

Lab 1 - CropCircles Product Description

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1. Introduction

Home gardening has witnessed a recent surge in popularity, experiencing a nearly 35% increase since 2021(gardenpals, 1). 55% of American households actively engage in some form of gardening activities(gardenpals, 1), reflecting a growing trend in home gardening interest. However, despite growing interests in home gardening, gardeners are facing problems, primarily an outlet for community driven growing advice and solutions. It was found that only 20% of gardeners turn to mobile apps as a source of information, a surprisingly low amount when considering the fact that 37% of people who use the internet spend more than 10 hours per week online(gardenpals, 1). Having recognized the divide between home gardeners that need community and application usage, CropCircles wishes to bridge the gap between traditional gardening practices and modern information-sharing platforms.

Evidence of this can be seen in the following through wine production through hobbyist growers. In the United States alone, 79 million individuals actively consume wine, while 500,000 North Americans have embraced winemaking as a pastime(nytimes, 1) With such a large consumer market for wine products, many individuals beyond those listed in the study would likely find themselves interested in the cultivation of homemade wine. CropCircles wishes to attract novice growing individuals through community involvement.

Expanding on the cultivation of wine, examples can be seen within strawberry crop products. When looking at home gardening, strawberries emerge as the most popular small fruit for growing interest. 3 pounds of strawberries have the potential to yield approximately four standard 750ml bottles of wine(getbrewsy, 1). The former presents an exciting prospect for gardeners to explore how gardening and winemaking come together and while many growers do

not have an outlet to follow this idea, CropCircles intends to deliver this feature in app form for convenience of use.

CropCircles provides a centralized community of like minded growers from novices to experts that have interests in the same growing and product goals. Users will be able join growing group, share questions in forums, annotate and display growing progress, receive, and provide recipe recommendations, and gain confidence from individuals with similar goals.

2. Product Description

CropCircles is a smartphone application with features for promoting collaborative community involvement through Q/A Forums, Growing Recommendation Forums, Growing Update posting, product history tracking and journaling features, and post-harvest forums for activities like recipe sharing. It is an application that is intended to bridge users of all experience levels with growing activities they wish to engage in.

2.1 Key Product Features and Capabilities

CropCircles allows users to engage and communicate within product communities. This feature fosters a collaborative environment where individuals can share insights, experiences, and expertise with each other. With the implementation of the product communities, the user experience on the app goes from isolating to social. Product communities promote a sense of community with like-minded individuals, bolstering user initiative. And most importantly, it allows for the expanding collective pool of information for mutual benefit on particular products.

One of the key benefits of joining a CropCircle will be the Q/A forum feature. Within the Q/A, user's will be able to interact with forums as one of two roles. The user is either a poster who will be asking the questions or the responder, the user who will be answering questions. For

a user who is a poster, they will be able to title and write out a description of their issue and provide attachments and images as necessary. The benefit of the Q/A forum is the ability to share concerns and have them addressed in real time with users and experts that are going through the growing process at the exact same time. The answers are catered to the user who is asking, and it allows for other members of the CropCircle to feel engaged in a community growing progression. Responders will be able to access forum questions and provide replies that form a chain on the original post.

When a user is actively participating in a CropCircle, the app will have the option for information recording through a journaling feature. The journal will act as a form of user input for information collection. Information collection can take the form of weather for the day, any notable changes in health, any pest or soil concerns, and whatever the user feels important to add. The benefit of implementing a journaling feature can be valuable for growing records for if the user wants to grow in a following session. The journaling from a previous growing session can be used in determining if a crop is the best match for the user or the environment it would be in.

Users participating in a CropCircle will be able to see the growing progress of other members in the group using the growing updates forum. Here users can post their own growing updates for discussion with members amongst the team or view and comment on the posts of other members. The growing updates feature allows users an environment to encourage one another's progress and communicate in an encouraging fashion.

After growing and harvesting, users will be able to contribute to product success in the post-harvest forum. Users will be able to receive and provide recommendations for recipes involving their crop and rate information on its usefulness. Concerns such as storage methods

and handling procedures can also be addressed by experts assigned to the CropCircle group and other members of the community.

2.2 Major Components (Hardware/Software)

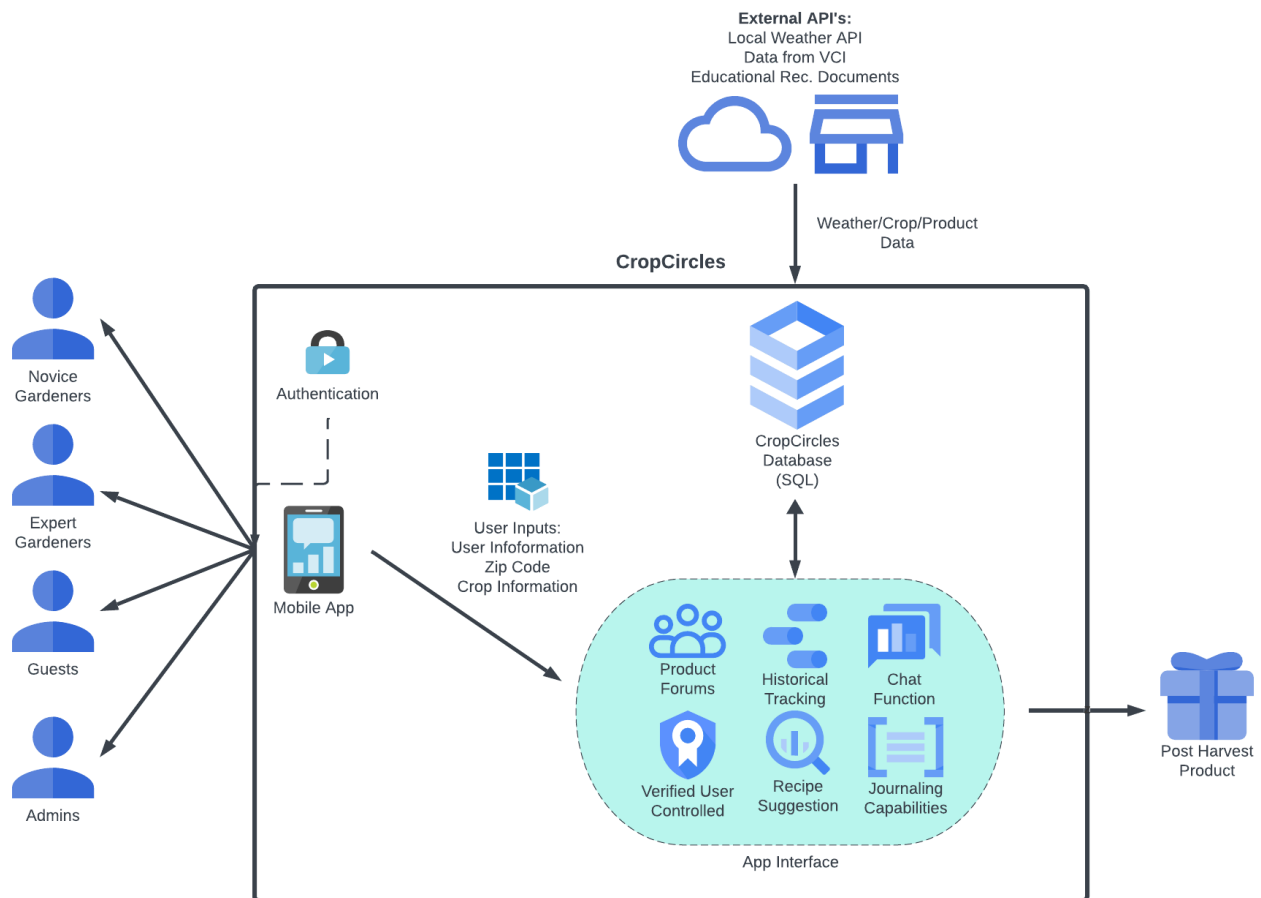


Figure 1: Main Functional Component Diagram

As shown in figure 1, users interact with CropCircle via a smartphone device after authentication with their login credentials. Users allow permissions for location data and crop preferences, and administrators collect additional data from external sources such as VCI (Virginia Cooperative Extension) and the USDA (United States Department of Agriculture). All application data is stored in the CropCircle MySQL database hosted on the database server.

The backend framework is hosted on an AWS (Amazon Web Service) virtual machine or through ODU servers if preparations can be arranged. Frontend will consist of requests to the backend hosted by the smartphone. Version control is accomplished via GitHub, and we use Visual Studio for the IDE with testing implemented via the Gradle library.

Key functions provided on the application dashboard include the Product Communities that the user is actively a member of, the Product Community finder tool for browsing new groups to join, and once the user is a part of an active CropCircle, they will be able to access tracking tools that log their growing process, chat functions that allow them to message other members of the CropCircle team, forums for Q/A and growing updates, as well as a forum for post-harvest recommendations and recipe browsing.

3. Identification of Case Study

CropCircles' intended users will be focused on gardeners, particularly those that are new to gardening and need encouragement and incentive but the app will cater to gardeners of any proficiency level. For the sake of the case study, we will have several test users that fall into the following categories. Users that represent the novice gardener category will have little to no prior experience with gardening and will rely heavily on the app's capabilities to fuel their decision making. User's that have standard growing knowledge will be utilized in the CropCircle case study and will bring their own unique experiences to the app. These users likely will not rely as heavily on the app's expert user help features. Users with excellent growing proficiency will be represented in the app and will be great sources of information for more novice members of the CropCircle team. Expert gardeners will be represented and have the ability to guide the team members in Q/A forums and recipe suggestions. A user from the novice gardener group will be

selected to go through CropCircles. They will have to select their post harvest product interests which in this case study will represent Jam and Wine. The user will join crop circles that focus on strawberry jam and wine and get placed with members of all of the represented target groups. They will access the different forum features to gain guidance on growing recs from other team members and a gardening expert and will do the same for post harvest recs. The expert will provide a recipe for the team to follow and other members can suggest alternative recipes.

4. CropCircles Prototype Description

4.1 Prototype Architecture (Hardware/Software)

4.2 Prototype Features and Capabilities

4.3 Prototype Development Challenges

5. Glossary

- **Annuals:** Plants completing their life cycle in one growing season, providing vibrant blooms and requiring replanting each year for seasonal color and variety in gardens
- **Blanching:** A brief exposure of harvested vegetables to boiling water or steam, often followed by rapid cooling, to halt enzyme activity and preserve color, texture, and nutritional value
- **Brining:** The immersion of harvested produce, particularly fruits or vegetables, in a solution of salt and water to preserve, flavor, or enhance texture

- **Canning:** A preservation method involving the sealing of harvested food in airtight containers and heat processing to prevent spoilage, commonly used for fruits, vegetables, and sauces
- **Cider:** A beverage made from the fermentation of apple juice, resulting in a mildly alcoholic drink with various levels of sweetness and carbonation
- **Community Forum:** A social feature in the gardening app that enables users to connect with other gardener users, share experiences, ask questions, and seek advice on various gardening topics
- **Compost:** Decomposed organic matter, such as kitchen scraps and yard waste, used as a nutrient-rich soil amendment to improve soil structure and fertility
- **Curing:** The controlled drying and conditioning process applied to certain crops, such as tobacco or onions, to enhance flavor, texture, or storage qualities
- **Dehusking:** The removal of the outer husk or shell from a harvested crop, commonly applied to grains, nuts, or seeds

- **Expert Gardener:** A gardening professional with certified expertise gained through formal education, training, or hands-on experience in product-related subjects. They lead and manage groups focused on specific gardening products
- **Fallow:** Allowing a field or garden bed to remain unplanted for a season to naturally restore fertility, control pests, or prevent soil erosion
- **Fermentation:** A microbial process used in the post-harvest stage to transform certain crops, like cocoa or coffee beans, through the breakdown of compounds, often resulting in improved flavor or quality
- **Frost Date:** The average date of the last spring frost or the first fall frost in a specific location, crucial information for gardeners to determine appropriate planting times and protect sensitive plants
- **Harvest:** The point at which the crop is ready to be gathered for use
- **Heirloom Seeds:** Seeds from plants that have been passed down through generations, maintaining their original characteristics, and often valued for their historical, cultural, or genetic significance
- **Jam:** A sweet spreadable product made by cooking fruit with sugar to a gel-like consistency, often containing whole or pieces of fruit

- **Microgreens:** Young, edible greens harvested at an early stage, typically within a couple of weeks of germination, prized for their intense flavors and nutritional content
- **Mulching:** The practice of covering the soil around plants with a layer of organic or inorganic material (mulch) to conserve moisture, suppress weeds, and regulate soil temperature
- **Novice Gardener:** A gardener with limited formal training, education, or professional background in the subject matter, possessing some knowledge but lacking accreditation
- **Oils:** Extracted from fruits, seeds, or nuts, oils serve various culinary purposes. Olive oil, for example, is pressed from olives and is a common cooking and salad oil with distinct flavors based on the olive variety and processing methods
- **Pickling:** The preservation of harvested produce, typically cucumbers or other vegetables, in an acidic solution, often vinegar, along with various spices, to create pickles with a distinct flavor profile
- **Perennials:** Plants that live for more than two years, often returning each growing season, providing long-term stability in a garden
- **pH Levels:** A measure of the acidity or alkalinity of the soil, influencing nutrient availability to plants. Adjusting pH levels can optimize conditions for specific crops

- **Plant Care Reminders:** Notifications and reminders within the app that alert users to water, fertilize, prune, or perform other care tasks for specific plants based on their individual needs and schedules
- **Post-Harvest:** The phase following the harvest, including the processes involved in transforming a crop into a product
- **Preserves:** Similar to jam, preserves are a sweet spread made by preserving whole or large pieces of fruit in a sugary syrup
- **Product:** The end goal of a crop after harvesting, ranging from wine to jam or any other item that can be produced in the post-harvest stage
- **Raised Bed Gardening:** Cultivating plants in beds elevated above ground level, often enclosed by frames, allowing for better soil drainage, warmer temperatures, and easier accessibility
- **Relish:** A condiment made from chopped fruits or vegetables, often pickled, and seasoned with spices, vinegar, or sugar, used to enhance the flavor of savory dishes
- **Syrup:** A thick, sweet liquid often made by boiling sugar or fruit juice, used as a topping for pancakes, waffles, desserts, or in beverages

- **Thinning:** The practice of selectively removing excess seedlings or fruits to allow the remaining ones to grow more robustly, ensuring proper spacing and resource allocation
- **USDA Hardiness Zones:** A zoning system created by the United States Department of Agriculture (USDA) to classify regions based on temperature extremes. Ranging from 1 (coldest) to 13 (warmest), these zones guide gardeners in selecting plants adapted to their local climate, ensuring successful cultivation
- **Weather Integration:** The incorporation of real-time weather data into gardening apps, offering users insights into current and forecasted weather conditions to assist in garden planning and care
- **Wine:** An alcoholic beverage produced through the fermentation of crushed grapes or other fruits, with variations in flavor, aroma, and complexity depending on the grape variety, region, and production techniques

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