

Secure File Sharing System over Google Cloud Platform

CPSC – 5207

INTRO TO CLOUD TECHNOLOGIES

Group – 5

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Business Case

Secure File Sharing and Team Collaboration:

- Startups/small businesses often struggle with securely sharing and collaborating documents across teams.
- Thus, the app would provide a controlled file sharing, permission management, and real-time information (for eg. logs, audits, etc.)
- So as to not let anybody access sensitive customer data, the deployment can be hybrid too.

Cloud vs On-Premises

- Scalability: The cloud storage can easily be scaled without any infrastructural investment.
- Cost efficiency: No upfront hardware purchases or maintenances required.
- Global Accessibility: Teams can access files anytime and from anywhere.
- Built-in Security and Compliance: Robust security by the cloud provider and thus, no need of compliance certifications.
- Regular updates: The provider updates the cloud automatically over time and doesn't require any manual intervention.

Why GCP?

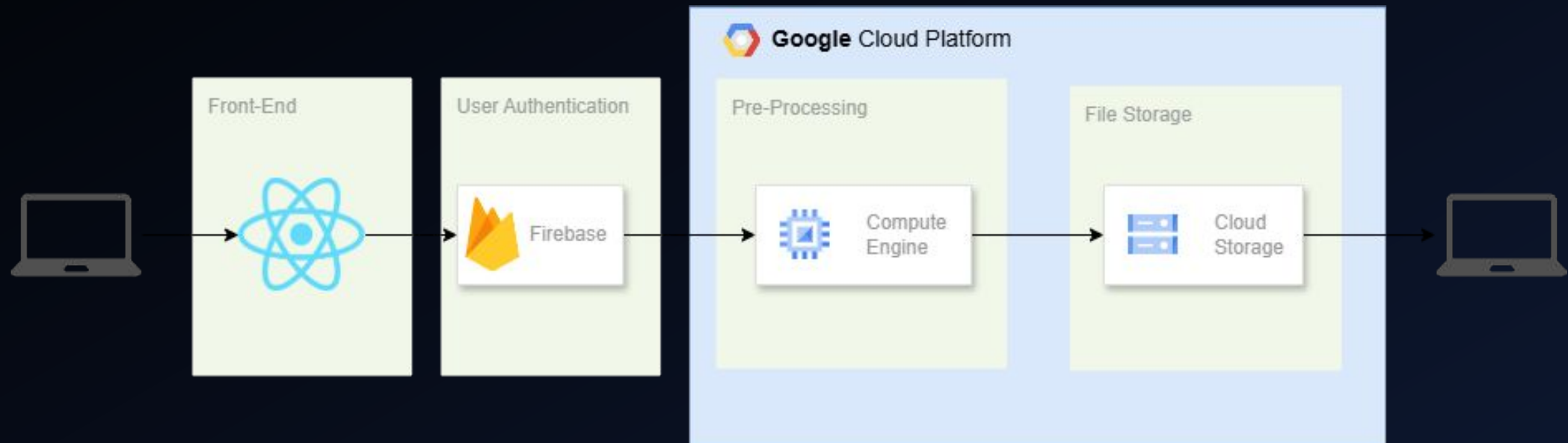
- Firebase Integration: Seamless setup for authentication and notifications.
- AI and Data Tools: Future integration possibilities with Google's AI and analytics services.
- Simple Service Setup: Quick deployment with Firebase, easy storage with Cloud Storage, and straightforward permissions.
- Free Tier: Covers key services for free, making it affordable for students.
- Student-Friendly Learning: Access to hands-on labs, Qwiklabs, and clear documentation.

Project Overview

So as to develop a secure, user-authenticated file sharing system using GCP, we shall implement:

- Authentication with Firebase
- File upload and storage with Firebase Storage
- Notifications with Firebase
- Pre-Processing via Compute Engine
- System supports Google Authentication and storage upto 1GB per user.

File-Sharing System Architecture



Technologies Used

- JavaScript
 - React
- Google Cloud Platform
 - Compute Engine
- Firebase
 - Authentication
 - Storage

Why Cloud Storage and not any alternatives?

Google Cloud Storage	Any other storage (eg. SQL, Firestore)
<u>integrates seamlessly</u> with Firebase and Cloud Functions.	may require manual integration.
<u>designed to store and retrieve objects</u> like files, images & videos.	<u>SQL</u> or <u>Firestore</u> : ideal for structured or semi-structured data. <u>Filestore</u> : overkill for such system and expensive
<u>free tier usage</u> , followed by pay-as-you-go	higher costs and fixed capacities in some cases
<u>available globally</u> over HTTPS or public URLs.	not feasible with some alternatives

Why Firebase and not OAuth?

Firebase	OAuth
<u>Easy to implement</u> and simple to set up	Requires <u>manual</u> setup, managing API keys and handling token packages
Includes a <u>built-in</u> user management system for managing various accounts	Need to implement a <u>custom</u> user management system
<u>Free</u> for a basic usage or a small-scale project	May require additional backend logic which potentially would <u>increase cost</u>
<u>Easy integration</u> with Firestore, Google Cloud Storage and Cloud Functions	Requires <u>manual integration</u> with any system

Challenges faced and the Resolution

- File Upload and Storage Limitations
 - Validated file size on the frontend, show real-time upload progress, and restrict uploads if storage limits are exceeded.
 - Monitoring storage with Firebase Admin SDK and optimize space using file compression.

```
const MAX_FILE_SIZE = 1 * 1024 * 1024 * 1024; // 1 GB

const handleFileUpload = (event) => {
  const file = event.target.files[0];

  if (file.size > MAX_FILE_SIZE) {
    alert("File exceeds the maximum size limit of 1 GB.");
    return;
  }

  uploadFileToFirebase(file);
};
```

```
const admin = require("firebase-admin");
admin.initializeApp();

async function getStorageUsage() {
  const bucket = admin.storage().bucket();
  const [metadata] = await bucket.getMetadata();
  const storageUsage = metadata.itemsTotalSize; // In bytes
  console.log(`Current storage usage: ${storageUsage / (1024 * 1024)} MB`);
}

getStorageUsage();
```

- User Authentication and Access Control
 - Using Firebase Authentication to verify users, and implement role-based access control (RBAC) via Firebase Storage and Firestore security rules to restrict file access based on ownership and sharing permissions.

```
import { getAuth, signInWithEmailAndPassword, onAuthStateChanged } from "firebase/auth";

const auth = getAuth();

const login = async (email, password) => {
  try {
    await signInWithEmailAndPassword(auth, email, password);
    console.log("User logged in successfully!");
  } catch (error) {
    console.error("Login failed:", error);
  }
};

// Monitor user state
onAuthStateChanged(auth, (user) => {
  if (user) {
    console.log("Logged in as:", user.email);
  } else {
    console.log("User is logged out.");
  }
});
```

```
rules_version = '2';

// Craft rules based on data in your Firestore database
// allow write: if firestore.get(
//   /databases/(default)/documents/users/${request.auth.uid}).data.isAdmin;
service firebase.storage {
  match /b/{bucket}/o {
    match /{allPaths=**} {
      allow read, write: if request.auth != null;
    }
  }
}
```

Estimated Cost for Storage

Google Cloud

Overview Solutions Products Pricing Resources [Contact Us](#)

🔍

Docs Support

🌐 English ▾

📄 Console

⌵

⋮

●

Total estimated cost

\$2.64 / mo

📄 Download .csv

📄 Duplicate estimate

Next steps

Request a custom quote

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Start your proof of concept

Sign up for Google Cloud, new customers get \$300 in free credits.

[Get started](#)

SERVERLESS

--

Cloud Run functions

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Service type Cloud Run functions

STORAGE

\$2.64

Cloud Storage

\$2.64

Service type Cloud Storage

Total amount of storage 100 GiB

\$2.64

Location type Region

N/A

Location Iowa (us-central1)

N/A

Storage class Standard Storage

N/A

Source region North America

N/A

Destination region North America

N/A

Total estimated cost

\$2.64 / mo

Remaining estimated cost

- Authentication: free for upto 50k users/month, then GCP pricing takes place accordingly.
- Hosting: free upto 10GB/month, then \$0.10/GB.
- Data Transfer: free upto 360MB/day, then \$0.15/GB.

Future Scope

This project utilizes core GCP services to create a scalable, secure file-sharing system.

Future enhancements could include:

- Notifications sent to the user upon access.
- Scale to multiple regions, if required.
- Support for additional file formats
- Hybrid deployment, if necessary.