Improving the Quality of Deployed Systems through Remote Analysis, Monitoring, and Testing

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The significant increase in computing power, the proliferation of computing devices, and the advent of the Internet has led to a new era of connectivity and accessibility. This has facilitated new development paradigms, such as the open-source model. It will result in the development and acceptance of increasingly distributed, heterogeneous systems that are dynamic and powerful, characterized by frequently changing requirements and interactions with external systems and components to a degree not found in the systems of the past. Addressing the quality problems that such systems will exhibit will be a complex and important effort, and analysis and testing techniques will be needed to understand, evaluate, modify, and validate new systems releases and configurations. The Gamma approach aims to leverage the widespread usage of software, the high connectivity of computing systems, and the average user’s substantial computing power to facilitate continuous analysis and testing of deployed software by (1) augmenting quality-assurance tasks traditionally performed in-house with data from the field, and (2) shifting part of in-house activities to user environments, so as to leverage in-the-field computational power and human resources.

In this talk, I will introduce the Gamma approach, present several applications of the approach to software engineering tasks, overview similar efforts in practice and within the research community, and discuss challenges in research and in adoption of such an approach.