Infinitely Scrolling Message List

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Summary

- Test environment: iPhone
- Used the Intersection Observer API to lazy load messages.
- Recycled 20 DOM elements to show infinite messages while scrolling.
- Swipe interaction: When swiping a message to right, the message becomes transparent. If a message is swiped further than a threshold, the message becomes more transparent and letting go of the touch will take the message off the screen. If the swipe distance is shorter than the threshold, letting go of the touch will slide the message back.

Technical Challenge

I didn't use libraries other than jQuery since we can easily create a performant infinite scroller with vanilla Javascript and this way we have more freedom to customize. I used 20 DOM elements since 20 seems good enough number for smooth interaction based on web and mobile experimentation.

1. Intersection Observer

The Intersection Observer API is used to determine when to load more messages during scroll. Using this API, we can set the top and bottom anchored elements (sentinels) and observe when these elements intersect with the viewport as shown in the Figure 1. The top sentinel is the first DOM element that holds a message and the bottom sentinel is the 20th DOM element. From now on, I'll refer to a DOM element which holds a message as a tile.

When the page is loaded first, it retrieves 20 messages and creates 20 tiles. When scrolling down to the 20th tile, the Intersection Observer API detects the intersection and makes an API call to fetch more messages or get cached data if they exist. Let's say a user has scrolled all the way down to 40th message, and now a user scrolls up to 21th message. Then the Observer API detects the intersection of top sentinel with the viewport and updates the messages.

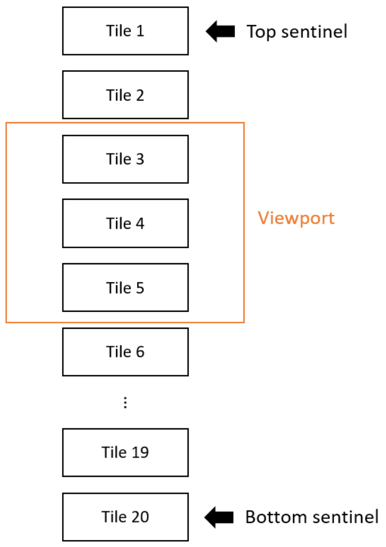


Figure 1. Intersection observer sentinels

2. Recycle DOM

Adding a new DOM element for each new message will cause performance and memory issues when there are infinite number of messages. To solve this, we should recycle the DOM elements and update its contents when needed. As shown in Figure 2, initially the 20 tiles hold the first 20 messages. When it's scrolled down to the 20th tile, the DOM elements update the contents to hold messages from 10th to 30th and the top padding of the tile container increases so that the elements shown in the viewport stay the same.

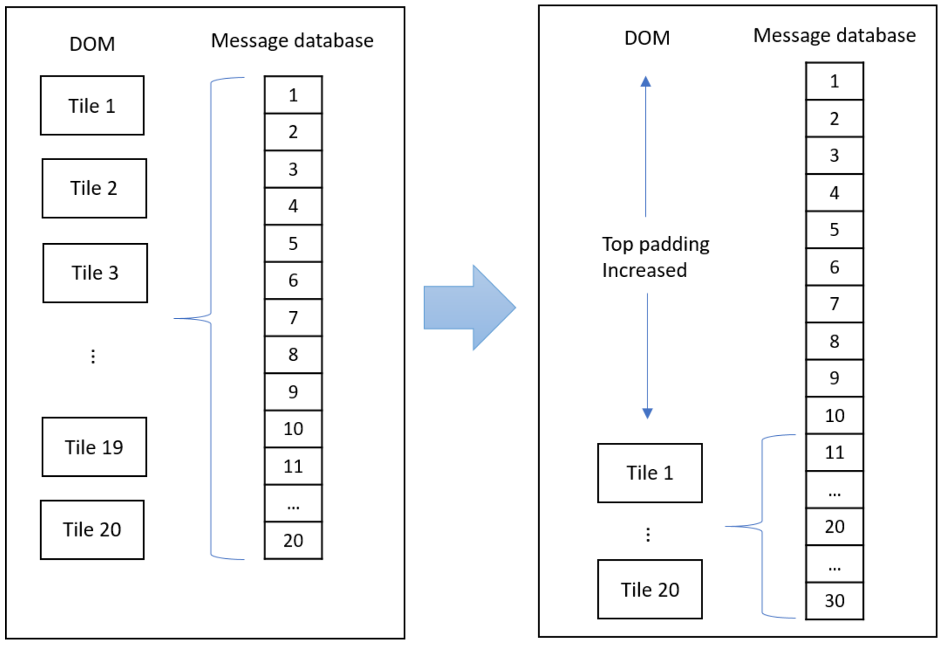


Figure 2. Recycle DOM elements

UX Challenge

1. Assumption

The requirements of swipe action are:

- When swiping a message right to dismiss, the message becomes transparent.
- When the message is dismissed, it should be taken off from the screen.

Depending on the scenarios, taking a message off a screen can imply multiple actions such as archiving, deleting or unfollowing the author in the context of newsfeed. But for simplicity and based on the guidelines, I assumed that in this context, removing a message from a screen could only mean dismissing it and a user will not have any confusion about it.

2. User Interaction

I introduced a swipe threshold as 60% of the message width and use this value to determine whether to dismiss a message or ignore the swipe action. This way we can prevent dismissing it from accidental swipe which can occur often on mobile devices and also give a chance to a user to review the action or change the mind. Here's the breakdown of the user interaction.

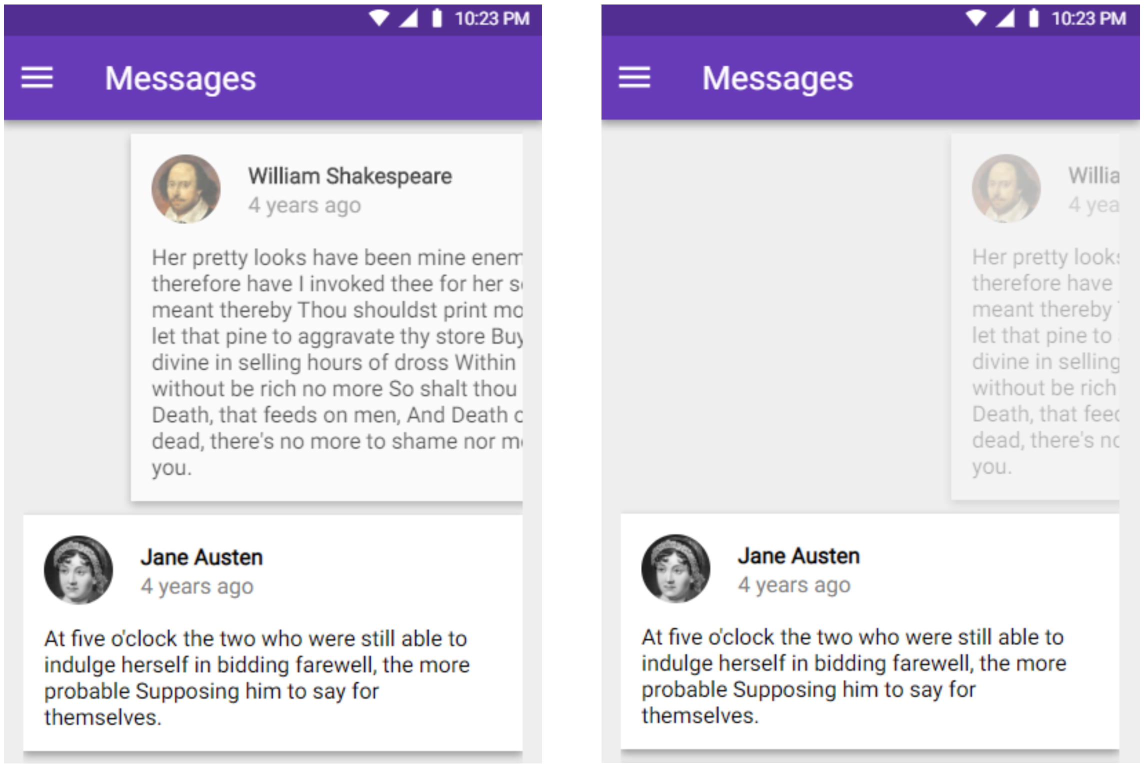
A. Swipe distance is less than the threshold:

- Change message opacity from 1 to 0.68.
- If a user lets go the touch, the message will slide back to original position.

B. Swipe distance is beyond the threshold:

- Change message opacity from 0.68 to 0.28.
- If a user ends the touch, the message will slide off the screen and be removed.

The initial opacity change is to indicate this action is for dismissing the message and the second change is to indicate that it'll be automatically removed when the touch ends. Figure 3 shows the screenshots of both cases. The message translations after the touch are animated for smooth user experience.


10:23 PM

Messages

William Shakespeare
4 years ago

Her pretty looks have been mine enem
therefore have I invoked thee for her s
meant thereby Thou shouldst print mo
let that pine to aggravate thy store Buy
divine in selling hours of dross Within
without be rich no more So shalt thou
Death, that feeds on men, And Death c
dead, there's no more to shame nor m
you.

Jane Austen
4 years ago

At five o'clock the two who were still able to indulge herself in bidding farewell, the more probable Supposing him to say for themselves.

10:23 PM

Messages

Willia
4 yea

Her pretty look
therefore have
meant thereby
let that pine to
divine in selling
without be rich
Death, that feed
dead, there's nc
you.

Jane Austen
4 years ago

At five o'clock the two who were still able to indulge herself in bidding farewell, the more probable Supposing him to say for themselves.

Figure 3. Transparency changes when swiped less or beyond a threshold

3. Responsive Design

Since this is for mobile application, I've applied mobile first design and added media queries for the web version.

Future Improvements

1. Technical Improvements

- There's a slight glitch when making a new API call to fetch messages and update DOM. I could change the order of DOM elements to be recycled so that the elements shown in the viewport stay as they are and update only the ones outside of the viewport.
- If the viewport is bigger than initial 20 messages, it'll not make other API calls to retrieve messages since the bottom sentinel never intersects with the viewport. In this edge case, it should keep making calls until the viewport is filled with messages.
- The Intersection Observer API is not supported on IE. Provide support for it using polyfill.

2. UX Improvements

- Show a loading icon below the last message while fetching new messages.
- When messages move up after a message is swiped off, animate the vertical transition for natural look.
- When a message is being swiped, let it reveal 'Dismiss' text/icon to clearly indicate this action will dismiss the message. When the swipe passes the threshold, change the color of the text or icon to indicate it.
- Add short vibration when the swipe threshold is passed.