Guest editorial

Special Issue on Network Integration Technology

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Published online: 22 August 2013

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In the field of information science, network integration is the bringing together of the component subnetworks into one network and ensuring that the subnetworks function together as a network. Moreover, networks integration is the process of linking together different computing networks and software applications physically or functionally, to act as a co-ordinated whole.

The network integrator brings together discrete networks utilizing a variety of techniques such as computer networking, enterprise application integration, business process management or manual programming.

A network is an aggregation of subnetworks cooperating so that the network is able to deliver the over-arching functionality. Network integration involves integrating existing subnetworks. The subnetworks will have interfaces. Integration involves joining the subnetworks together by integrating their interfaces together. If the interfaces do not directly interlock, the integration between them can provide the required mappings. Network integration is about determining the required integrating.

Network integration is also about adding value to the network, capabilities that are possible because of interactions between subnetworks.

In modern connected world, the role of network integration engineers is becoming more and more important: more and more networks are designed to connect together, both within the network under construction and to networks that are already deployed.

A network integration technology needs a broad range of skills and is likely to be defined by a breadth of knowledge

rather than a depth of knowledge. These skills are likely to include software and hardware engineering, interface protocols, and general problem solving skills. It is likely that the problems to be solved have not been solved before except in the broadest sense. They are likely to include new and challenging problems with an input from a broad range of engineers where the network integration engineer “pulls it all together.”

Vertical Integration is the process of integrating subnetworks according to their functionality by creating functional entities also referred to as silos. The benefit of this method is that the integration is performed quickly and involves only the necessary vendors, therefore, this method is cheaper in the short term. On the other hand, cost-of-ownership can be substantially higher than seen in other methods, since in case of new or enhanced functionality, the only possible way to implement (scale the network) would be by implementing another silo. Reusing subnetworks to create another functionality is not possible.

Star Integration is a process of integration of the networks where each network is interconnected to each of the remaining subnetworks. The cost varies due to the interfaces which subnetworks are exporting. In a case where the subnetworks are exporting heterogeneous or proprietary interfaces, the integration cost can substantially rise. Time and costs needed to integrate the networks increase exponentially when adding additional subnetworks. From the feature perspective, this method often seems preferable, due to the extreme flexibility of the reuse of functionality.

Horizontal Integration or Enterprise Service Bus (ESB) is an integration method in which a specialized subnetwork is dedicated to communication between other subnetworks. This allows cutting the number of connections (interfaces) to only one per subnetwork which will connect directly to the ESB. The ESB is capable of translating the interface into an

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other interface. This allows cutting the costs of integration and provides extreme flexibility. With networks integrated using this method, it is possible to completely replace one subnetwork with another subnetwork which provides similar functionality but exports different interfaces, all this completely transparent for the rest of the subnetworks. The only action required is to implement the new interface between the ESB and the new subnetwork.

The horizontal scheme can be misleading, however, if it is thought that the cost of intermediate data transformation or the cost of shifting responsibility over business logic can be avoided.

This special issue is devoted to selected papers that were presented at the 5nd International Conference on Intelligent Computation Technology and Automation (ICICTA2012). ICICTA2012 take place in Zhangjiajie, China in January 12–13, 2012. The goal of the ICICTA2012 is to bring together researchers interested in all aspects of the application of intelligent computation technology and automation, in order to display the state-of-the-art in this field. The wealth and variety of the papers presented in ICICTA2012, naturally formed a basis for a special issue dedicated to the topic of network integration technology in Communication Systems.

The papers invited for this special issue have been selected based on the reviews of ICICTA2012. All papers have been revised and extended by their authors to meet the high standards of the journal, and the journal versions underwent an indepth and independent review process. This volume contains twenty-one papers.

Acknowledgements I, being the Guest Editor, would like to express sincere thanks to all the people who have contributed their time and efforts in making this special issue a success. I thank all the authors who contributed their papers for this special issue. I'm also full of gratitude to the reviewers who scrutinized the submitted manuscripts and recommended modifications and revisions in enhancing the quality of the accepted papers. In addition, I'm also grateful to Dr. Yi Zuo and Editor Jackie James for their assistances. Last, but certainly not the least, I would like to pay my special thanks to the Editor-in-Chief, Prof. Bezalel Gavish, for his encouragement and strong support during the preparation of this special issue.

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Zhi Xiang Hou received his bachelor degree in 1993 and master degree in 2002, Ph.D. in 2006, respectively from Central South University, Changsha University of Science and Technology and Central South University, both in control theory and engineering. Currently he is full professor of Changsha University of science and technology. His main research interests focus on automobile electric control. He is responsible for more 10 financial projects of China, and published more 40 papers. He has act as

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