**Project Milestone 2: Ideation and Low-Fidelity Prototyping**

**Comp 3020 A01**

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**Part (a): Group Brainstorming**

**The Process:**  
We met as a group in a quiet place so there would be little distractions, and we would not have to worry about distracting others. We made sure to allot a generous (well over an hour) amount of time, so that we would not feel rushed to press out ideas. We decided to give ourselves a specific amount of time for each sketch. We felt that shorter was better, so that we would not get stuck on one idea. This brainstorming session was about producing quantity of ideas. We set the timer and started out sketching. When time was up, it turned to discussion. We would each go around the table and discuss what we drew. What part of the system it was, whether it was a whole screen, or just a small feature. We discussed what sparked our idea to sketch something this way. Then we discussed what we ended up liking and disliking about our own sketch. We then repeated the process, trying to come up with something completely different. We continued until we had a large variety of ideas, representing different parts of the system.

**Range of Ideas, and Requirements:**  
One of our goals was to create a broad range of ideas, representing different potential parts of the system. Some of our sketches were focused on small, but important areas of our system, such as the notification center. Referring to our requirements from milestone 1, we believed there should be a way for users to receive notifications in regards to their profile. Some of our sketches illustrated a new ticker type style of relaying notifications. Others featured a separate sidebar where you could scroll through notifications sent and received. With these contrasting ideas, we were then able to combine them and the idea of a pop up notification was expressed.  
 Also in our requirements we knew there should be a way for the user to see who owed them money, and whom they owed money to. We were able to come up with a variety of ideas that would also fit the requirements of easy to understand and use. Because this was one of the most important features of the system, we tried to come up with many ideas. One of our ideas showcased this information in a calendar format. Users would be able to see a calendar, on the dates you would be able to see if a transaction occurred where they owed money to someone or someone owed money to them. Another idea to have a slider where you could scroll between lists, of lent or borrowed. There was a sketch representing the list as a bar graph. The bars went in different directions depending on whether money was owed, or the user was waiting repayment. We had a sketch that represented the debts and assets as different sized bubbles, showing the person owing or owed and their amount. We had a few out of the box ideas, such as representing the debts in a tree, or in a virtual jar. Theses sketches were used to meet the requirement of showing who owed who money, in an alterable list. Another one of our requirements was that it was easy to learn, and understand. These sketches met in this requirement in varying capacities, so when I came to picking our sketches to finalize, we made sure to use ones that met this requirement more fully.

Through our brainstorming sketching session we were able to come up with several ideas that didn’t fit in with our requirement as strongly. The idea of a rating system came into play. This is where users would have a rating based on whether/when they paid a person back. This could be a deciding factor if people would lend them money in the future, and could encourage quick repayment.

**Part (b): Idea Polishing**

**Polished Sketch #1: Notification Centre**

A sketch that we saw as having potential was one depicting a notification system. This would be a page consisting of notifications that have been sent to the user from others. The notification would be sent out automatically when someone creates a tab, and then the user would have the option of sending a brief message along with it. A message can also be sent to other people from the notification page directly if the user forgot to send it along with the automatic notification, or else in order to remind someone of their debt who hasn’t paid the user back for a longer period of time. Each person you owe money to has a section with the option to view reminders they’ve sent, along with the amount you owe them. There is also a quick link to direct the user back to the page where they can see if others owe them money. This is for ease of use because after the user sees how much they owe other people, they might want to compare that to what others owe them.

This sketch is appropriate and fits with our system because our notifications will be sent out automatically, which means that people don’t need to stress about the potential social awkwardness of confrontation. The awkward situation is avoided since it is the system bothering the person, not the user. This was a concern noted in our character profiles, which justified the feature in our functional requirements. One person forgot to pay back a roommate until he asked, and one person disliked the uncomfortable act of asking for their money back. Hence in the sketch the notification centre drawn shows all the notifications that people have sent you (the user) automatically, along with optional direct messages. This adds to the friendly atmosphere mentioned in the environmental requirements, because the automatic notifications take away the tense social situation of asking for money back. The lines going from the person’s name to the amount you owe them are to aid the viewer’s eyes so it’s easy to see the relationship between the two. This would be especially useful with many notifications since the eye can get confused. Hence to avoid scanning across gaps of white space we used leaders.

**Polished Sketch #2: The Bar List Main Screen**

This sketch shows a way to implement the list of the money you have lent, and money borrowed. This feature would be on the front page of the application. There would be two columns in a central box. One column to represent lent, and one to represent borrowed. In each column there would be horizontal bars. The horizontal bar would represent the current tab owed. The horizontal bar would grow and shrink depending on the amount owed. At the end of each bar it would state in text the amount owed. The bars on the lent side would be black, the bars on the borrowed side would be coloured red. The bars would be ordered by date, most recent to least by default. There may be an option to sort in a different order. You would also see a picture and name of who owed the money. This picture would come from that user’s profile; if the user did not have a profile picture a stock silhouette would be used. You could click on the profile photo of another user, or the edit button beside to edit that person’s tab. At the bottom of the column there would be a total of the amount borrowed or lent.

This list satisfies several of our requirements. Our first major requirement is a way to show users who they owe, and who owes them. The sketch demonstrates a list showing both, who owes them money, and who they owe money to in a visual way. Our second requirement was that the list was detailed and alterable. The list gives important details such as the amount borrowed or lent, and the date that the transaction occurred. There is also an option to edit each tab. A third major requirement is that it is usable for people of all levels of computer knowledge. Our graphical interface uses recognition rather than recall, with clear description on the buttons, for the tasks they may need to complete. Another user ability that needs to be taken into account is colour blindness. To make sure it is accessible to a greater number of people we chose to use red, and black to represent borrowed and lent instead of red and green. When the items are colour coded they will adhere to the Gestalt Principle of Similarity. This means it will be easier for the user to see the bars as two separate groups.

**Polished Sketch #3: Bubbles Main Screen**

This sketch shows the main screen of the app that appears when the user first opens the app. It features bubbles of various sizes which represent different tabs that the user has. A tab represents another person whom the user owes money, or who owes the user money. Therefore, the bubbles have either a generic silhouette image of a human, or a photo if that person has an account with the app and has uploaded a photo. The bubble also has the name of the person and the amount of money owed. The size of the bubble depends on how much money is owed, and the colour represents who owes who money. The sizes are proportional in comparison with one another; as in, if the amount of money owed, either to the user or to someone else, is $500, that bubble will be larger than a tab where $10 is owed. If the user owes someone money, the colour is red, and if someone owes the user money, the colour is black. This is based on the idiom where if you are in the black, your assets are greater than your debts, and if you are in the red, you owe money. To access a tab, the user clicks on the bubble, and can then see more information about it. In the top right corner are the options to add a tab, open the notification centre, and for the user to edit their profile. The user can edit their profile by clicking on the down arrow beside their profile picture, which has the word “Me” displayed underneath it. By clicking on the arrow, the user can also access other options that would have crowded the screen. This includes extra settings, like logging out and the potential to scan receipts. At the top, there is also a search bar. As the user types, certain bubbles will disappear because they do not match the search terms. This way, the user can easily find who they are looking for.

This main screen idea meets several of our requirements, as well as user needs. One of our must have requirements is “Accessible for users with any level of computer knowledge”. This design allows for learnability, so that users with varying computer knowledge can use it. It does not involve any typing, and the user can access a tab with only one click. This also assists with the “Quick and easy use” requirement. Another of our must have requirements is “Easy to learn”. This design is easy to learn because it is highly visual. A new user can look at the bubbles and understand that a bigger bubble would be more pressing, and that it is more pressing because it involves a greater amount of money. This applies the design principle of proportion, which involves comparing the sizes of the areas of two objects. The user can compare the proportions of bubbles to determine which is more important. The bubble also states how much money is owed in case the sizing doesn’t resonate with the user. Our colour usage is explained by a key in the bottom right corner of the screen. We used black and red because of the aforementioned idioms, and also because colour blind users would be able to differentiate between the colours. We chose this instead of red and green, because some people with colour blindness cannot differentiate between reds and greens. Although none of our respondents were colour blind, it is likely that some of our end users would be colour blind; therefore, this is a user need. “A method for the user to see who they owe money and who owes them money” and “Detailed, alterable list of people the user owes money to and who owes the user money” are other must have requirements from our user research. The bubble system shows the user who they owe money to through bubbles outlined in red, as well as who owes them money outlined in black. Although the bubbles are not a list, they are detailed in that the user can click on bubbles to access more information about the tab, and alterable in that tabs can be added and will then show up on the screen as new bubbles.

**Part (c): Hierarchical Task Graphs**



Plan 0: Do 1-2-3-4-5

If user is already logged in do 2-3-4-5

Plan 3: Do 3.1-3.2-3.3



Plan 0: Do 1-2-3-4

Plan 3: If lender, do 3.1.1

If borrower and cash/cheque do 3.2.1 else do 3.2.2



Plan 0: Do 1-2-3-4-5-6

**Part (d): Low-Fidelity Prototypes**

See plastic sleeves following this page.

Page #1: Adding a Tab Storyboard

Page #2: Confirming Payments Storyboard

Page #3: Sending a Message Storyboard

**Part (e): Informal Prototype Evaluation**

Evaluators:

|  |  |  |
| --- | --- | --- |
| Gender | Age | Computer Knowledge |
| Female | 17 | Advanced |
| Male | 18 | Intermediate |
| Female | 22 | Intermediate |
| Male | 25 | Advanced |
| Female | 47 | Beginner |
| Male | 52 | Intermediate |
|  |  |  |

Our evaluators came from a variety of different backgrounds. They range from ages 17 to 52, with computer knowledge ranging from beginner to advanced. They are an equal mix of genders. The variety in our evaluators provided a rich display of comments, and suggestions. These were semi structured interviews that were carried out in person.

**Adding a Tab**  
Most of our evaluators were able to follow the storyboard fairly well and did not feel as they any major steps were missing. They did have several suggestions. One that was brought up more than once was that there should be a way to confirm that you are setting up a tab with the correct person. Some sort of message that checks if the user is sure would be appropriate. One evaluator suggested that sending a customized message should be put into a separate step from sending automatic notifications. The evaluators like the option of adjusting the frequency of notifications sent.

**Confirming a payment**  
On the confirming payment storyboard the evaluators concern was that it was not explicit enough. Evaluators were concerned that there was no message, or way to denote if the amount paid was in full or not. It was also expressed from several evaluators that the wording should be changed when confirming payment, “What does cancel do, does it mean they didn’t pay, or will it cancel the whole tab”, asked one evaluator. One evaluator expressed they would like to see the reason that the debt occurred, to be shown. An evaluator expressed that they thought the two-step confirmation was a good way to make sure all parties were clear that the transaction had occurred.

**Sending a Message**  
On the sending the message storyboard, evaluators faced confusion when they didn’t understand if the messages in the notification center were sent or received. Evaluators were confused if sending a message was the same or different from sending a notification. One evaluator suggested a way to flag the message as urgent. Another suggested an option to send the message as an email.

**Overall Comments**  
Some evaluators liked the bubble interface. They thought the idea that the bubbles could grow and shrink to represent the size of the debt was intuitive. Others did not like the bubbles, and felt it should be represented in a list. Evaluators wanted a way to denote debts that have been standing for longer periods of time, and some way to prioritize notifications based on their urgency. Evaluators wanted most things to be more explicit, as it helped them understand if this was their first time. They also had concerns over the language used. Asking for money back can be an awkward situation, and they wanted to ensure that the language was not too confrontational. One evaluator suggested a way to link with already existing social networks, as to cut down sign up/login times. The word tab was brought up several times. The evaluators stated upon hearing the word tab they thought first of an internet window, and second of a tab at a bar or restaurant.

**Our thoughts**  
After having our prototype evaluated, several changes that needed to be made became clear, the first being that everything needs to be explicit. We need to make sure that our application clearly represents, and displays what it taking place. We need to make some things less ambiguous such as incoming vs outgoing notifications. The second change we need to consider is separating sending personalized messages and sending notifications. We feel that having notifications that are automatically sent are a non-confrontational way of reminding others of their debts. Evaluators also like the option of sending a personalized message. Though when we have both, there was concern that personalized messages my just get lost in a bunch of automatic notifications and never read. We need to consider how we can separate them, or make them different enough that users don’t miss personalized messages.

**Appendix**

**Informal Prototype Evaluation Raw Notes**

**Male, 18, intermediate computer knowledge**

**Adding a Tab**

Does the layout make sense?

Yes, looks easy to figure out without prior knowledge

Is there a step missing?

No

How would you format it?

Looks good the way it is

What would you change?

Could be an option to connect to Facebook friends. Originally not sure what “tab” meant, thought of a Windows tab.

What do you like? What do you hate?  
I like that it takes the place of post it notes, and I like that you can change the frequency of notifications the system sends.

**Confirming Payment**

Does the layout make sense?

Yes

Is there a step missing?

No

Do you feel disoriented?

Not really

What would you change?

Instead of saying “confirm payment” (because it sounds like you’re paying Thomas), say “confirm money has been received” or something to that effect

What do you like? What do you hate?  
I like that both people need to confirm that the debt has been paid off.

**Sending a Message**

Does the layout make sense?

Yes, nice and simple, nothing unnecessary added

Is there a step missing?

Nope

How would you format it?

When the send message button is clicked, the message screen should pop up over the notification centre so you don’t need to do a bunch of page navigation

What would you change?

Nothing

What do you like? What do you hate?  
Message format is consistent with other messaging apps.

**Comments**The direct messaging is a good feature.   
A description of the money would be nice, saying whether it’s for groceries, gas, etc.

**Female, 47, beginner**

**Adding a tab**

Does the layout make sense?

Yeah

How would you format it?

No differently

What would you change?

Change the name of “tab”, maybe look up accounting terms. I would like to see my bank account connected (I know now that’s version 2, but it would still be nice)

What do you like? What do you hate?  
I like that visuals are represented through the circles.

**Confirming Payment**Does the layout make sense?  
It’s fine  
What would you change?  
Change “confirm payment” to “confirm receipt” if that’s what was meant.   
What do you like? What do you hate?  
I like the two way communication. I like that the bubbles change in size, it’s an easy visual representation of debt shrinking

**Sending a Message**Does the layout make sense?  
Yeah  
Is there a step missing?  
Before the message screen pops up, select whether to have a customized message or a standard message  
What would you change?  
Nope, looks good.  
What do you like? What do you hate?  
I like sending reminders because it’s easier than doing it face to face.   
**Comments**Good for family because my whole family owes me money  
Have an itemized list of debts/credits and a total

**Male 52 intermediate computer knowledge**

**List/Bubbles**

Does the layout make sense?

Yes. Lent Joe $55. Joe hasn’t paid me back. When Joe pays me back, it’ll go to the middle. I borrowed $37 from John. Might say “Lent to”, “Borrowed from”.

Bubbles work, too.

How would you format it?

Option for colour coding for people who borrowed money a long time ago, as a reminder. Heats up or something, little flame. Longer you have to settle the bill. Maybe bolder. I borrowed $60 from that guy three months ago, I need to give it back.

What would you change?

Incorporate time value of money. How much interest the borrowers are worried about. Is it a business collecting interest? No.

This is more just for casual friends.

What do you like? What do you hate?

**Adding a Tab**

Does the layout make sense?

I think so, yeah.

Is there a step missing?

No. Sign in, tap on button, info comes up. Looks good to me.

Do you feel disoriented?

Don’t think so.

What step is taking place?

Add tab means add another transaction. Put in emails, names. Can send a notification. Here’s my automated reminder.

What would you change?

No, I like it.

What do you like? What do you hate?

Like that you just do it by clicking. Happy that there is less typing. Like the drop down menus. If you’re on your phone and your finger is too big for the buttons; this is easier.

**Confirming Payment**

Does the layout make sense?

This is asking me to confirm that I got the money from Thomas?

Is there a step missing?

How would I cancel it or not confirm? Or say that they didn’t pay me. Maybe say payment not received instead of cancelled. Propose a different amount, you only gave me $25. Multiple options: 1. Payment not received 2. Actual amount received was different

Unsure about if it’s a notification from Bob Builder or something I sent. Is notification incoming or outgoing?

How would you format it?

No, I like it.

What would you change?

Would be good to put in when sending out the notification, don’t want to be too in your face, have the message “Contact me if you think the number is different, if you think something is different”. Less confrontational.

**Sending a Notification**

Does the layout make sense?

This works.

Is there a step missing?

No, I don’t think so.

What about notifications coming to me? Can’t tell between incoming and outgoing.

What step is taking place?

Logging on, search, notification centre. So this is a manual thing. This is the message you want to send.

How would you format it?

Same. Makes sense.

What would you change?

So that you know which notifications are incoming and outgoing. Should be able to see notification history, which ones you’ve sent.

What do you like? What do you hate?

Make sense.

**Comments**

For roommates, it’s a good thing.

Can you say what it was for? Trigger a reminder. Say concert tickets, or Avengers movie.

Should format for group settings, paying back as a group.

Families could use this, too, like siblings.

What if A owes B and B owes C, and A just gives money straight to C?

Money is close to the heart; good to not be confrontational.

Points system like Uber or eBay; thumbs up thumbs down. Paid on an agreed time frame.

**Male, 25, intermediate computer knowledge**

**Adding a tab**

What step is taking place?

Adding a new tab and sending a message.

Does the layout make sense?

Yes. You click on the add tab bubble and fill out the blank fields. I don’t like the bubbles though.

Is there a step missing?

Yes. What if I split the bill with multiple people? Do I have to do that manually or can I add more than one person at once?

Do you feel disoriented?

No. The layout is straight for enough I could understand without descriptions.

What would you change?

I could change the notification. Maybe make them a separate thing?

What do you like? What do you hate?

I like how I could add tabs easily. Don’t like how it’s combined with sending a message.

**Confirming payment**

What step is taking place?

Confirming a payment has been received. Thomas’ bubble disappear at the 4th frame after it was paid for.

Does the layout make sense?

The layout could be improved a little, I don’t like the bubbles. Don’t really know how they would show that someone has paid me and waiting for confirmation.

Is there a step missing?

No not really. I would expect to confirm a payment quickly and easily. This fits my criterias.

Do you feel disoriented?

No. You just login, see a notification, click on it and confirm, simple enough.

What would you change?

I would probably add the option to confirm in the person’s profile too.

What do you like? What do you hate?

I like how you can confirm in the notification center without having to navigate somewhere else. I don’t like the bubbles.

**Notification center**

What step is taking place?

Sending a reminder through the notification center.

Does the layout make sense?

I would probably understand the layout after a few uses because I would link sending a message to someone’s profile and not the notification center.

Is there a step missing?

No. The task is simple. Go to the notification and send a reminder to someone.

Do you feel disoriented?

Probably for the first few times. I would go looking for the send message button somewhere else.

What would you change?

I would add this task to their bubble instead.

What do you like? What do you hate?

I like the idea of having reminder and customizable messages. I don’t like how it is in the notification center.

**Female 22, computer knowledge basic function, no knowledge of underlying functionality**

**Adding a tab**

Can you briefly tell me what is going on?

-Signing into my account, I see all of my contacts that currently that currently owes money, or I owe money. I can add a new tab, and set the frequency of when I want to send reminders. The bigger the circle the bigger the debt, right?

Is there any step missing?

-I might want a step to confirm that I am setting the tab up with the right person

If you were to change anything what would you change?

-I don’t like the word tab, it makes me think of tab on a computer.

Did you understand the sequence of events, was there too big of a change at any time?

-No, it made sense

**Confirming payment**

Can you tell me what is going on?

-Enter the app, on the front page it the notification center it is highlighted. There you can see all of the notification you have received. There you can confirm if payment was received. When you return to the main screen the bubble is gone.

What would you change?

-I would change the wording of the payment. It doesn’t say that he has paid, it could be more explicit. And change the wording of the buttons.

Is there any step missing?

-You could have an option to take you to pay Bob back

-Wording should be clearer in the confirming payment

-Maybe have an extra statement saying they were paid in full or not

**Notification center**

What is happening?

- You are selecting a user to send a notification

Any step you would add?

-Maybe add an option to send an email, to make it stand out from weekly reminders

**Notes and Questions**

-Will the notification center look the same for when there is an active notification or not?

-How can you differentiate between personalized messages and automatic messages, increase clarity somehow?

-Having an option for a pre written message, as done in previous storyboards

**Female, 17, intermediate computer knowledge**

**Bubbles/List**

Does the layout make sense?

Bubbles: Yes

List: Yes

Both examples are showing me who owes money to me and who I owe money to

List option doesn’t have search bar

Really like the bubbles option; bigger for the more money you owe; more important

What would you change?

Nothing

**Adding a Tab**

What step is taking place?

How to register someone if they owe you money or you owe them money

Does the layout make sense?

Yes.

Is there a step missing?

No.

Do you feel disoriented?

No.

How would you format it?

Said it was good.

What would you change?

It’s beautiful.

Maybe make sure that the other person has to accept it; otherwise you could just send a notification saying “You owe me $500” when you don’t.

More of a confirmation.

What do you like? What do you hate?

Like all of it.

Like how you can search by their username or enter name and email.

**Confirming Payment**

Why would you decline a payment?

Doesn’t make sense. Say means of payment, and then confirm that you were paid.

Does the layout make sense?

Yes.

Is there a step missing?

As said above. How it was paid.

Do you feel disoriented?

No.

How would you format it?

Like it.

What would you change?

Add the means of payment; better explanation of what confirming a payment means.

What do you like? What do you hate?

Like the confirming payment, how it keeps track of ongoing things so you don’t need to pay it all at once. Just subtracts from the tab.

Hate the ambiguity.

**Notification Centre**

What step is taking place?

Reminding people that they owe you money.

Does the layout make sense?

No. How do I know if notification is incoming or outgoing? Do I owe Regina $100 or did I send her a notification that she owes me $100?

Is there a step missing?

No.

Do you feel disoriented?

No.

How would you format it?

Make it You owe Regina George $100. You is clearly the user using the device. Clarify incoming and outgoing notifications.

What would you change?

Should have a notification history so that you can see the last time that you sent them a notification, and how many you’ve sent them.

Have an urgency thing, can flag notifications as urgent. If you’re going on a trip next week and someone owes you $1000, then you can urgently remind them to pay you.

Add a dropdown menu for the sending notifications, of options for messages or you can customize a message if you prefer.

What do you like? What do you hate?

Like that you can send a customized message.

**Polished Sketches**

See plastic sleeves following this page.

Page #1: Notification Centre

Page #2: Task List Main Screen

Page #3: Bubbles Main Screen