IN THIS ISSUE

In this Special Issue on "Ethics and Computing," I'd like to add two additional articles. I thank the authors for their patience in waiting for their accepted articles to be published. *Computer* has seen an uptick in the number of submissions, and we have a backlog of accepted articles.

The authors of the first article[A1] discuss virtualization, a technique where computer hardware resources are divided and allocated to the software as if the software had sole access to the hardware. The authors argue that although virtualization is widely used, open research questions exist in terms of its dependability, thus potentially limiting its adoption. This article reviews dependability requirements, threats, and corresponding solutions for resilient virtualization.

The authors of the second article[A2] discuss self-encrypting drives (SEDs); SEDs are a solution to accomplishing data security by encrypting stored data. This article proposes multitenant security architectures employing SEDs. The article: 1) introduces security technologies such as link encryption, trusted virtualization, attestation, and fine-grained encryption, 2) discusses how next-generation SEDs incorporate those technologies, and 3) explains how multitenant cloud systems built with SEDs might address future security concerns.

—*Jeffrey Voas*, *Editor in Chief*

APPENDIX: RELATED ARTICLES

A1. F. Cerveira, A. H. Ferreira, and R. Barbosa, "Resilient virtualization," *Computer*, vol. 57, no. 2, pp. 70–78, Feb. 2024, doi: 10.1109/MC.2023.3306617.

A2. J. Kim et al., "Self-encrypting drive evolving toward multi-tenant cloud computing," *Computer*, vol. 57, no. 2, pp. 79–90, Feb. 2024, doi: 10.1109/MC.2023.3308955.

supercomputers executing code to teach AI systems how to mimic human writing for OpenAI's ChatGPT-4.[4] This effort cost 11.5 million gallons of water coming from a source that is also used to provide drinking water for Iowans. To put this in perspective, ChatGPT uses approximately a 16-oz bottle of water for a simple conversation (20–50 questions/answers).[5] Semiconductor chip production also requires a lot of water. Thus, severe water shortages affect chip production. In the case of Taiwan's water shortage in 2021, water was brought in via tanker trucks from other parts of the country.[6] So in summary, it takes much water to manufacture the chips and operate the chips.

TODAY'S PROBLEM STEMS FROM YESTERDAY'S SOLUTION

Water scarcity is a complex problem because there is not just one reason for it. Maybe we should consider one of the laws of systems thinking (i.e., a holistic way to analyze the interactions of complex systems and their parts). The law is "today's problem comes from yesterday's solution."[7] However, the transparency concerning data center water cooling is new.

As recent as 2016, in an environmental press release by a global environmental authority, agriculture was the top concern of freshwater withdrawals in 2016: no mention of AI and its significant water use.[8] Today, AI is a solution to many problems. It has and will continue to improve many aspects of our lives, such as in the medical device industry where, for example, AI innovation has improved the quality of life of chronically ill patients by assisting with daily treatment regimens. But does the average person need an AI chatbot to answer common questions? Society understands that drinkable water is a limited resource. However, do they understand the effects that this type of computing has on it now and in the future? The bottom line is that the average citizen isn't aware that this resource is being used by supercomputers to answer their simple (and possibly unnecessary) questions.

> Due to the increased use of artificial intelligence models, bitcoin mining, and other computing intensive applications, water-intensive data center cooling is causing a significant increase in computing's water footprint.