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# PLAN OF ACTION

## Design patterns in .NET

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|---|---|
| Bachelor | Applied informatics |
| Major | Software Engineer |
| Academic year | 2023 - 2024 |
| Student | Kjell Coppin |

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# Table of contents

# 1. Introduction/Context

This introduction will give you an idea of what my thesis will be about, why this topic was chosen and introduce you to the company I will do this with.

## 1.1. Introduction to research topic

Design patterns are established solutions to recurring problems encountered in software engineering. They foster code reusability, enhance software reliability and can have a huge impact on the performance and scalability of software.

What exactly are these established patterns and how do they apply in .NET applications?

## 1.2. Experiment

**Assignment**: The purpose of this research is to explore the utilization and effectiveness of design patterns in .NET programming, particularly within the context of the BestMix software. I aim to answer fundamental questions such as which design patterns are commonly employed in C# programming and how they contribute to software scalability and performance.

**Relevance**: This research is crucial for understanding the impact of design patterns on software development practices, especially within the .NET framework. By systematically analyzing the implementation of design patterns and their outcomes within BestMix software, we can contribute valuable insights and recommendations for optimizing software design and enhancing overall system efficiency. This research seeks to expand current knowledge on design patterns, offering practical applications and recommendations for real-world software development scenarios.

## 1.3. Client

The idea for this topic came from Sander Wallaert, who is my internship mentor at Bestmix Software. Sander is a software engineer and the team lead of the scrum team in which I work during my internship.

## 1.4. Organisation description

Adifo NV is a software development company specializing in providing solutions for the nutrition industries. Founded in 1974 by the De Lille family, it initially focused on developing software applications for payroll and invoicing, which evolved into the MILAS® ERP package. With the acquisition of BESTMIX®, Adifo expanded its offerings to include recipe management for the animal feed industry, later extending to the food industry in the late 1990s. As of 2017, Adifo is part of the Info Support International Group. Following a rebranding initiative in early 2022, all brands are consolidated under BESTMIX Software.

**Mission and Vision:** Their mission is to add value to the nutrition industries by developing software applications and offering services that support the success of our clients and their customers. They aim to achieve this by developing and supporting a unique line of industry-specific strategic software tools for feed formulation, recipe management, quality data management, ration calculation, cloud

services, and ERP solutions.Their vision is to continue being a reliable, result-driven, passionate, knowledgeable, and innovative partner for our clients, combining decades of specialized industry knowledge with cutting-edge ICT solutions to drive progress and innovation in the nutrition sectors.

# 2. Problem definition and questions

What are concrete questions and problems I will try to solve? What research will I do?

## 2.1. Problem definition

**The problem:** There are many cases where using a design pattern instead of regular straight forward code has huge benefits. But it is not always easy to identify this and in some cases design patterns are overkill and just complicate things. There is also the choice of which patterns to use. These are all difficult things to figure out.

**Client:** My experiment will look at the software of my internship company Bestmix Software. With my research I will try to find possible improvements in their code.

**Consequences of bad design patterns:** Bad usage of design patterns can have several negative impacts on code. The code might be less maintainable and scalable, but performance is also impacted.

## 2.2. Delineation

**Research:** I will read the book "Design Patterns Elements of Reusable Object-Oriented Software" since this is widely considered the most important source regarding design patterns. There are other sources I will explore as well, listed in the sources section. From these sources I will write the first part of my thesis in which I define design patterns, explain how they are implemented in c#. I will also try to find c# specific information about these design patterns, why some work better or worse in .Net applications.

**Analysis of BestMix Software:** The second part of my thesis will consist of an analysis. Most importantly I will try to map out what kind of design patterns they commonly use and if those choices were good ones. Since the software I work on there is huge (Bestmix Recipe management), I will need to look into a smaller part of the application to do my analysis. However I do not know yet which part, it will be the code I am most familiar with by then.

## 2.3. Objective

The objective of my bachelor thesis project is to create a thesis document and give a presentation. Both of these will have 2 chapters:

1. Research about software design patterns in c#, this research will answer the questions defined in 2.4 and 2.5.

2. Analysis of Bestmix software: I will analyse the design patterns of the software I work on during my internship, map it out and draw conclusions.

## 2.4. Main question

With my research, there is one main question I will try to answer:

**What are the most important design patterns in programming, and how are they applied in C#?**

## 2.5. Sub-questions

Because my main question is a bit broad, I have come up with these questions I will answer first.

1. What are the commonly agreed upon design patterns in programming?
2. What are the advantages and disadvantages of these patterns?
3. How do you recognize good use cases for these patterns?
4. How do these patterns work in c#?

# 3. Design of experiment: Method of data collection.

The concrete design of my experiment will be as follows.

## 3.1. Design of experiment

**Type of research:** My research will be qualitative since I will go in depth on a few sources and won't collect large amounts of data.

**Method of data collection:** The information in my paper will come from the book "*Design Patterns: Elements of Reusable Object-Oriented Software*" as well as other online sources which discuss design patterns and c# code. While looking through these I will take notes and try to write a comprehensive document describing all these design patterns and their applications in .NET.

The knowledge I gain from this research will be used to analyze code from Bestmix Software.

## 3.2. Research conditions

To successfully execute this project, I will need the following:

- Consent by Bestmix Software to use analyze their code
- Consent by bestmix Software to present my findings regarding their code in a public talk (if not I will leave that part out)

## 3.3. Risk analysis

Some risks to consider:

- I need to define the scope of my analysis to a part of the code, if I try to look at the entire application I won't be able to go into enough detail.
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## 4. Work planning

I will complete the work by these dates:

18/03/2024 – **Intermediate evaluation:** Finished initial research about design patterns (reading book)

01/04/2024 – Finished research about design patterns applications in c#

12/05/2024 – **Rehearsal of presentation:** Finished First version of analysis on Bestmix code, First version of presentation

24/05/2024 – **End of Internship**: Finish analysis on Bestmix code.

01/06/2024 – **Final Deadline:** Tie everything together and create final presentation/paper.

# 5. Resource list

**Sources:**

*Apa Citation Generator*. Citation Machine, a Chegg service. (n.d.). https://www.citationmachine.net/apa

YouTube. (2022, March 14). *10 design patterns explained in 10 minutes*. YouTube. https://www.youtube.com/watch?v=tv-_1er1mWI

YouTube. (2020, March 27). *Design patterns in C#*. YouTube. https://www.youtube.com/watch?v=bzQeMqcgILY&list=PLBEm2Vv2nD-Ppk8U_LaR8wXl47kgCI8Dl

Gamma, E., Vlissides, J., Helm, R., & Johnson, R. (n.d.). *Design Patterns: Elements of Reusable Object-Oriented Software*.

**ChatGpt Prompts:**