

Updating the current Jolie microservices based Document Management System to include electronic invoicing

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1 Introduction

Since 2015, Monrif S.p.A has adopted an eDocument policy aimed to digitalise all the company documents and rationalise all the document correlated processes. The IT department, to implement the policy technically, opted for a microservices solution; the resulting Jolie based microservices architecture (Figure 1) is responsible for the integration of multiple software solutions present in Monrif, making possible the exchange of data and the creation of cross software processes.

Since then, the solution has been expanded several times to include new data, new documents or new processes; this paper looks at how a Jolie based microservices architecture has eased the procedure solution adaptation. To support this statement, this paper presents a real example on the adaptation of the current solution to include the new Italian electronic invoicing regulation.

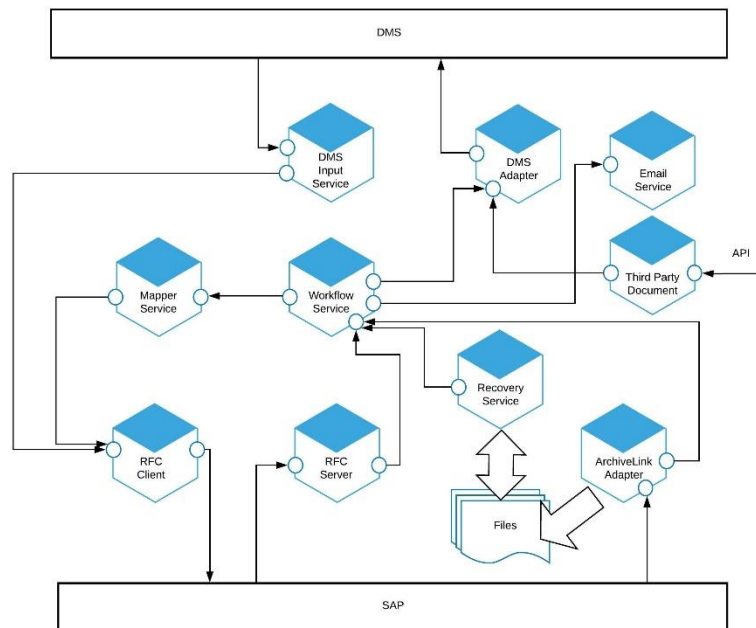


Figure 1: Pre Electronic Invoicing Architecture

2 Electronic invoicing

The Italian government has introduced a new regulation whereby all the produced invoices, from 1st January 2019, need to be dematerialized and sent via an electronic channel. This regulation is part of a broader EU[1,2] effort to digitalise the procurement process, the EU technical committee has indicated the XML file format as the technological choice for the dematerialization of invoice information. In Italy the practical implementation of the European directive has been left to two state own entities: the AgID[3] and SOGEI[4], the later responsible for the development and maintenance of an electronic invoice exchange service accessible via REST API. The access to this API is regulated by a technical and legislative accreditation procedure, which can prove quite burdensome for a single enterprise, therefore many enterprises have opted for the use of a middle third-party service. In the case of Monrif, we use a service provided by our cloud document storing provider.

3 Handling of XML invoice document

Our approach to the entire DMS (Document management system) integration project has been the creation of domain-bounded microservices with specific functionalities that can be used by different clients. The same approach was adopted when the need for a separate microservice to handle XML document was identified. The reason behind this choice were the following:

- i. The implementation of the electronic invoicing package for our main ERP (SAP) required a considerable effort both in terms of financial and organizational resources. Because our current SAP implementation ill fitted the installation of the of both standard active and passive XML invoice packages, due to module and customisation limitations.
- ii. It was our intention to safely decouple the event of a sales/purchase invoice registration from the actual handling of the XML electronic invoice (as illustrated further on). In particular, the sales invoices document format (pdf) produced by SAP had to be maintained due to some business requirement, so by maintain the standard output and devolving the XML creation to a microservice we have been able to maintain unchanged the users' operability (Figure 2)
- iii. It was also identified the need to recover some of the invoice data from not SAP source
- iv. We wanted to use some of the Jolie language features to validate the correctness of the constructed document. The validation was carried out by transforming the electronic invoice document XSD definition into a nested Jolie type that has been then used as an input message for a control operation. By feeding the generated nested value to the controlling operation, any incoherence between the nested value and the expected type would generate a runtime type exception that can be catch and compensated.
- v. Centralize any further XML Document manipulation into a single microservice.

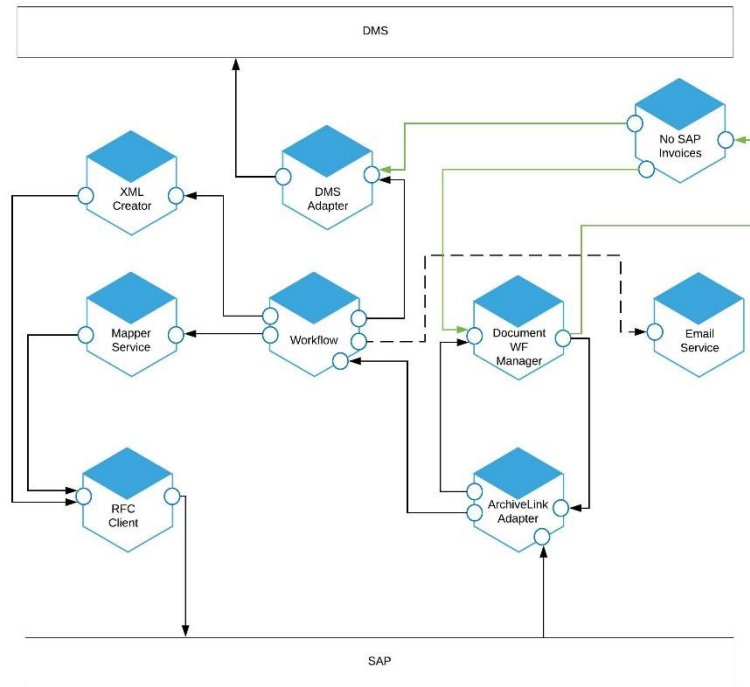


Figure 2: Architecture for sales invoices

4 Early or late archiving

When dealing with purchase invoices there are two main possible approaches: “early registering late archiving” or “early archiving late registering”. The first one foresees the registration of the document in the ERP then the archiving of it in the DMS, the second one inverts the order of the action. The latter is a more natural choice when dealing with electronic document because all the necessary information for the ERP registration are contained in the XML and can be used directly or transformed into an ERP compatible format. In Monrif, we were operating in the “early registering late archiving” yet the introduction of this new approach has been obtained by refactoring some of the preexisting microservices and by introducing a new centralized document workflow manager Jolie microservice (Figure 3).

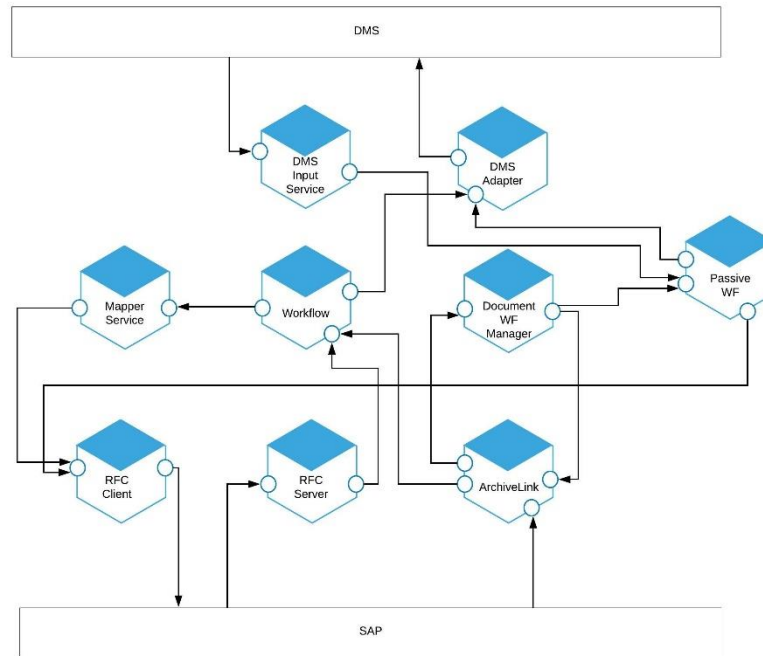


Figure 3: Early or late archiving architecture

5 Document Workflow Manager

This component is fundamental in the refactoring of the DMS integration solution, the rationale behind the creation of this microservices was the necessity to concentrate in single point the definition and management of the document workflow. This component developed, in collaboration with our technical partner italianaSoftware, allowed us to define specific document workflows. Each workflow is expressed as a series of states, the state's behaviour is expressed by simple Jolie code. Each state present in the state machine can fail and the workflow manager will compensate and retry to execute the defined workflow. The document workflow manager also allows any other microservice to load a new state machine and start the execution of one. This approach has allowed us to achieve better separation between the ERP events and DMS events tasking the microservice infrastructure with the processing and creation of XML documents and the management of such process.

6 Looking at the future

We feel confident that our implementation will stand the potential changes in electronic invoicing regulation, we think that the adopted architecture and the Jolie language expressivity will allow it to adapt to the solution without having to revolutionize the overall architecture. The presence of both the document workflow manager and a microservice to handle XML document, will allow us to implement any new XML based electronic documents quickly.

7 References

- [1] https://ec.europa.eu/growth/single-market/public-procurement/e-procurement_en
- [2] https://ec.europa.eu/growth/single-market/public-procurement/e-procurement/e-invoicing_en
- [3] <https://www.agid.gov.it/en>
- [4] <http://www.sogei.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/8>