Lab 1 – Thought Locker Product Description

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Table of Contents

1 Introduction ........................................................................................................................................3
2 Thought Locker Product Description ..............................................................................................5
   2.1 Key Product Features and Capabilities ......................................................................................5
   2.2 Major Components (Hardware/Software) ..................................................................................7
3 Identification of Case Study .............................................................................................................8
4 Thought Locker Product Prototype Description ..........................................................................TBD
   4.1 Prototype Architecture (Hardware/Software) .........................................................................TBD
   4.2 Prototype Features and Capabilities .......................................................................................TBD
   4.3 Prototype Development Challenges .......................................................................................TBD
5 Glossary ...........................................................................................................................................10
6 References .........................................................................................................................................11

List of Figures

1 Major Functional Component Diagram .........................................................................................8
1 Introduction

Dementia is an umbrella term used to describe individuals that have impairment in their ability to remember, think, and make decisions. It encompasses a wide variety of neurological conditions and diseases, including Alzheimer’s disease, Vascular, and Lewy Body. This cognitive impairment is common among older populations of adults, affecting one in ten Americans aged 70 and older. The proportion of adults that are diagnosed with a variation of dementia increases significantly if categorized by age. While only 3% of adults aged 70-74 have dementia, this percentage rapidly increases to 33% of adults aged 90+ (PRB, n.d.).

Despite the large number of adults that are diagnosed with the condition, not all cases are equivalent in terms of the severity of symptoms. According to research performed by the National Institute of Health, roughly 50% of Alzheimer's patients had a mild form of the disease, while 30% and 19% received moderate and severe diagnoses, respectively (2021). Mild dementia is characterized by several distinct symptoms, such as short-term memory loss, difficulties with communicating and making decisions, challenges with spatial reasoning and visual processing, and changes in mood and temperament. During this phase of dementia progression, the independence of the individual is largely preserved, as these symptoms are not severe enough to require constant caregiver supervision (Alzheimer’s Society, n.d.).

The predictable result of developing dementia is the restrictions it imposes on daily life. Short-term memory loss can cause individuals to become more prone to losing household items, such as keys and reading glasses. These events can worsen mood swings and inadvertently create schisms between the individual and their loved ones.
Dementia can also impair an individual’s ability to plan and coordinate their activities. Often, patients must remember many important commitments, such as doctor’s appointments, reminders to take life-saving medication, holidays, and milestones achieved by family members. Because dementia can cause orientation to be impeded, these activities are often misremembered and sometimes forgotten entirely. This can lead the patient to become distressed or even sick if doctor’s instructions are not heeded correctly.

The progression of dementia can also cause caregivers to feel helpless in caring for their patients. Alongside their own responsibilities, caregivers must maintain their patient’s schedule, remind them of upcoming appointments, and ensure that the patient is completing their daily obligations. This level of responsibility can often be taxing for family members that are not hired full-time caregivers. Caregivers in many cases also lack the ability to monitor their patient’s activity in real-time. This can lead to the possibility of catastrophic consequences, such as the patient leaving their home unattended or refrigerator door open.

Due to the short-term memory loss and lack of orientation that is often associated with dementia, patients can also forget how to contact loved ones in the event of an emergency. A typical touchscreen interface on a smartphone or smart watch can be complex to those who don’t use these technologies often. This initial confusion can lead to frustration, as patients may resort to repeatedly call the wrong number, inadvertently misdialed contacts, or accidentally call emergency services.

These issues, when viewed together, point towards the need for a centralized platform that can strike a balance between patient independence and caregiver monitoring capabilities. A proposed solution would allow for easy-to-use tracking of the locations of important items,
provide caregivers with a comprehensive tool to monitor patient activity, and allow patients to maintain a degree of independence while still being cared for properly.

Thought Locker is an application designed to strengthen and enhance the patient-caregiver relationship. It streamlines the item-finding process, allows caregivers to effectively monitor patient activity, and enables patients to retain a degree of independence despite the mental challenges they face each day.

2 Thought Locker Product Description

Thought Locker is a mobile application designed to assist patients with mild to moderate dementia and their caregivers. The purpose of the application is to simplify finding solutions to the day-to-day challenges and disruptions that individuals living with mild to moderate dementia and their caregivers may experience. It is designed with two primary intentions in mind: to maximize the ability of the caregiver to monitor a patient’s day-to-day activities and to grant a degree of personal freedom for patients who still wish to remain independent of a full-time caregiver.

2.1 Key Product Features and Capabilities

Thought Locker has several key features that simplify the patient-caregiver relationship. These features can be customized based on the patient’s needs. The first is a simple calendar and reminder interface. The caregiver is primarily in-control of this aspect of the application, but the patient can also add and delete events as needed. This feature functions in much the same way as a normal calendar and reminder application, where the caregiver or patient can customize the tasks that are needed to be fulfilled. As those tasks are checked off and completed, the patient and caregiver will receive a notification through their device. This feature supports patients with
short-term memory loss and sends them a friendly reminder if a task is not completed within the preset time they specified. The structure of this feature ensures that patients can complete tasks independently while under the watchful eye of a caregiver.

Another feature Thought Locker houses is its contact center. Rather than a large rolodex-like contact system in a typical iOS device, Thought Locker instead creates a simple interface with a select-few contacts that are important to the patient. A caregiver or patient can add emergency contacts as needed. In the event a patient is in need, they can simply press a button that is always present within the application that calls their highest-priority emergency contact. In the event they do not answer to the notification, the next-highest individual on the priority list is contacted. This feature will be created to tackle the orientation and short-term memory difficulties that individuals with dementia experience. Rather than fumbling through various applications, patients can instead readily contact who they need to without having to navigate the complex array of applications on their device. This simplification inherently eliminates much of the frustration those with dementia experience.

One of the features that truly separates Thought Locker from other competitors is its item location feature. Caregivers can pair important items with Geo Tags to the patient’s device, such as their car keys or medicine bottles, so that the patient or caregiver can readily find them when they are needed. Rather than spending hours trying to find important medication, the caregiver or patient can instead use the application to “ping” the item’s last location and have it play a sound. Caregivers will also be able to log the locations of important items so that in the event they cannot find an item, they can try looking in specific locations that are often visited by the patient. This feature will allow patients and caregivers to find items more readily, reducing the potential for conflicts related to misplaced items.
Finally, Thought Locker will enable caregivers to effectively respond to patient needs using comprehensive monitoring features. A common complication associated with the loss of orientation in dementia patients is forgetting to complete important actions, such as turning off a stove, closing a refrigerator door, or leaving the house at abnormal times. Thought Locker enables the caregiver to know when these events happen without having to be present with the patient. Using sensors on doors and appliances, Thought Locker can track when doors are not locked or when appliances are not turned off. The application will produce analytics based on these activities, which the caregiver can use to tailor the patient’s environment to mitigate risk.

These features, when incorporated into one application, can mitigate the risks on behalf of the patient and caregiver and can allow the patient to retain a degree of independence while still being properly cared for. No other product on the market currently attempts to bridge this gap and Thought Locker will stand out as a more comprehensive solution when compared to its competitors.

2.2 Major Components (Hardware/Software)

Thought Locker is an application intended to be cross-compatible across multiple devices, such as smartphones, tables, smart watches, or any other devices connected to Android and iOS operating systems. An application and database server will also be needed to house the analytics. To sign up, a patient simply creates an account with their email address and password. A caregiver must create a separate account with their own email and password. When patients first interact with the software, they will be presented with the option to add their caregiver. Once the caregiver is added, they will have administrative control of what the patient is able to do within the application.
The major components of the application according to these user roles are shown in Figure 1. As stated before, the caregiver will have primary responsibility for creating calendar reminders, creating the emergency contact list, and pairing items for the patient to then interact with.

**Figure 1**

*Major Functional Components Diagram*

Thought Locker also incorporate several types of software to achieve its goals: AWS for backend server development, PostgreSQL and MongoDB as our databases, and JavaScript as our primary programming language. Jest will be used for testing, Docker will be used for containerization, and GitHub will be used for version control, issue tracking, and CI/CD.

3 **Identification of Case Study**
The target demographic of this product are individuals that have mild to moderate dementia and their respective caregivers and family members. There is currently no popular application on the market that is designed specifically for caregivers to effectively manage patient independence, so this product would be intended to support caregivers and patients in managing dementia symptoms. Patients will be able to plan tasks ahead of time, call their contacts at any time, or find important items themselves. Caregivers, by contrast, will be able to leave more tasks up to the discretion of the patient rather than claiming comprehensive responsibility of the patient’s everyday activities.

In terms of a case study group, our prototype would seek feedback from individuals with mild to moderate dementia, along with the caregivers who support them. They will provide valuable feedback for what daily habits should be monitored by caregivers, as well as the capabilities of patients in this phase of the dementia progression. This case study would also hone Thought Locker’s analytic capabilities, as we could tailor our product to the most popular needs of caregivers and their patients. Their feedback could also be used to offer insights on the design of the user interface, the quality of our features that we designed, and making sure that our product truly meets the needs of our target market.

While our product is specifically designed for dementia patients and their family members/caregivers, our product could potentially be used by other population segments, such as those with general short-term memory problems or other individuals with other conditions that may require monitoring by a trusted party. By design of our application, a patient does not necessarily need a caregiver as an administrator. The caregiver is offered to take this role in the initial set-up of the application. Otherwise, the patient, by default, has all of the capabilities of a
caregiver. In terms of monitoring capabilities, our product may allow those with mental challenges the opportunity to live by themselves under the auspices of a trusted third-party.
5 Glossary

**AWS (Amazon Web Services):** Provides cloud-computing platforms and APIs to individuals and governments on a metered, pay-as-you-go basis.

**PostgreSQL:** Free and open-source database management system that supports relational (SQL) and non-relational (JSON) querying.

**MongoDB:** Non-relational document database that provides support for non-relational querying.

**JavaScript:** Scripting programming language that creates dynamic web page content and mobile applications.

**Jest:** Test-runner for JavaScript applications. It supports a JavaScript library for creating, running, and structuring tests.

**Docker:** A software platform that allows its users to build, test, and deploy applications in standardized executables resembling containers.

**GitHub:** An open-source repository service that allows its users to work on a single project simultaneously.
References

