Review of M. Ali, A. Bertolino, F. De Angelis, G. De Angelis, D. Fani, and A. Polini, 2014, "An extensible framework for online testing of choreographed services", *IEEE Computer* 47, 2, 23–29

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Services computing is widely adopted in the information technology (IT) industry because of the popularity of social networks, mobile computing, cloud computing, and big data. A composite service may be supported by service orchestration or service choreography. In the former case, a main service coordinates all the component services. In the latter case, a global interaction protocol coordinates the message exchanges of component services without a main control.

In service choreography, each component is selected from a pool of candidate components provided by different service providers. This selection is performed dynamically at runtime rather than during the design or compilation of the service application. For example, the users may choose to pay for the reservation of a hotel guest room through a specific bank, a selected credit card service, or PayPal. In this paper, the authors propose continuous online testing at runtime. Test strategies are specified so that service providers may test their services with those of other providers. A detailed architecture for online testing is proposed. The paper provides innovative and practical ideas for software testers to understand the complex challenges related to the dynamic environment and to conduct online testing of services computing to cater for such issues. It is useful reading for developers and testers of web services.

In real-life services computing, however, there may be more complications than "end users [selecting] their preferred services for different roles." For example, a service provider may enhance their services without advance notice. In another case, a particular service may be down so that an application may switch to another service during the interim period. Thus, there may be an indefinite number of possibilities. When will online testing be adequate? Will there be a state explosion problem for real-life applications, in which the number of combinations of potential services may grow exponentially? The authors and other researchers need to address these serious issues that are not only theoretically important but also practically challenging.