Design Automation in the Era of AI and IoT: Challenges and Pitfalls

Arvind Krishna

Senior Vice President, Hybrid Cloud and Director, IBM Research

Abstract:

The AI and IoT revolutions are twin phenomena that are reshaping business models, industries, and society. If we are to maximize their potential, we must overcome significant technical challenges with the help of the Design Automation and Test Community.

First, new computer architectures are required to accelerate solutions driven by cognitive computing, the term given to a comprehensive set of AI capabilities that includes not just machine learning but also data ingestion, data privacy, learning, reasoning, natural language, and conversation. These architectures must support each of these new technologies and manage extreme, cognitive workloads marked by unprecedented volumes of structured and unstructured data. This challenge poses important questions for the Design Automation and Test community about what new approaches can be taken.

A similar challenge is inherent in the rapid development of IoT, where the span of computing architecture varies from extremely low power constraints, limited bandwidth, and sporadic access at the "edge" of the network to the nearly infinite power and compute of data centers. This raises the question of how to maximize the design and placement of IoT systems, which will have to function for extended periods of time (up to ten years or more, like a pacemaker). Unlike smartphones, these systems can't simply be disposed of, which raises significant security concerns.

In his talk exploring these challenges, Dr. Krishna will emphasize that solutions can only come from an integrated hardware-software co-design approach. He will also highlight some of the leading-edge technologies IBM Research is developing to drive further innovation in the computing stack as the era governed by Moore's law comes to a close.