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PLAN OF ACTION

Strategies for improving a strained monolithic Laravel structure by compartmentalizing

Research at Citymesh

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1. Introduction/Context

1.1. Introduce research topic

Imagine you are a company and suddenly a few employees are asking for a tool because they currently lack one that they need. This is project may not be important enough to spend too much time and resources on, since it is just a tiny tool. The decision can be made to just set up a simple Laravel system to satisfy the demands. At the start this perfectly does what it needs to do, but as time passes and demands grow more and more features are added to the tool and it becomes one big mess. Since this was a side project it has become a big, sloppy mess that is hard to manage and breaks often.

I will be looking into strategies on ways you can solve this mess with microservices. Splitting of parts that have no business being in a Laravel environment. Refactoring sloppy functionality to a more suitable place with a better fitting technology so it runs smoother. Just replacing the clunky monolithic architecture with microservice architecture in general.

1.2. Experiment

As mentioned above I will be looking for ways to improve a suboptimal and clunky monolithic Laravel architecture with microservices. This topic is closely linked to my Internship. My internship project and this BAP will mutually support each other as a result.

This BAP topic was actually based on my Internship program. This is a relatively common issue in our modern world since this kind of situation can easily happen when you let your guard down.

I will be looking into how microservices can solve the specific issues in my Internship project. This project will be a catalyst for me to learn a lot about microservices and how to use them as well as valuable real life data for my research.

This research topic also revolves around learning microservice architecture and looking for solutions to some of their challenges. Microservice architecture has become popular and a real staple practice for organisations since it is such a potent type of architecture that offers solutions for large scale projects and businesses.

I will be resolving such a monolithic issue as my Internship program and basing my research and strategies for this BAP on this real world example.

1.3. Organisation description

This research will be done at Citymesh in Oostkamp. Citymesh is a big telecom company that is all about high tech connectivity solutions. It offers solutions to a wide range of markets and has a lot of partnerships with many different sectors of society.

It was founded in 2006 and wants to bring high quality, but affordable connectivity to the Belgian telecom market. Citymesh was one of the first Belgian telecom companies to invest in 5g and managed to obtain their 5g license early on. They want to bring the network quality of Belgium up while trying to bring the cost of it down.

Their offshore plans really took off when it helped to resolve an oil leak disaster off the coast of the USA, now called the Deepwater Horizon oil spill. Citymesh was already investing for their growth in the offshore market, but this event certainly was big leap forward for them.

Citymesh has since worked on a lot of off-shore projects, such as providing ships with Wi-Fi and location tracking should the need arise to find them. They offer all kinds of different services, everything to do with connectivity such as providing Wi-Fi, 0g, 4g and 5g to all kinds of organisations, events and possibly hazardous places.

In addition to such services they have lots of drone project to provide help in all kinds of situations. These projects include coastal services, but also providing drones for the police and firefighters.

Currently the company is growing in both employees and opportunities. The company is expanding at a fast pace. Citymesh's place today is that as a potent challenger in the Belgian Telecom market, growing each day and providing high tech solutions to all sorts of problems.

2. Problem definition and main and sub-questions

2.1. Problem definition

I want to address the problem of relieving a big clunky monolithic Laravel structure that has outgrown its original purpose and gives a lot of problems.

The current monolith provides several services to help people in their daily tasks. While the tool is made for their ease of use, the current system misses some key functionality that is hard to implement and breaks often. The current structure makes it hard to repair some broken services, or make a small change without breaking another service

It takes a lot of effort to keep it running smoothly and it is hard to improve or change the services if in a monolithic architecture. By using microservices multiple teams can work on one project at the same time because of the compartmentalisation. Each small change or improvement can be easily deployed too since just one tiny service needs to be redeployed.

2.2. Delineation

The research will be based on the Internship Ops Tool Refactor. It would be an improvement for any people who have to work with it. This means the technicians, helpdesk, IT/Project Managers, and the SDM. This will be done during the period of 12/02 to 24/05.

The most important part is the refactoring is to improve it`s upkeep and make future developments more manageable. The current solution has too many architectural bottlenecks that impact the UX and leave little to no room for actual to-the-point solutions. Several workarounds have already been done, each time making the system more complicated and leaving more of a mess.

This BAP will be a more broad and abstract research based on the specific research and testing the Internship requires.

2.3. Objective

My goal for this research is to observe and note comprehensive tips and strategies on how to improve a monolithic structure that needs improvement. Which steps need to be taken, what needs to be done and looked into before improvements can be made.

2.4. Main question

How can you improve a strained and clunky monolithic architecture by compartmentalising with microservice architecture?

2.5. Sub-questions

- What is the process of relieving a monolithic architecture with microservices?
- How can you decide which parts need to be replaces with what microservice?
- What needs to be considered and prepared before being able to use microservice architecture?
- When should you consider implementing microservices and when should you avoid microservice technology?
- What are some good solutions and technologies that could help and should be looked into when using microservices?
- What is the gradual refactoring process to transition a monolith to microservices?

3. Design of experiment: Method of data collection.

3.1. Design of experiment

I will make general steps and notes of the process I have taken to work out this issue in a real world scenario. When theorising ways of doing something and steps needed to be taken there are usually some forgotten small steps that are very important in order to resolve the issue. As such I will be writing down which steps I have taken.

Afterwards I will look back to reflect what I would have done differently to smooth out the process. I will consider whether all steps were necessary and if they were taken in the right order. There will probably have been some discoveries in my research that would have helped me a ton earlier, so these would be an improvement to the strategy I used. Were some things lacking in this part of the process that should be added?

I will doing the whole process from project introduction to prototyping my solution. This will entail different phases and different strategies for each phase. After each phase I will reflect upon it and try to come up with different ways to solve the issues. This will include writing down different ways of working if the environment and conditions had been different for the project.

Of course not everything will be abstract descriptions on how to come to a solution. The research will include recommendations on particular technologies and techniques that could be implemented, both for specific issues and broader technology solutions that go together well with microservice architecture.

During the whole process I will be supported by professionals working at Citymesh. I will receive regular feedback and input from people who have years of experience. This advice will come from all sorts of teams such as the developer team, the datacentre team, the helpdesk, project managers and more. This professional input will validate this research and elevate it to a higher level.

3.2. Research conditions

- Information
- Time
- Experience
- Environment

3.3. Risk analysis

This research is mostly risk free and there are not a lot of things that could go wrong. Everything that negatively the implementation of the solution is just more data for me to work with at the end of the day. The research method is also harmless and holds close to no risk to anyone.

4. Work planning

I will be working on the research on a weekly basis. Each week I will reflect on the progress I have made. I shall document what steps I have taken, what challenges I ran into and how I tried to resolve them. I will write down both failed and successful attempts to resolve the issue. If I have some time left I will try to find additional ways to solve the issue. This will give me a broader perspective on the issue and better knowledge on the topic.

The Internship project I will be working on will be done in an Agile style of working with sprints more or less every other week. For example, once the research phase is done at the end of the sprint and I can go onto the next phase I will summarise and optimise all the data I had gathered for this phase. With this data I should be able to write some comprehensive strategies and tips for this phase of the implementation of microservice architecture.

Due to this way of working I am expecting to completely finish this BAP research paper around the time my internship has ended. I will also complete each part around the time I enter a new phase in my internship, gradually gathering data and building up the research document with it.

By the end of my internship I will have a comprehensive guide on how to use and implement microservices based on real world experience. With all this documentation and data I will be able to deliver a well-founded and comprehensive TED talk that smoothly guides people throughout this process.

5. Resource list

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