Lab 1 – AskMissy Product Description

Dannisse Arenas

Old Dominion University

CS 411W

Professor Janet Brunelle

31 January 2022

Version 1

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1 Introduction

As a result of the impacts of COVID-19, students' education and learning have been deteriorating as the transition from face-to-face learning to remote learning slowly integrates into society. In the United States, an estimated 55 million students under the age of 18 were forced to transition to remote learning, while an estimated 1.4 billion children globally were moved to at-home learning (Garcia, 2020). The effects of online learning have caused a significant decline in testing performance, a rise in technological challenges within teachers and instructors, and a deflux in resource finders.

The Virginia Standards of Learning, or SOL, is known to be the pinnacle of standardized testing within the Commonwealth of Virginia. This testing program sets forth the expectations for each core subject for secondary students. As a result of the pandemic, school systems are changing the way the standardized tests are administered. Newport News Public Schools stated that the impact of COVID-19 resulted in students in grades 6-8 not needing to participate or make up any missed SOL exams during the 2020 school year. Moreover, students in grades 9-12 only need to take one SOL exam per core class, as opposed to the prior SOL requirement of taking an exam for each class they register for (Ellard, 2020). The pandemic changed the way standardized testing is administered and is a response to not only the students' change in learning environment, but also the effect it had on its instructional staff.

Teachers, despite knowing the required instructional lessons provided by the school system, fail to become universally proficient in remote teaching as a result of the normalcy with face-to-face teaching. According to the 2017 National Assessment of Educational Progress, only

32.5% of eighth graders have instructors who have knowledge about technology, and only about 19.3% of teachers are willing to fully integrate technological software into the school systems. However, those who do not consider themselves to be proficient in basic computer knowledge, but have received prior training, resulted in about 43.4% to 69.2%. Furthermore, 24.1% of eighth graders are without teachers who are trained to use computers and educational software (Garcia, 2020). Even before the pandemic, technology has evolved and will continue to evolve if the resources to create these programs and software are available. The lack of preparation the school systems provide to the teachers who have little to no experience with technology has impacted the quality of learning within the virtual classroom.

Public libraries have shown a decrease in usages over the past eight years. As of 2018, there has been an estimated 31% decrease in usages of libraries in the United States (Albanese, 2021). However, a recent survey in the United States was conducted in April of 2021, which focused on the impacts of the pandemic on reading. The research found that about 87% of users read during the pandemic, as opposed to the 81% from the 2019 collection of previously surveyed data. Many libraries now have digital and online libraries/databases available for users to read remotely from home, hence the influx in reading by 6% (Coates, 2021). Due to a library's large digital resource and book databases, they can provide users a safer way to read and view resources, safely from home.

The COVID-19 pandemic impacted students' learning and development. The transition to remote learning failed to provide them daily access to materials and resources their schools would generally supply. Because of this, students lack the necessary resources, such as textbooks, to use to successfully complete their assignments.

AskMissy is a software application that is designed to recommend students with the proper resources to assist them with their assignments and recommend them books to read. A key design consideration in this software application is the ability to filter the user's recommendations through machine learning based on their interests, needs, and preferences—showcasing a multitude of resources that students can use.

2 AskMissy Product Description

The AskMissy software is an application that searches for resources pertaining to an instructor's lesson plans established by both the instructor and librarians. The main goal is to improve resource finding capabilities for students, teachers, and librarians to help improve the already declining standardized test performances.

2.1 Key Product Features and Capabilities

AskMissy implements machine learning algorithms to create tags that help identify each resource to make locating them easier for the student, teachers, and librarians. The number of times users utilize the search algorithm is directly correlated to the results the machine learning algorithm outputs. In other words, the more times users utilize the software, the better the resource results become.

The machine learning algorithm will provide personalized search results based on user feedback and ratings. A feedback/rating system is initiated and prompts the user to rate and provide feedback for the resources presented. The overall rating does not affect the user's personal profile recommendations because personalized searching is still intact.

The user's feedback/ratings can be viewed on their user profiles. AskMissy's personalized profiles allow users to also view resources they previously used and saved. The software application is not only for registered students, teachers, and faculty, but can also be utilized by non-registered guests. These guests are given limited access to ensure the safety of the registered students.

AskMissy will be placed and implemented through the school system, which can be accessible through the student and teachers' identification numbers. Those who are registered will utilize their respective school system to authenticate individual profiles and then be given special access to the AskMissy search tool. Illustrated in Figure 1 are the key features of AskMissy, as well as its competitors.

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Figure 1

Competition Matrix

|	What Should I Read Next	Goodreads	Amazon	Allreaders	AskMissy
Specific Book Search	✓	✓	✓	✓	✓
Genre Search	✓	✓	✓	✓	✓
Cover Shown	✓	✓	✓		✓
Incorporated Synopsis		✓	✓	✓	✓
Incorporated Reviews And Rating System		✓	✓		✓
Personalized Profiles	✓	✓	✓		✓
Specified Groups/Communities		✓			✓
Community/School Library Integration					✓
Reading/Difficulty Level					✓
Reports for Teachers/Librarians					✓
Intelligent Feedback Usage					✓
Predictive Analytics Based Search Results					✓

2.2 Major Components (Hardware/Software)

AskMissy is structured to hold multiple servers, such as the front-end, web scraping, machine learning, and main database back-end servers. The front-end servers will be user

friendly, making it easier to navigate through, while the back-end server would contain user

and resource information and the machine learning algorithm. These servers can be accessed

through internet connection. The major functional component diagram shown in Figure 2

describes the interfaces, users, GUI, and external resources within AskMissy and how they

interact with one another.

Figure 2

Major Functional Component Diagram
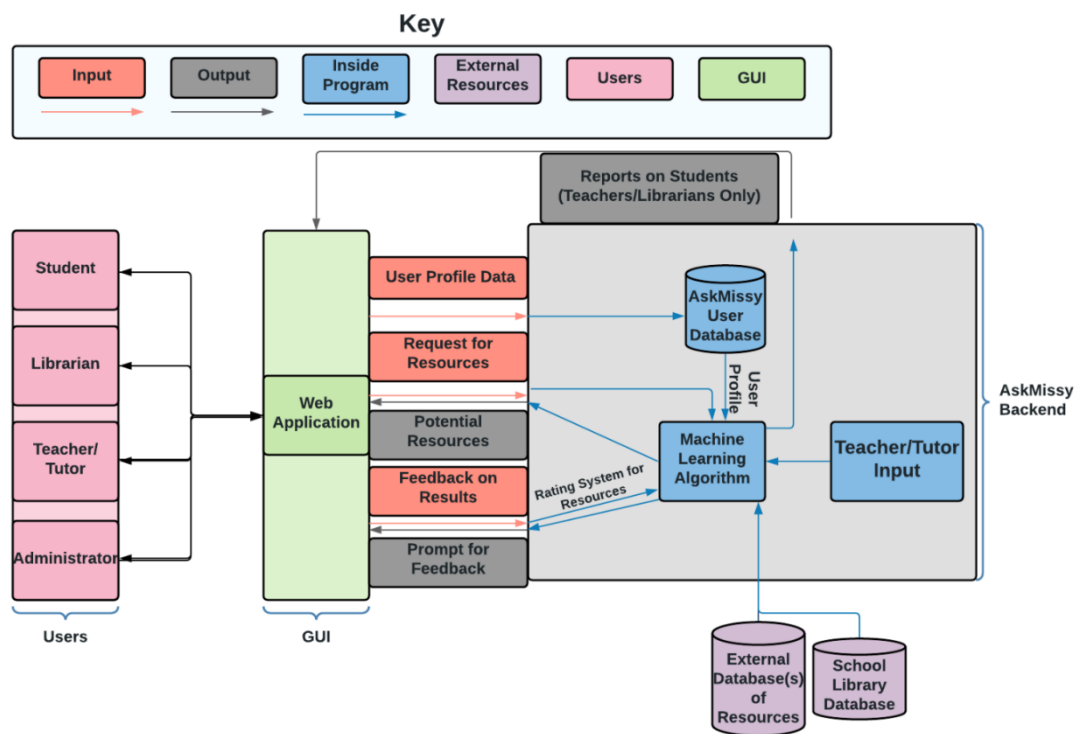
AskMissy's web application will be written in HTML5, CSS3, and JavaScript. MySQL

will be used to store resource information such as the author, ISBN, date published, genre, and

synopsis, as well as the user information: profiles, ratings, recommendations, and feedback. Users

would need access to the internet and a computer or smart device to access AskMissy. Hardware

requirements include any smart device that has access to internet connection.

3 Identification of Case Study

AskMissy is designed for students, teachers, librarians, and guests. The students will be

from grade levels 6-12 as they are the grades that are required to take standardized tests. This

application's goal is to help users search for appropriate and reliable academic resources by

having the machine learning algorithm learn their preferences and recommend the resources to

the users.

The specific case demonstrated for AskMissy will be the user's local school system.

Students in public school who need resources to utilize in their course will create a profile

linked to their respective schools. Teachers can request and send school resources to the

librarians in the event it is not available within the library's database, as well as create and

manage groups throughout the school year, thus creating an interactive online experience in the

classroom.

Librarians also have access to all features the teachers and students have. In addition to

those, they can update the school's library inventory within AskMissy and manage the lists of

requests from both teachers and students, as well as approve/disapprove the requested resource.

Guests who do not attend secondary public school are able to use AskMissy; however,

will only have access to basic searches and profile creation. Other users who might benefit from

AskMissy are the resource publishers who require a referencing database and the students'

parents who cannot locate a certain resource due to a lack of a personalized search algorithm.

4 AskMissy Product Prototype Description

The AskMissy software application was designed to become a personalized resource finder using predictive analytics to recommend the best resources for its users. The prototype for AskMissy will sufficiently demonstrate its main core features. User profiles, rating system, and group interactions are a few of the main AskMissy features. However, the AskMissy search tool will be simulated due to the limited structured reference data, and thus this feature will be partially implemented.

4.1 Prototype Architecture (Hardware/Software)

The prototype for AskMissy shall be completed using Flask, written in Python. The front-end of the application will be made with HTML5, CSS3, and JavaScript. The integrated development environment the back-end server will be using is PyCharm, with GitLab as its repository. For the automatic navigation, PyAutoGUI will be utilized. The Major Functional Component Diagram for the AskMissy prototype will be illustrated below in Figure 3.

Figure 3

Prototype Major Functional Component Diagram
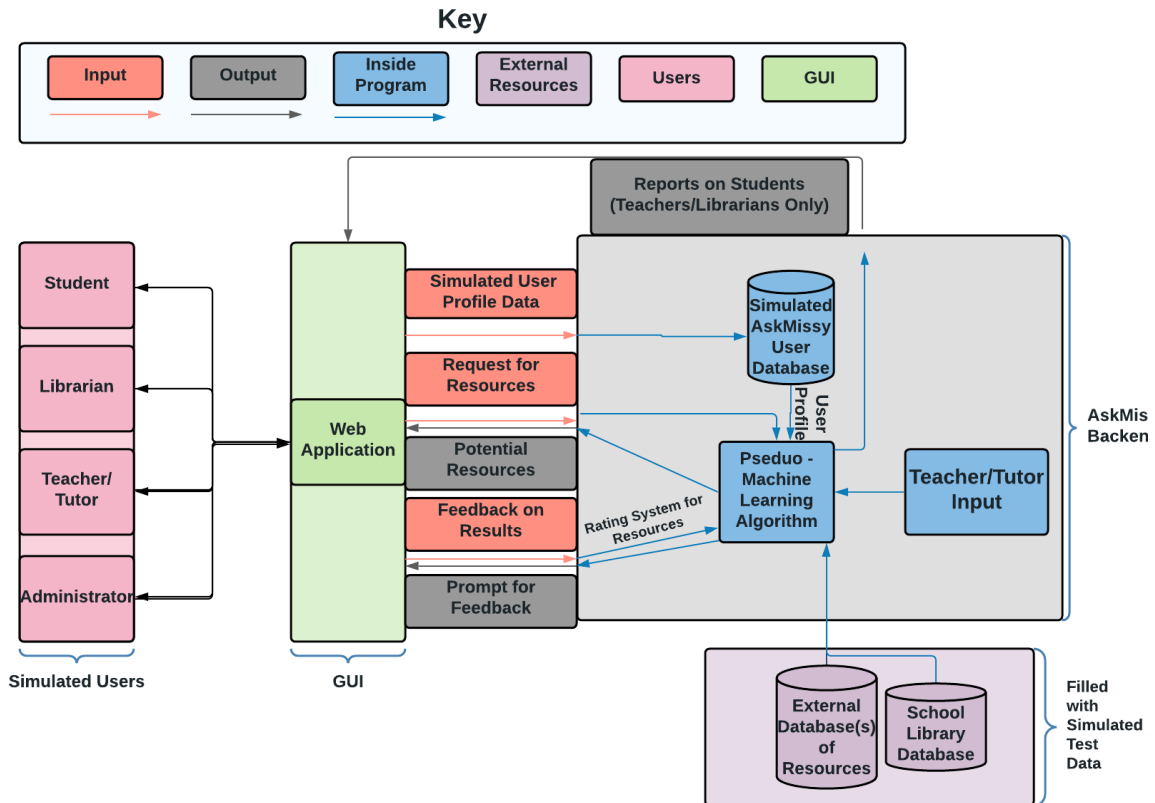
The database will be stored on Amazon RDS and MySQL. Both resource and user

accounts will be simulated to test out its functionality. When running the AskMissy prototype, the

tester will be able to create a user profile, which will be saved in the database. The tester will also

be able to utilize the search tool and have the database output any stored resource information.

Figure 4 below shows the Work Breakdown Structure of the resource, library, and external

database components.

Figure 4

Work Breakdown Structure - Resource Matching
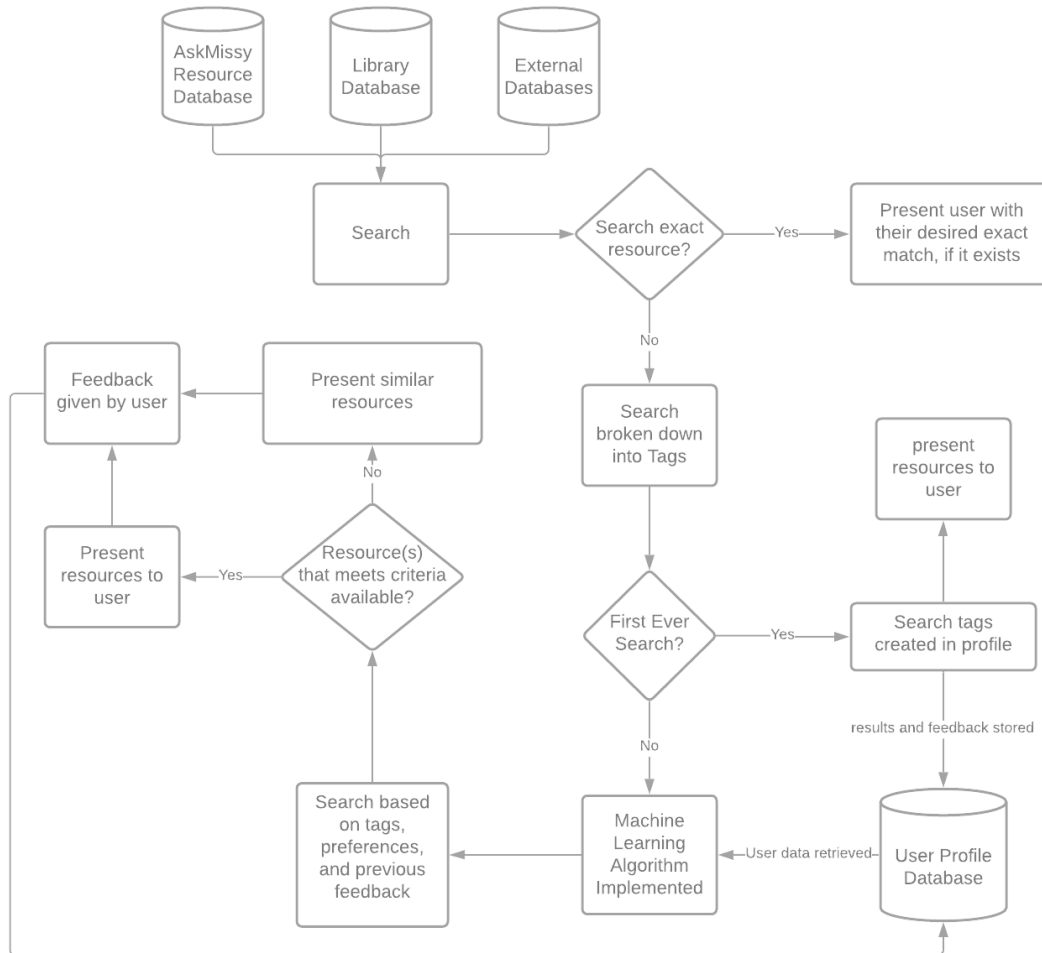
4.2 Prototype Features and Capabilities

The AskMissy prototype will fully implement all the RWP features of the data retrieval,

data management of the live product, security, account management, and the UI. The only feature

that will not be implemented is the development aspect of the data management feature— the

machine learning algorithm will oversee this section. Table 1 displays a comprehensive list of the

functional and non-functional features of the RWP and the prototype.

Table 1

RWP vs. Prototype

Category	Feature	RWP	Prototype	Reasoning
Data Retrieval	Metadata Report	Full	Partial	Limited test data as a proof of concept
	Basic Search	Full	Full	
	AskMissy Search	Full	Full	
Data Management - Live Product	Machine Learning	Full	Partial	Limited test data as a proof of concept
	Source Tag Creation	Full	Full	
	Source Tag Management	Full	Full	
	Lesson Plans	Full	Partial	Limited test data as a proof of concept
	Internal Database Manipulation	Full	Full	
	External Database Manipulation	Full	Full	
Data Management - Development	Source Tag Development	None	Full	Use to develop default tags
	Machine Learning Training	None	Full	Use to develop algorithm defaults
	Simulated Data	None	Full	Use to fill database with simulated data for testing
	User testing reports	None	Full	Use to develop user interface
Security	Login/Authentication	Full	Partial	Limited test data as a proof of concept
	Data Encryption, moving	Full	None	Best practices will be put in place
	Data Encryption, resting	Full	None	Best practices will be put in place

Account Management	User Profile	Full	Partial	Limited test data as a proof of concept
	Feedback	Full	Full	
	Group Management	Full	Partial	Limited test data as a proof of concept
	Login/registration	Full	Full	
UI	Group Interaction	Full	Partial	Limited test data as a proof of concept
	Bug Report	Full	Partial	Limited test data as a proof of concept
	Basic Search	Full	Full	
	AskMissy Search	Full	Full	
	Communication	Full	Partial	Limited test data as a proof of concept
	Personal Data Report	Full	Partial	Limited test data as a proof of concept

4.3 Prototype Development Challenges

AskMissy requires the development of several tasks for the software application to be functioning successfully. Convincing local school systems to invest in AskMissy is the largest challenge to overcome as the application is highly dependent on user interaction. One development challenge is the data retrieval feature. The metadata contains the information of authors, publishing dates, ISBN, and file size of the resources. The data retrieval tool is dependent on the metadata; however, the lack of user searches will result in limited structured reference data. Implementing fake data to store in the back-end server will mitigate this risk. A lack of knowledge with the development tools required to build the software prototype will also pose a challenge in the creation of the prototype.

5 Glossary

Administrator: A user who is responsible for managing a majority of AskMissy's working

data.

Agile: A set of frameworks and practices where solutions evolve through collaboration between

self-organizing cross-functional teams.

Algorithm: A finite sequence of defined instructions, mainly used to solve a class of problems or

perform a computation.

Amazon Relational Database (RDS): A database web-service run by Amazon on a cloud,

designed to simplify the setup, operation, and scaling of relational databases in applications.

AskMissy: A software application that will help users find more relevant

resources.

Application Programming Interface (API): A software intermediary that allows

two applications to talk to each other.

Data Retention: The continued storage of an organization's data for compliance or

business reasons.

Database: An organized collection of structured information, data, typically stored

in a computer system.

Economically Disadvantaged: A student eligible for Free/Reduced Meals who receives Temporary Assistance for Needy Families (TANF) or is eligible for Medicaid.

Exact Match Search: A search for a single specific type of resource.

Flask: A web framework written in Python to allow for prototyping.

File Server: A device that controls access to separately stored files.

GitLab: A single application platform that allows for collaborative development.

Guest: A user who is not a student, teacher, librarian, or administrator; who has limited access to the AskMissy program.

Graphical User Interface (GUI): A graphics-based operating system interface that utilizes icons, menus, and a mouse to interact with the program.

Librarian: A user responsible for managing the library's inventory/database, communicating with teachers and students.

Machine Learning: The study of computer algorithms that improve automatically through the use of data provided.

MySQL: An open-source relational database management system.

Personal Learning: An educational approach that aims to customize learning for each user's strengths, needs, skills, and interests.

PyAutoGUI: A cross-platform automation module written in Python.

PyCharm: An integrated development environment (IDE) written in Python that is used for computer programming.

Python: A high-level programming language used for programming and developing software applications.

Real World Product (RWP): The fully implemented, final product for AskMissy.

Student: A user studying at grades 6-12 in need of reliable resources.

Teacher: A user who helps students in grades 6-12 acquire knowledge. They are responsible for making plans and managing students' groups/communication.

Temporary Assistance for Needy Families (TANF): A program that provides eligible families with a monthly cash payment to meet their basic needs.

Tester: A user responsible for designing and conducting testing suites for usability testing.

User: An individual using the AskMissy Interface.

Web Scraping: The process of extracting content and data from a website.

Web Server: A computer program that distributes web pages as they are requisitioned.

Windows: A series of operating systems developed by Microsoft.

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