Bullet Chatting Logical Architecture and Data Flow Diagram
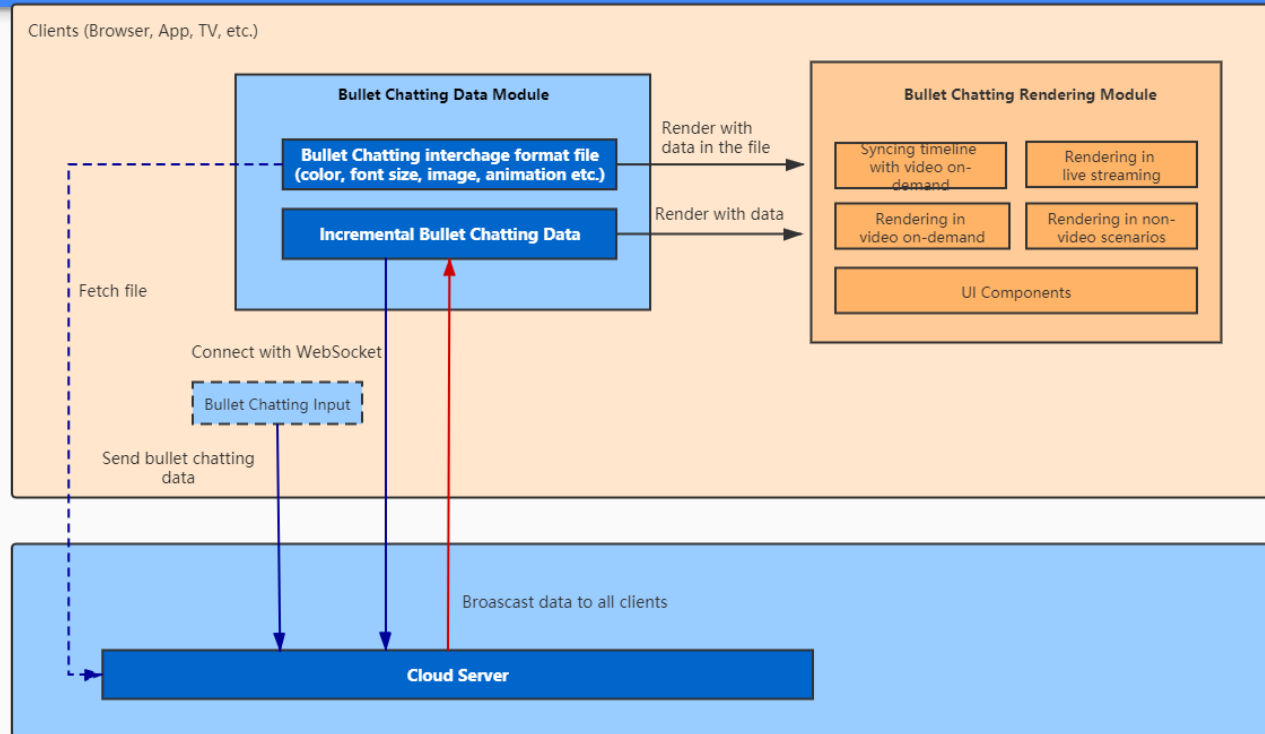
Bullet Chatting Task Force / CG
7 April 2020

Agenda

- Bullet Chatting Logical Architecture Diagram

- Bullet Chatting Data Flow Chart

- Whether Bullet Chatting File Standardization is needed

- Necessity of Bullet Chatting Rendering Standardization

- Use cases to be covered by Bullet Chatting Rendering

- Rendering Behaviors to be covered by Bullet Chatting Rendering Standardization

- Q&A

Bullet Chatting Logical Architecture Diagram

- In Bullet Chatting client there are mainly Bullet Chatting Data and Rendering modules

- On initialization the client loads Bullet chatting interchange format file from the server

- When running the client get incremental bullet chatting data by using websocket or polling

- Rendering Module shall cover 3 scenarios: video on-demand, live streaming, non-video

- The server and clients are from the same vendor.

Clients (Browser, App, TV, etc.)

Bullet Chatting Data Module

Bullet Chatting interchage format file (color, font size, image, animation etc.)

Incremental Bullet Chatting Data

Render with data in the file

Render with data

Bullet Chatting Rendering Module

Syncing timeline with video on-demand

Rendering in live streaming

Rendering in video on-demand

Rendering in non-video scenarios

UI Components

Fetch file

Connect with WebSocket

Bullet Chatting Input

Send bullet chatting data

Broascast data to all clients

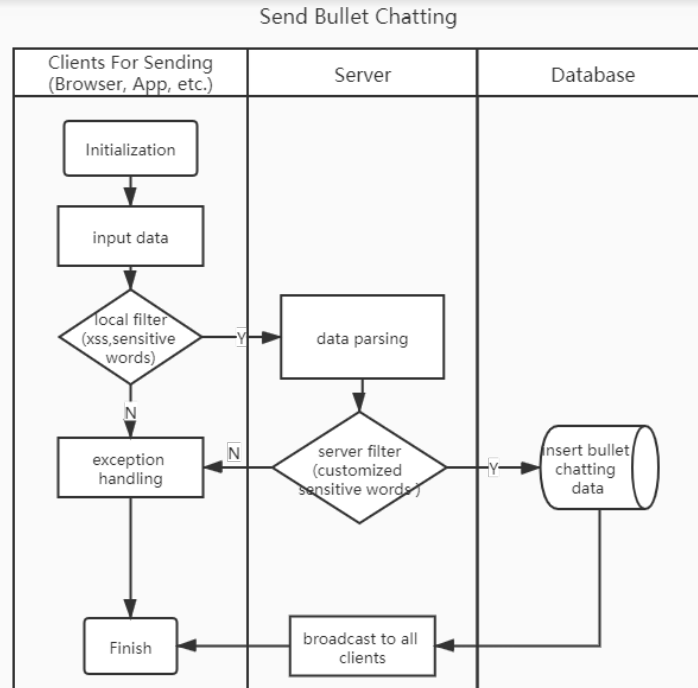**Cloud Server**

Bullet Chatting Data Flow Chart
- Rendering Bullet Chatting in file

Render Bullet Chatting (file)
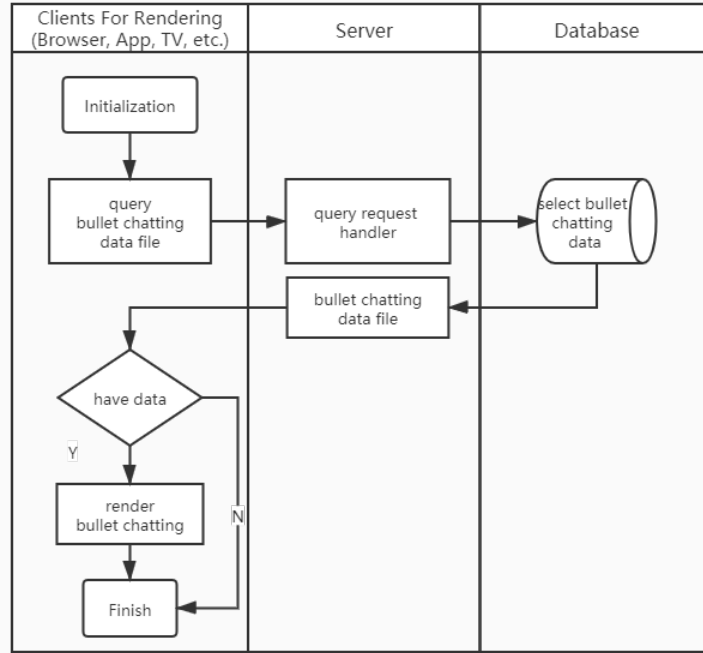
Bullet Chatting Data Flow Chart
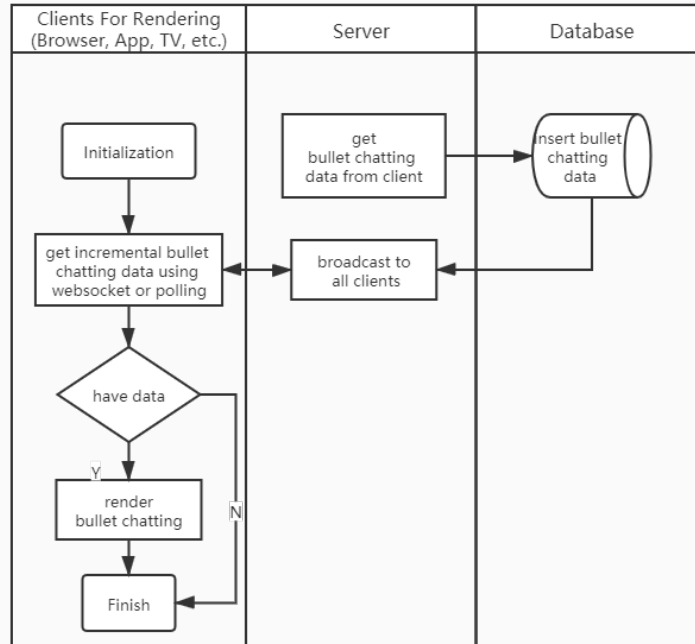## - Sending Bullet Chatting

Send Bullet Chatting
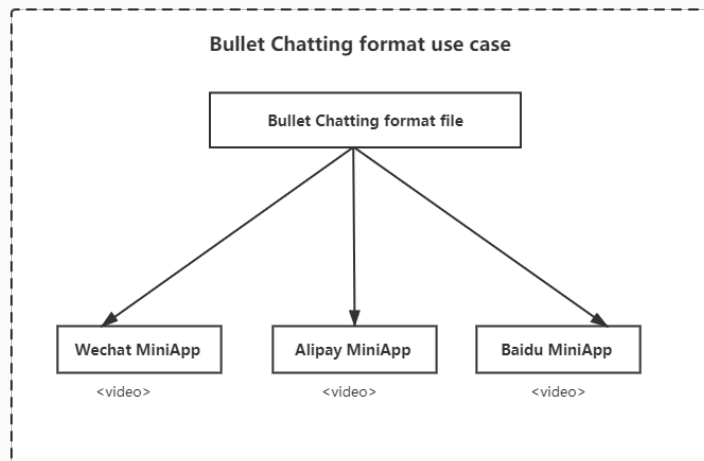
Bullet Chatting Data Flow Chart
- Rendering Incremental Bullet Chatting

Render Bullet Chatting (Incremental Data)

Whether Bullet Chatting File Standardization is needed

- No requirement for interoperability at present

- Portability requirement
  - Support multiple platform, iOS, Android, desktop OS, etc.
  - Support mini apps for multiple vendors

- Save cost of new developers / companies

Bullet Chatting format use case

Bullet Chatting format file

Wechat MiniApp
\<video\>

Alipay MiniApp
\<video\>

Baidu MiniApp
\<video\>

Necessity of Bullet Chatting Rendering Standardization

- Currently Bullet Chatting Rendering is not supported in the browser in a standard way
- At present Web developers mainly use Canvas or CSS to implement Bullet Chatting
  - The Canvas Way
    - **Advantages**: The performance is better when used with WebGL and a large number of bullet chatting text can be displayed at the same time.
    - **Disadvantages**: Not flexible. It is cumbersome to display bullet chat that contains both text and images, and to pause the animation of one of the moving bullet chats. Moreover, resolution issue needs to be addressed on mobile devices.
  - The CSS Way
    - **Advantages**: Simple and flexible. Developers can style the bullet chat through the DOM, and supports the combination of images and text. The user can pause a particular bullet chat of interest.
    - **Disadvantages**: Huge collections of DOM nodes will be generated when the there are much bullet chatting. It will consume more memory and make the page unresponsive. Moreover, to manipulate the bullet chatting such as making the bullet chatting disappear, the corresponding DOM node needs to be removed.

Use cases to be covered by Bullet Chatting Rendering Standardization (1)

- **On-demand Video**
  - The bullet chatting content includes text, images and animation, etc.
  - The bullet chatting may be sent by a user in real time. For real-time bullet chatting, it is associated with the timeline of the video and will be displayed at the certain time.
    - For example, the user A sends a bullet chatting message at 00:00:10, the other users viewing the video will see the bullet chatting sent by user A at 00:00:10 of the video.
  - If the user pause the video, and the bullet chatting is also paused
  - In some vendors, it is supported - if the use hover one bullet chatting then the bullet chatting stop scrolling, and other bullet chatting is display as usual.
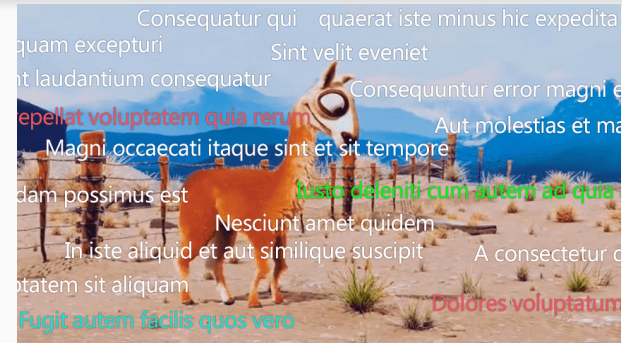
Use cases to be covered by Bullet Chatting Rendering Standardization (2)

- **Live Streaming**

  - Irrelative to the media timeline

    - there is no progress bar in live streaming

  - The bullet chatting sent by the user needs to be displayed in real-time on both the anchor's and the viewers' screen.

    - the server broadcasts the bullet chatting via websocket

  - The live streaming can be paused and not be rewound. If the user pause the video, the bullet chatting is also paused.

    - There exists the mixture of on-demand video and live streaming scenario, and it is not supported in Bullet Chatting)
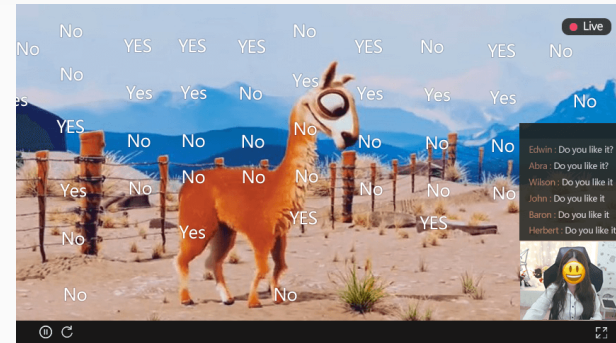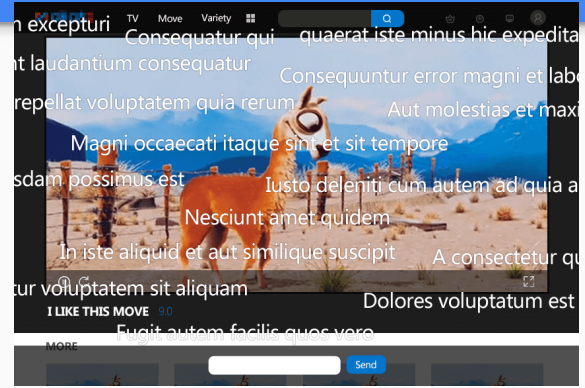
Use cases to be covered by Bullet Chatting Rendering Standardization (3)

- Interaction within a webpage
  - The Bullet Chatting is used in the webpage to promote some products and improve the effect of the page
  - the Bullet Chatting is displayed separately and is not attached to the video

- Interactive wall

  - The user can send the content of the Bullet Chatting to the display wall in an offline event.

Rendering Behaviors to be covered by Bullet Chatting Rendering Standardization (1)

- **Element**
  - We propose Bullet Chatting use new elements which are not used as children of the media elements audio and video. The usage of bullet chatting is not limited to those media elements like video. In scenarios like Web page interaction or interactive wall, bullet chatting is independent of any media element.

- **Attributes**
  - the percentage of the total height of the Bullet Chatting in Bullet Chatting display area
  - whether the Bullet Chatting beyond the display area allows overlap or not
  - The mode of Bullet Chatting: scroll, top, bottom and reverse

- **Event:**
  - The event is triggered when the Bullet Chatting animation starts / ends.
  - The event is triggered when the Bullet Chatting is terminated unexpectedly, such as the Bullet Chatting is removed or hidden, or because the display area is not displayed.

Rendering Behaviors to be covered by Bullet Chatting Rendering Standardization (2)

- Style:
    - the state of the Bullet Chatting as running or paused
    - the duration of the Bullet Chatting is rendered
    - when the Bullet Chatting animation begins, defining a negative value allows a Bullet Chatting to start moving from the middle
    - Font size, color, border, line height, transparency, shadow, etc.
- Sync with Media Timeline
    - In on-demand video scenario, the bullet chatting is associated with media timeline
        - At present the Bullet Chatting is synchronized and rendered via ontimeupdate, or every media frame is synchronized and rendered via requestAnimationFrame
        - Media Timed Events TF: https://w3c.github.io/me-media-timed-events/#synchronized-rendering-of-web-resources 5.2.2 & 5.2.3

Q&A (1)

- Chris: Does the browser provide all the rendering primitives you need, including for animation and pausing, or do you see gaps?
    - In current bullet chatting implementation CSS3 is used by default and Canvas is used in specific browser or use case. The implementation depends on cost, rendering performance, and browser, etc.
        - the bullet chatting with images is usually rendered by CSS3 but Canvas is used in early Edge browser.
        - Canvas is used by default in Firefox since the performance is better.
    - Gap: In VOD case, the bullet chatting of every media frame need be synchronized and rendered with media timeline.
        - Is video.rAF a good choice? https://wicg.github.io/video-raf/

Q&A (2)

- Francois: Do we want to specify the exact behaviour across all providers? Which parts could vary between providers?... it would say that the rendering must stop scrolling when the user hovers over a bullet chat message, or will implementers be free to implement other behaviours?
  - It is not necessary to specify the exact behavior in spec. it is necessary that the browser supports the capability of pausing one single bullet chatting message, e.g., Response to Click or hover event is supported in browser.

Q&A (3)

- Nigel: From the image in the slide, there's a lot of text, which doesn't overlap other text.... The text scrolls at different speed, so is there a presentation requirement to prevent overlap of text? Is this setting in the application, or in the data?
  - The setting need be supported in browser whether the bullet chatting can be overlapped or not. The controlling is configured by the user in application and it is global not for one single bullet chatting message.
  - The text scrolling duration has default value and also can be set by the user in application.
  - The font size, color, mode of Bullet Chatting can be set in the data.

Q&A (4)

- Nigel: The bullet chat messages are sent via web socket, so how do you manage scaling to millions of viewers?
  - The number of bullet chatting messages broadcast to the clients is controlled by the service provider.
  - The browser is only responsible for rendering.

Q&A (5)

- Nigel: ... If a viewer pauses the video, is their player expected to continue to receive bullet chat messages via the web socket and then associate them with media time? Is the existing behaviour the desired user experience, or what you have based on existing solutions or limitations?
  - In live streaming, the browser continues to receive data when the video is paused by the viewer.
  - When the viewer resumes the video, the behavior varies among different service providers.
    - Some data is discarded and the bullet chatting from the moment when the viewer resumes will be rendered - the user experience is better
    - All bullet chatting which the browser has received will be rendered

Q&A (6)

- Pierre: Is there a diagram for the broadcasting use case?
- Nigel: Is there an existing technology in the broadcast world for bullet chatting?
  - In future there might be such use case. Service provider A has the licence of the video including bullet chatting file which is issued by the government.