemented
Feedback	Feedback	Fully Implemented	Partially Implemented

Table 3 shows that the prototype allows access to all of the features. Subscription service management is partially implemented with select subscription services with easily available third party API. Not all subscriptions are available for the prototype, but the selected few are integrated.

The CineMap feature is fully functional, but data exporting, testing, and analysis are simulated. The tester is the user for the prototype, users and user data including watch history and reactions are simulated. Simulation of aspects of FlixPicks is required, specifically regarding user data, user selection of content (watch history), creation of new movies for the Library API, and analytics.

General functionality in the prototype allows guest users to access the default Library of popular media, ability to view all FlixPicks features, and the ability to only use the CineWheel feature. Guest users only see general popular media because the guest interface does not include the user Taste Profile and other user data necessary for recommendations. For registered users a user specific Library based on their registered subscriptions and Taste Profile is available. The registered user interface allows users to use CineRoll, CineMap, and the CineWheel feature. It also allows users to view and reset their Taste Profile recommendations at any time. A newly registered user must fill out an initial taste survey that sets their starting recommendations.

The CineWheel and CineRoll features are functions that are available inside the prototype. The CineWheel function requires no machine learning or access to the back-end, the CineRoll feature requires the Taste Profile and machine learning to provide recommendations to the user. The CineMap feature is implemented through the use of a FlixPicks extension that is turned on when the user is consuming content. This extension sends data back to the database after a user session to be collected and analyzed.

4.3 Prototype Development Challenges

Developing the FlixPicks prototype is anticipated to be complex, necessitating the navigation of various challenges throughout the development process. The biggest challenge is identifying and handling time conflicts. The semester is only a few months, and with a large

team working within this time constraint can get confusing and hectic. To mitigate this, a to-do checklist and task board on our Git repository is used and updated every week.

Another handful of challenges include our database configuration, pooling of information from third party API sources, simulation of users for testing and feedback, and learning to use collaborative filtering for machine learning recommendation algorithms. These challenges are mitigated by a team of mentors consistently helping with questions. Machine learning and DB concerns are mitigated by research into machine learning and SQLite DB configuration prior to the semester.

5. Glossary

5. Glossary

Administrator: A user who, beyond having access to the full slate of features a Registered user has and the data available to a Representative, can manipulate FlixPicks data.

Android: An operating system for mobile devices manufactured by Google, Samsung, and other companies.

Apache Tomcat: An open-source implementation of the Java Servlet, Java Server Pages, Java Expression Language, and WebSocket technologies. Tomcat provides a “pure java” HTTP web server environment in which Java code can run.

API: An Application Programming Interface is an interface that allows for interactions between multiple software applications or mixed hardware-software intermediaries.

Apriori Algorithm: Association mining that allows for common patterns in a users watch history to be used to help suggest content for other users.

Choice Overload: The phenomenon that choosing between a large variety of options can be detrimental to the decision-making process.

CineFeatures: CineFeatures is the collective name of the three features in FlixPicks: CineRoll, CineWheel, and CineMap.

CineMap: FlixPicks extension that is enabled when a user is watching media. It overlays their media and allows the user to see and make their own time-stamped comments and reactions that are stored on the FlixPicks DB.

CineRoll: FlixPicks feature that generates random selections based on a user’s interests.

CineRoll uses the Taste Profile to generate selections for a user based on their recommendations and chooses one for the user. The user has the option to reroll if they aren’t satisfied with the

selection.

CineWheel: FlixPicks feature that randomly selects from a set of user-inputted choices. The user provides the feature with media options and the feature randomly selects from a maximum of ten options.

CSS: Cascading Style Sheets is a style sheet language used for customizing the appearance of a document written in a markup language such as HTML. CSS is a cornerstone technology of the World Wide Web, alongside HTML and JavaScript.

Decision Fatigue: The fatigue from deciding what to watch can take the joy out of watching anything.

Git: Software for tracking changes in any set of files, usually used for coordinating work among programmers collaboratively developing source code during software development.

Guest: An unregistered user who has limited access to features offered by FlixPicks.

HotPicks: A micro-experience tile for showing popular and trending media. Dynamically creates the list upon page refresh. Available for registered users and guests.

HTML: Hyper Text Markup Language. HTML is the standard markup language for creating web pages. HTML elements tell the browser how to display the content and define the structure of web pages.

IDE: An integrated development environment is a software application that provides comprehensive facilities to computer programmers for software development.

iOS: An operating system used for mobile devices manufactured by Apple Inc.

JavaScript: A scripting or programming language that allows you to implement complex features and interactivity on web pages.

Library: Aggregated content that is shown to users. Guest users only have access to HotPicks but registered users can see aggregated content from HotPicks and their personalized recommendations.

Linked Subscriptions: User's subscription data that will be used to filter what media is shown in the Library, users can change this in settings if they want to only view their subscriptions.

MySQL: An open-source relational database management system.

Netflix: A subscription-based streaming service that allows members to watch TV shows and movies on internet-connected devices.

Quick Click: A link from FlixPicks that redirects the user to the selected streaming media.

Reactions: Small images that the user attaches to their comment to describe a variety of emotions that the user feels about the media.

Recommendation Algorithm: An algorithm that uses a dynamically built input library and information filtering system based upon the Taste Profile that provides suggestions for media content that is most relevant to a particular user.

Registered User: A user who completed registration and Taste Profile Survey, having full access to features offered by FlixPicks.

Representative: A user who is an affiliate of a particular streaming service who has access to non-account-specific data analytics of Registered Users.

Stakeholder: A person with interest or concern in something, especially a business.

Streaming: A method of transmitting or receiving data over a computer network as a steady, continuous flow, allowing playback to start while the rest of the data is being processed.

Streaming Service: A streaming service is a digital platform that delivers multimedia content over the internet, allowing users to watch or listen to it in real-time without downloading.

Examples include Netflix, Spotify, and Disney+.

Subscription: A user's enrollment with a Streaming Service provider, providing them access to media available through the service.

Survey: A questionnaire to establish the initial information for recommendations in the Taste Profile.

Taste Profile: A user profile on FlixPicks that stores data about user streaming subscriptions, recommended media, and user preference information. As a user makes selections the Taste Profile recommendations become more refined to the users' preferences.

User Roles: Guest, Registered User, Representative, and Administrator are the user roles for FlixPicks.

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