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### Project no. 956748

## ADAPTIVE MULTI-TIER INTELLIGENT DATA MANAGER FOR EXASCALE

### **D8.2**

# Dissemination, communication, exploitation, and standardisation plan

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PU	Public	$\checkmark$
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

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### **Executive Summary**

The Plan for the Exploitation and Dissemination of Results (PEDR) presented here is one of the compulsory reports that EuroHPC projects are required to submit to the EC. The PEDR summarises the consortium's strategy and concrete actions to disseminate, exploit, and protect the foreground generated by a project and should serve as a guideline to the Consortium for the Dissemination and Exploitation (D&E) activities to be carried out in the context of the ADMIRE project.

This report is the first PEDR release. It gives an introduction of the dissemination activities at M6 and the ones planned for the subsequent period and summary of most promising achievements, exploitable opportunities and identification of target segments for ADMIRE project and perspective business opportunities of involved enterprises.

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### **Chapter 1**

### Introduction

The two key areas addressed by this deliverable are the dissemination and the exploitation actions, which are separately reported in Dissemination Plan and Exploitation Plan.

In ADMIRE, WP8 coordinates the activities aimed to obtain the widest possible impact of the project results and outputs. This is carried out by concentrating the efforts in three activities:

- Dissemination: to make the HPC and Big Data, academic and research communities aware of the AD-MIRE technical achievements. Following a well-planned dissemination strategy, the project consortium targets at a solid presence in international scientific conferences and other events, in the form of papers presentations, workshop organization, etc., as well as presence in international journals and magazines in the form of articles. Moreover a public website (https://www.admire-eurohpc.eu/) has been activated to promote the research activities carried out during the project lifetime.
- Standardization: to participate and actively contribute in standardization bodies such as ISO, MPI Forum, or C++ as a mechanism to allow the project consortium ensure fruitful exploitation of the ADMIRE concepts, output, and results.
- Exploitation: to enable the HPC and Big Data communities to adopt and exploit the ADMIRE concepts in terms of architectural solutions, prototypes and proof of concepts. This can be achieved through individual exploitations carried out by each project partner to enhance its own activities and markets, as well as through joint exploitations carried out by the project consortium as a whole.

The outputs of the ADMIRE project will consist mainly of system software, software manuals, scientific technical papers, deliverables, and communication media. The open-source software produced by the project will be made freely available on open platforms (e.g., GitHub, Bitbucket) under open source licenses. Third parties will be able to freely download and use the software for their applications and products. The project partners will decide on case basis on the suitability of protecting the knowledge derived from this work by applying for patents for utility.

For the scientific technical papers the project partners will target as a first option open access publications (gold open access). In addition to the website of the publisher, the papers along with all required H2020 metadata will be posted to the project web page, to the web pages of project partners, and to other standard open platforms. The public posting will be done immediately for golden access or after the embargo period for green access.

This deliverable provides the strategies planned by the project consortium to carry out the dissemination (Chapter 2), standardization (Chapter 3), and exploitation (Chapter 4) activities in an effective and efficient way for each particular partner. Finally, in chapter 5 we present some activities already made towards project dissemination.

### **Chapter 2**

## **Dissemination plan**

The main objective of the planned dissemination activities is to increase the visibility of the ADMIRE project on selected communities and target groups at both European and International level and to further facilitate the realization of the impacts.

The project ADMIRE dissemination and communication plan will target three major goals:

noitemsep,topsep=0.5pt	Scientific dissemination to communicate project objectives and results to researchers,
	scientists, and technical managers, including closely-related research projects.

- noitemsep,topsep=0.5pt Industrial and commercial dissemination to inform potential providers and clients of the ADMIRE technology and its benefits, availability terms, and involvement possibilities.
- noitemsep,topsep=0.5pt Communication beyond the project's own community for reaching out to both society as a whole and specific audiences, for showing the benefits of the research and how EU funding addresses fundamental societal challenges.

### 2.1 Target audience

The targeted audiences for those activities are the ADMIRE user group (UG), HPC research infrastructures and facilities, including PRACE and CoE, and HPC networks (ETP4HPC, HIPEAC, JLESC), EuroHPC, EPI, and other European-f HPC projects (HPC), the business sector and industry (BS), Centres of Excellence for computing applications (CoEs), Standardisation bodies (SB), higher education (HE), policy makers at both national and European level (PM), a wider scientific community not specialised in HPC (WS), Media and press (MP), and the general public (GP). The performance of dissemination and communication activities will be assessed by the dissemination and exploitation committee (DEC).

In order to maximize impact, special attention will be given to approximate specific stakeholder groups such as:

- i) Policy makers
- ii) Potential commercial end users and in particular automotive component suppliers and packaging equipment manufactures
- iii) Consultation groups
- iv) Academics
- v) Investors

Through this interaction, valuable feedback from stakeholders that will be interested in the ADMIRE outputs, its exploitable results and future market products the ADMIRE technology will uncover, are anticipated. We will focus on propagating our results both to the computer science research community and to potential users of the technology. We will do this through a mixture of high-quality publications, presentations and direct engagement with the user community.

The overall aim is to maximize the utilization of the dissemination potential of ADMIRE consortium. Dissemination activities then must be tailored in such a way to reach the audiences most efficiently through appropriately selected dissemination channels and dissemination tools.

#### 2.1.1 Internal dissemination

Ensuring effective internal communication and dissemination among the Consortium partners represents an important key success element for the ADMIRE project. Partners are important for dissemination for two reasons. First they are potential users of ADMIRE's results themselves and secondly they represent influencers because of their huge impact on the associated industrial sectors.

Particularly, ADMIRE consortium partners comprise important market players in various segments and this constitutes a natural channel for the dissemination of the project and its result to other potential users. In this respect, the dissemination activities rely on the effort and the possibility of each partner in exploiting opportunities to present the project and its result. Therefore, it is important to communicate information about ADMIRE project and its results to partners' management, consultants and people responsible for their marketing and sales. Additionally, it is necessary to encourage them to share this information further to their customers and business partners.

Methods of internal dissemination can vary from providing links from partners' web pages to the ADMIRE website, to seminars or workshops showcasing, to articles in partners' internal newsletters and publications etc. The internal communication strategy also pursues the objective to maintain all partners fully informed about planning, work in progress and existing or potential problems. Besides the requested EC and Internal reporting, all partners are invited to actively communicate with WP Leaders about technical progresses and issues.

#### 2.1.2 External dissemination

In order to structure the external dissemination activities in the dissemination plan and to be able to analyse the impact of dissemination on a comparable basis a more accurate division of the target audience was developed as follows:

- Academic and research community. This group targets all research communities interested in the AD-MIRE project developments, results and innovation which can be beneficiary for their own research activities. Scientific contributions of ADMIRE are particularly interesting for researchers working in the field of parallel programming models, data centre monitoring, auto-tune and adaptive scheduling, and data intensive applications.
- Industrial sector & professional associations. At the end of the project we plan to elaborate ADMIRE dissemination impact analysis where we will evaluate which further industrial segments would be addressed and to compare the responses gained from the various segments. This will bring important information for further exploitation of ADMIRE project results by particular consortium partners after the end of the project.
- *International standardization bodies*. This target should be aware of ADMIRE scope and objectives, owing the innovative character. In an advanced stage of the project, standardization bodies can be involved and provide consultative advice on pre-standardization procedures which may be carried out when the technology reaches a suitable readiness level.
- *Government bodies and policy makers*. This is a wide group encompassing innovation driven local, regional authorities, representatives and associations, Ministries, parliaments and Public Administrations at national and international level.

### 2.2 Scientific dissemination

The main routes to good scientific dissemination are mainly through peer-reviewed publication, and through presentation of results at key scientific events. ADMIRE partners will therefore aim to produce high-quality *peer-reviewed research publications* in relevant leading conferences, technical workshops and journals. We will build on the existing good publication records of the ADMIRE partners, aiming to produce a sizable volume of good quality publications in the course of the project.

For raising awareness, presenting results, and promoting exploitation opportunities, several conference papers will be published and talks will be given at various events. The scientific technical papers will be orally presented in conferences and workshops. The project activity and results will be promoted in network meetings, workshops, and conferences.

The conferences that we propose to target include:

- **IEEE/ACM SC:** The International Conference for High Performance Computing, Networking, Storage, and Analysis.
- ACM ICS: International Conference on Supercomputing.
- USENIX: USENIX Annual Technical Conference
- FAST: USENIX Conference on File and Storage Technologies.
- ACM HPDC: The ACM International Symposium on High-Performance Parallel and Distributed Computing.
- **IEEE CLUSTER:** IEEE Cluster Conference.
- **IPDPS:** International Parallel and Distributed Processing Symposium;
- ICPP: International Conference on Parallel Processing;
- CCGRID: International Conference on Cluster Computing and the Grid;
- EURO-PAR International Conference on Parallel processing;
- TACAS: Tools and Algorithms for Construction and Analysis of Systems;
- SPLASH/OOPSLA: ACM SIGPLAN conference on Systems, Programming, Languages and Application;
- PDP Euromicro International Conference on Parallel, Distributed and Network-Based Computing.

The scientific and technical results produced by ADMIRE will be published in top peer-reviewed international journals. During the project's lifetime we will target to publish at least 18 papers in top journals. We propose to target relevant high-impact journals such as:

- TPDSIEEE Transactions on Parallel and Distributed Systems.
- FGCS: Future Generation Computer Systems.
- ToPC: ACM Trans. on Parallel Computing.
- ToS: ACM Trans. on Storage.
- IJHPCA: International Journal of High Performance Computing Applications.
- JSS: Journal of Systems and Software.
- SPE: Software: Practice & Experience.

- JPDC: Journal of Parallel and Distributed Computing.
- *PPL* Parallel Processing Letters.

All the not confidential results of the research activities carried out in the framework of the project for creating the ADMIRE network will be collected in technical reports and in scientific articles. Such documents will be peer-reviewed and published on EU and National journals, and made available to other users through open access models, together with the proceedings of the final conference.

According to the Art. 29.2 of the GA "each beneficiary must ensure open access (free of charge, online access for any user) to all peer-reviewed scientific publications relating to its results".

In particular, project partners must:

- 1. As soon as possible and at the latest on publication, deposit a machine-readable electronic copy of the published version or final peer-reviewed manuscript accepted for publication in a repository for scientific publications (Zenodo, eArchive, ...). Moreover, the partners must aim to deposit at the same time the research data needed to validate the results presented in the deposited scientific publications.
- 2. Ensure open access to the deposited publication via the repository at the latest:
  - On publication, if an electronic version is available for free via the publisher, or
  - Within six months of publication (twelve months for publications in the social sciences and humanities) in any other case.
- 3. Ensure open access via the repository to the bibliographic metadata that identify the deposited publication.

All publications based on work funded by EC within the activities of the ADMIRE project should acknowledge their affiliation to ADMIRE and bear recognition of the EuroHPC funding. This is generally accomplished by adding the following sentence in the acknowledgements section:

"This project has received funding from the European Union's Horizon 2020 under grant Agreement number: 956748-ADMIRE-H2020-JTI-EuroHPC-2019-1."

#### 2.2.1 ADMIRE workshops.

We will organise one workshop per year, in which the project partners will present the project activities and results to a specialised audience. The workshop will be organised in conjunction with a top conference or together with a research network event such as European HPC Summit Week, HIPEAC Computing Week, or PRACE Days.

#### 2.2.2 General scientific and technical community

We will further engage with the general scientific and technical community by participating in relevant workshops and clustering events (including ones which will develop our technologies beyond the bounds of our own research communities), by engaging with the different EC-sponsored CORDIS information channels, by presenting at trade fairs, and through other dissemination activities.

We will use materials such as presentations, papers, posters, demonstrations and the project web site to do this.

### 2.3 Industrial and commercial dissemination

ADMIRE dissemination activities will go beyond the project's own community targeted by dissemination and exploitation for reaching out to both society as a whole and specific audiences, for showing the benefits of the research and how EU funding addresses fundamental societal challenges.

### 2.4 Exhibitions, seminars and fora

The consortium members will present the project results in seminars for interested stakeholders. All the project partners will actively pursue the organisation of seminars at universities, research institutes, and business partners.

ADMIRE dissemination activity will be delivered by means of the presentation of the results in exhibition and technology transfer seminars, also by exploiting resources available in the Commission for media and information activities, interviews in national newspapers and magazines, presentations in various relevant institutions, presentations with government officials in areas relevant for ADMIRE project.

We will participate in either SC and ISC technical exhibitions at least once per year. Additionally, we plan participation at the Teratec exhibition.

We will organise for amailing lists for target groups such as the user group, journalists, and other interested researchers. The mailing lists will be used for announcing major releases and regular updates of the project status. The fora will serve as platforms for discussing the project activities and results. Leaflets will also be prepared, printed, and distributed, providing information to possible users of ADMIRE project, through mailing lists, specific centres, and associations.

### 2.4.1 Training events.

For promoting the adoption of project technologies we will organise at least 3 tutorials or training events about the technologies developed in this project. The tutorials will be located either in main conferences or winter/summer schools such as PRACE Summer of HPC, HIPEAC ACACES summer school, or Teratec.

The academic partners will include presentations about the project activities in relevant classes and seminars directed to undergraduate and graduate students.

#### 2.4.2 Developer and user communities

We will engage with the broader developer and user communities by a series of focused activities that will include the organisation of dedicated user community workshops, presentations at developer and other conferences, the production of posters, delivering tutorials, staffing booths, and providing hands-on guidance in the use of our tools and technologies etc.

This direct engagement will be supported by the production of video demonstrations, training materials, tutorials and documentation that can be accessed through the project web site. We will also aim to produce white papers and slide sets that can be used to explain the benefits of the ADMIRE approach to prospective users, both developers and managers.

#### 2.4.3 Participation in user groups of relevant technologies.

The consortium will be represented at workshops of various working groups supporting relevant technologies including Lustre User Group, Slurm User Group, OpenHPC, and EOFS.

#### 2.4.4 Expert working groups and networks of excellence

In order to ensure good dissemination to the research and development community, including industrial researchers, we propose to disseminate our project results through the most relevant scientific/technological networks and working groups, including HIPEAC, PRACE, BDVA, and other EU-funded projects, as well as national groups.

### 2.4.5 Co-operation with other research projects

A collaborative strategy has been prepared to coordinate collaborative activities with other European research projects. A realistic and achievable set of actions has been and will be planned for each year to ensure a steady, consistent and high quality dissemination flow from the project. The dissemination will be promoted in face-to-face and virtual meetings.

Progress on achieving the actions set out on the plan will be monitored carefully by the project coordinator. We have strive special cooperation efforts with the following EU funded projects:

- IO-Sea. "Storage I/O and Data Management for Exascale Architectures". IO-SEA aims to provide a novel data management and storage platform for exascale computing based on hierarchical storage management (HSM) and on-demand provisioning of storage services. We will cooperate on adhoc file systems topic.
- DeepSea. "DEEP Software for Exascale Architectures" will deliver the programming environment for future European exascale systems, adapting all levels of the software (SW) stack including low-level drivers, computation and communication libraries, resource management, and programming abstractions with associated runtime systems and tools. We will cooperate on application malleability topic.
- Regale. "An open architecture to equip next generation HPC applications with exascale capabilities". The project will define an open architecture. It will also build a prototype system that can equip supercomputing systems with the mechanisms and policies for effective resource utilisation. We will cooperate on application malleability topic.

The plan is to exchange tools, use-cases, and contribution between these and other EU founded projects.

### 2.5 Communication activities

ADMIRE communication activities will go beyond the project's own community targeted by dissemination and exploitation for reaching out to both society as a whole and specific audiences, for showing the benefits of the research and how EU funding addresses fundamental societal challenges.

The project will use a variety of channels for communication: the project website and the websites of the project partners, international conferences and journals, scientific and/or industrial network events, seminars, technical exhibitions (e.g., SC, ISC), ADMIRE workshops, training events, video channels, social networks, RSS feeds, discussion fora and mailing lists, on-line media, traditional media (e.g., newspapers, TV, radio). The messages to be conveyed will be designed in various formats depending on the communication objective and the target audience. The project partners can resort to their local communication units in the design and execution of the communication strategy and in the preparation of media materials and distributions.

### 2.5.1 Video Channels

Videos with interviews and news regarding scientific information and knowledge, in addition to being distributed in the scientific platforms, will be published in:

- UC3M Media (UC3M's video portal): https://media.uc3m.es/. - YouTube: www.youtube. com/user/UC3M.

#### 2.5.2 Press releases

Pieces of news will be sent to the media directory and specialized science, technology and innovation sections, which have over one hundred mass media registries.

#### 2.5.3 Social Networks

In addition of the social network accounts for the project ADMIRE, UC3M as project coordinator, will disseminate contents adapted for distribution in the following UC3M Social Networks corporate accounts:

- LinkedIn: https://www.linkedin.com/school/universidad-carlos-iii-de-madrid/ Followers 104,705.
- Facebook: https://www.facebook.com/uc3m Followers: 50,195.

- Twitter: @uc3m https://twitter.com/uc3m Followers: 35,437.
- Twitter: @ciencia\_uc3m https://twitter.com/ciencia\_uc3m Followers: 25,640.
- Instagram: https://www.instagram.com/universidadcarlosiiidemadrid/Followers: 8,917.
- Weibo: http://www.weibo.com/p/1002065478763531 Followers: 388.

All publications follow the guidelines of the Social Media guide for EU funded R&I projects: http://ec.europa.eu/research/participants/data/ref/h2020/other/grants\_manual/amga/soc-med-guide\_en.pdf

### 2.5.4 Official scientific news platforms

We will publish news in the following platforms:

- EurekAlert! & EurekAlert! Chinese. This is an online, global news service operated by American Association for the Advancement of Science's (AAAS) that provides a central place through which universities, medical centers, journals, government agencies, corporations and other organizations engaged in research can bring their news to the media. It is a global leader in the sector of the distribution of news on science, health, medicine and technology. There are around 6,000 journalists from approximately one hundred countries registered using this platform as a news source. The UC3M publish the piece of news in spanish, english and chinese. Websites: http://www.eurekalert.org http://chinese.eurekalert.org.
- AlphaGalileo is a business-to-business service that distributes research news (in the fields of science, medicine, art, humanities and social sciences) to more than 7,000 journalists from around the world who have asked to receive this news. A third of the visitors to the site are from the US and it has media registered from more than 40 countries. The UC3M publish the piece of news in Spanish, english and Chinese. Website: https://www.alphagalileo.org.
- SINC Agency (Science News and Information Service), FECYT. This is the first public information agency specializing in science, technology and innovation in Spanish. All contents have a Creative Commons 3.0 license. SINC offers its service to journalists, scientists and citizens to shed light on the latest, most relevant scientific developments, with special emphasis on Spanish studies. Approximately 1,000 journalist members use it as news source. Website: www.agenciasinc.es.
- Notiweb. Madrid+d. Comunidad de Madrid (Autonomous Community of Madrid). This science and technology news bulletin is a reference for university professors and researchers, science and technology managers, innovative companies and technology-based entrepreneurs, administrators of scientific policy, journalists, and everyday citizens interested in these issues. It has over 65,000 subscribers, particularly in the area of academics within the Spanish-speaking world. Website: www.madrimasd.org/informacionidi/notiweb/default.asp.
- DiCYT (News Agency for Public Understanding of Science and Technology). 3CIN Foundation. This agency focuses on creating synergies between countries on both sides of the Atlantic and improving visibility of R+D+I in the Spanish and Portuguese languages, with 18,000 registered users. Website: www.dicyt.com.

### 2.6 Evaluation

For the purposes of evaluation of ADMIRE dissemination activities, quantitative indicators and associated metrics were set up where applicable. A numerical target has been estimated as a cumulative estimate based on individual partners' inputs. These targets will be periodically reviewed in collaboration with the whole

consortium. Table 2.1 shows the planned dissemination activities and the applicable metric employed for evaluation.

Activity	Target group	Objective/Impact	KPI
Factsheets	All	Raise awareness	Distribute at least 500 copies
Brochures and	PM, BS, CoE, HPC,	Promote results	Distribute at least 500 copies
posters	UG, HE, WS		
Website	All	Promote results, encourage	Al least 1000 visits per year
		adoption, support exploitation	
Papers in top	HPC, HE, BS, CoE,	Promote results, encourage	At least 18 papers
journals and	HPC, UG	adoption	
conferences			
Talks at scientific	UG, BS, CoE, HPC,	Raise awareness, promote	At least 6 talks per year
events	HE, WS	results, encourage adoption	
Seminars	BS, CoE, HPC, UG,	Raise awareness, promote results	At least 6 seminars
<b>T</b> 1 1 1/0 1 1	HE DA G E UDG UG		
Technical/Commercial	BS, CoE, HPC, UG	Promote results, encourage	At least 6 participations
exhibitions and fairs		adoption	1
ADMIRE workshops	PP, BS, CoE, HPC,	Promote results, encourage	l per year
		adoption	
Training events	PP, BS, COE, HPC,	Raise awareness, promote	At least 3 in 3 years
	UG	results, encourage adoption,	
TT		support exploitation	At 1, and 20 a trans 1 and
User fora and	PP, BS, COE, HPC,	Promote results	At least 20 external users
Illanning lists			At least 2 participations
User groups of	вз, прс, 00	edention	At least 5 participations
Meetings with policy	DM	Paise awareness	At least 3 meetings
makers	<b>F</b> IVI	Kaise awareness	At least 5 meetings
Social network and	A 11	Raise awareness among larger	LinkedIn group with at least 100
video channel		audience	members at least 100 Twitter
nresence		addrenee	followers 300 video views
On-line media	A11	Raise awareness among larger	At least 10 interviews news
presence	7 111	audience	reports and/or references
Videos	A11	Raise awareness among larger	At least 3
		audience	
Press releases	MP. All	Raise awareness among larger	At least 6
	,	audience	
Events for society at	GP	Raise awareness among larger	At least 3 events
large		audience	

Table 2.1: ADMIRE dissemination	n and	communication	activities
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### 2.7 Dissemination tools

The project will use a variety of channels for communication: the project website and the websites of the project partners, international conferences and journals, scientific and/or industrial network events, seminars, technical exhibitions (e.g., SC, ISC), ADMIRE workshops, training events, video channels, social networks, RSS feeds, discussion fora and mailing lists, on-line media, traditional media (e.g., newspapers, TV, radio). The messages to be conveyed will be designed in various formats depending on the communication objective and the target audience. The project partners can resort to their local communication units in the design and execution of the communication strategy and in the preparation of media materials and distributions.

### 2.7.1 Graphic identity

A common graphic identity has been defined (see Chapter 5) to allow for better visibility and recognition as well as branding of the ADMIRE project. Therefore, all dissemination tools and activities must refer to or include:

- the name of the project: ADMIRE,
- the project's website URL (https://https://www.admire-eurohpc.eu),
- to the ADMIRE project logo,
- acknowledgements to EC public funds. The official EuroHPC logo, with the Horizon 2020 indication below, will be used for any (internal or external) deliverable, report and dissemination tool.

### 2.7.2 Project web site

A crucial component of the ADMIRE dissemination strategy is a high-quality project website. The public section will provide ample and consistent information about all aspects of the ADMIRE project, with the goal of positioning the ADMIRE website as a prime information source for relevant scientific and technical information. The vast majority of the ADMIRE deliverables are public, and full access to these will be provided through the web site. The web site will also contain lists of publications and links to open-access repositories; copies of technical reports and white papers; a news feed; technical documentation; downloadable software and pre-installed virtual machines; video demonstrations; online tutorials; information about project partners; copies of presentations, podcasts and other material; data and results; and links to the Horizon 2020 programme and to related research projects in order to highlight the role played by ADMIRE within the broader EC research framework.

### 2.7.3 Project news feed

We have set up open public mailing lists/twitter/research gate accounts that will be used to communicate project news and results to interested parties, whether they are scientists, academics, developers or the general public. This news feed will be highlighted on the project web site.

The mailing lists will be used for announcing major releases and regular updates of the project status. The fora will serve as platforms for discussing the project activities and results.

### 2.7.4 Project leaflet and poster

We have already built a project leaflet. The main objective of the project leaflet is to provide our audiences with an attractive and written project overview and a summary of the main project objectives and characteristics. The leaflet presents the goals of the project and the main (expected) findings. The text is designed taking into account not only experts, but also an interested non-specialist. It introduces the main idea, the approach and the goals of the ADMIRE project. Furthermore, it includes the website address and provides basic information on ADMIRE Consortium.

A second version of the leaflet will be implemented after M18. This version will contain an updated content, with an overview of preliminary results, and a new layout for making it more attractive. The final version of the leaflet will be implemented at the end of the Project. The leaflet can be circulated in printed form, e.g. it can be handed out at conferences or other events; on the other hand also an electronic version (e.g. PDF file) can be circulated. The leaflet can be also downloaded from the project website.

We have also built a poster that is available for all project members participating in events to show ADMIRE results.

### Chapter 3

### **Standardization**

Contributions to standardization will be an important strategy to ADMIRE. Standards are essential to create a platform for product differentiation and economic development because they attract innovators and investors by creating large markets. They also foster the necessary conditions for technology to converge. By sharing costs of standards development with other stakeholders in industry, academia and government, we minimize investment in producing long-lasting infrastructure that reduces costs and technology risks and increases opportunities for new market innovations and products.

ADMIRE will use cooperation with standardization forum as a means to exploit the impacts of the project result and to most efficiently invest the public funding of this project. It will go about this in two ways: Firstly, through monitoring of standardization bodies, i.e., it will ensure that the research results produced by the project will be aligned with existing and emerging standards from the relevant communities (e.g. ISO, MPI Forum). Secondly, through establishing new pre-standardization groups and contributing to ongoing standardization efforts, ADMIRE will provide feedback to the standardization process by providing experiences, lessons learned, and research results.

ADMIRE partners are members of several standardization committees. UC3M is member of the ISO C++ Standards Committee, the leading body for standardisation of the C++ programming language, and INRIA and Paratools are member of MPI Forum, which is in charge of standardising MPI. As such they will present ADMIRE solutions and proposal in those entities to increase the impact of the project.

### **Chapter 4**

### **Exploitation plan**

The Exploitation Plan (EP) will be designed in order to multiply the impact of the proposed solutions and prepare the transition towards industrial and commercial uptake in order to fully achieve the expected impact. The EP will describe the activities to be undertaken (how and by whom) in order to ensure the exploitation beyond the project itself. The exploitation strategy will reflect and will be built-up as a result of sound analysis of the market trends potential users, and financial sustainability. The target users will be precisely identified and analysed in terms of specific needs and objectives. The exploitation activities will be coordinated by the Steering Committee in collaboration with the Dissemination and Exploitation Coordinator.

### **Exploitation by project partners**

The consortium of ADMIRE project has been carefully defined to match the project objectives. It brings together world-leading research groups from six Universities and research institutions (Carlos III of Madrid, Darmstadt, Johannes Guttenberg, CINI (Torino, Pisa, Milano, Napoli), INRIA Bordeaux, and KTH), four supercomputing centres (BSC, Julich, Poznan and CINECA), and three successful industrial companies (DDN, Paratools and E4). Two of the companies (Paratools and E4) are SME. The team shares common technical interests and they also have a considerable history of previous positive cooperation in research projects, networks of excellence (ETP4HPC, HIPEAC, PRACE, JLESC, NESUS, ASPIDE, NEXTGenIO, ...), and joint papers, which reduces the possibility of cooperation risks. This previous experiences represents an important base for efficiently working together within the ADMIRE consortium.

The ADMIRE consortium will considerably benefit from the consortium involvement of two SMEs (PARA-TOOLS and E4) and a leading provider of large storage systems (DDN). They will play an active role in the identification and exploitation of technology transfer opportunities, driven by the strong interest in growing and exploiting new markets. Additionally, DDN will also contribute its international expertise in intellectual property protection, including patents of utilities and open-source software.

The partners will exploit the project results both during the project duration and after the project finalises. All partners are interested to use the results from these projects in research activities, release open source software, provide support services for the ADMIRE software during and after the project execution, and promote the project results to standardisation bodies. The particular interest in exploitation of each partner is shortly described below.

#### 4.0.1 Scientific beneficiaries exploitation plans.

All scientific partners are strongly committed to technology transfer. They main institutions provide specialised units that offer services for drafting exploitation plans, intellectual property management, commercial contracts, spin-offs, and cooperation with industrial partners. Additionally, all academic partners will use the project results in their teaching activities at both undergraduate and graduate levels.

**UC3M** is strongly committed to promote the application and exploitation of research results. UC3M will publish the research results in high-impact conferences and will use them as a basis for future research activities and for consolidating its reputation for research efficiency. The software produced by UC3M will be released

as open software. UC3M will contribute to transforming the research results from this project into products and will strongly support their adoption and uptake by external stakeholders. The exploitation activities of UC3M will receive the support of its own Science Park with services for intellectual property management, spin-off creation, technological transfer, and cooperation with industrial partners. Additionally, UC3M will use the results for involving undergraduate and graduate students in research.

JGU strives for academic excellence and will exploit ADMIRE to improve its position as leading German competence centre in the field of storage systems research. The first strategic component is an increase in research visibility by publishing results from this project in highly-esteemed conferences and journals. The second component is the release of open source software developed in this project, which is expected to become widely-used in many leading HPC data centres. JGU is also taking responsibility within the German Gauss Alliance on the topics parallel file systems and scalable storage and will therefore also provide software support for the ADMIRE software stack and will take an active role in the technology transfer to make the ADMIRE software a de-facto standard. JGU furthermore always tries to engage Bachelor and Master students in research and will therefore incorporate the project topics into lectures and seminars and will also offer Bachelor and Master thesis topics closely related to the project. JGU will further use project results in its own data centre.

**BSC** plans to exploit the following main products developed by ADMIRE: the ad-hoc storage systems and the I/O scheduler. Given that the ad-hoc storage systems will be user-level components, we plan to enable their use in production at BSC in its infrastructures. With respect to the IO scheduler and its integration with the job scheduler, we will evaluate the viability of putting it into production, or at least to cooperate with the Slurm community to exploit some of the lessons learnt to improve job and IO schedulers. BSC also plans to continue exploiting the developed ad-hoc storage systems and the IO scheduler in its infrastructures as well as promoting them for its use in other funded projects and in contracts with companies. Finally, all developed software will be open source enabling a global exploitation of the results obtained in this project.

**TUDA** plans to contribute to the development of Slurm by providing a plugin, taking advantage of Slurm's flexible plugin system. The plugin will implement the scheduling algorithms and policies for malleability that we develop in this project. Since Slurm is available under the *GNU General Public License* (GPL) we plan to publish the Slurm plugin under an open source license compatible with GPL. Once the scheduler and the runtime components are sufficiently stable, we want to open a test-bed at the Lichtenberg cluster of TUDA also for other interested users external to the project. Moreover, we want to integrate the extensions of the performance modelling tool Extra-P, which will allow the generation of application I/O requirement models from measurements, in the release version of Extra-P, which is regularly published under the New BSD (3-clause) open source license. This will allow application developers to create I/O requirement models also for other purposes, such as application tuning and system co-design, substantially expanding the scope of Extra-P. Finally, we will allow students to participate in the project via seminars, laboratories, or thesis projects.

**FZJ.** The scalable and automatic deep learning frameworks that will be developed for the generation of continental-scale land cover maps will enable FZJ to contribute to the production of free land cover databases, such as the CORINE and the ESA CCI land cover products. Our databases will support many scientific and operational applications that require high resolution up to date land cover information (i.e., vegetation monitoring, urban management). FZJ will publish new large free annotated datasets with high degree of reliability. This will enable to produce novel datasets for benchmarking deep learning models on Earth observation classification problems and reduce the gap in terms of data size with the large datasets that are available in the computer vision community (e.g., ImageNet with 14,197,122 images). Selected results will be used further as teaching material in various FZJ educational activities in AI and HPC (e.g., PRACE tutorials), and will be adopted to expand the FZJ course portfolio to reach academia, industry, and SMEs. In addition, the various AI methods and tools developed in ADMIRE will be exploited through ongoing collaborations in a variety of projects (e.g., Helmholtz AI) that are not only related to Earth observation (i.e., medical research and retail sectors). Finally, the results achieved in ADMIRE will be used for scientific publications in international conferences and journals.

**INRIA** The ADMIRE is completely in line with the Tadaam team at Inria Bordeaux which main goal is to develop algorithms and solutions to manage application I/O access at system scale. Therefore, ADMIRE will enable to provide important building blocks towards Inria's strategic research agenda: new algorithms for scheduling I/O, a distributed and system-scale environment for managing data in a coordinated fashion,

and profiling tools to monitor application behaviour. Inria will publish these results in high-impact computer science and computational science journals and conferences. This project will also help Inria to increase the research synergy with other teams or companies with whom it already collaborates, e.g., UC3M, FZJ, or DDN. Last, Inria has a strong focus on technology transfer. It will leverage on this project to achieve this in two ways. First, all the software developed will be made open and second, Inria will use its strong ties with the MPI-Forum to influence this standardisation body in the direction of better data management for the HPC software stack.

**CINI** CINI participates to ADMIRE with the recently established working group on *Key Technologies and Tools for HPC* aiming at constituting a pan-Italian federated laboratory possibly involving over forty public Italian Universities across the country. A foremost aim of the CINI HPC working group is to extend the EuroHPC "Joint Undertaking" concept at the Italian national level, directly involving research groups from different universities, and their industrial relations of trust, in large pan-European initiatives, thus multiplying by capillarity the technological transfer opportunities in the HPC area to industries and SMEs. Due to its academic culture heritage and background, CINI will exploit the research results by using the standard channels to present academic research, namely publications and demonstrations at conferences and in leading journals. Also, CINI will exploit research results as a flywheel effect for other undergoing applied research activities in the field of two use cases related to (marine) computational environmental science and HPDA on software heritage datasets. The first is framed within the Campania Region Centre for Marine and Atmosphere Monitoring and Modelling, internet of things afloat for marine data crowdsourcing for coastal management protection and development, marine pollution impact evaluation and assessment for sea farms and human safety at sea. The second aiming at experimenting methods and tools to manage and analyse the INRIA software heritage repository, which is a vast dataset of small files, for this it is a perfect stress test for I/O technology.

**CINECA** In accordance to its institutional mission, CINECA today is an important technology bridge between the academic and research world and the world of industry and public administrations. The goal of CINECA within a project like ADMIRE is to field test solutions, tools and methodologies, and then transfer the validated innovative solutions to the CINECA pre-exascale environment for the EU users, including industries. In addition, to reach these goals, CINECA will expand its training program on HPC technology to eventually include the products released by ADMIRE. Since the ADMIRE technologies are particularly relevant for preexascale system exploitation, the training event could be scheduled multiple times per year in different Italian cities where CINECA has its main offices (Rome, Milan and Bologna), so to give the possibility to everybody to take-up with the new technologies. For industrial users, CINECA will also demonstrate the ADMIRE technologies through specific actions carried out by the Italian EuroHPC co-funded HPC Competence Centre (e.g., workshops targeting specifically industrial users). Moreover CINECA will showcase the ADMIRE technologies in international events and fairs it usually attends with a booth (e.g., Supercomputing). In these events, CINECA could showcase a poster on the ADMIRE technologies or give away ADMIRE flyers or other advertising materials which the dissemination WP will prepare.

**PSNC** will act as a potential user (being an HPC centre), helping to validate the project outcomes and analyse potential gains for the PSNC HPC centre. Improvements in performance and efficiency of super-resolution imaging (Life Sciences Case Study) will be applied to make progress in studies of cells during disease (a part of the LifeTime EU Flagship). Generally, PSNC being an R&D centre, has three main paths of exploiting project results: (1) as an operator of a HPC centre, its goal is to minimise operational costs along with ensuring required performance for emerging data-intensive applications; (2) PSNC aims at improving its knowledge and competences in its strategic areas (including energy efficient, heterogeneous, advanced computing) to increase PSNC chances in the realisation of future research projects; (3) PSNC plans to use expertise and results from R&D projects to increase a number of industrial contracts with both external companies and its spin-offs. PSNC also plans to exploit results and know-how derived from ADMIRE internally. Ad-hoc I/O facilities, monitoring and management methods and tools will be deployed and applied to improve the LABEE laboratory, which will be used (among others) as the ADMIRE testbed. In this way sustainability of the project results can be ensured, providing access to the ADMIRE results after the end of the project.

**KTH** will exploit the results of ADMIRE in two main ways. Our pilot code NEK5000 will profit from the enhanced data scheduling policies. This will enable a more efficient execution and thus contribute to address the research questions of the KTH Mechanics department, particularly on turbulent flow. All developments in NEK5000 will be fed back into the public open source release and thus also benefit the wider NEK5000 user

community. In addition, the PDC Center for High Performance Computing of KTH will exploit both, the developments of ADMIRE as well as the knowledge gained through its participation. We will advertise the software and technologies to other PDC users and through collaborations on other codes exploit the results of ADMIRE in domains, PDC is actively working on. This includes particularly materials, life sciences, and weather/climate. We will also exploit the results in further research work on in-situ processing and the convergence of HPC and big data technologies.

**MPG** will exploit the results of ADMIRE in its various activities on improving scientific applications towards the Exascale. We will continue to work with selected applications and use the ADMIRE results, in particular the in-situ frameworks, to improve their efficiency and also use the knowledge gained through ADMIRE in our network, expanding the reach of ADMIRE to many more scientific domains as was possible with the pilot applications in the project.

#### **4.0.2** Industrial beneficiaries exploitation plans.

The industrial partners are interested to leverage the results from this project either for improving their existing products or create new products or services.

**DDN** will use the project results for consolidating its position as main provider of storage products and services for 70% of the Top500 systems. ADMIRE will also support the software-defined storage business strategy of DDN. ADMIRE will enable DDN to integrate its storage products and services into a global frame-work and, thus, to become a pioneer provider of an end-to-end software-defined solution for the whole hierarchy of a large-scale HPC system. In particular DDN will exploit the project results for creating novel services for providing global optimisations for block storage, flash storage, and file storage products. DDN is strongly committed to open source development. The software developments conducted by DDN within ADMIRE will be made available to the open source community. ADMIRE code involving the Lustre file system will be hardened, as well as validated, through the company quality assurance and test process. Once validated, DDN software engineers will then pushed back the code to the open source Lustre tree. This code will be married to DDN's own management, high availability, and support tools for the Exascaler product after, which ensures exploitation beyond the end of the project by thousands of potential users.

**PARA** was founded around the TAU performance system, all developments in ADMIRE will both take advantage of this previous work and when relevant be released in open source in the same project under a BSD style license. Moreover, a strong activity on innovative middleware has been developed by the company which is focused on exascale challenges with respect to supercomputers' programmability. In particular, we have identified malleability and composition as key challenges for upcoming systems. Therefore, ADMIRE, which aims at addressing these issues for I/O, will naturally deal with components and abstractions that are lacking in current programming models. Our will is to develop these abstraction, not only in performance tools but also in runtime systems with a particular interest on the Message Passing Interface. All developments outside of the TAU measurement chain will also be open sourced in a BSD style license. Eventually, as an SME, such a project provides resources in support of the growth of the company.

**E4** E4 has a long tradition in delivering products and services for HPC, AI and HPDA to its customers. In the very competitive market of HPC solutions, technological leadership is key for growing in the market and offering attractive solutions to customers and prospects. Because of its participation to ADMIRE and thanks to the solutions developed within the project, E4 will increase its expertise in designing and building products suited for serving the needs of its customers and prospects towards extreme-scale applications for exascale supercomputers. These products will be added as a new asset to the E4 Computer Engineering?s products and solutions portfolio and complemented by a number of focused marketing campaigns targeted to positioning these products and solutions in the academic, large scientific institutions, R&D departments and industrial fields.

### 4.1 Exploitation plans as a whole

Table 4.1 summarises the interest in the exploitation of results of each partner.

Exploitation	Research	Open	Market	Deploy in	SW	Tech.	Standardisation	Teaching,
		software	a product	own DC	services	transfer		Training
UC3M	X	X		X		X	X	X
JGU	X	X		X	X	X	X	X
BSC	X	X		X		X	X	X
TUDA	X	X		X	X	X	X	X
DDN	X		X		X			X
INRIA	X	X				X	X	X
PARA	X	X	X		X	X		
FZJ	X	X		X				X
CINI	X	X			X	X		X
CINECA	X	X		X	X			X
E4			X	X				
PSNC	X	X		X	X	X		
КТН	X	X		X	X	X		X
MPG	X	X		X				X

Table 4.1: Exploitation interests of project participants.

### **Chapter 5**

## **Early achievements**

Even if the project has been centered on preparing the ground basis for the rest of the project, ADMIRE partners have made a strong effort on dissemination, as shown in the section.

### 5.1 Project Web site

Following the project kick-off on April 13th, 2021 in Madrid, activities have been undertaken towards fulfilling the objectives set above. We open the website prototype on May 1st 2021. The current version is stable since the end of July 2021.

The public project website is visually attractive and informative and includes a link to the web-based collaborative workspace (GitLab) to facilitate continuous project partner communication. New visual media and dynamic outreach products will be used (e.g. videos, newsletters) on the website, where suitable. Key features of the website include:

- A global calendar for the project includes all the events organised by the ADMIRE consortium as well as events where ADMIRE partners are going to be represented and any other events of interest to the partnership.
- News section regularly updated throughout the project's lifetime with news on the project as well as external news relevant to ADMIRE.
- Repository of public deliverables and results uploaded to the website as they become available. This also houses all dissemination products, press releases and the project factsheet.

### 5.1.1 Google Analytics

The website traffic is now being tracked using Google Analytics, a free and safe high-end web statistics tool. We started tracking on September 1st 2021 and analytics has been reporting since this time. Figure **??** shows an overview of the analytics for the ADMIRE website.

- We have recorded 70 visits with around 260 page views.
- 90% corresponds with new visitors.



The growing need to process extremely large data sets is one of the main drivers for building exascale HPC systems today. However, the flat storage hierarchies found in classic HPC architectures no longer satisfy the performance requirements of data-processing applications. Uncoordinated file access in combination with limited bandwidth make the centralized back-end parallel file system a serious bottleneck. At the same time, emerging multi-tier storage hierarchies come with the potential to remove this barrier. But maximizing performance still requires careful control to avoid congestion and balance computational with storage performance. Unfortunately, appropriate interfaces and policies for managing such an enhanced I/O stack are still lacking.

The main objective of the ADMIRE project is to establish this control by creating an active I/O stack that dynamically adjusts computation and storage requirements through intelligent global coordination, malleability of computation and I/O, and the scheduling of storage resources along all levels of the storage hierarchy. To achieve this, we will develop a software-defined framework based on the principles of scalable monitoring and control, separated control and data paths, and the orchestration of key system components and applications through embedded control points.

Our software-only solution will allow the throughput of HPC systems and the performance of individual applications to be substantially increased – and consequently energy consumption to be decreased – by taking

Figure 5.1: The main project webpage.

Design". Leader: ZJ).
- <u>0 1171</u>
2
Apr 13, 2021

WP5 Presentation "Sensing and profiling". Leader Jean-Thomas Acquaviva (DDN)



Figure 5.2: Number of users and their countries in the ADMIRE web since September 1st.

### 5.2 Social media

A strong importance will be given to the use of Social Network in order to connect with the general public, creating a two-way dialogue while encouraging the debate among stakeholders on specific issues. ADMIRE, as a result:

- A dedicated page on Twitter (@ADMIRE\_EUROHPC) has been already createda.
- A ResearchGate group has been created (ADMIRE). https://www.researchgate.net/project/ ADMIRE-4
- A dedicated YouTube channel will be created, with the purpose of broadcasting ADMIRE project videos.
- We have also created a Linked-In account (Admire EURO-HPC Project) for the project to make dissemination in the professional world.

• We have created a ResearchGate project for AMIRE project as fast way for scientific dissemination. https://www.researchgate.net/project/ADMIRE-4.

### **5.3** Dissemination in the project in EU portals

- EurekAlert. EU project ADMIRE launched. JOHANNES GUTENBERG UNIVERSITAET MAINZ. 19-JUL-2021 https://www.eurekalert.org/news-releases/858209
- CORDIS. https://cordis.europa.eu/project/id/956748/es
- EuroHPC Webpage info. https://eurohpc-ju.europa.eu/press-releases/european-high-p
- ETP4HPC. 2021 Handbook of European HPC projects. https://www.etp4hpc.eu/european-hpc-han html

### 5.4 Scientific and commercial dissemination

Scientific papers in conferences:

- Marco Aldinuci. University of Torino. Keynote: The modernization of HPC applications for the cloud era. Fifth EAGE Workshop on High Performance Computing for Upstream. Heterogeneous HPC: Challenges, Current & Future Trends. 6-8 September 2021. https://eage.eventsair.com/ fifth-hpc-ws/
- Frederic Schimmelpfennig, Marc-André Vef, Reza Salkhordeh, Alberto Miranda, Ramon Nou, and André Brinkmann. 2021. Streamlining distributed Deep Learning I/O with ad hoc file systems. In 23rd IEEE Cluster Conference (CLUSTER). 2021.
- Aldinucci, M., Agosta, G., Andreini, A., Ardagna, C. A., Bartolini, A., Cilardo, A., ... & Torquati, M. (2021, May). The Italian research on HPC key technologies across EuroHPC. In Proceedings of the 18th ACM International Conference on Computing Frontiers (pp. 178-184).
- Carretero, J. Session Chair. Europar 21. Panel "European Initiative Projects Towards Exascale Computing". September 3rd 2021, Lisbon. https://2021.euro-par.org/program/eu-projects/

Talks:

- Teratec forum on June 23, 2021. Presented along with other Inria EuroHPC projects. https://teratec.eu/forum/Sessions\_Recherche.html
- Lecture at Univ. Innsbruck, 27.01.2021 https://www.uibk.ac.at/fz-hpc/events/lecture\_series.html.en
- Dagstuhl Seminar. "Understanding I/O Behavior in Scientific and Data-Intensive Computing", 16.-20-8.2021

Web dissemination:

- UC3M. Research portal. https://researchportal.uc3m.es/display/act536382.
- UC3M. ARCOS group web page. https://www.arcos.inf.uc3m.es/projects/
- UniParthenope Web page. https://rcf.uniparthenope.it/en/projects/
- TU Darmstadt https://www.tu-darmstadt.de/universitaet/aktuelles\_meldungen/ einzelansicht\_324864.de.jsp

- TU Darmstadt https://www.informatik.tu-darmstadt.de/fb20/aktuelles\$\_\$fb20/ fb20\$\_\$neuigkeiten/neuigkeiten\_fb20\_details\_233280.de.jsp
- TU Darmstadt https://www.parallel.informatik.tu-darmstadt.de/research/projects/ projects.html
- BSC. Kickoff dissemination. https://www.bsc.es/news/bsc-news/bsc-participates-admire-created

### 5.5 **Project communication material**

This section covers already finalized dissemination templates, related to ADMIRE during the first six months. It is including the project logos, leaflet, poster, flyer and presentation slide-set to be used by project members presenting at different events.

### 5.5.1 Project's logo



malleable data solutions for HPC

ADAPTIVE MULTI-TIER INTELLIGENT DATA MANAGER FOR EXASCALE



malleable data solutions for HPC

Figure 5.3: ADMIRE Logos.

### 5.5.2 **Project presentation flyer**



### ADAPTIVE MULTI-TIER INTELLIGENT DATA MANAGER FOR EXASCALE www.admire-eurohpc.eu

### **ADMIRE Overview**







\* \* \*

EuroHPC

### 5.5.3 Preliminary project poster



malleable data solutions for HPC

ADAPTIVE MULTI-TIER INTELLIGENT DATA MANAGER FOR EXASCALE

www.admire-eurohpc.eu

### **ADMIRE Overview**



### System architecture







EuroHPC

### 5.5.4 Preliminary project leaflet







### ADAPTIVE MULTI-TIER INTELLIGENT DATA MANAGER FOR EXASCALE



This project has received funding from the European Uniors Horizon 2020 JTI-EuroHPC research and innovation programme, with grant Agreement number: 956748 — ADMIRE — H2020-JTI-EuroHPC-2019-1

www.admire-eurohpc.eu



Coordinated by University Carlos III of Madrid (UC3M) and funded by the European High-Performance Computing Joint Undertaking (EuroHPC JU) and the participating states, the **ADMIRE project** will create a European adaptive storage system to boost data-intensive applications comprising HPC simulation, bioinformatics, and artificial intelligence. The project aims to integrate novel and existing technologies through the codesign of six applications Pillars with high industrial and social relevance: weather forecasting, molecular dynamics, turbulence simulations, planetary scale cover mapping, brain superresolution imaging, and Software Heritage catalog management and indexing.

ADMIRE project aims to deliver an Input/Output software stack and a clearly defined Application ProgrammingInterface for the optimization of dataintensive HPC and machine learning applications. The main objective of the ADMIRE project is to establish this control by creating an active I/O stack that dynamically adjusts computation and storage requirements through intelligent global coordination, malleability of computation and I/O, and the scheduling of storage resources along all levels of the storage hierarchy. To achieve this, we will develop a software-defined framework based on the principles of scalable monitoring and control, separated control and data paths, and the orchestration of key system components and applications through embedded control points.

#### 🔘 MAIN GOAL

Creation of an active I/O stack that dynamically adjusts computation and storage requirements through intelligent global coordination, elasticity of computation and I/O, and the scheduling of storage resources along all levels of the storage hierarchy, while offering quality-of-service (QoS), energy efficiency, and resilience for accessing extremely large data sets in very heterogeneous computing and storage environments.

#### **ADMIRE Overview**



#### System architecture



#### Work packages structure



### 5.5.5 Project Slide-set



### **ADMIRE Overview**









### System architecture





EuroHPC



### Work packages structure













## 6. Conclusion

The outputs of the ADMIRE project will consist mainly of system software, software manuals, scientific technical papers, deliverables, and communication media. The open-source software produced by the project will be made freely available on open platforms (e.g., GitHub, Bitbucket) under open source licenses. Third parties will be able to freely download and use the software for their applications and products. The project partners will decide on case basis on the suitability of protecting the knowledge derived from this work by applying for patents for utility.

For the scientific technical papers the project partners will target as a first option open access publications (gold open access). In addition to the website of the publisher, the papers along with all required H2020 metadata will be posted to the project web page, to the web pages of project partners, and to other standard open platforms. The public posting will be done immediately for golden access or after the embargo period for green access.

The main dissemination media of ADMIRE projects are now set up as cheduled and we are starting to plan next meetings and activities for dissemination and exploitation.