

# Milestone 2

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## 1) Background:

### 1.1) Current Conditions

The constant struggle with searching for specific items in storage systems has led to the need for a simple system to locate the item through voice commands that anyone is able to use. Where's My Stuff looks to solve this problem through integrating a database and voice processing software with a voice recognition system to quickly identify where items are located. Currently, the team is working on researching different softwares and interactions to devise a solution that seamlessly integrates all parts. We have decided to use a MySQL database with a NodeJS backend that will help handle incoming requests as well as process audio commands.

### 1.2) Existing Systems

Prior to this project there has been some work done on the side of more precise inventory tracking, leading to specialized bins being created to track the amount of inventory. Additionally, there have been inventory systems that have been developed for large scale manufacturing and businesses to keep track of merchandise inventory but those are primarily focused on enterprise. As for personal inventory with a focus on voice interaction, there doesn't seem to be anything that is publicly available for use. This existing system will be useful in understanding how to better track the inventory through these bins and observe the interaction between the code and hardware of the bins.

### 1.3) Problems

While a plan has been developed for implementing a solution, there are apparent problems that have arisen through research. Questions about the design are still being addressed such as specific functionality of the voice processing and list of commands

as well as the issue of hosting a cloud application to access the local database. There are also procedural problems that come into play such as if the user asks where something is, should we automatically update the quantity to reflect that they took the item? Issues like those continue to present themselves throughout development and are being discussed as the design process continues, and cooperation with the project partner will be necessary to assure requirements are being met.

#### **1.4) Pertinent History and Stakeholders**

In researching for this project, several similar products have been discovered such as Smart Bin Solutions. There are several bin systems that track inventory through a similar means with physical bin hardware. However none of these options seem to have effective search capabilities such as with voice commands as this project plans to implement. The use of voice recognition software has led to research into different means such as a simple phone microphone or using Google Home or Amazon Alexa technologies. The last two technologies have the capability of adding functionality to their voice processing and thus may provide a solid solution to the voice recognition issue. These are relatively new technologies that will need to be researched more to understand the ease of implementation.

This project has come about from Mark Reed, a retired HP employee looking for innovative solutions to inventory management systems. As the project continues, the assistance and advice from professors or professionals may be consulted for advice on issues, but the current stakeholder and project lead remains Mark Reed.

#### **1.5) Terms, Concepts and Definitions**

Voice Recognition Software: This is the software and hardware we will use to transmit audio and process it such as Alexa or Google Home combined with our created software.

MySQL: a SQL language for creating, manipulating and handling a relational database.

NodeJS: A JavaScript framework used to create network applications for handling requests.

React: A Javascript library used for building user interfaces

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## **2) Vision:**

### **2.1) Vision**

This project will work to solve the issue of spending an unnecessary amount of time searching for specific items. Where's My Stuff provides a solution that allows users to quickly and efficiently locate inventory within their storage systems that allows them to streamline their production process and save time/money. Life for individuals and industries alike will be greatly improved by the ability to much more quickly acquire what they need and track the amount of inventory present. In creating this product there is a set of prioritized goals that will be met to deliver the most complete project. First and foremost is a database that stores the inventory and a voice processing system that allows users to access the database. The user will also be able to modify inventory and find availability in their system through various voice commands. One of the final goals will be to allow for notifications for low inventory and other various statistics and easy exportation of inventory information. There may be potential for other features given time constraints and feasibility.

### **2.2) Central Hypotheses**

#### *Growth hypothesis:*

Users will be attracted to this product as the technologies used are relatively new and growing quickly. Voice technology is a growing industry that reinforces the idea of a "smart home" to many users and helps to further improve the efficiency and ease of daily life. The simple and intuitive design will attract users to this new form of inventory management.

### *Value hypothesis:*

The benefits of Where's My Stuff lies in the saved time from being able to quickly locate items in large inventory systems. The system will be intuitive and easy to use so as to allow users to come on board and quickly get value from the product. A limited amount of technology and setup is necessary thus making the product more user friendly and valuable.

## **2.3) High-level Requirements**

### *Functional requirements:*

- The system will store a database of information about the location of items in containers.
- The user can interact with the system via the web application.
- The system will interact with the user via voice commands and audio feedback.

### *Non-functional requirements*

- The system should remain decently organized.
  - The system should return accurate information based on the contents of the database
  - Quickly processes voice commands and accesses information
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## **3) Prioritized Project Constraints:**

### **3.1) Time**

Thus far in the development process, we are making good progress in finding viable solutions and planning the project. The project requirements will require us to split the work into sprints to show our progress over time. We are able to split the work up through a Trello board into what needs to be done and the sprints in which they may be accomplished. Looking toward the end of the Capstone project it is very reasonable to believe we will have a finished project before then. We have planned to accomplish our tasks before the end and potentially add other features as time permits. The three members have a large availability

throughout the week with roughly 3-4 hours available daily. We hope to have a minimal viable product done before the end of winter term and be able to add additional features after that point.

### **3.2) Resources**

From researching potential solutions to this problem, we have come across numerous resources that will be useful. One constraint that hasn't been thoroughly researched yet is the need for hosting our product and a database in the cloud. This may require small financial resources if using services such as Amazon Web Services or Google to host our program. Other resources fall under the category of personal development items like laptops or voice assistant technology, however most members have access to these resources.

### **3.3) Scope**

In order to create the minimal viable product we will need to create an API backend that will interact with the MySQL database that needs to be created. Voice commands will be used to access these APIs and get data, but the voice commands need to be interpreted from our program. These tasks should be feasible to complete in the time of the project given our current level of research and development. Given our resource constraints, it will take some research and time to understand how to host our program on the cloud and understand the resources required for this constraint.

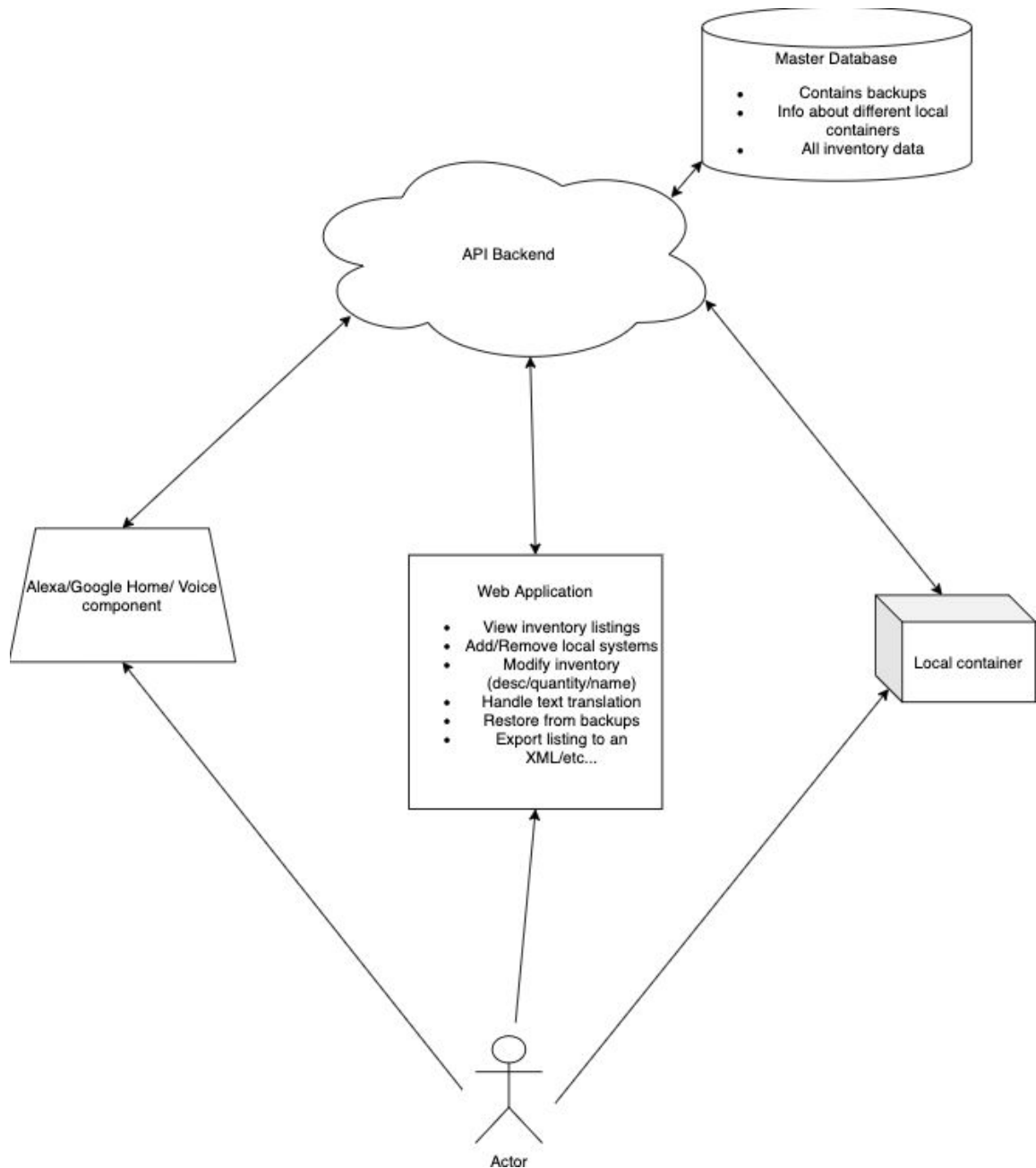
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## **4) Scope:**

### **4.1) Process Flows:**

- (Voice) User wants item -> asks application -> application returns information about item

- (App) User wants item -> searches for item -> application has information about item
- (Voice) User takes item -> decrement item in app -> application has an accurate count of items
- (Voice) User has new item -> tells application about new item -> application adds new item to database
- (Voice) User loses item -> tells application -> application deletes item
- (Error Handling) User says something -> application doesn't understand -> application asks for clarification.
- (Error Handling) User asks for item -> Item not in database -> application says they don't have a record of that item.



#### 4.2) User Stories:

- As a user I need to access items in the database with my voice so that I can remain hands free and improve my workflow.
- As a user I need to locate items in my workshop with simple voice commands so that I can quickly find what I need.

- As a user I need to be able to use voice commands to show what items are in my system so that I can see what all I have available.
- As a database manager I need to have full control over everything in the database so that I can do my job.

#### **4.3) Supported Voice Commands:**

- **Minimum product**
  - Add Item: "I have a \_\_\_\_."
  - Remove Item: "I don't have any more \_\_\_\_."
  - Increment Item: "Add x quantity to \_\_\_\_."
  - Decrement Item: "Remove x quantity from \_\_\_\_."
  - Find Item: "Where's my \_\_\_\_?"
  - Create a new category: "Add a new category called \_\_\_\_."
- **Planned commands**
  - Filter Item: "Show me all \_\_\_\_."
    - By category: "Show me all \_\_\_\_ categorized by \_\_\_\_."
    - By container: "Show me all \_\_\_\_ in \_\_\_\_."
  - Find space for an item: "Where is the nearest empty container?"
- **Extra Feature Commands**
  - Low items: "What do I need to restock?"
  - List all containers: "What are all of my containers?"
  - Export to csv: "Export my stuff."
  - List all items: "What all do I have?"
  - Reserve container: "reserve container \_\_\_\_ for \_\_\_\_"

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#### **5) Iteration Plan and Estimation:**



Task	Time Estimation
Beginnings of research and layout	1 month
Create skeleton of database, web application	1 month
Add basic voice processing for accessing database	6 weeks
Add sample data and add more commands	6 weeks
Testing and fine tuning	1 month
Minimal viable product finished	At 6 month mark
Add inventory notifications	2 weeks
More advanced filtering, locating, inventory management commands	6 weeks
Final testing and finishing touches	1 month