TECHUNPLUGGED

vFunction

Intesa Sanpaolo Accelerates Microservice & PaaS Transformation of Mission Critical Applications with vFunction

Case study

Introduction

Three years ago, the management of Intesa Sanpaolo adopted a modern IT vision to evolve both infrastructure and applications. Although microservices were still a cutting-edge technology they would form the basis for building the applications we now label as cloud native.

This decision was designed to initiate the modernization of applications and services to address modern IT challenges, achieving three objectives: cost control, better stability and scalability, and greater customer satisfaction.

In this case study we will describe the challenges, how Intesa Sanpaolo decided to convert one of its main business-critical applications from a monolithic application to microservices, and how a platform called vFunction helped to turn this challenge into a success.

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> *vFunction addressed a critical need for us to take our thousands of enterprise applications and modernize them through the use of an extremely powerful automated platform.*
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> *The great advantage of vFunction is that the same transformation activity carried out manually would involve a high cost in terms of time and resources.*
>
> *In addition to the product benefits, the expertise and availability of the vFunction team made a huge difference.*
>
> *Flavio Fasano*
> *Senior Solution Architect*

Challenge: Modernizing Monolithic Applications

Traditionally, applications have followed a monolithic design pattern, with a vertical structure that incorporated all the desired functions within a single executable. Releasing bug fixes and/or new features took a considerable amount of time, as it required significant unit and system testing even for small changes. This has led to prolonged development cycles.

In addition, the lack of modularity affected application availability, especially in production. Business-critical applications, in particular those directly accessible to customers such as Online Banking, have very limited maintenance windows. In a digital and mobile world, high service availability is essential for consumers; any repeated or prolonged downtime, even if required for the release of fixes, corrections, updates or new features, impacts customer satisfaction.

Applications that have been developed, continuously extended, and modified over the course of several years are also plagued by layers of code that don't always follow a single programming logic. As if that were not enough, the older the code, the more difficult it is to upgrade the application to the latest supported software versions, thus creating technical debt.

Technical debt consists of the visible or hidden costs required to support older applications including the software and infrastructure prerequisites for these applications. In the long run, unless refactoring action is taken, applications lag behind and require unsupported environments to continue running, thus putting the organization at risk from both a technical and business perspective. Also, the longer that refactoring is delayed, the more difficult and costly further application migration will be in the future. Prohibitive licensing costs also put a burden on the organization's budget and prevent any possibility of innovation.

For Intesa it was not a question of innovating for the sole purpose of innovating, but more to address a fundamental need to evolve, so the bank stayed competitive in a world where technological and digital transformation is essential.

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> *vFunction has not only accepted our requests and requirements but has also integrated them quickly into the product.*
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> **Ilyas Ozkan**
> *Senior IT Project Manager*

Intesa Sanpaolo: Modernizing Online Banking Applications

As part of Intesa Sanpaolo’s application modernization journey, the management and business stakeholders identified a reference application to refactor from monolith to microservices: FVCB.

FVCB is a platform that provides Online and Corporate Banking services to Intesa Sanpaolo's large user base of small and medium-sized business customers of over 300,000 customers.

The platform itself consists of three monolithic applications, one of which has already been converted into microservices. The manual conversion of the first monolith had been carried out successfully, but through a long process that required significant manual effort. The Bank's IT division was therefore looking for a way to automate and standardize the refactoring process: the aim was to avoid running into the same problems already encountered during the first manual refactoring project and to facilitate mass refactoring going forward.

Intesa Sanpaolo searched for a solution to satisfy the requirements for automating this analysis and refactoring process and selected vFunction for a pilot project on FVCB0. It was agreed that only a high-profile, business-critical application would work to validate the value of the solution and provide sufficient complexity and constraints to assess whether the vFunction platform met the requirements.

The objective of the pilot was to transform FVCB0, one of the FVCB monoliths, into a microservices application, while delivering the three essential business functions provided by the application monolith: import, download and flow management.

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> *vFunction provides a complete topology map of the application by identifying all the services and functions present.*
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> *The ability to aggregate microservices via drag & drop is a plus and the ease of extracting the code needed to build the microservice is astounding.*
>
> **Ciro Ragone**
> *Senior Middleware Administrator*

Understanding vFunction

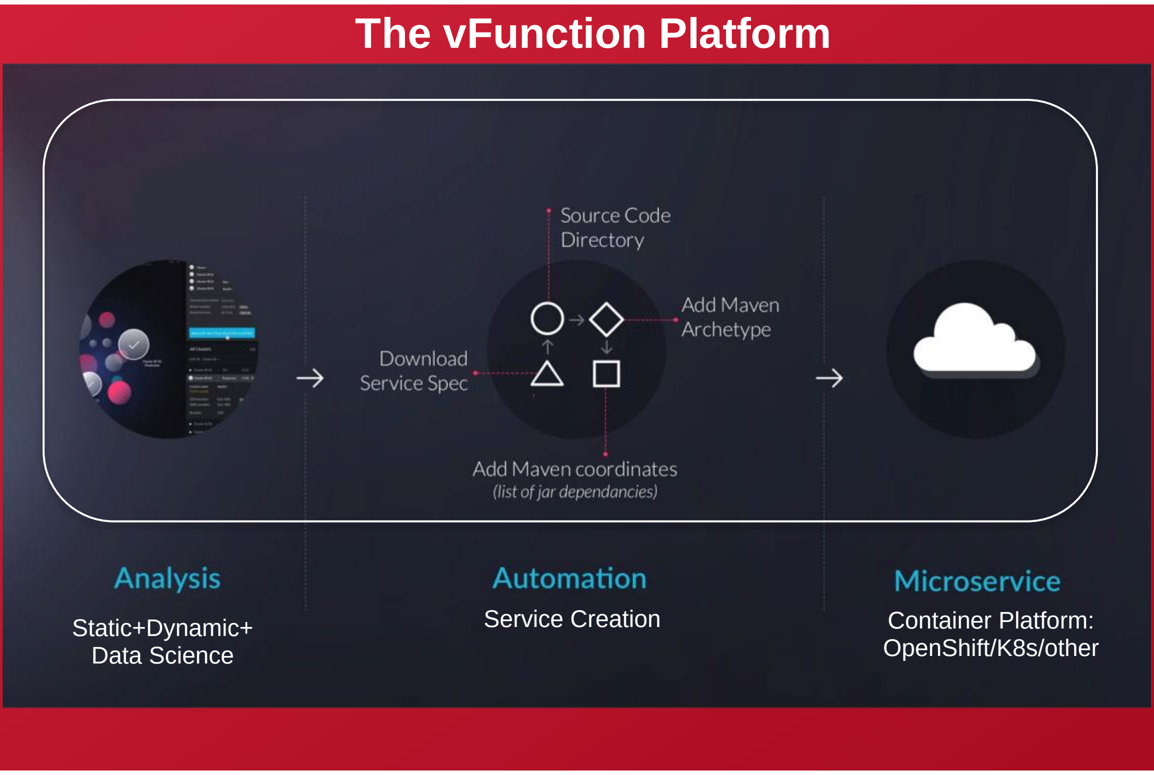
vFunction combines dynamic and static code analysis, deep data science and automation to analyze, identify, and extract services from any Java application. This allows the architect to identify the boundaries of services within a monolith and automatically extract those services into separate projects that can be built, containerized and deployed on any modern infrastructure (e.g. OpenShift or Kubernetes).

By analyzing application flows at runtime, vFunction is able to relate individual application user flows to potential services, analyze a wide range of dependencies, and recommend potential microservices.

It then correlates the dynamic analysis output with the static analysis of the binary files. It takes into account compile-time dependencies, identifies infrastructure jars, minimizes spring/EJB configuration and config file properties.

With all of this information, it not only recommends the services to extract, but also creates potential common services and libraries. Finally, it automatically builds these microservices and libraries based on the original application code using an additional tool provided by vFunction.

The vFunction Platform



Source Code Directory

Add Maven Archetype

Download Service Spec

Add Maven coordinates
(list of jar dependancies)

Analysis
Static+Dynamic+
Data Science

Automation
Service Creation

Microservice
Container Platform:
OpenShift/K8s/other

vFunction not only provides a systematic and repeatable approach to application analysis, it goes even further. By isolating functions and showing relevant source code, vFunction provides a framework that greatly accelerates application refactoring.

This can be achieved by reducing costs in terms of time and labor due to lengthy manual analysis activities: vFunction reduces the time required for refactoring from months to a few days and thus allows teams to focus on innovation instead of being forced to carry forward technical debt.

A key aspect of vFunction is the freedom it provides to development teams. Once monolithic program analysis is done, developers or architects can incrementally determine the best way to split or merge services from within the vFunction platform.

A positive side effect of vFunction is source code cleanup and efficiency as the deprecated functions are not automatically copied to the new microservices.

15x Acceleration – Actual vFunction ROI

	Without vFunction	**With vFunction**	**Factor (ROI)**
Learning	-	3-4h (of testing)	-
Assessment + Analysis	10 Days	2h	40x
Service Extraction (per service)	3-4 Days	2h	12x-16x
Technology upgrade (per service)	4h	4h	-
Total modernization time for a small-medium App with 8 services (with no technology upgrade)	42.5 days	2.75 days	15x
Total modernization time for a small-medium App with 8 services (all inclusive)	46.5 days	6.75 days	7x

Specific POC application stats: ~100,000 lines of code, ~250 classes
"*vFunction enabled us to refactor one of our most complex applications which I thought might never be possible*" - Chief Architect, FinServ customer

> *vFunction was the perfect way for us to refactor the monolithic applications still present in the Intesa Sanpaolo Group. The process will be even faster for simpler, small applications and have a positive impact on the cost of moving all applications to microservices.*
>
> **Andrea Fantechi**
> *Software Engineer*

Solution: vFunction Accelerates Modernization

A collaborative effort between Intesa Sanpaolo and vFunction formed the basis for the pilot's success. During the pilot, Intesa Sanpaolo teams provided extensive feedback and feature requests to the vFunction team. Not only were feature requests accepted, but they were implemented in the product at a steady and sustained pace, making Intesa Sanpaolo a major contributor in the vFunction refinement process.

The refactoring of FCVB0 has brought about some important changes in the development model adopted by Intesa Sanpaolo: the development and release processes have been significantly improved by moving from a traditional “waterfall” development model to a Continuous Integration (CI), Continuous Testing model.

Time-consuming and complex regression testing has been considerably reduced thanks to the substantial simplification of the code into microservices. In turn, this has made code release and rollback activities much leaner, with a positive impact on application agility and availability (reduced downtime for updates).

Before refactoring, FVCB0 was based on Java, and WebLogic. Following the refactoring, the application is now based on JBoss and OpenShift and compatibility tests are underway for portability to the public cloud.

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> *What we found really useful in vFunction is that the approach is based on actual application flows not just code analysis.*
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> *vFunction goes beyond analysis; it also provides us with a platform to create the microservices, isolating those software components that contribute to the business processes in the application.*
>
> *The UI presentation is effective, concrete and the analysis is delivered quickly and clearly.*
>
> ***Andrea Crovagna***
> *IT Architect*

Benefits: Cost, Manageability, & Customer Satisfaction

vFunction has enabled Intesa Sanpaolo to accelerate their modernization journey.

The major improvements that refactoring brought them can be classified into three categories: cost, application management, and customer satisfaction.

From the point of view of costs, the reduction of WebLogic licenses, the saving of time and manpower used in long development/test cycles, and on manual deployment activities, brought substantial savings.

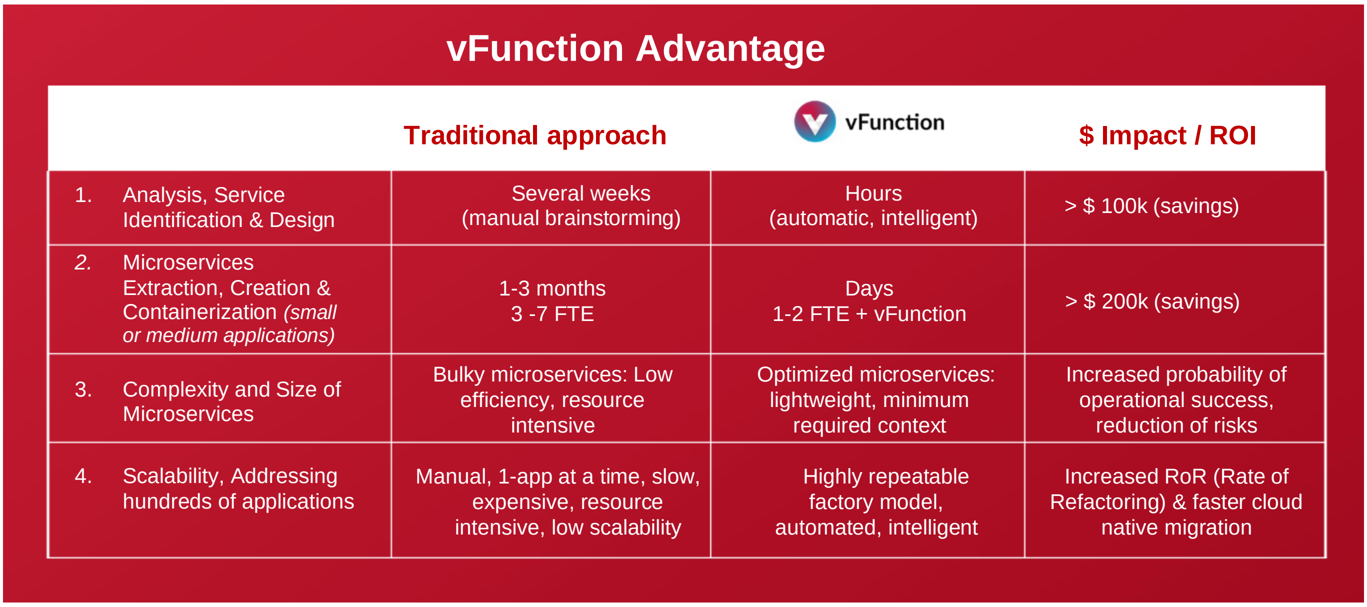
The higher release frequency, combined with the principles of automated deployment to Intesa Sanpaolo's Platform-as-a-Service (PaaS) platform, has made infrastructure management a much leaner experience. Finally, from the customer's point of view, refactoring has allowed for increased stability, better scalability and reduced downtime for updates, increasing customer satisfaction.

In the process of refactoring the FCVB0 monolith into microservices, the impact of vFunction was quantified as follows:

- 4 months of saved work thanks to vFunction
- 3x increase in release frequency
- 25% reduction in regression testing

The collaboration between Intesa Sanpaolo's development, infrastructure and architecture teams and vFunction made this pilot project a success story.

Not only did it validate a systematic and repeatable approach to application refactoring, it also paved the way for a major, continuous and rapid transformation of the bank's application landscape: from monolithic applications to modern microservices.



vFunction Advantage

	Traditional approach	vFunction	$ Impact / ROI
1. Analysis, Service Identification & Design	Several weeks (manual brainstorming)	Hours (automatic, intelligent)	> $ 100k (savings)
2. Microservices Extraction, Creation & Containerization *(small or medium applications)*	1-3 months 3 -7 FTE	Days 1-2 FTE + vFunction	> $ 200k (savings)
3. Complexity and Size of Microservices	Bulky microservices: Low efficiency, resource intensive	Optimized microservices: lightweight, minimum required context	Increased probability of operational success, reduction of risks
4. Scalability, Addressing hundreds of applications	Manual, 1-app at a time, slow, expensive, resource intensive, low scalability	Highly repeatable factory model, automated, intelligent	Increased RoR (Rate of Refactoring) & faster cloud native migration

About Us

vFunction

Founded in 2017, vFunction revolutionizes how businesses modernize their applications.

In a world where cloud computing and technology are advancing rapidly, vFunction observed businesses falling behind in their cloud native journey for applications and software infrastructure.

Outdated legacy systems and a lack of automated, efficient microservice refactoring are dragging down business agility, budgets, and engineering velocity.

vFunction brings a new perspective and advanced technology innovations that transform an organization’s ability to modernize their core business applications and advance their business forward.

TECHUNPLUGGED

TECHunplugged is an innovative company focused on content creation and analysis for the corporate IT market, led by two independent IT veterans: Arjan Timmerman and Massimiliano Mortillaro.

Our mission has two aspects: the first is to help solution providers articulate optimally their messaging and thus reach the appropriate audience.

The second of equal importance is to help customers better understand the market landscape, help them identify their needs and propose optimal solutions. All with a customer-centric approach.

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