Newborn Screening Data

Final Presentation

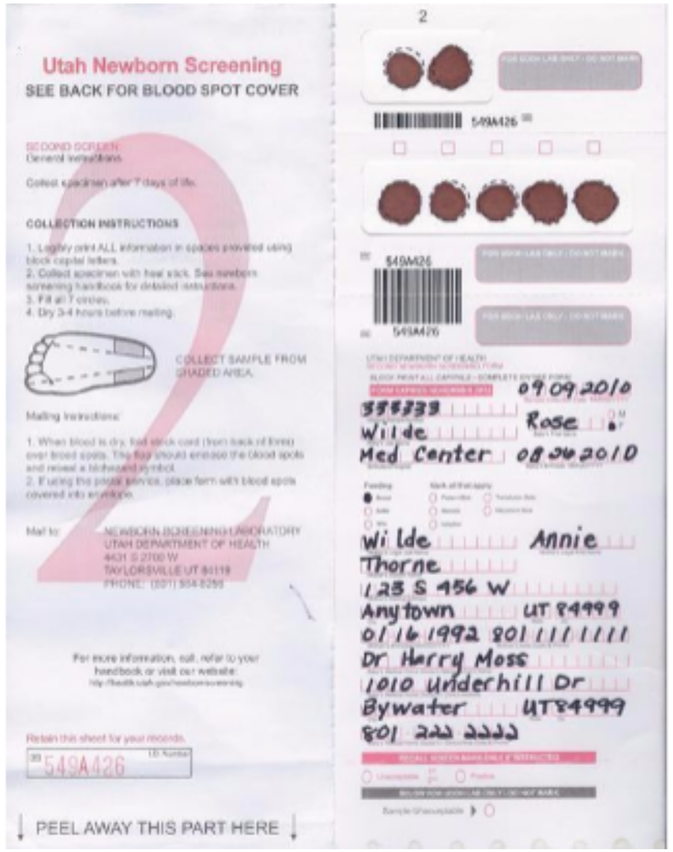
FHIRfighters

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



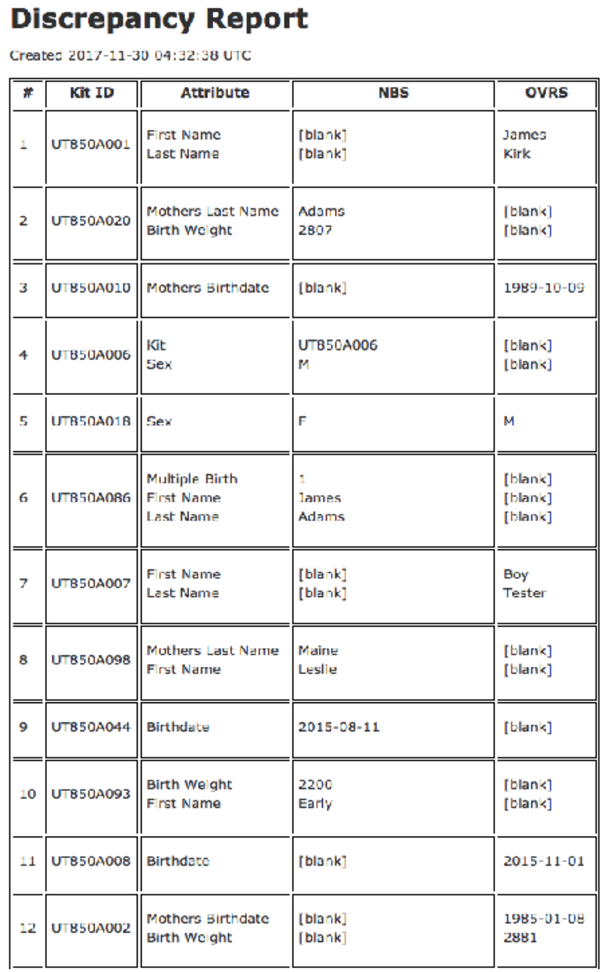
source: http://health.utah.gov/newbornscreening

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

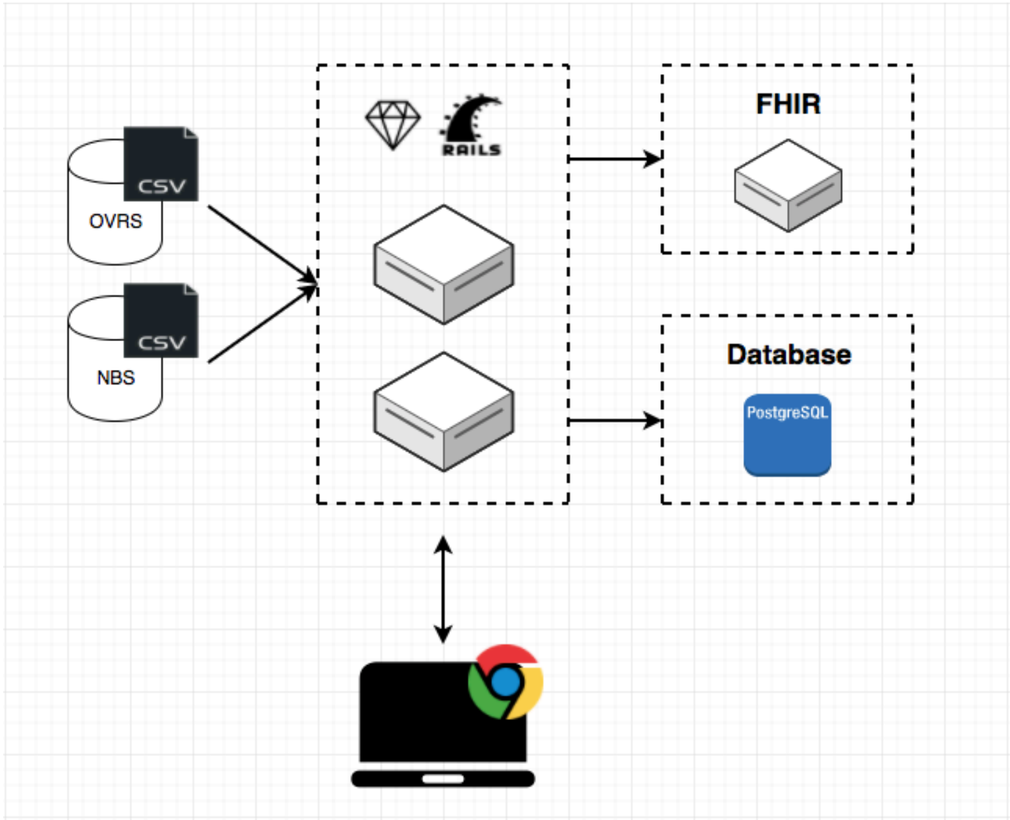
#	Kit ID	Attribute	NBS	OVRS
1	UT850A001	First Name Last Name	[blank] [blank]	James Kirk
2	UT850A020	Mothers Last Name Birth Weight	Adams 2807	[blank] [blank]
3	UT850A010	Mothers Birthdate	[blank]	1989-10-09
4	UT850A006	Kit Sex	UT850A006 M	[blank] [blank]
5	UT850A018	Sex	F	M
6	UT850A086	Multiple Birth 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

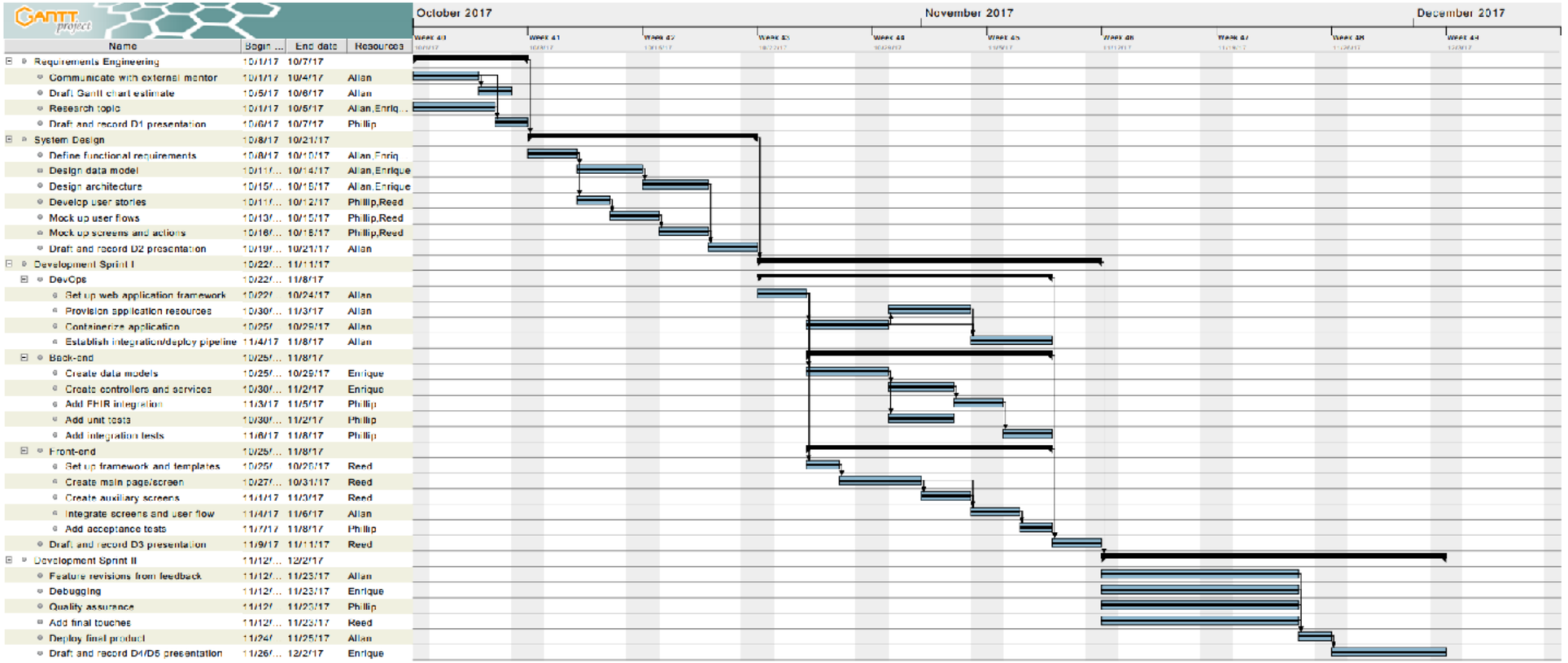
Technical Details

- Ruby on Rails
- PostgreSQL
- FHIR



On FHIR

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



Name	Begin ...	End date	Resources
Requirements Engineering	10/1/17	10/7/17	
Communicate with external mentor	10/1/17	10/4/17	Allan
Draft Gantt chart estimate	10/5/17	10/6/17	Allan
Research topic	10/1/17	10/5/17	Allan,Enriq...
Draft and record D1 presentation	10/6/17	10/7/17	Phillip
System Design	10/8/17	10/21/17	
Define functional requirements	10/8/17	10/10/17	Allan,Enriq
Design data model	10/11/...	10/14/17	Allan,Enrique
Design architecture	10/15/...	10/16/17	Allan,Enrique
Develop user stories	10/11/...	10/12/17	Phillip,Reed
Mock up user flows	10/13/...	10/15/17	Phillip,Reed
Mock up screens and actions	10/16/...	10/18/17	Phillip,Reed
Draft and record D2 presentation	10/19/...	10/21/17	Allan
Development Sprint I	10/22/...	11/11/17	
DevOps	10/22/...	11/8/17	
Get up web application framework	10/22/	10/24/17	Allan
Provision application resources	10/30/...	11/3/17	Allan
Containerize application	10/25/	10/29/17	Allan
Establish integration/deploy pipeline	11/4/17	11/8/17	Allan
Back-end	10/25/...	11/8/17	
Create data models	10/25/...	10/29/17	Enrique
Create controllers and services	10/30/...	11/2/17	Enrique
Add FHIR integration	11/3/17	11/5/17	Phillip
Add unit tests	10/30/...	11/2/17	Phillip
Add integration tests	11/6/17	11/8/17	Phillip
Front-end	10/25/...	11/8/17	
Get up framework and templates	10/25/	10/26/17	Reed
Create main page/screen	10/27/...	10/31/17	Reed
Create auxiliary screens	11/1/17	11/3/17	Reed
Integrate screens and user flow	11/4/17	11/6/17	Allan
Add acceptance tests	11/7/17	11/8/17	Phillip
Draft and record D3 presentation	11/9/17	11/11/17	Reed
Development Sprint II	11/12/...	12/2/17	
Feature revisions from feedback	11/12/...	11/23/17	Allan
Debugging	11/12/...	11/23/17	Enrique
Quality assurance	11/12/	11/25/17	Phillip
Add final touches	11/12/...	11/23/17	Reed
Deploy final product	11/24/	11/25/17	Allan
Draft and record D4/D5 presentation	11/26/...	12/2/17	Enrique

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

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

Manual

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

The video for this presentation is available at:
https://youtu.be/SCrq5IU7qw4