Warsaw University of Technology

FACULTY OF
MATHEMATICS AND INFORMATION SCIENCE

Bachelor's diploma thesis

in the field of study Computer Science and Information Systems

Platform for hybrid learning

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WARSAW 2022

Abstract

Platform for hybrid learning

The platform for hybrid learning intends to demonstrate, how the design of educational software could be done using a non-object-oriented approach alongside applying principles of cloud computing. As students, during the pandemic of 2020-2021, we have seen how the educational system was struggling to handle such a change. Meanwhile, we have also discovered the advantages of studying online - it gave us a great level of flexibility and the possibility to re-access materials (in particular). Keeping in mind, that teachers would also benefit from the re-design of the current approach to knowledge transfer, we decided to try and implement a platform, that covers the interests of both groups. We did that using Rust programming language for our backend system, Elm programming language for the frontend, and Azure as a main hosting solution. This paper addresses the obstacles to implementing such a platform and how it differs from already existing solutions. We used our professional knowledge as acting software engineers and students to identify and solve arising issues. It is worth adding, that we do not focus on the software development pipeline here, as it would differ vastly from the real-world development team. Nevertheless, we address usability, extendability, supportability, and other important software traits, since they are crucial to the success of the design itself.

Keywords: hydrid learning, massive open online courses, functional programming, cloud computing, education

History of changes

Table of changes		
Author	Date	Change
Kiryl Volkau	20.10.2021	add: Abstract, Introduction
Kiryl Volkau	20.10.2021	add: Functional requirements
Illia Manzhela	20.10.2021	add: Non-functional requirements
Illia Manzhela	20.10.2021	add: SWOT analysis, schedule

Contents

Vocabulary

1. **Massive Open Online Courses (MOOC)** platform - platform with educational content including videos, text content, discussion forums.
2. **Application Programming Interface (API)** - set of definitions for building and integrating application software.
3. **Minimal Viable Product (MVP)** - version of product that has enough functionalities to be used by early customers.
4. **Infrastracture as a Service (IaaS** - pay-as-you-go service where a third party provides you with infrastructure services, like storage and virtualization, as you need them, via a cloud, through the internet. https://www.redhat.com/en/topics/cloud-computing/iaas-vs-paas-vs-saas
5. **Platform as a Service (PaaS**) - on-premise infrastructure management where a provider hosts the hardware and software on its own infrastructure and delivers this platform to the user as an integrated solution, solution stack, or service through an internet connection. https://www.redhat.com/en/topics/cloud-computing/iaas-vs-paas-vs-saas

Introduction

What is the thesis about? What is the content of it? What is the Author's contribution to it?

WARNING! In a diploma thesis which is a team project: Description of the work division in the team, including the scope of each co-author's contribution to the practical part (Team Programming Project) and the descriptive part of the diploma thesis.

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1. The next chapter

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1.1. Matrices

Simple matrix:

$$\begin{matrix} a & b & c & d \\ d & e & f & g \\ 1 & 1 & 1 & 1 \end{matrix}$$

Matrix with parentheses:

$$A = \begin{pmatrix} a & b & c & d \\ d & e & f & g \\ 1 & 1 & 1 & 1 \end{pmatrix}$$

Matrix with brackets:

$$\begin{bmatrix} a & b & c & d \\ d & e & f & g \\ 1 & 1 & 1 & 1 \end{bmatrix}$$

You can also use more general environment:

$$\begin{matrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{matrix}$$

Matrix with braces:

$$\left\{ \begin{array}{ccc} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{array} \right\}$$

Definition 1.1. Let $A \neq \emptyset$, $n \in \mathbb{N}$. Every function $f\colon A^n \to A$ is called an *n-ary operation* or *działaniem* określonym na A. 0-ary operations are constant functions.

Definition 1.2 (Algebra). The ordered pair (A, F), where $A \neq \emptyset$ is a set and F is a family of operations defined on A, shall be called an *algebra* (or *F-algebra*). The set A is called *the set of elements*, *support* or *universe* of an algebra (A, F) and F is called *the set of elementary operations*.

Proposition 1.3. I state that, having passed to the limit, the only thing left me me is to camp at said limit or return, or, maybe, search for a pass or an exit to other areas.

Bibliography

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List of symbols and abbreviations

nzw.	nadzwyczajny
$*$	star operator
$\sim$	tilde

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List of Figures

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List of appendices

1. Appendix 1
2. Appendix 2
3. In case of no appendices, delete this part.