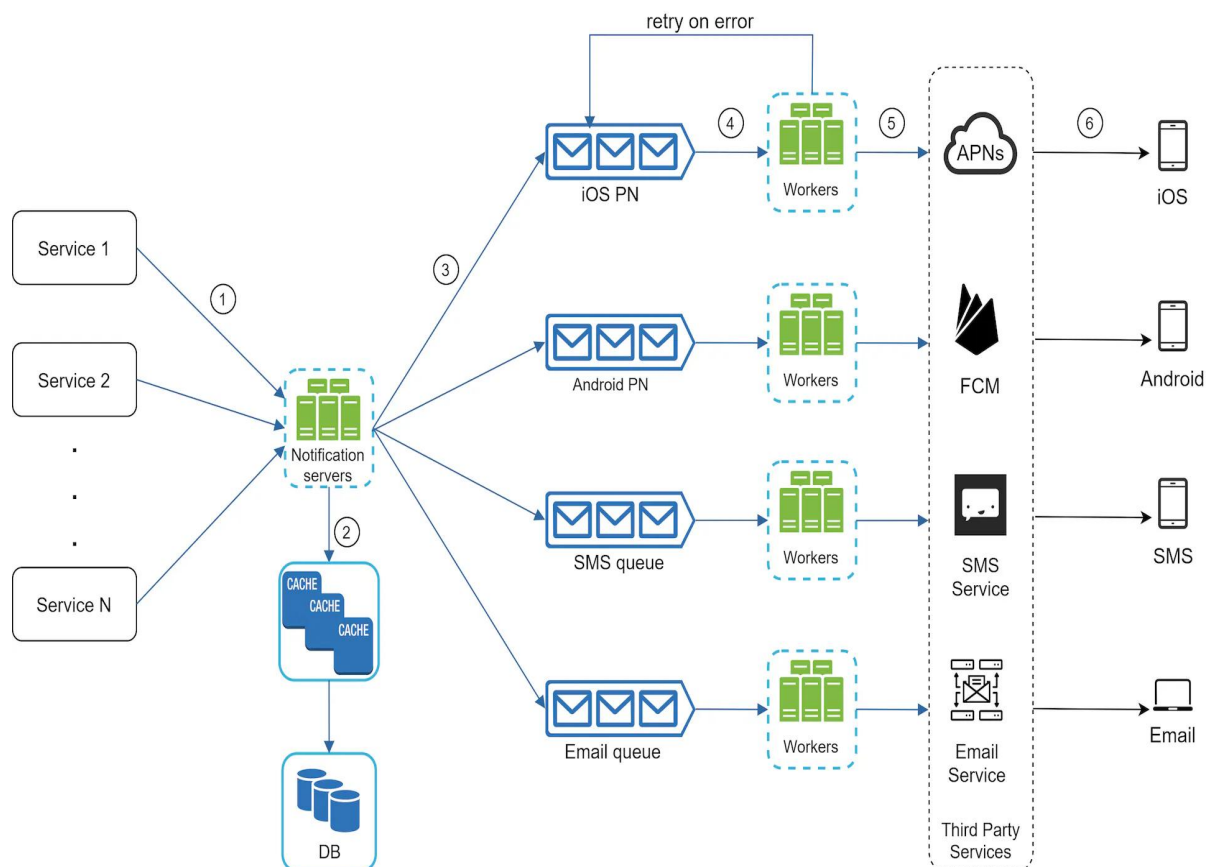# 25. Notification System

Requirements clarification

Functional requirements

- System can send push notifications, SMS messages and emails.

- Notifications can be triggered by server-side and client-side.

Non-functional requirements

High-level design

Service 1 to N

- Different services that send notifications via APIs provided by notification servers.

Notification servers

- Provides APIs for services to send notifications.

- Queries the database or cache to fetch data needed to render a notification.

- Carries out basic validations to verify emails, phone numbers.

- Puts notification data to message queues for parallel processing.

Cache

- Caches user info, device info, notification templates.

DB

- Stores user info, device info, notification templates.

Message queues

- Buffers notifications need to be sent out for different types.

Workers

- A list of servers that pull notification events from message queues and send them to the corresponding third-party services.

Third-party services

- APNs (Apple Push Notification Service)

  - For iOS push notifications.

- FCM (Firebase Cloud Messaging)

  - For Android push notifications.

  - Examples for China: Jpush, PushY.

- SMS Service

  - Examples: Twilio, Nexmo, AWS SNS.

- Email Service

  - Examples: Sendgrid, Mailchimp, AWS SES.

Detailed Design

Updated design for considering other factors