

Design Document

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1 PROJECT SUMMARY

Heart disease, a common chronic illness that affects millions of people in the United States, is the top ranking cause of death. However, when administered appropriately, statins can mitigate the risk of cardiovascular events. Through application of health informatics, our group proposes a FHIR-enabled tool to automatically import patient data, assess cardiovascular disease risk, and recommend statins as appropriate. The tool would notify physicians during medication reconciliation, which is typically done on discharge, of the increased risk of cardiovascular events, and recommend for a moderate or high intensity statin as appropriate. Furthermore, myalgia, a commonly documented side effect for statin medications (Jacobson, 2008), has been found to be a placebo/nocebo (Pedro-Botet et al., 2019). It is found that patients may often experience reduced symptoms after switching to a different statin (Joy & Hegele, 2009). Patients who experience intense side effects may wean off, leading to the patient no longer taking statin medications. Thus, our tool will be able discern whether a patient has taken a certain statin medication in the past and inform the physician to prescribe a different statin medication.

2 TOOLS AND TECHNOLOGY

- Programming languages:
 - Frontend: HTML5, CSS, JavaScript
 - Backend: Python
- Libraries/packages:
 - Backend:
 - Python FHIR parsing library
 - FHIR-Parser: <https://github.com/greenfrogs/FHIR-Parser>
 - SMART-on-FHIR API
 - Django (backend Python web framework for running the web server)
 - Frontend:
 - Bootstrap 4 (frontend/CSS styling framework)
- Hosting:

- Web Deployment:
 - Local Django Server (testing)
 - Heroku (deployment)

3 DATA SOURCES

We use sample patient data by integrating our application with the SMART-on-FHIR API.

There were three main python libraries that we used. The “fhirclient” library supports Smart-on-FHIR integrations and has functions to parse and extract specific data from FHIR formatted JSON files (PyPI, 2021). Then, the “Requests” library was used to communicate with the Smart-on-FHIR API when integrations with the fhirclient were difficult (PyPI, 2020). Finally, code was used from the “python-framingham10yr” library to calculate the 10 year AVSCD risk percentage (Videntity Systems, 2012).

4 DIAGRAMS

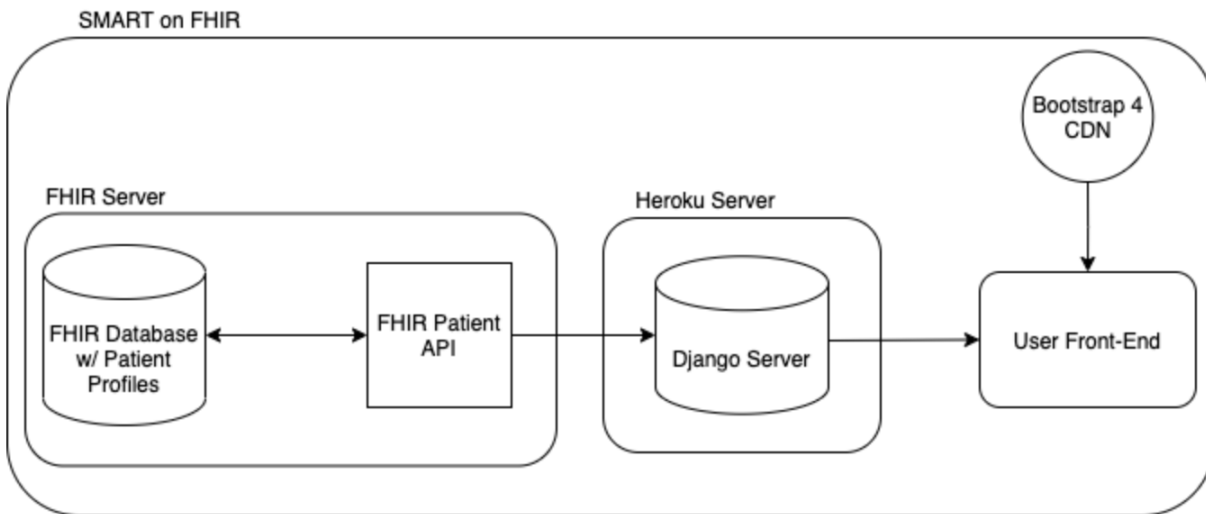


Figure 1. This is the architecture we have used for our application.

5 SCREEN MOCK-UPS

We displayed a red notification box that shows the medication recommendation for the patient on SMART-on-FHIR API existing discharge tab and patient profile interface, as shown in Figure 2.

Our solution will ideally be built on Epic's system. We will try to display a notification or popup box that displays the medication recommendation for the patient on Epic system's existing discharge tab and patient profile interface, as shown in Figures 3 and 4.

Statin Tool

Choose a Patient:

Mr. Barrett Cummings

Submit

Recommendation: Based on the patient's current risk status and previous medication history, Statin-X is recommended. Statin-X has been recommended because the patient is now high-risk and Statin-Y is no longer intense enough. Please discuss with the patient about their lifestyle.

Patient Information

Sex: male

Total Cholesterol: 171 mg/dl

HDL Cholesterol: 68 mg/dl

Systolic Blood Pressure: 156 mmHg

Smoker: False

Blood Pressure Medication Treatment: True

Percent Risk: 2%

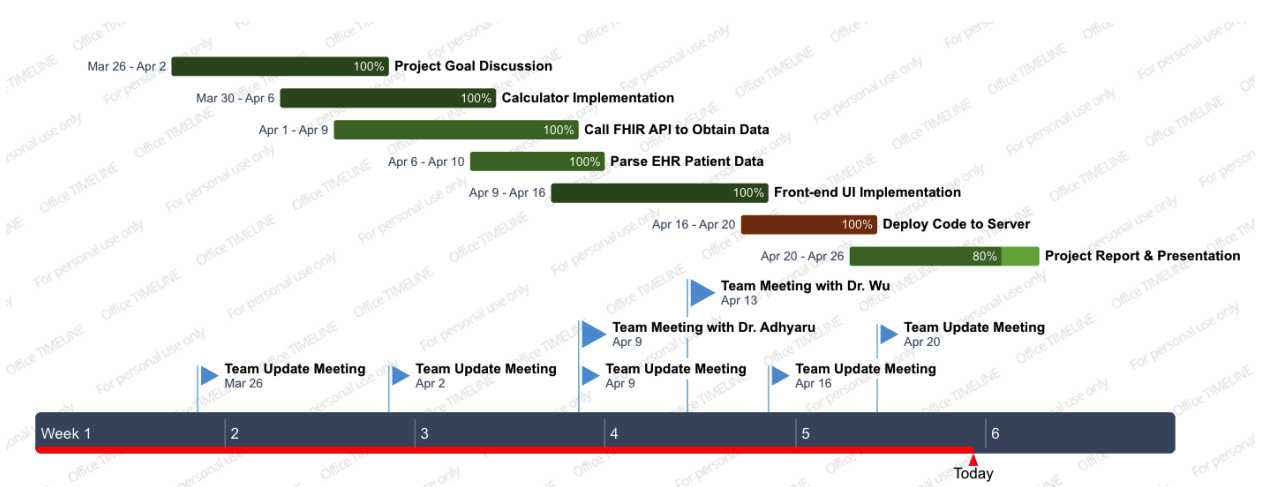
Figure 2. A proof-of-concept for the notification on the discharge page

6 PROJECT TASKS

Below is a table of high-level tasks that our group would be focusing on for the next 6 weeks.

Week 11	- Incorporating calculator
Week 12	- Attempt to create a database with patient data from github - Incorporating calculator
Week 13	- Create front-end pop-ups/notifications
Week 14	- Integrate front-end with existing SMART-on-FHIR API - Integrate front-end with calculator
Week 15	- Test the application (QA) - Deploy the application to Heroku
Week 16	- Meet with mentor to check with the requirements - Final sprint and presentation submission

7 PROJECT TIMELINE



9 REFERENCES

1. Ignatov, V., & Moesel, C. (2020). Smart-on-fhir. Retrieved March 20, 2021, from <https://github.com/smart-on-fhir/generated-sample-data>
2. Jacobson, T. A. (2008). Toward “pain-free” statin prescribing: Clinical algorithm for diagnosis and management of myalgia. *Mayo Clinic Proceedings*, 83(6), 687–700. <https://doi.org/10.4065/83.6.687>
3. Joy, T. R., & Hegele, R. A. (2009). Narrative review: Statin-related myopathy. *Annals of Internal Medicine*, 150(12), 858–868. <https://doi.org/10.7326/0003-4819-150-12-200906160-00009>
4. Nelson, G. (2017). *A Practical Guide to Healthcare Data: Tips, traps and techniques*. Retrieved March 19, 2021, from https://www.researchgate.net/publication/318865889_A_Practical_Guide_to_Healthcare_Data_Tips_traps_and_techniques
5. NumPy. (2021). NumPy. Retrieved March 21, 2021, from <https://numpy.org/>
6. Pedro-Botet, J., Climent, E., & Benaiges, D. (2019). Muscle and statins: From toxicity to the placebo effect. *Expert Opinion on Drug Safety*, 18(7), 573–579. <https://doi.org/10.1080/14740338.2019.1615053>
7. PyPI. (2020, December 16). *requests*. PyPI. <https://pypi.org/project/requests/>
8. PyPI. (2021). *fhir.resources 6.1.0*. Retrieved March 20, 2021, from <https://pypi.org/project/fhir.resources/>
9. Salem Health. (2016). *Epic Physician Discharge Reconciliation Process*. Retrieved March 19, 2021, from https://www.salemhealth.org/docs/default-source/default-document-library/education---physician-discharge-reconciliation.pdf?sfvrsn=3318d897_0
10. Vident Systems. (2012). *videntity/python-framingham10yr*. GitHub. <https://github.com/videntity/python-framingham10yr>