

Abstract

This project explores the application of Node.js, Express, and EJS templates in developing reusable, stateless web page components that adhere to the Fast Healthcare Interoperability Resources (FHIR) standard.

Introduction

Interoperability is a challenge in software engineering, this is especially true in healthcare where timely and accurate sharing of patient data can be a matter of quality of life for a patient.

In addition to direct patient care, the analysis of cohorts of patient's data is key to planning and providing health services.

This project attempts to provide a solution for applications to use standards driven approaches when capturing data to improve efficiencies by reducing mapping and reprocessing of data.

The approach is to examine and demonstrate the use lightweight modern frameworks, conventions and standards.

Frameworks and Standards

- This project depends upon HL7 FHIR as the data-model and backbone of the technical solution.
- Node.js is a JavaScript runtime for server-side programming, enabling fast, scalable network applications using non-blocking, event-driven architecture.



Industry Background

- Burden of existing development stack
- Proprietary data models – app, middleware, database
- Complexity of mapping data for interoperability and analytics

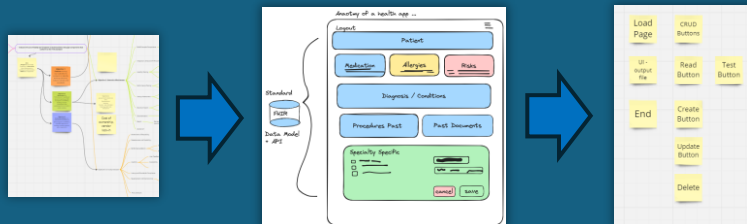
Project Objectives

- Objective 1:** Evaluate existing low-code e-forms products to identify existing solutions, industry trends, and standards
- Objective 2:** Determine the effectiveness and usability of EJS Templates and FHIR by building example components and combining them to create a usable solution
- Objective 3:** Critically evaluate the effectiveness of EJS Templates and FHIR as a feasible approach to building reusable stateless web components

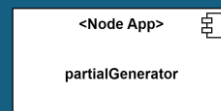
Research Methodologies

Positivism -> Deductive -> Mono-method->Experimental->Cross-sectional

Design



- Agile approach to the design and build
- Wireframe and Story Mapping allowing for flexibility



Evaluation

- The project examined existing open source and commercial solutions such as low-code offerings. The did not meet the objective of being FHIR standards compliant.
- The prototype demonstrated the use of Nodejs and autogenerating HTML forms using the lightweight Embedded JavaScript templates (EJS) library was successful.
- The approach is consistent with industry standards regarding RESTful services, stateless components and cloud hosting.

Project Conclusions

The project demonstrated that using a strong data modal and standards at the point of data capture can minimise the effort for downstream data uses such as interoperability and analytics.

A lightweight framework such as EJS can meet the requirement for reusable components and produce valid from data.

Recommendations

- Development of health applications to adopt the principles of build apps with FHIR data model at the client-side.
- Build upon the approach outlined in this research to better ways of working
- Build Nodejs and FHIR skills
- Examine whether the tools could be used for developing Microservices approach to applications design, e.g. by including security elements such as JWT tokens and Oauth 2.0 style security model.
- The project will be published via GitHub to encourage collaboration and further the language and use of FHIR
- The approach be adopted by development teams within healthcare organisations

References

Nodejs: <https://nodejs.org>
EJS: <https://ejs.co>
HL7 FHIR: <https://www.hl7.org>