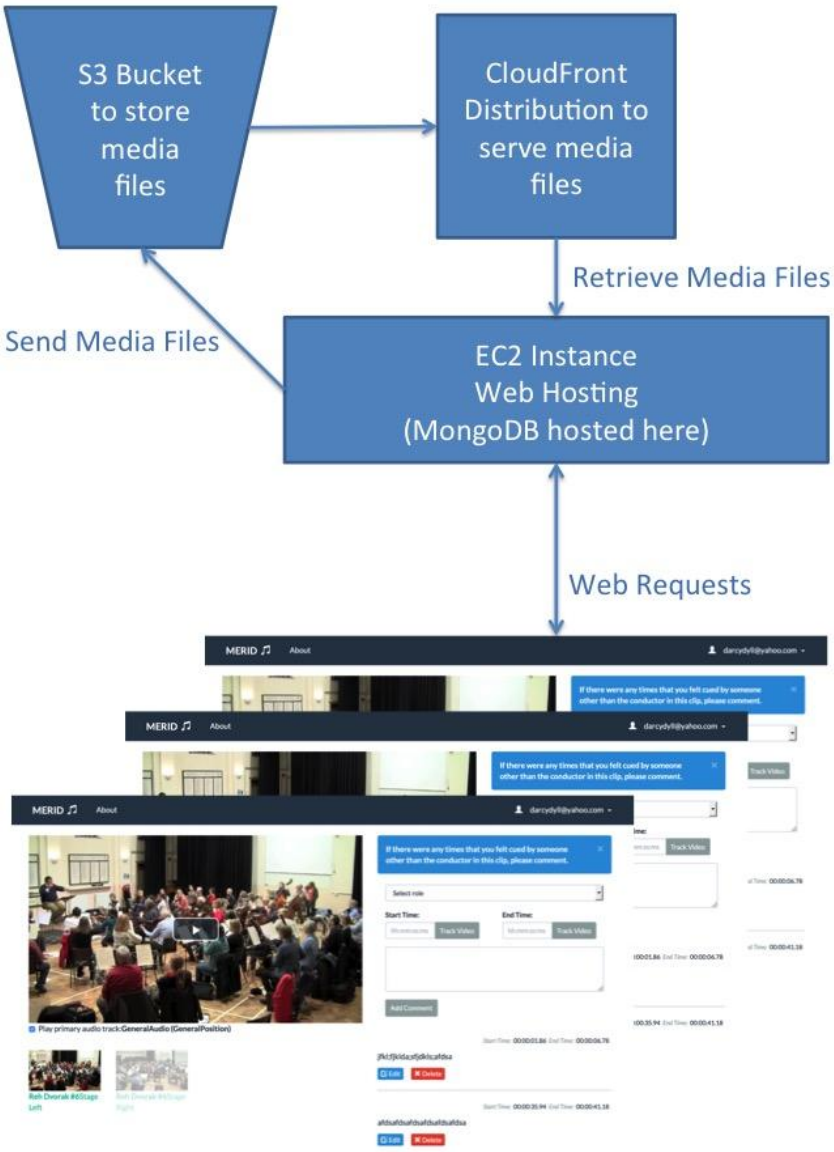
System Design

MERID is hosted with AWS and utilizes the following services:

- Amazon **Elastic Compute Cloud (EC2)** for web site hosting.
- Amazon **Simple Storage Service (S3)** to store media (video and audio) files.
- Amazon **CloudFront** to serve media files stored on S3 service.

Figure 1



MERID is built using the following technologies:

Frontend:

- **Jade:** Jade is a high performance template engine heavily influenced by Haml and implemented with JavaScript for node and browsers. Using this template engine, we can ensure the front-end HTML is well-formed and valid.
- **VideoJS:** Video.js is an HTML5 video player framework. Through its well-documented API, we built a video player that is synchronized across 1-4 videos and a primary audio track.
- **.validate**: .validate is a jquery validation plugin for forms. It is currently being used for the participant commenting feature.

Backend: Node.js

Node.js is a JavaScript runtime built on Chrome's V8 JavaScript engine. It is an asynchronous event driven framework which is designed to build scalable network applications. npm, one of the largest ecosystems of open source libraries, is the package manager for Node.js. npm is bundled and installed automatically with the environment. npm runs through the command line and manages dependencies for an application. The MERID application is built using Node.js and several open source packages. The following are the most important packages used in our system:

- **Express:** The Express package is a light-weight web application framework that helps to organize the MERID web application into an MVC (Model-View-Controller) architecture on the server side.

- **AWS SDK:** The AWS SDK package enables a Node.js application to access AWS. By using this package, the server is able to upload all processed media files into Amazon Simple Storage Service (S3), which are then accessed by the survey views and video player using cloudfront.
- **ffmpeg:** The ffmpeg package is a media file processing tool. ffmpeg is able to cut, concatenate and transcode (compress and/or convert to different formats) audio and video files. By integrating this package into our system, we are able to process the audio and videos to make them the same length and produce high quality transcoded videos in a timely manner. Also, in MERID v2, the system was using a paid-for service provided by AWS; wherever this a free and open source package. We are also using ffmpeg to create video thumbnails and poster images for the survey views and video player.

Database: MongoDB

MongoDB is also free and open source. Classified as a NoSQL database, MongoDB utilizes JSON-like documents stored in collections with dynamic schemas (MongoDB calls the format BSON) instead of a traditional table-based relational database. This makes the integration of data faster and it's more flexible.