

# **Modelado de servicios en contextos web. Aplicación en ecosistemas de aprendizaje**

**Dr. Miguel Ángel Conde González**

GRupo de investigación en InterAcción y eLearning (GRIAL)  
Universidad de León

[miguel.conde@unileon.es](mailto:miguel.conde@unileon.es)

## **Resumen**

Principios de arquitecturas orientadas a servicios en contextos de aplicaciones web aplicadas a ecosistemas de aprendizaje. Conferencia invitada en los másteres de Sistemas Inteligentes e Ingeniería Informática de la Universidad de Salamanca, impartida el 14 de marzo de 2016 en la Facultad de Ciencias de la USAL.

## **Enlace a la presentación**

<http://www.slideshare.net/grialusal/modelado-de-servicios-en-contextos-web-aplicacion-en-ecosistemas-de-aprendizaje>

## **Palabras clave**

Arquitectura software; Arquitecturas orientadas a servicios; SOA; Servicios web; Ecosistemas Tecnológicos; Ecosistemas de Aprendizaje

## **Referencias**

- Alba, J. (2008). ¿Qué es SOA - Arquitectura Orientada al Servicio, *Bit*, 167, 52-53.
- Alier Forment, M., Casany Guerrero, M. J., Conde González, M. Á., García-Peñalvo, F. J., & Severance, C. (2010). Interoperability for LMS: the missing piece to become the common place for e-learning innovation. *International Journal of Knowledge and Learning (IJKL)*, 6(2/3), 130-141. doi:10.1504/IJKL.2010.034749
- Alier, M., & Casany, M., (2008). Moodbile: Extending Moodle to the Mobile on/offline Scenario. *Proceedings of IADIS International Conference Mobile Learning*. Algarve, Portugal, pp.11-18.
- Alier, M., Casany, M.J., & Piguillem, J. (2009). Multiplatform E-Learning Systems and Technologies: Mobile Devices for Ubiquitous ICT-Based Education. T. Goh (Editor) capítulo XI *Towards Mobile Learning Applications Integration with Learning Management Systems*. Ed. IGI Group 2009
- Alier, M., Mayol, E., Casañ, M. J., Piguillem, J., Merriman, J. W., Conde, M. A., García-Peñalvo, F. J., Tebbens, W., & Severance, C. (2012). Clustering Projects for eLearning Interoperability. *Journal of Universal Computer Science*, 18(1), 106-122. doi:10.3217/jucs-018-01-0106
- Beloudane, A., & Belalem, G. (2015). Towards an Efficient Management of Mobile Cloud Computing Services based on Multi Agent Systems. *Journal of Information Technology Research*, 8(3), 59-72. doi:10.4018/JITR.2015070104

- Booch, G. (2004) *Object Oriented Analysis and Design with Applications*. 2<sup>nd</sup> Edition. The Benjamin/Cummings Publishing Company.
- Bosch, J. (2010). Architecture challenges for software ecosystems *ECSA'10 Proceedings of the Fourth European Conference on Software Architecture: Companion Volume* (pp. 93-95). New York, NY, USA: ACM.
- Canfora, G., Fasolino, A. R., Frattolillo G., & Tramontana, P. (2008). A wrapping approach for migrating legacy system interactive functionalities to Service Oriented Architectures. *Journal of Systems and Software*, 81(4), 463-480.
- Casany, M. J., Alier, M., Conde, M. Á., & García-Péñalvo, F. J. (2009). SOA initiatives for eLearning. A Moodle case *23rd International Conference on Advanced Information Networking and Applications, AINA 2009, Workshops Proceedings. The International Symposium on Mining and Web (MAW 2009)* (pp. 750-755). Los Alamitos, California, USA: IEEE Computer Society.
- Casany, M. J., Alier, M., Mayol, E., Piguillem, J., Galanis, N., García-Péñalvo, F. J., & Conde, M. Á. (2012). Extending Moodle Services to Mobile Devices: The Moodbile Project. In J. Llorent Mauri & P. Lorenz (Eds.), *Proceedings of UBICOMM 2012: The Sixth International Conference on Mobile Ubiquitous Computing, Systems, Services and Technologies (September 23-28, 2012 - Barcelona, Spain)* (pp. 24-28). Lisbon, Portugal: IARIA Press.
- Chang, E., & West, M. (2006). Digital Ecosystems A Next Generation of the Collaborative Environment. In G. Kotsis, D. Taniar, E. Pardede, & I. K. Ibrahim (Eds.), *Proceedings of iiWAS'2006 - The Eighth International Conference on Information Integration and Web-based Applications Services, 4-6 December 2006, Yogyakarta, Indonesia* (pp. 3-24): Austrian Computer Society.
- Channabasavaiah, K., Holley, K., & Tuggle, J. (2003) Migrating to a service-oriented architecture. 2003. <http://ibm.com/developerworks/webservices/library/wsmigratesoa>
- Cheung, B. Stewart, B., & McGreal, R. (2006) Going Mobile with MOODLE: First steps. *Proceedings of Mobile Learning 2006*. IADIS.
- Conde-González, M. Á. (2012). *Personalización del aprendizaje: Framework de servicios para la integración de aplicaciones online en los sistemas de gestión del aprendizaje*. (Doctorado en Informática y Automática Tesis Doctoral), Universidad de Salamanca, Salamanca. Retrieved from <http://grialspace.usal.es:443/handle/grial/223>
- Conde-González, M. Á., García-Péñalvo, F. J., & Alier, M. (2011). Interoperability scenarios to measure informal learning carried out in PLEs. In F. Xhafa, L. Barolli, & M. Köppen (Eds.), *Proceedings of the Third IEEE International Conference on Intelligent Networking and Collaborative Systems, IEEE INCoS 2011* (pp. 801-806). Los Alamitos, CA, USA: IEEE CS Press.
- Conde-González, M. Á., García-Péñalvo, F. J., Casany Guerrero, M. J., & Alier Forment, M. (2009). Back and Forth: From the LMS to the Mobile Device. A SOA Approach. In I. Arnedillo Sánchez & P. Isaías (Eds.), *Proceedings of the IADIS International Conference Mobile Learning 2009 (Barcelona, Spain, February 26-28, 2009)* (pp. 114-120). Portugal: IADIS Press.
- Conde-González, M. Á., García-Péñalvo, F. J., Casany, M. J., & Alier, M. (2009). Adapting LMS architecture to the SOA: an Architectural Approach. In H. Sasaki, G. O. Bellot, M. Ehmann, & O. Dini (Eds.), *Proceedings of the Fourth International Conference on Internet and Web Applications and Services – ICIW 2009 (Venice/Mestre, Italy, 24-28 May 2009)* (pp. 322-327). Los Alamitos, California, USA: IEEE Computer Society.
- Conde-González, M. Á., García-Péñalvo, F. J., Rodríguez-Conde, M. J., Alier, M., & García-Holgado, A. (2014). Perceived openness of Learning Management Systems by students and teachers in education and technology courses. *Computers in Human Behavior*, 31, 517-526. doi:10.1016/j.chb.2013.05.023
- Conde-González, M. Á., García-Péñalvo, F. J., Rodríguez-Conde, M. J., Alier, M., Casany, M. J., & Piguillem, J. (2014). An evolving Learning Management System for new educational environments using 2.0 tools. *Interactive Learning Environments*, 22(2), 188-204. doi:10.1080/10494820.2012.745433

- Conde-González, M. Á., Gómez, D. A., de Dios, A. D., & García-Peñalvo, F. J. (2010). Moodle 2.0 Web Services Layer and Its New Application Contexts. First International Conference, TECH-EDUCATION 2010, Athens, Greece, May 19-21, 2010. Proceedings. In M. D. Lytras, P. O. DePablos, D. Avison, J. Sipior, Q. Jin, W. Leal, L. Uden, M. Thomas, S. Cervai, & D. Horner (Eds.), *Technology Enhanced Learning: Quality of Teaching and Educational Reform* (Vol. 73, pp. 110-116). Berlin: Springer.
- Conde-González, M. Á., Muñoz, C., & García-Peñalvo, F. J. (2008). mLearning, the First Step in the Learning Process Revolution. *International Journal of Interactive Mobile Technologies (iJIM)*, 2(4), 61-63.
- Conde-González, M. Á., Pozo de Dios, A. d., & García Peñalvo, F. J. (2011). e-Learning Services in Moodle 2.0. *CEPIS Upgrade, XII*(2), 43-50.
- Conde-González, M.Á. & García-Peñalvo F. J. (2007). mLearning, de camino hacia el uLearning. *Avances en Informática y Automática*. (pp. 11-20). Salamanca: Departamento de Inofrmática y Automática.
- Cruz-Benito, J., Borrás-Gené, O., García-Peñalvo, F. J., Fidalgo-Blanco, Á., & Therón, R. (2015). Extending MOOC ecosystems using web services and software architectures. *Proceedings of the XVI International Conference on Human Computer Interaction. Vilanova i la Geltrú, Spain — September 07 - 09, 2015* (pp. Art. 52). New York, USA: ACM.
- Di Lucca, G. A., Gold N., & Vesaggio, G. (2008). Guest editor's introduction: 10th Conference on Software maintenance and Reengineering. *Journal of Systems and Software*, 81(4), 461-462.
- Downes, S. (2005). E-learning 2.0. *eLearn Magazine*(October).
- Fielding, R. T. (2000). Architectural Styles and the Design of Networkbased Software Architectures. Tesis Doctoral, Universidad de California.
- García Holgado, A., & García-Peñalvo, F. J. (2013). Análisis de integración de soluciones basadas en software como servicio para la implantación de ecosistemas tecnológicos corporativos. In J. Cruz Benito, A. García Holgado, S. García Sánchez, D. Hernández Alfageme, M. Navarro Cáceres, & R. Vega Ruiz (Eds.), *Avances en Informática y Automática. Séptimo Workshop* (pp. 55-72). Salamanca, Spain: Departamento de Informática y Automática de la Universidad de Salamanca.
- García-Holgado, A., & García-Peñalvo, F. J. (2013). The evolution of the technological ecosystems: An architectural proposal to enhancing learning processes. In F. J. García-Peñalvo (Ed.), *Proceedings of the First International Conference on Technological Ecosystems for Enhancing Multiculturality (TEEM'13) (Salamanca, Spain, November 14-15, 2013)* (pp. 565-571). New York, NY, USA: ACM.
- García-Holgado, A., & García-Peñalvo, F. J. (2014). Architectural pattern for the definition of eLearning ecosystems based on Open Source developments. In J. L. Sierra-Rodríguez, J. M. Dodero-Beardo, & D. Burgos (Eds.), *Proceedings of 2014 International Symposium on Computers in Education (SIEE), Logrono, La Rioja, Spain, 12-14 Nov. 2014* (pp. 93-98). USA: Institute of Electrical and Electronics Engineers.
- García-Holgado, A., & García-Peñalvo, F. J. (2014). Patrón arquitectónico para la definición de ecosistemas de eLearning basados en desarrollos open source. In J. L. Sierra Rodríguez, J. M. Dodero Beardo, & D. Burgos (Eds.), *Actas del XVI Simposio Internacional de Informática Educativa (SIEE'14). Acceso masivo y universal para un aprendizaje a lo largo de la vida (Logroño, La Rioja, España, 12-14 de noviembre, 2014)* (pp. 137-142).
- García-Holgado, A., & García-Peñalvo, F. J. (2016). Architectural pattern to improve the definition and implementation of eLearning ecosystems. *Science of Computer Programming, In Press*.
- García-Peñalvo, F. J. (2015). Ecosistemas Tecnológicos. *IEEE VAEP-RITA*, 3(1), 36-37.
- García-Peñalvo, F. J. (2016). Technological Ecosystems. *IEEE Revista Iberoamericana de Tecnologias del Aprendizaje*, 11(1), 31-32. doi:10.1109/RITA.2016.2518458
- García-Peñalvo, F. J., Alier, M., & Lytras, M. D. (2012). Some Reflections about Service Oriented Architectures, Cloud Computing Applications, Services and Interoperability. *Journal of Universal Computer Science*, 18(11), 1405-1409.

- García-Peñalvo, F. J., & Conde, M. Á. (2015). The impact of a mobile Personal Learning Environment in different educational contexts. *Universal Access in the Information Society*, 14(3), 375-387. doi:10.1007/s10209-014-0366-z
- García-Peñalvo, F. J., Conde, M. A., Alier, M., & Casany, M. J. (2011). Opening Learning Management Systems to Personal Learning Environments. *Journal of Universal Computer Science*, 17(9), 1222-1240. doi:10.3217/jucs-017-09-1222
- García-Peñalvo, F. J., Cruz-Benito, J., Maderuelo, C., Pérez-Blanco, J. S., & Martín-Suárez, A. (2014). Usalpharma: A cloud-based architecture to support Quality Assurance training processes in health area using Virtual Worlds. *The Scientific World Journal*, 2014. doi:10.1155/2014/659364
- García-Peñalvo, F. J., Hernández-García, Á., Conde-González, M. Á., Fidalgo-Blanco, Á., Sein-Echaluce Lacleta, M. L., Alier-Forment, M., . . . Iglesias-Pradas, S. (2015). Learning services-based technological ecosystems. In G. R. Alves & M. C. Felgueiras (Eds.), *Proceedings of the Third International Conference on Technological Ecosystems for Enhancing Multiculturality (TEEM'15) (Porto, Portugal, October 7-9, 2015)* (pp. 467-472). New York, USA: ACM.
- García-Peñalvo, F. J., Hernández-García, Á., Conde-González, M. Á., Fidalgo-Blanco, Á., Sein-Echaluce Lacleta, M. L., Alier-Forment, M., . . . Iglesias-Pradas, S. (2015). Mirando hacia el futuro: Ecosistemas tecnológicos de aprendizaje basados en servicios. In Á. Fidalgo Blanco, M. L. Sein-Echaluce Lacleta, & F. J. García-Peñalvo (Eds.), *La Sociedad del Aprendizaje. Actas del III Congreso Internacional sobre Aprendizaje, Innovación y Competitividad. CINAIC 2015 (14-16 de Octubre de 2015, Madrid, España)* (pp. 553-558). Madrid, Spain: Fundación General de la Universidad Politécnica de Madrid.
- García-Peñalvo, F. J., Johnson, M., Ribeiro Alves, G., Minovic, M., & Conde-González, M. Á. (2014). Informal learning recognition through a cloud ecosystem. *Future Generation Computer Systems*, 32, 282-294. doi:<http://dx.doi.org/10.1016/j.future.2013.08.004>
- Kurz, S., Podwyszynski, M., & Schwab, A. (2008). Dynamically Extensible, Service-Based Infrastructure for Mobile Applications. *Advances in Conceptual Modeling – Challenges and Opportunities*. (pp. 155-164). Berlin, Heidelberg: Springer.
- Merriman, J. (2008). Redefining interoperability. The Open Knowledge Initiative (OKI). <http://www.okiproject.org/view/html/node/2916>
- OASIS (2006). Reference Model for SOA 1.0 Committee Specification. <http://oasis-open.org>
- OMG. (2012). SoaML 1.0.1 Specification. Service oriented architecture Modeling Language (SoaML). <http://www.omg.org/spec/SoaML/1.0.1/>
- Prensky, M. (2001). Digital natives, digital immigrants. *On the Horizon*, 9(5), 1-6.
- Ramaratnam, R. (2007). *An analysis of service oriented architectures*. Massachusetts Institute of Technology.
- Rosen, M., Lublinsky, B., Smith, K. T., & Balcer, M. J. (2008) *Applied SOA: Service-oriented architecture and design strategies*. Wiley Pub.
- Shaw, M., & Garlan, D. (1996) *Software Architecture: Perspectives on a Emerging Discipline*. Prentice-Hall.
- Velasco, A., Carabias, J., Conde, M. Á., & García-Peñalvo, F. J. (2007). CLAYNET: Content Adaptation in M-learning. In I. Arnedillo Sánchez (Ed.), *Proceedings of IADIS International Conference Mobile Learning 2007, part of the IADIS Multi Conference on Computer Science and Information Systems 2007 - MCCSIS 2007. (July 5-7, 2007, Lisbon, Portugal)* (pp. 269-272). Portugal: IADIS Press.
- Zachman, J. A. (1987). A framework for information systems architecture. *IBM Systems Journal*, 26(3), 276-292. doi:10.1147/sj.263.0276