

Mobile Security Solution on Cloud

Course Name: Cloud Computing

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Project #8

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Motivation

“ A single CCTV camera with $640 * 480$ image resolution set up for security purposes uploads 14GB of data per day.”

Problem : This requires high bandwidth to send the data to server, high amounts of storage and compute power to store this data and retrieve when required.

Time for a cheaper and better alternative !!

Our Solution

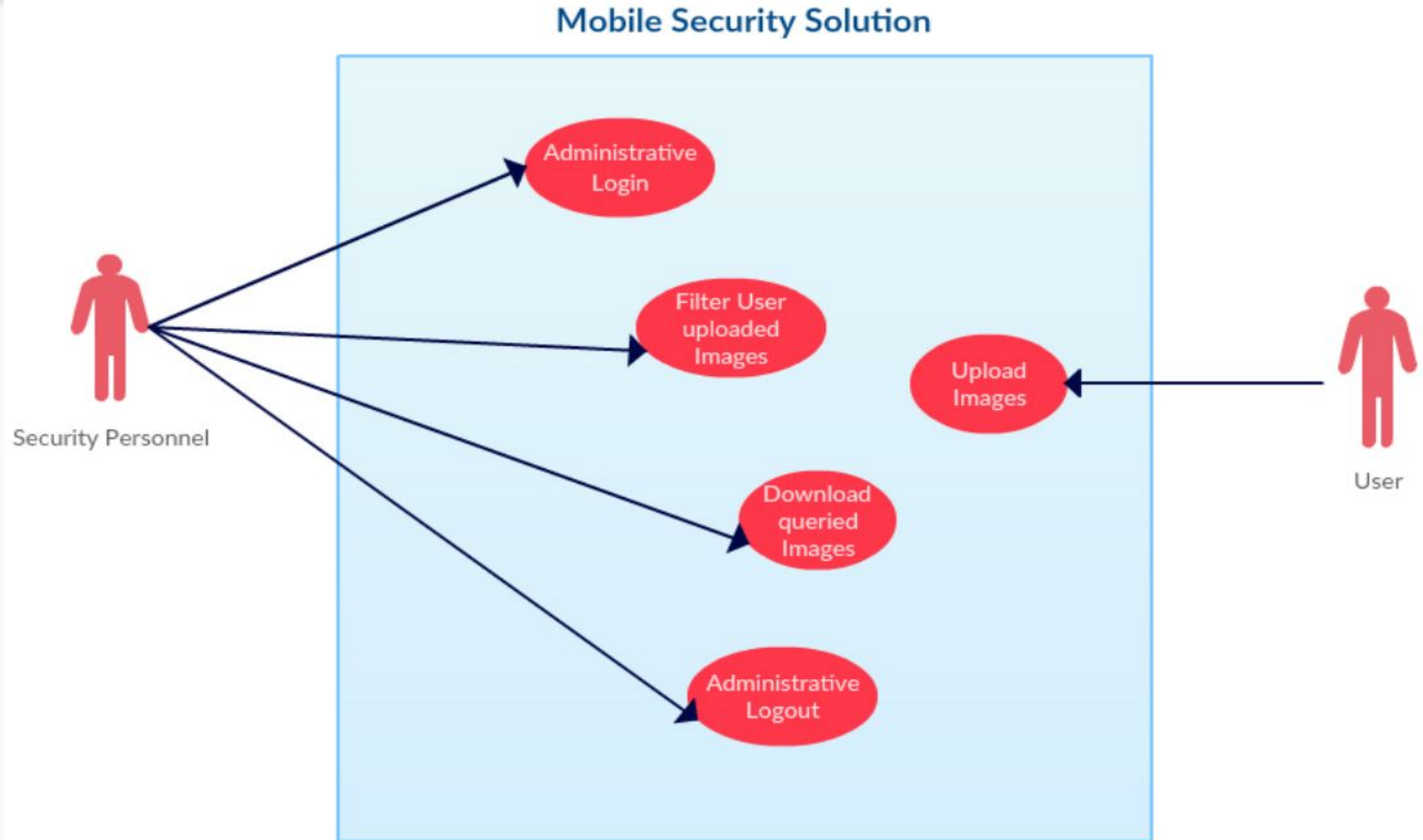
Mobile Camera Instead of CCTV camera
and
Continuous Images Instead of Videos

In brief, a **Mobile Security Solution.**

Introduction

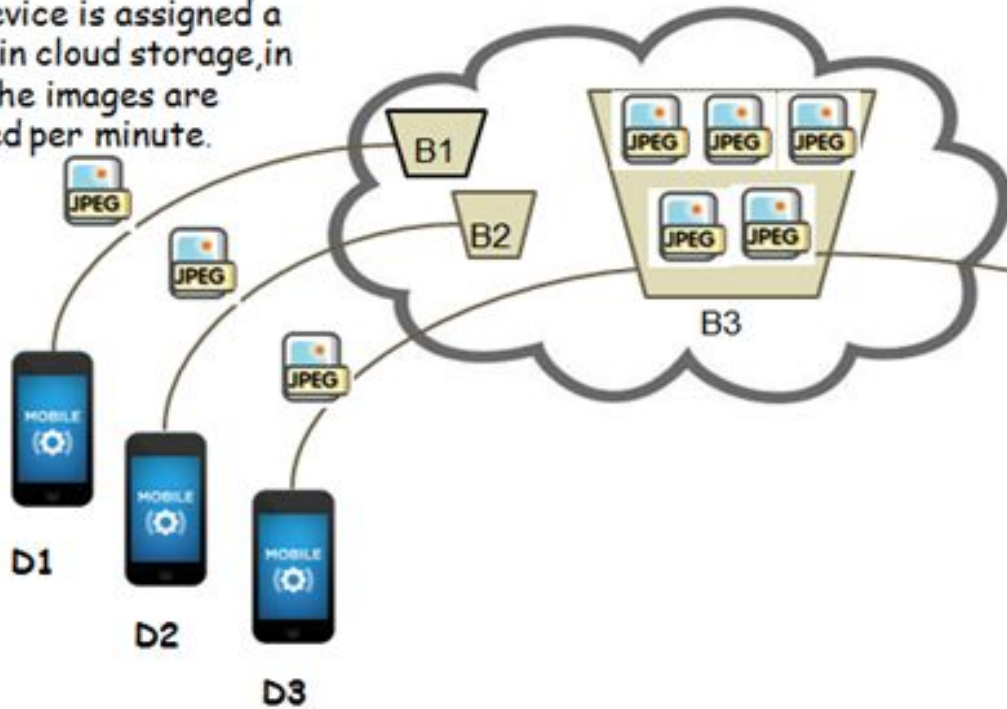
- Fueled by the widespread adoption of mobile devices and the explosion of mobile applications, mobile device can be used as a cheaper alternative for CCTV cameras in security solutions.
- The project provides a cloud framework that allows mobile phone to post images on a regular interval.
- The project also provides a web interface for the easy filtering of the images.

Use Case Diagram

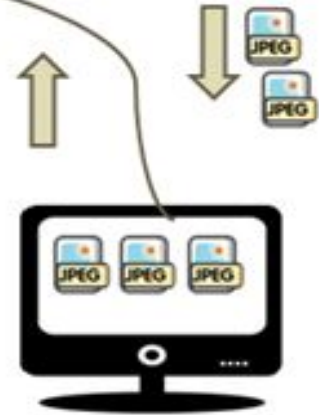


Flow Diagram

Each device is assigned a bucket in cloud storage, in which the images are uploaded per minute.



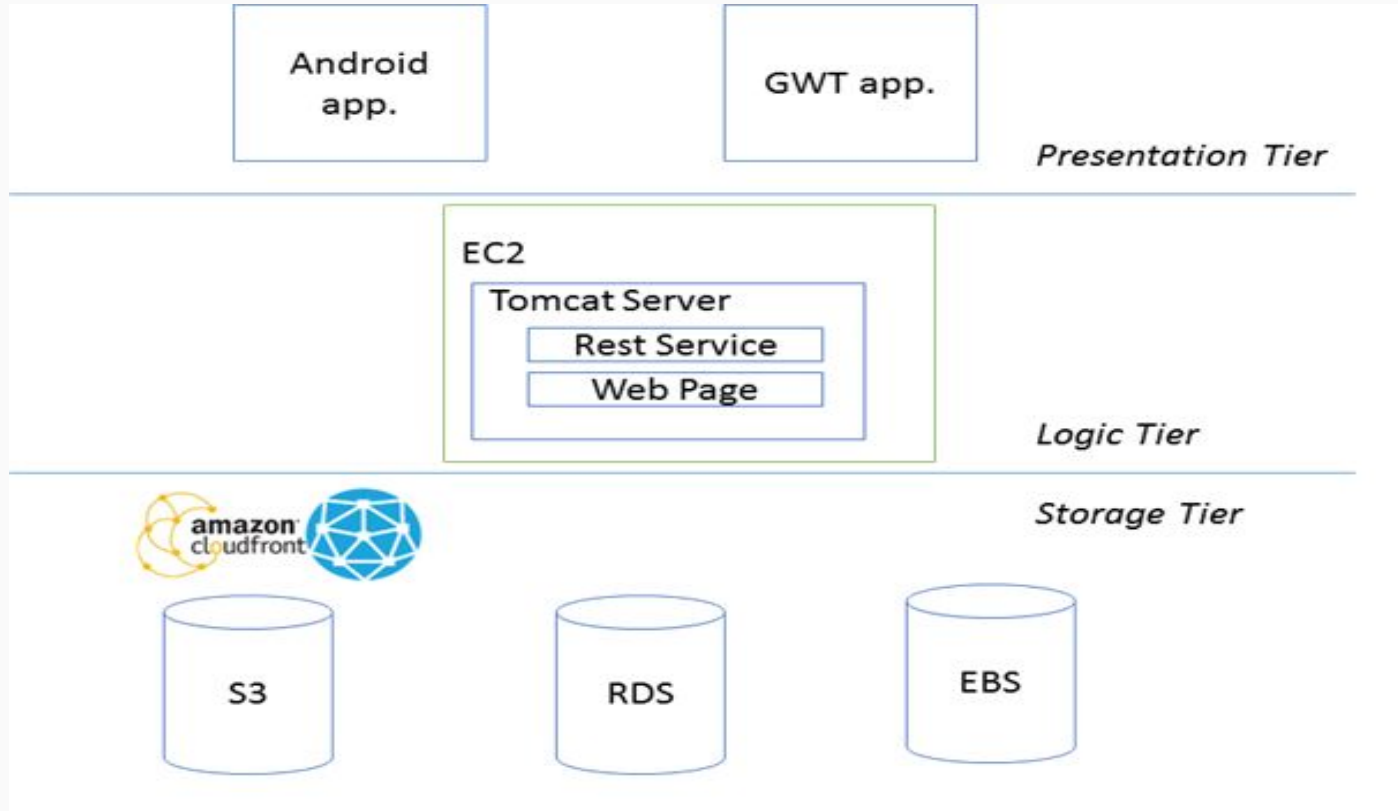
The security personnel chooses the device ID, and the time. Images are populated from the respective bucket.



Major Components of Application

- Android Application
- Web Application
- Rest Backend Service
- Database

High level Design



Design Choice

- AMAZON AWS S3
 - Cross Region Replication : CRR is an Amazon S3 feature that automatically replicates data across AWS regions.
 - Accessing Images quickly : Each image is stored as a Key, Value pair.
 - CloudFront CDN : We used Amazon CloudFront a CDN (Content Delivery Network) service to serve the images faster to the user.
- AMAZON AWS RDS
 - RDS provides supports **ACID**, i.e, Atomicity, Consistency, Isolation, and Durability.
 - **Querying**: Querying data in NoSQL Databases like DynamoDB is very limited, especially to query for non-indexed data. Also, complex querying can be easily done in RDS.
 - **Backup**: RDS has a slick backup when compared to the tedious backup procedure for NoSQL Databases like DynamoDB
 - **Speed**: RDS has better response time when compared with NoSQL Databases like DynamoDB.
 - **Latency**: On table creation, RDS allows us to use the table with negligible latency. Also, latency for read/write is better in the case of RDS.

Technology Stack

- Android SDK - Used to build an android application which captures images using mobile camera and uploads them on cloud.
- Google web Toolkit (GWT) - Provides web application interface to use REST API Service.
- Amazon S3 - Stores the captured images.
- Amazon RDS - Store the user and session tables.
- Amazon EC2 - Virtual server that runs tomcat.
- Amazon EBS - Provides the block storage for the EC2 instance.
- Amazon CloudFront - Content delivery network to boost the image retrieval.

Details of Workflow

- The table “Device Info” stored in Amazon RDS holds the information of a particular user / device.
- Another table “Session Info” holds the details of every session of every user.
- Amazon S3 storage stores the uploaded images in a hierarchy of device id followed by session id.
- By this time, we already have a hosted web server on a virtual machine running on cloud supported by Amazon EC2 (Elastic Compute Cloud).
- Later when required, a web page, which is the front end of the web application is used by security administrator to retrieve images from cloud.
- Amazon cloudfront acts as the backbone for the faster delivery of images.
- A REST backend service accepts requests from both android application and web page and responds to them.

Problems Faced

- We are unable to connect to the Amazon EC2 node as port 22 is blocked inside our college LAN network. We solved this problem using ssh tunneling.
- Sending images from mobile device using asynchronous background Task instead of making the post call for the image data on the UI Thread.
- We had to define appropriate security groups for different AWS services used such that our application can GET and POST data to these services.

Benefits of Application

- This application can be used by security personals for any public or private surveillance system.
- Provides low cost security solution because here we are using mobile device instead of costly CCTV cameras for surveillance.
- Storage requirements of storing a video is more than the storage requirement of storing an image. Thus the application will help to save a lot of storage space.

Thank You