SMART INDIA HACKATHON '18

Ministry Category: Ministry of Space(ISRO)

Problem Statement: Enable customized animation over the internet

Problem Code: #ISR4 **Team Name: X-GEN**

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IDEA / SOLUTION / PROTOTYPE

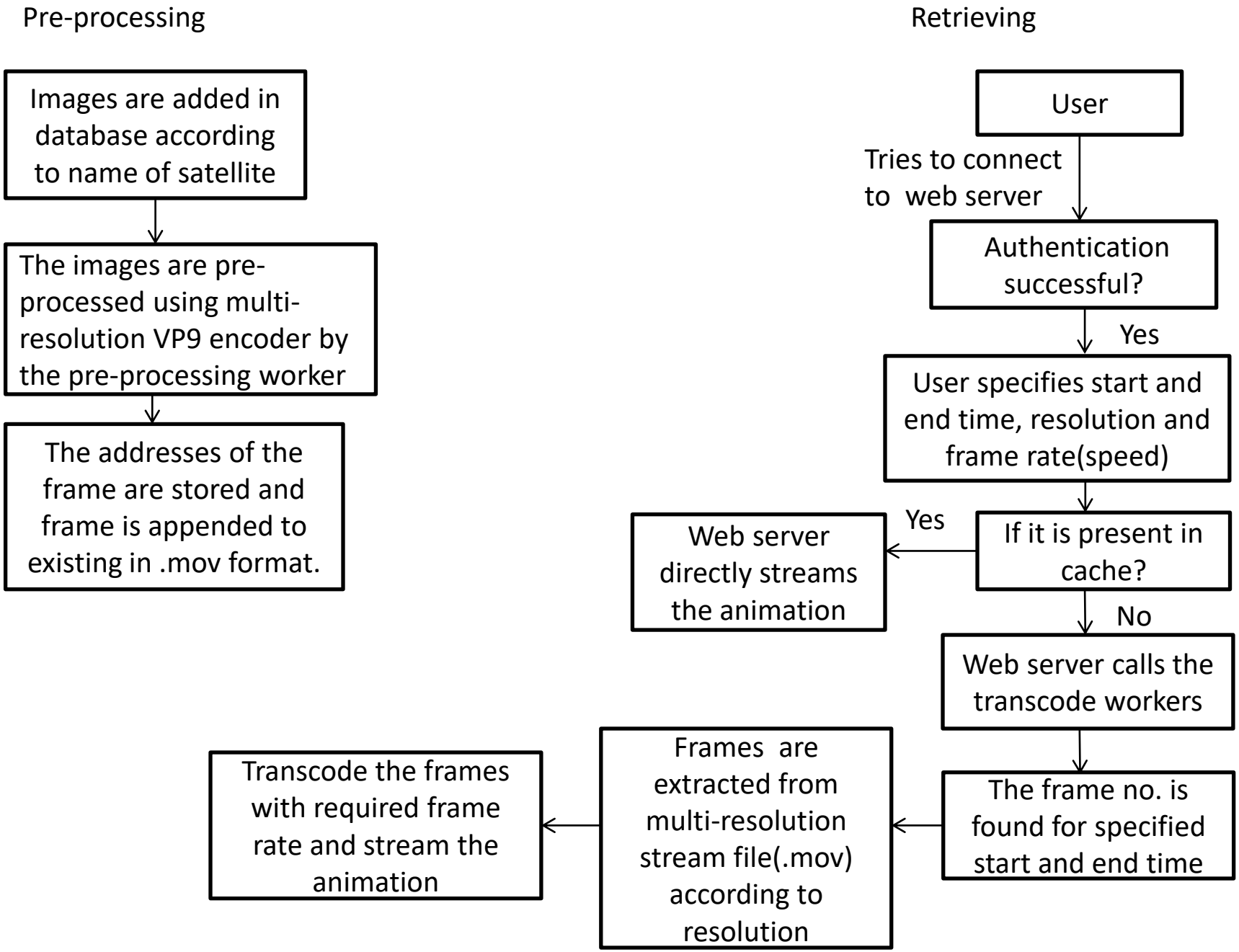
- A server with database consisting of address of images, timestamps (IST and GMT) and name of the satellite is maintained.
- As a new image is added in the database a multi-resolution VP9(open source) encoded frame is created by a 'pre-processing worker' and then the multi-resolution .mov frame is created and appended to the existing stream. Location of the frame is stored along with the corresponding frame number.
- The heavy computing and the encoding is done at the server. This facilitates smooth , lag free streaming at the run time.
- The required resolution from the multi-resolution stream is extracted. The transcoded stream is created from the extracted stream while adjusting the frame rate at run time by the 'display worker'. The display worker is spawned as the end user requests the service.
- The web server authenticates the user. The display worker sends the encoded live stream to the web server. The end user can access the live stream from the webserver as per requirement sent previously.
- This web server also caches the previously encoded video of most frequently used speed and resolution.

TECHNOLOGY STACK

- Open source encoders like VP9
- Browser based front end client
- Database: PostgreSQL
- Languages used: Python for web interface, Rust/Go for encoders

DEPENDENCIES/SHOW-STOPPERS

- The encoders should be able to smoothly encode in real-time without any losses and delay.
- Fast network/filesystem interface from workers/where the images are stored.


Pre-processing
Images are added in database according to name of satellite
The images are pre-processed using multi-resolution VP9 encoder by the pre-processing worker
The addresses of the frame are stored and frame is appended to existing in .mov format.
Retrieving
User
Tries to connect to web server
Authentication successful?
Yes
User specifies start and end time, resolution and frame rate(speed)
If it is present in cache?
Yes
Web server directly streams the animation
No
Web server calls the transcode workers
The frame no. is found for specified start and end time
Frames are extracted from multi-resolution stream file(.mov) according to resolution
Transcode the frames with required frame rate and stream the animation