



Precise Emailer

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Business Case

Many businesses struggle with efficiently managing email communication, especially when it involves scheduling future emails, handling attachments, and ensuring timely delivery. Existing email services often lack seamless integration with modern cloud platforms, making it challenging to automate workflows and manage large-scale email campaigns.





Challenges

01

Send thousands of emails daily, without worrying about server performance or limitations.

02

Reduces costs associated with maintaining dedicated servers. Lack of integration with cloud platforms like Google Cloud for scalability.

03

Manual processes for managing and sending emails, leading to errors and inefficiencies.



Requirements

Automating email scheduling: Users can schedule emails for future delivery, with Firestore managing the email data and Pub/Sub triggering timely email dispatch.

Handling attachments: Securely upload and store attachments in cloud storage, ensuring availability and reliability.

Integration with SendGrid: Leverage SendGrid for high deliverability rates and email tracking.

User authentication: Secure the application with OAuth2-based JWT authentication, ensuring only authorized access.





Cloud vs On-Prem

Effort	Cloud	On-Prem
Setup & Deployment	Fast deployment, minimal setup	Requires high effort on setup
Infrastructure Management	Minimal management	Require in-house management
Security & Compliance	Shared Responsibility	Full responsibility of user
Maintenance	Low	High
Scalability	Easily scalable	Scaling requires investment
Cost Management	Pay-as-you-go	High Initial Cost
Innovation & Upgrades	Access to latest tools and features	Require manual upgrades
Availability	High	Dependent on in-house resources

GCP VS AWS

Feature	Google Cloud Platform (GCP)	Amazon Web Services (AWS)
Event-Driven & Messaging	Pub/Sub Pricing: \$0.40 per million messages published and delivered.	SNS (Simple Notification Service) Pricing: \$0.50 per million publishes.
Storage & Database	Firestore Pricing: Free tier to start with, after that \$0.18 per GB stored per month, \$0.026 per 100K reads, writes, or deletes.	DynamoDB Pricing: \$1.25 per WCU (Write Capacity Unit), \$0.25 per RCU (Read Capacity Unit), \$0.25 per GB of storage.
Scheduling & Automation	Google Cloud Scheduler Pricing: 3 jobs per month free. After that \$0.10 per job per month and billed per day.	Amazon EventBridge Scheduler Pricing: Free tier includes 14 million invocations/month, after that \$1 per million invocations per month.
Authentication & Security	Google Identity Platform Pricing: Free tier includes up to 50K verifications/month. After that, \$0.005 per verification.	AWS IAM (Identity and Access Management) Pricing: Free for managing users and groups; costs apply to features like AWS Multi-Factor Authentication (MFA) at \$1 per month per user.
Email Processing	SendGrid API Pricing: Free tier includes 100 emails/day. Paid plans start at \$15/month for up to 50,000 emails	Amazon SES (Simple Email Service) Pricing: \$0.10 per 1,000 emails sent; free for up to 62,000 emails/month if sent from an EC2 instance.



Load Assumptions

- **Requests Per Year:**
 - 100,000 requests per year.
- **Data per Request:**
 - 5 KB per request
 - Results in 500 MB of data processed per year (100,000 requests \times 5 KB per request).



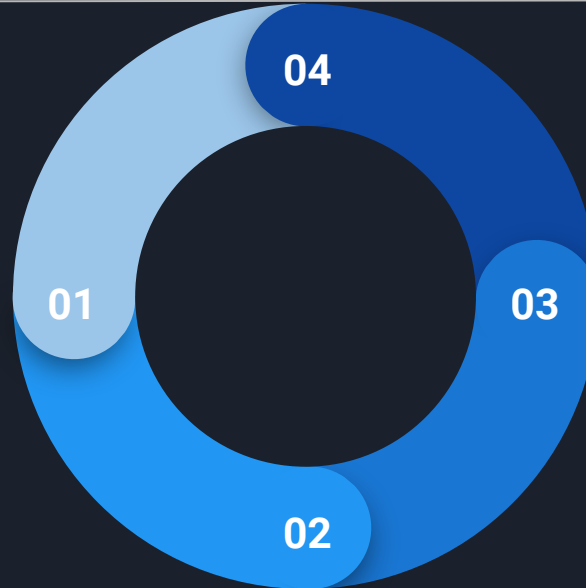
Solution Cycle

Storage

Store data in Firestore

Scheduling

Set specific dates and times for email delivery

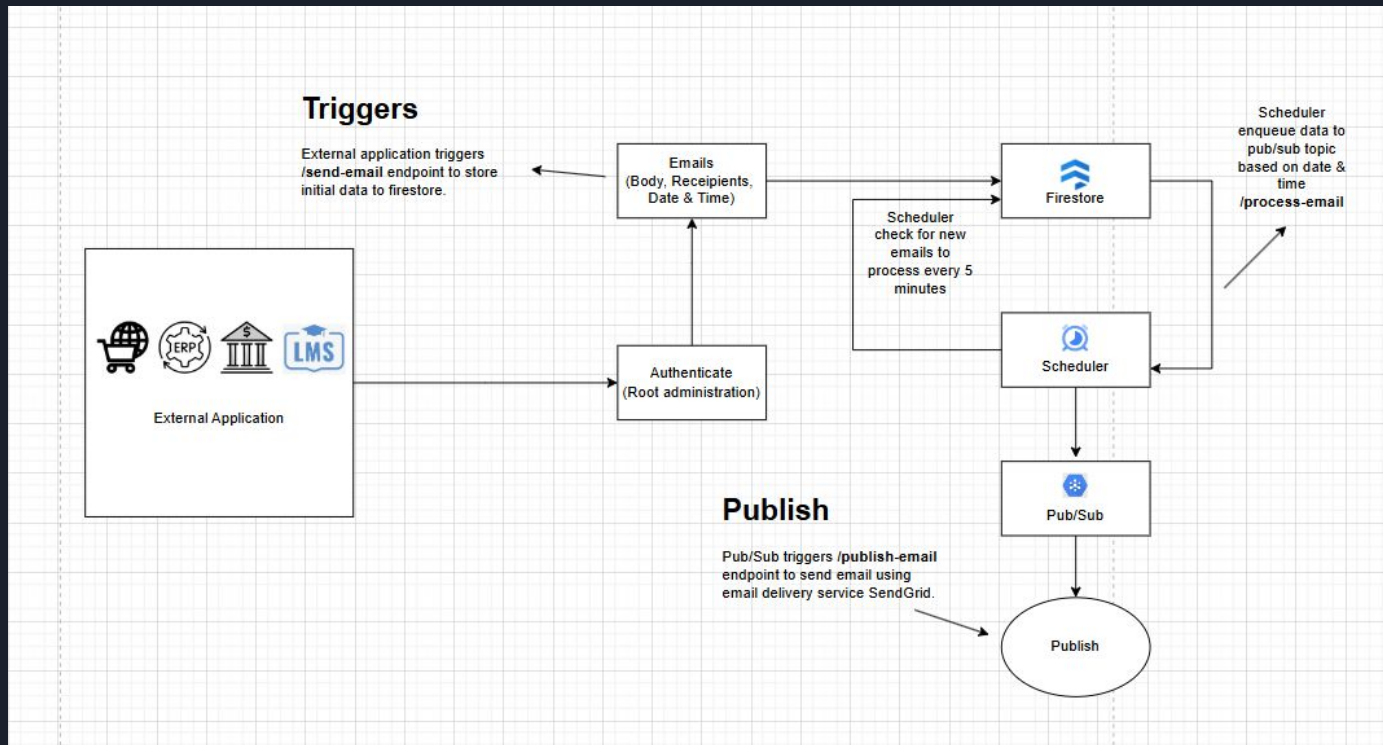


Delivery and Status

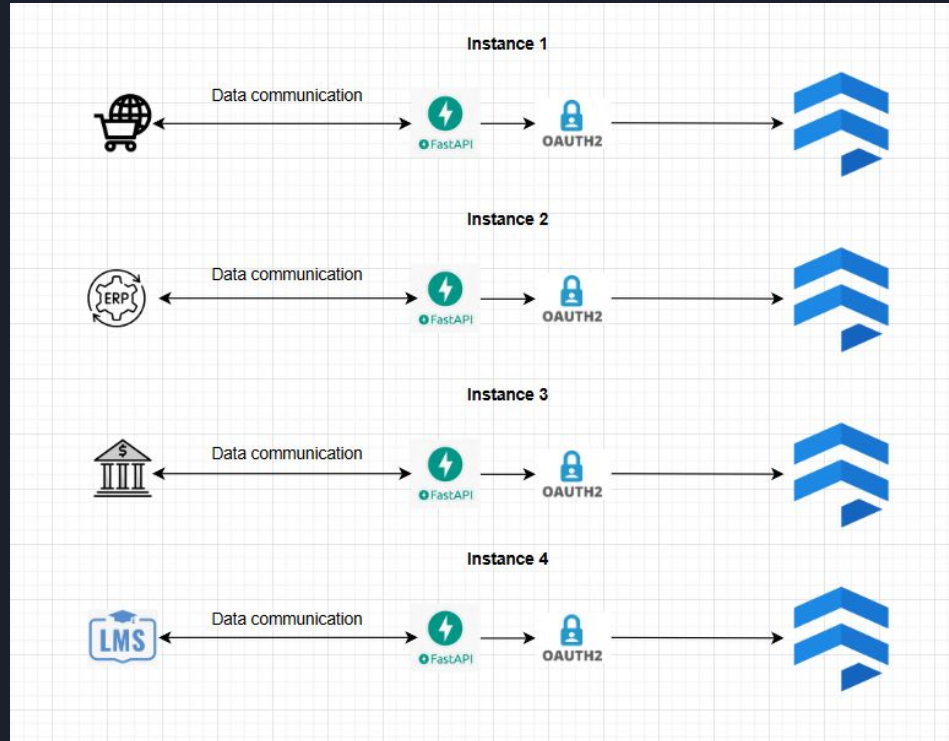
SendGrid for reliable email dispatch and tracking

Pub/Sub

For scalable message handling



Data Collection



Service Account

Cloud Technology

IAM

ALLOW

DE

Permissions

These permissions

VIEW BY PRIN

GRANT ACCE

Filter

Type

Edit access to "Cloud Technology"

Principal ?

cpsc5207@cloud-technology-436021.iam.gserviceaccount.com

Project

Cloud Technology

Assign roles

Roles are composed of sets of permissions and determine what the principal can do with this resource. [Learn more](#)

Role

Owner

Full access to most Google Cloud resources. See the list of included permissions.

IAM condition (optional) ?

+ ADD IAM CONDITION

+ ADD ANOTHER ROLE

SAVE

TEST CHANGES ?

CANCEL

LEARN

Tutorial

Recommended for you

IAM overview

Help document

Basic IAM concepts and access management in Google Cloud

Grant an IAM role using the Google Cloud console

Help document

Use the Google Cloud console IAM roles to principals at the level.

Choose predefined roles

Help document

Choose which predefined roles to users.

Basic and predefined roles reference

Help document

IAM roles that you can grant to

Data Structure

1L82PN42tLRjmsBaQ95y



+ START COLLECTION

+ ADD FIELD

attachment_url: null

body: "I am test body"


email: "sakib@mailinator.com"


schedule_time: September 24, 2024 at 9:00:00.000 AM UTC-4



status: "pending"


Debugging - Swagger UI


FastAPI 0.1.0 OAS3
/openapi.json



Authorize 



default 


GET / Root  

POST /token Login For Access Token 

POST /send-email/ Send Email 

GET /process-scheduled-emails/ Process Scheduled Emails  

POST /pubsub-handler/ Pubsub Handler  

Schemas 

How to setup Cloud Pub/Sub

- Go to Cloud Pub/Sub dashboard (As you already enabled the service)
- Create a topic.
- Create subscription.
- Select subscription type - push
- Set endpoint url - `https://your-domain/pubsub-handler`
- Set acknowledgement deadline to 10 seconds (If the response status code is not 200 ok, the pubsub will retry)

Google Cloud Cloud Technology Search (/) for resources, docs, products, and more Search

Pub/Sub Create subscription

A subscription directs messages on a topic to subscribers. Messages can be pushed to subscribers immediately, or subscribers can pull messages as needed.

Subscription ID *
email-handler-subscription

Subscription name: projects/cloud-technology-436021/subscriptions/email-handler-subscription

Select a Cloud Pub/Sub topic *
projects/cloud-technology-436021/topics/email-queue

Delivery type

☐ Pull

☒ Push

☐ Write to BigQuery
A variant of the push operation. Select this option if you want Pub/Sub to deliver messages directly to an existing BigQuery table. [Learn more](#)

☐ Write to Cloud Storage
A variant of the push operation. Select this option if you want Pub/Sub to deliver messages directly to an existing Cloud Storage bucket. [Learn more](#)

Endpoint URL *
http://my-precise-emailer/pubsub-handler/

☐ Enable authentication [Learn more](#)

☐ Enable payload unwrapping
Remove all metadata from messages. Only delivers the raw, decoded message data.

duration specified above. This increases message storage fees. [Learn more](#)

Expiration period

☒ Expire after this many days of inactivity (up to 365)
A subscription is inactive if there is no subscriber activity such as open connections, active pulls, or successful pushes.

31 Days

☐ Never expire
The subscription will never expire no matter the activity.

Acknowledgement deadline

10 Seconds

Deadline time is from 10 seconds to 600 seconds. When using the high-level client libraries, the lease management configuration is used in place of this acknowledgement deadline. [Learn more](#)

Subscription filter

If a filter syntax is provided, subscribers will only receive messages that match the filter. [Learn more](#)

Example: attributes.k OR (attributes.k1 = "v" AND NOT hasPayload(attributes.k2, "v"))

SendGrid

- Login to SendGrid
- Generate API key through Full Access
- Add the saved API key to projects .env file
- Go to settings, Sender Verification.
- Add Sender to details to verify your sender email.
- Add the verified email to projects .env file (Which will be used as from Email to deliver the emails)
- Manually trigger the pubsub handler endpoint from swagger ui to test the emails are delivering or not.

Before sending your first email, you'll need to create a sender identity.

takhi4@gmail.co

Dashboard

Email API

Marketing

Design Library

Stats

Activity

Suppressions

Settings

Account Details

Create API Key

API Key Name •
Precise Emailer

API Key Permissions* ①

Full Access
Allows the API key to access GET, PATCH, PUT, DELETE, and POST endpoints for all parts of your account, excluding billing and Email Address Validation.

Restricted Access
Customize levels of access for all parts of your account, excluding billing and Email Address Validation.

Billing Access
Allows the API key to access billing endpoints for the account. (This is especially useful for Enterprise or Partner customers looking for more advanced account management.)

Cancel Create & View

Sender Authentication /
Single Sender Verification ①

Create a Sender

You are required to include your contact information, including a physical mailing address, inside every promotional email you send in order to comply with the anti-spam laws such as CAN-SPAM and CASL. You'll find replacement tags for this information in the footer of all the email designs SendGrid provides. [Learn more](#)

From Name •
Nazmus Sakib

From Email Address •
takhi44@gmail.com

Reply To •
takhi44@gmail.com

Company Address •
takhi44@gmail.com

Company Address Line 2

City •
Dhaka

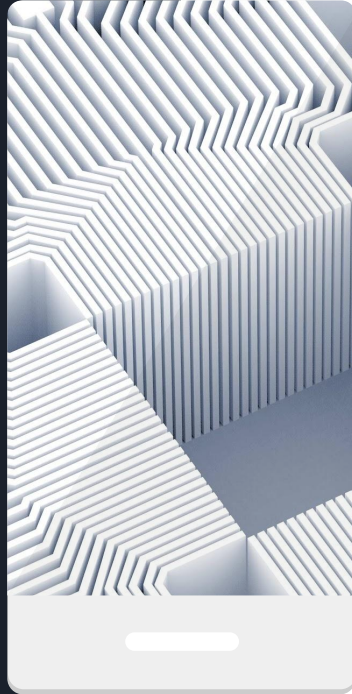
Attempting to send from a free email address domain like gmail.com is not recommended. [Learn more](#)

Verify a Create

Future Improvements

Advanced Email Analytics

analytics to track email performance, such as open rates, click-through rates, and delivery status.



Enhanced Scheduling Features

Allow users to set recurring schedules (e.g., daily, weekly emails) or send emails at specific time zones

References

<https://www.hpe.com/ca/en/what-is/on-premises-vs-cloud.html>

<http://aws.amazon.com/lambda/pricing/>

<http://cloud.google.com/functions/pricing>

<http://aws.amazon.com/sns/pricing/>

<http://cloud.google.com/pubsub/pricing>

<http://aws.amazon.com/dynamodb/pricing/>

<http://cloud.google.com/firestore/pricing>

<http://aws.amazon.com/eventbridge/pricing/>

<http://cloud.google.com/scheduler/pricing>

<http://aws.amazon.com/iam/pricing/>

<http://cloud.google.com/identity-platform/pricing>

<http://aws.amazon.com/ses/pricing/>

<http://sendgrid.com/pricing/>

Thank You

