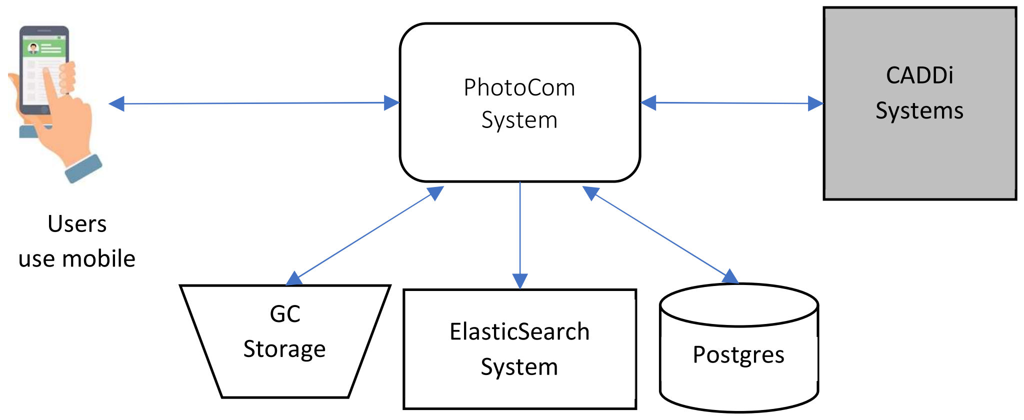
CADDi

Technical Architecture Work Sample – BY anphamvan@gmail.com

1 Brief project

- Customer: large manufacturing companies, there is about 500+ employees each company (total: n x 500)
- Main use case: Communication between mechanical engineers, procurement, and factory
- Vague requirements:
    - File storage and sharing, where the files are primarily PNG and JPEG photos
    - Be able to annotate the photos with circles and start a message thread
    - Allow multiple individuals to respond in the message thread
- Non-functions:
    - There is quite a bit of time pressure to show that this software is viable and delivers value to users
    - You are the first engineer assigned to this project, and no code has been written yet. Your design
      document will drive the resourcing strategy, including engineer reassignments and new hiring.

2 Solution draft and Development plan options: PhotoCom system



2.1 Functions: (minimum)

- ✓ Register/Login
- ✓ Upload photo
- ✓ Annotate photo (oval + comment)
- ✓ Thread circle (post, view, response)
- ✓ Display photo + annotation overlay

2.2 Plan options:

2.2.1 PhotoCom System:

- ✓ Frontend (Web app Mobile/Mobile): Upload photo, annotate (oval + comment), view + response thread, search. Responsive web app or mobile app is preferred because of using a mobile phone when factory worker notices a scratch on a part suddenly.
- ✓ Backend Service (Spring Boot hoặc Node.js):
  - Authentication + Authorization (OAuth2, JWT or CADDi user API?): a user only response another user's threads that the both are belong to the same company.
  - Photo functions: upload, dowload
  - Annotation functions: save, load and overlay with photo
  - Thread functions: list thread, view thread, response thread
- ✓ Storage:
  - Image files: GC storage
  - Metadata & Annotation: PostgreSQL
  - Search (text): ElasticSearch
- ✓ CI/CD + DevOps:
  - Dockerized services, deploy bằng Kubernetes
  - Support operation (Logging)
  - Monitoring (optional): Prometheus + Grafana

2.2.2 Plan for PhotoCom System

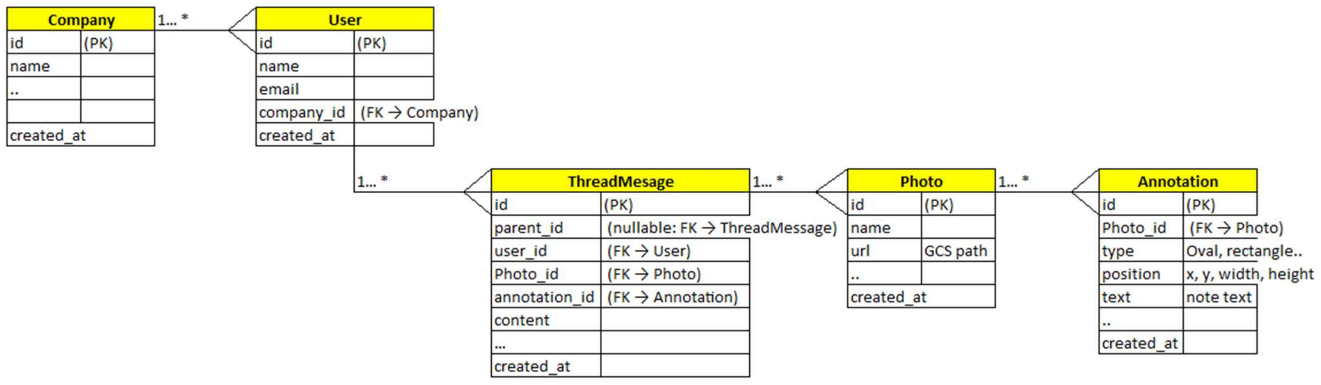
No.	Item	Plan 1 - Backend Monolith (Thread service only: contains all functions)	Plan 2- Backend Microservices (Auth service, Photo service, Thread service, ..)
1	Developer	1–2 person	3–5 person
	Tester	1 person	1-2 person
2	PoC	01 month	02 month
3	Scale	Module scale	Service scale
4	Total Project cost	Low	High

* Suggestion plan:

- If number of users <= 10 x 500 or low traffic: Backend Monolith + Frontend Web
  => then convert to Backend Microservices if number of users become large enough or high enough traffic (annual growth prediction)
- Otherwise: number of users > 10 x 500 or high traffic: Backend Microservices + Frontend Web

3 Design system

3.1 Database entity relationship



- User information: User, Company table contain this information or provided by CADDi user API (keycloak?)?
- Thread information:
    - Thread: start by root (parent_id = null), then following messages that connected by parent_id (if any limit only connects to the root message so maximum thread depth size is only 2)
    - Thread Message: its description is built up its own content + photo + annotations

3.2 Services Integration

- API flows: call API login first to get user information => check authorization that based on the user information when calling to any other APIs
- Security: Frontend + Backend should be configured to prevent CORS security issue.
- Backend is integrated with APM + ELK: to support Devops to operate and to supply API performance measurements such as response time to monitor operation latter.
- If Search text function is preferred: should be isolated to APIs, so implemented independently such as feed newly created thread message by a background job (that use time slice window technique to feed to ElasticSearch,)
- Deploy the system on CADDi infrastructure so use existing feature for security such DDOS, Load Balancing, ..