Final release of the SafeCloud platform

D4.3

Project reference no. 653884

August 2018

European Commission

Horizon 2020
European Union funding
for Research & Innovation

Document information

Scheduled delivery	31.08.2018
Actual delivery	31.08.2018
Version	1.0
Responsible Partner	CYBER

Dissemination level

Public

Revision history

Date	Editor	Status	Version	Changes
27.08.2018	K. Tarbe	Draft	0.1	Initial version
31.08.2018	K. Tarbe	Final	1.0	Addressed the review comments

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Acknowledgements

This project is partially funded by the European Commission Horizon 2020 work programme under grant agreement no. 653884.

More information

Additional information and public deliverables of SafeCloud can be found at http://www.safecloud-project.eu

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Executive summary

This deliverable summarizes the final release of the SafeCloud platform on the SafeCloud website (https://www.safecloud-project.eu/). The main updates since the initial platform release are the inclusion of the missing components, the addition of an integration blueprints figure that shows which components can be used together, and a few example architectures that integrate more than one SafeCloud component.

1 Introduction

The framework proposed by SafeCloud consists of three layers: secure communication, secure storage, and secure queries. Secure communication provides schemes for the establishment of channels amongst protocol participants employing technologies for tamper-resistant channels, ensuring confidentiality and availability. Secure storage provides techniques for reliable storage, such as long-term confidentiality, protection against file corruption or data deletion. Finally, secure queries provide cryptographic constructions from the database storage layer to the end-user processing requests. The overarching idea is to allow system developers to use the techniques provided by these three layers to achieve application-specific deployments. These deployments should surpass the state-of-the-art of existing tools with respect to functionality, performance and security. We recall Figure 1, from the general SafeCloud framework description.

Secure communication	State of the art: TLS secure channels	**Solution:**	**SC1 - Vulnerability-tolerant channels**	**SC2 - Protected channels**	**SC3 - Route-aware channels**
		Gives:	Tolerance to vulnerabilities in components	Decreased risk of fake certificates; resistance to port scans and enumeration of network infrastructure	Improved confidentiality with warnings about route hijacking and making harder access to communication
		API:	Extended secure socket API	Extended secure socket API	Extended secure socket API
		Provided by:	INESC-ID, TUM	INESC-ID, TUM	INESC-ID, TUM
Secure storage	State of the art: Encrypted storage	**Solution:**	**SS1 - Secure block storage**	**SS2 - Secure data archive**	**SS3 - Secure file system**
		Gives:	Block storage on individual data centers with fine control over data placement	Entangled immutable data storage for protection against tampering and censorship	Distributed secure file storage leveraging the secure block storage
		API:	Key/value	REST (S3 or similar)	POSIX-like
		Provided by:	UniNE, INESC TEC	UniNE, INESC TEC	UniNE, INESC-ID
Secure queries	State of the art: CryptDB	**Solution:**	**SQ1 - Secure database server**	**SQ2 - Secure multi-cloud database server**	**SQ3 - Secure multi-cloud application server**
		Gives:	Privacy of data against the server	Privacy of data against non-colluding servers	Privacy of data against non-colluding servers and clients
		API:	SQL	SQL	SQL
		Provided by:	INESC TEC	INESC TEC, Cyber	Cyber

Figure 1: Components of the SafeCloud architecture.

The SafeCloud platform is a set of solutions that are being developed in the SafeCloud project.

The components are listed on the SafeCloud public website under the platform menu and are also directly accessible at http://www.safecloud-project.eu/platform/. The landing page for SafeCloud platform mimics the SafeCloud architecture as can be seen on Figure 2. For the final release of the platform we updated the landing page with a figure and text about which components can be used together. The new and updated landing page can be seen on Figure 3.

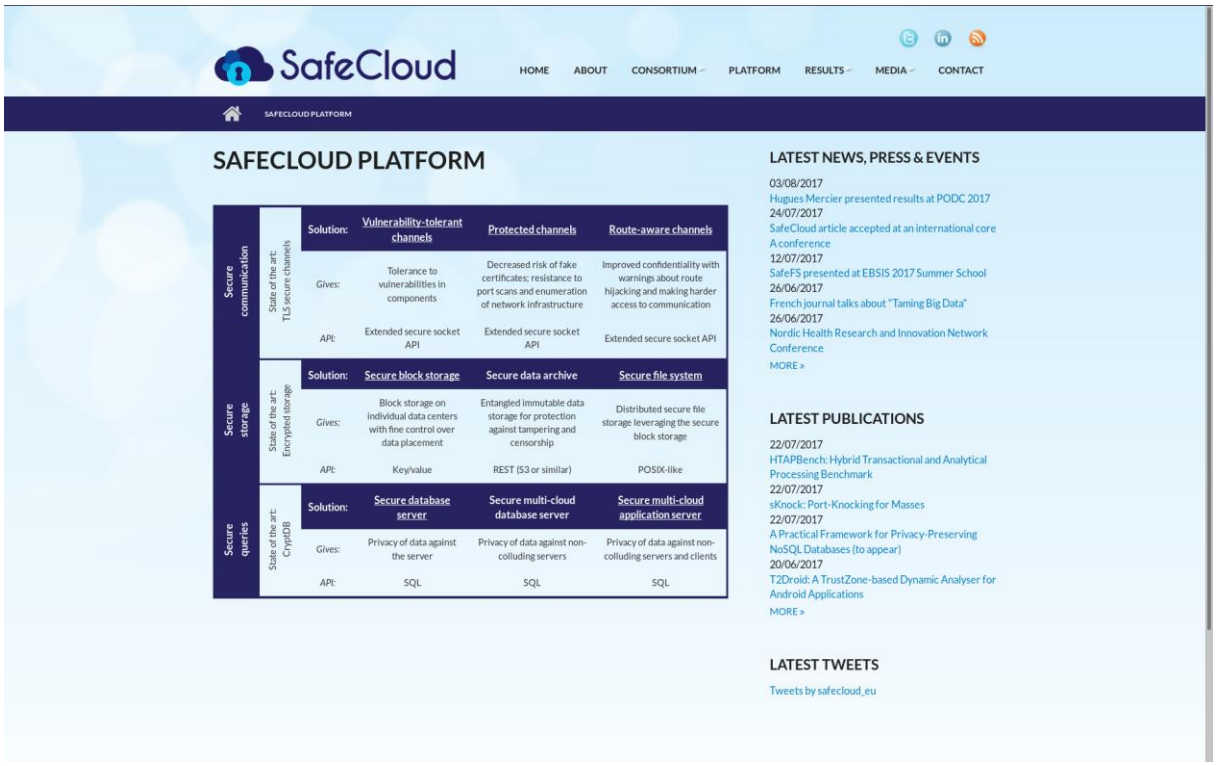

Figure 2: The landing page of SafeCloud platform from the initial release on the SafeCloud website.

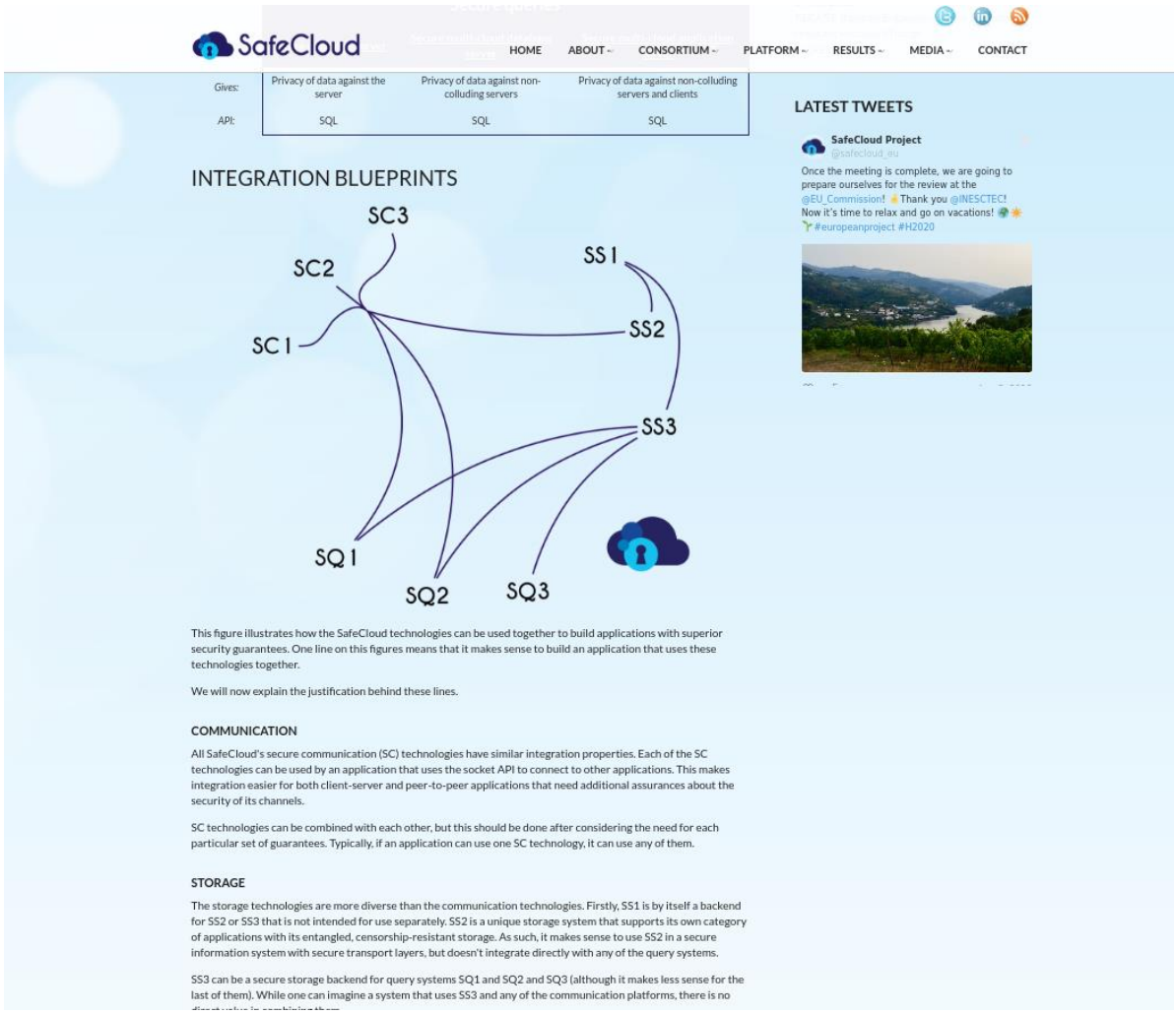

Figure 3: The updated version of the platform landing page also features integration blueprints.

We also created two example architecture diagrams that show how you can use multiple SafeCloud components together. The examples are linked from the platform landing page and for reference we also include the links here:

- https://www.safecloud-project.eu/platform/example1
- https://www.safecloud-project.eu/platform/example2

2 Content

The subpage for each solution contains information about where to obtain said solution, and instructions on how deploy it. Additional information like scientific publications and relevant public SafeCloud deliverables are also linked.

For the final release we updated each solution subpage with the most recent guides, GitHub links and related publications. For an example, the subpage for SafeCloud Secure queries layer solution 1 can be seen on Figure 4.

We favour Docker containers for distributing our software. Docker containers are easy to set up, test and deploy. These properties are paramount for the adoption of the SafeCloud technologies.

Figure 4: An example of a subpage describing one SafeCloud platform component.

We also updated the Products and solutions page which can be seen on Figure 5. There are descriptions for all the industrial partners. In addition Maxdata and Cloud & Heat, the two industrial partners that had use cases, describe how SafeCloud solutions have helped them.

PLATFORM / SAFECLOUD PRODUCTS AND SOLUTIONS

SAFECLOUD PRODUCTS AND SOLUTIONS

The components developed by the SafeCloud consortium are integrated in the following solutions and products:

CLOUD&HEAT

Since founded as AoTerra back in 2011 the primary focus of Cloud&Heat is to integrate energy efficiency with state of the art safe cloud computing and storage services. Cloud&Heat (C&H) has developed two use cases in the context of the SafeCloud project that represent two product pilots of the company. Both pilots are storage solutions backed by the Ceph distributed storage software. They are described in detail in D5.5. There C&H shows that SafeCloud technology can be fully integrated into C&H products. The SafeCloudBox product relies on the SafeCloud File System (SafeCloudFS, SS3) to provide customers with a secure and fault-tolerant data storage solution. The CloudBlockStorage product extends C&H's block storage cloud offer with inter-datacenter security by using the SafeCloud Private Communication Middleware (SC2).

CLINIdATA®
eHealth|one solution

Maxdata develops and commercializes the CLINIdATA® healthcare software line of products. These products are used to manage clinical laboratories and store results of clinical tests, among other personal data. Since 1978, this software has been delivered to customers by installing it on their premises. This approach has allowed Maxdata to conquer most of the Portuguese market – currently it is present in more than 80% of national public hospitals – but now the company wants to sell CLINIdATA® abroad and one of the ways is to deploy it on the cloud and sell it as a service (SaaS).
However, when moving to the cloud, additional mechanisms are needed to ensure an adequate protection of personal data given that a single breach may destroy company credibility. In the case of CLINIdATA®, as in many other information systems, one component is of paramount importance: the relational database management system (DBMS). SafeCloud provides Maxdata DBMS-like Secure Queries Solutions able to guarantee the classic ACID properties, with an SQL interface, and, at the same time, protect personal data from potential adversaries such as cloud providers, hackers and unauthorized government agencies.

Cybernetica is a R&D intensive technology company that researches, develops and manufactures software solutions as well as maritime surveillance and radio communications systems. It also investigates and

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Figure 5: Updated Products and Solutions page.