National College of Ireland

HDip Sc in Computing

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AluControl

Technical Report



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# Executive Summary

Maximum 300 words. The abstract should mention the problem being addressed, describe the technical solution and briefly report the findings of the evaluation.

# Introduction

## Background

A report by Grand View Research (2024) predicts that the global market for enterprise resource planning (ERP) software will grow by 11.0% annually between 2023 and 2030. This growth is driven by companies' need to enhance operational efficiency and transparency in business processes, coupled with the rise of mobile and cloud applications.

The implementation of ERP within an organization has the potential to decrease inventory costs by 25% to 30% and raw material costs by approximately 15% (Grand View Research, 2024). Furthermore, it can significantly increase profitability, resulting in an increase in the overall demand for ERP solutions.

Cloud-based solutions are becoming more popular due to their flexibility, scalability and cost savings, crucial features for small and medium enterprises (SMEs) operating with limited resources. Despite the positive outlook, there are obstacles such as the high initial investment and the complexity of integrating ERP systems with existing infrastructures. Nevertheless, the benefits of integrating data management, accessing real-time information and simplifying processes make ERP solutions a strategic investment for SMEs that want to compete in an increasingly digital market, moving towards modernization and making strategic decisions to ensure sustainable growth and success in the future.

AluControl, the solution developed in this project, aims to enhance operational efficiency and decrease costs, providing real-time reporting and analytics capabilities that meet the growing demand for affordable digital solutions. The cloud deployment of this solution provides modern SMEs with the scalability and flexibility they need to compete in today's digital marketplace.

## Aims

The main purpose of this project is to produce a centralized business automation system that enables users to manage their sales and inventory operations efficiently. To be more specific, the AluControl application is meant to do:

* **Manage Inventory**: Make tracking and inventory management easier with automation.
* **Sales and Rental Reports:** Deliver detailed reports on sales and rental operations, allowing for a better comprehension of the business's performance.
* **Dashboards** Provide data visualization tools, like charts and dashboards, to keep track of performance metrics in real-time.
* **Automate Business Processes:** Minimize the use of manual processes, avoid errors, and improve operational efficiency.
* **Increase productivity:** Eliminate repetitive tasks to focus on activities that bring more value to the business.
* **Facilitate the Decision-Making:** Offer access to cutting-edge analytics and real-time reporting that can assist with strategic decision making.
* **Financial Reports:** Provide detailed reports of expenses, providing a clearer understanding of the company's financial condition.
* **Cash Flow Control:** Ensure more effective financial control by managing the company's cash flow, which includes paid and receivable items.

Although AluControl's current version has the mentioned features, there are plans to expand and enhance the system in future versions. Future goals include:

* **Optimization of Stock Levels:** Apply a sophisticated algorithms to maintain precise stock levels of products and prevent shortages and overstocks.
* **Expansion of Financial Control:** Integrate additional functionalities for detailed management of revenues and expenses, as well as more comprehensive financial reports.

## Technologies

The AluControl is supported by a robust technology set that ensures efficient and scalable development and deployment.

**Frontend Development**

* **HTML** and **CSS**: The frontend interface of AluControl is built with HTML for structure and CSS for styling. Moreover, Bootstrap features are utilized to guarantee a responsive and visually appealing design.
* **JavaScript:** Real-time interaction with backend services is supported by JavaScript to enhance the user experience. The ability to update parts of the page without refreshing and send and receive data asynchronously is achieved using dynamic interface behaviour and AJAX requests. The user experience becomes faster and more responsive, leading to smoother interactions with the system.

**Backend Development**

* **Java**: The core application is built on Java, which makes it ideal for business applications and has been the foundation of this course.
* **Spring Boot:** This framework is employed to make configuration and backend development easier. It facilitates the creation of standalone applications that can run with minimal configuration.
* **Maven:** Maven is utilized for managing projects and dependencies, and also facilitates the integration of necessary libraries and plugins.
* **Jakarta:** The creation of entities and business objects was made possible by using this API to build the project models.
* **JPA (Java Persistence API):** This tool was applied to create and manage tables in the database.
* **RESTful API**: The backend services were created using the RESTful API to facilitate communication and integration with the frontend. This enable system components to communicate effectively and efficiently, enabling operations like data creation, reading, updating, and deletion.

**Hosting**

* **Heroku:** The application is hosted on the Heroku platform, which provides a reliable and scalable cloud infrastructure. This approach simplifies the deployment and management process, enabling me to focus on developing functionalities instead of maintaining the infrastructure.

**Database**

* **MySQL:** The database was developed through the MySQL tool. The course provided a valuable guide that demonstrated the simplicity and efficiency of managing data, which is why it was selected and utilized during the test and construction phases of the system.
* **PostgreSQL:** Hosting and production services are no longer possible due to the non-availability of MySQL within Heroku, so the server hosts the PostgreSQL relational database. However the tool is known for its robustness and efficiency in data management, providing secure storage and quick recovery of information, essential for the commercial operations managed by AluControl.

## Structure

Brief overview of each chapter

# System

## Requirements

This section will be similar to your original requirements specification. Requirements have probably evolved somewhat since. Where this is the case explain what changed and why.

### Functional requirements

### Data requirements

### User requirements

### Environmental requirements

### Usability requirements

## Design and Architecture

Describe the design, system architecture and components used. Describe the main algorithms used in the project. (Note use standard mathematical notations if applicable).

An architecture diagram may be useful. In case of a distributed system, it may be useful to describe functions and/or data structures in each component separately.

## Implementation

Describe the main classes/functions used in the code. Consider to show and explain interesting code snippets where appropriate.

## Testing

Describe any testing tools, test plans and test specifications used in the project

## Graphical User Interface (GUI) Layout

Provide screenshots of key screens and explain.

## Customer testing

Provide evidence for and results of customer testing. This may include ratings or quotes from the customer.

## Evaluation

How was the system evaluated and what are the results? In many cases this will include usage data and user feedback. It may also include performance evaluations, scalability, correctness, etc. depending on the focus of the project.

Quantative results may be reported in tables or figures. Note that tables have their caption above the table and need to be cross referenced in the text (see **Error! Reference source not found.**). In many cases, tables are better to read if you skip the vertical lines.

Table 1: Performance with and without caching

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Nwithout** | **Nwith** | **Std.-Deviationwith** | **Std.-Deviationwithout** | **p** |
| Records | 100 | 200 | 2.54 | 3.97 | .002 |
| Data (GB) | 100 | 200 | 2.54 | 3.97 | .002 |
| Speed | 100 | 200 | 2.54 | 3.97 | .002 |

Figures have their caption below the figure as shown in **Error! Reference source not found.**. Make sure that if you use colour, the figure is still readable when printed in black & white, e.g., by using additional symbols, patterns, etc.



Figure 1: Learning gain across different experimental groups

# Conclusions

Describe the advantages/disadvantages, opportunities and limits of the project.

# Further development or research

With more resources, where could the results of this project lead to?

# References

It is recommended that students use the APA, Berkeley, Harvard or other internationally approved style. Here is an example of the APA citation style:

Wilcox, R. V. (1991). Shifting roles and synthetic women in Star Trek: The Next Generation. *Studies in Popular Culture, 13*(2), 53-65.

In the text this article can be cited as “Wilcox (1991)” or “(Wilkox, 1991)”.

References to web sites must include the access dates.

The library provides a study guide on Harvard style referencing.

# Appendix

## Project Proposal

## Project Plan

## Requirement Specification

## Monthly Journal

## Other Material Used

Any other reference material used in the project for example evaluation surveys etc.

CD containing code should be glued to the technical report.