

# Promoting ACT through mobile application

Manav Sharma  
Faculty of Computer Science  
Dalhousie University  
Halifax, Canada  
mn665640@dal.ca

Oyshee Saha Roy  
Faculty of Computer Science  
Dalhousie University  
Halifax, Canada  
oyshee@dal.ca

Shilpa Singh  
Faculty of Computer Science  
Dalhousie University  
Halifax, Canada  
sh379942@dal.ca

## ABSTRACT

The research aims to promote Acceptance and Commitment therapy (ACT) among college and university students through a mobile application. A study was conducted in three phases. In the first phase, an online survey helped to understand the basic requirements of the students. The collected data was used to design a low-fidelity prototype. This prototype was used for the second phase of data collection. Unstructured one-to-one interviews were conducted and feedback on the prototype was collected. Further literature survey results and data from the interviews were used to design the high-fidelity prototype using the Marvel wireframing application. In the last phase, heuristic evaluation as well as user evaluation was conducted via an online survey. The final results showed a positive inclination towards the proposed application.

## CCS CONCEPTS

• Human Computer Interaction • Cognitive and Behavioral Science • Qualitative research

## KEYWORDS

Mobile application; ACT; social network

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## 1 INTRODUCTION

The research helps in presenting a high-fidelity design for a mobile application to promote Acceptance and Commitment Therapy (ACT) in post-secondary students. It has been noted that anxiety and depression are the most commonly reported mental health concerns in college and university students [11]. As they start their journey post high school, a lot of expectations and goals are imposed on them. These expectations include doing well in class, being popular among friends or having a balanced social and professional life. This often makes them anxious and affects their mental and physical health. In our research, we have focused on the mental health of post-secondary students and decided on promoting ACT through a mobile application.

ACT assists in accepting an individual's traits and characteristics. It also helps to avoid imitating others and helps the individual to stick to their goals [9]. We will be focusing on promoting a healthy relationship by following six processes: acceptance, cognitive defusion, self as context, contact with present moment, values, and committed action [10].

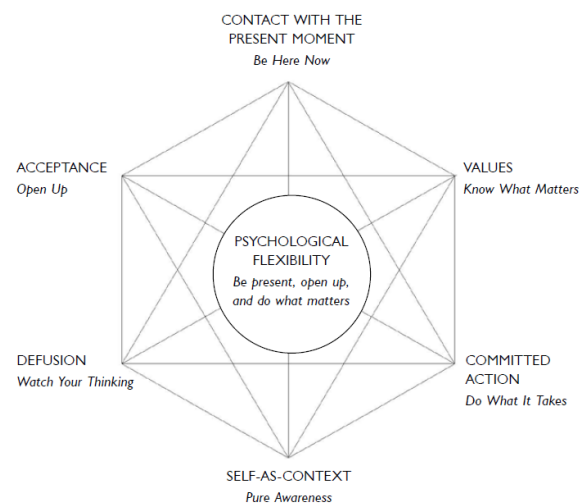


Figure 1: The ACT Hexaflex [5]

As shown in the Figure 1, our proposed application will help the user to open up, understand their thoughts, be aware of the environment, do what should be done, be present in the situation, and understand the actions to be taken to complete a task.

Also a social stigma is associated with any mental health related issues and therapies which eventually refrains an affected individual from seeking help [6]. So, using a mobile application to get necessary help will be more feasible.

Another reason that we are using a mobile application to promote ACT is because mobile phone usage in Canada is one of the highest in the world [15]. Moreover, it has been noticed that there has been a rise of mental application downloads. In 2016, it has been noted that 30% of the surveyed participants had one or two health applications in their phones. It has also been observed that millennials are more likely to use a health

application than the people above 25 years [2]. Hence if we wanted to promote this therapy using mobile applications.

ACT helps to engage with the surroundings and to increase involvement in different activities. Our proposed application will help the students to socialize and get comfortable with their surroundings. Our application will help the individuals to accept themselves[4]. It will help in increasing the psychological acceptance of the individual's mental experiences[10]. The proposed application will ask for access to the student's public social media profile, call logs, GPS or message logs. None of the telephonic conversations or message content will be accessed by the application. These data (mobile logs) will be used to assess the individual's mental state or to track the individual's location. For example, suppose there is an event going in their university which matches their interest. The application may encourage them to attend that event. It can also trigger notifications if the GPS location of the person is not changing for straight 5 hours or more. The preliminary features were decided based on the feedback we got from the first phase of survey. The design was further modified at later phases. While designing the application, it was kept in mind that the application should no way be intrusive and create more distress among users. The application will act as a friend or a guide and provide a therapeutic assistance.

## 2 BACKGROUND AND RELATED WORK

As the smartphone usage has increased exponentially, it can be said that at present almost every person has a smartphone. The sensory data or mobile data can also be used to determine the mental state of a person [5].

Deborah Serani has mentioned in her article on ACT therapy that "ACT focuses on 3 areas:

Accept your reactions and be present

Choose a valued direction

Take action [9]".

Our application will be focusing on these areas to help the students handle these situations. It will help them to understand their weakness and work on them. Our application will help them to develop skills which will eventually build confidence in them.

At present, there are several ACT and mindfulness applications available for Android and iOS users. These applications help the individual to meditate, complete regular task, keep a track of progress report and control their anxiety. For Example:

**Actcompanion**[3]: This application has dozens of ACT tasks which helps an individual to open with other people and be present. Also, it has audio tracks for guided mindfulness task. In addition to it also has the weekly progress tracker and stat generator.

**Headspace**[12]: This application basically focuses on meditation with hundreds of guided sessions on everything from stress to sleep and focus to anxiety. It also has shorter task for busier schedules. Moreover, the app provides the SOS feature in case of sudden meltdown.

Hence, our proposed application should gather feedback from these existing applications and reach for betterment. Again, application such as Calm [1] helps to get more restful sleep. We will be using some similar features to help people in distress and anxiety.

It has been seen that young people who suffer from anxiety often find social skills challenging and tend to avoid such situations [10]. Our application will encourage them to attend different social events (either from university or some local event that matches their profile), try out new things or may be talk to a new person.

The main goal of ACT is to help an individual to accept their present state, understand what should be done and plan how it should be done based on their evaluation [5]. Based on this we have introduced a "Set Goals" feature in our application. This will help to set milestones and the users can track the progress through the application. This will give the individual a sense of accomplishment.

## 3 RESEARCH QUESTIONS

To fight mental health problems such as anxiety, depression, universities or colleges provide counselling services to the student. But there are often situations where the services are understaffed or overwhelmed by the students demands [4]. This has led us to build our research question:

Is it possible to provide acceptance and commitment therapy to post-secondary students using a mobile application?

On conducting the first online survey, we found out that our sample population has only full-time students. Hence, we have decided on narrowing down our focus on only full-time students. The question also changes to:

Is it possible to provide acceptance and commitment therapy to post-secondary full-time students using a mobile application?

The main research question can be divided into sub problems. Solution of these problems will help us to get our result. The sub problems can be:

How can we use data collected from a participants' mobile phone to understand their mental health status?

How can we create awareness as well as help in removing self-stigma of ACT using a mobile application?

How can our mobile application provide an aid to a relapsing student [7] ?

## 4 STUDY METHODOLOGY

We have conducted the study in three phases with university students as participants. We have completed our TCPS core certificate as well as written an ethics application. This application will be used to request for ethics approval for future study to be conducted with bigger and broader sample of participants. As we did not have an ethics approval, we used convenience sampling and took participants from our HCI class.

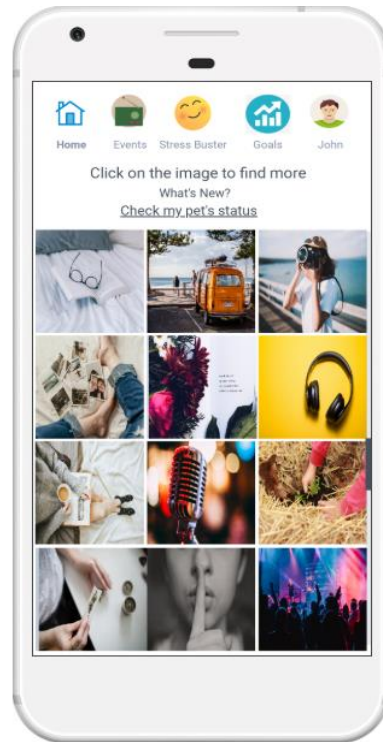
The first phase was an online survey (invites were sent out to the class email ids) which had basic questions such as age, gender and whether the participants are part-time or full-time students. This helped us to analyze the data based on age group and gender. The survey also had questions such as what the participants' primary concern is, will they be comfortable in sharing their personal/sensitive information and give access to GPS, Bluetooth, basic social media public profile and call/text logs. (Note: The user details will be secured, and no text message content or call recordings will be stored or used in our research). This online survey contained 15 questions, the questions were mostly MCQ's and few of them required a few-liner answers. The participants required a maximum of 8mins to fill up the online survey. The aim of the survey was to make sure that the user didn't get bored while filling up the survey. In this way we can ensure that the data collected was precise and accurate. Based on the responses and our background analysis, a low fidelity prototype was designed. The application is named "SOM". The low fidelity prototype was done on paper.



**Figure 2: Login & Sign Up Page of Low-fidelity prototype (SOM).**

After designing the low fidelity prototype, another questionnaire was made for conducting unstructured interviews. We chose this type of interview because this has the scope for open ended questions and opens a platform for

discussion. The aim of the interview was to gather further insights and get the participants' opinion on the prototype. Before starting the interview, we gave the participants a walk-through of the low-fidelity prototype. We conducted one to one interview to keep each participant's conversation secure. The duration of the interview were around 15 minutes. These interviews were conducted in our classrooms. We took 10 interviews. Since all the members were conducting separate interviews, the first step of analysis was to aggregate these data and filter out the redundant views. The data collected were qualitative in nature. The analysis of these data was used to develop the high-fidelity prototype. The analyzed data was brain-stormed within the team members and the features and requirements were modified or enhanced accordingly. Once all the features were finalized, a high-fidelity prototype was designed using the Marvel web prototyping tool[13]. The below figure shows the home page of the app SOM.



**Figure 3: Home Page of High-fidelity prototype (SOM).**

The third phase of study was conducted in two steps. The first step was expert testing where we did a heuristic evaluation on the application. The second stage was user survey. A short video of the high-fidelity prototype highlighting all the functionalities and feature was sent to the participants and a feedback survey questionnaire containing 14 questions was sent to the participants. This final responses to the questionnaire helped us to understand whether the application is useful to them or they are interested in using the application. The final result helped us to gather the answers to our research question.

## 5 DATA ANALYSIS

The data analysis was also done in different stages to understand the application's progress at each stage.

### 5.1 ONLINE SURVEY

The survey questionnaire was sent out first on 25th September to the HCI class fall 2018. The survey had 15 questions and would have taken 5-7 minutes to fill up. Initially we received 15 responses. But one of them was a redundant response, so we discarded it.

The next reminder was sent out on 27th September and received only 3 more new responses. So, our initially data collection has only 17 responses which is around 46% of the total class (sample population). A general information about the participants were collected as well as a general requirement gathering has been done. The below table shows the data analysis of this stage.

| Observation   | Inference   |
|---|---|
| Majority of the sample population lies within the age of 21-25.                             | Data was not used further.  |
| All the participants were full-time post-secondary students.                                | We reframed our study scope and considered only full-time post-secondary students as our target population.   |
| Both android and iOS got equal votes.   | We are focusing on android application for start.   |
| 82.4% of our participants use mobile phones mainly for social media.                        | We will try to access their social media public profile to understand their activity and mental stress level. |
| Majority of the participants never consulted any therapist for stress/anxiety/panic attack. | Our application will have therapeutic approach to calm users in such situations.                              |
| Majority of the users were reluctant to use a mobile application for anxiety or stress.     | Our application will try to address this issue and encourage more people to seek the necessary help.          |

**Table 1: Online Survey Data Analysis**

### 5.2 INTERVIEW

We conducted unstructured one-to-one interviews on 15th October 2018 in our classroom. Before starting the interview, we explained the purpose of the study to the participants and got their consent. They were also informed that they had the right to drop out from the interview anytime or skip any

question they didn't preferred to answer. Initially, we asked some basic questions regarding their year of study, mental health, amount of school work and mobile usage. After that we showed them our low fidelity prototype (SOM) and asked for their suggestions and had further discussions. The feedbacks gathered were categorized based on their similarity.

#### Feedback/Suggestion by the participants:

- All the participants liked the concept of digital pet.
- Few of them expressed the difficulty in expressing their emotions to the application and prefer talking to friends.
- Most of the participants appreciated the emergency contact feature and unchanged location for long hours (if it is customizable).
- Few of them mentioned they wouldn't like to receive too many notifications.
- One of the Participant suggested an application "Calm" for IOS users.
- Something to distract from stress

#### Features Finalized:

- Digital Pet: Selecting pet from the available options that would guide the user through the applications.
- Pet health status depends on the user's mood.
- If the user is on-track with the tasks and doing good the Pet status will be healthy.
- User will receive notifications if the goals are missed or they are not paying attention to their mental health.
- We have added an event feature where the application will show the nearby events where the user can go and connect with people or friends.
- User can add up to two emergency contacts to who the user/application can send SOS when needed.
- User can set the unchanged location hours on. So that if the user is not changing the location for the specified hours the application will send a notification to the user and a SOS to emergency contact if it exceeds the number of threshold hours.
- Dropped the idea of Live Chat features. As most of the universities provide counsellors and participants are not willing to talk to strangers
- Maintaining limited and essential notification system based on the tasks set and health of pet.

- Added Short Stories and Breathing audio guided exercises that are supported in “Calm” application.
- Introduce a doodling feature which will help the user to be creative and distract themselves from stress.

### 5.3 EXPERT TESTING AND USER TESTING

As per The Statista Portal [14] states that there are 3.8 million mobile applications available on android play store. Due to the increasing competition it is necessary for a mobile application developer to focus on user interactivity. So we did a heuristic evaluation[8] on our prototype. The results are given in Table2.

| Features  | Heuristics |
|---|------------|
| User can understand which tab they are in                 | H1         |
| Symbols and images used in SOM are similar to real world. | H2         |
| User can control preferences and settings                 | H3         |
| Same theme used for the entire application                | H4         |
| Error prevention during password setting                  | H5         |
| Easy navigation   | H7         |
| Simple and straightforward design                         | H8         |

**Table 2: Heuristic Evaluation**

For the user testing, we sent out an invite to the class email ids on 25<sup>th</sup> November. The survey questionnaire had 14 questions. Before answering the questionnaire, the participants were asked to watch a short video demo of our high-fidelity prototype. The link for the video demo was provided in the mail. The results of the user survey are as below:

- Majority of the participants agreed that the application SOM is easy to understand and can be navigated without any manual/tour.
- Majority of the participants liked the events tab, tasks, digital pet, doodle board and sleep stories feature.
- Majority of participants showed interest to try our application and recommend the application to their friends.

## 6. PROTOTYPE DESCRIPTION

The prototype designing has been done in two stages. The first prototype was a low-fidelity prototype. It had the preliminary screens and the basic outline of the application. The designing was done on paper. This prototype was used for the interview and it understand how the sample participants felt about the proposed application. In the later stage, a high-fidelity prototype was designed using Marvel [13] designing platform. This prototype has a more detailed design and shows the complete workflow of the application.

### 6.1 LOW-FIDELITY PROTOTYPE

The proposed application designed is an android application. The name of the application is SOM. The initial features that were decided for the application were:

**GPS Tracking:** Our application will track the GPS location of the user, and if it does not change for more than 3 hours, it will trigger a notification to the emergency contact in the application. Exceptions will be there for sleep hours, classroom mode, work mode.

**Sleep Time:** We have added a Sleep Time feature under Preferences in the application. The users can set their sleep time so that we do not track their GPS location during this time. The purpose of using this feature is to track if user is under an attack during the non-sleep hours. If the user does not move for more than five hours from a location the application will send them notification confirming if they are fine.

**Likes:** The users can select their likes in the application under Preferences option. The application will send them notification about the events happening nearby to keep the user interested and involved in his/her surroundings.

**Digital Pet:** Our application will provide users with a feature called Digital Pet. When the users will join the application, the users will be asked about their preference for dog, cat, dragon or a unicorn. The default name of this pet would be ‘Buddy’ on the application, however, it can be changed by the users. This digital pet’s health will be based on the user’s mental status. For example, if the user’s GPS location is not changed for more than five hours during the non-sleep hours, the application will send a notification saying the ‘Buddy’s is feeling sad, please take him outside.’ We believe the users will feel connected to the digital pet and they will develop sympathy for it. This will give users a sense of responsibility.

**Basic Profile:** Our application will ask users about their basic information like, name, phone number, address, date of birth and emergency contact.

**Social Media:** Our application uses the social media status of the users to track their daily activities. Their public profile will be accessed to track the activities. If a regular social media user stops their activity on their profile, we will send them notification along with the digital pet’s health status.

**Rate your health status:** We have included a feature in the application where users can set their depression and anxiety level by choosing among three options: high, medium or low. This feature will also ask the users if they are consulting a doctor. They can store the doctor's information in the application. If required, we will send the doctors details to the emergency contact set up by the users.

The below images show two important screens of the low fidelity prototype. The left image shows that the application seeks permission to access GPS or other mobile data (call or message logs) of the user. The second image shows one of the important features of our application: Digital Pet. In this screen the user will be able to choose any one or more pets.

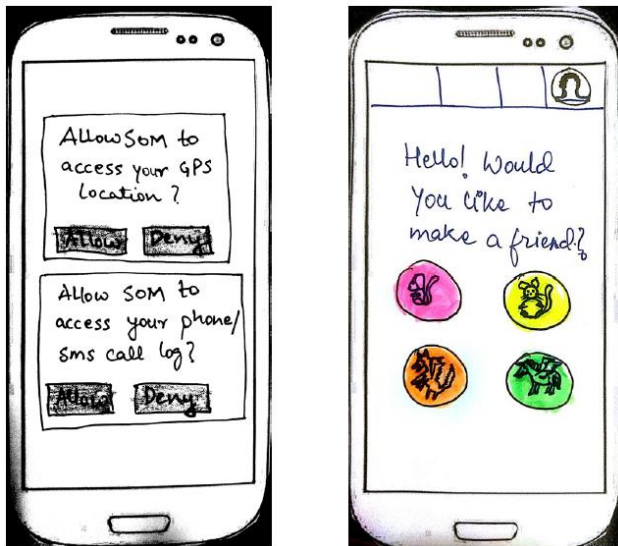


Figure 4: Permission/Access Page; Pet Page

## 6.2 HIGH\_FIDELITY PROTOTYPE

The high-fidelity prototype of SOM was designed using Marvel, a web-based prototype designing application.

Our proposed prototype can be accessed using the below URL: <https://marvelapp.com/55f2gib/screen/51241294>

After the interviews, the initial features were redesigned, and more specific features were decided which will provide a therapeutic relief to the user in stress or anxiety.

SOM asks for permission to access GPS location and mobile data (call or message logs). Once a user registers in the application they have to fill update their profile which includes their email, phone number, gender and their interest.

The user can further customize their profile by adding their social media links (only public profile will be accessed), anxiety or depression levels, education details (university/college name, degree, clubs they are a part of or their on-campus residence name). The user can also add their sleeping hours

and emergency contact numbers. We have also introduced the "forgot password" feature. The main features of SOM are:

**Events:** This tab uses the GPS location of the mobile, the user's public social media profile, education profile, and their interest to find out events happening near them. Be it an event at the university or at the local Convention Centre the application will encourage the user to attend the events. The event information will be modified based on the user's preferences and previous history (history in the application).

**Stress Buster:** As we have observed in our data collection stage, most of the participants prefer not to meditate or follow instructions of an application when they are anxious, instead they will prefer some other activity that will distract them at that time. Our application provides features like "Sleeping Stories", "Breathing Exercise" and "Doodle Board". Sleeping stories distracts the user's mind as well as helps the user to have a restful sleep. Breathing Exercise is very helpful during panic attacks. Doodle Board is fun as well as a very interactive way to distract any user.

In the below Figure 5, the left-hand side screen shows the Event tab and the right-hand tab shows the Stress Buster tab.



Figure 5: Event Page; Stress Buster Page

**Goals:** The goals tab provides a commitment therapy. In that tab the user can both set their own goals as well as complete goals suggested by the application. A lot of users are overloaded with different workloads and it becomes difficult for them to cope up with the situation. This feature helps them to make their own milestones and finish their milestones at their own pace. This help the user to be more organized and accept the way they work on any given problem.

The application will suggest some simple goals such as going out with friends, talk to someone new, work on a new hobby. This will help the user to explore a lot of things and help them to prepare for new experiences. On each completed goal, the

user's pet will gain reward points. This reward system was introduced to encourage the user to complete their goals.

In the below Figure 6, the left screen shows the Goals tab and the right screen shows My Pet tab.

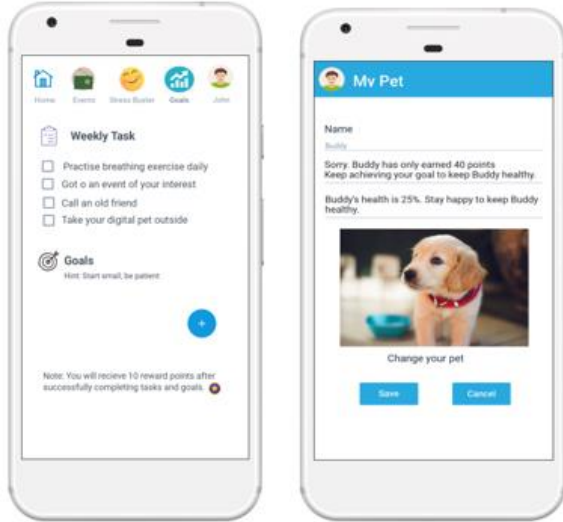


Figure 6: Goals Page; My Pet Page

**Pets:** The pet feature acts as a buddy or an assistant which tracks the user's mental health. The pet's health will act as a mod tracker for the user. This feature will help those users' who prefer to aloof themselves from people when in stress. The below image shows one such example.

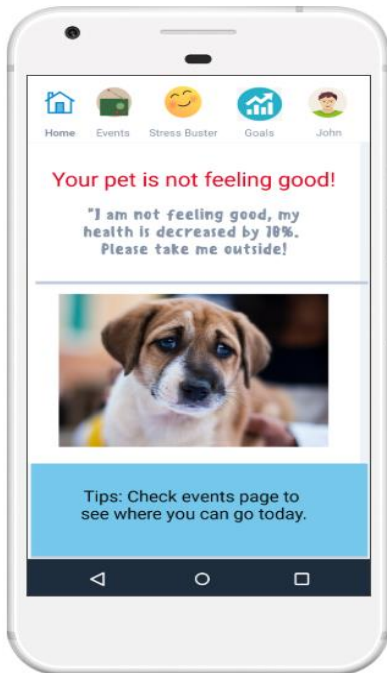


Figure 7: Pet health status

**Emergency Contacts:** Often people with severe anxiety or depression may need immediate assistance to help them get out of a bad phase. Our application has a feature that will track the GPS location of the user's device and if it is not changing for the set time, it will trigger a message to the emergency contact. The user has access to set the time after which the message will be sent.

## 7 RESULTS

In our initial survey, we observed that majority of our participants were unwilling to use a mobile application for stress or anxiety. We found out that they did not like features such as inspirational messages or meditation and wanted something to distract them. We came up with several ideas such as doodle board, breathing exercises to distract them. Again, our aim was to help an individual to accept themselves and be in the present. For that we introduced the preference feature where they can update their likings or hobbies. Based on such preferences as well as their hobbies, the application will suggest different events near them. The weekly tasks feature helps the user to take up new tasks every week and encourages to finish them. Our application also encourages an individual to set different goals for themselves and complete them.

At the end we could see that the majority of the participants were willing to try our application and recommend the application to their friends.

## 8 BENEFITS AND LIMITATIONS

Although we were able to get answers to most of our research questions, we were not able to answer one of them. We were not able to create awareness or help in removing self-stigma related to mental health illness. Time was one of the constraints as these types of studies take a lot of time. Again, we have to take participants from our class as we did not have proper ethics approval. So, the sample we worked with was very limited and did not have a proper representation of the target population. But as our target population was full-time post-secondary students, we were able to at least maintain these two criteria in our participants.

## 9 CONCLUSIONS

In conclusion, we can say that we were able to design a mobile application which promotes ACT in post-secondary students. Our pet feature and pet reward feature will help the user to maintain a balance and stop them into relapsing again into a stressed mental state. The GPS tracking feature will also help to find out whether the user is changing their position. In future, call logs and message logs can also be used to assess the mental health of the user.

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