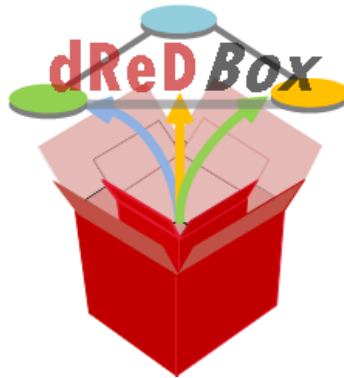


H2020 ICT-04-2015



Disaggregated Recursive Datacentre-in-a-Box
Grant Number 687632

D7.2 – Dissemination Plan and Report (a)

WP7: Dissemination and Exploitation



D7.2 – Dissemination Plan and Report (a)

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Dissemination level	
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Disclaimer

This deliverable has been prepared by the responsible Work Package of the Project in accordance with the Consortium Agreement and the Grant Agreement No 687632. It solely reflects the opinion of the parties to such agreements on a collective basis in the context of the Project and to the extent foreseen in such agreements.

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The partners in the project are IBM IRELAND LIMITED (IBM-IE), PANEPISTIMIO THESSALIAS (UTH), UNIVERSITY OF BRISTOL (UOB), BARCELONA SUPERCOMPUTING CENTER – CENTRO NACIONAL DE SUPERCOMPUTACION (BSC), SINTECS B.V. (SINTECS), FOUNDATION FOR RESEARCH AND TECHNOLOGY HELLAS (FORTH), TELEFONICA INVESTIGACION Y DESSARROLLO S.A.U. (TID), KINESENSE LIMITED (KS), NAUDIT HIGH PERFORMANCE COMPUTING AND NETWORKING SL (NAUDIT HPC), VIRTUAL OPEN SYSTEMS SAS (VOSYS), POLATIS LTD (POLATIS).

The content of this document is the result of extensive discussions and decisions within the dReDBox Consortium as a whole.

More information

Public dReDBox reports and other information pertaining to the project will be continuously made available through the dReDBox public Web site under <http://www.dredbox.eu>.

Version History

Version	Date DD/MM/YYYY	Comments, Changes, Status	Authors, contributors, reviewers
0.1	01/06/2016	First draft	Georgios Zervas
0.2	23/06/2016	Second draft – Most sections complete	Georgios Zervas
0.3	28/06/2016	Amendments after internal review	Georgios Zervas
1.0	29/06/2016	Final version	Kostas Katrinis

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Executive Summary

dReDBox aims at bringing innovation in the Cloud and data centres by proposing a functional disaggregated architecture. dRedBox will prototype a data centre in a box system that will enhance IT resource (i.e. compute, memory) utilization, best match application/workload/VM needs to resource usage, while delivering a modular and scalable and resilient solution. The project will bring innovation on optical interconnects to deliver a high performance information transport network as well as novel solutions on remote memory access, control, hypervisor, and orchestration of IT and network resources. The proof of concept prototype will be evaluated on a number of applications such as mobile edge computing, network data analytics and security.

In dRedBox, dissemination aims to deliver the widest possible impact of the project results and outputs. This is carried out by concentrating the efforts in the following activities:

- Scientific dissemination: dRedBox due to its highly innovative aspects is expected to deliver numerous publications in top conferences and journals with high impact factor. The consortium has already and will also engage with the research community through participation on leading international conferences by presenting the results but also organize workshops that will bring together industry and academia as well as other EU research funded projects for maximum impact.
- Industrial and broader dissemination: Industrial partners aim to participate and contribute to relevant open source ecosystems. This will create a return of the initial investment done by the EU community over the whole population. It will also help companies in creating a strategic position with respect to competitors, and boosting the market uptake of innovation.
- Collaboration with other EU projects: dReDBox has initially identified EU funded projects that are complementary and has already initiated and otherwise will initiate a dialogue of collaboration in order to maximize impact. Common workshops will aid the process of potentially working together at technical level.

This deliverable provides the strategies planned by the project consortium to carry out dissemination (Section 2), collaboration with other projects (Section 3), list of dissemination fora (Section 4) as well as the achieve scientific and dissemination outcome to date (Section 5).

1 Introduction

In dRedBox, WP7 and in particular Task 7.2 is in charge of dissemination and awareness related to the outcomes and results of the project. The main goal is to ensure the dRedBox impact, by harmonizing and stimulating dissemination activities in the consortium, with the final aim of pushing the results for impact generation, wide acceptance and adoption across Europe and beyond.

The dRedBox dissemination will target a wide audience of research and industrial community in Europe and the world by publishing the results produced in scientific journals and conferences and participate as well as organize events such as workshops and special sessions.

The team also aims to contribute to the open source community to boost innovation, better position industrial partners in the market place and have rapid uptake on innovative solutions.

2 Dissemination

Scientific and industrial dissemination of the project vision and outcomes is of fundamental importance in the dRedBox project. We have considered several tools to disseminate our work from both, scientific and industrial perspective.

2.1 Internal Dissemination

At the onset of the project, a complementary and complete set of tools has been put in place to facilitate internal exchange and flow of information. Specifically, IBM has created and kindly provided access to all consortium members to its online, secure document sharing facility named Box¹. Box sports securely sharing files and collaborating with anyone, both on desktop and mobile devices. It allows to easily but securely create, edit and review documents among consortium partners in real-time or on-the-go and keeps the project moving forward, with handy features like collaborative editing, versioning and fine-grained access controls. The dRedBox Box space is the central internal repository for document exchange, including editing of deliverables and design drafts, communication material, scientific dissemination manuscripts, related art and literature sharing, up-to-date information of consortium contacts, meeting minutes and information, and others.

IBM has also put in place a comprehensive set of mailing lists, operating on top of its mailing service infrastructure, with membership to each mailing list on a need to know basis. The set of mailing lists is listed in the table below:

¹ <http://www.box.com>

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Mailing List Name	Description
dreDBox_ALL	All Partners (serves WP1 and WP7 communications too)
dReDBox_WP2	WP2 Partners
dReDBox_WP3	WP3 Partners
dReDBox_WP4	WP4 Partners
dReDBox_WP5	WP5 Partners
dReDBox_WP6	WP6 Partners
dReDBox_WG_Arch	Cross-Work-Package dReDBox Architectural Discussion Group
dReDBox_WG_Prototype	Cross-Work-Package dReDBox Prototyping Discussion Group
dReDBox_WG_Sim	Cross-Work-Package dReDBox Simulation Discussion Group
dReDBox_WG_SysSoft	Cross-Work-Package dReDBox Software Discussion Group
dReDBox_PCB	Project Coordination Board
dReDBox_FA&Admin	Project Financial Administration

IBM has put in place appropriate templates for internal documentation and reporting, including presentation templates for use in project meetings, document and spreadsheet templates for quarterly reporting and project documentation. Also, Kinesense has put in place scorecard templates to keep track of external dissemination and communication actions pursued as part of the project activities. Last, an audio conferencing of global reach is being used for the numerous conference calls taking place within and across work-packages, as well as plenary calls. The aforementioned Box repository is being used to promptly share produced minutes capturing all these calls, follow-up on action items and tracking standing sub-tasks and issues.

2.2 Scientific Dissemination

International and national conferences and workshops

dReDBox will organize workshops possibly co-located with relevant European and international events such as conferences aiming at disseminating the relevant results and fostering collaboration with other European and International projects. The partners will also distribute printed brochures and posters at such events.

Publications and magazines

Thanks to its highly innovative aspects, dReDBox is expected to deliver numerous publications. The quality and volume of published articles will be of high importance since they will provide a visible and quantifiable assessment of the project-induced innovation. Both theoretical and experimental results will be presented at international conferences, leading journals and magazines. In addition some partners will communicate the results to industrial specific events which they will participate to and/or organize.

Exhibitions, seminars and media

Exhibitions and technology transfer seminars also exploiting resources made available by the Commission through information activities, interviews in magazines, presentations in various institutions and government officials will broaden the dissemination spectrum of dRedBox. Also newsletters and leaflets will be prepared, printed and distributed on public events, research centers and associations. dReDBox has active role on twitter and other social media described in D7.1.

2.3 Industrial and broader Dissemination

Contribution to the Open Source community

The Open Source community has always been a useful medium for the dissemination of European Projects' outcomes. On one side the Open Source community will help the outcomes of the project to become visible to a wider audience that could benefit of the novelties introduced by the project, creating a return of the initial investment done by the EU over the whole population. On the other side contributing to Open Source projects helps companies in creating a strategic position with respect to competitors, and boosting the market uptake of innovation.

The dReDBox consortium will exploit open source software in various levels of its architecture. Namely the Linux kernel, QEMU and relevant cloud management/datacenter operating system ecosystems, such as OpenStack and Mesos. Contributions to such ecosystems will be pushed to the relevant communities when not creating confidentiality issues and per partner-internal clearance policies; also, subject to what is accepted by the leadership/decision-making structures governing each open source ecosystem.

Industrial commitment in research-oriented projects

Partner VOSYS believes that the work carried on the dReDBox project is extremely important for the company to enter the cloud/high performance computing segment with a solid experience to be transformed in actual market possibilities. For this purpose VOSYS has hired a PhD student who has been completely dedicated to the project to boost the scientific impact of the company and maximize the effort put in the project.

The research questions to be answered within the project and innovation outcome of dReDBox is highly relevant to IBM, particularly as part of exploring novel architectures and designs for cloud datacenters and near-memory computing, evaluation of fitness and limits of existing commercial and experimental technologies, as well as ramifications and evolution of open-source system software and management platforms driving this evolutions.

Sintecs has noticed that the dRedBox participation is giving interest from other (H2020) research projects and therefore creating possibilities for future

cooperation in multi-disciplinary projects. Before participating in dRedBox, their focus has mainly been on industrial partners, whereas now it broadens towards the scientific field as well. Furthermore, participating in a Horizon 2020 project has a positive impact on communication with current and potential future industrial customers.

Industrial commitment in video analytics

Partner Kinesense sees an increasing pace of change in recent months in the video analytics industry. Particularly notable is the trend towards large regional data centres for processing police and security acquired surveillance video data. Such data centres will need to deal seamlessly with massive variations in data processing loads. These variations are caused by events (e.g. criminal investigations and terrorist incidents) and are impossible to predict. Kinesense feels that the advantages of the dReDBox architecture presents huge advantages for this kind of adaptable regional data centre.

Industrial commitment in network analytics

Nowadays, businesses are being migrated to the cloud and the importance of the digital economy is relentlessly growing. Therefore, network analytics are becoming more and more necessary in order to assess the quality of online services, guarantee the security of transactions, and obtain valuable business data. It is particularly important to monitor application performance, and also to keep a close watch on systems in order to avoid attacks or thefts.

Unfortunately, network monitoring is becoming an increasingly difficult task due to high speed of network backbones (100 Gbps) and the huge amounts of data involved (tens to hundreds of terabytes per day). Partner Naudit considers that the current architecture of servers will soon not be able to cope with the complexity of network monitoring. It is necessary to develop a new architecture such as the one proposed by dReDBox: highly parallel, scalable, flexible, and power efficient. Particularly, flexibility is very important for this problem, in order to balance resources between online and offline analysis, and be able to tackle sudden increases in traffic.

3 Collaboration with other relevant EU projects

Below there is a list of EU funded projects that have considerable complementarities and as such we plan to explore targeted cooperation on different levels. Some of the dReDBox partners participate in these projects that aids communication but also we plan to organize cross-project workshops to enhance the dialogue.

- 1) ICT STREAMS project (<http://155.207.169.35/streams/>)
The objective of STREAMS project is to develop the necessary Silicon Photonics Transceiver and Routing technologies towards a new, power efficient, WDM-based, Tb/s, optical on-board interconnection paradigm.

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STREAMS will develop a distributed routing system based on a passive Si-Pho AWGR routing element to provide simultaneous any-to-any communication between 16 end-points, such as high-end processor sockets. On that account, constructive collaboration will be established with dRedBox project in terms of AWGR-based optical network performance metrics that can be employed towards investigating alternative optical passive routing implementations for Brick-to-Brick or Tray-to-Tray optical interconnection.

2) ICT Vineyard project (<http://vineyard-h2020.eu/en/>)

The ICT Vineyard project is about building an integrated platform for energy-efficient data centres based on novel programmable hardware accelerators (Dataflow engines and FPGA-based servers). It aims at developing a high-level programming framework an big data infrastructure for allowing end-users to seamlessly utilize these accelerators in heterogeneous computing systems by employing typical data-centre programming frameworks (i.e. Spark.). The dReDBox architecture is of interest to the vineyard project.

3) ICT Uniserver project (<http://www.uniserver2020.eu>)

The principal aim of UniServer is to facilitate the evolution of the Internet from an infrastructure where data is gathered in centralized datacenters to an infrastructure where data is handled in a distributed and localized manner, close to the data sources enabling essentially Edge Computing. UniServer aspires to deliver, by 2019, a unique, fully working prototype able to exploit the intrinsic system heterogeneity with lightweight software mechanisms for improving the energy efficiency and performance of micro-servers. The UniServer platform will support classical cloud applications such as financial trade management and analysis, while enabling the development of new applications at the Edge of the cloud such as smart traffic control and in-home directed advertisement. dReDBox shares overlapping value-add targets with Uniserver and will strive to benefit from the innovation produced by its partner project, as well as share produced innovation, among others on energy-efficient micro-datacenters, expanded use-case reach and virtualization technologies. The participation of IBM in both projects is expected to facilitate ease of information exchange. In fact, this interaction has been materializing e.g. in the form of deliberations for organization of joint events.

4) H2020 ExaNoDe project (<http://exanode.eu/>)

The ExaNoDe H2020 European project is about development and prototyping of a highly efficient, integrated, multiway, high performance, heterogeneous compute element for exascale HPC computing node. Demonstrated using hardware emulated interconnect, it will build on top of multiple European initiatives for scalable computing, utilizing low-power processors and advanced nanotechnologies.

dReDbox can be definitely interested in the research done by ExaNoDe on the compute node, with the aim of reducing energy consumption, while still

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remaining competitive with respect to other compute node architectures (i.e., provide higher energy efficiency).

- 5) H2020 ExaNeSt project (<http://www.exanest.eu/>)
ExaNeSt develops and prototypes solutions for Interconnection Networks, Storage, and Cooling, as these have to evolve in order for the production of exascale-level supercomputers to become feasible. ExaNeSt is addressing HPC challenges by using ARMv8 energy-efficient cores, close integration of non-volatile memory, efficient interconnects and virtualization features. The interconnection architecture of dReDBox might be of interest for ExaNeSt to help scaling on the exa-scale size. On the other hand, some studies performed on the UNIMEM memory architecture could be of interest for dReDBox in order to better shape its memory disaggregation facility.
- 6) H2020 ECOSCALE project (<http://www.ecoscale.eu/>)
ECOSCALE works towards a scalable programming environment and hardware architecture tailored to the characteristics of current and future HPC applications. The ECOSCALE architecture, programming model and runtime system follows a hierarchical approach where the system is partitioned into multiple autonomous Workers in Partitioned Global Address Space (PGAS) partitions. ECOSCALE Workers will employ reconfigurable accelerators that can perform coherent memory accesses in the virtual address space utilizing an IOMMU.
Potential synergies with dRedBox lie in the accelerator architecture and construction, and in the possible application of memory disaggregation in the UNIMEM memory architecture.

4 Scientific dissemination fora of dRedBox outcome

The table below shows a list of major international technical journals and peer-reviewed conferences that are considered most appropriate for the project outcomes. A list of relevant call for papers will be maintained on the dRedBox internal Box and website, continuously updated.

Journals	<ul style="list-style-type: none">• IEEE Journal on Optical Communications and Networking• IEEE Journal of Lightwave Technology• IEEE Transactions on Networking• Elsevier – Journal of Parallel and Distributed Computing• IEEE Transactions on Parallel and Distributed Systems• IEEE Transactions on Computers• IEEE Transactions on Cloud Computing• ACM Transactions on Architecture and Code Optimization• ACM Transactions on Computer Systems (TOCS)
Conferences	<ul style="list-style-type: none">• ASPLOS (http://www.sigplan.org/Conferences/ASPLOS/)• International Symposium on Computer Architecture (ISCA)• International Symposium on Microarchitecture (MICRO)

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	<ul style="list-style-type: none"> • The International Symposium on Memory Systems • International Conference on Computational Science • International Conference on Parallel Processing • IEEE International Conference on High Performance Computing, Data, and Analytics • Symposium on Principles and Practice of Parallel Programming • IEEE International Parallel & Distributed Processing Symposium • ACM International Symposium on High-Performance Parallel and Distributed Computing • EuroSys • VHPC • KVM-Forum • HiPEAC • Linux Plumbers conference • Linux Kernel Summit • OSDI Usenix • OSA/IEEE Optical Fibre Communications (OFC) Conference (http://www.ofcconference.org/en-us/home/) • European Conference on Optical Communications (ECOC) (http://conference.vde.com/ecoc-2016/Pages/ECOC2016.aspx) • GLOBECOM (http://globecom2016.ieee-globecom.org/) • ICC (http://icc2016.ieee-icc.org/) • ACM SIGCOMM (http://www.sigcomm.org/) • International Conference on Field-Programmable Logic and Applications (FPL) • International Symposium on Field-Programmable Custom Computing Machines (FCCM)
Magazines	<ul style="list-style-type: none"> • IEEE Communications Magazine • IEEE Network • IEEE Micro

5 Dissemination outcome

A critical dissemination activity of the dReDBox project partners is the publication of the technical results in international leading journals, conferences, workshops, etc. The following sections report the early activities carried out during the first six months of the project.

5.1 Scientific publications

1. Katrinis, K., Syrivelis, D. , Pnevmatikatos, D. , Zervas, G., Theodoropoulos, D., Koutsopoulos, I., Hasharoni, K., Raho, D., Pinto, C., Espina, F., Lopez-Buedo, S.,

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- Chen, Q., Nemirovsky, M., Roca, D., Klos, H. and Berends, T., "Rack-scale disaggregated cloud data centers: The dReDBox project vision." 2016 Design, Automation & Test in Europe Conference & Exhibition (DATE). IEEE, 2016. ()
2. Katrinis, K., Zervas, G., Pnevmatikatos, D., Syrivelis, D., Alexoudi, T., Theodoropoulos, D., Raho, D., Pinto, C., Espina, F., Lopez-Buedo, S., Chen, Q., Nemirovsky, M., Roca, D., Klos, H. & Berends, "On Interconnecting and Orchestrating Components in Disaggregated Data Centers: The dReDBox Project Vision", EuCNC'2016 Conference Proceedings.
 3. Yifan Liu, Hui Yuan, Adaranijo Peters, Georgios Zervas, "Comparison of SDM and WDM on Direct and Indirect Optical Data Center Networks", accepted for publication at ECOC 2016.

5.2 Workshops and participation on international networks

1. "dReDBox project: Efficient blade servers via disaggregation", Dionysios Pnevmatikatos, Microserver: Energy Efficient Servers workshop, in conjunction with Hipeac Conference, Prague, Czech Republic, Jan. 20, 2016
2. "Impact of optical network virtualization – When realizes, what happens and how it works", workshop co-hosted with OECC-PS, Motoyoshi Sekiya (Fujitsu Labs), Georgios Zervas (University of Bristol).
3. "Sneak Preview of dReDBox Project", presented by Kostas Katrinis (IBM), Dimitris Syrivelis (UTH) and Roy Krikke (Sintecs), Advanced Computing and Cyber-Physical Systems 2016 Collaboration Workshop, Brussels, 14 June 2016
4. Subscription to HIPEAC; the driving network and probably important to the EU

5.3 Wider dissemination: Press releases and interviews

At the beginning of the project a press release was prepared with the aim of disseminating the new project and its objectives. The press release was written in English and then translated in other European languages.

The Spanish version of the press release was sent to technical Spanish media by the Communications Department at BSC (1 March 2016). Also press releases in UK and interviews by online media have already increased and broadened the visibility of the project. The following list details the impact of this initial press release:

Date	Country	Title media	Headline	Link
25/01/2016	IE	Biz Plus	Kinesense And IBM Share In €6.4m Fund	
26/01/2016	IE	Silicon Republic	Irish consortium wins €6.4m to develop next-gen cloud server	
09/02/2016	NL	Link Magazine	Horizon 2020 Subsidie dRedBox consortium om Cloud computing groener te maken	
15/2/2016	EU	Irish Examiner	Kinesense CCTV investigative technology saves time for police forces	

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16/2/2016	NL	H2020 Projects.com	H2020 to support greener cloud computing	
11/02/2016	NL	Link Magazine	Horizon 2020 Subsidie dRedBox consortium om Cloud computing groener te maken	
01/03/2016	ES	Computer World España	El Centro Nacional de Supercomputación trabaja en una arquitectura de 'data center' de bajo consumo	On 02/03/2016: 5 shares in Facebook and 7 shares in LinkedIn
01/03/2016	ES	@ComputeworldES	El BSC trabaja en una arquitectura de 'data center' de bajo consumo http://bit.ly/bsc_arquitectura_data_center_bajo_consumo ... @BSC_CNS	On 02/03/2016: 5 retweets and 3 likes
01/03/2016	ES	@BSC_CNS	Cómo integrar los recursos desagregados de un data center de bajo consumo para mejorar su eficiencia http://ow.ly/YVkAY @dredbox	On 02/03/2016: 1 retweet
01/03/2016	ES	@BSC_CNS	El BSC participa en esta investigación financiada por @EU_H2020 @myCORDIS	On 02/03/2016: 1 like
01/03/2016	ES	SYSGURU	El Centro Nacional de Supercomputación trabaja en una arquitectura de 'data center' de bajo consumo	
01/03/2016	ES	BSC Facebook page	El BSC investiga cómo integrar los recursos desagregados de un data center de bajo consumo para mejorar su eficiencia.	
02/03/2016	ES	Conectónica	El BSC-CNS investiga cómo integrar los recursos desagregados de un centro de datos de bajo consumo	
02/03/2016	ES	CIO España	El CNS de Barcelona trabaja en una arquitectura de data center de bajo consumo	
04/03/2016	ES	@TSystems_Iberia	El @BSC_CNS prepara una arquitectura #datacenter de bajo	

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			consumo http://bit.ly/1QRgUho @ComputerworldES #cloud	
11/04/2016	UK	techWEEK. es	El BSC-CNS investiga cómo integrar los recursos desagregados de un data center de bajo consumo para mejorar su eficiencia	
26/05/2016	UK	v3.co.uk	Future of the server: the data centre is the server	

6 Conclusions

This deliverable has described all dimensions of dissemination plan and strategies of dRedBox project. The activities aim at ensuring the widest possible impact of concepts, results, prototypes and outputs.

The dReDBox dissemination activities are targeting a wide audience of data centre and HPC community in Europe and the world that spans across individual researchers, technology vendors, providers and users.

Interestingly, the consortium aims at bridging the communities focusing on HPC/Data centre design and system software with the ones working on optical interconnects and they fundamentally need to work together in order to deliver maximum impact on the newly-formed research area of disaggregated data centres, supported by beneficiaries of application use-cases. The trial of real applications can bring added value on the planned technological innovation strategy.