



# MORPHEMIC

## Final Dissemination and Communication Report and Plan

Modelling and Orchestrating heterogeneous  
Resources and Polymorphic applications for  
Holistic Execution and adaptation of Models  
In the Cloud

H2020-ICT-2018-2020  
Leadership in Enabling and Industrial  
Technologies: Information and  
Communication Technologies

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### Executive summary

This document presents a report of dissemination and communication activities carried out within the MORPHEMIC project. The deliverable describes a mix of channels, tools, and activities that have been used in order to reach the project's target audience and objectives. As assumed, our efforts to maximise the reach of MORPHEMIC and its chances for exploitation included both proven, traditional approaches, such as scientific conferences and industry events, as well as a constant presence in the most popular social media.

The purpose of this document is to report in detail the dissemination and communication activities carried out within the MORPHEMIC project scope. This deliverable is closely connected to the preceding MORPHEMIC deliverable *D7.1 Initial Dissemination and Communication Report and Plan* and is considered its continuation, referring to the initial dissemination and communication strategy outlined there and providing a further report on actions leading to sharing the information and project results with the relevant, wide audience.

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## 1. Introduction

Dissemination and communication (D&C) are an integral part of every Horizon 2020 project. Their role is essential for the project to be considered successful and profitable after the end of its duration. Table 1. clearly and concisely presents the meaning of these activities, as well as the reasoning behind them, helping to understand their nature. Having in mind this undoubtedly great importance of D&C tasks, as well as further project exploitation, MORPHEMIC partners put much effort into the activities focused on reaching the targeted audience and publicly sharing the project outcomes, to increase the chances of exploitation of MORPHEMIC final results.

*Table 1 Communication, dissemination and exploitation objectives*

|  <b>COMMUNICATION, DISSEMINATION &amp; EXPLOITATION</b>  |  |  |
|---|--|--|
| <b>COMMUNICATION</b><br>Promote your actions and results  | <b>DISSEMINATION</b><br>Make your results public   | <b>EXPLOITATION</b><br>Make concrete use of results  |
| <b>Target groups</b>   | <b>Target groups</b>    | <b>Target groups</b>    |
| Multiple audience: citizens, media, stakeholders, etc.  | Scientists, industries, authorities, policymakers, sectors of interest, civil society and others that can learn from the results   | Researchers, industries, SMEs, authorities, industrial authorities, policymakers, sectors of interest, civil society, and others that can make a good use of the project's results   |
| <b>Measures</b>    | <b>Measures</b>   | <b>Measures</b>   |
| <ul style="list-style-type: none"> <li>• Having a well-designed strategy</li> <li>• Conveying clear messages</li> <li>• Using the right media channels</li> </ul>   | Publishing your results on: <ul style="list-style-type: none"> <li>• Scientific magazines</li> <li>• Scientific and/or targeted conferences</li> <li>• Databases</li> </ul>  | <ul style="list-style-type: none"> <li>• Creating hardware, prototypes, software</li> <li>• Sharing knowledge, skills, data</li> </ul>   |
| <b>Timing</b>    | <b>Timing</b>   | <b>Timing</b>   |
| From the start of the action until the end  | At any time, and as soon as the action has results   | Towards the end and beyond, even as the action has exploitable results   |
| <b>Reasons of actions</b>    | <b>Reasons of actions</b>   | <b>Reasons of actions</b>   |
| <ul style="list-style-type: none"> <li>• Engage with stakeholders</li> <li>• Attract the best experts to your team</li> <li>• Generate market demand</li> <li>• Raise awareness of how public money is spent</li> <li>• Show the success of European collaboration</li> </ul> | <ul style="list-style-type: none"> <li>• Maximise results' impact</li> <li>• Allow other researchers to go a step forward</li> <li>• Contribute to the advancement of the state of the art</li> <li>• Make scientific results a common good</li> </ul> | <ul style="list-style-type: none"> <li>• Lead to new legislation or recommendations</li> <li>• For the benefit of innovation, the economy and the society</li> <li>• Help to tackle a problem and respond to an existing demand</li> </ul> |
| Table based on the European Commission's handbook available at <a href="https://ec.europa.eu/horizon/handbook/">https://ec.europa.eu/horizon/handbook/</a>  |  |  |

### 1.1 Purpose of the document

The purpose of this deliverable is to report the dissemination and communication activities carried out within the MORPHEMIC scope during the whole duration of the project, from month 1 to month 42. This document refers to MORPHEMIC deliverable D7.1 *Initial Dissemination and Communication Report and Plan* and is its continuation, providing information about the implementation of the initial D&C strategy described in the document, as well as pointing out the actions taken to spread the information about the project and its results to the wide audience.



## 1.2 Structure of the document

This document consists of the following sections:

1. **Introduction**, which explicates the purpose of the deliverable, the audience and synergy between communication, dissemination and exploitation,
2. **Objectives**, which points out the reached project's goals and effects of the consortium work in reaching and sharing information about project and its results,
3. **Target Groups**, which describes the audience of the MORPHEMIC project and their main focus,
4. **Communication activities** broadly describes all communication activities undertaken by the project partners within the whole duration of the project and already planned future communication activities,
5. **Dissemination reporting**, which describes all dissemination activities undertaken by the project partners within the whole duration of the project and already planned future dissemination activities,
6. **Partners' channels**, shows partners engagement in the communication of the MORPHEMIC activities and dissemination of the project's results,
7. **Report on initially scheduled communication and dissemination activities** refers to the preliminary strategy for communication and dissemination tools and activities providing the status of the activities which have been carried out during the project,
8. **Related deliverables** section describes two other deliverables related to deliverable D7.2,
9. **Conclusions** gives overview of the communication and dissemination importance in the project.

## 1.3 Audience of the document

The deliverable is directed to all partners and contributors of the MORPHEMIC project and to every person who participated in communication and dissemination activities:

- Academic – participants working in university environments; scientists and researchers,
- Industrial – employees of private or public companies or corporations, mostly in the Information Technology sector.

This document is also addressed to all those interested in the actions taken to spread the information about the MORPHEMIC project and share its results among the targeted groups.

## 1.4 Synergy of communication, dissemination and exploitation

Communication and dissemination activities are closely connected and overlapping in many aspects. Thus, to be efficient and effective all goals connected respectively to communication and dissemination activities were supported, but activities were treated mostly as indivisible with much reuse of materials and positive feedback loops. Considering this and the fact that both D&C activities lead to the successful exploitation of the results, both communication and dissemination are described together in this and the previous MORPHEMIC deliverable D7.1 *Initial Dissemination and Communication Report and Plan*.

In the chosen communication and dissemination strategy one of the most important messages to communicate was that the MORPHEMIC project is based on the results of the MELODIC project, finished with success in January 2020. We called it: MORPHEMIC powered by MELODIC.

MORPHEMIC, as a unique way of adapting and optimizing Cloud computing applications, extends the MELODIC multi-cloud platform by simplifying cloud application modelling and continuously optimizing and morphing the deployment model to take advantage of beneficial cloud capabilities. This information was inserted on the project website, provided through social media messages as well as included on communication materials and conveyed through other activities within the project lifetime.

In this deliverable, we focus not only on communication and dissemination synergistic activities, aimed at promoting the project and its results to the world. We also focus on the third element, considering all activities carried out under the label of D&C we used to provide the solid foundation for further exploitation of developed tools and knowledge gained during the work on the project.



## 2. Objectives

All the objectives of the MORPHEMIC presented in deliverable D7.1 *Initial Dissemination and Communication Report and Plan* considered as a key to the success of the communication and dissemination strategy, have been carried out during the lifespan of the project. The consortium engaged **academic units** (scientists and researchers), **SMEs**, **data-intensive application providers and developers**, **cloud service providers**, **developers from the Open-Source community** as well as **large companies** and other relevant groups in order to explain all the objectives and results of the MORPHEMIC project and offer benefits that came out from the project and may change the previous perspective of the audience.

In order to achieve these objectives, we carried out many D&C activities, including:

- Clustering with 7 projects and initiatives,
- Open-source community with OW2,
- Presented our project at over **80** business events (including conferences, webinars, workshops, internal meetings with companies, and business face-to-face meetings),
- Participated in **25** scientific events (including scientific workshops, webinars, scientific launches),
- **20** accepted scientific papers,
- **19** videos including:
  - **6** use case videos prepared by business partners,
  - **1** professional MORPHEMIC video presentation,
- Active participation in the H-CLOUD community events and meetings – 23 meetings in total (22 internal Communication Task Force meetings and 2 workshops organised with H-CLOUD projects),
- **20** accepted scientific publications and 13 with on-going status,
- **3** self-organized webinars engaging SMEs, large companies, and scientists,
- **1529** followers on the MORPHEMIC social media:
  - **1363** LinkedIn
  - **124** Twitter
  - **42** Facebook
- **7** paid ads published on LinkedIn.

In our strategy, we used the benefits coming from the Melodic project and communicated, that **MORPHEMIC is powered by MELODIC**, which also let us share some of the project-related messages with the use of Melodic website and social media channels.

### 2.1 Target Groups

The main target groups of the MORPHEMIC project were defined and described in D7.1 and are presented in Table 2, together with their main focus. Within the dissemination and communication activities, we tried to adjust the messages to the type of audience making them as effective as possible.





Table 2 Target audience

| Id | Audience group   | Specific focus adapted to the audience group   |
|----|--|--|
| 1  | <b>Members of Cloud and big-data research communities</b>                                  | 1 Keeping up to date with the newest trends and solutions<br>2 Deep understanding of cloud technologies<br>3 Making use of available solutions for their projects<br>4 Promoting their projects, research and work |
| 2  | <b>Opinion leaders and influencers (experts, industry analysts, bloggers, journalists)</b> | 5 Keeping up to date with the newest trends and solutions<br>6 Engaging stories they can tell<br>7 Proven use cases<br>8 Self-promotion  |
| 3  | <b>Cloud educators</b>   | 9 Step-by-step educational materials<br>10 Engaging stories they can tell<br>11 Practical approach: how I can use this<br>12 Self-promotion  |
| 4  | <b>Computing-focused academic units – administrative side</b>                              | 13 Sharing resources both non-profit and for-profit<br>14 Operational benefits and improvements  |
| 5  | <b>Computing-focused academic units – tech side</b>  | 15 Ease of use of MORPHEMIC<br>16 Team workload  |
| 6  | <b>SMEs and other data-intensive application providers – the business side</b>             | 17 Time-to-market<br>18 Cost-related issues<br>19 Business benefits<br>20 Stability  |
| 7  | <b>SMEs and other data-intensive application providers – the tech side</b>                 | 21 Ease of use of MORPHEMIC<br>22 Team workload<br>23 Stability issues<br>24 Product-Project match<br>25 Barrier to entry  |
| 8  | <b>Large companies – business side</b>   | 26 Cost related issues<br>27 Business benefits<br>28 Stability   |
| 9  | <b>Large companies – tech side</b>   | 29 Team workload<br>30 Automation<br>31 Support<br>32 Quality  |
| 10 | <b>Cloud providers – the business side</b>   | 33 Promoting their offer<br>34 Fighting for market share<br>35 Making their services easy to use and access  |
| 11 | <b>Cloud providers – tech side</b>   | 36 Ease of use of MORPHEMIC<br>37 Team workload<br>38 Stability issues   |
| 12 | <b>Open-Source developers and other Open-Source contributors</b>                           | 39 Ability to use MORPHEMIC as a platform for their projects<br>40 Understanding how their code is used in MORPHEMIC<br>41 Quality of code<br>42 Stability issues  |



| Id | Audience group                                      | Specific focus adapted to the audience group                              |
|----|---|---|
|    |   | 43 Barrier to entry   |
| 13 | <b>Other H2020 project participants and leaders</b> | 44 Promoting their projects<br>45 Seeking partners to reach and publicity |
| 14 | <b>Other interested parties</b>                     | 46 Everyone interested in MORPHEMIC outcomes and exploitable assets       |

### 3. Communication activities

#### 3.1 Website

The MORPHEMIC website<sup>1</sup> was a centrepiece for all activities of the project. It has been enhanced with high-quality visual design and illustrations, making the MORPHEMIC brand more approachable and easier to remember. Also, the navigation on the website is user-friendly: easy and intuitive, for the best experience of the visitors. Over the years, the website has become the repository of all relevant information about the project. There have been published:

- Project general overview and its objectives,
- Work packages description,
- Information about the consortium and team members,
- Use cases descriptions along with the videos,
- Public deliverables,
- List of available scientific publications and their sources,
- Non-scientific articles,
- Information about projects/initiatives from the cluster,
- Contact information, including relevant email addresses, demo request form and MORPHEMIC social media accounts.

All materials have been presented in an easily accessible, audience-friendly form. The content has been published frequently, accordingly to the project's progress, and recently carried out dissemination and communication activities. The announcements of upcoming events have been presented on the MORPHEMIC homepage, to provide the easiest possible access to interesting news, and make it least demanding, to be up to date for the projects' followers.

The website, besides being a source of information about the project itself, also contains evidence of our efforts to reach as many people as possible, maximising the results of D&C activities, in order to prepare a foundation for the exploitation of MELODIC solution with the MORPHEMIC extension.

The MORPHEMIC deliverable D8.5 *Final Project Website and Advertising Materials* will provide further information about the role of the website and social media channels, LinkedIn<sup>2</sup>, Twitter<sup>3</sup>, Facebook<sup>4</sup>, at the final phase of the project, containing statistics, charts, and other relevant information. The final version of the sustainability plan for a complete web presence of MORPHEMIC outside of the project will be also included in the mentioned above deliverable.

#### 3.2 Social Media

The MORPHEMIC consortium has been and still is present in social media, on LinkedIn, Twitter and Facebook, posting and tweeting about the project's progress, MORPHEMIC benefits for users, events that consortium members participate in to promote the venture, and other relevant topics. In our publications we focus on creating a simple message, understandable not only for IT experts, but also for audience representing organizations from outside of IT industry,

<sup>1</sup> [MORPHEMIC website](#)

<sup>2</sup> [MORPHEMIC LinkedIn account](#)

<sup>3</sup> [MORPHEMIC Twitter account](#)

<sup>4</sup> [MORPHEMIC Facebook account](#)



which also is a potential user of the MORPEMIC solution, empowered by Melodic. Posts and Tweets published on our channels always contain dedicated graphics, which increase the chances of catching the attention of the social media users and getting them acquainted with the message.

Our social media activity has not been limited to publishing posts and Tweets. In 2021 and 2022 we carried out LinkedIn ads campaigns. In total, we prepared 7 versions of paid content, encouraging to try Melodic solution along with its MORPEMIC extension:

- 2 ads in June/July 2021
- 5 ads in November/December 2021

Two of the advertisements were repeated in February 2022.

As an effect of published ads, we received 16 demo requests: 10 for a video demonstration and 6 for a live virtual meeting. We answered all the potential solution users via email, sending the link to a demo or proposing an online presentation. The people to which video demonstration was sent represented the following companies (according to the LinkedIn profiles information): WARC Group, Mahindra Finance, Jordan Commercial Bank, IBL Operations, Soliton Technologies, Kukes International Airport, Barclays, Metabase Q, Ultria, NTConsult.

We also carried out a LinkedIn paid campaign to promote one of the webinars, addressed to representatives of financial, investments and banking industries, entitled: *Multi Cloud in the financial sector - save costs and process data faster*. The event organized by UiO and 7bulls took place 20 January 2022 and was preceded by a paid advertisement, displayed on 25 November – 5 December 2021.

The more detailed information about the campaigns and their statistics will be provided in MORPEMIC deliverable D8.5 *Final Project Website and Advertising Materials*.

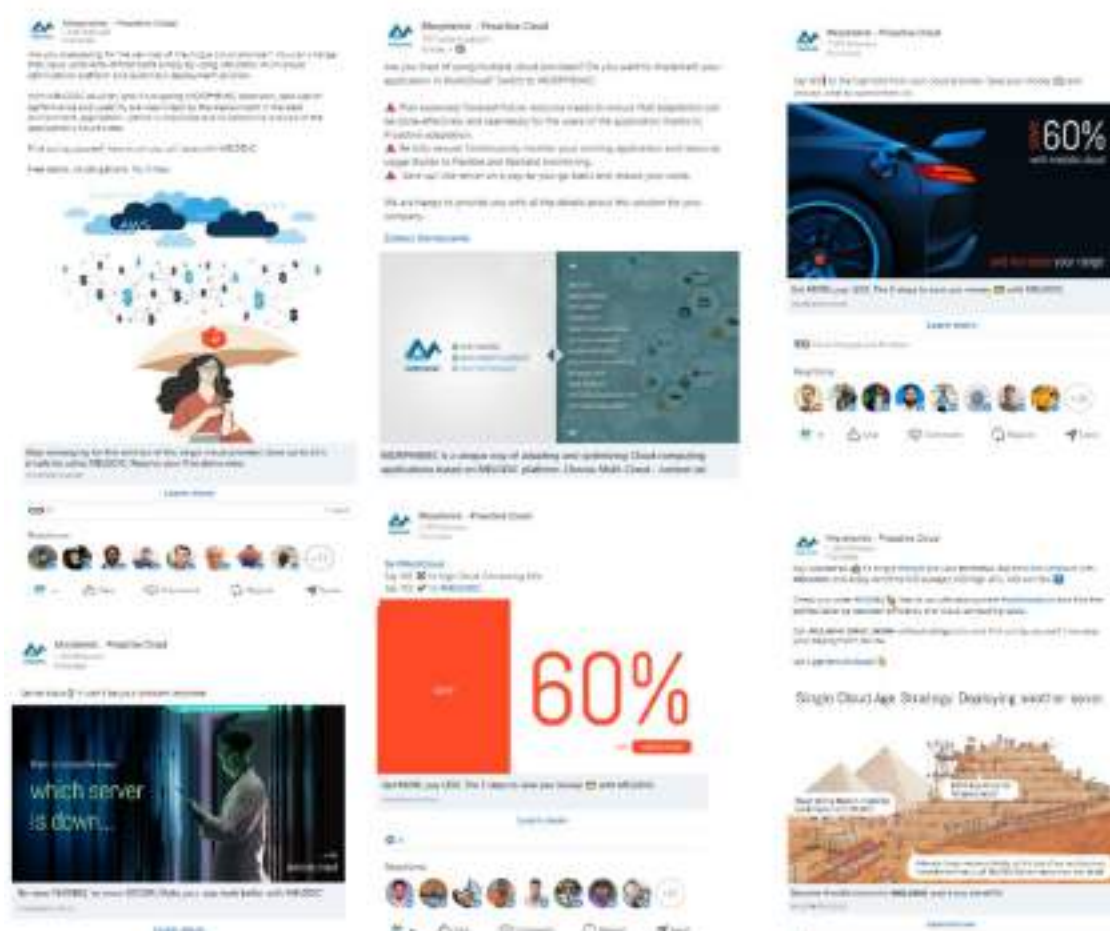


Figure 1 MORPEMIC advertisements



Figure 2 Webinar advertisement

During the project we managed to gain over 1500 followers on social media. LinkedIn has become the most effective tool to reach the audience: on 29 May 2023 the number of international followers was 1363, while number of news published in the past 3 years is over 300 (200+ on Facebook). Using Twitter, the more limited communication platform considering the limit of 280 characters in a single Tweet, we managed to share over 250 messages and gain 124 followers.

Table 3 MORPHEMIC social media statistics

| Statistics period: 17.02.2020 – 21.06.2023 |             |              |             |
|--|-------------|--------------|-------------|
|  | LinkedIn    | Twitter      | Facebook    |
| <b>Followers</b>                           | <b>1411</b> | <b>124</b>   | <b>43</b>   |
| <b>News</b>                                | <b>320</b>  | <b>261</b>   | <b>209</b>  |
| <b>Actions<sup>5</sup></b>                 | <b>8629</b> | <b>10929</b> | <b>1830</b> |

### 3.3 Business Events

During the whole project duration MORPHEMIC project members attended various high-impact industry events as well as open-source community events. All conference attendance was coordinated using the common MORPHEMIC

<sup>5</sup> ACTIONS: shares, likes, comments, reactions, profile visits, mentions

collaboration materials, (shared files, where all activities were reported and proofs of participation shared), and communication tools (Mattermost chat, emails, Zoom) to be promoted via social media posts on LinkedIn, Twitter, Facebook and announcements through the website.

Due to the pandemic, which hit the world at the beginning of 2020 coinciding with the launch of the project, we had to face the constraints leading to the cancellation of many events. Gladly, the conferences and other ventures began to take on the virtual formula relocating into the online space which provided another opportunity for the project promotion and communication.

Our participation in business and open-source community events was always intensively promoted in social media channels of the MORPHEMIC project, project website as well as partners' social media channels.

### 3.3.1 Business conferences


|                           |  |   |
|---------------------------|--|---|
| <b>Name of the event</b>  | <b>OW2 online'20</b>   |   |
| <b>Place of the event</b> | Online   |   |
| <b>Date of the event</b>  | 2020.06.17   |   |
| <b>Kind of the event</b>  | Business conference  |   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>• Softeam [Alessandra Bagnato]</li> <li>• Activeeon [Maxime Compastié]</li> <li>• UiO [Marta Różańska, Geir Horn]</li> </ul>  |   |
| <b>Outcome</b>            |  <p>the project were presented. It was also highlighted that the MORPHEMIC source code and repositories are on OW2 at:<br/> <a href="https://gitlab.ow2.org/melodic/morphemic-preprocessor">https://gitlab.ow2.org/melodic/morphemic-preprocessor</a></p>  | <p>The goal of the two presentations was to show the MORPHEMIC project and MELODIC platform as an open-source product. MORPHEMIC is powered by the MELODIC solution. Alessandra Bagnato from Softeam and Maxime Compastié from Activeeon had a video presentation entitled: "Advanced proactive and polymorphing cloud application adaptation". During the presentation the vision and key building blocks of</p> <p>Marta Różańska and Geir Horn from UiO presented the Melodic platform during the session entitled: "Autonomous Multi-Cloud Serverless Deployment and Optimized Management". Presentation focused on the Melodic as a single universal platform for optimized deployment and management of applications in the Cloud, key features and benefits of using Melodic were also presented. It</p> |

was highlighted that the Melodic is enterprise ready and used by European companies. The Melodic platform is hosted on OW2.

This online conference was focusing on open-source communities – especially on their growth.

OW2 is an independent, global, open-source software community. OW2online'20 brought together experts from around the world who focus on open-source software and its role in modern corporate information systems.

We expect that this first online OW2 conference organized during the pandemic constraints will have the positive impact of the exploitation of the MORPHEMIC project.


|                           |   |
|---------------------------|---|
| <b>Name of the event</b>  | <b>Serverless Days Online</b>   |
| <b>Place of the event</b> | Online  |
| <b>Date of the event</b>  | 2020.09.03 [Warsaw]<br>2020.09.04 [Australia & New Zealand]   |
| <b>Kind of the event</b>  | Business conference   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>7bulls [Alicja Reniewicz, Paweł Skrzypek]</li> </ul>   |
| <b>Outcome</b>            | <div data-bbox="443 1041 1168 1429">  </div> <p>Serverless Days are global developer-oriented conferences about serverless technologies. Alicja Reniewicz and Paweł Skrzypek presented the MORPHEMIC project during the session entitled: “Autonomous Multi-Cloud Serverless Deployment and Optimized Management”. That was a big interest among the audience regarding the project powered by a single universal platform for optimized deployment and management of applications in the Cloud – Melodic. Key features, core building blocks of the MORPHEMIC and benefits of using MORPHEMIC were showed.</p> <p>The success of this event came from the great interest among participants and especially the speakers regarding MORPHEMIC project and its potential outcomes.</p> <p>We believe that this online conference organized during the pandemic constrains despite the fact of lacking personal meetings will have the positive impact of the exploitation of the project.</p> |

|                           |  |  |
|---------------------------|--|--|
| <b>Name of the event</b>  | <b>BigData &amp; AI Paris 2020</b>   |  |
| <b>Place of the event</b> | Paris  |  |
| <b>Date of the event</b>  | 2020.09.14-15  |  |
| <b>Kind of the event</b>  | Business conference  |  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>Activeeon [Maxime Compastié]</li> </ul>   |  |
| <b>Outcome</b>            |  <p>BigData Paris &amp; AI Paris 2020 have been merged due to pandemic constraints. Activeeon was located in the Startups Village as a technical exhibitor. Alongside the presentation of their core products, Activeeon exposed H2020 MORPHEMIC as their current R&amp;D effort in application orchestration in edge environments. Maxime Compastié from Activeeon had a presentation entitled: "Proactive and polymorphing application adaptation for Cloud and Edge". During the presentation the vision, key objectives, as well as technical features and benefits of using MORPHEMIC were showed. Maxime presented the project and its objectives, detailed its added value for the typical visitors of these events, and proposed to stay in contact with the consortium. During the event 30 participants left their contacts as an interest of the project and its outcomes.</p> | <p>BigData Paris &amp; AI Paris 2020 have been merged due to pandemic constraints. Activeeon was located in the Startups Village as a technical exhibitor. Alongside the presentation of their core products, Activeeon exposed H2020 MORPHEMIC as their current R&amp;D effort in application orchestration in edge environments. Maxime Compastié from Activeeon had</p> |

|                           |  |  |
|---------------------------|--|--|
| <b>Name of the event</b>  | <b>DeveloperWeek Global: Cloud 2020</b>  |  |
| <b>Place of the event</b> | Online   |  |
| <b>Date of the event</b>  | 2020.09.29   |  |
| <b>Kind of the event</b>  | Business conference  |  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>UiO [Marta Róžańska]</li> <li>7bulls [Paweł Skrzypek]</li> </ul>  |  |
| <b>Outcome</b>            | <p>The MORPHEMIC project together with the MELODIC solution co-created a content of the conference by running a presentation during the Future of Cloud-Native Computing session: 29th of September: "Autonomous Multi-Cloud Serverless Deployment and</p> |  |

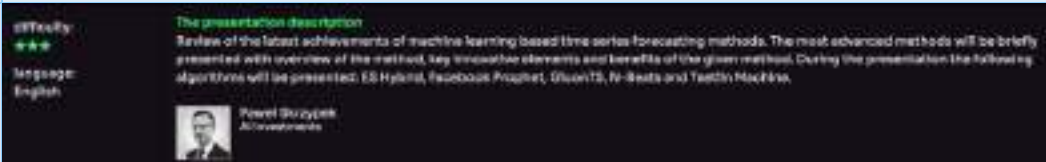


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|  |  <p>polymorphic architecture and proactive adaptation.</p> <p>DeveloperWeek Global: Cloud Conference was the premiere international cloud computing conference, where 3,500+ cloud engineers &amp; developers, IT managers, entrepreneurs, and innovators converged to discover newest cloud computing innovations. DeveloperWeek Global: Cloud 2020 was 15,000+ dev professionals for the world's largest virtual conference series with 4+ fully immersive events covering the newest technology innovations, best practices, and learning across cloud, API, enterprise dev, architecture, DevOps, DevTools, dev management.</p> <p>The success of this event was the interest among participants and speakers regarding the MORPHEMIC outcomes. We believe that this online conference organized during the pandemic period will have a positive impact of the future exploitation of the MORPHEMIC project.</p> | <p>Optimized Management” by Marta Róžańska from University of Oslo and Paweł Skrzypek from 7bulls.</p> <p>Participants of this presentation had an occasion to deepen their knowledge of multi-cloud and its extension into</p> |
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| <b>Name of the event</b>  | <b>Teratec'20</b>   |
| <b>Place of the event</b> | Online  |
| <b>Date of the event</b>  | 2020.10.13-14   |
| <b>Kind of the event</b>  | Business conference   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>Activeeon [Maxime Compastié]</li> </ul>  |
| <b>Outcome</b>            |  <p>Maxime Compastié from Activeeon has presented the MORPHEMIC project at Teratec Forum 2020. The presentation was entitled: “Proactive and polymorphic application adaptation for Cloud and Edge”.</p> <p>Teratec brings together over eighty technological and industrial companies, laboratories and research centers, universities, and engineering schools, who want to</p> |



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|  | <p>combine their resources in the strategic area of Simulation and High-Performance Computing.</p> <p>The MORPHEMIC presentation was a part of the whole exhibition. During the presentation the vision, key building blocks of the project, as well as technical features and benefits of using MORPHEMIC were showed.</p> <p>Activeeon has exposed how the R&amp;D effort on the polymorphic and proactive adaptation are promising assets for optimizing intensive workloads. The success of this event was the interest among participants and speakers regarding the MORPHEMIC solution &amp; outcomes. We believe that this online conference organized during the pandemic constraints will have the positive impact of the future of the MORPHEMIC project.</p> |
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|---------------------------|---|
| <b>Name of the event</b>  | <b>Data Science Summit 2020</b>   |
| <b>Place of the event</b> | Online  |
| <b>Date of the event</b>  | 2020.10.16  |
| <b>Kind of the event</b>  | Business conference   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>7bulls [Paweł Skrzypek]</li> </ul>   |
| <b>Outcome</b>            |  <p>Paweł Skrzypek from 7bulls presented the MORPHEMIC during the keynote “Review of time series forecasting methods”. Presentation focused on the review of the latest achievements of machine learning based time series forecasting methods.</p> <p>The most advanced methods were briefly presented with overview of the method, key innovative features and benefits of the given method. Paweł presented the following algorithms: ES Hybrid, Facebook Prophet, GluonTS, N-Beats and Tsetlin Machine. Data Science Summit is the largest, independent data science conference in the CEE Region.</p> <p>We experienced the success of this event – it was an interest among participants and speakers regarding the MORPHEMIC outcomes. We believe that this online conference organized during the pandemic constraints will have the positive impact of the future of the MORPHEMIC project.</p> |

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| <b>Name of the event</b>  | <b>DevFest Poland 2020</b>  |
| <b>Place of the event</b> | Online  |
| <b>Date of the event</b>  | 2020.10.17  |
| <b>Kind of the event</b>  | Business conference   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>7bulls [Paweł Skrzypek]</li> </ul>   |
| <b>Outcome</b>            | MORPHEMIC was presented by Paweł Skrzypek from 7bulls. Speech entitled: “Forecasting based proactive optimization of cloud resources” highlighted a novel concept |




of advanced adaptation of cloud resource using predicted demand for Cloud resources with it all benefits.

The presentation included practical examples of the novel approach to proactive optimization of cloud

resources based on dynamic and anticipated use of resources. The prediction of application workload is provided as input to the advanced, machine learning based solvers which calculate the optimal deployment plan for the application to anticipate the future needs.


Paweł presented the latest state of the art methods used for forecasting, like ES-Hybrid and advanced Monte Carlo Tree Search based solvers which are used to find the optimal solution.

DevFest 2020 brought together thousands of developers globally and shared passion for Google technologies. For DevFest 2020, Google Developer Groups from Poland came together in a whole new way – virtually for one day.


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| <b>Name of the event</b>  | <b>Cyber Academy, 5th Edition</b>   |
| <b>Place of the event</b> | Online  |
| <b>Date of the event</b>  | 2020.10.22  |
| <b>Kind of the event</b>  | Business conference   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>7bulls [Krzysztof Urbański]</li> </ul>   |
| <b>Outcome</b>            |  <p>Krzysztof Urbański from 7bulls had a presentation entitled: “Optimizing the cloud in terms of performance, cost, security and avoiding vendor lock-in” [<i>“O optymalizacji chmury pod kątem wydajności, kosztów, bezpieczeństwa i uniknięcia vendor lock-in”</i>].</p> <p>Cyber Academy is a free event that has become a fixture in the calendars of people from the world of business, science, administration, and education interested in the subject of new technologies, with particular emphasis on issues in the field of cybersecurity and artificial intelligence.</p> |


Participants of this presentation had an occasion to deepen their knowledge of the important features of the cloud solution and getting familiar with MORPHEMIC project and its objectives.

Questions were answered and interesting discussions on advantages of multi-cloud environments were held after the event.

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| <b>Name of the event</b>  | <b>API World 2020</b>  |
| <b>Place of the event</b> | Online   |
| <b>Date of the event</b>  | 2020.10.29   |
| <b>Kind of the event</b>  | Business conference  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>7bulls [Alicja Reniewicz, Paweł Skrzypek]</li> </ul>  |
| <b>Outcome</b>            | <div data-bbox="416 869 1117 1249" data-label="Image">  </div> <p>MORPHEMIC, together with MELODIC co-created the content of the conference by running a presentation: “Autonomous Multi-Cloud Serverless Deployment and Optimized Management” by Alicja Reniewicz and Paweł Skrzypek, both representing 7bulls.</p> <p>Participants of this presentation had an occasion to deepen their knowledge of multicloud and its extension into polymorphic architecture and proactive adaptation.</p> <p>API World is the largest virtual conference and expo with the goal of organizing this new API Economy. The API World 2020 Conference and Expo was created with the mission to be neutral and facilitate connections, knowledge, trust, and business within the developer community of API providers and consumers.</p> <p>We believe that this online conference organized during the pandemic constraints will have the positive impact of the exploitation of the MORPHEMIC project.</p> |

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| <b>Name of the event</b>  | <b>MLConf 2020</b>  |
| <b>Place of the event</b> | Online  |
| <b>Date of the event</b>  | 2020.11.06  |
| <b>Kind of the event</b>  | Business conference   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>InAccel [Chris Kachris]</li> </ul>   |
| <b>Outcome</b>            |  <p>Chris Kachris from InAccel presented the FPGA acceleration of machine learning applications and face detection on a cluster of cloud FPGAs. The MORPHEMIC project was presented with key objectives, benefits and future outcomes. Presentation went virtually.</p> <p>MLConf is a machine learning conference that gathers the community to discuss the recent research and application of Algorithms, Tools, and Platforms to solve the hard problems associated with organizing and analyzing massive and noisy data sets.</p> |

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| <b>Name of the event</b>  | <b>Warsaw Booster'20 [ <i>WITH A HEAD IN THE CLOUD</i> ]</b>   |
| <b>Place of the event</b> | Online   |
| <b>Date of the event</b>  | 2020.11.12   |
| <b>Kind of the event</b>  | Business conference  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>7bulls [Paweł Skrzypek]</li> </ul>  |
| <b>Outcome</b>            |  <p>Warsaw Booster'20 is an acceleration program for capital start-ups. The purpose of the accelerator is to support young technology companies in improving their business competences:</p> <p><a href="https://www.facebook.com/warsawbooster/">https://www.facebook.com/warsawbooster/</a></p> <p>This time Warsaw Booster organized a webinar dedicated to the cloud and its possibilities.</p> <p>During the webinar, speakers discussed about the following topics:</p> <ul style="list-style-type: none"> <li>○ How does the use of the cloud increase our efficiency in business?</li> <li>○ What does cloud optimization mean?</li> <li>○ How the pandemic period affected business and use of the cloud?</li> </ul> <p>During the webinar Paweł Skrzypek presented the Melodic solution and its extension to MORPHEMIC project and innovative features.</p> |

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| <b>Name of the event</b>  | <b>Intel® FPGA Technology Day (IFTD)</b>  |  |
| <b>Place of the event</b> | Online  |  |
| <b>Date of the event</b>  | 2020.11.18  |  |
| <b>Kind of the event</b>  | Business conference   |  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>• InAccel [Chris Kachris]</li> </ul>   |  |
| <b>Outcome</b>            |  <p>Intel IFTD was a one-day event that showcased the latest Intel FPGA products and solutions through a series of webinars and demonstrations from Intel, partners, and customers.</p> <p>Chris Kachris from InAccel presented the FPGA acceleration of machine learning applications and face detection on a cluster of Cloud FPGAs. The MORPHEMIC key objectives, benefits and future outcomes were presented to the audience.</p> |  |

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| <b>Name of the event</b>  | <b>Data Science Conference Europe 2020</b>   |  |
| <b>Place of the event</b> | Online   |  |
| <b>Date of the event</b>  | 2020.11.18   |  |
| <b>Kind of the event</b>  | Business conference  |  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>• 7bulls [Paweł Skrzypek]</li> </ul>  |  |
| <b>Outcome</b>            |  <p>Paweł Skrzypek from 7bulls had a presentation entitled: “Advanced forecasting methods for Investments Portfolio Optimization” of the first complete AI investment platform. It is based on most innovative AI methods: most advanced neural networks and reinforcement learning for risk control and position sizing using Alpha Zero approach. In the presentation the comparison of the latest achievements in machine learning for time</p> |  |



series forecasting was presented: Transformer Networks, Dual Attention Networks, Echo state network, etc.

The AI Investments solution presented by Paweł Skrzypek uses multi-Cloud approach with Melodic and MORPHEMIC to optimize the machine learning models training at large scale. It also uses serverless for the optimization algorithms.

Data Science Conference Europe is one of the largest Data & AI conferences and fastest growing Data & AI community in Europe. It is a Tech-first Data & AI Conference, that connects business, professionals & academia on one place.

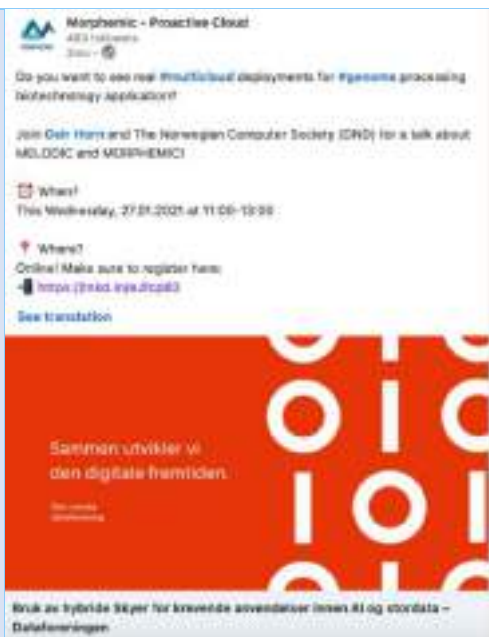
We experienced the success of this event - it was an interest among participants and speakers regarding the MORPHEMIC outcomes. We believe that this online conference organized during the pandemic constraints will have the positive impact of the future exploitation of the MORPHEMIC project.

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| <b>Name of the event</b>  | <b>Globecom2020 - IEEE Global Communications Conference</b>   |
| <b>Place of the event</b> | Online  |
| <b>Date of the event</b>  | 2020.12.11  |
| <b>Kind of the event</b>  | Business conference   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>IS-Wireless [Adam Flizikowski]</li> </ul>  |
| <b>Outcome</b>            | <div data-bbox="424 1167 1184 1608"> </div> <p>Adam Flizikowski from Is-Wireless had an Industry Podium Pitch entitled: “Utility function-based adaptation of virtual RAN (vRAN) – the future of 5G networks”. The MORPHEMIC key objectives, technical aspects as well as benefits and outcomes vital for IS-Wireless as a use case partner, were demonstrated.</p> <p>IEEE Global Communications Conference (GLOBECOM) is one of the IEEE Communications Society’s two flagship conferences dedicated to driving innovation in nearly every aspect of communications. Each year, more than 3000 scientific researchers and their management submit proposals for program sessions to be held at the annual conference.</p> <p>This year GLOBECOM was organized virtual and on-site 7-11.12.2020. The MORPHEMIC presentation went online.</p> |




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| <b>Name of the event</b>  | <b>Jakarta TechTalk</b>   |  |
| <b>Place of the event</b> | Online  |  |
| <b>Date of the event</b>  | 2021.01.19  |  |
| <b>Kind of the event</b>  | Business conference   |  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>7bulls [Alicja Reniewicz, Paweł Skrzypek]</li> </ul>   |  |
| <b>Outcome</b>            |  <p>presented as an innovative way of cloud resources optimization with polymorphic architecture &amp; proactive adaptation. As an example of that approach the AI Investments application was described. Jakarta Tech Talks is a mix of conference based and virtual webinars dedicated to the discussion and discovery of Jakarta EE and broader Cloud-Native Java technologies.</p> | <p>Alicja Reniewicz and Paweł Skrzypek from 7bulls presented the Melodic solution and MORPHEMIC project during the keynote session entitled: “Autonomous Multi-Cloud Serverless Deployment and Optimized Management”.</p> <p>MORPHEMIC project was</p> |

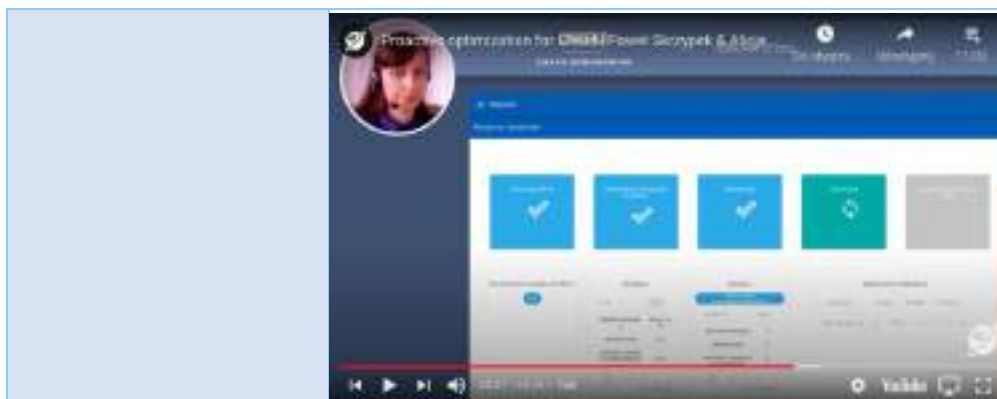
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| <b>Name of the event</b>  | <b>The Norwegian Computer Society (DND)</b>  |  |
| <b>Place of the event</b> | Online   |  |
| <b>Date of the event</b>  | 2021.01.27   |  |
| <b>Kind of the event</b>  | Business conference  |  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>UiO [Geir Horn]</li> <li>7bulls [Alicja Reniewicz]</li> </ul>   |  |
| <b>Outcome</b>            | <p>The Norwegian Computer Society (DND) has invited Geir Horn from University of Oslo and Alicja Reniewicz from 7bulls to give a presentation about MORPHEMIC project and Melodic solution. The presentation entitled: “Optimized Hybrid Cloud Application</p> |  |

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|  |  | <p>Management for AI and Big-Data”. It presented a key objective of the MORPHEMIC project and its innovative features as well how it extends the MELODIC solution.</p> |
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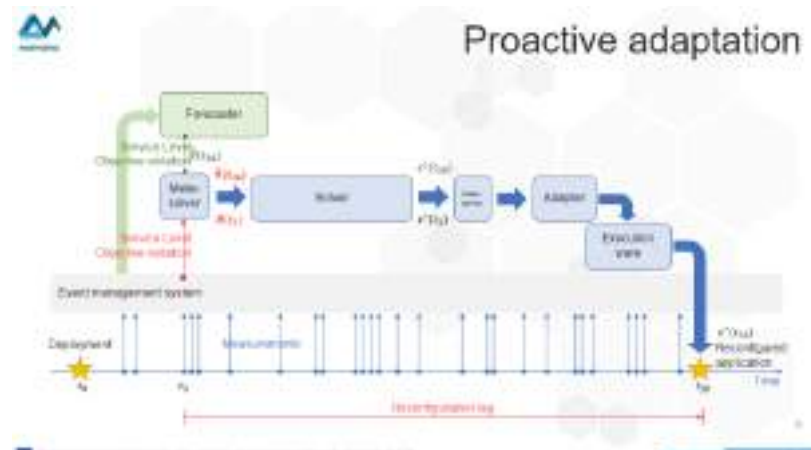
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| <b>Name of the event</b>  | <b>GDG Sacramento Meetup</b>  |
| <b>Place of the event</b> | Online  |
| <b>Date of the event</b>  | 2021.02.12  |
| <b>Kind of the event</b>  | Business conference   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>• 7bulls [Alicja Reniewicz, Paweł Skrzypek]</li> </ul>   |
| <b>Outcome</b>            | <div data-bbox="416 1234 1117 1590">  </div> <p>Alicja Reniewicz and Paweł Skrzypek from 7bulls gave a presentation of the MORPHEMIC project, entitled: “Autonomous Multi-Cloud Serverless Deployment and Optimized Management”. Alicja and Paweł presented the novelty of Melodic solution and its extension to the MORPHEMIC proactive optimization.</p> <p>Main presented topics were:</p> <ul style="list-style-type: none"> <li>○ CAMEL - Cloud Application Modelling and Execution Language</li> <li>○ Optimization and automation of Melodic</li> <li>○ Core Concepts: Polymorph Architecture and Proactive Adaptation</li> </ul> <p>As an example of that approach the AI Investments application was shown.</p> <p>The Google Developer Group (GDG) Sacramento provides a forum for anyone in the Sacramento area to meet and discuss Google technologies such as Android, AppEngine, APIs, AngularJS, Polymer, Dart, Go, etc. The event was attended by 13 Google technologies enthusiasts.</p> |

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| <b>Name of the event</b>  | <b>Azure Meetup Oslo</b>   |   |
| <b>Place of the event</b> | Online   |   |
| <b>Date of the event</b>  | 2021.02.22   |   |
| <b>Kind of the event</b>  | Business conference  |   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>• UiO [Geir Horn]</li> <li>• 7bulls [Alicja Reniewicz, Paweł Skrzypek]</li> </ul>   |   |
| <b>Outcome</b>            |  <p>presentation entitled: “Autonomous Multi-Cloud Serverless Deployment and Optimized Management”. This presentation described how to implement Multi-Cloud native strategies using advanced an open-source framework that allows for Cloud-agnostic Multi-Cloud deployment and optimized management of the serverless applications based on flexible monitoring, context aware maximization of the application owner’s utility of the deployed serverless components, and autonomic reconfiguration based on the application’s current execution context.</p> <p>Azure Meetup Oslo is a group for anyone interested in Microsoft Azure. The MORPHEMIC session was attended by 34 Microsoft Azure technologies enthusiasts.</p> | <p>Alicja Reniewicz &amp; Paweł Skrzypek from 7bulls and Geir Horn from University of Oslo presented Melodic solution and MORPHEMIC project as well as how to use the proactive optimization. As an example of the approach the AI Investments application was shown. The</p> |

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| <b>Name of the event</b>  | <b>Conf42: Chaos Engineering 2021</b>   |   |
| <b>Place of the event</b> | Online  |   |
| <b>Date of the event</b>  | 2021.02.25  |   |
| <b>Kind of the event</b>  | Business conference   |   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>• 7bulls [Alicja Reniewicz, Paweł Skrzypek]</li> </ul> |   |
| <b>Outcome</b>            |           | <p>Alicja Reniewicz &amp; Paweł Skrzypek from 7bulls presented the Melodic solution and MORPHEMIC project with its novelty of using the proactive optimization. As an example of the approach the AI Investments application was shown.</p> |



Conf42 is Computer Science Conference, where speakers from all around the world can share their ideas with a larger public, no matter if they are from a multi-billion-dollar giant, a startup, an open-source community or a university.

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| <b>Name of the event</b>  | <b>Horizon Cloud Summit 2021</b>   |
| <b>Place of the event</b> | Online   |
| <b>Date of the event</b>  | 2021.03.08-09  |
| <b>Kind of the event</b>  | Business conference  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>• UiO (Geir Horn)</li> <li>• ICON (Sebastian Geller)</li> </ul>   |
| <b>Outcome</b>            | <p>In 2021 MORPHEMIC representatives participated in the Horizon Cloud Summit. The 2<sup>nd</sup> edition of this H-Cloud event was collocated with Cloud Expo Europe event, and aimed to gather together innovators and researchers, Cloud adopters, policy makers, Cloud initiatives, and open-source projects to shape the EU digital transition.</p>  <p>Our project was represented by two experts – panelists of the following sessions:</p> <ul style="list-style-type: none"> <li>○ “Cloud Computing Research Challenges”. Geir Horn (UiO), MORPHEMIC coordinator, gave a presentation entitled: “MORPHEMIC: Application Management. Multi-Hardware and Multi-Cloud”.</li> </ul> |




- “Success Stories and Use Cases from the European Cloud Community”. Sebastian Geller (ICON) introduced to the audience one of the MORPHEMIC use cases in presentation “Engineering Simulation in the (Multi)Cloud”.

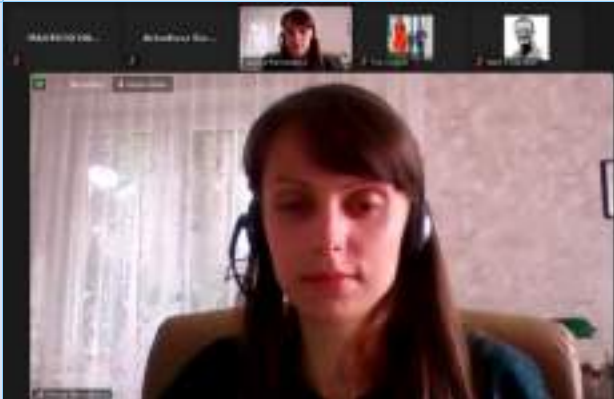

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| <b>Name of the event</b>  | <b>Blueprint LDN - The UK's Cloud-Native Architecture Event</b>   |  |
| <b>Place of the event</b> | Online  |  |
| <b>Date of the event</b>  | 2021.03.10  |  |
| <b>Kind of the event</b>  | Business conference   |  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>• 7bulls [Alicja Reniewicz, Paweł Skrzypek]</li> </ul>   |  |
| <b>Outcome</b>            |   | <p>The MORPHEMIC project was presented at the UK's Enterprise Cloud-Native Event virtual conference [LDN Blueprint] during the special session: “Autonomous Multi-Cloud Serverless Deployment and Optimized Management”.</p> <p>Alicja Reniewicz &amp; Paweł Skrzypek from 7bulls presented the novelty of the MORPHEMIC project and Melodic solution as well as how to use the proactive optimization and polymorphic adaptation. AI Investments application was shown as an example of using the MELODIC approach.</p> |



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| <b>Name of the event</b>  | <b>Open-Source Community Conference (OSCONF) 2021</b>   |
| <b>Place of the event</b> | Online  |
| <b>Date of the event</b>  | 2021.04.10  |
| <b>Kind of the event</b>  | Business conference   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>7bulls [Paweł Skrzypek]</li> </ul>   |
| <b>Outcome</b>            |  <p>An Open-Source Community Conference (OSCONF) is a platform built to connect &amp; bring all leading Meetup Communities, Cloud-native experts and DevOps. It is a non-profit community event that allows to interact with community leaders, ambassadors and open community contributors. The event took place on April 10 from 9.00 am to 2:30 pm IST.</p> <p>Paweł Skrzypek from 7bulls had a speech about “Autonomous Multi-Cloud Serverless Deployment and Optimized Management”.</p> <p>Over 1200 developers participated in the session.</p> |

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| <b>Name of the event</b>  | <b>HIPEAC Computing System Week, Spring 2021</b>  |
| <b>Place of the event</b> | Online  |
| <b>Date of the event</b>  | 2021.04.13  |
| <b>Kind of the event</b>  | Business conference   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>InAccel [Chris Kachris]</li> </ul>   |
| <b>Outcome</b>            |  <p>HiPEAC organizes four networking events per year: the HiPEAC Conference, two Computing Systems Weeks and a Summer School. During the computing System Week, major startups, SMEs and large companies presents their main research efforts. During this HIPEAC computing system week, InAccel presented in the “Future Generation Heterogeneous Computing” session the novel InAccel “Resource managers for FPGA cloud deployment”.</p> <p>During this session Chris Kachris from InAccel presented its research efforts on MORPHEMIC for easy deployment of FPGAs on multi-cloud platforms.</p> <p>More than 90 people attended the event online.</p> |



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|---------------------------|---|---|
| <b>Name of the event</b>  | <b>UKOUG Spring Tech Summit</b>   |   |
| <b>Place of the event</b> | Online  |   |
| <b>Date of the event</b>  | 2021.04.20  |   |
| <b>Kind of the event</b>  | Business conference   |   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>7bulls [Alicja Reniewicz, Paweł Skrzypek]</li> </ul>   |   |
| <b>Outcome</b>            |   | <p>UK Oracle User Group organized a virtual event, which took place on 20 and 22 April 2021. It was a first Technology Summit paved the way for UKOUG's virtual event program.</p> <p>20th of April at 14.00 BST Paweł Skrzypek and Alicja Reniewicz gave a presentation on the topic “Autonomous Multi-Cloud Serverless Deployment and Optimized Management”.</p> <p>We experienced the success of this event – it was an interest among participants and speakers regarding the MORPHEMIC outcomes. We believe that this online conference organized during the pandemic constraints will have the positive impact of the future exploitation of the MORPHEMIC project.</p> |

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|---------------------------|---|---|
| <b>Name of the event</b>  | <b>Indianapolis Azure Group</b>   |   |
| <b>Place of the event</b> | Online  |   |
| <b>Date of the event</b>  | 2021.04.22  |   |
| <b>Kind of the event</b>  | Business conference   |   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>7bulls [Alicja Reniewicz, Paweł Skrzypek]</li> </ul> |   |
| <b>Outcome</b>            |         | <p>Alicja Reniewicz and Paweł Skrzypek from 7bulls presented the Melodic solution and MORPHEMIC project during the keynote session entitled: “Autonomous Multi-Cloud Serverless Deployment and Optimized Management”.</p> |

MORPHEMIC project was presented as an innovative way of cloud resources optimization with polymorphic architecture & proactive adaptation.



as infrastructure, security, big data and artificial intelligence.

The Azure Indy User Group is a community user group counting +650 attendees located in Indianapolis, Indiana. The group is focused on all things Azure and aims to build the local Azure community in cloud areas such

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| <b>Name of the event</b>  | <b>Women in Data Science Miami</b>  |
| <b>Place of the event</b> | Online  |
| <b>Date of the event</b>  | 2021.04.23  |
| <b>Kind of the event</b>  | Business conference   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>7bulls [Katarzyna Materka]</li> </ul>  |
| <b>Outcome</b>            | <div data-bbox="413 1068 1088 1444" data-label="Image">  </div> <p>Katarzyna Materka from 7bulls presented the Melodic solution and MORPHEMIC project during the keynote session entitled: “Complex AI Forecasting Methods for Investments Portfolio Optimization”.</p> <p>Katarzyna presented the novelty of the MORPHEMIC project and Melodic solution as well as how to use the proactive optimization and polymorphic adaptation. AI Investments application was shown as an example of using Melodic approach.</p> <div data-bbox="413 1594 1088 1986" data-label="Image">  </div> <p>The Global Women in Data Science (WiDS) Conference aims to inspire and educate data scientists worldwide, regardless of gender, and support women in the field. WiDS Miami is an independent event organized by the Group for Resilient and Inclusive Tech (G.R.I.T) to coincide with the annual Global Women in Data Science (WiDS) Conference held at Stanford University and an estimated 150+ locations worldwide.</p> |

This one-day technical conference provided an opportunity to hear about the latest data science-related research in a number of domains, learnt how leading-edge companies are leveraging data science for success, and connected with potential mentors, collaborators, and others in the field.

We believe that this conference organized during the pandemic constraints will have the positive impact of the exploitation of the MORPHEMIC project.


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| <b>Name of the event</b>  | <b>Conf42: Cloud Native 2021</b>   |  |
| <b>Place of the event</b> | Online   |  |
| <b>Date of the event</b>  | 2021.04.29   |  |
| <b>Kind of the event</b>  | Business conference  |  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>7bulls [Alicja Reniewicz, Paweł Skrzypek]</li> </ul>  |  |
| <b>Outcome</b>            | <p>Conf42: Cloud Native belongs to the big family of the Conf42 Quality Tech Conferences.</p> <div data-bbox="416 913 1133 1321" data-label="Diagram"> <pre> graph LR     A((Model your application in CAMEL)) --&gt; B((Deploy the MELODIC platform))     B --&gt; C((Submit your CAMEL model to MELODIC))     C --&gt; D((Start deployment of the application))     D --&gt; E((Connect to your application))     E --&gt; F((Enjoy!))   </pre> </div> <p>universal platform for optimized deployment and management of applications in the cloud – MELODIC.</p> <div data-bbox="416 1449 1133 1852" data-label="Image"> </div> <p>Alicja Reniewicz and Paweł Skrzypek presented the MORPHEMIC project during the session entitled: “Autonomous Multi-Cloud Serverless Deployment and Optimized Management”. It was a big interest among the audience regarding the project powered by a single</p> <p>Conf42 Cloud Native is a Computer Science Conference, where speakers from all around the world share their ideas with a larger public: they are from multi-billion-dollar giant companies, start-ups, open-source communities and universities.</p> |  |

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| <b>Name of the event</b>  | <b>DevOps Pro Europe 2021</b>   |
| <b>Place of the event</b> | Online  |
| <b>Date of the event</b>  | 2021.05.12  |
| <b>Kind of the event</b>  | Business conference   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>7bulls [Alicja Reniewicz, Paweł Skrzypek]</li> </ul>   |
| <b>Outcome</b>            |  <p>DevOps Pro Europe is an annual conference. It covers the core principles and concepts of the DevOps methodology and demonstrates how to use the most common DevOps patterns to develop, deploy and maintain applications on-premises and in the cloud. At DevOps Pro Europe 2021 Alicja Reniewicz and Paweł Skrzypek gave a talk entitled: “Autonomous Multi-Cloud Serverless Deployment and Optimized Management”, during which the MORPHEMIC solution has been presented and the implementation of Multi-Cloud native strategies using advanced an open-source framework has been described for the audience.</p> |

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| <b>Name of the event</b>  | <b>DevOps Pro Europe 2021</b>   |
| <b>Place of the event</b> | Online  |
| <b>Date of the event</b>  | 2021.05.11-12   |
| <b>Kind of the event</b>  | Business conference   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>7bulls [Alicja Reniewicz, Paweł Skrzypek]</li> </ul>   |
| <b>Outcome</b>            |  <p>DeveloperWeek Global: Management 2021 was the premier virtual conference &amp; expo for engineering managers, dev team leads, and dev executives. The event is one on many in the series of conferences organized by DevNetwork – the global professional organization for technical professionals.</p> |


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|  | <p>Alicja Reniewicz and Paweł Skrzypek from 7bulls were among the speakers at this virtual event. They had a speech entitled: “The Complete MultiCloud Management Platform” during which they presented Melodic platform and introduced its MORPHEMIC extension to some of the 2000+ participants of the conference. We believe that presentation delivered at another one of DeveloperWeek Global series of events was met with the interest of the international group of audience and got attention of people, which may benefit from the offered multi-cloud management solution.</p> |
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| <b>Name of the event</b>  | <b>17th International Conference on Open-Source Systems (OSS 2021)</b>  |
| <b>Place of the event</b> | Online  |
| <b>Date of the event</b>  | 2021.05.12  |
| <b>Kind of the event</b>  | Business conference   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>• 7bulls [Konrad Wawruch]</li> </ul>   |
| <b>Outcome</b>            | <p>The 17th International Conference on Open Source Systems (OSS) served as an international forum where a diverse community of professionals from academia, industry the public sector, and diverse FLOSS initiatives gathered together to share research findings and practical experiences. The conference was also a forum to provide information and education to practitioners and identify directions for further research. During the event Konrad Wawruch from 7bulls.com delivered an industry talk entitled: “The Melodic project: a business story”. He presented MELODIC solution, developed under H2020 program, as well as its developed extension - MORPHEMIC project. The presentation earned the interest of the online audience.</p> |

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| <b>Name of the event</b>  | <b>Conf42: Python 2021</b>  |
| <b>Place of the event</b> | Online  |
| <b>Date of the event</b>  | 2021.05.27  |
| <b>Kind of the event</b>  | Business conference   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>• 7bulls [Anna Warno, Paweł Skrzypek]</li> </ul>   |
| <b>Outcome</b>            | <div data-bbox="418 1637 938 1928">  </div> <p>Conf42: Python belongs to the big family of the Conf42 Quality Tech Conferences, addressed to IT experts and professionals representing both the academic and business worlds.</p> <p>During the online event, Conf42: Python 2021 edition, Anna Warno and Paweł Skrzypek (7bulls) delivered a presentation entitled: “Complex AI Forecasting Methods for Investments Portfolio Optimization”. The talk introduced AI Investments’ platform</p> |



and showed an example of an application for which MORPHEMIC, powered by Melodic, provides cloud resource optimization. The online presentation has 280 views so far.

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| <b>Name of the event</b>  | <b>Data Science Summit ML Edition 2021</b>  |
| <b>Place of the event</b> | Online  |
| <b>Date of the event</b>  | 2021.06.18  |
| <b>Kind of the event</b>  | Business conference   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>7bulls [Anna Warno, Paweł Skrzypek]</li> </ul>   |
| <b>Outcome</b>            |  <p>Data Science Summit is an annual event addressed to people interested in topics fully dedicated to the area of Artificial Intelligence and Machine Learning. This large-scale conference gave Anna Warno and Paweł Skrzypek an opportunity to reach out to AI/ML enthusiasts and professionals and share with them “Complex AI Forecasting Methods for Investments Portfolio Optimization”. Thanks to the delivered presentation, the audience of 7bulls experts’ session was able to discover the first complete AI investments platform and the multi-cloud architecture of the system together with its benefits. The platform was an example of the solution which optimizes cloud resources with the use of Melodic, extended by MORPHEMIC.</p> |


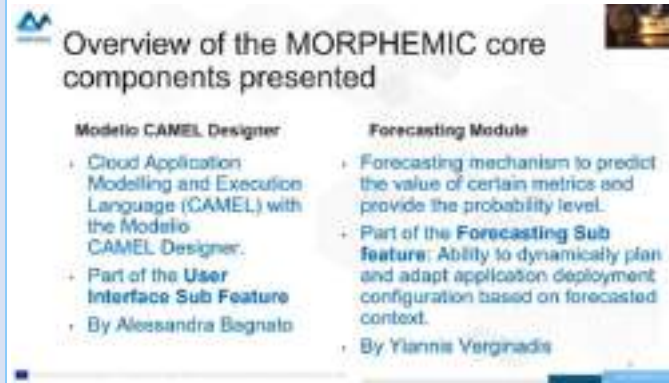
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| <b>Name of the event</b>  | <b>2021 Cyberjutsu Con: Securing the Future</b>   |
| <b>Place of the event</b> | Online  |
| <b>Date of the event</b>  | 2021.06.19  |
| <b>Kind of the event</b>  | Business conference   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>7bulls [Alicja Reniewicz, Paweł Skrzypek]</li> </ul>   |
| <b>Outcome</b>            |  <p>Women’s Society of Cyberjutsu is a International nonprofit community, focused on empowering women to succeed in the cybersecurity industry. WSC’s mission is to advance women in cybersecurity careers by providing programs and partnerships that promote networking, education, training, mentoring, resource-sharing and other professional opportunities.</p> |






In 2021 Alicja Reniewicz accompanied by Paweł Skrzypek participated in the WSC's event: Cyberjutsu Con: Securing the Future Presentation in the roles of speakers. They delivered a talk entitled: "Autonomous Multi-Cloud Serverless Deployment and Optimized Management"


providing audience with particular knowledge about the implementation of multi-cloud native strategies with Melodic and MORPHEMIC open-source tools, enriched by live usage presentation. Thanks to the session, the viewers found out about the multi-cloud application management solutions developed under the Horizon 2020 programme.


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| <b>Name of the event</b>  | <b>OW2con' 21</b>  |
| <b>Place of the event</b> | Online   |
| <b>Date of the event</b>  | 2021.06.24   |
| <b>Kind of the event</b>  | Business conference  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>• Softeam [Alessandra Bagnato]</li> <li>• ICCS [Yiannis Verginadis]</li> </ul>  |
| <b>Outcome</b>            |  <p>OW2con is an annual event organized by an experienced Open-Source Software community for collaborative R&amp;D projects. MORPHEMIC supported the 11<sup>th</sup> edition of the conference, by becoming the Silver Sponsor of OW2con' 21 - Leveraging the European Open Source Ecosystem.</p>  <p>Our Horizon 2020 venture has been presented to the conference audience in the online session: "MORPHEMIC Project - advanced polymorphic and proactive Cloud Computing resources adaptation project" delivered by Alessandra Bagnato and Yiannis Verginadis. Beside providing general information about the project, the presenters focused on two core MORPHEMIC components: Alessandra's part of the presentation</p> |

was dedicated to Modelio CAMEL Designer, while Yiannis introduced the Forecasting Module used in the project. A chat room was available to the attendees through the whole conference, MORPHEMIC representatives could reply to questions and provide further details and links on our work within the project.

After the virtual event, the recorded presentation was published on the events' website and is freely available to Internet users, increasing the chances for positive impact of the project.


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| <b>Name of the event</b>  | Ya!vaConf 2021  |   |
| <b>Place of the event</b> | Online  |   |
| <b>Date of the event</b>  | 2021.06.24  |   |
| <b>Kind of the event</b>  | Business conference   |   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>7bulls [Alicja Reniewicz, Paweł Skrzypek]</li> </ul>   |   |
| <b>Outcome</b>            |  <p>Ya!vaConf is one of the few conferences in Poland fully focused on the Java ecosystem and related areas. The event is distinguished by a strong emphasis on IT Security topics, profiled for developers. The project is organized by the Academic Partners Foundation, whose team, in cooperation with IT communities, is responsible for organizing a number of leading Polish IT/data science conferences.</p> <p>At Ja!vaConf 2021 Alicja Reniewicz and Paweł Skrzypek has jointly conducted a presentation entitled: "Proactive and polymorphic adaptation of Multi-cloud deployments" in which the MORPHEMIC project, along with the base MELODIC solution has been introduced to the audience. 7bulls.com experts presented how to implement multi-cloud native strategies using our advanced open-source framework. During the presentation, a practical introduction to multi-cloud application modeling, configuration, deployment, and adaptation was provided. All stages of the cloud deployment planning and designing process were shown. Also, all the key steps in the deployment and autonomic application management were demonstrated.</p> <p>In this way, 7bulls' specialists introduced the developed tools to the developers, IT architects, DevOps, testers and other participants of the event, showing the capabilities and advantages of Melodic and MORPHEMIC, widening the possible group of future users of the provided solutions.</p> | <p>Ya!vaConf is one of the few conferences in Poland fully focused on the Java ecosystem and related areas. The event is distinguished by a strong emphasis on IT Security topics, profiled for developers. The project is organized by the Academic Partners Foundation, whose</p> |


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| <b>Name of the event</b>  | <b>Apidays Live New York 2021</b>  |  |
| <b>Place of the event</b> | New York, USA  |  |
| <b>Date of the event</b>  | 2021.07.28-29  |  |
| <b>Kind of the event</b>  | Business conference  |  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>7bulls [Paweł Skrzypek]</li> </ul>  |  |
| <b>Outcome</b>            |  <p>Apidays is the leading industry tech and business series of conferences in APIs and the programmable economy. Since 2012, 50+ apidays conferences have been organised in 13 countries to cover: Banking &amp; Financial Services, Consulting, Energy, Healthcare &amp; Life Science, IT &amp; Technology, Manufacturing &amp; Automotive, Media, Non-profit &amp; Education, Public Sector, Retail, Transport &amp; Hospitality.</p> <p>Paweł Skrzypek from 7bulls had a speech entitled: “API for multi-cloud management platform”. It showed Melodic solution and it’s proactive and polymorphic extension into the MORPHEMIC project. It was a big interest among the audience regarding the project powered by a single universal platform for optimized deployment and management of applications in the cloud – MELODIC.</p> |  |

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| <b>Name of the event</b>  | <b>Conf42: Machine Learning 2021</b>  |  |
| <b>Place of the event</b> | Online  |  |
| <b>Date of the event</b>  | 2021.07.29  |  |
| <b>Kind of the event</b>  | Business conference   |  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>7bulls [Anna Warno, Paweł Skrzypek]</li> </ul>   |  |
| <b>Outcome</b>            |  <p>Conf42: Machine Learning belongs to the big family of the Conf42 Quality Tech Conferences. This international series of conferences gather together IT specialist from all around the world to share their ideas with a larger public, representing big companies, start-ups, open source communities and universities.</p> |  |

Anna Warno and Paweł Skrzypek presented a MORPHEMIC project and Melodic solution during the session entitled: “Advanced machine learning time series forecasting methods review”. This online session presented the first complete AI investments platform and an example of an application using Melodic and its proactive and polymorphic MORPHEMIC extension to optimise applications’ cloud resources. The video is still available online and has been viewed over 1 900 times, letting us reach a wider audience with the message about MORPHEMIC solution.

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| <b>Name of the event</b>  | <b>DevOpsDays Medellin 2021</b>   |
| <b>Place of the event</b> | Online  |
| <b>Date of the event</b>  | 2021.07.30-31   |
| <b>Kind of the event</b>  | Business conference   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>7bulls [Alicja Reniewicz, Paweł Skrzypek]</li> </ul>   |
| <b>Outcome</b>            | <div data-bbox="422 936 1189 1339" data-label="Image">  </div> <p>DevOpsDays is a series of international technical conferences on topics of software development. DevOpsDays present a combination of workshops and talks, in addition to having open and self-organized sessions and spaces for networking with references from the DevOps community, sharing their experiences obtained in different organizations, countries and cultures presenting real cases, lessons learned, successes and obstacles they face every day.</p> <p>At the event Alicja Reniewicz and Paweł Skrzypek delivered a presentation entitled: “Autonomous Multi-Cloud serverless deployment and optimized management”. It showed Melodic solution and it’s proactive and polymorphic extension into the MORPHEMIC project. The presentation helped to reach another group of IT experts with potential interest in the projects results.</p> |


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| <b>Name of the event</b>  | <b>Docker Mumbai Meetup</b>  |  |
| <b>Place of the event</b> | Online   |  |
| <b>Date of the event</b>  | 2021.08.14   |  |
| <b>Kind of the event</b>  | Business conference  |  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>7bulls [Paweł Skrzypek]</li> </ul>          |  |
| <b>Outcome</b>            |  | <p>Docker Mumbai Meetup was an event for DevOps practitioners. It was a virtual event where DevOps mindset, skills, and tools were presented. The event gathered DevOps leaders and the Cloud-native world to collaborate and learn from each other.</p> <p>Paweł Skrzypek was among the speakers and gave a presentation entitled: "Autonomous Multi-Cloud serverless deployment and optimized management", reaching to the participating in the event DevOps practitioners. In this presentation, Paweł described how to implement Multi-Cloud native strategies using advanced an open-source framework that allows for Cloud-agnostic Multi-Cloud deployment and optimized management of the serverless applications based on flexible monitoring, context-aware maximization of the application owner's utility of the deployed serverless components, and autonomic reconfiguration based on the application's current execution context.</p> <p>The meeting with his session is available online and has been viewed over 520 times so far.</p> |

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| <b>Name of the event</b>  | <b>WorldFestival 2021</b>  |   |
| <b>Place of the event</b> | Online   |   |
| <b>Date of the event</b>  | 2021.08.17-19  |   |
| <b>Kind of the event</b>  | Business conference  |   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>7bulls [Paweł Skrzypek]</li> </ul>            |   |
| <b>Outcome</b>            |  | <p>WorldFestival is an annual, global conference supporting emerging technology innovation. It gathers over 20 000+ participants from 130+ nations involved in the year-long WorldFestival program of awards, voting, conference, and expo.</p> |




At the event, Paweł Skrzypek conducted a presentation entitled: “It is time for multi-cloud: trends and technologies”. In the session, the latest trend and technologies related to Multi-cloud were presented, along with the Melodic and its MORPHEMIC extension. The real business case studies and their benefits were presented, and the future research directions were briefly described. The session was based on the commercial and research experience for over 5 years period.

As a speaker, Paweł had a perfect opportunity to share information about the MORPHEMIC project with Business, Dev & IT Technology Professionals attending this virtual event.

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| <b>Name of the event</b>  | <b>European Identity and Cloud Conference 2021</b>  |
| <b>Place of the event</b> | Online/Munich, Germany  |
| <b>Date of the event</b>  | 2021.08.17-19   |
| <b>Kind of the event</b>  | Business conference   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>7bulls [Alicja Reniewicz, Paweł Skrzypek]</li> </ul>   |
| <b>Outcome</b>            |  <p>European Identity and Cloud Conference 2021 is a part of the KuppingerCole events. 2021 edition of the event lasted 4 days, with over 200 speakers, 250 sessions, workshops and networking opportunities.</p> <p>Hapily, MORPHEMIC submission has been accepted despite strong competition. As a result, Alicja Reniewicz and Paweł Skrzypek gave a virtual presentation entitled: Proactive and Polymorphic Adaptation of Multi-Cloud Deployments” as a part of the track: Managing Multi-Cloud Deployment. Our project representatives took advantage of the opportunity and demonstrated how Melodic solution with MORPHEMIC extension works, also providing information about the platform’s benefits for users. This virtual presentation is still available online for registered user of <a href="http://www.kuppingercole.com">www.kuppingercole.com</a> website.</p> |

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| <b>Name of the event</b>  | <b>oneAPI DevSummit, Asia-Pacific &amp; Japan 2021</b>  |  |
| <b>Place of the event</b> | Online  |  |
| <b>Date of the event</b>  | 2021.09.15  |  |
| <b>Kind of the event</b>  | Business conference   |  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>InAccel [Chris Kachris]</li> </ul>   |  |
| <b>Outcome</b>            |  <p>The oneAPI Developer Summit focused on oneAPI, Data Parallel C++ and AI for accelerated computing across xPU architectures (CPU, GPU, FPGA, and other accelerators). In this live virtual conference, participants were given an opportunity to learn from leading industry and academia speakers, working on innovative cross-platform, multi-vendor architecture oneAPI solutions.</p> <p>During the event InAccel presented MORPEMIC related talk, presenting their contributions on the development of hardware accelerators for multi-cloud deployments of FPGAs. Chris presentation is still available online on <a href="http://www.oneapi.io">www.oneapi.io</a> website.</p> |  |

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| <b>Name of the event</b>  | <b>Big Data Conference Europe 2021</b>   |  |
| <b>Place of the event</b> | Online   |  |
| <b>Date of the event</b>  | 2021.09.29   |  |
| <b>Kind of the event</b>  | Business conference  |  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>UiO [Marta Różańska]</li> <li>7bulls [Alicja Reniewicz, Paweł Skrzypek]</li> </ul>  |  |
| <b>Outcome</b>            |  <p>DevOpsCon is a series of events focusing on latest tools, technologies, and methodologies you need to build and maintain secure, scalable, and resilient software systems. DevOpsCon New York 2021 was the conference for Continuous</p> |  |

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|  | <p>Delivery, Microservices, Containers, Clouds and Lean Business.</p> <p>MORPHEMIC representatives have been among the 30+ speakers and DevOps masterminds from around the globe to conduct one of a few workshops at the event. Their interesting session entitled: “Proactive and polymorphic adaptation of multi-cloud deployments” presented to the audience the novel concept of advanced adaptation of cloud resources using predicted demand for Cloud resources with its all benefits.</p> <p>Thanks to the event, our experts had an opportunity of networking with an international community of DevOps enthusiasts.</p> |
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| <b>Name of the event</b>  | <b>Open Source Automation Days (OSAD) 2021</b>  |   |
| <b>Place of the event</b> | Online  |   |
| <b>Date of the event</b>  | 2021.10.04-06   |   |
| <b>Kind of the event</b>  | Business conference   |   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>7bulls [Alicja Reniewicz, Paweł Skrzypek]</li> </ul>   |   |
| <b>Outcome</b>            |  <p>Open-Source Automation Days (OSAD) is an annual manufacturer-independent open-source conference. The central theme of OSAD 2021 was “Automation in Data Centers Based on Open Source”, with a focus on Cloud, DevOps/GitOps, Containerization, Security Automation and Artificial Intelligence. As in previous years, OSAD 2021 consisted of a two-day conference and one workshop day.</p> <p>At the event, Alicja Reniewicz and Paweł Skrzypek from 7bulls conducted a presentation, entitled: “Autonomous Multi-Cloud Serverless Deployment and Optimized Management”. The presentation showed how to implement Multi-Cloud native strategies using MORPHEMIC powered by MELODIC.</p> | <p>Open-Source Automation Days (OSAD) is an annual manufacturer-independent open-source conference. The central theme of OSAD 2021 was “Automation in Data Centers Based on Open Source”, with a focus on Cloud, DevOps/GitOps,</p> |

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| <b>Name of the event</b>  | <b>DevOpsDays Poznań 2021</b>  |  |
| <b>Place of the event</b> | Online   |  |
| <b>Date of the event</b>  | 2021.10.04-05  |  |
| <b>Kind of the event</b>  | Business conference  |  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>7bulls [Alicja Reniewicz, Paweł Skrzypek]</li> </ul>  |  |
| <b>Outcome</b>            |   | <p>DevOpsDays Poznań 2021 was the 2nd edition of the event. The conference was organized for community by community – DevOps and other tech specialists eager to tell their stories and share their work related experiences.</p> <p>Alicja Reniewicz and Paweł Skrzypek did an excellent job by presenting our project with the talk entitled: “Autonomous Multi-Cloud serverless deployment and optimized management”. Their presentation has aroused interest in the audience and has helped to increase the number of people aware of our MORPHEMIC project.</p> |


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| <b>Name of the event</b>  | <b>DevOps@Enterprise Forum</b>  |   |
| <b>Place of the event</b> | Warsaw, Poland  |   |
| <b>Date of the event</b>  | 2021.10.07-08   |   |
| <b>Kind of the event</b>  | Business conference   |   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>7bulls [Paweł Skrzypek]</li> </ul>           |   |
| <b>Outcome</b>            |  | <p>DevOps@Enterprise Forum is a unique DevOps conference in Poland addressed to managers responsible for the culture and tools implementation in organisations. The event took place in Warsaw in person, 7-8th of October.</p> <p>On the 1st day of the event there was a panel discussion with Paweł Skrzypek representing 7bulls and AI Investments use case. The debate was entitled: “DevOps retrospection. What you will lose and what you will gain by implementing DevOps”. Other panelists were Marcin Dzienniak (CTO, Board</p> |





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|  | <p>Member of Chmura Krajowa) and Robert Pławiak – CEO / CIO / CTO in many companies.</p>  <p>Panelists discussed the DevOps implementation challenges and positive outcomes that an implementation can have. They also brought up topics such as good practices in preparation for implementation and the experiences of organizations that have already done it. It was also a chance to talk about the Horizon 2020 project: successfully finished Melodic and the current venture MORPHEMIC. Paweł Skrzypek mentioned not once about the each of them during the discussion.</p> |
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|---------------------------|---|
| <b>Name of the event</b>  | <b>5G Made Together - Open RAN for Beyond 5G Wireless Networks: Challenges and Visions</b>  |
| <b>Place of the event</b> | Online  |
| <b>Date of the event</b>  | 2021.10.14  |
| <b>Kind of the event</b>  | Business conference   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>• UiO [Geir Horn]</li> <li>• 7bulls [Paweł Skrzypek]</li> <li>• IS-Wireless [Adam Flizikowski]</li> </ul>  |
| <b>Outcome</b>            |  <p>5G Made Together is a conference focused on and the future beyond the 5G. Idea of the event is to discuss the telecommunication standards and their inevitable changes with the leading experts from the both worlds: science and business.</p> <p>On 2021 three MORPHEMIC experts participated in the interesting panel discussion entitled: “The main challenges of ML/AI in the Beyond 5G open-RAN networks”. During the panel our representatives presented the MORPHEMIC project and its objectives. The approximate audience of the conference was around 400 people.</p> |





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| <b>Name of the event</b>  | <b>EuropeClouds Summit 2021</b>  |  |
| <b>Place of the event</b> | Online   |  |
| <b>Date of the event</b>  | 2021.10.14   |  |
| <b>Kind of the event</b>  | Business conference  |  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>7bulls [Alicja Reniewicz, Paweł Skrzypek]</li> </ul>  |  |
| <b>Outcome</b>            |  <p>At the event Alicja Reniewicz and Paweł Skrzypek from 7bulls gave a presentation entitled: “Autonomous Multi-Cloud Serverless Deployment and Optimized Management”. In their presentation were explained how to implement Multi-Cloud native strategies with advanced Melodic open-source framework and its MORPHEMIC extension and increased the number of people aware of our novel multi-cloud application management platform.</p> | <p>EuropeClouds Summit 2021 was a 3 day online event. The conference did not only presented the most advanced technologies and solutions in the cloud computing world but also extend the participants’ knowledge and helped to improve their skills by presenting the practical tools useful in work.</p> |

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|---------------------------|---|--|
| <b>Name of the event</b>  | <b>Calls for European Open Source Projects</b>  |  |
| <b>Place of the event</b> | Online  |  |
| <b>Date of the event</b>  | 2021.10.26  |  |
| <b>Kind of the event</b>  | Business webinar  |  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>Softeam [Alessandra Bagnato]</li> </ul>  |  |
| <b>Outcome</b>            |  <p>Alessandra Bagnato from Softeam gave a feedback about our Horizon 2020 project, sharing tips and tricks, how the MORPHEMIC project has been set up.</p> | <p>Calls for European Open-Source projects was a webinar which took place in October 2021. During the event organised by Systematic Paris-Region all participants could discover the selection of European calls for Open Source projects.</p> <p>MORPHEMIC representative</p> |

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|---------------------------|--|--|
| <b>Name of the event</b>  | <b>All Day DevOps [ADDO] 2021</b>  |  |
| <b>Place of the event</b> | Online   |  |
| <b>Date of the event</b>  | 2021.10.28   |  |
| <b>Kind of the event</b>  | Business conference  |  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>7bulls [Alicja Reniewicz, Paweł Skrzypek]</li> </ul>  |  |
| <b>Outcome</b>            |  <p>All Day DevOps [ADDO] is the world's largest online community of DevOps professionals in the world. The annual ADDO events are growing in popularity, gathering more and more DevOps enthusiasts. DevOps 2021 hosted 180 speakers, giving talks in 6 thematic tracks. Alicja Reniewicz and Paweł Skrzypek from 7bulls presented the MELODIC solution and its extension into MORPHEMIC during the session entitled "Autonomous Multi-Cloud serverless deployment and optimized management". They showed the process of Multi-Cloud native strategies implementation using the Horizon 2020 open-source solutions and with which they interested the audience.</p> |  |

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|---------------------------|--|--|
| <b>Name of the event</b>  | <b>Scale By The Bay 2021</b>   |  |
| <b>Place of the event</b> | Online   |  |
| <b>Date of the event</b>  | 2021.10.28-29  |  |
| <b>Kind of the event</b>  | Business conference  |  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>7bulls [Anna Warno, Paweł Skrzypek]</li> </ul>  |  |
| <b>Outcome</b>            |  <p>Scale By the Bay is a developers' own conference. It is a community event with the best Bay Area meetups and technologies powering the global leaders in data, operations, ML, and the art and craft of software engineering. In 2021 virtual edition Anna Warno and Paweł Skrzypek had a great opportunity to introduce Melodic with its MORPHEMIC extension to the conference audience. They delivered a presentation entitled: "Advanced, machine learning time series forecasting methods". Their talk was a review of the latest and most advanced time series forecasting methods like ES-Hybrid, N-Beats, Tsetlin machine, and more. Anna and Paweł gave a tips and tricks for forecasting difficult, noisy, and nonstationary time series and mentioned our project not only once, so that more could learn about our unique solution.</p> |  |


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|---------------------------|--|
| <b>Name of the event</b>  | <b>Open Source Experience 2021</b>   |
| <b>Place of the event</b> | Paris, France  |
| <b>Date of the event</b>  | 2021.11.10   |
| <b>Kind of the event</b>  | Business conference  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>• Softeam [Alessandra Bagnato]</li> </ul>   |
| <b>Outcome</b>            |  <p>SIDO [IoT, AI, ROBOTICS, XR] and Open Source Experience as the synergy of 2 events took place in November 2021 at Palais des Congrès in Paris. Alessandra Bagnato from Softeam, Head of Modelio Research, presented MORPHEMIC project during the speech entitled: “The MORPHEMIC project – Adaptation of cloud computing resources according to an advanced polymorphic and proactive approach”.</p> <p>The talk described the latest advances in MORPHEMIC and introduced two novel concepts to Cloud Computing which utilize cloud computing resources in the most optimal way using the latest, state of the art methods, machine learning-based for time series forecasting like ES Hybrid method, Tsetlin machine, Echo State Networks, Temporal Fusion transformer and others.</p> <p>The event gave us an opportunity to finally present the MORPHEMIC project not virtually, but in-person, during the onsite event.</p> |


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|---------------------------|---|
| <b>Name of the event</b>  | <b>DevFest Romania 2021</b>   |
| <b>Place of the event</b> | Online  |
| <b>Date of the event</b>  | 2021.11.23  |
| <b>Kind of the event</b>  | Business conference   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>• 7bulls [Alicja Reniewicz, Paweł Skrzypek]</li> </ul>   |
| <b>Outcome</b>            |  <p>DevFest Romania 2021 was a business conference organized by Google Developers Groups. Community-run, one-day online conference was aimed to bring developers, students, tech-</p> |

companies and speakers together in one location, so they can learn about established or emerging technologies on topics such as Cloud, Kubernetes, Android, Flutter, Firebase, Mobile, Google Assistant, Machine Learning, Kotlin, Big Data and more.

Alicja and Paweł from 7bulls delivered a presentation entitled: “Autonomous Multi-Cloud serverless deployment and optimized management” presenting the usage of Melodic platform and its MORPHEMIC extension for the implementation of multi-cloud native strategies. The presentation met with the interest of the participants and allowed to enlarge the group of people aware about the developed solution and its core module.


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|---------------------------|--|
| <b>Name of the event</b>  | <b>Data Science Summit 2021</b>  |
| <b>Place of the event</b> | Online   |
| <b>Date of the event</b>  | 2021.12.03   |
| <b>Kind of the event</b>  | Business conference  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>7bulls [Anna Warno, Paweł Skrzypek]</li> </ul>  |
| <b>Outcome</b>            | <div data-bbox="419 976 1018 1570">  </div> <p>Data Science Summit is annual, the largest and oldest independent data science conference in the CEE region. Its 4<sup>th</sup> edition in 2021 gathered 2000 participants with a focus on many technical areas covered by the event.</p> <p>Anna Warno and Paweł Skrzypek from 7bulls were among the speakers. They gave a speech entitled: “Advanced ensembling techniques for time series forecasting”. Our experts presented the latest state of the art forecasting methods ensembled by using innovative techniques, to improve accuracy and robustness of predictions. During the session the introduction to the forecaster’s ensemble was made and live demo based on real examples was provided. Anna and Paweł used the session to briefly present mention MORPHEMIC project and reach another targeted audience.</p> |

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|---------------------------|--|
| <b>Name of the event</b>  | <b>Pyjamas Conf 2021</b>   |
| <b>Place of the event</b> | Online   |
| <b>Date of the event</b>  | 2021.12.04   |
| <b>Kind of the event</b>  | Business conference  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>7bulls [Anna Warno, Paweł Skrzypek]</li> </ul>  |
| <b>Outcome</b>            |  <p>Pyjamas Conf is an unusual event addressed to IT enthusiasts, aiming to include the community around the world that is not necessarily able to join physical conferences around the world due to many reasons. It is a free conference where anyone can join either to attend, volunteer and/or advocate for Python.</p> <p>Anna Warno and Paweł Skrzypek took part in the 2021 edition of the event in the role of speakers. They presented “Advanced, machine learning time series forecasting methods” giving a tips and tricks for forecasting difficult, noisy, and nonstationary time series. Our project was mentioned too, to help increase the number of potential users and promote the Horizon 2020 venture.</p> <p>The recordings from Pyjamas Conf 2021 are available online on YT.</p> |

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|---------------------------|---|
| <b>Name of the event</b>  | <b>Conf42: Python 2022</b>  |
| <b>Place of the event</b> | Online  |
| <b>Date of the event</b>  | 2022.01.27  |
| <b>Kind of the event</b>  | Business event  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>7bulls [Anna Warno, Paweł Skrzypek]</li> </ul>   |
| <b>Outcome</b>            |  <p>Conf42 is Computer Science Conference, during which speakers from all around the world can share their ideas with a larger public, no matter their work environment.</p> <p>During the virtual event, Anna Warno and Paweł Skrzypek from 7bulls delivered a presentation entitled: “Ensembling techniques for time series forecasting”. During their talk our experts made an introduction to the forecaster’s ensemble and live demo based</p> |



on real examples. MORPHEMIC project was introduced to the audience to interest the viewers with the novel solution and its Melodic core, increasing the chances for their successful further exploitation.

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|---------------------------|---|---|
| <b>Name of the event</b>  | <b>API Days Helsinki &amp; North 2022</b>   |   |
| <b>Place of the event</b> | Online  |   |
| <b>Date of the event</b>  | 2022.03.16  |   |
| <b>Kind of the event</b>  | Business conference   |   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>• 7bulls [Paweł Skrzypek]</li> </ul>   |   |
| <b>Outcome</b>            |  <p>API Days Helsinki &amp; North is one of a series of conferences, joining the tradition of hugely popular global apidays events. The apidays Helsinki event is brought to the audience together with the local APIOps community. In 2022 edition of the event Paweł Skrzypek presented H2020 Melodic solution and its MORPHEMIC extension. He delivered a presentation entitled: “API for multicloud management platform”. The session covered the following topics:</p> <ul style="list-style-type: none"> <li>○ Introduction of multi-cloud ideas and the latest research,</li> <li>○ Introduction to Multi-Cloud API,</li> <li>○ Overview of MELODIC – multi-Cloud management platform and MORPHEMIC introduction,</li> <li>○ Demo: Migration of the typical big data application for Genom data processing into the multi cloud.</li> </ul> <p>Thanks to the presentation we managed to reach new people, explaining to them the idea of the platform and pointing out its benefits, increasing the group of potential user of the solution and its extension.</p> <p>The recording of the session is freely available online for all internauts.</p> | <p>API Days Helsinki &amp; North is one of a series of conferences, joining the tradition of hugely popular global apidays events. The apidays Helsinki event is brought to the audience together with the local APIOps community. In 2022 edition of the event Paweł Skrzypek presented H2020 Melodic solution and its MORPHEMIC extension. He delivered a presentation entitled: “API for multicloud management platform”. The session covered the following topics:</p> <ul style="list-style-type: none"> <li>○ Introduction of multi-cloud ideas and the latest research,</li> <li>○ Introduction to Multi-Cloud API,</li> <li>○ Overview of MELODIC – multi-Cloud management platform and MORPHEMIC introduction,</li> <li>○ Demo: Migration of the typical big data application for Genom data processing into the multi cloud.</li> </ul> <p>Thanks to the presentation we managed to reach new people, explaining to them the idea of the platform and pointing out its benefits, increasing the group of potential user of the solution and its extension.</p> <p>The recording of the session is freely available online for all internauts.</p> |

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|---------------------------|--|
| <b>Name of the event</b>  | <b>Warsaw IT Days 2022</b>   |
| <b>Place of the event</b> | Warsaw, Poland/Online  |
| <b>Date of the event</b>  | 2022.04.01-02  |
| <b>Kind of the event</b>  | Business conference  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>7bulls [Alicja Reniewicz, Maciej Riedl]</li> </ul>  |
| <b>Outcome</b>            |  <p>Warsaw IT Days (WDI) is an annual conference with a rich agenda consisting of as many as several hundred speeches, as well as an ongoing parallel largest IT and data science job fair. The 13th edition of the legendary event of the Warsaw IT community took place online – 1 April 2022, and physically in Warsaw – 2 April 2022. During the 2nd day Alicja Reniewicz and Maciej Riedl from 7bulls had a presentation entitled: "Autonomous Multi-Cloud Serverless Deployment and Optimized Management". The live session was met with interest from the audience.</p> |

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|---------------------------|--|
| <b>Name of the event</b>  | <b>Open Research Webinars 2022</b>   |
| <b>Place of the event</b> | Online   |
| <b>Date of the event</b>  | 2022.05.03   |
| <b>Kind of the event</b>  | Business webinar   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>Softeam [Alessandra Bagnato]</li> </ul>   |
| <b>Outcome</b>            |  <p>Through a selection of state-of-the-art project presentations and demonstrations, this series of webinars introduces software research projects that help shape the future of open-source software and the IT industry. Co-organized by OW2 and the Eclipse Foundation, the webinars focus on international partners leveraging open-source in European publicly funded collaborative research and innovation programs.</p> <p>On 3 May 2022 Alessandra Bagnato from Softeam presented our project at one of the webinars. Her talk entitled: "MORPHEMIC Cloud computing optimization platform" presented the project, its architecture, objectives, and benefits for users, as well as CAMEL DSL used in the project. The recording of the session and the slides are available at event website.</p> |

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|---------------------------|--|
| <b>Name of the event</b>  | <b>OW2con'22</b>   |
| <b>Place of the event</b> | Online   |
| <b>Date of the event</b>  | 2022.06.08-09  |
| <b>Kind of the event</b>  | Business conference  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>• Softeam [Alessandra Bagnato]</li> <li>• 7bulls [Paweł Skrzypek]</li> <li>• Activeeon [Ali Jawad Fahs]</li> </ul>  |
| <b>Outcome</b>            |  <p>OW2 is an annual event organized by the independent, global, open-source software community. independent, global, open-source software community. The 2022 edition of the conference was a 3rd virtual event in the series and took place on 8-9 June 2022. The central theme of the conference was: “Reliable and Predictable Open-Source Software”.</p>  <p>OW2con'22 addressed many challenges of ensuring reliable and predictable open-source software. Alessandra Bagnato, Paweł Skrzypek, and Ali Jawad Fahs delivered a presentation entitled: “The H2020 MORPHEMIC Project Open Source”. They presented the developed solution during the session and were available in the dedicated chat room, ready to answer all project-related questions and arrange demonstrations for all interested. The link to the website, where demos can be booked was shared, too. MORPHEMIC was a silver sponsor of the event.</p> |

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|---------------------------|---|
| <b>Name of the event</b>  | <b>DevOps Con Berlin 2022</b>   |
| <b>Place of the event</b> | Berlin, Germany/Online  |
| <b>Date of the event</b>  | 2022.06.20-23   |
| <b>Kind of the event</b>  | Business conference   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>• UiO [Marta Różańska]</li> <li>• 7bulls [Alicja Reniewicz]</li> </ul> |

**Outcome**

DevOps Con Berlin is an annual Conference for CI/CD, the Kubernetes Ecosystem, Agile & Lean Business. At the 2022 edition of the event Marta Róžańska (UiO) and Alicja Reniewicz (7bulls) represented our project by delivering a presentation entitled: "Autonomous Multi-Cloud Serverless Deployment and Optimized Management".

Our female experts presented the use of Melodic solution along with its MORPHEMIC describing the process of multi-Cloud native strategies implementation.

The presentation of the Horizon 2020 projects' results was further carried out during the 8-hours workshop, conducted at the conference by MORPHEMIC team members.

**Name of the event****IsraelClouds Virtual Summit 2022****Place of the event**

Online

**Date of the event**

2022.06.20-23

**Kind of the event**

Business conference

**Presenters**


- 7bulls [Paweł Skrzypek]

**Outcome**

Israel Clouds Virtual Summit bringing the best experts for cloud computing technology – Broadcasting LIVE to your screen. This online event provides the opportunity to present the most advanced technologies and solutions in the fields of Cloud Computing,

Security & Cyber, AI- ML & Data.

In 2022 edition of the event Paweł Skrzypek from 7bulls had a presentation during the section DevOps, FinOps & Architecture entitled: "Proactive and Polymorphic Adaptation of Multi-Cloud Deployments". During the presentation, a practical introduction to multi-cloud application modelling, configuration, deployment, and adaptation was provided. All stages of the cloud deployment planning and designing process were shown. Also, all the key steps in the deployment and autonomic application management were demonstrated. The presentation introduced MELODIC and MORPHEMIC to the experts watching the IsraelClouds Virtual Summit, and new audience was reached.

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|---------------------------|---|--|
| <b>Name of the event</b>  | <b>Open Source in Finance Forum London 2022</b>   |  |
| <b>Place of the event</b> | London, UK  |  |
| <b>Date of the event</b>  | 2022.07.13  |  |
| <b>Kind of the event</b>  | Business conference   |  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>7bulls [Alicja Reniewicz, Paweł Skrzypek]</li> </ul>   |  |
| <b>Outcome</b>            |  <p>Open-Source Finance Forum is a conference dedicated to driving collaboration and innovation in financial services through open-source software and standards. The event brings together experts across financial services, technology, and open-source to engage its community in stimulating and thought-provoking conversations about how to best (and safely) leverage open-source software to solve industry challenges. OSFF presented by Finos and The Linux Foundation was a part of London Tech Week and took place onsite, in London on 13th of July, 2022.</p> <p>Our project has its representation at the event. Alicja Reniewicz and Paweł Skrzypek's presentation related to the MORPHEMIC project was chosen to be shown at the OSFF 2022. Our experts gave a talk entitled: "Proactive and Polymorphic Adaptation of Multi-cloud Deployments" presenting how to implement multi-cloud native strategies using an advanced open-source Melodic framework with MORPHEMIC extension. Delivered talk provided tips for participants, how our open-source solution can be used to solve some of the industry problems.</p> |  |

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|---------------------------|---|--|
| <b>Name of the event</b>  | <b>Yalva Conf 2022</b>  |  |
| <b>Place of the event</b> | Warsaw, Poland/Online   |  |
| <b>Date of the event</b>  | 2022.09.27-28   |  |
| <b>Kind of the event</b>  | Business conference   |  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>7bulls [Alicja Reniewicz, Paweł Skrzypek]</li> </ul> |  |



**Outcome**

Ya!VaConf is an annual conference for developers, IT architects, DevOps, testers and everyone interested in Java technologies. In 2022 the conference was held in a hybrid mode – providing both live and online talks for all Yava enthusiasts.

Alicja Reniewicz and Paweł Skrzypek, the project Technical Manager were among the speakers and conducted a physical session entitled: “Proactive and polymorphic adaptation of multi-cloud deployments”, as part of the DevOps & Cloud onsite track.

Our experts presented a practical introduction to multi-cloud application modelling, configuration, deployment, and adaptation using Melodic and its on-going MORPHEMIC extension. The advantages of the presented solution were mentioned to the audience, and we managed to interest another group with the project’s results.

**Name of the event****DevOpsDays Warsaw 2022****Place of the event**

Warsaw, Poland

**Date of the event**

2022.10.24-25

**Kind of the event**

Business conference

**Presenters**

- UiO [Marta Różańska]
- 7bulls.com [Alicja Reniewicz]

**Outcome**

DevOpsDays is a name of international conferences for developers, IT operations, management, CEOs, and all DevOps enthusiasts. They are worldwide series of technical conferences that cover topics such as software development, IT infrastructure operations, and the intersection between them. Our multi-cloud management platform was presented at the polish edition of the DevOpsDays in Warsaw


during the session entitled “Autonomous Multi-Cloud Serverless Deployment and Optimized Management”. was delivered by Alicja Reniewicz from 7bulls and Marta Różańska from UiO.

Our female experts described in their session, how to implement multi-Cloud native strategies using advanced an open-source Melodic framework that allows for Cloud-agnostic Multi-Cloud deployment and optimized management of the serverless applications based on flexible monitoring, context-aware maximization of the application

owner's utility of the deployed serverless components, and autonomic reconfiguration based on the application's current execution context. MORPHEMIC extension was introduced to the audience, too.

We believe that the presentation let us reach to the new people, who has not heard about the project before and interest them with the free to use open-source solution.

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|---------------------------|--|
| <b>Name of the event</b>  | <b>AI-SPRINT &amp; MORPHEMIC joint webinar: "Unleashing the potential of AI in Healthcare and E-Brainscience"</b>  |
| <b>Place of the event</b> | Online   |
| <b>Date of the event</b>  | 2022.11.02   |
| <b>Kind of the event</b>  | Business conference  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>• UiO [Geir Horn]</li> <li>• CHUV [Adeliya Latypova, Ferath Kherif]</li> </ul>  |
| <b>Outcome</b>            |  <p>On 2 November 2022, our project representatives took part in the webinar organized by AI-Sprint, MORPHEMIC and H-CLOUD: "Unleashing the potential of AI in Healthcare and E-Brainscience". The main focus of the event was the AI-based frameworks developed within the projects' scope, which aim to exploit the potential of Artificial Intelligence and Cloud Computing to offer tools and open-source platforms. During the webinar both projects presented their use cases connected with healthcare: E-Brainscience (MORPHEMIC) and Personalised Healthcare (AI-Sprint).</p> <p>Our project was represented by Adeliya Latypova, Geir Horn and Ferath Kherif.</p> |

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|---------------------------|--|
| <b>Name of the event</b>  | <b>Open Source Experience 2022</b>   |
| <b>Place of the event</b> | Paris, France  |
| <b>Date of the event</b>  | 2022.11.08-09  |
| <b>Kind of the event</b>  | Business conference  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>• Softeam [Alessandra Bagnato, Amina Moussaoui]</li> </ul>  |
| <b>Outcome</b>            |  <p>In November 2022, our team members represented MORPHEMIC at Open Source Experience in Paris, France. The event supported by Systematic Paris Region was the meeting place for the entire open-source software industry, bringing together a few thousands of professionals. This year's edition of OSXP, just like the previous one, focused on open-source technologies, solutions, and challenges in France and Europe, highlighting the driving role of open-source innovations in the digital transformation of companies in technologies such as AI, IoT, Cloud and Blockchain.</p> <p>MORPHEMIC was one of the OSXP exhibitors. In the project's booth experts were presenting our advanced and innovative multi-Cloud management platform, demonstrating and explaining the tool's main features. People were encouraged to visit our website, where demo meeting can be requested. What more, MORPHEMIC was also presented during the presentation delivered by Alessandra Bagnato: „The MORPHEMIC Project – open-source strategy optimization of the deployment and life-cycle management of data-intensive applications in the cloud computing continuum”.</p> |

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|---------------------------|---|
| <b>Name of the event</b>  | <b>European Big Data Value Forum 2022</b>   |
| <b>Place of the event</b> | Prague, Czech Republic  |
| <b>Date of the event</b>  | 2022.11.21-23   |
| <b>Kind of the event</b>  | Business conference   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>• UiO [Geir Horn]</li> <li>• Softeam [Alessandra Bagnato]</li> </ul> |

**Outcome**

The European Big Data Value Forum is an annual major ICT event in Europe that brings together big industry, technology professionals, business developers, researchers and policymakers attracting a large number of visitors. In 2022, the event took place in Prague, Czech Republic. A central theme of the event was: "At the Heart of the Ecosystem for Data and AI".

The EU-funded research and innovation projects RAINBOW, PLEDGER and MORPHEMIC, had the pleasure to host a session under the prestigious European Big Data Value Forum. The representatives of Horizon 2020 project took part in the panel discussion entitled: "Next-generation platforms for Europe's Cloud continuum" on November 23. The experts shared with the audience the latest developments and results of bleeding-edge cases utilising next-generation cloud technologies developed in the EU. The panel's main goal was to highlight the opportunities for the EU innovation landscape offered by the next-generation solutions developed by the projects, MORPHEMIC included, and to illustrate how the latest Edge/Fog/Cloud Continuum developments can strengthen EU competitiveness.

**Name of the event****DevOpsCon Munich 2022****Place of the event**

Munich, Germany

**Date of the event**

2022.12.05-08

**Kind of the event**

Business conference

**Presenters**

- 7bulls [Alicja Reniewicz]


**Outcome**

DevOpsCon Munich is an annual event from DevOpsCon series and the conference for Continuous Delivery, Microservices, Containers, Cloud & Lean Business.

On 7 December 2022 MORPHEMIC representative Alicja

Reniewicz delivered a presentation entitled: „Autonomous Multi-Cloud Serverless Deployment and Optimized Management” during the 2022 edition of the DevOpsCon Munich. In her presentation, Alicja described how to implement multi-Cloud native strategies using advanced an open-source framework that allows for Cloud-agnostic Multi-Cloud deployment and optimized management of the serverless applications based on flexible monitoring, context-aware maximization of the application owner's utility of the deployed serverless components, and autonomic reconfiguration based on the

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|  | <p>application's current execution context. Her professional presentation of the MELODIC solution and its MORPHEMIC extension was received by the attendants with interest and enthusiasm. The audience asked questions, about the limitations to using Melodic for a given application and CAMEL example. All answers were provided.</p> <p>On the next day of the conference, our project and its core module Melodic was presented in more detailed, comprehensive way by other MORPHEMIC experts during the whole day long workshop dedicated to the Melodic platform and its extension.</p> |
|--|--|

|                           |   |   |
|---------------------------|---|---|
| <b>Name of the event</b>  | <b>Open Source in Finance Forum New York 2022</b>                                   |   |
| <b>Place of the event</b> | New York, USA   |   |
| <b>Date of the event</b>  | 2022.12.08  |   |
| <b>Kind of the event</b>  | Business conference   |   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>7bulls [Katarzyna Materka]</li> </ul>        |   |
| <b>Outcome</b>            |  | <p>Katarzyna Materka from 7bulls had a pleasure to represent our project at Open Source in Finance Forum New York. The event organized by The Linux Foundation &amp; FINOS, is the only conference dedicated to driving collaboration and innovation in financial services through open-source software and standards.</p> <p>At the conference Katarzyna presented MORPHEMIC and its main module MELODIC platform while conducting a session entitled „Proactive and Polymorphic Adaptation of Multi-Cloud Deployments” to the gathered audience consisting of experts across financial services, technology, and open source. We believe our presentation met the organizers expectations, showing how to leverage our open-source software to solve some of industry challenges.</p> |

|                           |   |  |
|---------------------------|---|--|
| <b>Name of the event</b>  | <b>Conf42: DevOps Con 2023</b>  |  |
| <b>Place of the event</b> | Online  |  |
| <b>Date of the event</b>  | 2023.01.26  |  |
| <b>Kind of the event</b>  | Business conference   |  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>7bulls [Maciej Riedl]</li> </ul> |  |



## Outcomes




At this year's edition of Conf42: DevOps, the online event for IT professionals, Maciej Riedl presented the key results of Melodic and MORPHEMIC H2020 project. Our expert delivered a session entitled: "Autonomous Multi-Cloud Serverless Deployment and


Optimized Management".

The event was a perfect opportunity to introduce our solution to DevOps specialists. During the delivered presentation Maciej Riedl showed the implementation of multi-Cloud native strategies using the advanced, open-source framework, which allows for cloud-agnostic multi-cloud deployment and optimized management of the serverless applications.


The MORPHEMIC related session was published on Conf42 YouTube channel and is freely available for all DevOps enthusiasts and other people interested in the topic.

|                           |   |   |
|---------------------------|---|---|
| <b>Name of the event</b>  | <b>Warsaw IT Days 2023</b>  |   |
| <b>Place of the event</b> | Warsaw, Poland/Online   |   |
| <b>Date of the event</b>  | 2023.03.31-04.01  |   |
| <b>Kind of the event</b>  | Business conference   |   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>7bulls [Alicja Reniewicz, Paweł Skrzypek]</li> </ul> |   |
| <b>Outcome</b>            |         | <p>Warsaw IT Days (WDI) is an annual event with a rich agenda consisting of as huge number of speeches, as well as an ongoing parallel largest IT and data science job fair. This year's 14th edition of the Warsaw IT community conference was held in a</p> |

hybrid mode - with both physical and online way.

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|  |  <p>Alicja Reniewicz and Paweł Skrzypek delivered a presentation entitled: "Proactive and polymorphic adaptation of multi-cloud deployments", during which practical introduction to multi-cloud application modelling, configuration, deployment, and adaptation was provided and all stages of the cloud deployment planning and designing process were shown. The presentation is available in VoD form on the event website for the logged users in the period of 3 months from the session premiere. We believe that thanks to the significant interest in the conference the Melodic and MORPHEMIC related presentation will attract viewers and the results of our project will reach more people potentially interested in the product.</p> |
|--|---|

|                           |   |
|---------------------------|---|
| <b>Name of the event</b>  | <b>Hannover Messe 2023</b>  |
| <b>Place of the event</b> | Hannover, Germany   |
| <b>Date of the event</b>  | 2023.04.17-21   |
| <b>Kind of the event</b>  | Business fair trade   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>• ICON [Sebastian Geller]</li> </ul>   |
| <b>Outcome</b>            |  <p>On 20 April 2023, Sebastian Geller, from ICON was present in the booth of the CAE-Forum at the Hannover Messe, one of the world's largest trade fairs dedicated to industry development, which takes place in Hannover, Germany.</p> <p>In the CAE-Forum stand, Sebastian gave a talk entitled: "iconPlatform - Engineering Simulation with Optimal Cloud Resources" which highlighted ICON's digital engineering platform – iconPlatform and its use within MORPHEMIC. The presented approach demonstrated the use of optimal Cloud resources for on-demand requests simulation.</p> |

|                           |   |  |
|---------------------------|---|--|
| <b>Name of the event</b>  | <b>Europejskie inicjatywy związane z Cloud-Edge-IoT finansowane z programu Horyzont Europa "Z danymi w chmurze – czyli jak finansować Cloud-Edge-IoT z programu Horyzont Europa"</b>  |  |
| <b>Place of the event</b> | Online  |  |
| <b>Date of the event</b>  | 2023.5.25   |  |
| <b>Kind of the event</b>  | Business info session   |  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>IS-Wireless [Robert Gdowski]</li> </ul>  |  |
| <b>Outcome</b>            | <div data-bbox="419 651 1117 1023" data-label="Image">  </div> <p>On 25 May 2023 Robert Gdowski took part in the business info session organized by Polish National Research and Development Centre (NCBR) and Horizon Europe National Contact Point in Poland.</p> <p>The topic of discussion was funding of the Cloud-Edge-IoT projects from the Horizon Europe program.</p> <p>Robert Gdowski delivered a presentation about disaggregated and software-defined 5G wireless access networks (RANs) operating in an Edge-Cloud environment. During his speech Robert shared IS-Wireless' experiences from the H2020 MORPHEMIC and BRAINE projects.</p> |  |

### 3.3.2 Business workshops

|                           |   |
|---------------------------|---|
| <b>Name of the event</b>  | <b>DevOps Support for Cloud FPGA Platforms, FPL 2020</b>                  |
| <b>Place of the event</b> | Online  |
| <b>Date of the event</b>  | 2020.09.04  |
| <b>Kind of the event</b>  | Business workshop   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>InAccel [Chris Kachris]</li> </ul> |

## Outcome



InAccel organized together with IBM and ETHZ the workshop of DevOps support for Cloud FPGA Platforms. The workshop took place virtually September 4th, 2020, 14:00-17:00 CEST.

The main goal of this workshop was to highlight the challenges, which a Cloud application developer faces when designing, implementing, deploying and debugging Cloud services on Cloud FPGA platforms.

One important aspect is portability and scalability of designs across different Cloud providers and target platforms.

210 people registered and attended the event.

|                           |  |
|---------------------------|--|
| <b>Name of the event</b>  | <b>Horizon Cloud Summit 2020 workshop</b>  |
| <b>Place of the event</b> | Online   |
| <b>Date of the event</b>  | 2020.11.25   |
| <b>Kind of the event</b>  | Business workshop  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>• 7bulls [Alicja Reniewicz]</li> <li>• Softeam [Alessandra Bagnato]</li> <li>• ICCS [Yiannis Verginadis]</li> <li>• Activeeon [Maxime Compastié, Nebil Marbrouk]</li> </ul> |

## Outcome



On 25 & 26 November 2020, H-CLOUD organized its first major community event: The virtual edition of Horizon Cloud Summit 2020. The MORPHEMIC project had a session 25 November 2020 entitled: “Proactive and polymorphic adaptation of multi-cloud deployments” presented by: Alicja Reniewicz

(7bulls), Alessandra Bagnato (Softimeam), Yiannis Verginadis (ICCS), Maxime Compastie (Activeeon), Nebil Marbrouk (Activeeon).

Aim of the event was to gather researchers and innovators, Cloud stakeholders, as well as Cloud initiatives and projects to be on top of the relevant technology and market developments.



MORPHEMIC is a part of the HORIZON CLOUD [H-CLOUD] as an initiative by the European Commission aimed to consolidate and grow the Cloud Computing research and innovation community in Europe.

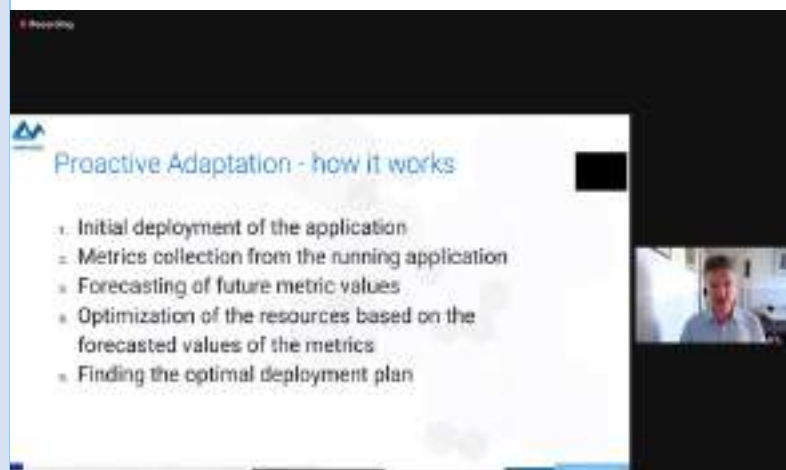
It associates projects under Coordination & Support and Research & Innovation Actions, bringing together innovators, policy makers, cloud computing research, industry, and users into an open, participatory and sustainable forum.

During the MORPHEMIC session 30+ participants were registered and actively participated.

|                           |  |
|---------------------------|--|
| <b>Name of the event</b>  | <b>H-CLOUD Technical Community Event</b>   |
| <b>Place of the event</b> | Online   |
| <b>Date of the event</b>  | 2021.03.23   |
| <b>Kind of the event</b>  | Business workshop  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>• UiO [Marta Róžańska, Geir Horn]</li> <li>• FORTH [Kyriakos Kritikos]</li> </ul> |
| <b>Outcome</b>            | <b>H-CLOUD</b> organized 1st Technical Community Event for the European Cloud Scene. MORPHEMIC had 2 sessions:           |



11:30 – 11:45 MORPHEMIC: Cloud modelling, presented by:  
**Marta Róžańska** (UiO)  
**Kyriakos Kritikos** (FORTH)

outcomes of their Cloud projects. Topics discussed during the community event range from Cloud modelling and optimization to edge computing, unikernels, DevOps practices, and green Cloud.

During the 2 MORPHEMIC sessions 30+ participants were registered and actively participated.

11:45 – 12:00  
 MORPHEMIC  
 Cloud optimization,  
 presented by:  
**Marta Róžańska**  
 (UiO)  
**Geir Horn** (UiO)


H-CLOUD  
 organized a  
 Technical  
 Community Event  
 for the European  
 Cloud Scene. During  
 this event, Cloud  
 Computing projects  
 funded under the  
 European Union's  
 Horizon 2020  
 Research and  
 Innovation Program  
 as well as other  
 stakeholders from  
 the Cloud ecosystem  
 presented technical

|                           |   |
|---------------------------|---|
| <b>Name of the event</b>  | <b>DevOps Pro Europe 2021</b>   |
| <b>Place of the event</b> | Online  |
| <b>Date of the event</b>  | 2021.05.11  |
| <b>Kind of the event</b>  | Business workshop   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>• UiO [Marta Róžańska]</li> <li>• 7bulls [Alicja Reniewicz, Paweł Skrzypek]</li> </ul> |


|                |   |
|----------------|---|
| <b>Outcome</b> |  <p>DevOps Pro Europe is a conference, which takes place every year. It covers the core principles and concepts of the DevOps methodology and demonstrates how to use the most common DevOps patterns to develop, deploy and maintain applications on-premises and in the cloud. The conference was hybrid: taking place both onsite and online. During 2021 edition of the event Marta Róžańska, Alicja Reniewicz and Paweł Skrzypek conducted a workshop entitled: "Forecasting based proactive optimization of cloud resources". Our experts spend a whole day with workshop participants, leading 4 sessions, during which the MELODIC platform and its on-going extension were presented in detail:</p> <ul style="list-style-type: none"> <li>○ Introduction to Multi-Clouds and Modelling Cloud Applications,</li> <li>○ Multi-Cloud Deployment, Platform overview,</li> <li>○ Multi-Cloud Deployment, Application Modelling,</li> <li>○ Multi-Cloud Deployment, Monitoring and Adaptations.</li> </ul> <p>Thanks to the workshop our experts were able to fully present the solution performance and show its main features and benefits to all participants.</p> |
|----------------|---|

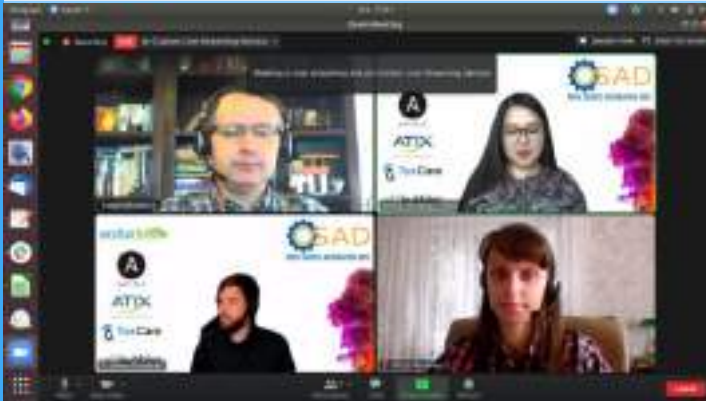
|                           |   |
|---------------------------|---|
| <b>Name of the event</b>  | <b>DevOpsCon Berlin 2021</b>  |
| <b>Place of the event</b> | Online  |
| <b>Date of the event</b>  | 2021.06.17  |
| <b>Kind of the event</b>  | Business workshop   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>● UiO [Marta Róžańska]</li> <li>● 7bulls [Alicja Reniewicz, Paweł Skrzypek]</li> </ul>   |
| <b>Outcome</b>            | <p>DevOpsCon is the Conference for Continuous Delivery, Microservices, Containers, Cloud &amp; Lean Business.</p>  <p>In 2021 Marta Róžańska from UiO, as well as Alicja Reniewicz and Paweł Skrzypek from 7bulls had a whole day long Multi-Cloud workshop entitled: „Proactive and polymorphic adaptation of multi-cloud deployments“. During the workshop our experts imparted a wealth of knowledge about cloud computing to the participants, including overview of the latest research, but the core of the presentation was an introduction to the multi-Cloud application modelling, configuration, deployment, and adaptation, including the survey of the existing Cloud Management Platforms (CMP), modelling methods, and languages. Melodic open-source middleware was used to present the features of the platform and introduce its ongoing MORPHEMIC extension.</p> |

The webinar was met with the interest from the participants and all questions about the offered solution were answered.

|                           |   |   |
|---------------------------|---|---|
| <b>Name of the event</b>  | <b>FPL2021 [2nd workshop on DevOps Support for Cloud FPGA platforms]</b>  |   |
| <b>Place of the event</b> | Online  |   |
| <b>Date of the event</b>  | 2021.08.30  |   |
| <b>Kind of the event</b>  | Business workshop   |   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>InAccel [Chris Kachris]</li> </ul>   |   |
| <b>Outcome</b>            |  <p>The International Conference on Field-Programmable Logic and Applications (FPL) was the first and remains the largest conference covering the rapidly growing area of field-programmable logic and reconfigurable computing.</p> <p>During the past 30 years, many of the advances in reconfigurable system architectures, applications, embedded processors, design automation methods and tools were first published in the proceedings of the FPL conference series. The conference objective is to bring together researchers and practitioners from both academia and industry and from around the world.</p> <p>During the 31<sup>st</sup> edition of the event, on 30 August 2021, Chris Kachris from InAccel conducted a workshop entitled: “Seamless FPGA DevOps on multi-cloud deployments”, presenting the easiest way for FPGA deployment on the most advanced multi cloud optimization platform using the MORPHEMIC platform.</p> | <p>The International Conference on Field-Programmable Logic and Applications (FPL) was the first and remains the largest conference covering the rapidly growing area of field-programmable</p> |


|                           |                                |
|---------------------------|--------------------------------|
| <b>Name of the event</b>  | <b>DevOpsCon New York 2021</b> |
| <b>Place of the event</b> | Online                         |
| <b>Date of the event</b>  | 2021.09.27-30                  |

|                          |  |
|--------------------------|--|
| <b>Kind of the event</b> | Business workshop  |
| <b>Presenters</b>        | <ul style="list-style-type: none"> <li>• UiO [Marta Róžańska]</li> <li>• 7bulls [Alicja Reniewicz, Paweł Skrzypek]</li> </ul>  |
| <b>Outcome</b>           |  <p>DevOpsCon is a series of event focusing on latest tools, technologies, and methodologies you need to build to maintain secure, scalable, and resilient software systems. DevOpsCon New York 2021 was the conference for Continuous Delivery, Microservices, Containers, Clouds and Lean Business.</p> <p>MORPHEMIC representatives have been among the 30+ speakers and DevOps masterminds from around the globe to conduct one of a few workshops at the event. Their interesting session entitled: “Proactive and polymorphic adaptation of multi-cloud deployments” presented to the audience the novel concept of advanced adaptation of cloud resources using predicted demand for Cloud resources with its all benefits.</p> <p>Thanks to the event, our experts had an opportunity of networking with an international community of DevOps enthusiasts.</p> |

|                           |  |
|---------------------------|--|
| <b>Name of the event</b>  | <b>Open Source Automation Days 2021 OSAD</b>   |
| <b>Place of the event</b> | Online   |
| <b>Date of the event</b>  | 2021.10.04-06  |
| <b>Kind of the event</b>  | Business workshop  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>• UiO [Marta Róžańska]</li> <li>• 7bulls [Alicja Reniewicz, Paweł Skrzypek]</li> </ul>  |
| <b>Outcome</b>            |  <p>The Open-Source Automation Days (OSAD) is an annual manufacturer-independent open-source conference. The central theme of OSAD 2021 was “Automation in Data Centers Based on Open Source”, with a focus on Cloud, DevOps/GitOps, Containerization, Security Automation and Artificial Intelligence. As in previous years, OSAD 2021 consisted of a two-day conference and one workshop day.</p> <p>On the last day of the event, MORPHEMIC experts conducted a workshop entitled: “Forecasting based proactive optimization of cloud resources”. Among others, the</p> |




|  |   |
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|  | <p>workshop provided an introduction to the multi-Cloud application modelling, configuration, deployment, and adaptation, including the survey of the existing Cloud Management Platforms (CMP), modelling methods, and languages. During the workshop the MELODIC platform with currently developed MORPHEMIC extension was used in order to implement a self-adaptive deployment and reconfiguration system.</p> <p>Thanks to the workshop our specialists managed to reach another potential group of users for MELODIC and MORPHEMIC open-source tools, showing in detail how it works and pointing out the benefits of the solution.</p> |
|--|---|

|                           |  |
|---------------------------|--|
| <b>Name of the event</b>  | <b>H-CLOUD Technical Community Event</b>   |
| <b>Place of the event</b> | Online   |
| <b>Date of the event</b>  | 2021.10.26   |
| <b>Kind of the event</b>  | Scientific workshop  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>• UiO [Geir Horn]</li> <li>• Engineering [Maria Antonietta Di Girolamo]</li> <li>• Softeam [Etienne Brosse]</li> <li>• 7bulls [Paweł Skrzypek, Maciej Riedl]</li> </ul>   |
| <b>Outcome</b>            |  <p>In October 2021 took place the H-CLOUD Technical Community Event with MORPHEMIC and MELODIC. Event was held online. Our project represented by 5 IT specialists, from 4 organisations. The conducted 2h workshop entitled: “Proactive and polymorphic adaptation of multi-cloud deployments” was a great opportunity to present the MORPHEMIC project, which based on the results of the MELODIC solution, ended with success in 2020. During the event multi-cloud application modelling, configuration, deployment, and adaptation was presented, and latest research overviewed. Additionally, Paweł Skrzypek presented how AI-Investment the usage mentioned tools for its platform multi-cloud optimization.</p> <p>Two of the presentations and the recording of the webinar are available on the H-CLOUD website.</p> |

|                           |                               |
|---------------------------|-------------------------------|
| <b>Name of the event</b>  | <b>DevOps Con Berlin 2022</b> |
| <b>Place of the event</b> | Berlin, Germany/Online        |
| <b>Date of the event</b>  | 2022.06.20-23                 |





|                          |   |   |
|--------------------------|---|---|
| <b>Kind of the event</b> | Business workshop   |   |
| <b>Presenters</b>        | <ul style="list-style-type: none"> <li>• UiO [Marta Róžańska]</li> <li>• 7bulls [Alicja Reniewicz, Maciej Riedl]</li> </ul>   |   |
| <b>Outcome</b>           |   | <p>DevOps Con Berlin is an annual Conference for CI/CD, the Kubernetes Ecosystem, Agile &amp; Lean Business. At the 2022 edition of the event Marta Róžańska, Alicja Reniewicz and Maciej Riedl conducted a whole-day workshop entitled: “Proactive and polymorphic adaptation of multi-cloud deployments”.</p> |
|                          | <p>The 8-hours long workshop covered the following topics:</p> <ul style="list-style-type: none"> <li>○ Introduction of multi-cloud ideas and the latest research</li> <li>○ Introduction to Multi-Cloud optimization,</li> <li>○ Overview of MELODIC</li> <li>○ Extensions to MORPHEMIC</li> <li>○ Deployment of the MORPHEMIC Platform</li> <li>○ UI and features walkthrough</li> <li>○ CAMEL model overview</li> <li>○ Preparation of the CAMEL model for sample application</li> <li>○ Deployment and optimization of the sample application</li> <li>○ Reconfiguration of the application</li> <li>○ Existing Research Challenges and Summary.</li> </ul> <p>We believe this workshop interested the audience and directed their attention to the opportunities offered by Melodic solution along with its MORPHEMIC extension.</p> |   |

|                           |                               |
|---------------------------|-------------------------------|
| <b>Name of the event</b>  | <b>DevOpsCon Munnich 2022</b> |
| <b>Place of the event</b> | Munich, Germany               |
| <b>Date of the event</b>  | 2022.12.05-08                 |

|                          |   |  |
|--------------------------|---|--|
| <b>Kind of the event</b> | Business workshop   |  |
| <b>Presenters</b>        | <ul style="list-style-type: none"> <li>• 7bulls [Maciej Riedl, Jakub Pacześ]</li> <li>• ICCS [Yiannis Verginadis]</li> </ul>  |  |
| <b>Outcome</b>           |  <p>DevOpsCon Munnich is an annual event from DevOpsCon series and the conference for Continuous Delivery, Microservices, Containers, Cloud &amp; Lean Business.</p> <p>On December 2022 MORPHEMIC team members participated in the event and conducted a workshop entitled: "Proactive and Polymorphic Adaptation of Multi-Cloud Deployments".</p> <p>During the 8-hours workshop our experts used the MELODIC open-source middleware platform to implement a self-adaptive deployment and reconfiguration system based on a feedback-driven control loop. Based on the MELODIC presenters, showed the existing research project MORPHEMIC and its first release of Proactive and Polymorphic Adaptation, Proactive Scheduler, Self-healing Event Management System and CAMEL Designer.</p> <p>The workshop was a great opportunity for detailed presentation of the MORPHEMIC project and its core module Melodic to the gathered audience.</p> |  |

|                           |               |
|---------------------------|---------------|
| <b>Name of the event</b>  | OW2con'23     |
| <b>Place of the event</b> | Paris, France |
| <b>Date of the event</b>  | 2023.06.14-15 |

|                          |  |  |
|--------------------------|--|--|
| <b>Kind of the event</b> | Business event   |  |
| <b>Presenters</b>        | <ul style="list-style-type: none"> <li>• UiO [Geir Horn]</li> <li>• 7bulls [Konrad Wawruch]</li> <li>• Softeam [Amina Moussaoui]</li> </ul>                            |  |
| <b>Outcome</b>           |   | <p>As in the previous 3 years the MORPHEMIC participated in the annual OW2 conference. This year, our project was even more exposed to the public, having a status of Gold Sponsor of the event.</p> <p>During the conference the session was conducted: “MORPHEMIC: Open source cross Cloud application management supporting hardware accelerators”. The presentation was delivered by Geir Horn, the project coordinator and Konrad Wawruch, 7bulls.</p> <p>Beside the session, as Gold Sponsor of the event, MORPHEMIC experts, Geir Horn and Amina Mousaoui were present at the dedicated DEMO pod at the event venue through the conference. In the booth all interested conference participants could ask for MORPHEMIC demonstration and ask questions about the developed solution.</p> <p>As a Gold Sponsor of the event, MORPHEMIC has gained a few more options to reach more IT professionals with the project results. MORPHEMIC logotype was visible on all conference online and onsite materials, as well as in Social Media campaigns.</p> |

A total of 75 business conferences, including open-source community events, as well as 11 business workshops have featured the MORPHEMIC project. Events were in majority organized via online platforms with participants from all over the world from various countries and continents.

### 3.4 Mainstream Media

MORPHEMIC deserved a wider audience and visibility, that is why we used mainstream media magazine to spread the information about our project. The MORPHEMIC has success by being presented in the *HiPEACInf62 magazine*<sup>6</sup>. The article dedicated to the MORPHEMIC project entitled: “MORPHEMIC – Advanced polymorphic and proactive cloud

<sup>6</sup> [HiPEACInf62 magazine, January 2021](#)

computing resources adaptation project” was presented in the in section “Innovation Europe”. Alessandra Bagnato from Softeam was the author of the article.



Figure 3 Excerpt of the MORPHEMIC article from HIPEACInf62 magazine

### 3.5 Other Types of Communication

The MORPHEMIC project explored other means of communication and dissemination in order to broaden the public's awareness of the project and its results:

- Clustering: A major objective of MORPHEMIC was to build and promote synergies with other existing European initiatives and networks and with similar European projects funded under the same call. The MORPHEMIC has established working relationship with:
  - **Horizon CLOUD, The European Cloud Computing Hub**<sup>7</sup>
    - Till September 2022, each month Horizon CLOUD organized *H-CLOUD Communication Task Force meeting*. 7 bulls actively participated in all meetings, which were 22, by the end of H-CLOUD initiative.
    - MORPHEMIC took part in 3 events organized by Horizon CLOUD: H-CLOUD Summit 2020 Workshop on 25 November 2020; and H-CLOUD Technical Community Event on 23.03.2021 and 26 October 2021. Each of the events was described in *Business Events* section of the document.
    - MORPHEMIC, AI-Sprint and H-CLOUD co-hosted a webinar entitled “Unleashing the potential of AI in Healthcare and E-Brainscience” 2 November 2022. The event was described in *Business Events* section of the document.
    - Basic information about the H-CLOUD, along with the website address, was published on MORPHEMIC website, on *Clustering* subpage.
  - **Rainbow project**<sup>8</sup>
    - MORPHEMIC & Rainbow organized together the 1st technical workshop on 14 April 2021. The idea of this 1-hour workshop was to focus on technical and research topics addressed in the two projects. First round, conducted by Rainbow, presented the technical solutions of the project and potential collaboration between the 2 projects.
    - The two projects along with PLEDGER<sup>9</sup> jointly hosted a session under the prestigious European Big Data Value Forum on 21-23 November 2022. The panel discussion entitled: “Next-generation platforms for Europe's Cloud continuum” was held physically in Prague, Czech Republic. In the discussion

<sup>7</sup> [HORIZON CLOUD, The European Cloud Computing Hub](#)

<sup>8</sup> [Rainbow project](#)

<sup>9</sup> [PLEDGER project](#)



participants shared with the audience the latest developments and results of bleeding-edge cases utilising next-generation Cloud technologies developed in the EU. The panel's main goal was to highlight the opportunities for the EU innovation landscape offered by the next-generation solutions developed by the 3 projects and to illustrate how the latest Edge/Fog/Cloud Continuum developments can strengthen EU competitiveness.

- MORPHEMIC and Rainbow projects supported each other by mutually sharing publications via social media channels. What more, a basic information about the Rainbow project, along with the website address, was published on MORPHEMIC website, on *Clustering* subpage.
- **ReachOut project<sup>10</sup>**
  - MORPHEMIC & ReachOut started a collaboration on 16 March 2021 with a first “Morphemic - ReachOut Workshop”<sup>11</sup>. Seven MORPHEMIC project representatives attended the ReachOut event. Interactions with the organizer team allowed our project partners to evaluate the potential benefits of the beta testing platform for MORPHEMIC respective use cases.
  - The ambition of the ReachOut Project is to connect research projects with beta testers and early users on the market and to help with managing the projects' beta-testing campaigns. The collaboration with a beta testing campaign was reached on the Camel Designer component. The campaign for camel designer started at the end of June 2021 and finished at the end of November 2021. Different webinars were organized in this period and Softeam prepared the testing scenarios, customizing the feedback survey. The complete campaign description was published on ReachOut website<sup>12</sup>.
- **HUB4CLOUD<sup>13</sup>**
  - Geir Horn, the MORPHEMIC coordinator, was a part of the **HUB4CLOUD Strategic Coordination Board** (SCB). There has been an initial meeting aiming to prioritize the topics for the strategic agenda on Cloud computing challenges to be elaborated by HUB4CLOUD.
  - A basic information about the HUB4CLOUD, along with the website address, was published on MORPHEMIC website, on *Clustering* subpage.
- **AI-Sprint<sup>14</sup>**
  - MORPHEMIC, AI-Sprint and H-CLOUD co-hosted a webinar entitled *Unleashing the potential of AI in Healthcare and E-Brainscience* 2 November 2022. The event was described in the paragraph related to the collaboration with H-CLOUD initiative.
- **PLEDGER**
  - MORPHEMIC, Rainbow and PLEDGER jointly hosted a session under the prestigious European Big Data Value Forum on 21-23 November 2022, which was described in the paragraph dedicated to cooperation with the Rainbow project.
- **SWForum<sup>15</sup>**
  - In January 2022 MORPHEMIC has joined the SWforum H2020 project Hub to connect with researchers and practitioners, and other projects, and increase MORPHEMIC visibility.
- **Videos**, used as promotional materials and the best way of project results presentation. During the project lifespan we managed to prepare and share via the project's YouTube Channel:
  - **1 professional video**, promoting the project and its benefits for the users.

<sup>10</sup> [ReachOut Platform](#)

<sup>11</sup> [Morphemic – ReachOut workshop](#)

<sup>12</sup> [ReachOut completed campaigns](#)

<sup>13</sup> [HUB4CLOUD project](#)

<sup>14</sup> [AI-Sprint project](#)

<sup>15</sup> [SWForum](#)



- **7 use cases videos** in order to communicate and disseminate the project outcomes: 3 videos presenting the use cases and 3 other materials focusing on the project's influence on the use cases,
- **1 video presenting the project in general**, the motivation of the consortium partners and the challenges they have to face, project strengths and benefits.
- **3 recordings of webinars** organised by the consortium members,
- **1 video with MORPHEMIC 2.5 features**,
- **1 video demonstration**, presenting the process of downloading, installing, and using the Melodic solution with MORPHEMIC extension,
- **1 video presenting the MORPHEMIC Camel Designer tool**,
- **1 professional MORPHEMIC use case video, presenting iconPlatform**,
- **3 recordings of the sessions** carried out during the events.

As a part of the project creating of the promoting video was ordered. The final video *MORPHEMIC. Shaping clouds for you and your business*<sup>16</sup> is a mix of professionally edited scenes accompanied by the subtitles introducing the project and its benefits, with the energetic music in the background. The video is undoubtedly catching attention and interesting yet explaining the project objectives and advantages in a simple, understandable way.



Figure 4 A screenshots of the MORPHEMIC promotional video compilation

Additionally, we are in the process of preparing 7-8 short video tutorials about “Modeling a Camel Application with Camel Designer Tool”, which are to be uploaded in June 2023.

Closing the paragraph about the videos it's worth to mention, that MORPHEMIC consortium members participated in many events, which recording are freely available online on the events YouTube channels or websites, providing another way to reach the potential users of the project and its outcomes.

- **Webinars:** MORPHEMIC partners organized webinars in the topic of multi-Cloud, Cloud resources optimization, polymorphic architecture & proactive adaptation, vendor selection, optimization, multi-Cloud environments, hybrid & digital infrastructures, etc.
  - 1<sup>st</sup> webinar was organized by UiO and 7bulls: 5 May 2021 from 10:00 to 12:00, entitled: “Break out of Matrix, free your mind and enter into the Multicloud World”. Speakers: Marta Róžańska from UiO, Katarzyna Materka, Alicja Reniewicz, Paweł Skrzypek and Maciej Riedl from 7bulls.

<sup>16</sup> [MORPHEMIC. Shaping clouds for you and your business – project's promotional video](#)



*Figure 5 Webinar banner displayed on the LinkedIn page:  
Break out of Matrix, free your mind and enter into the Multicloud World*

- o 2<sup>nd</sup> webinar is going to be organized by UiO and 7bulls: 22 June 2021 from 16:00 to 17:30, entitled: “Matrix Reloaded – Multi-Cloud is coming back!”. Speakers: Marta Róžańska from UiO, Katarzyna Materka, Alicja Reniewicz, Paweł Skrzypek and Maciej Riedl from 7bulls.



*Figure 6 Webinar banner displayed on the LinkedIn page: “Matrix Reloaded – Multi-Cloud is coming back!”*

- o 3<sup>rd</sup> webinar was organized by UiO and 7bulls: 20 January 2022 from 18:00 to 18:45, entitled: “Multi Cloud in the financial sector - save costs and process data faster”. Speakers: Marta Róžańska from UiO, Alicja Reniewicz and Paweł Skrzypek from 7bulls.



*Figure 7 Webinar banner displayed on the LinkedIn: “Multi Cloud in the financial sector - save costs and process data faster”*

- **MELODIC communication channels**

- o Some information about the MORPHEMIC project and its team members activity has been also published on MELODIC website<sup>17</sup> and social media channels: LinkedIn<sup>18</sup>, Facebook<sup>19</sup>, and Twitter<sup>20</sup>. Especially the events, at which both the already developed solution and its extension have been presented were promoted on the MELODIC website. Below are examples of shared messages.

<sup>17</sup> [MELODIC website](#)

<sup>18</sup> [MELODIC LinkedIn account](#)

<sup>19</sup> [MELODIC Facebook account](#)

<sup>20</sup> [MELODIC Twitter account](#)



Figure 8 News about MELODIC and MORPHEMIC at [www.melodic.cloud](http://www.melodic.cloud)

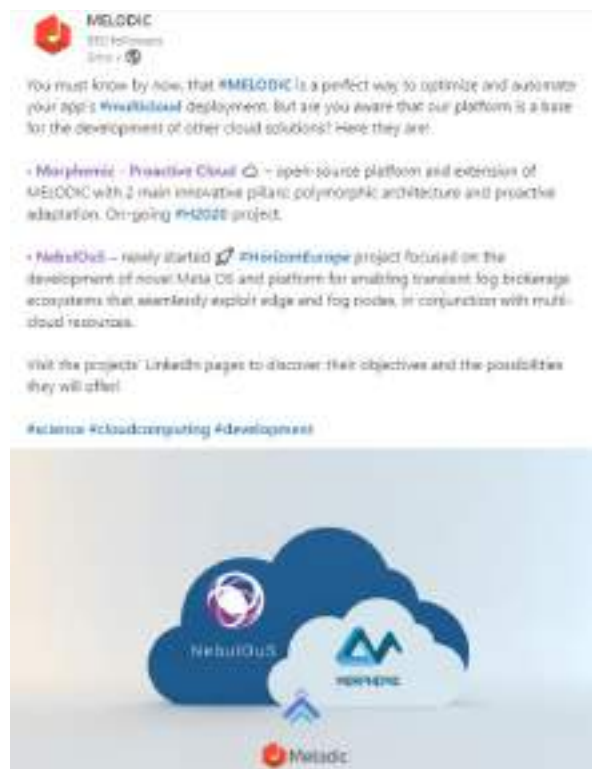


Figure 9 Example of MORPHEMIC promotion via Melodic social media



### 3.6 Communication Plan

MORPHEMIC partners have used a professional B2B *Communication Plan* in order to support the exploitation of the project outcomes. MORPHEMIC partners have planned the communication activities with great care of defining the right target audiences. 7Bulls have led and managed the communication activities planning with all consortium partners. In accordance with the project proposal and approved budget, partners have committed a part of their overall budget to spend toward B2B communication activities, such as events participation, LinkedIn campaign or video production.

Below we present the details of the Communication Plan: its strategic and operational goals as well as MORPHEMIC key messages and target groups, which were to be attracted.

- **Strategic goals:**
  - Make the research carried out under MORPHEMIC and the EU funding more visible,
  - Gain understanding and support from scientific community, potential industrial partners and society,
  - Encourage the take-up of the open-source code by a critical number of external developers,
  - Incorporate a feedback loop with the target audience for continuous improvement of results,
  - Attract potential users of the MORPHEMIC results,
  - Publicize the results in order to identify potential new use cases and application domains,
  - Share knowledge and strengthen the innovation landscape in Europe.
- **Operational goals:**
  - Define a common strategy and plan to help the partners identify issues that should be communicated,
  - Plan and coordinate the communication efforts throughout the project,
  - Set targeted audiences, key messages and principal media for specific communication activities.
- **Target audience and key message:**
  - Internal audience – members of the consortium,
  - Developers, ISV, providers and integrators of dynamic data-intensive Cloud applications,
  - SMEs, start-ups, large companies and public organizations,
  - Cloud and Big Data Research Community,
  - Cloud providers and brokers,
  - Community of developers working in IoT, Cloud/edge/distributed computing,
  - End users and general public.

To reach the target audience and the goals of the project MORPHEMIC consortium members spend money on the following communication activities:

- UiO: Pod at the Open Source Experience Event 2022 – € 3149.84
- 7bulls: LinkedIn Campaigns – € 4286.00
- FORTH: STAF 2022 Conference sponsorship & OW2con sponsorship – € 2371.85
- Softeam: OW2con 2021 & 2022 sponsorship - € 4000.00
- InAccel: OW2con sponsorship – € 1333.00
- ENGINEERING: - Promotional marketing video – € 3327.00
- UPRC: European Big Data Value Forum 2022 – € 1500.00
- IS-Wireless: OW2con sponsorship – € 1333.00
- ICON: Digital Media Portals, promotional video, Hannover Messe and online event – € 5280.50

In total we spend € 26 581.19 on the above-mentioned means of project promotion.

Three remaining partners (ICCS, Activeeon, CHUV) participated in free-of-charge events and transferred the money to other tasks.

The key value of the MORPHEMIC project is the unique concept of the polymorphic architecture and proactive adaptation, making it possible for dynamic Cloud applications to run seamlessly in different configurations based on an automatic prediction of workload. It is a complete solution for the deployment and adaptation of Cloud applications, widely available as open-source software and Melodic solution extension. Our key messages were adjusted to different audience groups based on the level of technical expertise, to be easily understandable by the addressees.

The communication was also tailored to the perspective of each audience groups, covering one or more of the following aspects:

- Awareness of the project objectives, general concept and achieved results,
- Understanding of the proposed innovation,
- Actions related to delivering feedback, validation and use of results, engagement in the project community.

## 4 Dissemination activities

### 4.1 Publications

According to the R&I nature of the MORPHEMIC project, consortium members were involved into the innovative tasks related to the scientific activities with the objective of bringing state of the art methods and contributing to the community by offering advanced techniques developed within the MORPHEMIC project.

Table 4 below contains the publications which have been registered during the project duration.

The status field contains 2 different values:

- *Accepted* status means that the publication is accepted to a conference or a journal,
- *On-going* status means the editing already started / probably finished / the publication already submitted to a conference or journal. However, the acceptance decision has not been delivered yet.

Table 4 Publications list

| Publication   | Status   |
|---|----------|
| <p><b><i>Extending TOSCA for Edge and Fog Deployment Support</i></b></p> <p>This publication presents a set of Topology and Orchestration Specification for Cloud Applications (TOSCA) extensions to model applications relying on any combination of the aforementioned technologies.</p> <p>Published in: Special Issue Novel Cloud-Based Service/Application Platforms and Ecosystems</p> <p>Available at: <a href="https://doi.org/10.3390/electronics10060737">https://doi.org/10.3390/electronics10060737</a></p> <p>Authors: Andreas Tsagkaropoulos (ICCS), Yiannis Verginadis (ICCS), Grigoris Mentzas (ICCS), Maxime Compastié (Activeeon)</p> | Accepted |
| <p><b><i>Real-time adaptable resource allocation for distributed data-intensive applications over Cloud and edge environments</i></b></p> <p>This publication presents an approach exploited on the MORPHEMIC where the application model is constructed enabling a dynamic manner of allocating resources for maximizing the Cloud/edge application.</p> <p>Publication has been presented during the scientific conference, entitled: <i>IEEE CCEM 2020 9th IEEE International Conference on Cloud Computing in Emerging Markets</i>.</p>   | Accepted |





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| <p>Presenter: Jean-Didier Totow (UPRC)</p> <p>Available at: <a href="https://easychair.org/publications/preprint/open/ZRSc">https://easychair.org/publications/preprint/open/ZRSc</a></p> <p>Author: Jean-Didier Totow (UPRC), Dimosthenis Kyriazis (UPRC)</p>  |                        |
| <p><b><i>Data and Cloud Polymorphic Application Modelling in Multi-Clouds and Fog Environments</i></b></p> <p>This publication presents the modelling approach used in Morphemic for application in a multi-Cloud and fog environment.</p> <p>Paper presented during the scientific conference, entitled: <i>33rd International Conference on Advanced Information Systems Engineering</i>.</p> <p>Presenter: Yiannis Verginadis (ICCS)</p> <p>Published in: Advanced Information Systems Engineering. CAiSE 2021. Lecture Notes in Computer Science, vol 12751. Springer, Cham.</p> <p>Available at: <a href="https://link.springer.com/chapter/10.1007/978-3-030-79382-1_27">https://link.springer.com/chapter/10.1007/978-3-030-79382-1_27</a></p> <p>Authors: Yiannis Verginadis (ICCS), Ioannis Patiniotakis (ICCS), Kyriakos Kritikos (FORTH)</p> | <p><b>Accepted</b></p> |
| <p><b><i>Mapping grip force to motor networks</i></b></p> <p>This publication presents the application of the neuroimaging tools with Proactive workflow for large scale study.</p> <p>Published in: NeuroImage, Volume 229.</p> <p>Available at: <a href="https://doi.org/10.1016/j.neuroimage.2021.117735">https://doi.org/10.1016/j.neuroimage.2021.117735</a></p> <p>Authors: Ferath Kherif (CHUV), Ladina Weitnauer, Stefan Frisch, et al.</p>   | <p><b>Accepted</b></p> |
| <p><b><i>Apolipoprotein E4 effects on topological brain network organization in mild cognitive impairment</i></b></p> <p>This publication presents the use case brain science-application of the neuroimaging pipeline with Proactive workflow.</p> <p>Published in: Scientific Report 11, 845 (2021).</p> <p>Available at: <a href="http://doi.org/10.1038/s41598-020-80909-7">http://doi.org/10.1038/s41598-020-80909-7</a></p> <p>Authors: Ferath Kherif (CHUV), Gretel Sanabria-Diaz, Lester Melie-Garcia, et al.</p>   | <p><b>Accepted</b></p> |
| <p><b><i>Medical Informatics Platform (MIP): A Pilot Study Across Clinical Italian Cohorts</i></b></p> <p>This publication presents the application of the neuroimaging pipeline with Proactive workflow.</p> <p>Published in: Frontiers in Neurology, Volume 11 – 2020.</p> <p>Available at: <a href="https://doi.org/10.3389/fneur.2020.01021">https://doi.org/10.3389/fneur.2020.01021</a></p> <p>Authors: Ferath Kherif (CHUV), Alberto Redolfi, Silvia De Francesco, et al.</p>  | <p><b>Accepted</b></p> |
| <p><b><i>Remodeling of brain morphology in temporal lobe epilepsy</i></b></p> <p>This publication is based on a neuroimaging application exploiting Proactive workflow.</p>   | <p><b>Accepted</b></p> |



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| <p>Published in: Brain and Behaviour, Volume10, Issue11, November 2020.</p> <p>Available at: <a href="https://doi.org/10.1002/brb3.1825">https://doi.org/10.1002/brb3.1825</a></p> <p>Authors: Ferath Kherif (CHUV), Elisabeth Roggenhofer, Sandrine Muller, et al.</p>  |                        |
| <p><b><i>MORPHEMIC Cloud application model design</i></b></p> <p>This publication presents the MORPHEMIC Camel Designer tool responsible of the Cloud Application Modelling and Execution Language (CAMEL) design for the modelling Environment Modelio.</p> <p>Publication was presented during at 1st Eclipse Research International Conference on Security, AI, Architecture, and Modelling for Next Generation Mobility.</p> <p>Presenter: Alessandra Bagnato (Softeam)</p> <p>Available at: <a href="https://ceur-ws.org/Vol-3028/D2-07-ESAAMM_2021_paper_10.pdf">https://ceur-ws.org/Vol-3028/D2-07-ESAAMM_2021_paper_10.pdf</a></p> <p>Authors: Alessandra Bagnato (Softeam), Etienne Brosse (Softeam), Kaïs Chaabouni (Softeam)</p>  | <p><b>Accepted</b></p> |
| <p><b><i>An architecture for autonomous proactive and polymorphic optimization of Cloud applications</i></b></p> <p>This paper describes the initial architecture of the Morphemic platform based on D4.1.</p> <p>Paper was presented at The 4th International Workshop on Recent Advances for Multi-Clouds and Mobile Edge Computing (M<sup>2</sup>EC 2022).</p> <p>Presenters: Marta Róžańska, Katarzyna Materka, Geir Horn</p> <p>Published in: Advanced Information Networking and Applications. AINA 2022. Lecture Notes in Networks and Systems, vol 451. Springer, Cham.</p> <p>Available at: <a href="https://link.springer.com/chapter/10.1007/978-3-030-99619-2_53">https://link.springer.com/chapter/10.1007/978-3-030-99619-2_53</a></p> <p>Authors: Marta Róžańska (UiO), Paweł Skrzypek (7bulls), Katarzyna Materka (7bulls), Geir Horn (UiO)</p>  | <p><b>Accepted</b></p> |
| <p><b><i>Proactive Autonomic Cloud Application Management</i></b></p> <p>Applications running in the Cloud can adapt to the varying demands by autonomic management of their resource configurations. The reconfiguration can be done as a reaction to the changed situation, or proactively to ensure the good performance of the application at some future point. However, it is difficult to predict the future behaviour of the application as it depends both on the changing contexts and reconfiguration. We describe the approach for proactive autonomic Cloud application management, and introduce a concept of 'utility metrics', which are metrics related to the application's utility and influenced by reconfigurations. We describe how utility metrics can be learned as regression functions and used in the proactive autonomic Cloud application optimization. Finally, the approach is evaluated with a real Cloud application. The paper was presented at 15th International Conference on Utility and Cloud Computing UCC 2022.</p> <p>Presenter: Marta Róžańska</p> <p>Published in: 2022 IEEE/ACM 15th International Conference on Utility and Cloud Computing (UCC 2022)</p> | <p><b>Accepted</b></p> |



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|---|------------------------|
| <p>DOI: .1109/UCC56403.2022.00021</p> <p>Authors: Marta Róžańska (UiO), Geir Horn (UiO)</p>   |                        |
| <p><b><i>Severity: A QoS-aware approach to Cloud application elasticity</i></b></p> <p>Approach on severity – partially related to Morphemic Journal of Cloud Computing</p> <p>Published in: Severity: a QoS-aware approach to Cloud application elasticity. J Cloud Comp 10, 45 (2021)</p> <p>Available at: <a href="https://doi.org/10.1186/s13677-021-00255-5">https://doi.org/10.1186/s13677-021-00255-5</a></p> <p>Authors: Andreas Tsagkaropoulos (ICCS), Yiannis Verginadis (ICCS), Nikos Papageorgiou (ICCS), Fotis Paraskevopoulos (ICCS), Dimitris Apostolou (ICCS) and Gregoris Mentzas (ICCS)</p>   | <p><b>Accepted</b></p> |
| <p><b><i>Marginal Metric Utility for Autonomic Cloud Application Management</i></b></p> <p>Managing Cloud applications with variable resource requirements over time is an insipid task that could benefit from autonomic application management. The management platform will then need to know what the application owner considers a good deployment for the current execution context, which is normally captured by a utility function. However, it is often difficult to define such a function directly by first principles in a way that would perfectly capture the application owner's preferences. This paper proposes a methodology for defining the utility function only from the monitoring measurements taken to assess the state and context of the running application.</p> <p>Paper has been presented at 14th IEEE/ACM International Conference on Utility and Cloud Computing (UCC 2021).</p> <p>Presenters: Marta Róžańska, Geir Horn</p> <p>Published in: UCC '21: Proceedings of the 14th IEEE/ACM International Conference on Utility and Cloud Computing</p> <p>Available at: <a href="https://doi.org/10.1145/3492323.3495587">https://doi.org/10.1145/3492323.3495587</a></p> <p>Authors: Marta Róžańska (UiO), Geir Horn (UiO)</p> | <p><b>Accepted</b></p> |
| <p><b><i>Digital Twins for Autonomic Cloud Application Management</i></b></p> <p>Publication provides a vision for a Utility Function free autonomic Cross-Cloud application management. Provides a partial answer to the reviewers' suggestion that the SLOs and high-level goals of the DevOps engineers could be enough for the optimization.</p> <p>Paper was presented at Cloud Computing Project and Initiatives (CCPI'22)</p> <p>Presenter: Geir Horn</p> <p>Published in: Advanced Information Networking and Applications. AINA 2022. Lecture Notes in Networks and Systems, vol 451. Springer, Cham.</p> <p>Available at: <a href="https://doi.org/10.1007/978-3-030-99619-2_14">https://doi.org/10.1007/978-3-030-99619-2_14</a></p> <p>Authors: Geir Horn (UiO), Rudolf Schlatter (UiO) and Einar Broch Johnsen (UiO)</p>   | <p><b>Accepted</b></p> |



### ***A Supervised Learning Solver for Proactive Optimization of Cross-Cloud Applications***

This paper presents a new supervised learning solver to find the Cloud application configuration with the highest utility value for predicted runtime conditions.

It has been presented at CCGrid 2022 in Taormina, Italy.

Presenter: Marta Róžańska

Published in: 2022 22nd IEEE International Symposium on Cluster, Cloud and Internet Computing (CCGrid)

DOI: [10.1109/CCGrid54584.2022.00103](https://doi.org/10.1109/CCGrid54584.2022.00103)

Authors: Marta Róžańska (UiO); Katarzyna Karnas (7bulls); Geir Horn (UiO)

**Accepted**

### ***A Review of Monitoring Probes for Cloud-to-Things Continuum***

In this work, the author considers some of their fundamental components, which refer to the means for efficiently measuring and propagating information on the application components and their hosting. Specifically, the 20 most well-known monitoring tools are analyzed and compared against several criteria. This comparison allows us to discuss their fit for the distributed complex event processing frameworks of the future that can efficiently monitor applications and trigger reconfigurations across the Cloud Computing Continuum.

Published in: Advanced Information Networking and Applications. AINA 2023. Lecture Notes in Networks and Systems, vol 655. Springer, Cham.

Available at: [https://doi.org/10.1007/978-3-031-28694-0\\_59](https://doi.org/10.1007/978-3-031-28694-0_59)

Author: Yiannis Verginadis (ICCS)

**Accepted**

### ***The MORPHEMIC Project and its Unified User Interface***

This paper describes the MORPHEMIC Project and gives some details on its graphical user interface.

Available at: <https://ceur-ws.org/Vol-3144/RP-paper13.pdf>

Authors: Amina Moussaoui (Softeam), Alessandra Bagnato (Softeam), Etienne Brosse (Softeam), Józefina Krasnodębska (7bulls) and Paweł Skrzypek (7bulls)

**Accepted**

### ***Utility Function Creator for Cloud Application Optimization***

Cloud computing promises unlimited elasticity and allows Cloud applications to scale or change the configuration in response to demand. To automate the application management, one must capture the goals and preferences of the application owner, and the most flexible way to represent these is as a utility function. However, it is often difficult for the application owner to define a such mathematical function. Therefore, we propose the Utility Function Creator, a software component that can create the utility function for Cloud application optimization based on a set of predefined utility function policies as well as by template utility function shapes.

Published in: Advanced Information Networking and Applications. AINA 2023. Lecture Notes in Networks and Systems, vol 655. Springer, Cham.

Available at: [https://link.springer.com/chapter/10.1007/978-3-031-28694-0\\_58](https://link.springer.com/chapter/10.1007/978-3-031-28694-0_58)

**Accepted**



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| Authors: Marta Róžańska (UiO), Kyriakos Kritikos (FORTH), Jan Marchel (7bulls), Damian Folga (7bulls), Geir Horn (UiO)  |          |
| <p><b><i>MORPHEMIC - Optimization of the Deployment and Life-Cycle Management of Data-Intensive Applications in the Cloud Computing Continuum</i></b></p> <p>The publication describes the MORPHEMIC H2020 project and its unique way of adapting and optimising Cloud computing applications.</p> <p>Paper was presented at the DeCPS 2022 – event colocated with 26th Ada-Europe International Conference on Reliable Software Technologies (AEiC 2022).</p> <p>Presenter: Alessandra Bagnato</p> <p>Published in: ACM SIGAda, Ada Letters, Volume 42. The article will be open access in December 2023.</p> <p>Authors: Alessandra Bagnato (Softeam), Józefina Krasnodębska (7bulls)</p> | Accepted |
| <p><b><i>Using optimization constraints to minimize the adaptation cost of Cloud applications</i></b></p> <p>This publication will present an approach for Cloud adaptation where the reconfiguration cost is included into the constraint problem.</p> <p>The publication will cover the work of UiO and ICCS in <i>Task 3.3 Model adaptation</i>.</p>   | Ongoing  |
| <p><b><i>Algorithms for real-time performance analysis, prediction and enhancement for distributed applications over Cloud and fog / edge environments</i></b></p> <p>This publication will present different advanced algorithms used on the MORPHEMIC project for analysing Cloud applications performance and prediction the workload.</p> <p>Author: Jean-Didier Totow (UPRC).</p>  | Ongoing  |
| <p><b><i>Bayesian Fusion for Distributed and Clinical Data Sources: Methods, Application and Reference Cloud Architecture</i></b></p> <p>This publication will present the MORPHEMIC's capability of supporting federated learning methods by managing in a distributed manner the underlying infrastructure.</p> <p>Author: Ferath Kherif (CHUV)</p>   | Ongoing  |
| <b><i>Dynamic Patterns for Cloud Application Life-Cycle Management</i></b>  | Ongoing  |
| <b><i>Multidimensional estimation and prediction of aging trajectories in brain tissue microstructures</i></b>  | Ongoing  |
| <b><i>Federated EMS with Self-healing capabilities for multi-Clouds and Edge computing applications monitoring</i></b>  | Ongoing  |
| <b><i>Constrained Optimal Grouping of Cloud application components</i></b>  | Ongoing  |





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| <i>MRI feature engineering for deep learning applied to the classification of Alzheimer's disease minimizes cost and increases privacy.</i>   | Ongoing  |
| <i>Survey: code classification with graph methods</i>   | Ongoing  |
| <i>Optimisation for the computing continuum</i>   | Ongoing  |
| <i>Inferring benefits of hardware accelerators from an application's CPU behavior</i>   | Ongoing  |
| <i>Self-* for the computing continuum</i>   | Ongoing  |
| <i>Leveraging multi-agent reinforcement learning for dynamic resource allocation towards enhanced performance on cloud-edge environments</i>  | Ongoing  |
| <b>Accepted but not yet published</b>   |          |
| <p><i>The MORPHEMIC Project on the Data Intensive E-Brain Science Case Study</i></p> <p>This paper presents the MORPHEMIC H2020 project and its way of adapting and optimising Cloud computing applications through one of the project case studies, the E-Brain Science case study proposed by CHUV giving details on the application and its modelling, deployment, and optimization through MORPHEMIC.</p> <p>The paper will be presented at DeCPS 2023 by Amina Moussaoui and published in the conference proceedings after December 2023.</p> <p>Authors: Amina Moussaoui (Softeam), Alessandra Bagnato.</p> | Accepted |
| <p><i>Polymorphic Cloud Application Design Assisted by Open Source Software Classification</i></p> <p>This work introduces the MORPHEMIC approach for enriching a Cloud component configuration by code mining for enabling polymorphism.</p> <p>The paper will be presented at 5th International Communication Engineering and Cloud Computing Conference 2023 and published in the IEEE conference proceeding.</p> <p>Authors: Kyriakos Kritikos (FORTH), Jean-Didier Totow (UPRC)</p>  | Accepted |

## 4.2 Scientific Events

From January 2020 to May 2023, our project's partners have participated in many scientific conferences, workshops and webinars presenting the MORPHEMIC research outcomes.


#### 4.2.1 Scientific conferences

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| <b>Name of the event</b>  | <b>9th IEEE International Conference on Cloud Computing in Emerging Markets - IEEE CCEM 2020</b>   |
| <b>Place of the event</b> | Online   |
| <b>Date of the event</b>  | 2020.11.04 – 2020.11.07  |
| <b>Kind of the event</b>  | Scientific conference  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>UPRC [Jean-Didier Totow]</li> </ul>   |
| <b>Outcome</b>            |  <p>During the 9<sup>th</sup> edition of IEEE CCEM 2020, a paper has been presented by Jean-Didier Totow from UPRC exploring an important MORPHEMIC functionality, which consist of predicting the performance of a Cloud application given a specific configuration. The paper entitled “Real-time adaptable allocation for distributed data-intensive applications over Cloud and edge environments”.</p> |

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| <b>Name of the event</b>  | <b>Norway Brazil Weeks: VIII November Conference Decommissioning and P&amp;A Session</b>  |
| <b>Place of the event</b> | Online  |
| <b>Date of the event</b>  | 2020.11.10  |
| <b>Kind of the event</b>  | Scientific conference   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>UiO [Marta Róžańska, Geir Horn]</li> </ul>   |
| <b>Outcome</b>            |  <p>During this year's sessions of Norway Brazil Weeks, MORPHEMIC together with Melodic co-created a content of the conference by running a presentation entitled: “Recent advances and opportunities in Cloud deployment” by Marta Róžańska and Geir Horn from University of Oslo.</p> |


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|  | <p>The participants of this presentation had an occasion to deepen their knowledge of multi-Cloud, optimizing the Cloud in terms of performance, cost, security and avoiding vendor lock-in.</p> <p>Norway Brazil Weeks main objective is to create meeting places to strengthen and develop the cooperation between both countries through an agenda of several events and meetings within different areas. The NBWs is also an arena where Norwegian SME's can actively engage with business partners, clients, and technology leaders.</p> |
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| <b>Name of the event</b>  | <b>Plenary meeting organized by WHO and UN-ITU on the topic of AI for healthcare (12th Meeting)</b>   |
| <b>Place of the event</b> | Online  |
| <b>Date of the event</b>  | 2021.05.19-21   |
| <b>Kind of the event</b>  | Scientific conference   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>CHUV [Ferath Kherif]</li> </ul>  |
| <b>Outcome</b>            | <p>The MORPHEMIC project was presented by Ferath Kherif from CHUV – one of the MORPHEMIC use case partners-during the Plenary meeting organized by WHO and UN-ITU on the topic of AI for healthcare.</p> <p>Ferath had 2 presentations:</p> <ul style="list-style-type: none"> <li>One focused on data sharing and data sourcing,</li> <li>Second detailed the work to apply AI for diagnosis of neurodegenerative diseases.</li> </ul> <p>In both presentations, the MORPHEMIC project has been described.</p> |

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| <b>Name of the event</b>  | <b>Eclipse SAAM Mobility 2021 Security, AI, Architecture and Modelling for Next Generation Mobility</b>   |
| <b>Place of the event</b> | Online  |
| <b>Date of the event</b>  | 2021.06.15-16   |
| <b>Kind of the event</b>  | Scientific conference   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>Softeam [Alessandra Bagnato, Etienne Brosse, Kaïs Chaabouni]</li> </ul>  |
| <b>Outcome</b>            |  <p>Eclipse SAAM Mobility 2021 virtual conference brought together industry experts and researchers working on innovative software and systems solutions for the next generation of mobility, especially focusing on Security</p> |

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|  | <p>and Privacy, Artificial Intelligence, Architecture, Modelling and related challenges.</p> <p>MORPHEMIC project was represented by Softeam experts: Alessandra Bagnato, Etienne Brosse and Kaïs Chaabouni. Together, they presented a publication entitled: “Morphemic Cloud Application Models Design”.</p> <p>The conference proceedings are available on the CEUR portal, as well as video recordings and slides.</p> |
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| <b>Name of the event</b>  | <b>33rd International Conference on Advanced Information Systems Engineering – CAiSE 2021</b>  |
| <b>Place of the event</b> | Melbourne, Australia   |
| <b>Date of the event</b>  | 2021.06.28-07.02   |
| <b>Kind of the event</b>  | Scientific conference  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>• ICCS [Yiannis Verginadis]</li> </ul>  |
| <b>Outcome</b>            | <div data-bbox="395 994 1114 1370" data-label="Image">  </div> <p>International Conference on Advanced Information Systems Engineering (CAiSE) is an annual event focused on innovative and rigorous research across the whole spectrum of Information Systems Engineering with a special emphasis on the theme of Cyber-Human Systems. 2021 edition of CAiSE acknowledged the high level of uncertainty that organizations have to deal with, and the increasing need to respond through Intelligent Information Systems that provide trusted, adaptive, agile, and autonomous solutions.</p> <p>Yiannis Verginadis represented our project at the conference and on 2 July presented MORPHEMIC related scientific paper entitled: “Data and Cloud Polymorphic Application Modelling in Multi-Clouds and Fog Environments”.</p> <p>The paper was published in Springer’s <i>Advanced Information Systems Engineering. CAiSE 2021. Lecture Notes in Computer Science</i>.</p> |

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| <b>Name of the event</b>  | <b>CCGrid 2022 - HUB4CLOUD EU Day</b>  |  |
| <b>Place of the event</b> | Taormina, Italy  |  |
| <b>Date of the event</b>  | 2022.05.19   |  |
| <b>Kind of the event</b>  | Scientific conference  |  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>• UiO [Marta Róžańska]</li> </ul>   |  |
| <b>Outcome</b>            |  <p>On 19th of May 2022, we organised the EU Day at the CCGrid 2022 conference.</p> <p>The CCGrid symposium series serves as a major international forum for presenting and sharing recent research accomplishments and technological developments in the field of Cluster, Cloud and Internet computing.</p> <p>Marta Róžańska from University of Oslo represented the MORPHEMIC project at the whole CCGRID Taormina event and took an active part in the EU Day organized by HUB4CLOUD.</p> <p>EU Day explored the major developments in the European Cloud computing ecosystem, in particular open-source approaches. During the event Marta gave a talk entitled: “MORPHEMIC: multi-Cloud autonomous proactive optimization and complex monitoring of Cloud applications”, presenting the on-going extension to Melodic platform. The event brought together European communities that are working across various fields but have a common interest in Cloud. We are glad we could share our project objectives with other them and hopefully contribute to the further research advancements.</p> | <p>On 19th of May 2022, we organised the EU Day at the CCGrid 2022 conference.</p> <p>The CCGrid symposium series serves as a major international forum for presenting and sharing recent research accomplishments and technological developments in the field of Cluster, Cloud and Internet computing.</p> <p>Marta Róžańska from University of Oslo represented the MORPHEMIC project at the whole CCGRID Taormina event and took an active part in the EU Day organized by HUB4CLOUD.</p> <p>EU Day explored the major developments in the European Cloud computing ecosystem, in particular open-source approaches. During the event Marta gave a talk entitled: “MORPHEMIC: multi-Cloud autonomous proactive optimization and complex monitoring of Cloud applications”, presenting the on-going extension to Melodic platform. The event brought together European communities that are working across various fields but have a common interest in Cloud. We are glad we could share our project objectives with other them and hopefully contribute to the further research advancements.</p> |






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| <b>Name of the event</b>  | <b>16th International Conference on Research Challenges in Information Science (RCIS) 2022</b>   |  |
| <b>Place of the event</b> | Barcelona, Spain   |  |
| <b>Date of the event</b>  | 2021.05.17-20  |  |
| <b>Kind of the event</b>  | Scientific conference  |  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>• Softeam [Alessandra Bagnato]</li> </ul>   |  |
| <b>Outcome</b>            |  <p>RCIS is an annual scientific conference which aims to bring together scientists, researchers, engineers and practitioners from a wide range of information science fields and to opportunities for knowledge sharing and dissemination. Alessandra Bagnato from Softeam represented our venture at the RCIS 2022 having the paper presentation: “The MORPHEMIC Project and its Unified User Interface”, as one of the co-authors. The presentation was held on 19 May 2022.</p> <p>Our presence at the conference increased MORPHEMIC visibility and was a perfect opportunity to make new contacts with possible future users of Melodic with MORPHEMIC extension.</p> |  |

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| <b>Name of the event</b>  | <b>Utility and Cloud Computing Conference 2022</b>   |  |
| <b>Place of the event</b> | Vancouver (Washington State), USA  |  |
| <b>Date of the event</b>  | 2022.12.06-09  |  |
| <b>Kind of the event</b>  | Scientific conference  |  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>• UiO [Marta Róžańska, Geir Horn]</li> </ul>  |  |
| <b>Outcome</b>            |  <p>Marta Róžańska, accompanied by Geir Horn, MORPHEMIC coordinator, present their scientific paper entitled „Proactive Autonomic Cloud Application Management” at 15th IEEE/ACM International Conference on Utility and Cloud Computing</p> |  |

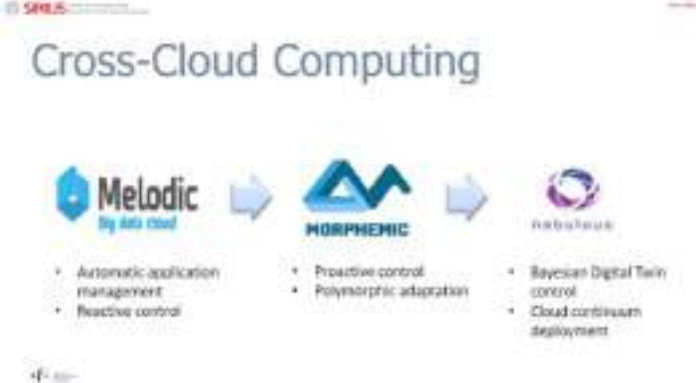
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|  | <p>2022. The four-day scientific event took place in December 2022 and was held onsite Vancouver, USA. The premier IEEE/ACM was a conference covering areas related to Cloud Computing as a Utility. The aim of UCC2022 was to provide an international forum for leading researchers and practitioners in this important and growing field.</p> <p>On the conference, our representatives met and talked with Professor Gul Agha, professor of computer science at the University of Illinois at Urbana-Champaign, and director of the Open Systems Laboratory. The potential scientific collaboration was discussed. As an effect of the delivered presentation Marta and Geir were invited by professor to conduct a workshop on the Zurich University of Applied Sciences, what happened in March 2023.</p> |
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#### 4.2.2 Scientific workshops

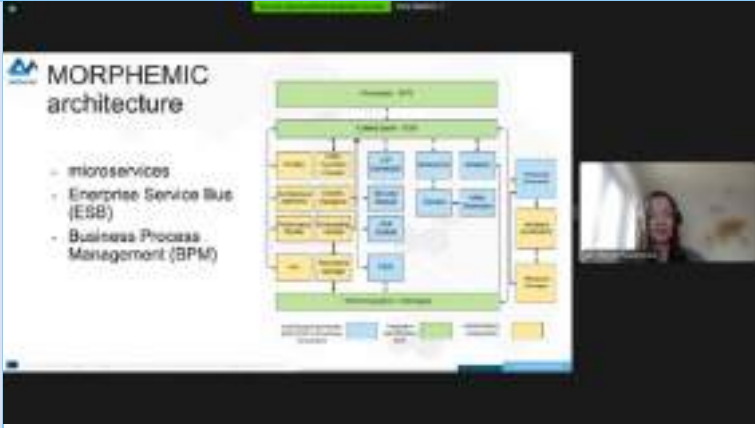
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| <b>Name of the event</b>  | <b>IEEE International Conference on Autonomic Computing and Self-Organizing Systems - ACSOS 2020</b>   |   |   |
| <b>Place of the event</b> | Online   |   |   |
| <b>Date of the event</b>  | 2020.08.21   |   |   |
| <b>Kind of the event</b>  | Scientific workshop  |   |   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>• UiO [Marta Róžańska, Geir Horn]</li> </ul>  |   |   |
| <b>Outcome</b>            |  <p>Autonomous Multi-Cloud Application Deployment<br/>Optimized Management Using Open Source Frameworks<br/>Tutorial: 21st of August<br/>MORPHEMIC</p>  |   | <p>MORPHEMIC together with Melodic co-created a content of the tutorial entitled: “Autonomous Multi-Cloud Application Deployment and Optimized Management Using Open-Source Frameworks” by Marta Róžańska and Geir Horn</p> |
|                           | <p>from University of Oslo.</p> <p>Participants of this tutorial had an occasion to deepen their knowledge of multi-Cloud, also through hands-on exercises.</p> <p>CSOS is a brand-new event of <a href="http://ieee.org">ieee.org</a> – one of the tech industry leaders. Their numerous conferences focus crowds of experts and practitioners.</p> <p>The entire 1st edition of ACSOS was held online.</p> <p><b><u>Agenda of the tutorial:</u></b></p> <p><b>Session I 10:00-12:30 EST</b></p> <p><b>Introduction to Multi-Clouds and Modelling Cloud Applications</b></p> <ul style="list-style-type: none"> <li>o Welcome, Agenda</li> <li>o Introduction to Multi-Cloud optimization, MAPE-K loop applied in Cloud optimization</li> <li>o Survey of the latest research and the existing tools</li> </ul> |   |   |

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|  | <ul style="list-style-type: none"> <li>Step by step modelling Cloud application and designing utility function for the Cloud applications</li> </ul> <p><b>Session II 13:30-16:00 EST</b></p> <p><b>Multi-Cloud Deployment, Monitoring, and Adaptations</b></p> <ul style="list-style-type: none"> <li>Overview of Melodic Multi Cloud Management Platform and extensions in MORPHEMIC</li> <li>Hands-On: Installing MELODIC platform; materials</li> <li>Hands-On: Autonomous Optimization in the Cloud; materials</li> <li>Existing Research Challenges and Summary</li> </ul> |
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| <b>Name of the event</b>  | <b>Short lecture at Warsaw University</b>   |  |
| <b>Place of the event</b> | Online  |  |
| <b>Date of the event</b>  | 2021.01.18  |  |
| <b>Kind of the event</b>  | Scientific workshop   |  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>UiO [Marta Róžańska]</li> </ul>              |  |
| <b>Outcome</b>            |  | <p>Marta Róžańska from University of Oslo gave a presentation for a group of students from University of Warsaw regarding research challenges in the MORPHEMIC project – mostly the ways how the project solves complex optimization problems.</p> |

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| <b>Name of the event</b>  | <b>SIRIUS General Assembly</b>   |   |
| <b>Place of the event</b> | Oslo, Norway   |   |
| <b>Date of the event</b>  | 2022.05.11-12  |   |
| <b>Kind of the event</b>  | Scientific workshop  |   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>UiO [Marta Róžańska, Geir Horn]</li> </ul>    |   |
| <b>Outcome</b>            |  | <p>In May 2022 MORPHEMIC representatives from UiO, Marta Róžańska and Geir Horn, took part in the SIRIUS General Assembly meeting, dedicated to one of the Norwegian projects. At the meeting, MORPHEMIC was presented, as a solution</p> |

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|  | <p>supporting scalable computing.</p> <p>Marta and Geir conducted a 3-hour long workshop about CAMEL language and application. In an effect, they had a conversation about the possible usage of CAMEL in SIRIUS research projects.</p> |
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| <b>Name of the event</b>  | <b>The 4th International Workshop on Recent Advances for Multi-Clouds and Mobile Edge Computing (M2EC 2022)</b>  |
| <b>Place of the event</b> | Sydney, Australia/Online   |
| <b>Date of the event</b>  | 2022.04.13-15  |
| <b>Kind of the event</b>  | Scientific workshop  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>• UiO [Marta Róžańska, Geir Horn]</li> <li>• 7bulls [Katarzyna Materka]</li> </ul>  |
| <b>Outcome</b>            | <div data-bbox="403 891 1161 1317" data-label="Image">  </div> <p>M2EC is an annual scientific workshop, organized in conjunction with AINA conference, that aims to bring together people from research and industry to provide a discussion forum for state-of-the-art topics related to Cloud, multi-Cloud, and mobile edge computing technology, networks, and applications.</p> <p>During the event, Marta Rožańska, Katarzyna Materka and Geir Horn conducted a workshop entitled: “An architecture for autonomous proactive and polymorphic optimization of Cloud applications” and disseminated MORPHEMIC project results.</p> <p>The workshop included full-paper sessions and a poster session to introduce preliminary ideas as well as work in progress.</p> <p>Proceedings of the workshop were published in the Springer Nature Group Series “Advances in Intelligent Systems and Computing”.</p> |


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| <b>Name of the event</b>  | <b>Cloud Computing Project and Initiatives – CCPI'22</b>  |
| <b>Place of the event</b> | Sydney, Australia/Online  |
| <b>Date of the event</b>  | 2022.04.13-15   |
| <b>Kind of the event</b>  | Scientific workshop   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>• UiO [Geir Horn]</li> </ul>   |
| <b>Outcome</b>            |  <p>Cloud Computing Project and Initiatives (CCPI-2022) is a workshop which aims to be a forum for exchanging ideas on different Cloud Computing related topics and finding synergies between projects tackling similar challenges. CCPI is organized in conjunction with the 36th International Conference on Advanced Information Networking and Applications – AINA 2022.</p> <p>During the event, MORPHEMIC Geir Horn from UiO presented his MORPHEMIC-related vision paper entitled: “Digital Twins for Autonomic Cloud Application Management” co-authored by Rudi Schlatter, and Einar Broch Johnsen. The approach described in the paper uses a concurrent simulation model of the application that is continuously updated with real-time monitoring data, optimizing, and validating deployment reconfiguration decisions prior to enacting them for the running applications. This enables proactive decisions to be taken for a future time point, thereby allowing ample time for the reconfiguration actions, and realistic Bayesian estimation of the application’s time variate operational parameters for the optimization process. Accepted papers were included in conference proceedings of Lecture Notes series published by Springer.</p> |


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| <b>Name of the event</b>  | <b>CCGrid 2022 - Cloud2Things Workshop</b>   |
| <b>Place of the event</b> | Taormina, Italy  |
| <b>Date of the event</b>  | 2022.05.16-19  |
| <b>Kind of the event</b>  | Scientific workshop  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>• UiO [Marta Róžańska]</li> </ul>   |
| <b>Outcome</b>            |  <p>CCGrid 2022 is the 22nd edition of the IEEE/ACM international conference on Cluster, Cloud and Internet Computing. The first CCGrid Conference started in Brisbane, Australia, in 2001. Since then, the conference has successfully been hosted around the world. Returning to its originating country,</p> |




the 22nd International conference held in Taormina (Messina), Italy.


Marta Róžańska from University of Oslo represented the MORPHEMIC project at the whole CCGRID Taormina event and additionally conducted a project related workshop entitled: “A Supervised Learning Solver for Proactive Optimization of Cross-Cloud Applications”.


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| <b>Name of the event</b>  | <b>14th IEEE/ACM International Conference on Utility and Cloud Computing (UCC) 2021 – workshop on CloudAM online session</b> |   |
| <b>Place of the event</b> | Leicester, UK/Online   |   |
| <b>Date of the event</b>  | 2022.12.07   |   |
| <b>Kind of the event</b>  | Scientific workshop  |   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>• UiO [Marta Róžańska, Geir Horn]</li> </ul>  |   |
| <b>Outcome</b>            |   | <p>Marta Róžańska, accompanied by Geir Horn, MORPHEMIC coordinator, present their scientific paper entitled „Proactive Autonomic Cloud Application Management” at 15th IEEE/ACM International Conference on Utility and Cloud Computing 2022.</p> <p>The four-day scientific event took place in December 2022 and was held onsite Vancouver, USA. The premier IEEE/ACM was a conference covering areas related to Cloud Computing as a Utility. The aim of UCC2022 was to provide an international forum for leading researchers and practitioners in this important and growing field.</p> <p>On the conference, our representatives met and talked with Professor Gul Agha, professor of computer science at the University of Illinois at Urbana-Champaign, and director of the Open Systems Laboratory. The potential scientific collaboration was discussed. As an effect of the delivered presentation Marta and Geir were invited by professor to conduct a workshop on the Zurich University of Applied Sciences, what happened in March 2023.</p> |

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| <b>Name of the event</b>  | <b>Cloud Autoscaling and Optimization Experts Day</b>  |  |
| <b>Place of the event</b> | Zurich, Switzerland  |  |
| <b>Date of the event</b>  | 2023.03.13   |  |
| <b>Kind of the event</b>  | Scientific workshop  |  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>• UiO [Marta Róžańska, Geir Horn]</li> </ul>  |  |
| <b>Outcome</b>            |  <p>In March 2023 Marta Róžańska and Geir Horn from UiO conducted a workshop entitled: "Proactive and polymorphic optimization of Cloud applications" at the Zurich University of Applied Sciences. Their presentation of MELODIC solution and MORPHEMIC extension was met with an enthusiasm from the university representatives and an opportunity for the exploitation of project results for scientific purposes appeared. As a result of the workshop, we have also established contact with 2 companies interested in the use of Melodic with MORPHEMIC extension. Further meetings are planned.</p> |  |


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| <b>Name of the event</b>  | <b>The 5th International Workshop on Recent Advances for Multi-Clouds and Mobile Edge Computing (M2EC 2023)</b>   |  |
| <b>Place of the event</b> | Juiz de Fora, Brasil/Online   |  |
| <b>Date of the event</b>  | 2023.03.29-31   |  |
| <b>Kind of the event</b>  | Scientific workshop   |  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>• UiO [Marta Róžańska]</li> <li>• ICCS [Yiannis Verginadis]</li> </ul>   |  |
| <b>Outcome</b>            |  <p>MORPHEMIC representatives took part in the 5th edition of M2EC scientific workshop, which took place in March 2023. The event held in the conjunction with AINA conference aims to bring together representatives of research and industry, in order to provide a discussion forum for state-of-the-art topics related to Cloud, multi-Cloud and mobile edge computing technology, networks and applications.</p> <p>During M2EC our team members presented two scientific papers related to the MORPHEMIC project:</p> |  |


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|  | <ul style="list-style-type: none"> <li>• "Utility Function Creator for Cloud Application Optimization" - presented by Marta Róžańska (UiO),</li> <li>• "A Review of Monitoring Probes for Cloud Computing Continuum" presented by Yiannis Verginadis (ICCS).</li> </ul> <p>Proceedings of the workshop will be published in Springer Series "Advances in Intelligent Systems and Computing". The books of this series are submitted to ISI Proceedings, EI-Compendex, DBLP, SCOPUS, Google Scholar and Springerlink.</p> |
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| <b>Name of the event</b>  | <b>Lecture at Warsaw University</b>   |   |
| <b>Place of the event</b> | Online  |   |
| <b>Date of the event</b>  | 2021.01.18  |   |
| <b>Kind of the event</b>  | Scientific workshop   |   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>• UiO [Marta Róžańska]</li> </ul>            |   |
| <b>Outcome</b>            |  | <p>Marta Róžańska from University of Oslo gave a MORPHEMIC related presentation for a group of Master students from University of Warsaw regarding the grouping of Cloud application as coalition structure generation problem.</p> |


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| <b>Name of the event</b>  | <b>Lecture at the University of Piraeus</b>   |   |
| <b>Place of the event</b> | Online  |   |
| <b>Date of the event</b>  | 2023.06.14  |   |
| <b>Kind of the event</b>  | Scientific workshop   |   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>• UPRC [Efterpi Paraskevoulakou, Jean-Didier Totow]</li> </ul> |   |
| <b>Outcome</b>            |                    | <p>In June 2023 MORPHEMIC representatives from University of Piraeus Research Center (UPRC), Efterpi Paraskevoulakou and Jean-Didier Totow, gave a presentation of the developed solution and the main functionalities offered by the platform.</p> <p>The conducted workshop was addressed to the students of the Master Programme</p> |

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|  | <p>"Information Systems and Services" at the University of Piraeus (Department of Digital Systems) and presented in particular:</p> <ul style="list-style-type: none"> <li>○ AI Algorithms that have been used to implement both Polymorphic and Proactive adaptation (Forecasting Module, Profiler, Component Grouping, Polymorphic Solver);</li> <li>○ Description of the Camel model and its features,</li> <li>○ MORPHEMIC's monitoring capabilities (EMS federated agents).</li> </ul> <p>The workshop gained the interest of gathered students and helped to enhance their knowledge about the MORPHEMIC itself as well as its components and features.</p> |
|--|---|

|                           |   |
|---------------------------|---|
| <b>Name of the event</b>  | <b>Presentation at the Cybercrime Division of the Hellenic Police</b>   |
| <b>Place of the event</b> | Online  |
| <b>Date of the event</b>  | 2023.06.16  |
| <b>Kind of the event</b>  | Scientific workshop   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>● UPRC [Efterpi Paraskevoulakou, Jean-Didier Totow]</li> </ul>   |
| <b>Outcome</b>            | <div data-bbox="397 1019 874 1653">  </div> <p>Efterpi Paraskevoulakou and Jean-Didier Totow (UPRC) shared knowledge about the MORPHEMIC project at the meeting organized for Hellenic Police Cybercrime Division in Athens, Greece.</p> <p>Our project's expert presented the solution developed under Horizon 2020 program with a focus on the following functionalities of the MORPHEMIC:</p> <ul style="list-style-type: none"> <li>○ Proactive adaptation (main logic and the technology beyond the feature);</li> <li>○ Polymorphic adaptation (similarly main logic and the technology beyond the feature);</li> <li>○ Scenario with BYON in order to align with the sector's developed applications and how Morphemic can support its objectives.</li> </ul> <p>Within the conducted workshop MORPHEMIC representatives managed to introduce new information to the workers of the Hellenic Police, which may be beneficial in their future work in Cybercrime Division.</p> |

|                           |  |
|---------------------------|--|
| <b>Name of the event</b>  | <b>DeCPS 2023</b>  |
| <b>Place of the event</b> | Lisbon, Portugal   |
| <b>Date of the event</b>  | 2023.06.16   |
| <b>Kind of the event</b>  | Scientific workshop  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>• Softeam (Amina Moussaoui)</li> </ul>  |
| <b>Outcome</b>            |  <p>Amina Moussaoui, Softeam, had a pleasure to present our project at DeCPS 2023 - Challenges and New Approaches for Dependable and Cyber-Physical System Engineering workshop, organised in conjunction with 27th Ada-Europe - International Conference on Reliable Software Technologies (AEiC 2023).</p> <p>At the workshop Amina presented a paper written by Alessandra Bagnato and herself, entitled: "The MORPHEMIC Project on the Data Intensive E-Brain Science Case Study". The article describes the MORPHEMIC project including the way of adapting and optimising Cloud computing applications through one of the project case studies, the CHUV's e-brains science case study.</p> <p>This scientific article will be published in a revised post-proceeding version of the <i>Ada User Journal Issue</i> of December 2023, with camera ready submission on 15 September 2023.</p> |

#### 4.2.3 Scientific webinars

|                           |   |
|---------------------------|---|
| <b>Name of the event</b>  | <b>Webinar with Melodic organized by Project Management Institute, Norway Chapter</b>   |
| <b>Place of the event</b> | Online  |
| <b>Date of the event</b>  | 2021.02.10  |
| <b>Kind of the event</b>  | Scientific webinar  |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>• UiO [Geir Horn]</li> </ul>   |
| <b>Outcome</b>            |  <p>Geir Horn from University of Oslo presented Melodic solution at the dedicated webinar, which covered topics such as:</p> <ul style="list-style-type: none"> <li>○ A brief introduction to the MELODIC platform</li> <li>○ The vision and objectives of the project</li> </ul> |





- The project organization and planning
  - The management structure needed to ensure timely progress
  - The tools used, and
  - Lessons learned from the management of such a complex collaborative development.
- Furthermore, the MORPHEMIC project was presented as an extension of the MELODIC solution.

In total MORPHEMIC team members presented our project at 21 scientific events in 8 conference sessions, 13 workshops and 1 webinar.

#### 4.2.4 Planned scientific events

|                           |   |
|---------------------------|---|
| <b>Name of the event</b>  | <b>5th International Communication Engineering and Cloud Computing Conference (CECCC) 2023</b>  |
| <b>Place of the event</b> | Nanjing, China  |
| <b>Date of the event</b>  | 2023.10.27-29   |
| <b>Kind of the event</b>  | Scientific workshop   |
| <b>Presenters</b>         | <ul style="list-style-type: none"> <li>● NI</li> </ul>  |
| <b>Outcome</b>            | <p>The paper will be presented, entitled: “Polymorphic Cloud Application Design Assisted by Open Source Software Classification”. The session will introduce the MORPHEMIC approach for enriching a Cloud component configuration by code mining for enabling polymorphism.</p> <p>The paper will be published in the IEEE conference proceeding.</p> |

#### 4.3 Research lunches

The MORPHEMIC research lunches were organized in order to exchange knowledge, develop research ideas and disseminate the technology developed within the project. These events were organized by and for project partners, both academic and industrial, as well as external computer scientists and researchers. Research lunches were a perfect opportunity to meet, discuss and share experiments concerning a subject directly related to the MORPHEMIC project or to one of the domains explored by the MORPHEMIC.

Project consortium have organized 4 1-hour long virtual research lunches within the project scope:

- 13 November 2020 – research lunch organized by Geir Horn, project coordinator,
- 30 November 2020 – *Temporal Fusion Transformer experiments* - organized by 7bulls,
- 16 February 2021 – *Tsetlin Machine* – organized by UiO,
- 1 March 2021 – *Prophet Forecasting method* - organized by Activeeon.

Additionally, Softeam reported on the Modelio MORPHEMIC CAMEL Designer advances during the Modelio Team quarterly meeting in September 2020, July 2021, July 2022, and December 2022.

### 5 Partners' channels

The MORPHEMIC partners have used their personal networks for communication and dissemination of the project related information and results. Starting from the January 2020 project partners have presented our joint venture via their organizational social medias and websites. Below are a few examples of the MORPHEMIC partners activities:



Figure 10 Information about the project on the ICON website



Figure 11 Link to the MORPHEMIC news on CHUV website



Figure 12 Information about the project presentation at OW2Con'22 on SOFTEAM website

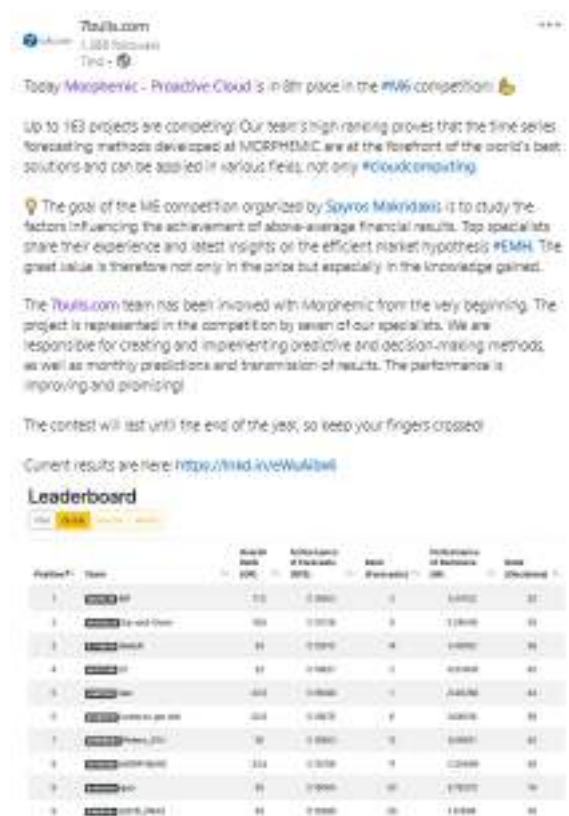


Figure 13 Post about MORPHEMIC team results in M6 competition on 7Bulls.com LinkedIn page



Figure 14 Post about MORPHEMIC project on IS-WIRELESS website

The project team members were also engaged in the promotion of the project via their private accounts on LinkedIn, Twitter and Facebook. They posted, tweeted and shared news publicised on the MORPHEMIC social media channels. Below a few examples of members activities:



Figure 15 LinkedIn publication about the MORPHEMIC project



Figure 16 Post about MORPHEMIC session at Open Source Experience 2022

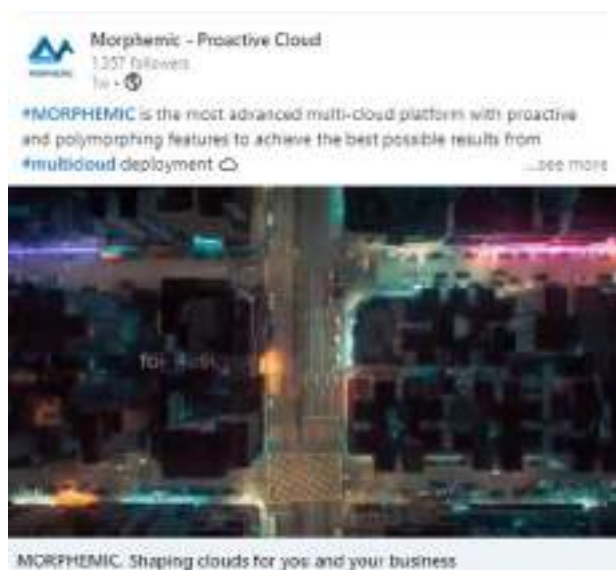


Figure 17 Shared MORPHEMIC video



Figure 18 Shared Tweet about MORPHEMIC planned activities



## 6 Report on initially scheduled communication and dissemination activities

Table 5 presents the status of activities, which have been scheduled as a part of the dissemination and communication initial strategy, described in MORPHEMIC deliverable D7.1 *Initial Dissemination and Communication Report and Plan*.

*Table 5 D&C activities carried out during the project*

| Tool/activity                     | Description  | Realized | Pending | Planned |
|-----------------------------------|--|----------|---------|---------|
| <b>Visual identification</b>      | High quality logo of the project has been prepared done at the initial phase of the project.   |          |         |         |
| <b>MORPHEMIC website</b>          | An approachable website with high quality design for MORPHEMIC has been launched and frequently updated with the news, publications and other materials related to the project.<br><br>Will be further updated.  |          |         |         |
| <b>Direct contact</b>             | Realized in accordance with D7.1 strategy. By active participating in multiple various events mentioned in the document we managed to reach the targeted number of contacts with the direct message about the MORPHEMIC project.   |          |         |         |
| <b>Social media activities</b>    | Realized in accordance with D7.1 strategy. From the beginning of the project MORPHEMIC was active on the social media, publishing posts and Tweets, sharing graphics and videos to engage the audience and grow the number of followers. In total project is followed by 1622 users on social media (YT subscribers not included). We plan to continue our activity on LinkedIn and Twitter.   |          |         |         |
| <b>MORPHEMIC presentation</b>     | Realized in accordance with D7.1 strategy. During the project we created multiple presentations of MORPHEMIC project on its different stages. They were used to simplify the communicates about the project and to popularize to MORPHEMIC brand among the targeted groups of audience. The presentations were showed on various events and occasionally on LinkedIn.  |          |         |         |
| <b>Core communication package</b> | Realized in accordance with D7.1 strategy. In order to increase MORPHEMIC's reach we used branded, consistent with the project and catching attention graphics to accompany our messages. Beside the professional visuals, occasionally we also posted photos of team members, showing the human side of the project, memes about the Cloud computing and other graphics. Also project's roll-up, leaflet and poster were prepared to promote the project during the events. |          |         |         |



| Tool/activity  | Description   | Realized | Pending | Planned |
|--|---|----------|---------|---------|
| <b>Participation in business and scientific events</b>     | Realized in accordance with D7.1 strategy. <i>Communication Plan</i> of MORPHEMIC was prepared in order to coordinate paid communication activities in the project among partners. During the project we managed to participate in 102 events (84 business and 18 scientific) – conferences, webinars and workshops included, and reached various target groups, from scientists to businessmen, spreading the information about MORPHEMIC. Further event activities are planned. | ✓        |         |         |
| <b>Press releases &amp; publicity engagement</b>           | During the project we managed to publish 2 press releases: 1 article about the MORPHEMIC project in HiPEACInf62 magazine and 1 about joint activity of RAINBOW, PLEDGER and MORPHEMIC (EBDVF 2022 event participation). During the project, we focused more on publishing shorter messages via social media channels and website.   |          | ✓       |         |
| <b>Internal dissemination and communication activities</b> | Realized in accordance with D7.1 strategy. Within the project scope project consortium have organized 4 1-hour virtual research lunches. Additionally, Softeam reported on the Modelio MORPHEMIC CAMEL Designer advances during the Modelio Team 4 meetings. The activities regarding the D&C have been discussed by the consortium during the WP7/WP8 meetings.  | ✓        |         |         |
| <b>Technical webinars/workshops</b>                        | Realized in accordance with D7.1 strategy. During the project, we: organized 4 webinars (one in collaboration with Rainbow project), conducted 3 workshops at H-CLOUD events and 7 more workshops at business events. Moreover, we co-organized 1 webinar with AI-Sprint project.   | ✓        |         |         |
| <b>Search engine targeting/social media paid targeting</b> | Realized in accordance with D7.1 strategy. We used some amount of money intended for D&C activities (accordingly to the project's <i>Communication Plan</i> ) to publish LinkedIn paid campaigns promoting MELODIC and MORPHEMIC. They have been displayed for a limited time in 2021 and in February 2022.   | ✓        |         |         |
| <b>Extended publications</b>                               | Although our efforts we did not managed to reach our ambitious goal of 40 publication, however we can count 20 accepted scientific publications, and 13 papers with on-going status.  |          | ✓       |         |
| <b>Presentation and document templates</b>                 | Realized in accordance with D7.1 strategy. All needed templates were created.   | ✓        |         |         |





| Tool/activity                          | Description   | Realized | Pending | Planned |
|--|---|----------|---------|---------|
| <b>External initiatives</b>            | During the project and we were engaged in H-CLOUD Task Force Community Meetings till its end. MORPHEMIC has also joined SWForum and used the services of Horizon Results Booster in 2022/2023 (Business Plan Development).  |          |         |         |
| <b>6 most important business ideas</b> | Business Partners have started to prepare the presentation and video scenario. After the materials will be ready, they will be published on MORPHEMIC website and social media channels.  |          |         |         |
| <b>6 most important research ideas</b> | Academic Partners have started to prepare the presentation and video scenario. After the materials will be ready, they will be published on MORPHEMIC website and social media channels.  |          |         |         |
| <b>Promotional videos</b>              | Realized in accordance with D7.1 strategy. On our YT channel we have 18 videos uploaded, including: 6 use case videos, 1 project presentation, 1 long DEMO, 1 professional promotional video and more. Other videos are planned.  |          |         |         |
| <b>Industry Round Table</b>            | Although we did not participate in the Industry Round Table by definition, MORPHEMIC team members took part in a few conversations with academics and the representatives of companies, regarding the exploitation of MORPHEMIC results. Zurich University of Applied Sciences expressed an interest of including the topics of CAMEL and MORPHEMIC in their Cloud classes for students. Moreover. We have also established contact with 2 companies interested in the use of Melodic with MORPHEMIC extension, which took place in April 2023. Further meetings are planned. |          |         |         |
| <b>MORPHEMIC Kickstart Manual</b>      | The manual instruction for users, including screenshots, will be contained in deliverable D5.2 <i>User Guidelines</i> . Other useful information for new users of MORPHEMIC will be provided in 7.4 <i>Training materials</i> .   |          |         |         |
| <b>Use case partners materials</b>     | Realized in accordance with D7.1 strategy. 6 videos presenting the use cases have been recorded in published on the MORPHEMIC YouTube channel and website (3 in 2021 and 3 in 2022). The second series of videos is a before-after case study enriched with slides shown on the recordings.   |          |         |         |

## 7 Related deliverables

There are three other deliverables directly related to this document:

- Deliverable D7.1 *Initial Dissemination and Communication Report and Plan* [M18] - the initial version of D&C strategy, describing a mix of channels, tools and activities for reaching the MORPHEMIC target audience and objectives. D7.2 is considered an update of the proceeding document D7.1.
- Deliverable D8.3 *Final IPR and Exploitation Plan*, a final report documenting the project IPR and final exploitation activities. It will contain information about KPIs related to the SMEs and other organization to which MORPHEMIC project was presented.
- Deliverable D8.5 *Final Project Website and Advertising Materials* [M42] - the final version of the sustainability plan for a complete web presence of MORPHEMIC outside of the project. This deliverable will also include the final statistics for the communication and dissemination channels.

## 8 Conclusions

This deliverable reports on the comprehensive dissemination and communication activities carried out within MORPHEMIC, for almost whole duration of the Horizon 2020 project [M1-M42].

In section 4 communication activities are reported, including MORPHEMIC website and social media presence, attended business conferences and business workshops, mainstream media presence and other types of communication, including collaboration with other projects and initiatives, videos, LinkedIn campaigns, organized webinars and others. The section not only points out already past events and finished actions, but also further planned activities.

Section 5 contains report of dissemination activities: publication list and scientific events (conferences, workshops, webinars) at which MORPHEMIC results were disseminated, as well as organized research lunches focused on the project.

In section 6 we provide examples of consortium and team members activities regarding the communication of the project, its results and related activities.

Section 7 is a reference to the preliminary dissemination and communication strategy. The status of planned activities is declared and a short summary is provided.

As evidenced by this document, MORPHEMIC consortium carried out many activities do reach targeted groups and disseminate the project results. All partners, within their means, contributed to the project dissemination and communication, and have been committed to fulfilling their responsibilities. We reached a wide audience by our constant presence on social media, participation in many events, both business and scientific, and other D&C activities, which have been all described in this document.

We strongly believe that our engagement in dissemination and communication of MORPHEMIC, motivated with a firm belief in the potential of the developed tool, created a strong foundation for successful exploitation of the project results after its end.



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