



### CURRICULUM VITAE (CVA)

**IMPORTANT – The Curriculum Vitae cannot exceed 4 pages. Instructions to fill this document are available in the website.**

#### Part A. PERSONAL INFORMATION

CV date

Dec. 2021

First name	Alejandro		
Family name	Fernández-Montes	González	

(\*) Mandatory

#### A.1. Current position

Position	Profesor Titular de Universidad		
Initial date	09/11/2018		
Institution	Universidad de Sevilla		
Department/Center	Lenguajes y Sistemas Informáticos	Escuela Técnica Superior de Ingeniería Informática	
Country	Spain		
Key words	Optimization and Simulation of Distributed Systems, Energy Efficiency, Scheduling		

#### A.2. Previous positions (research activity interruptions, art. 14.2.b))

Period	Position/Institution/Country/Interruption cause
2020	Titular de Universidad/ U. de Sevilla / Spain / Birth of daughter
2016-2018	Contratado Doctor / U. de Sevilla / Spain
2015-2016	Ayudante Doctor / U. de Sevilla / Spain
2014-2015	Profesor Sustituto Interino / U. de Sevilla / Spain
2011-2014	Personal Investigador en Formación / U. de Sevilla / Spain
2008-2011	Profesor Sustituto Interino / U. de Sevilla / Spain

#### A.3. Education

Ph.D., Licensed, Graduate	University/Country	Year
Ph.D. Engineer in Computer Science	Universidad de Sevilla / Spain	2013
Official Master in Software Engineering and Technologies	Universidad de Sevilla / Spain	2008
Bachelor's degree in Computer Science and Engineering	Universidad de Sevilla / Spain	2007



## Part B. CV SUMMARY (max. 5000 characters, including spaces)

### Scientific contributions

For the last 10 years, I have been **focused on optimizing performance and improving energy efficiency and cost savings in hyperscale Data Centres (DC)**, from which I highlight the following contributions:

- Application of **AI techniques to identify and classify the workload** that is being executed by the DC so that the resource manager can be optimized according to the workload characteristics. We demonstrated that key performance indicators can be improved by at least 20%. This contribution was published in [1] the D1 JCR-ranked Journal Future Generation Computer Systems and received the **award of the best paper of 2021** of the ETSII of the US.
- Development of a **simulation tool for hyperscale DCs** that enables researchers to run simulations and apply various strategies to improve performance and energy efficiency. The simulation tool also enables the computation of performance and energy consumption KPIs so that DC behaviour can be empirically evaluated when these policies are applied. The main contribution was to offer the research community a reliable simulation tool that was published and updated in the Q1 JCR Journal Simulation Modelling Practice and Theory in three articles in 2018, 19 and 20 [4, 6, 8] and available as an open source tool at Github. We hold the intellectual property of this simulation tool called SCORE (ref: SE-1016-18).
- Development of **energy policies** that can be applied to hyperscale DCs to improve their energy efficiency. These policies have been published in Q1-Q2 JCR ranked journals [2, 3, 7, 9] and conferences [11, 12]. We showed that at least **20% of energy consumption** can be saved without having an impact on DC performance.
- Development and application of analysis **techniques to compare relative efficiency between DCs** and computing infrastructures. This contribution allows DC federation operators to compare the relative efficiency between their DCs and offers recommendations on what characterization or parameterization should be done on nonefficient infrastructures to come near the so-called efficient frontier, and it was published in a JCR-Q1 journal [10].

In addition, I am the **author of 19 articles in JCR-ranked Journals** (8Q1, 9Q2, 2Q3, 0Q4)

### Leadership and Scientific Responsibilities

I am the Principal Investigator (PI) of the REACT project of the *Retos* 2018 call as the head of the DAUS-Lab research group. The contributions presented above come from the ideas and planning of this project, which resulted in 13 JCR-Q1/Q2 publications. Moreover, I am PI of nine R&D contracts that sum up 124k€ and allowed us to educate new personnel for the group and currently advising of a doctoral thesis of an international PhD. student.

Moreover, I advised the Ph.D. Thesis of D. Fernández Cerero, focused on DC optimization, who obtained the **Extraordinary Doctorate Award** granted by the University of Sevilla (US) for the **best thesis of 2018**.

### International relationships

I maintain strong and fluent collaborations with international colleagues. The following milestones are a consequence of these collaborations:

- **3 international research stays**, including 2 research stays at ENS-Lyon with Prof. L. Lefevré, one stay at Shanghai Jiao Tong U. with Prof. F. Tang, and several short stays at the U. of Technology of Cracow and Gdansk with Prof. J. Kolodziej,
- various works that were **published with 14 researchers from international institutions**,
- author of **14 articles in collaboration with international researchers**, including 8 JCR publications and 2 book chapters,
- active **membership of the European COST Action IC1406 High Performance Modeling and Simulation for Big Data Applications (cHiPSet)**, directly related to the objectives of my research, and member of the OSAMI-Commons ITEA4 European project.

### Society and Dissemination

My collaborations with the industry are focused on the transference of the knowledge acquired on this research topic. I highlight the **nine R&D contracts related to my research on the optimization of DCs** and their services, where I acted as a consultant and provided solutions to companies who needed to improve their cloud services, optimize their deployments, and



reduce their costs. Moreover, I had the opportunity to carry out some **dissemination activities with *Fundación Descubre*** and gave seminars on the program called *Café Tertulia*.

### Other milestones

I completed my International Ph.D. thesis and **obtained the Extraordinary Doctorate Award** for it. Coordinator of the Msc. in Biomedical Engineering and Digital Health. Visiting professor at the Krakow University of Technology, conducting 60 lessons per year in the Official Msc. of Computer Science, and I obtained the **award of Best Foreign Professor of the 20/21**. Involvement in university management: a) member of the Governing Council (*Consejo de Gobierno*), b) member of the University Faculty for two periods (*Claustro Universitario* 17-20 and 20-), c) member of other commissions at the US (doctorate, academic organization, economic), and d) other responsibilities at the ETSII.

### Part C. RELEVANT MERITS (sorted by typology)

#### C.1. Publications (see instructions)

- [1] D. Fernández-Cerero, Ortega, F. Javier; A. Jakóbi, A. Fernández-Montes, 2021. DISCERNER: Dynamic selection of resource manager in hyper-scale cloud-computing data centres **JCR-Q1 (D1)** Future Generations Computer Systems. 116, Pages: 190-199. DOI: 10.1016/j.future.2020.10.031
- [2] D. Fernandez-Cerero, F.J. Ortega-Irizar, A. Fernández-Montes, F. Velasco-Morente. Bullfighting extreme scenarios in efficient hyper-scale cluster computing. 2020. **JCR-Q1** Cluster Computing- The Journal of Networks Software Tools and Applications. 23(7). Pages: 1-17. DOI: 10.1007/s10586-020-03094-2
- [3] D. Fernández-Cerero, A. Fernández-Montes, A. Jakóbi, "Limiting global warming by improving data-centre software". 2020 **JCR-Q1** IEEE Access. 8, Pages: 44048-44062 DOI: 10.1109/ACCESS.2020.2978306
- [4] D. Fernández-Cerero, A. Fernández-Montes, F.J. Ortega, A. Jakóbi "Sphere: Simulator of Edge Infrastructures for the Optimization of Performance and Resources Energy Consumption". 2020. **JCR-Q1** Simulation Modelling Practice & Theory. 101. Pages: 101966 (1-17). DOI: 10.1016/j.simpat.2019.101966
- [5] D. Fernández-Cerero, A. Varela, A. Fernández-Montes, M.T. Gómez, J. Bermejo. Measuring data-centre workflows complexity through process mining: the Google cluster case. 2020. **JCR-Q2**. The Journal of Supercomputing. 76 (4), Pages: 2449-2478. DOI: 10.1007/s11227-019-02996-2
- [6] D. Fernández-Cerero, A. Jakóbi, A. Fernández-Montes, J. Kolodziej, "GAME-SCORE: Game-based energy-aware cloud scheduler and simulator for computational clouds". 2019. **JCR-Q1** Simulation Modelling Practice & Theory. 93. Pages: 3-20.
- [7] D. Fernández-Cerero, A. Fernández-Montes, J.A. Ortega. "Energy Policies for Data-Center Monolithic Schedulers". 2018. **JCR-Q1** Expert Systems with Applications. 110, Pages: 170-181 DOI: 10.1016/j.eswa.2018.06.007
- [8] D. Fernández-Cerero, A. Fernández-Montes, A. Jakóbi, J. Kolodziej, M. Toro. "SCORE: Simulator for cloud optimization of resources and energy consumption". 2018. **JCR-Q2** Simulation Modelling Practice & Theory. 82, Pages: 160-173. DOI: 10.1016/j.simpat.2018.01.004
- [9] A. Fernández-Montes, L. González, J.A. Ortega, L. Lefèvre. "Smart scheduling for saving energy in grid computing". 2012. **JCR-Q1**. Expert Systems with Applications. 39 (10), Pages: 9443-9450 DOI: 10.1016/j.eswa.2012.02.115.
- [10] A. Fernández-Montes, F. Velasco, J.A. Ortega. "Evaluating decision-making performance in a grid-computing environment using DEA". 2012. **JCR-Q1**. Expert Systems with Applications. 39 (15), Pages: 12061-12070. DOI: 10.1016/j.eswa.2012.04.028.

#### C.2. Congress

- [11] D. Fernández-Cerero, Alejandro Fernández-Montes, A. Jakóbi, J. Kolodziej. "Stackelberg Game-Based Models In Energy-Aware Cloud Scheduling", **Int. Conf. on Modelling and Simulation**. May 2018. Germany. Oral presentation. Pages: 460-467
- [12] D. Fernández-Cerero, A. Fernández-Montes, J. Kolodziej, L. Lefèvre, "Quality of cloud services determined by the dynamic management of scheduling models for complex



heterogeneous workloads”. 11th Int. Conf. on the Quality of Information and Comm. Technology (QUATIC). September 2018. Oral presentation. Pages: 210-219

### C.3. Research projects. As Principal Investigator:

- **Ayuda para la recualificación del profesorado universitario..** Ref: 2043.Funding Entity: Fondos FEDER. 2022-2023. Budget: 63.908,37€.
- **Energy Efficiency And Performance Of Data Centers** By Smart Virtualization And Deep Learning. Ref: RTI2018-098062-A-I00. Funding Entity: Ministerio de Ciencia, Investigación y Universidades 2019-2021. Budget: 25.168 €
- **Masive.** Ref: 2018/00000520.Funding Entity: Plan propio U.S. 2017-2018. Budget: 5.000€.
- **Efficient eLAsTic SoftWare Infrastructure for City.** Ref: 2017/1017. Funding Entity: Plan propio U.S. 2016-2017. Budget: 5.000€.

#### As investigator:

- **High-Performance Modelling and Simulation** for Big Data Applications. Ref: ICT1406 Funding Entity: European Commission. European Cooperation in Science and Technology. 2015-2019. Principal Investigator: J. Kolodziej. Budget: 440.000€
- **SIMON. Saving Energy by Intelligent Monitoring.** Ref: P11-TIC-8052 Funding Entity: Consejería de Innovación, Ciencia y Empresas. 2013-2016 Principal Investigator: J.A. Ortega Ramírez. Budget: 125.045,25€

### C.4. Contracts, technological or transfer merits. Contracts as Principal Investigator:

1. OPOFLIX LMS: Investigación, Desarrollo e implantación de Plataforma de contenidos e-learning **optimizada para cloud computing** como base a la aplicación de Inteligencia Artificial para especialización de oferta de contenidos a estudiantes  
Company: Opoflix S.L. 2020-2021. Budget: 40.970 €
2. Metodología, **Análisis y Evaluación del Rendimiento y la Eficiencia** de Estaciones de Trabajo. Company: Teknoservice, S.A. 2014-2018. Budget: 30.000€
3. **PERFORM: Predicción de la Carga para la Mejora de la Eficiencia de la Plataforma Cloud**  
Company: Itálica Sinterizado Dental S.L.. 2020-2022. Budget: 22.758€
4. Metodología, **Análisis y Evaluación del Rendimiento y la Eficiencia** de Software en Estaciones de Trabajo  
Company: Teknoservice, S.A. 2014-2018. Budget: 20.000€
5. **DAISHO: Investigación, Desarrollo e implantación de Plataforma de gestión inteligente optimizada para cloud computing.**  
Company: Itálica Sinterizado Dental S.L.. 2020 – 2022. Budget: 19.205 €
6. Desarrollo y mejora de la **Plataforma Eficiente Cloud** de Sokar Mechanics “COSMIC”  
Company: Sokar Mechanics, S.L. 2018-2021. Budget: 18.730€
7. **MIPRAN: Módulos de Incidencias, Producción, Almacenaje y Notificaciones**  
Company: Itálica Sinterizado Dental S.L. 2019-2021. Budget: 10.000€

#### Patents and Intellectual property:

- **Sci (Simple Cluster Interface):** Architecture For Managing User Tasks In A Cluster Via The Web. J. A. Ortega, AFM, L. González, F. Velasco, J. Torres, M. J. Escalona, J. A. Alvarez, M. A. Álvarez, D. Fuentes, C. Angulo. Pub. No.: WO/2012/052581 International Application No.: PCT/ES2011/000310 Published on 26.04.2012 International Filing Date: 21.10.2011
- **Energy-efficient Monitoring and Localisation Device, System and Method.** L. M. Soria, J.A. Álvarez, AFM, J. A. Ortega, L. González. Pub. No.: WO2012/010727. International Application No.: PCT/ES2011/000237. Published on 26.01.2012 . International Filing Date: 22.07.2011
- Intellectual property registered of the **simulation tool “SCORE”**. Código: SE-1016-18
- Intellectual property registered of the **simulation tool “Grid’5000 Toolbox”** SE-1244-12