

## Hennessey and Patterson (2017 Turing Laureates) Lecture

### 1 Summary

John Hennessy and David Patterson are the recipients of the 2017 Turing Award for their work on RISC (reduced instruction set computer), which is 99% of more than 16 billion microprocessors produced today. In this lecture, besides the highlights of their careers and how they came to work together, they detail key events in microprocessor evolution, including the development, success, and proliferation of RISC-V, place the audience in where we are in the modern technological landscape with historical context, and set the stage for emerging problems and areas of interest for how the field may move forward as we are slowing down in Moore's Law and the Dennard Scaling. Examples include focusing on domain specific architecture and programming languages, reframing how security is approached with the rise in microarchitecture attacks and timing attacks, and collaboration with other specialties (compilers, operating systems, software, etc) to push development in parallel. They are great proponents for leaning in more to open source architectures and resources for what really moves innovation upwards and forwards.

### 2 Strengths

- Both of their enthusiasm made their speech engaging and easy to understand for people who have little experience with hardware but remains relevant to those who do work with or at the intersection of hardware.
- The way they laid context and arguments in support of DSA/DSLs and open-source resources made their stance convincing.

### 3 Weaknesses

- Introducing RISC lacked more of the explanations of the oppositional points they encountered when Hennessy and Patterson first pushed for the RISC architecture.
- Organization-wise, the lecture was a little all-over-the-place.

### 4 Rating: 4

## 5 Comments

*Traditional Review: I address strengths/weaknesses here*

Given that this is a joint award lecture, I assume time did not permit the recipients to cover the topics they wanted touch on in a way they are used to. The lecture itself covered a wide array of topics that I understood they were trying to connect together. It started very linear, with the historical context and building to potential future opportunities of research and innovation, and moved on to their award topic with where RISC-V fits in the world today, and ended with the use of the Agile methodology. The transition of topics towards the end were abrupt and made it seem overall disorganized, but not something unexpected for an award lecture with limited time. Some context I felt was missing was, in Part I, Patterson discussed briefly how their ideas for simpler architectures came after seeing that the architectures back then were following the trends of minicomputers and mainframes at the time by making more complex ISAs, which they predicted would increasingly require repairs in the microcode; for a more complete picture, I would have liked an explanation of the oppositional points they encountered when Hennessy and Patterson first pushed for the RISC architecture because Patterson said it was often the two of them debating for RISC against other architectures. Their lecture was otherwise engaging and easy to understand (likely given their decades of experience giving these talks and debates), especially for someone not familiar with the hardware side of things. Keeping the discussion at a high level and tying in problems and/or data relating to software, OS, and compilers was helpful for me to follow along in this lecture that otherwise could have leaned heavily into the technical details of the hardware right away. Another thing I thought they did well was laying the foundation and arguments for what they thought would be the future of processor technology. Namely, I liked the way they presented the context, problems, and evidence that showed the growing interest for security, DSA/DSLs, and open source architectures. For example, showing which specific companies that use RISC-V really tied the academic work with the industry applications, making it seem less abstract and showing where the real world was trending towards. Finally, I think this is a great intro lecture for EE156 to engage the students, given the diverse make-up of the class.