

The video for this presentation is available at:
<https://www.youtube.com/watch?v=ZzCBTlj3yN4>

Team FHIRfighters

Allan Reyes

Enrique Gonzalez

Phillip Birmingham

Reed Allred

Newborn Screening Data

Final Presentation
FHIRfighters



Agenda

- The Problem at Hand
- Our Solution: Artemis
- Demo
- Deployment
- Next Steps

Background

- Utah Newborn Screening Program
- Handwritten newborn data gets messy
- Use Utah Office of Vital Records and Statistics to verify data
- Data from both systems pulled into Access DB each month
- Manually identify discrepancies that need to be fixed
- Slow and error-prone

Utah Newborn Screening
SEE BACK FOR BLOOD SPOT COVER

SECOND SCREEN:
General instructions:
Collect specimen after 7 days of life.

COLLECTION INSTRUCTIONS

1. Legibly print ALL information in spaces provided using block capital letters.
2. Collect specimen with heel stick. See newborn screening handbook for detailed instructions.
3. Fill all 7 circles.
4. Dry 3-4 hours before mailing.

COLLECT SAMPLE FROM GRADED AREA.

Mailing instructions:

1. When blood is dry, fold back card (from back of front) over blood spots. The flap should enclose the blood spots and reveal a hatched symbol.
2. If using the postal service, place form with blood spots covered into envelope.

Mail to: NEWBORN SCREENING LABORATORY
UTAH DEPARTMENT OF HEALTH
4031 S 2700 W
TAYLORSVILLE UT 84119
PHONE: (801) 554-2295

For more information, call, refer to your handbook or visit our website:
<http://health.utah.gov/newbornscreening>

Retain this sheet for your records.
ID Number: 549A426

PEEL AWAY THIS PART HERE

2

549A426

549A426

UTAH DEPARTMENT OF HEALTH
NEWBORN SCREENING LABORATORY FORM
BLOOD SPOT ALL CAPS—COMPLETE ENVELOPE FORM
NAME (PRINT) SURNAME DATE 09/09/2010
335333 Wilde Rose M
Med Center 08/20/2010
Feeding: ☒ Breast ☐ Formula ☐ Transition Diet
☐ Solid ☐ None ☐ Unknown Diet
☐ Yes ☐ No
Wilde Annie
Thorne
123 S 456 W
Anytown UT 84999
01/16/1992 801 111 1111
Dr. Harry Moss
1010 Underhill Dr
Bywater UT 84999
801 222 2222
PEEL AWAY THIS PART HERE

source: <http://health.utah.gov/newbornscreening>

Understanding The Problem

- Multiple interviews with Dr. David Jones
- Research NBS website
- Learn about screening process
- Potential solutions

Artemis

- Greek goddess of childbirth
- Minimalistic and simple to use
- Generates discrepancy reports
- Modern technology
- Enables future improvements
- Scalable

Discrepancy Report

Created 2017-11-30 04:32:38 UTC

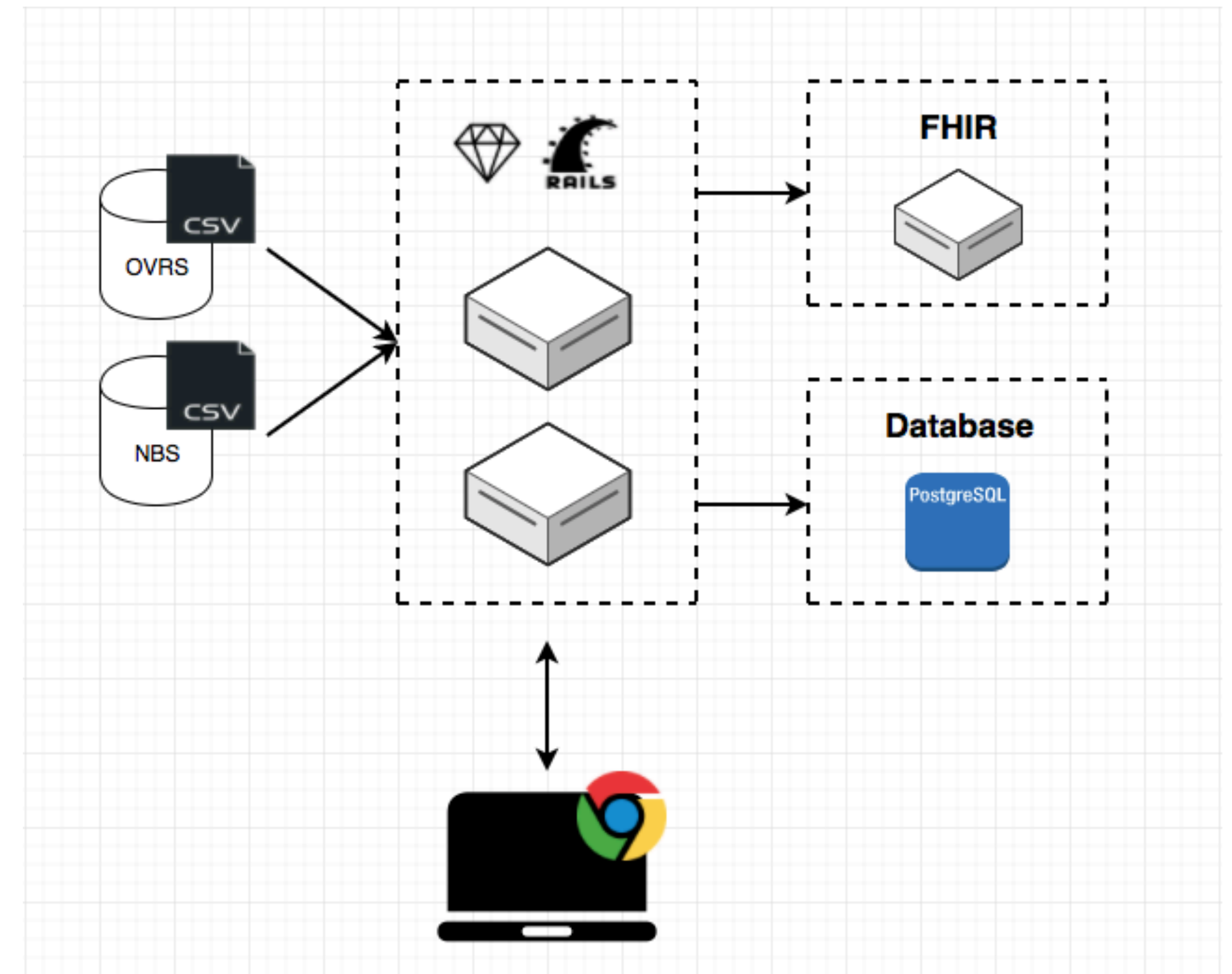
#	Kit ID	Attribute	NBS	OVR5
1	UT850A001	First Name Last Name	[blank] [blank]	James Kirk
2	UT850A020	Mothers Last Name Birth Weight	Adams 2807	[blank] [blank]
3	UT850A010	Mothers Birthdate	[blank]	1989-10-09
4	UT850A006	Kit Sex	UT850A006 M	[blank] [blank]
5	UT850A018	Sex	F	M
6	UT850A086	Multiple Birth First Name Last Name	1 James Adams	[blank] [blank] [blank]
7	UT850A007	First Name Last Name	[blank] [blank]	Boy Tester
8	UT850A098	Mothers Last Name First Name	Maine Leslie	[blank] [blank]
9	UT850A044	Birthdate	2015-08-11	[blank]
10	UT850A093	Birth Weight First Name	2200 Early	[blank] [blank]
11	UT850A008	Birthdate	[blank]	2015-11-01
12	UT850A002	Mothers Birthdate Birth Weight	[blank] [blank]	1985-01-08 2881

Challenge: Record Linkage

- Identify discrepancies
- Data is sparse or conflicting
- False positives are not an option
- Good record linkage algorithm is needed
- Field hierarchy

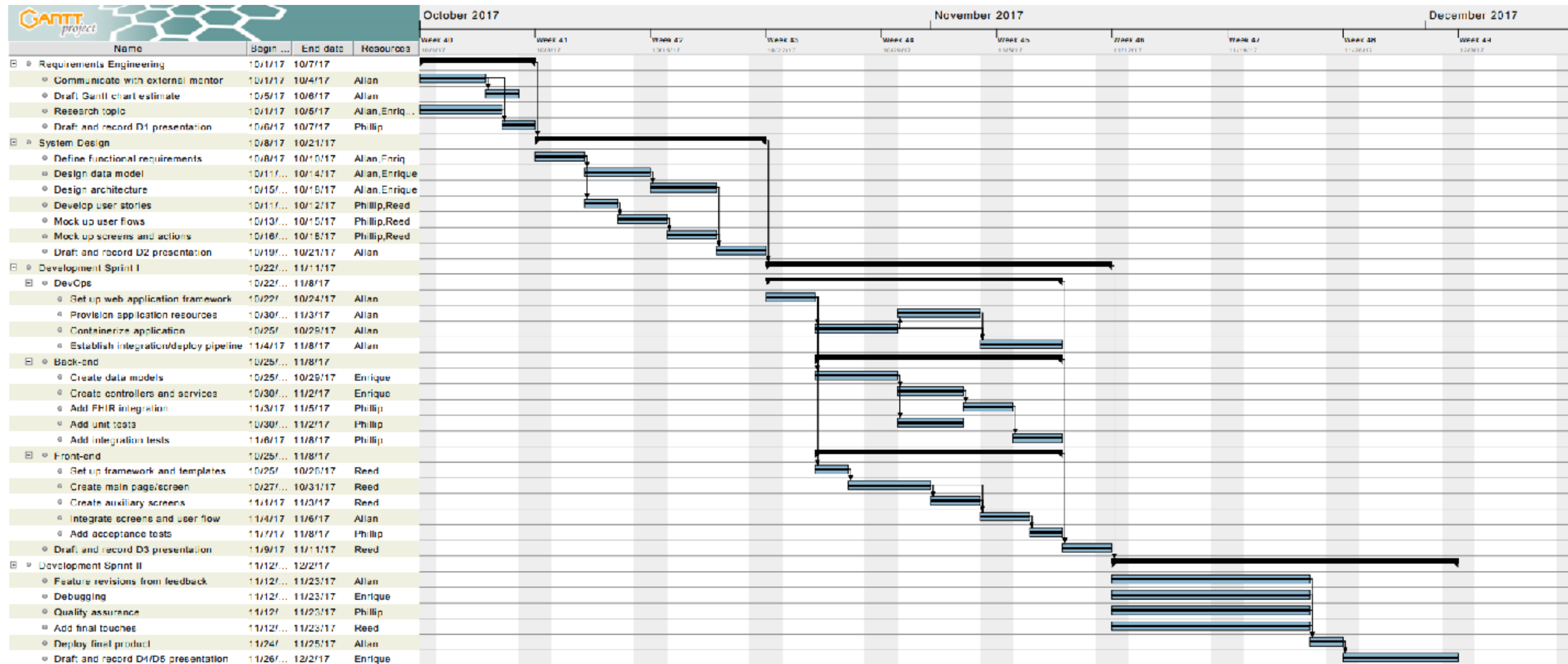
Technical Details

- Ruby on Rails
- PostgreSQL
- FHIR



On FHIR

- Data producer
- Patient: newborn
- RelatedPerson: mother
- Observation: birth weight and length



Project Status

Gantt Chart

Demo

Deployment

- On-Premise
- Run a local web server
- Simple deploy with Docker
- But we had to compromise...

The Cloud

- Deployed to a small Heroku Dyno
- Accessible at: <http://artemis-fhirfighters.herokuapp.com>
- Great for validating

User On-Boarding

Manual

- Keep interface simple
- Provide detailed documentation
- Good error handling

Contents

1. General	1
2. User Manual	1
2.1. How To Run The App	1
2.2. How to use the app to generate a report	2
2.3. Errors when running the app	5
2.4. How to read a report	6
3. Developer Manual	8
3.1. How To Deploy	8
3.2. How To Set Up For Native (Local) Development	8
3.3. How To Test	8
4. Informational	8
4.1. Dependencies	8
4.2. Clone Repository	9

1. General

Information of the project and team that worked on it:

- Team: FHIRfighters
- Team Members: Phillip Birmingham, Enrique Gonzalez, Allan Reyes, Reed Allred
- Project Name: Newborn Screening Data on FHIR
- GitHub link: <https://github.com/CDCgov/GaTech-Fall2017-Newborn-FHIRFighters>.

2. User Manual

2.1. How To Run The App

1. Clone repository
2. Ensure the correct versions of Docker and Docker Compose are installed per the dependencies.
3. Run docker-compose up.
4. The application is at <http://localhost:3000>

Next Steps

- Deploy application locally
- Keep it in the cloud with auth
- Integrate Artemis into automated feeds
- Push notifications on discrepancy
- Machine learning to automate discrepancy fix

Final Thoughts

