Lab 1 – Not E-Lone Product Description

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1 Introduction

1.1 Problem Background

Anxiety and depression were the two most common mental illnesses reported by young adults between the ages of 18 and 25 during the summer of 2021, a 7% increase compared to 2019 (Adams et al., 2022). In the short term, feeling stressed or depressed can make it difficult to sleep or focus on certain activities, and in severe cases, these feelings can lead to physical illnesses such as high blood pressure and heart disease (American Psychological Association, 2019). As these emotions persist, they can lead to a young adult developing depression or anxiety(U.S. Department of Health and Human Services, n.d.). The effects of feelings of stress or depression can make it harder for a young adult to deal with their emotions. Some young adults can overcome these temporary effects by using coping mechanisms or addressing the cause of their feelings; for many others, these effects can develop into a cycle that is difficult to escape.

1.2 Problem Description

Three of the most common obstacles young adults often face when dealing with feelings of depression or anxiety are financial costs, inflexible schedules, and a lack of resources that ease them into getting help. Even when a young adult has the will to try to seek help, they can find themselves overwhelmed or confused, exacerbating their feelings of depression or anxiety.

1.3 Solution Description

Not E-lone addresses these problems by providing a straightforward set of activities that are used to help treat anxiety and depression. Shifting a person’s focus towards helping someone else, writing about their feelings or another topic, and making a plan to deal with the causes of

their feelings are activities that have been shown to help people experiencing feelings of anxiety or depression (Erickson et al., 2017; Chan & Horneffer, 2006; Masicampo & Baumeister; 2011). Reconceptualization, which will be discussed in more detail later, is used by therapists to treat anxiety, depression, and other mental illnesses (Gatchel & Rollings, 2008). Completing activities intended to mitigate or counter those feelings and symptoms as part of a routine can improve a young adult's overall mood.

2. Not E-lone Product Description

Not E-lone's activities include writing a kind message to another young adult, focusing on the first step to accomplish a task, writing and reflecting on their thoughts, considering a different way of viewing their situation, and planning a way to organize their busy schedule. Not E-lone will also provide rewards for completing activities, as well as daily quests to encourage the young adult to complete these activities regularly.

2.1 Key Product Features and Capabilities

Some techniques used to treat anxiety and depression are focused on changing the sufferer's thought patterns to provide temporary or long-term relief. Note-passing is meant to redirect a young adult towards helping another person experiencing similar feelings to their own. In some cases, a person who focuses on helping another person instead of on helping themselves can experience reduced feelings of depression and anxiety (Erickson et al., 2017).

For young adults who struggle to get started due to feeling overwhelmed by a large amount of work, Not E-lone will offer an activity to help them isolate and focus on a single task or step. The young adult will only be able to add to the list of tasks once they have the current one as complete. A list of completed tasks will be displayed after finishing an objective to show the young adult how much progress they have made.

Another common activity used to help reduce symptoms of anxiety and depression is journaling. Not E-lone's Creative Mode journaling activity will not force the young adult to think about specific things but to simply write what is on their mind. At the end of a journaling session, the young adult will be asked how they feel about what they wrote. If they feel worse, Not E-lone will suggest that they seek further help either through talking with a close friend or family member or through a mental health professional. Not E-lone will also offer a Survival Mode activity, where writing prompts will be offered for young adults who struggle unable to come up with topics. Both free writing and prompt-based writing have been shown to have short-term positive effects on people with depression and anxiety (Chan & Horneffer, 2006).

Not E-lone will offer a quick and easy method for young adults to plan their day. Organizing a plan to achieve a goal or a set of goals, can offer a short-term reprieve from feelings of anxiety or depression, by taking the young adult's focus away from how they feel about those tasks (Masicampo & Baumeister, 2011). Not E-lone aims to use machine learning to suggest activities in the empty time slots of the young adult's day.

Not E-lone's Reconceptualization activity provides a young adult with a parable, to change the way the young adult views their current circumstances. This activity is named after a technique used in cognitive behavioral therapy which has been shown to help ease a wide variety of mental and physical symptoms (Gatchel & Rollings, 2008). Young adults will be able to provide feedback on the parable, which will be used to help Not E-lone decide whether to suggest similar stories in the future.

Optional Quests will be provided to young adults to encourage daily use of Not E-lone's activities. Rewards will also be given to help the young adult feel a sense of accomplishment after completing an activity, and further boost their mood.

2.2 Major Components(Hardware/Software)

One of Not E-lone's goals is to be convenient for young adults with severe feelings of anxiety or depression, for this reason, the application will be available on Android and iOS devices.

Starting from the middle left side of Figure 1, the young adult will use a graphical user interface to access Not E-lone's features. The young adult will be presented with the choice of the Philosophy, Journal, or Planner menus upon logging in as indicated by the green arrow leading from the young adult on the left to the first menu on the right within the Graphical User Interface Section. From this first menu, the young adult can choose one of three activity types which will lead them into one of the activities shown to the right of the first menu. The young adult will also be able to access Settings, Notifications, and Daily Quest menus within any other menu or activity. The young adult can choose to read a parable by selecting the Reconceptualization activity Philosophy menu. Beneath the Philosophy menu is the Journal menu where the young adult will able to select the Survival Mode, Note-Passing, or Creative Mode activities. If the young adult selects the Planner menu they can select the First Step activity or Build A Schedule activity. Moving to the right of the activities, the young adult will be presented with a Post-Activity Survey after reading a parable or completing the Survival Mode, Creative Mode, or First-Step Activity. The graphical user interface will be programmed in Java.

The information collected from the survey will either be sent to the Not E-lone server, and then to the Not E-lone machine learning algorithm and databases, or be ignored, based on the young adult's information collection settings as indicated by the blue arrows leading from the Post-Activity Survey and Settings in the right side of the Graphical User Interface section to the Web Server, Machine Learning symbol, and Initial Media Collections and Account Information

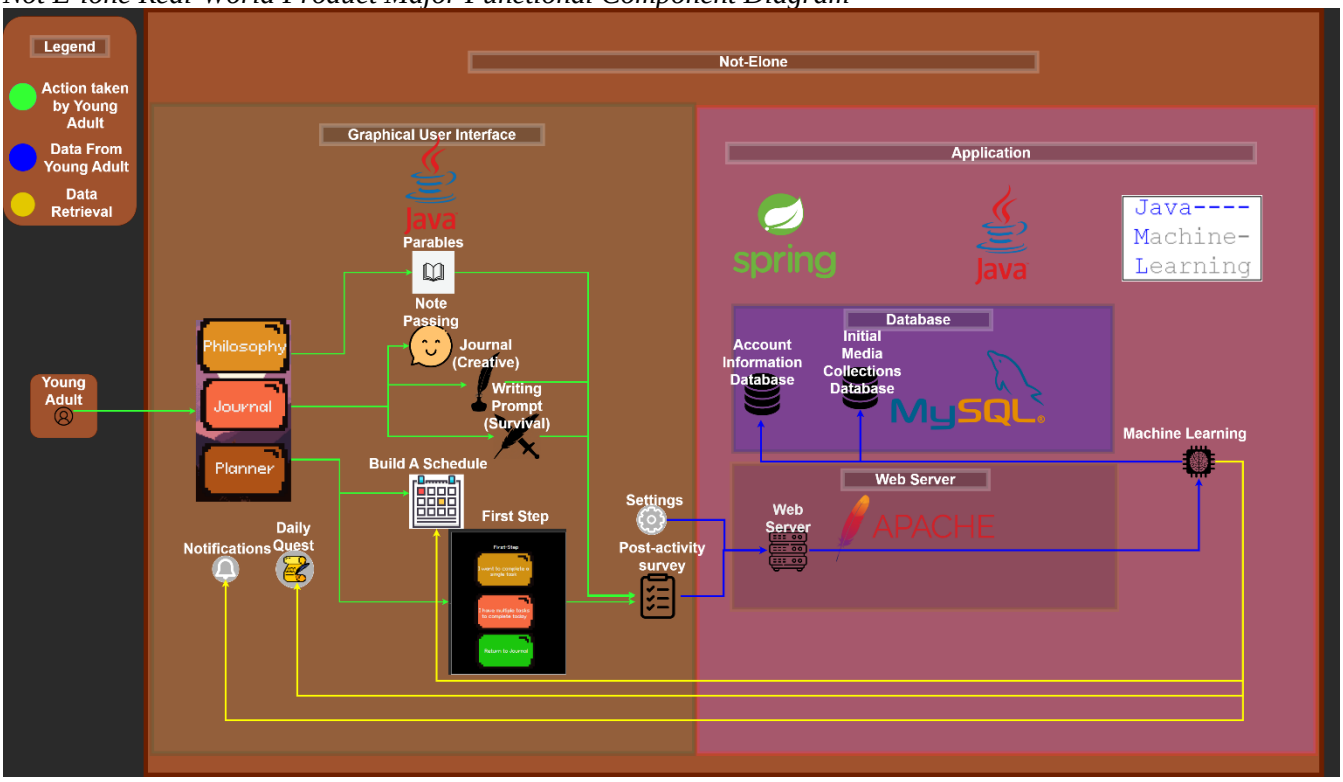
databases in the Application section. The Post-Activity Survey feedback will not be collected for use by Not E-lone without the young adult's permission. The Account Information database will be used for managing settings and feedback for each young adult. The Initial Media Collections database will be used for storing the initial collections of messages, parables, writing prompts, notifications, quests, and schedule templates. Messages, parables, writing prompts, and schedule templates created by young adults can be added to the database if they enable information collection in their settings menu. The Account Information and Initial Media Collections databases will be managed with MySQL. The yellow arrows originating from the Machine Learning symbol to the Build A Schedule activity, Daily Quests, and Notifications symbols in the Graphical User Interface section indicate that the information collected from Post-Activity Surveys will be used to recommend certain activities by adding them to the young adult's schedule, providing incentives to complete an activity through Daily Quests, or recommending activities through notifications. Young adults will be able to opt out of having their information collected for the purpose of training the machine learning algorithm. The machine learning algorithm used for parable, prompt, and activity suggestion in the Build A Schedule activity will be trained using the Java ML framework. The application used for handling interactions between the web server, database, and graphical user interface will be written in the Java programming language, using the Spring Boot library to communicate with the web server and databases.

User preferences, account information, and birthday will be stored on the young adult's device. If the young adult chooses to provide this data, it will be anonymized and encrypted. Quests and Notifications will also be optional.

The Eclipse and Atom IDEs will be used for programming the Java application and graphical user interface. Gradle will be used for build management, Github for its version control and collaboration tools, Trello for project management, and Discord for team communication.

Figure 1

Not E-lone Real-World Product Major Functional Component Diagram



3. Identification of Case Study

3.1 Who is Not E-Lone for?

Not E-lone is intended for young adults between the ages of 18 and 25, along with their close friends and family if they feel comfortable sharing their thoughts and feelings with them.

3.2 What will Not E-Lone be used for?

Not E-lone will be used to provide young adults with helpful coping mechanisms that may help them deal with their feelings of stress or anxiety, and encourage them to seek out further help from mental health professionals, close friends, or family members if necessary.

3.3 Who else might Not E-Lone benefit?

Not E-lone will not inform the young adult's school or place of work about their use of the application, but the young adult may feel comfortable sharing their activities with guidance counselors or therapists who can provide further help to the young adult. Schools and workplaces may also indirectly benefit from Not E-lone, by improving the mental health of young adults in general, as well as their students and employees.

4. Not E-lone Product Prototype Description

As indicated by the Simulated Machine Learning symbol in the middle right side of the Application section in Figure 2, which replaces the Machine Learning symbol in the same location in Figure 1, the Not E-lone prototype will not include fully implemented machine learning functionalities. The prototype will instead use initial sets of data and responses based on the young adult's activities to give the impression of machine learning. This change will affect the recommended Daily Quests, parables, Notifications, schedule templates. and writing prompts based on surveys given after First-Step, Reconceptualization, Journaling, and Note-Passing activities.

Messages will not be sent between young adults, and friend requests will not be implemented.

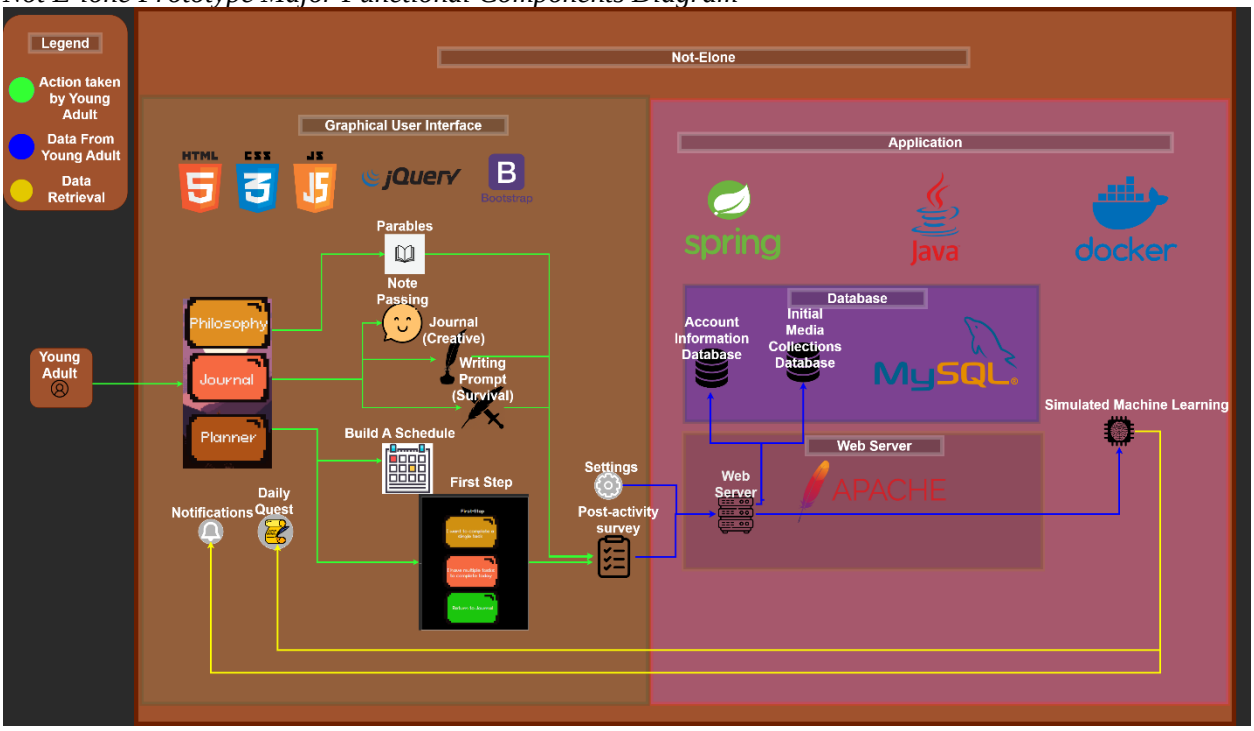
4.1 Prototype Architecture (Hardware/Software)

The Not E-lone Prototype will use multiple Docker containers running on a single virtual machine provided by the Computer Science Department, as indicated by the addition of the Docker logo below the Application section title on the right side of Figure 2. One container will be dedicated to running an Apache HTTP server, while another container will be used for a MySQL server, with a database containing account information of young adults using Not E-

lone. Another separate database on another container will be used for the initial parables, writing prompts, Notifications, schedule templates, and messages for the Note-Passing activity. A fourth container will run a Java application using the Spring Boot framework for determining which parables, prompts, and messages to send to young adults, based on their activities within the application and their saved preferences. Docker Compose will be used for managing the multiple containers. MySQL will still be used for managing the two database instances.

Figure 2

Not E-lone Prototype Major Functional Components Diagram



One difference between the real-world product and the prototype is that the Not E-lone prototype will be a web application, with the graphical user interface being presented through a mobile device's web browser. The graphical user interface will be designed using HTML, CSS, and JavaScript languages, as well as the Bootstrap and jQuery libraries, as indicated in the change in logos beneath the Graphical User Interface section title on the left side of Figure 2. Data that would have been stored on the young adult's local device will instead be stored in the

prototype databases. The prototype will simulate the machine learning aspect of the real-world product, removing the need for the Java-ML library, as indicated by the replacement of the Machine Learning symbol in Figure 1 with a Simulated Machine Learning symbol; the Java-ML logo in Figure 1 is not present in Figure 2. The yellow arrow leading from the Machine Learning symbol to the Build A Schedule activity in Figure 1 is not present in Figure 2, due to the prototype only recommending templates instead of recommending activities within schedules.

4.2 Prototype Features and Capabilities

Philosophy, Planner, Journaling – Survival Mode, and Note-Passing functions that made recommendations based on feedback that using machine learning are marked as partial in Table 1 within their respective sections, due to machine learning not being used to make these suggestions. Instead, the suggestions will use initial sets of suggestions based on Post-Activity Surveys.

The graphical user interfaces for the Reconceptualization, First-Step, Build A Schedule, Creative Mode, and Survival Mode activities will be fully implemented for the prototype.

The application will also include the limited recommendation and databases needed to provide simulated machine learning.

These components will be enough to demonstrate how Not E-lone would attempt to help young adults experiencing feelings of anxiety or depression as a fully developed product because they show the activities that would be presented to the young adult to address those feelings and how the application would respond to their feedback.

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Table 1

Real-World Product vs Prototype

Function	RWP	Prototype
Philosophy(Reconceptualization) - Read a story		
Suggest a story to read	Yes	Partial - Suggest random story, not based on machine learning
Read a story	Yes	Full
Suggest writing prompt to complete based on story	Yes	Partial - Prompts based on story but not based on machine learning
Redirect to Journaling - Survival Mode based on choice	Yes	Full
Collect information on what parables and schools of thought are preferred by users to better recommend resources	Yes	Partial - Suggestions can be given, no machine learning
First-Step - focus on one task at a time		
Prompt young adult to write the first thing they need to do	Yes	Full
Ask young adult to mark the activity as complete once they finish	Yes	Full
Display list of completed activities	Yes	Full
Planner		
Build a schedule manually	Yes	Full
Have a schedule built automatically	Yes	Partial - Set of templates can be used to fill most of the day, no machine learning
Provide a template for faster planning	Yes	Full
Use machine learning to build templates	Yes	Partial - machine learning framework
Use machine learning to recommend activities	Yes	Partial - Templates can be used to fill most of the day, no machine learning
Journaling		
Write a journal entry	Yes	Full
Journaling - Survival Mode - Prompt-based		
Display a prompt above the writing area	Yes	Full
collect information on what parables and schools of thought are preferred by users to better recommend resources	Yes	Partial - Suggestions can be given, no machine learning
Journaling - Creative Mode - Free Write		
Encourage young adult to reach out to professional help if they feel they need it	Yes	Full
Encourage young adult to share what they wrote with a concerned family member or friend	Yes	Full
Ask young adult if they are feeling better or worse after writing	Yes	Full
Note-passing - Write a kind message		
Write a message	Yes	Full
Receive a message	Yes	Full
Store messages in a database	Yes	Full
Categories of people to write messages to	Yes	Full
Content filters for preventing abusive messages	Yes	Partial - Only valid messages will be displayed in the prototype collection
Home Screen		

Provide Settings, Notifications, and Quest Menus	Yes	Full
Display active Quest in banner above activities	Yes	Full
Collect information about the overall happiness of users to see the effects of Not E-lone	Yes	Full
Settings		
Allow Quests to be disabled	Yes	Full
Allow Notifications to be disabled	Yes	Full
Allow Quests to be disabled	Yes	Full
Allow Planner-related Quests to be disabled	Yes	Full
Opt out of information collection altogether	Yes	Eliminated
Opt out of some information collection	Yes	Eliminated
Quests		
Encourage young adult to complete activities with family and friends in-person	Yes	Full
Encourage young adult to have family and friends create accounts	Yes	Full
Encourage young adult to sign on and complete activities daily	Yes	Full
Collect information on which Daily Quests receive the most feedback from users to better recommend suggestions	Yes	Partial - Suggestions can be given, no machine learning
Log-In Screen		
Verify young adult is 18 or older	Yes	Full
Ask if Not E-lone can collect information	Yes	Full
Assure young adult that any information collected will be safe and anonymous	Yes	Full
Assure young adult that any information collected will not be reported to work or school	Yes	Full
Administrative		
Create, edit, and delete accounts	Yes	Full
Social		
Send friend requests	Yes	Eliminated
Add a friend	Yes	Eliminated
Machine Learning Maintenance		
Train machine learning algorithm with data collected from young adults' feedback on parables	Yes	Eliminated
Train machine learning algorithm with data collected from young adults' feedback on writing prompts	Yes	Eliminated
Train machine learning algorithm with data collected from young adults' Planners	Yes	Eliminated

The risk of the Planner not adjusting based on preferences and data collected for machine learning will not be a factor for the prototype because this feature will not be implemented and is marked as eliminated under the Planner section of Table 1. The option to opt out of surveys will not be included in the prototype, because the prototype is meant to react to information collected

from the young adult's actions. Opting out of Quests to mitigate the risk of added stress will be carried over for the prototype. The function to opt out of information collection will not be included in the prototype due to the prototype's goal of simulating machine learning and is marked as eliminated in Table 1. A tutorial on how to use the application to mitigate the risk of the young adult not being technologically proficient will also be included in the prototype. The initial set of kind messages to demonstrate the Note-Passing activity will conform to the content filters to demonstrate the kind of messages that would be acceptable and mitigate the risk of malicious messages being sent through the application, the associated function located in the Note-Passing section of Table 1 is marked as partial.

4.3 Prototype Development Challenges

The biggest hurdle to overcome in developing the prototype is a lack of web application development knowledge and experience amongst the team. How the databases and web server would be configured along with the application that would ensure communication between the server, databases, and front-end, that works as intended to respond to the actions taken by the person interacting with the graphical user interface, are areas of uncertainty. This knowledge gap is the reason why Java was selected as the programming language instead of PHP or Python, as it is a language every member of the team has experience with. Lack of experience with developing mobile application user interfaces is the reason for making the prototype into a web application.

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5. Glossary

Android: Mobile operating system.

Amazon Relational Database Service (RDS): Cloud-based Amazon relational database service.

Amazon Web Services (AWS): A collection of cloud-based services.

Apache HTTP Server: Web server software developed by The Apache Software Foundation.

Bootstrap: CSS framework used to develop mobile-first web applications.

Cascading Style Sheets (CSS): Style sheet language used to determine the style and presentation of a document displayed in a web browser.

Creative Mode: A gameplay mode within the journaling feature that allows the young adult to express their thoughts.

Daily Quest: An objective provided to the young adult to encourage continuous use of Not E-lone and its activities.

Database: An organized collection of data stored and accessed electronically.

Docker: A set of software used to provide virtualization of applications.

Docker Container: Allows for processes to run in isolation.

Docker Compose: Allows for management of multiple Docker containers.

Depression: A mood disorder that causes a persistent feeling of sadness and loss of interest.

Eclipse: an integrated development environment used in computer programming.

First Step: A Not E-lone activity that allows a young adult to focus on a single goal.

Gitlab: Provides version control and repository for software development projects.

Gradle: An open-source build automation tool that is designed to be flexible enough to build almost any type of software.

GUI: Graphical user interface.

Hypertext Markup Language (HTML): Used to display documents in a web browser.

IDE: Integrated development environment.

Java: High-level object-oriented programming language.

JavaScript: Programming language used to determine the way a website behaves.

Java-ML: Java Machine Learning Library.

Java.net*: Java package used for communicating with networks through URLs.

Journaling: A Not E-lone activity where the young adult will be able to type their thoughts and feelings.

jQuery: JavaScript library that provides functions that simplify JavaScript operations.

Machine Learning: Artificial Intelligence designed to solve problems in a similar way to how humans solve problems.

MySQL: IDE for database coding in SQL.

Note Passing: A Not E-lone activity where the young adult is able to write a message of support to another young adult.

Notification System: A system based on preferences that push certain Notifications to the mobile device.

Parable: A simple story used to illustrate a moral or spiritual lesson, as told by Jesus in the Gospels.

Planner: A Not E-lone activity that allows a young adult to plan their day.

Priority System: Method used to determine what events you can and can't skip out on, used both for recommendations and the user.

Reconceptualization: conceptualizing a topic in a new or different way.

Survival Mode: A gameplay mode within the journaling feature that gives a writing prompt to the user.

Stress: A feeling of emotional tension.

SQL: Structured Query Language, a programming language made for manipulating databases.

Trello: A collaborative project management tool.

User: Young adult experiencing feelings of depression, stress, or anxiety.

User Interface: An interface that allows the user to interact with the software.

Virtual Machine: Software that provides a virtualization of a computer system.

Young Adult: A person between the ages 18 to 25.

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