

SeedConnect

by

Team Builder Dawgs



Kelly He
ML Engineer
[linkedin](#)



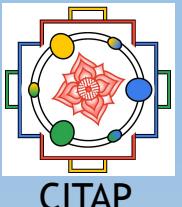
Pei-Hsin Wang
PM
[linkedin](#)



Rish Godara
BI Engineer
[linkedin](#)

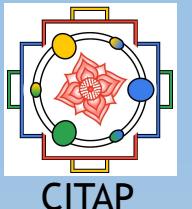
University of Washington - Foster School of Business

Student IT Architecture Competition - 2024

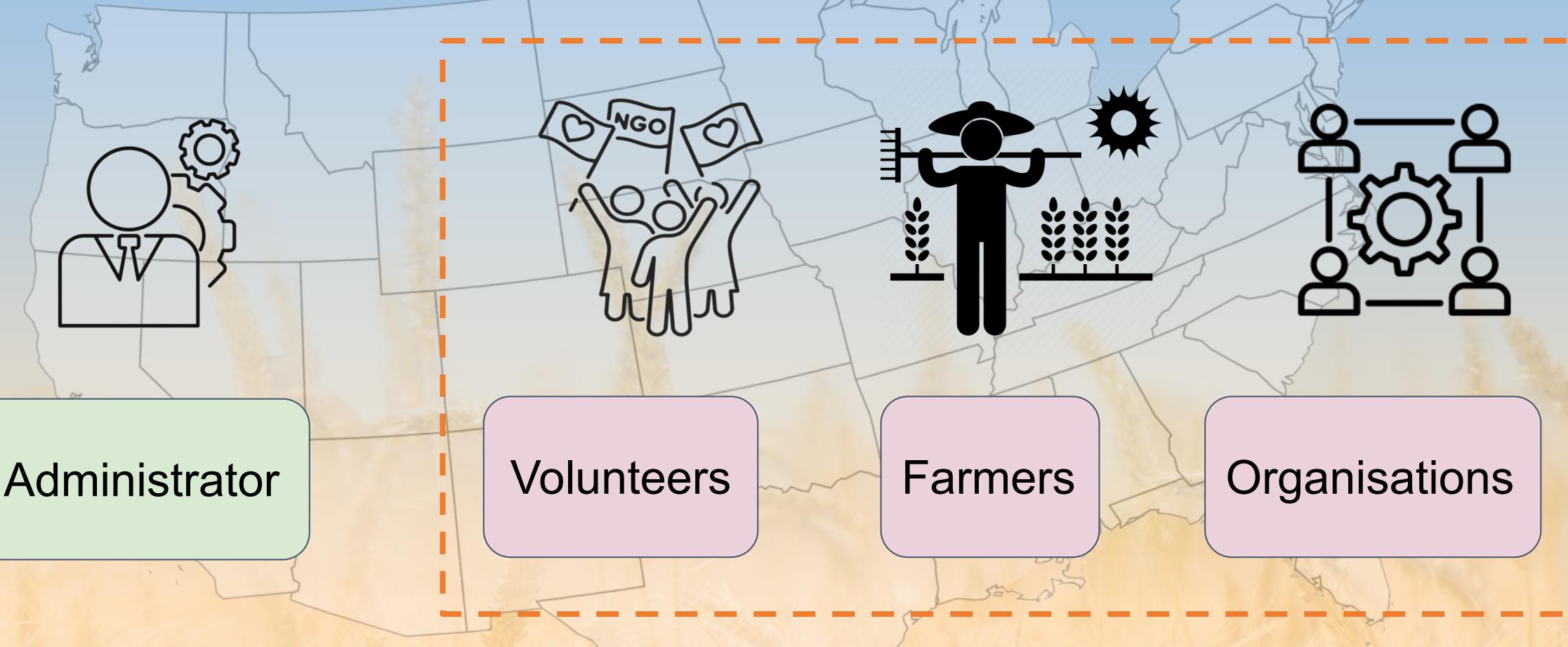


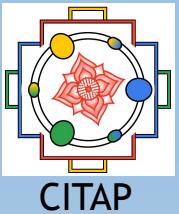
Introduction to FARM

- ❖ Volunteer-driven non-profit
- ❖ Operating in over 30 states in US
- ❖ Promote sustainable agriculture
 - Seed Donation
- ❖ Strong farmer communities
 - Events & Workshops



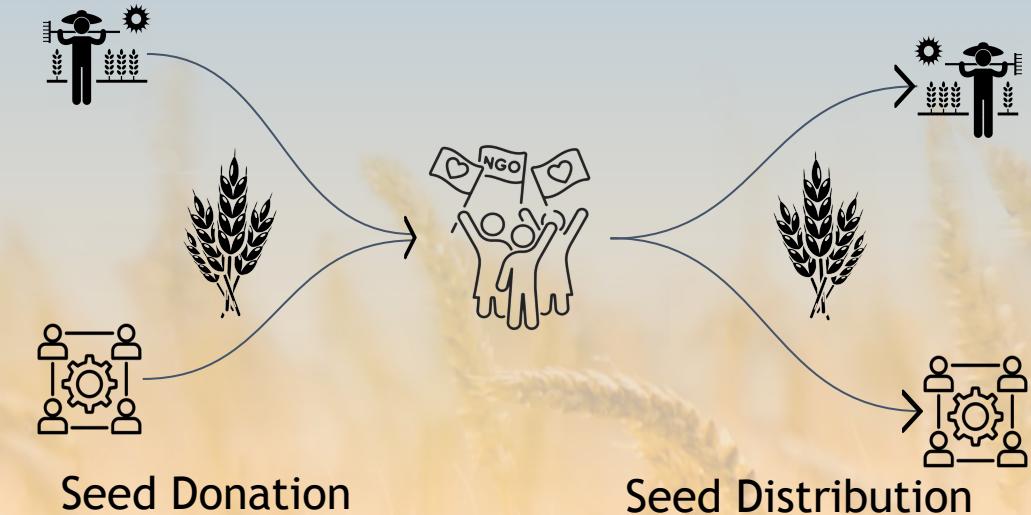
FARM Users

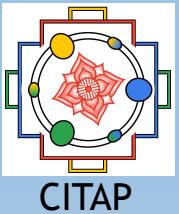




Problem: Process Gaps & Operational Inefficiencies

- ❖ Current process is manual
- ❖ Fragmented data management
 - excel sheets & word docs
- ❖ Lack of data & tracking
 - Current & Past Users
 - Seed sources
 - Demand patterns
 - Event Communication
- ❖ Uncertainty in Compliance





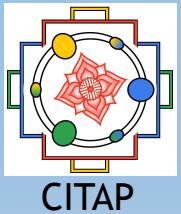
Solution: Digital Transformation

Problems

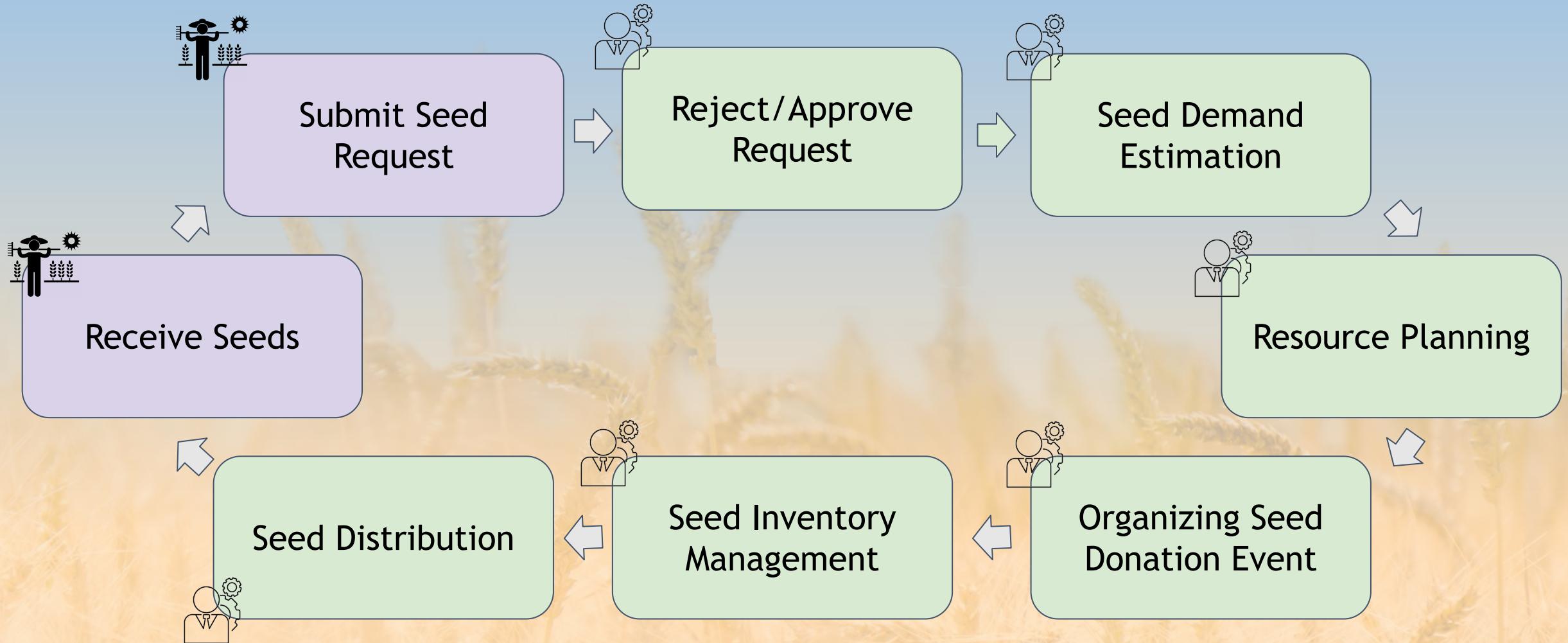
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Solutions

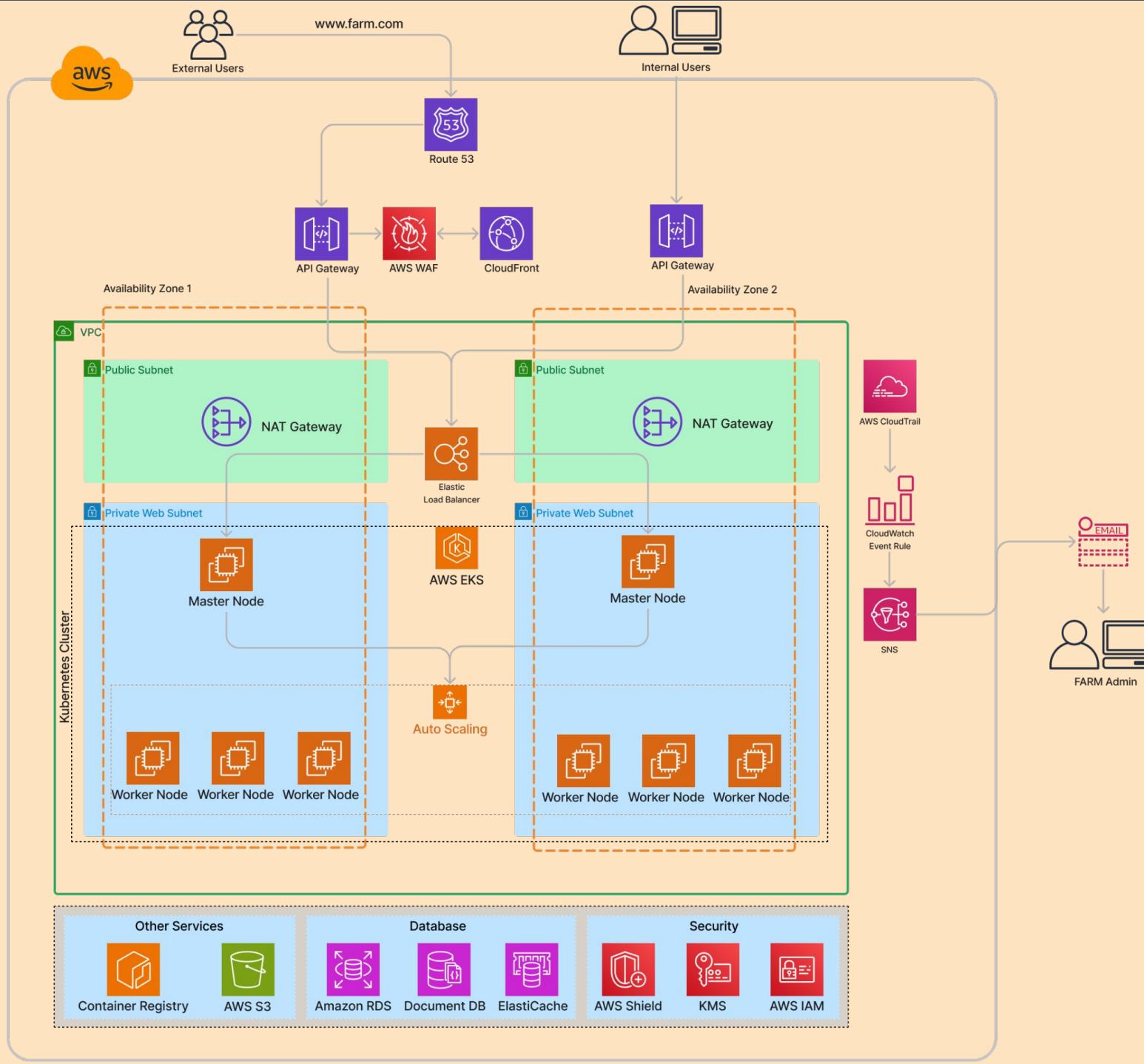
- ❖ Relational Database to store all data
- ❖ Modules for each Business Process
 - User Management
 - Event Management
 - Seed Lifecycle Management
 - Analytics & Forecasting
 - LLM Chatbot
- ❖ Satellite Images of Farms

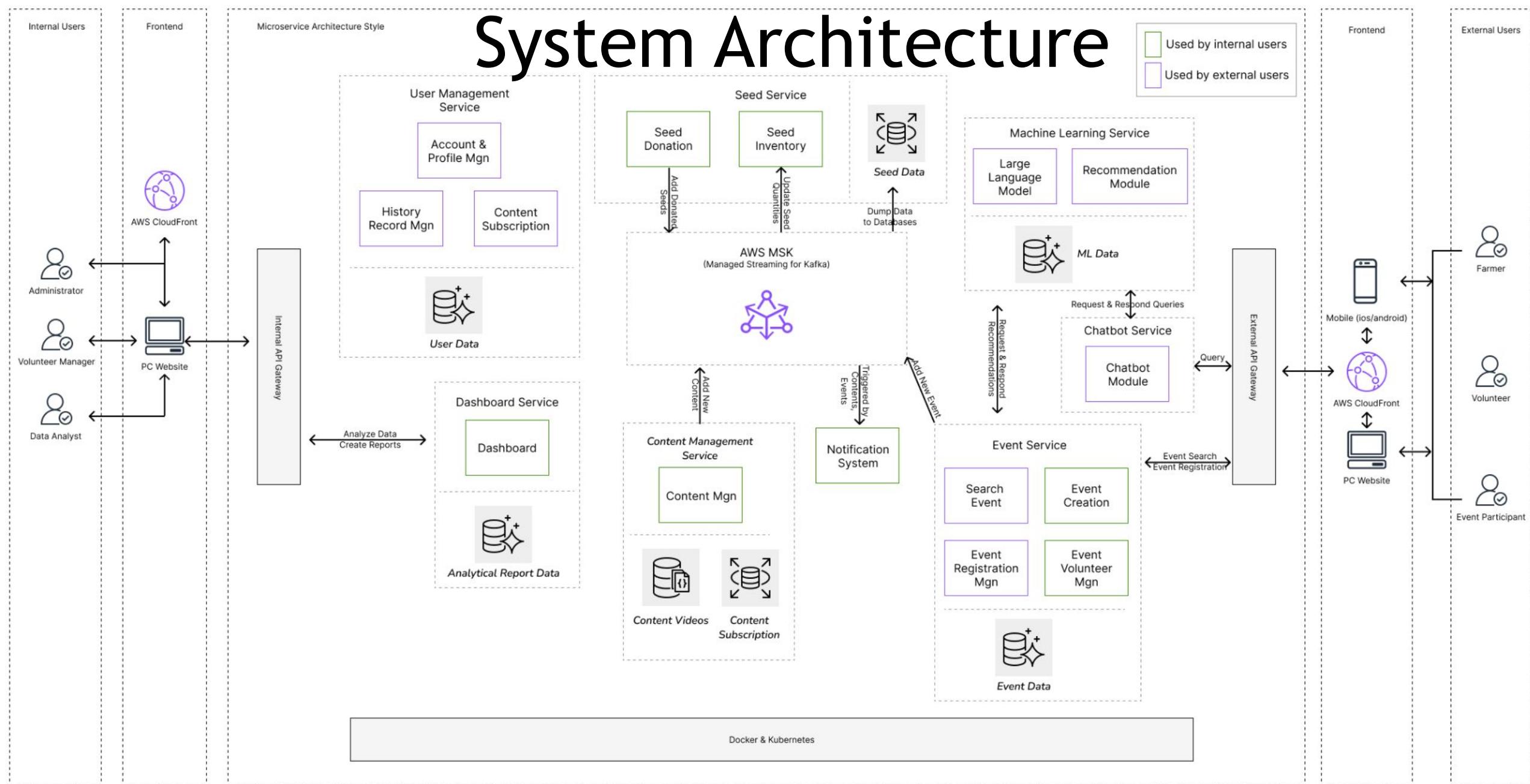


Seed Lifecycle Management



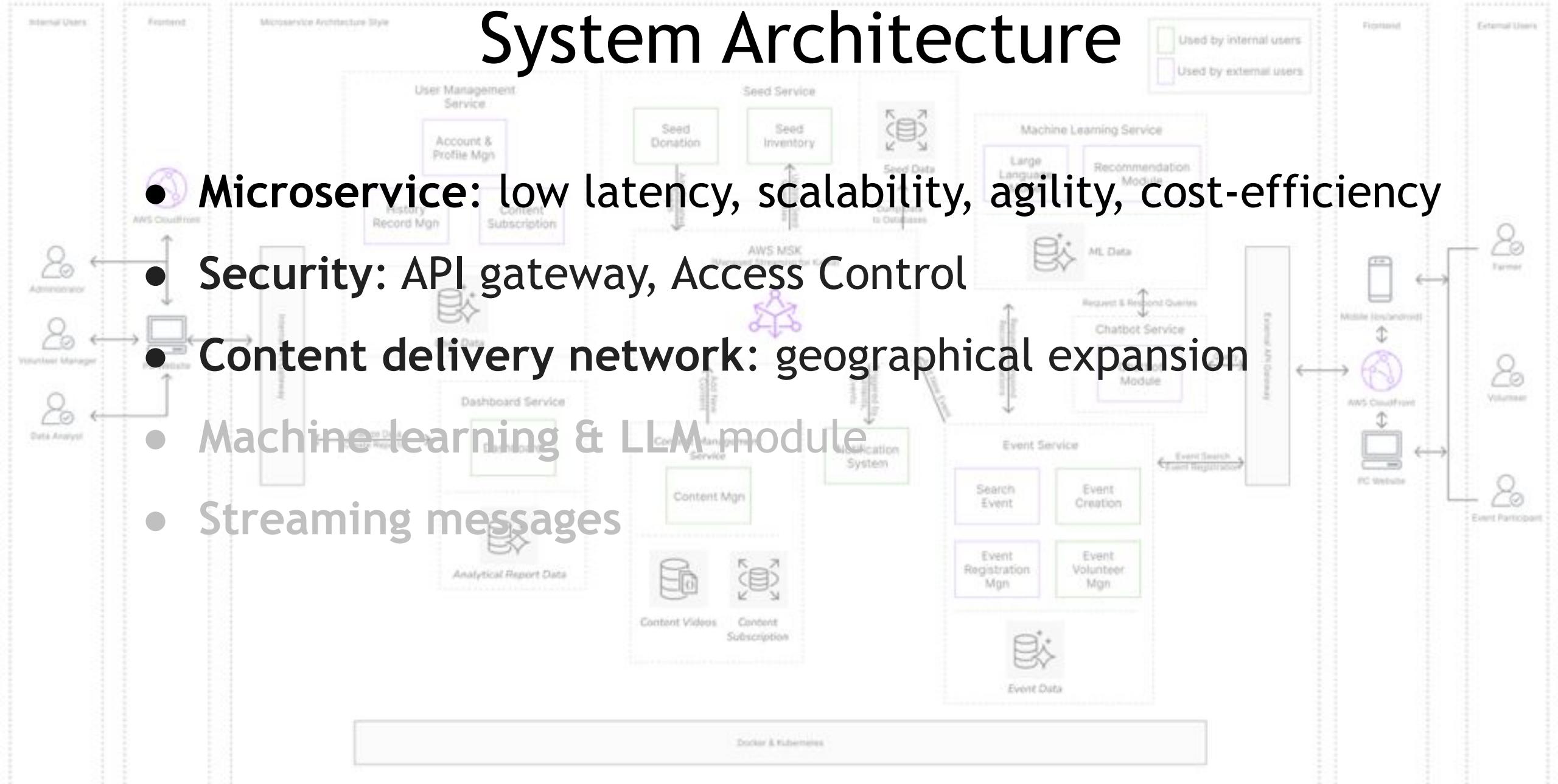
AWS Cloud Architecture



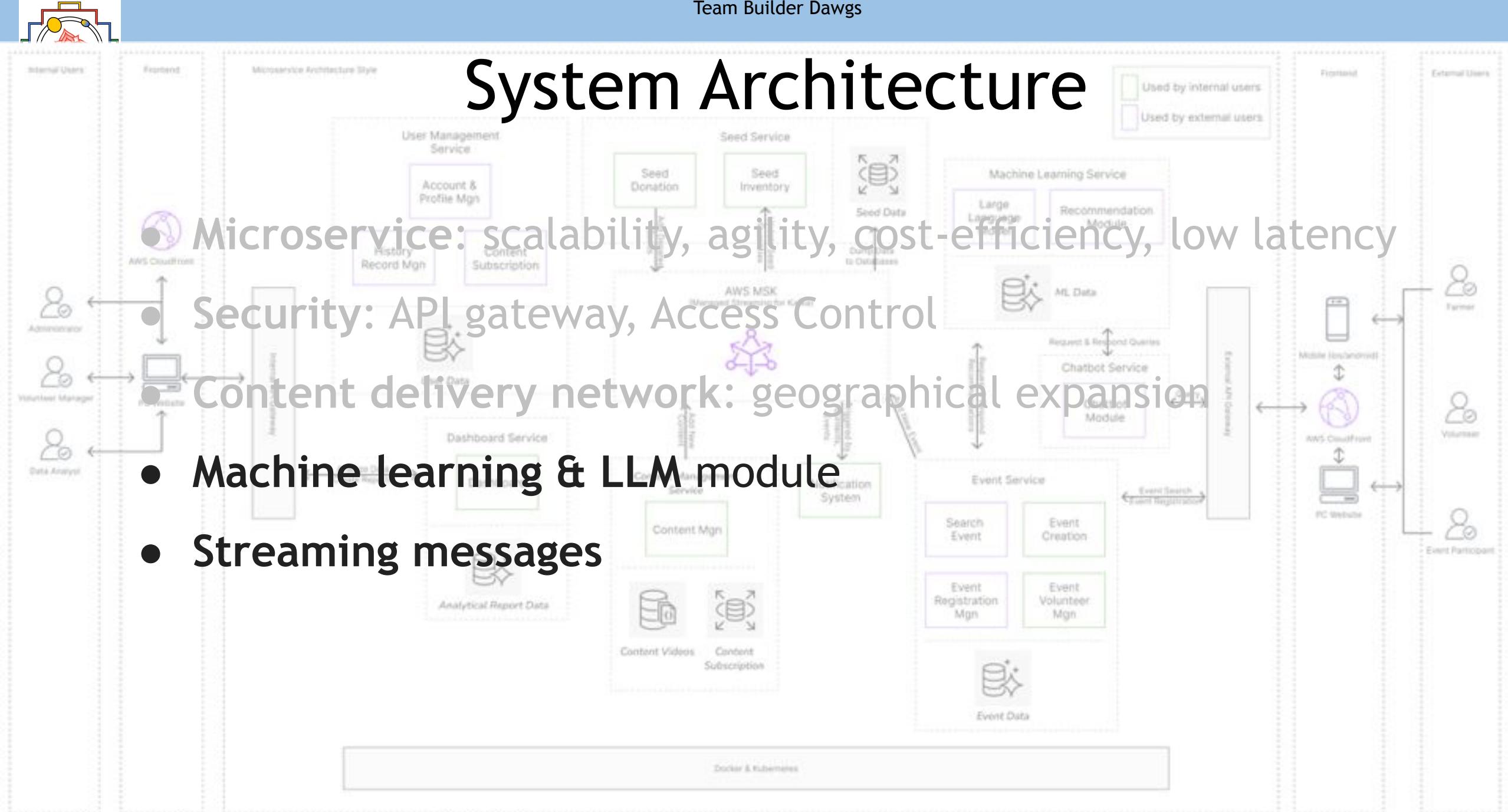


System Architecture

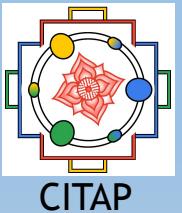
- **Microservice:** low latency, scalability, agility, cost-efficiency
- **Security:** API gateway, Access Control
- **Content delivery network:** geographical expansion
- **Machine learning & LLM module**
- **Streaming messages**



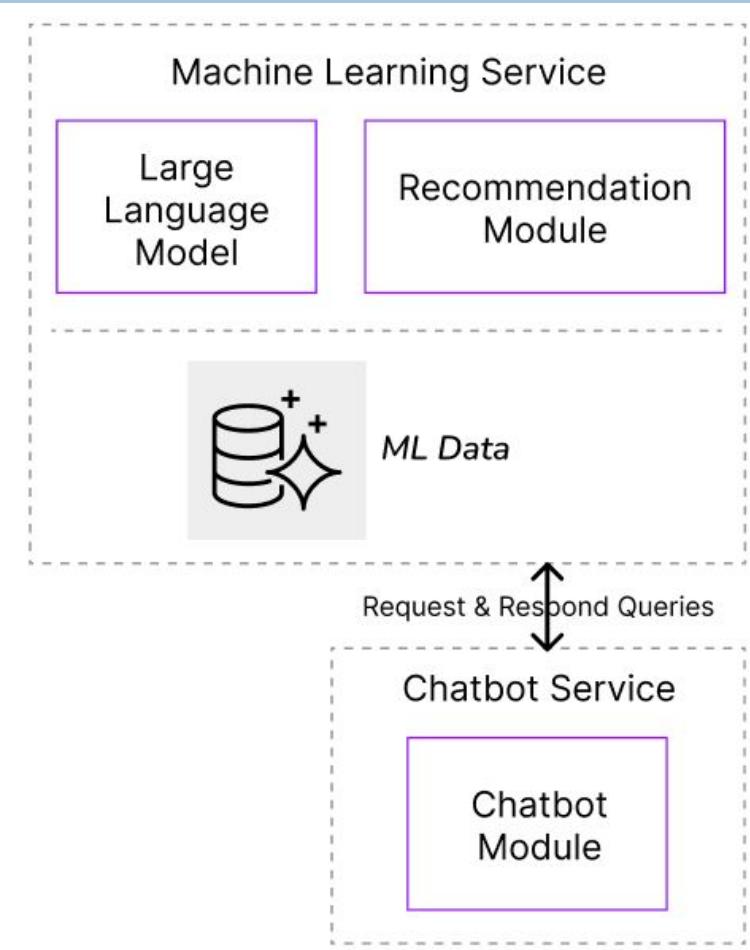
System Architecture



- Microservice: scalability, agility, cost-efficiency, low latency
- Security: API gateway, Access Control
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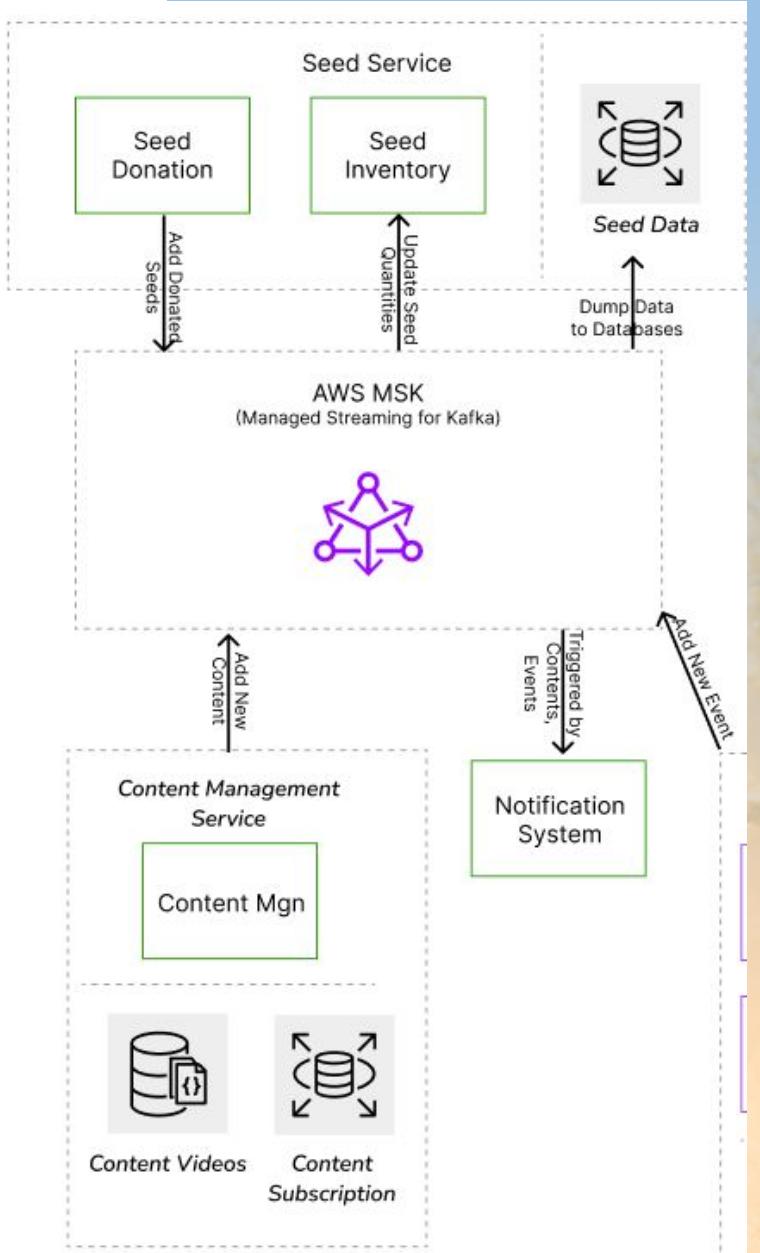
Technology Choices

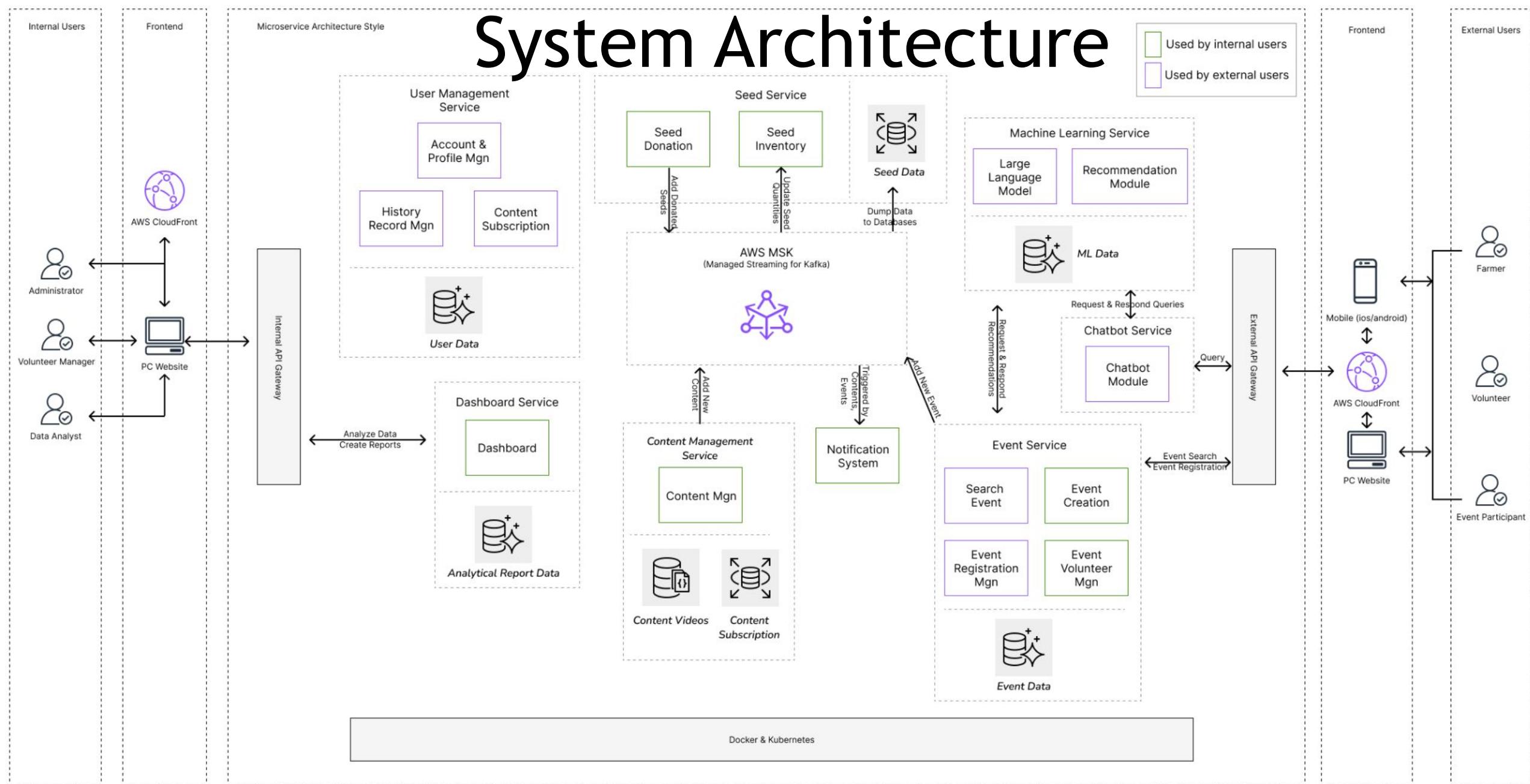


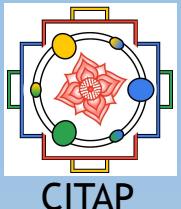
- Machine learning models
 - Deforested area prediction
 - Seed demand forecasting
 - Event recommendations
 - Expansion recommendations
- Large Language Models
 - Chatbot
 - Intelligent analytical dashboard support

Technology Choices

- Streaming messages
 - Seed donation
 - Reduce the cost of storage
 - Fill the gap between donated seeds & requested seeds
 - Event management
 - Real-time update for events

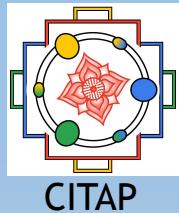






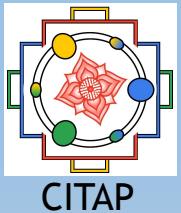
Execution - 10 Months Project

ID	Task Name	Start	Finish	Duration	2024								2025	
					May	Jun	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb
1	Phase 1 - Basic User Management Service (E1, E2, E4)	5/1/2024	5/31/2024	20d										
2	Phase 1 - Basic Event Management Service (E6, E7, E8)	6/1/2024	7/5/2024	25d										
3	Phase 1 - Basic Seed Management Service (E14, 15)	7/8/2024	7/26/2024	15d										
4	Phase 1 - Deployment Test + Release	7/29/2024	8/5/2024	6d										
5	Phase 2 - Enhance On-site Event Management (E5, E10) + Release	8/5/2024	8/19/2024	10d										
6	Phase 3 - Enhance On-site Event Management (E14) + Release	8/19/2024	9/2/2024	10d										
7	Phase 4 - Core Functionality Enhancement based on Feedback + Release	9/2/2024	9/16/2024	10d										
8	Phase 5 - Enhance Engagement Features (E3, E9) + Release	9/16/2024	10/7/2024	15d										
9	Phase 6 - Analytics Service - Seed (E12) + Release	10/7/2024	11/25/2024	35d										
10	Phase 7 - Analytics Service - Event (E11) + Release	11/25/2024	1/13/2025	25d										
11	Phase 8 - Chatbot (E16) + Release	1/13/2025	1/27/2025	10d										
12	Phase 9 - Analytics Chatbot (E13) + Release	1/27/2025	2/17/2025	15d										



Agile-Waterfall Hybrid Development Cycle

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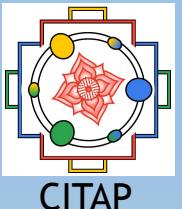
Resource Required

Development Team:

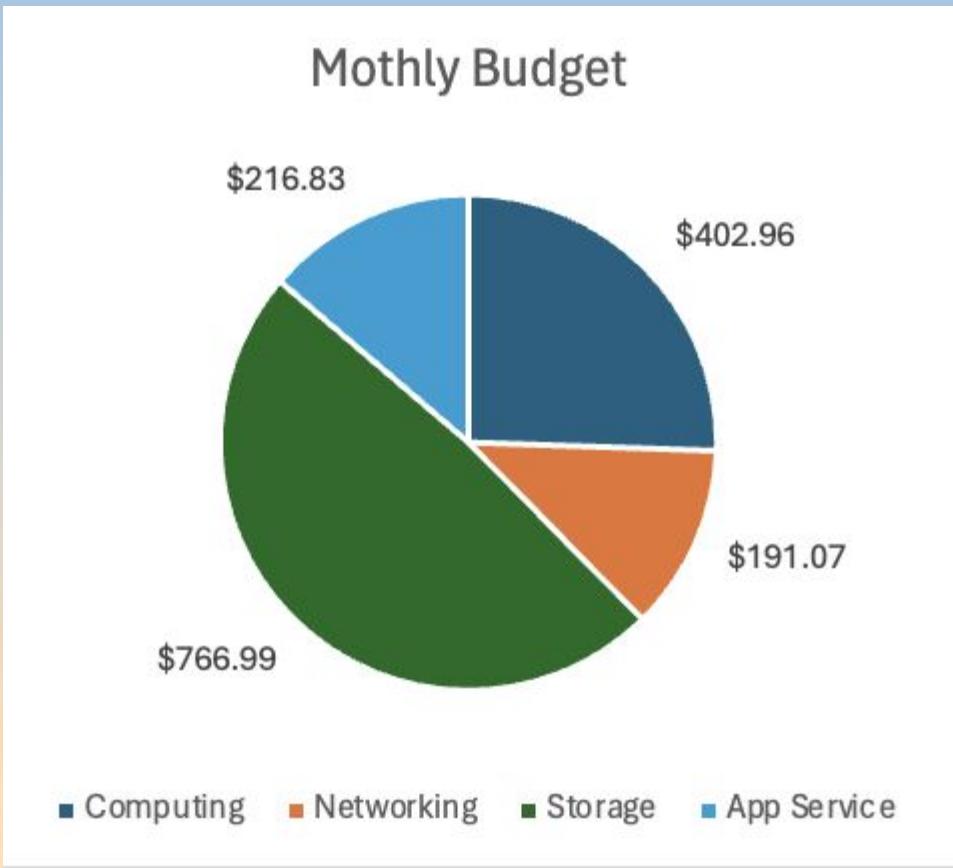
1. Project Manager: 98 working days
2. UI/UX Designer: 40 working days
3. Front-end Engineers: 230 working days
4. Back-end Engineers: 300 working days
5. IOS & Android Engineers: 200 working days

Usage and Data Size:

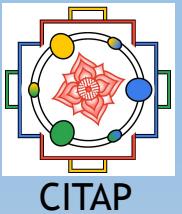
- 5,000 volunteers, 25,000 farmers
- text storage: user profile and events descriptions (300 GB)
- image storage: 30,000 satellite images (1 TB)



Estimate Cost



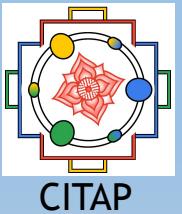
Computing	\$ 402.96
Amazon EC2	\$ 183.96
Amazon EKS	\$ 219.00
Amazon ElastiCache	\$ 273.75
Networking	\$ 191.07
Amazon API Gateway	\$ 5.00
AWS Web Application Firewall (WAF)	\$ 135.00
Application Load Balancer	\$ 51.07
Storage	\$ 766.99
Amazon RDS for PostgreSQL	\$ 257.72
S3 Standard	\$ 235.52
App Service	\$ 216.83
Amazon Managed Streaming for Apache Kafka (MSK)	\$ 216.44
SNS	\$ 0.39
Total	\$ 1,577.85



Next Steps

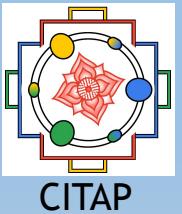
Maintenance and Operation

- Scaling up and geolocational expansion
- Collect user feedback and requirement for future enhancement



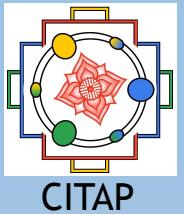
Lessons learned

- Offline capability
- Balancing scope and design depth
 - **Initial approach:** a wide range of features and functionalities, aiming to address multiple aspects of the organization's needs simultaneously
 - **Alternative approach:** focusing on a smaller set of core functionalities



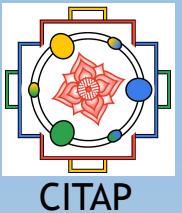
Acknowledgements

Special thanks to the SITAC committee, [Jennie Wang](#), [Janet Phan](#), and [Mike Diaz](#).



Appendix

1. [Seed Lifecycle Management UI - part 1](#)
2. [Seed Lifecycle Management UI - part 2](#)
3. [Phase 1 Epics](#)
4. [System Architecture](#)



Seed Lifecycle Management UI

1. Seed Request Result

Logo Data Event Knowledge Seed

Search ⋮ 🔔 🚙

Seed > Seed Request Result

Seed Request Result

From 01/01/2024

To 01/31/2024

All (3200) Accept (3184) Reject (16)

Farmer	Seed Request	Request Date	Status
John Miller	Coreopsis tinctoria * 300	01/24/2024	Accepted
Farmer Husky	Persicaria tinctoria * 100 Tagetes erecta * 200	01/24/2024	Rejected
Farmer Husky	Persicaria tinctoria * 200	01/27/2024	Pending

John Miller Accepted

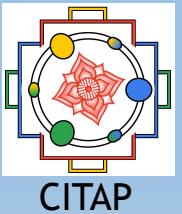
Address 4277 NE Stevens Way, Seattle, WA 98195

Phone +1(206)616-6632

System Decision Not deforest area. The farmer has been cultivating these lands for over 5 years. Accept the seed request.

Satellite Image 

4277 NE Stevens Way, Seattle, WA 98195



Seed Lifecycle Management UI

2. Donation Record

Logo Data Event Knowledge Seed

Search: tin

Seed > Seed Donation

Seed Donation

Search Result

Seed Image	Seed Name	Collected / Required	Donation
	Coreopsis tinctoria	1200 / 2000	+
	Persicaria tinctoria	800 / 2000	+

Donation Record

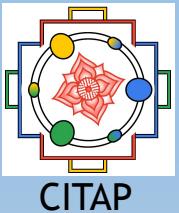
Seed Image	Seed Name	Collected / Required	Donated
	Coreopsis tinctoria	1200 / 2000	100

Save



Personal Info Donation History Seed Request

Name: John Miller
Roles: Farmer, Volunteer
Address: 4277 NE Stevens Way, Seattle, WA 98195
Phone: +1(206)616-6632



Epics for Phase 1

User Management Portal

Epic 1: Allow users to manage their accounts to manage personal basic information and account credentials.

Epic 2: Allow users to manage profiles and preferences under their accounts to receive personal recommendations and notifications.

Epic 4: Enhance User Access Management by enabling Roles-based access.

Event Management

Epic 6: Allow users to search and register for an event easily.

Epic 7: Allow event organizers to manage events online and simplify the event management process.

Epic 8: Allow event organizers to manage volunteers for event organization that aims to reduce people management efforts.

Seed Donation Event Management

Epic 14: Allow Volunteers to manage the seed donation event on-site.

Epic 15: Allow administrators to better capture seed demand for that year.

