

MICHIGAN STATE
UNIVERSITY

Project Plan Presentation
Electronic Laboratory User's Guide
(eLUG) Modernization
The Capstone Experience
Team Henry Ford Innovations eLUG

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From Students...
...to Professionals

Project Sponsor Overview

- Henry Ford Health eLUG- Detroit, MI.
- One of the nation's leading healthcare systems recognized for its dedication to medical innovation, research, and patient care.
- Electronic Laboratory User's Guide (eLUG), used in the Department of Pathology provides clinicians with essential test ordering, specimen handling, and regulatory compliance information.
- Project focuses on modernizing the Center for Precision Medicine (CPM)- within eLUG, ensuring that clinicians can easily access and interpret specialized genetic, molecular, and precision diagnostic tests that play a crucial role in personalized medicine.



Project Functional Specifications

- The eLUG provides clients with information about HFH laboratories and gives them access to a comprehensive testing catalog.
 - Current testing catalog is extremely outdated- Hard to Navigate and not user friendly.
- The eLUG is valuable because it ensures that doctors have access to guides on how to properly collect and handle specimen samples.
- Our goal is to improve the user experience, we will accomplish this by:
 - Creating a mobile app.
 - Ability to share page links.
 - Multimedia.



Project Design Specifications

- Designed to modernize parts of the current eLUG (2003).
- Scope of the project changed on 1/31, modernizing 3 performance laboratories:
 - Cytogenetics, Molecular Genetics, and Molecular Pathology.
- Modernization will include recent changes log, admin page, and updated test descriptions.



Screen Mockup: Report List Page

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Search

Pathology and Laboratory Medicine
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Report List for: ▼ Total Tests: 35

TEST NAME	ALIAS	CODE	PROFILE
Chromosome Analysis, Amniotic Fluid	Amniotic Fluid Karyotype, Amniotic Fluid Cytogenetics Analysis, Amniotic Fluid Chromosome Studies, Chromosome Analysis, Cytogenomics	CYTO40401 RTCG1	Detail
Chromosome Analysis, Blood - Congenital/Reproductive Disorders	Blood Karyotype, Blood Cytogenetics Analysis, Blood Chromosome Analysis, Karyotype, Cytogenomics, Peripheral Blood Chromosome Analysis	CYTO40403 RTCG1	Detail
Chromosome Analysis, Blood - High Resolution, Congenital/Reproductive...	High Resolution Karyotype, High Resolution Cytogenetics Analysis, High Resolution Chromosome Studies, Cytogenomics, Peripheral Blood Chromosome Analysis	CYTO40404 RTCG1	Detail
Chromosome Analysis, Chorionic Villus Sample	Chorionic Villus Karyotype, Chorionic Villus Cytogenetics Analysis, Chorionic Villus Karyotype, CVS Cytogenetics Analysis, CVS Chromosome Studies, Karyotype, ...	CYTO40402 RTCG1	Detail
Chromosome Analysis, Oncology - Bone Marrow/Blood/Lymph Node	Chromosome Analysis, Oncology - Bone Marrow/Blood/Lymph Node, cytogenomics	CYTO40406 RTCG1	Detail
Chromosome Analysis, Oncology - Lymph Node	Lymph Node Karyotype, Lymph Node Cytogenetics Analysis, Lymph Node Chromosome Studies, Cytogenomics	CYTO40406 RTCG1	Detail
Chromosome Analysis, Products of Conception	Products of Conception Karyotype, Products of Conception Cytogenetics Analysis, Products of Conception Chromosome Studies, Product of Conception Chromosome...	CYTO40405 RTCG1	Detail
Chromosome Analysis, Skin Biopsy	Skin Biopsy Karyotype, Skin Biopsy Cytogenetics Analysis, Skin Biopsy Chromosome Studies, Cytogenomics	CYTO40405 RTCG1	Detail
Chromosome Analysis, Tumor	Tumor Karyotype, Tumor Cytogenetics Analysis, Tumor Chromosome Studies, Cytogenomics, Chromosome Analysis	CYTO40407 RTCG1	Detail
Cystic Fibrosis, Prenatal Diagnosis, Amniotic Fluid	Prenatal Diagnosis, Amniocentesis, DNA Analysis for Cystic Fibrosis, CF, CFTR, cytogenetics, cytogenomics	CYTO2100003	Detail



Screen Mockup: Test Description Page

The screenshot shows a web browser window with the URL <https://www.henryford.com>. The page header includes the Henry Ford Health logo and a search bar. The main content area is titled "Pathology and Laboratory Medicine" and "This Electronic Lab User's Guide is applicable to Legacy Henry Ford Locations Only". The test title is "Y Chromosome Microdeletion Studies, Blood". A red lightbulb icon indicates a special instruction. The test code is DNA2100014 RTCG1. The table below provides details on specimen containers, volumes, availability, and priority. Special instructions, collection, storage, transport, and performing lab information are listed below the table. An in-house note and a reference range are also provided. The page is last updated on 02/02/2025 at 11:57 AM by Trevor Jacobs.

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HENRY FORD HEALTH
Innovations

Pathology and Laboratory Medicine
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Y Chromosome Microdeletion Studies, Blood

Synonyms (Alias): Cytogenetics, DNA analysis for Y chromosome infertility male infertility AZF deletions

Specimen Container	Test Code	Collect Volume	Min Volume	Availability	Test Priority
Lavender (EDTA) Tube and Sodium Heparin (EAI)	DNA2100014 RTCG1	5 mL	3 mL	Monday through Friday, day shift.	ROUTINE

Special Instructions: Draw one lavender (EDTA) and one Dark Green (sodium heparin) tube. A G-banded karyotype is recommended for all patients who undergo Y chromosome microdeletion studies.

Collection Instructions: Test Requisition – [Cytogenomics Pediatric/Adult](#)

Storage Instructions: Store at ROOM TEMPERATURE

Transport Instructions: Transport at room temperature.

Performing Lab: Cytogenetics

Turnaround Time: 14 days

Specimen Type: Whole Blood

Reference Range: Interpretive report in EPIC under Pathology

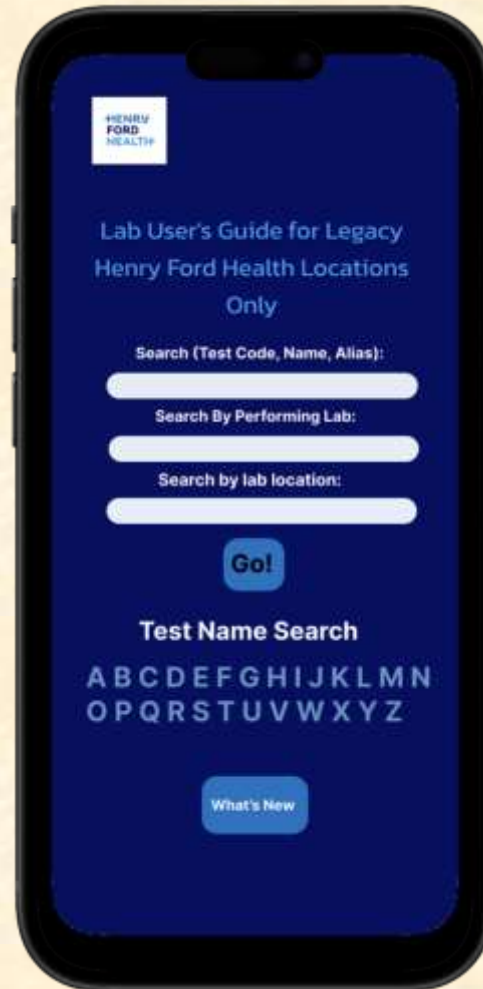
In-House Note: Please contact the Center for Precision Diagnostics at (313) 916-4362 for a clinical utility review.

This test is used to identify Y chromosome microdeletions associated with male infertility. Microdeletions of the Y chromosome are found in approximately 35% of men with idiopathic azoospermia, 10-15% of men with severe oligospermia and 7% of uned infertility patients. This assay will detect >99% of all Azoospermia Factor (AZFa, AZFb, AZFc, and AZFd) microdeletions. Failure to isolate...

Last updated: 02/02/2025 at 11:57 AM by Trevor Jacobs



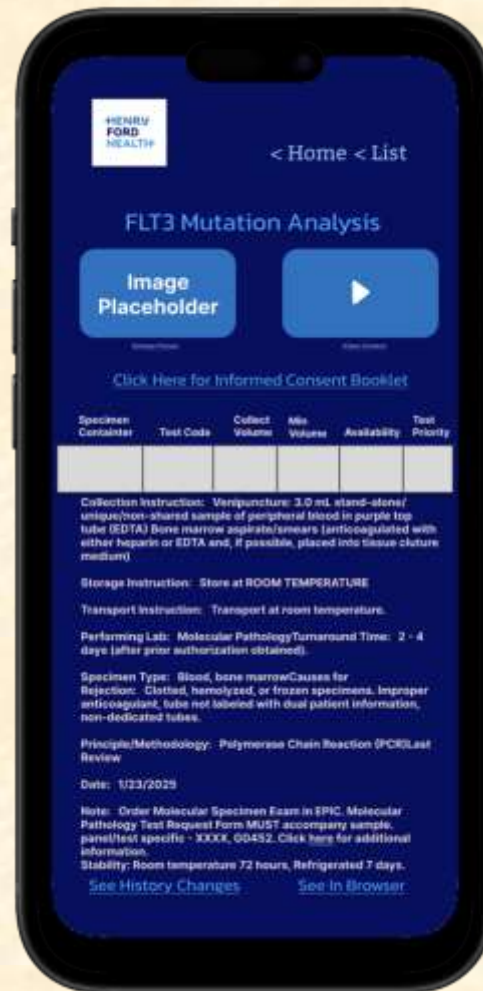
Screen Mockup: Home Page



Screen Mockup: Report List Pages



Screen Mockup: Test Description Page



Screen Mockup: History Page

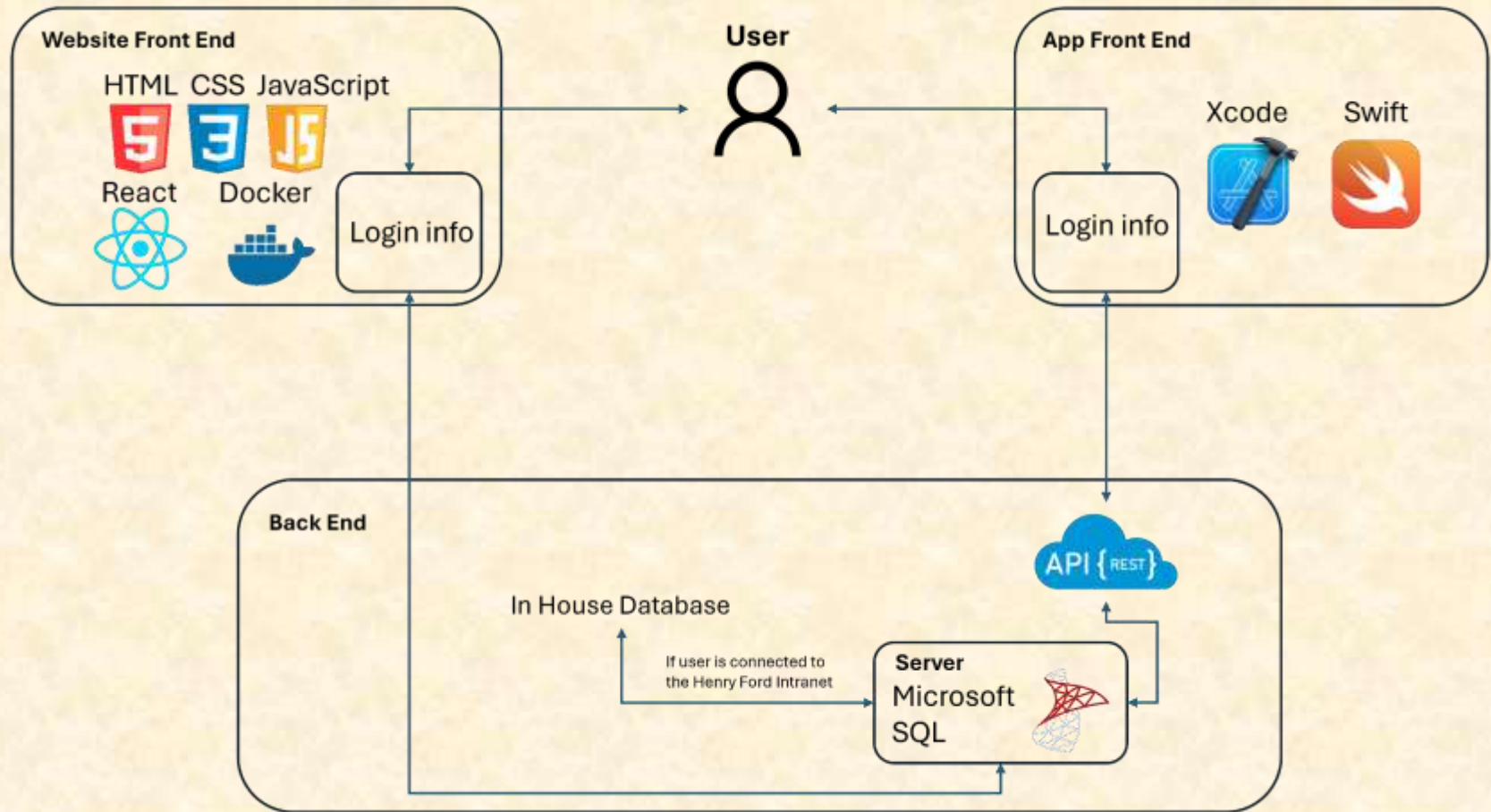


Project Technical Specifications

- Design and User Interface
 - HTML, CSS, JavaScript for web application.
- iOS app
- Speed
- Security
- Database



Project System Architecture



Project System Components

- Hardware Platforms
 - Mobile Devices- Used for testing mobile applications.
 - Local Dev Machines (Laptop/Desktops)- Used to write code, run tests, and develop web and mobile applications.
 - Staging and Production Environments- Servers for testing before deployment.
- Software Platforms/Technologies
 - Microsoft SQL and Flask for backend/database management.
 - HTML/CSS/JavaScript for front end and web development.
 - XCode and Swift for iOS development.
 - GitLab for version control.
 - Docker for creating and running applications in isolated environments.



Project Risks

- Risk 1- Data Breaches
 - The application will be used in the healthcare sector, meaning data security is crucial.
 - Mitigation- Implement role-based access control (RBAC) for sensitive information.
- Risk 2- Mimic the Format of Real Database
 - Working with potentially private medical data. We may not receive access to all of HFH's data and will have to fill in some of the missing data ourselves.
 - Mitigation- Create our own SQL server with example test data.
- Risk 3- Accurate Data
 - Inaccurate test data can lead to serious consequences for both patient care and hospital liability.
 - Mitigation- Ensure that every piece of information is reviewed and approved before going live. Create a log for when the most recent data was pulled.
- Risk 4- Lack of images that differentiate tests
 - The descriptions of the laboratory equipment are often very vague. This can cause confusion for clinicians when two pieces of equipment fit the same description.
 - Mitigation- Include images and detailed descriptions of equipment so clinicians can properly identify what to use.



Questions?

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