Lab 1 – AskMissy Product Description

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1 Introduction

As a result of the impacts of COVID-19, students' education and learning have been deteriorating as they transition from face-to-face learning to remote learning. 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 this 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 SOL's, or the Standards of Learning, has been 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 has stated that the impact of COVID-19 resulted in students in grades 6-8 not needing to participate, nor make up any or missed SOL exams. Moreover, students in grades 9-12 only needed to take one SOL per core class as opposed to the prior SOL requirement of taking an SOL 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.

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Teachers, despite knowing the required instructional lessons provided by the school system, fail to become universally proficient in remote teaching as expected when having been a face-to-face instructor. 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. In both instances, the numbers are well below 50%. This indicates that the instructional staff are incapable of utilizing technology within the classroom setting as a result of not being taught prior. 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% respectively, leaving an estimated 24.1% of eighth graders without teachers who know or are trained to use computers and educational software (Garica, 2020). Even before the pandemic, technology has evolved since 2015 and will continue to evolve as long as we have the resources to create these programs and software. The lack of preparation the school systems provide to the teachers to accommodate for the influx in technological advances have greatly affected the quality of learning.

Public libraries on the other hand 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). This is mainly due to the lack of interest in finding books that tailor to one's likes and dislikes. However, a recent survey in the United States has proven to change this result. According to the Freckle Report, a survey was conducted in April of 2021 which focused on the impacts of the pandemic on reading. It was found that about 87% of users read more during the pandemic as opposed to the 81% from 2019's collection of previous survey data.

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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 the library's large

digital resource and book databases, they are able to provide users a safer way to read and view

resources safely from home.

The overall result of COVID-19's impacts on students' learning and development have

been on the decline all over the world. This transition not only changed the way students learned,

but it also 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

in order to successfully complete their assignments.

AskMissy is a software application that solves the aforementioned issues above— to

showcase a multitude of resources students are able to use for school and present them with the

best options based on their preferences. This application is designed to recommend students with

the proper resources to assist them with their assignments as well as recommend them books to

read at their own leisure through machine learning. A key design consideration in this software

application is the ability to filter the users' searches based on their interests, needs, and

preferences.

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2 AskMissy Product Description

The AskMissy software is an application that allows users to search 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 scores as a result of the resources school systems failed to provide during the COVID-19 pandemic.

2.1 Key Product Features and Capabilities

AskMissy implements machine learning algorithms to create tags that help identify each resource to make locating them much easier for the student, teachers, and librarians. This algorithm will aim to provide personalized search results based on past recommendations' feedback and ratings. The amount 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.

After the AskMissy machine learning algorithm recommends them a resource, a feedback/rating system is initiated and prompts the user to rate and provide feedback for the resources they looked at. The overall rating does not affect the users' personal profile recommendations because personalized searching is still intact.

This software application is web-based that is accessible through a network connection using HTTP as opposed to having the software exist within the devices' memory, which in turn saves the users' storage capacity. AskMissy will also be placed and implemented through

the school system and accessible through the given student and teachers' identification numbers

that can be accessed both inside and outside of school. The school's database is composed of

school library and corollary resources which are directly managed by librarians and

administrators. External databases are accessed by web-scraping, which is responsible for

finding other avenues to access appropriate resources.

AskMissy is not only for registered students, teachers, and faculty, but can also be used

by "non-registered" guests. These guests are given limited access to ensure the safety of the

registered students. Those who are registered will utilize the school system to authenticate their

individual profiles and are given special access to the AskMissy search algorithms.

There are a total of three different school users: students, teachers, and librarians. The

students will have access to the personalized AskMissy search algorithms in order to search

through the resources needed as well as share the resources with the other users of the

application. Furthermore, the students are able to privately and safely message the teacher and

librarians for any queries or suggestions they may have, including book/resource

recommendations.

Teachers, on the other hand, will have access to all the features the students have but with

more permissions granted. They will be able to create class groups and manage them throughout

the school year to create an online, interactive experience with their students and their peers

using the AskMissy software. In addition, teachers will be able to request and send certain

resources for their students if it is not already available within the library's database to the

librarians. Teachers will also have the ability to create lesson plans to help organize each class

session as well as manage the lesson plans in the event the instructor needs to make changes to

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their agenda. Lastly, they will have access to their students' reviews of the various resources they

looked over. This will allow the teachers to view the resources the students liked and did not like

to help determine whether or not they want to use this resource for future classes.

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

to those, they are also able to update the school's library inventory within AskMissy to ensure

the data and resources are up to date. Furthermore, they are able to manage the lists of requests

from both teachers and students and approve/disapprove of the requested resource depending on

the school system's policy. Librarians can also contact the administrators for AskMissy for

technical support should they run into any issues regarding the application.

Administrators are not a part of the school system; however, they are responsible for

managing the AskMissy servers. They have access to all the features the other school users have.

Furthermore, they are responsible for ensuring data integrity to ensure the data resources are

accurate, complete and consistent. In addition, they are responsible for maintaining the external

database to ensure direct access to certain data that is not a part of our prolog files.

Administrators can also access all user profiles and metadata, as well as authorize librarians to

create school groups. Should the school system administrators make certain data requests, the

AskMissy administrators will be responsible for receiving their requests.

2.2 Major Components (Hardware/Software)

AskMissy is structured to hold multiple hardware servers, such as the front-end, main

back-end, web scraping, machine learning, and main database back-end servers. These servers

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are able to be accessed through internet connection. The major functional component diagram

shown in Figure 1 describes the interfaces, users, databases, and external resources within

AskMissy and how they interact with each other.

Figure 1

AskMissy Major Functional Component Diagram
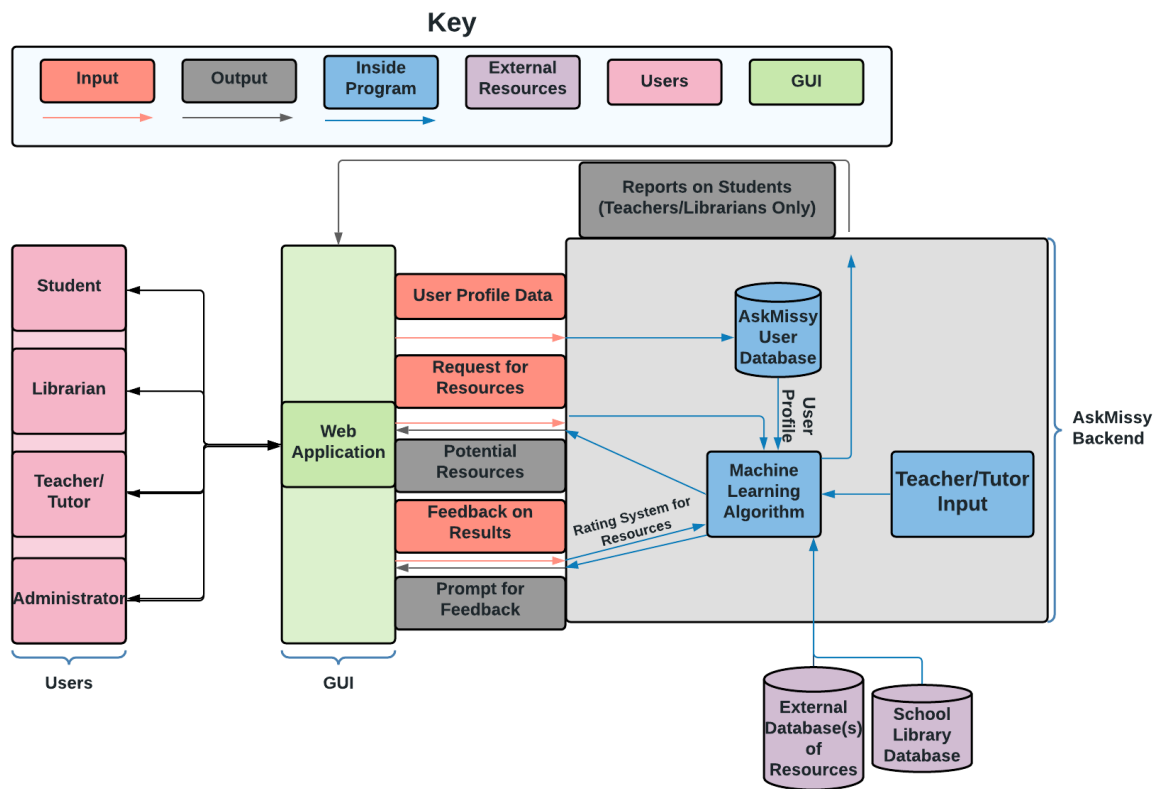
As for AskMissy's software requirements, the front-end servers are written in HTML5,

CSS3, and Javascript while the back-end servers are implemented using Python, as well as the

algorithm for machine learning and the natural language processing. The integrated development

environment AskMissy will be using is Microsoft Visual Studio Code and will use GibLab as its

repository. It will also use PyAutoGUI for the automatic navigation.

3 Identification of Case Study

AskMissy is designed for students, teachers, and librarians as the main users. The students will be from grade levels 6-8 as they are the grades that are required to take standardized tests. This application's goal is to help the users search for appropriate and reliable resources for assignments by having the machine learning algorithm learn their preferences and recommend them to the users. Other users who might benefit from this are the resource publishers who wish to search for other referencing data and the students' parents who require a certain resource but cannot find it online due to a lack of a personalized search algorithm, such as AskMissy.

4 AskMissy Product Prototype Description

4.1 Prototype Architecture (Hardware/Software)

4.1.1 Hardware

4.1.2 Software

4.2 Prototype Features and Capabilities

4.3 Prototype Development Challenges

5 Glossary

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

Agile: Set of frameworks and practices where solutions evolve through collaboration between self-organizing cross-functional teams

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

API: Application Programming Interface

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

Database: Structured data held in a computer

Economically Disadvantaged: A student in Virginia is considered economically disadvantaged if the student: is eligible for Free/Reduced Meals, receives TANF, or is eligible for Medicaid

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

File Server: Controls access to separately stored files

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

Librarian: Responsible for managing the library's inventory/database, communicating with teacher and students

Personal Learning: An educational approach that aims t**o customize** learning for each user's strengths, needs, skills, and interests.

Student: A person studying at a K-12 education institution in need of reliable resources.

Teacher: A person who helps students (K-12) to acquire knowledge; Responsible for making plans, managing students' groups/communication.

Temporary Assistance for Needy Families (TANF): Provides eligible families with a monthly cash payment to meet their basic needs

Tester: Responsible for designing and conducting testing suites for usability testing

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User: A user will be anyone using the AskMissy Interface and will fall into the category of a guest, student, teacher/mentor, librarian or admin.

Web Scraping: Extracting/scraping data from websites

Web Server: A computer that runs websites.

Windows: Series of operating systems developed by Microsoft

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