



encrypt

A scalable and practical
privacy-preserving framework

Brief Summary

ENCRYPT Newsletter Issue #2

Contents

1. Brief Summary
- 2-3. Project Achievements
4. Scientific publications
- 5-6. Events
7. Learn more

We are pleased to announce the publication of the 2nd issue of our newsletter!

We are pleased to announce the publication of the 2nd issue of ENCRYPT newsletter!

ENCRYPT is a 3-year Research and Innovation Action which started in July 2022, and is funded under Horizon Europe. The Consortium consists of 14 experienced and committed partners, namely 2 industrial partners, 3 SMEs, 1 start-up, and 8 research centers universities, spread around 8 EU countries.

ENCRYPT will develop a scalable, practical, and adaptable privacy preserving framework which allows researchers and developers to process data stored in federated cross-border data spaces in a GDPR compliant way. Within this framework, a recommendation engine for citizens and end-users will be developed, providing them with personalised suggestions on privacy preserving technologies based on the sensitivity of data and the trade-off between the degree of security and the overall system performance.

The ENCRYPT framework will consider the needs and preferences of the relevant actors, and will be validated in a comprehensive, 3-phase validation campaign. Those 3 phases are i) in-lab validation tests; ii) use cases provided by consortium partners in three sectors, namely the health sector, the cybersecurity sector, and the finance sector, that include cross-border processing of data; and iii) external use cases including privacy preserving computations on federated medical datasets.

Our newsletter is published twice a year, offering updates on the latest news and advances of the project!

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Project Achievements

This second issue of ENCRYPT newsletter covers a period of 6 months from January to June 2023. Activities on all technical Work Packages started in this period. An account per active Work Package of early project achievements based on the progress of initial work is summarised below.

Requirements and architectural design [WP2]

Most of the efforts focused on the first deliverable of WP2, namely D2.1 "*Legal, ethics, and user requirements, technical specifications and ENCRYPT architecture interim report*", that has presented the project use cases in three different domains, namely Medical, Fintech, and Cyberthreat Intelligence (CTI) and defined the user, functional, and non-functional requirements through several interactions among the consortium technical partners and the end-user responsible for each use case. The Deliverable has also specified the ethical and legal requirements that are essential and have to be considered throughout the development cycles of the project's technical offerings. Based on the elicited requirements technical specifications of the ENCRYPT platform as well as of the privacy-preserving tools have been provided. Deliverable D2.1 has reported on the initial results of the ENCRYPT platform design and contained a preliminary version of the platform architecture that combines privacy-preserving data processing tools and supportive technologies to allow end users to perform computation on sensitive data in scalable and secure fashion.

Privacy-preserving computation technologies [WP3]

Our project has made significant progress in Work Package 3, focusing on "Privacy-Preserving Computation Technologies." As part of our collaborative efforts, all partners have made substantial advancements in designing hybrid tools tailored to the project's specific use-cases. These tools encompass *Homomorphic Encryption*, *Trusted Execution Environments*, *Differential Privacy*, and *Hardware Acceleration*, each playing a crucial role in ensuring privacy while enabling efficient computation. **Homomorphic Encryption** is a cryptographic technique that allows computations to be performed directly on encrypted data, ensuring confidentiality throughout the process. **Trusted Execution Environments** provide secure enclaves where sensitive computations can be executed, protecting data from unauthorized access. **Differential Privacy** ensures that statistical analysis on datasets does not reveal individual-level information, striking a balance between data utility and privacy. Furthermore, we are actively exploring the integration of **Hardware Acceleration** techniques to optimize the computational performance of privacy-preserving operations. Through the collaborative efforts of all partners, our project is achieving significant milestones in the design of these hybrid tools. These advancements pave the way for robust privacy-preserving computation technologies, enabling secure and efficient processing of sensitive data in various real-world use-cases.



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Project Achievements

Privacy-supporting technologies [WP4]

On WP4, during the first half of 2023, significant progress was made in developing technologies and methodologies aimed at supporting ENCRYPT project, focusing on user-friendliness. More specifically:

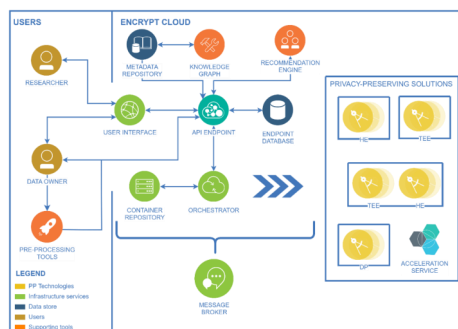
- ◆ The development of a prototype data pre-processing tool and a methodology for identifying Personally Identifiable Information (PII) on various data formats on the three domains of the ENCRYPT project, namely Finance, Health, and cybersecurity was initiated.
- ◆ A semantic layer was introduced on top of the available data relevant to the use cases. Well-established ontologies were identified for the project domains and progress was made in developing the Knowledge Graph Construction Module.
- ◆ A review was conducted of existing risk assessment methodologies and a preliminary version of the ENCRYPT privacy risk assessment methodology was started.
- ◆ The first version of the recommendation engine was started to be developed based on the user and tool owners' requirements.
- ◆ The UI and backend requirements for each tool were identified. Also, continual discussions were conducted to address the relations and integration between all the tasks of WP4, both within the front-end and back-end, as well as within the general architecture.

In general, throughout the first half of 2023, WP4 made significant progress in developing essential technologies and methodologies, paving the way for the successful deployment of ENCRYPT's technologies in real-world use cases with a focus on user-friendliness.

Integration, validation, and evaluation [WP5]

In WP5, the first 6 months of 2023 substantial effort has been made on the integration validation and evaluation activities of the project focusing more on the processes and infrastructure to be used for the remote integration tests between the different ENCRYPT modules, services and components. More specifically, based on the first version of the system architecture defined in WP2 activities the following milestones have been achieved.

- ◆ The 1st version of the Integration and validation plan has been defined, shaped and adopted by the technical partners
- ◆ The appropriate tools and platforms supporting the integration activities has been defined and fixed. These cover the *Hosting Platform* of the ENCRYPT system, the *Deployment* solution, the *Container Image registry*, the *Interconnections* between software modules and services, and the *Communication Bus* to facilitate the communications between the modules
- ◆ The virtual cloud environment and respective tools for the remote integration testing have been defined and shaped
- ◆ Established a VPN service and respective accounts between the partners have been created to be used during the integration testing
- ◆ Initial version of the data flows between identified between the ENCRYPT modules and services
- ◆ 1st version of the APIs has been defined for the ENCRYPT's supportive technologies
- ◆ 1st version of the testbeds was defined and shaped
- ◆ 1st version of the Functional and non-functional tests of the software modules have been defined and reported.



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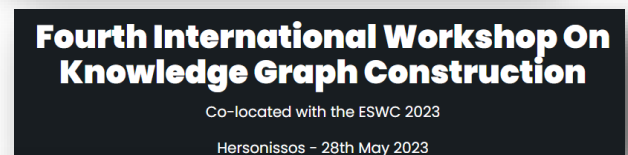
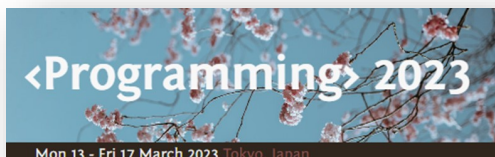
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Scientific publications

Scientific publications

We present a list of papers submitted and accepted during the period January-June 2023 that carry acknowledgement of ENCRYPT project. For the complete list of research papers, please visit <https://encrypt-project.eu/downloads/publications/> or the [ENCRYPT community page](#) directly at ZENODO.

- ◆ Athanasios Stratikopoulos, Florin Blanaru, Juan Fumero, Maria Xekalaki, Orion Papadakis, & Christos Kotselidis. (2023). *Cross-Language Interoperability of Heterogeneous Code*. In MoreVMs'23.
[Download from ZENODO](#)
- ◆ Amalia Georgoudi, Nikolaos Stylianos, Ioannis Konstantinidis, Georgios Meditskos, Thanassis Mavropoulos, Stefanos Vrochidis, & Nick Bassiliades. (2023, April 11). *Towards Knowledge Graph Creation from Greek Governmental Documents*. 36th International Conference on Industrial, Engineering & Other Applications of Applied Intelligent Systems.
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- ◆ Papadakis, O., Andronikakis, A., Foutris, N., Papadimitriou, M., Stratikopoulos, A., Zakkak, F., Xekalakis, P., & Kotselidis, C-E. (Accepted/In press). *Scaling Up Performance of Managed Applications on NUMA Systems*. Paper presented at The 2023 ACM SIGPLAN International Symposium on Memory Management (ISMM 2023), Florida, United States.
[Download from ZENODO](#)
- ◆ Siachos, I., Kaltakis, K., Papachristopoulou, K., Giannoulakis, I., & Kafetzakis, E. (Accepted). *Comparison of Machine Learning Algorithms trained under Differential Privacy for Intrusion Detection Systems*. 2023 IEEE CSR Workshop on Privacy-Preserving Data Processing and Analysis (2P-DPA)
[Download from ZENODO](#)
- ◆ Christina Karalka, Georgios Meditskos, & Nick Bassiliades. (Accepted). *Towards Semantic Interpretation of Structured Data Sources in Privacy-Preserving Environments*. 4th International Workshop On Knowledge Graph Construction (KGCW2023)
[Download from ZENODO](#)



ISMM 2023

Sun 18 Jun 2023 Orlando, Florida, United States co-located with PLDI 2023



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Events

Events

Check out all ENCRYPT project updates at <https://encrypt-project.eu/communication/encrypt-news/>

ENCRYPT at the European Network for Cybersecurity (NeCS) PhD School



ENCRYPT contributed to this year's edition of the European Network for Cybersecurity (NeCS) PhD School. Our colleague Luigi Romano from TrustUp gave a lecture titled: "Hardware-assisted Trusted Computing: State of The Art and Emerging Use Cases". Read more <https://encrypt-project.eu/communication/news/encrypt-at-the-european-network-for-cybersecurity-necs-phd-school/>

ENCRYPT participated to a project cluster meeting

A project clustering meeting was organized in Vason (IT), to create synergies among projects funded under HORIZON-CL3-2021-CS-01. Giovanni Mazzeo from TrustUp presented the approach ENCRYPT has taken to provide protection to IoT devices throughout their lifecycle. Read more <https://encrypt-project.eu/communication/news/encrypt-participated-to-the-project-cluster-meeting/>



ENCRYPT partner TiU joins the Stakeholder Board of CYBERSPACE project



Our colleague, Dr. Irene Kamara from project partner Tilburg University (TiU), joined the Stakeholder Board of the CYBERSPACE project, funded by the EU's Internal Security Fund – Police Programme. Read more <https://encrypt-project.eu/communication/news/encrypt-partner-tiu-joins-the-stakeholder-board-of-cyberspace-project/>

ENCRYPT at MoreVMs'23

Our colleague, Athanasios Stratikopoulos, from project partner UNIMAN, delivered a presentation in the 7th MoreVMs workshop that acknowledges ENCRYPT. He was also the workshop co-organiser. The event took place in Tokyo, Japan on March 13th, as one of the tracks of 'Programming' 2023. Read more <https://encrypt-project.eu/communication/news/encrypt-at-morevms23/>



ENCRYPT was presented to KINAITICS Consortium



ENCRYPT project has been presented to the members of KINAITICS consortium, during their 2nd Plenary in Pisa, on March 20 and 21, 2023. Project KINAITICS, aims to explore the new attack opportunities offered by the introduction of AI-based control and perceptive systems, as well as those offered by combination of behavioural understanding of physical systems and cyber-attacks. Read more <https://encrypt-project.eu/communication/news/encrypt-was-presented-to-kinaitics-consortium/>

ENCRYPT @ AICRYPT 2023

Our colleagues from project partner CEA participated in the 3rd Workshop on Artificial Intelligence and Cryptography (AICRYPT 2023), organised in Lyon, France, on April 22, 2023, where they gave a contributed talk. Read more <https://encrypt-project.eu/communication/news/encrypt-aicrypt-2023/>



ENCRYPT @ DEFEA2023



ENCRYPT was demonstrated at the Defence Exhibition Athens 2023. Our colleagues from project partner Eight Bells Ltd. participated in DEFEA2023 with a booth, where they promoted ENCRYPT, among other cybersecurity and defence products and research projects. Read more <https://encrypt-project.eu/communication/news/encrypt-defea2023/>



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ENCRYPT @ CypSec2023



Our colleague from Eight Bells Ltd., Demetris Antoniou, Senior Cybersecurity Manager, gave a speech on the importance of preserving truth in military settings and its impact on defense and cybersecurity, during the CYPSEC 2023, organised on 15-16 May 2023, at Nicosia, Cyprus. Read more <https://encrypt-project.eu/communication/news/encrypt-cypsec2023/>

ENCRYPT @ SMI2G event

Our colleagues from project partner EXUS AI Labs, Ioannis Lazarou and Roberto Maffulli, from TRUSTUP, Salvatore D'Antonio and Luigi Romano, and from project partner DBC, Nikos Avgerinos, attended the SMI2G brokerage event in Paris, promoting ENCRYPT. Read more <https://encrypt-project.eu/communication/news/encrypt-smi2g-event/>



ENCRYPT @ EUROFED2023



Our colleague from Eight Bells Ltd, Mr. Dimitris Nodaros, attended EUROFED 2023. The event was organised in Toulon, France, on May 31, 2023. During the event he had the opportunity to promote ENCRYPT through discussions and by handing out the project's 3-fold flyer. Read more <https://encrypt-project.eu/communication/news/encrypt-eurofed2023/>

2nd Plenary Meeting & Clustering Event

ENCRYPT partners got together for the 2nd Plenary meeting of the project, which took place in a hybrid form on May 30-31, 2023. The physical part of the event was kindly hosted by ENCRYPT's Technical Coordinator, TRUSTUP, at Procida, Italy. Read more <https://encrypt-project.eu/communication/news/2nd-plenary-meeting-clustering-event/>



Interim Review Meeting



We are pleased to report the successful organisation of the Interim Review Meeting, which included fruitful discussions and insightful recommendations. The meeting took place online, on June 14, 2023. Read more <https://encrypt-project.eu/communication/news/interim-review-meeting/>

ISMM23

Our colleague from UNIMAN, Dr. Orion Papadakis, attended ISMM 2023, which took place on June 18, 2023, in Orlando, Florida, USA. He presented his accepted paper on how to scale up the performance of Java applications on multi-core NUMA systems. Read more <https://encrypt-project.eu/communication/news/ismm23/>



ENCRYPT at ECCWS2023



The scalable and practical Privacy-Preserving framework that we are currently designing and developing in ENCRYPT has been the theme of the technical poster accepted at the ECCWS2023. Read more <https://encrypt-project.eu/communication/news/encrypt-at-eccws2023/>

EU Cybersecurity: Collective Resilience Through Regulation

Our colleague, Dr. Irene Kamara from TiU, and the Tilburg Institute for Law, Technology, and Society, co-organised a conference on "EU Cybersecurity: Collective Resilience Through Regulation". The event took place on June 22nd 2023, in Brussels, hosted at Campus Brussels, an intra-faculty hub of Maastricht University. Read more <https://encrypt-project.eu/communication/news/1811/>



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ENCRYPT project in a nutshell

Fact sheet

Project Title	A scalable and practical privacy-preserving framework
Acronym	ENCRYPT
GA No	101070670
Start	01 July 2022
End	30 June 2025
Budget	4.392.540 €
EU Funding	4.392.540 €
Call	HORIZON-CL3-2021-CS-01
Funding	RIA - Research and Innovation action
Topic	HORIZON-CL3-2021-CS-01-04

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