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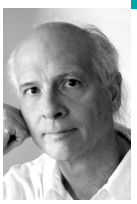
# musings



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I THOUGHT I'D TAKE A DIVE INTO THE deep end for my musings this time around. Maybe Sean Kamath's "Whither LISA?" (p. 7) got me going on this, or Alva Couch's own deep dive into phenomenology in system configuration (p. 10). Or perhaps it was the re-reading of *Accelerando* [1]. Whatever it was, I've decided to imagine what life, and work, would be like for a senior sysadmin 10 years from now.

Chuck awakens from a recurrent nightmare. He is sitting in a virtual meeting room, having been "promoted" to management, when he gets asked to present his research on fulfilling subsection 11.2.c of ISO 700001:2019 on the labeling of subsapient AIs. Of course, he's been caught, metaphorically, with his pants down, as he has nothing to present on this mind-numbingly boring topic, in yet another meeting.

Chuck is visibly agitated, but manages to wake up enough to head to the refresher. A few minutes later he returns and settles back in his bed, which has made itself as well as reshaped itself into a perfectly form-fitting recliner.

Chuck gestures for a glass of vanilla-flavored LJAA (Low Jitter Adrenaline Analog) and a glass of it pops up from his lounge-side table as he prepares to view reports from the system monitoring network.

## HAZE Computing

Chuck is the beneficiary of the continuous advances predicted by Moore's law [2], in that his home office has gone well beyond the Cloud Computing [3] that was all the rage back in the early 'teens. He has the latest in HAZE (Highly Adaptable Zoomorphic Engines) systems growing in his walls, with computing power that was totally unthinkable just a few years before. His every gesture gets interpreted as a command, which has made things like nose-wiping into a very conscious and deliberate activity.

The overnight monitor reports appear in Chuck's view as if they were floating in space ten feet away. The seventeen different windows all include color-coded borders indicating the general health and functioning of each subsystem. Today, several windows are bordered with an ominous-appearing

orange, and Chuck grimaces, then takes a big gulp of LJAA. Things are going to be interesting today indeed.

By focusing on a window, he can make it swish from its place in the array and zoom until it covers the other windows, which still can be seen vaguely behind it. This window deals with user satisfaction. A blink, and the user satisfaction window drills down into graphs showing the groups of users his team is responsible for. The scientist groups are blinking red, and Chuck sighs.

The scientists have been unhappy for years, ever since their treasured grids and clusters have been moved to the Physical Plant. It wasn't his fault that those systems generated enough waste heat to heat (and cool) the entire complex. As heating and cooling falls under the control of the Physical Plant, Plant gets to run grids and clusters as well, recycling their heat [4]. The scientists still get to use these systems, but the Physical Plant manager often throttles performance to match times of peak heat requirements, something that (of course!) vexes the scientists.

Chuck chuckles and gestures a note to himself to add a weight to the display of the scientist group's user satisfaction index. There is really nothing he can do about their discomfort, unless he can help them get their own HAZE-based systems. But that's a job for management.

## Backup

Chuck blinks, and the user satisfaction window zips back into its position. Another steely glare and the next orange-tinged window pops into front-and-center position. This window warns Chuck that today is backup day, and the automated truck carrying the disk arrays is late. Chuck gestures up a tracking screen and can see that the truck is sitting in a recharging station. Another gesture shows him that demand for electricity is exceptionally high this morning (yet another day of unusual heat!), and that is slowing down the recharge rate for the truck.

Chuck fondly recalls the days when he did off-site backups to tapes, back in the 'oughts. These days, with petabyte storage systems being the norm, nothing less than a truck full of disks (TFOD) can be used for reliable backup storage.

Like other businesses deemed part of the crucial infrastructure by the government, Chuck is responsible for seeing that all data gets backed up routinely, shipped by automated truck, then stored in Cheyenne Mountain. Chuck is vaguely aware that Cheyenne Mountain was once the doomsday bastion for fighting nuclear wars, but those days have passed. To Chuck, Cheyenne Mountain is just a secure place for off-site backups.

Chuck gestures up a trouble ticket, tags it with the truck's position and an action item to notify him when the truck has arrived and its TFOD is online. The backup operation will have to be postponed until this evening, as it not only takes all night but also sucks up almost all available I/O bandwidth.

## Virus Alert

Chuck blinks the window down, then stares up the final orange-framed window. He grimaces with annoyance as he sees that the network has a viral infection again. Ever since researchers learned how to use bacteria to build circuits, viruses have become a terrible problem. This virus is reducing net-

work bandwidth for several marketing managers' offices. Chuck calls up an anti-viral robot and sends it searching through the office's plumbing.

Chuck's own wideband connection is via his sewage pipe. It turned out to be the perfect place for genetically engineered bacteria to grow, and the sewage treatment plants provide a centralized location for connection to Internet3. He also can fall back on the much slower (1Gbs) link provided by his smartphone, if needed.

Chuck wonders why the marketing managers' network constantly has such issues. He pops a new window open to HeadSpace and grimaces as his brain gets scanned, authenticating him. He hates the ticklish feeling as the scanner passes over his cortex and doesn't believe the scan is any better than a plain old fingerprint. Then he is in.

## HeadSpace

HeadSpace, the social networking site favored by uber-geeks, appears as an endless plane stretching to the vanishing point in all directions. He gestures a query, then zooms across the plane to a gathering of like-minded visitors, who appear to be arguing. At times like this, Chuck marvels at the completely immersive experience provided by his gaming implants. The brain surgery was scary, even if it was done by robo-docs, and the cost—well, at least he could write off part of it as a business expense.

A stocky dwarf avatar is shouting, "You'd be better off if you stuck with McMantic anti-viral!"

An androgynous-looking mage intones a response: "I only trust Merc-Wellcome Pharmaceuticals when it comes to protecting my network's environment."

Chuck butts in, and his well-muscled warrior avatar works its own type of magic, as two meters of hulking, edgy, muscle-equipped-with-sharp-edged-instruments has a habit of doing. "Hey, has anyone heard of virals that seem to be attracted to marketing networks in particular?"

A pretty little fairy pipes up: "The creeps probably deserve it."

After a few more comments about how the marketing droids get all the nice bennies, a fairly normal-looking avatar (just an impossibly handsome one) suggests that he check to see if anyone in that group has visited Thailand recently. Turns out there is a rather nasty form of STD there that might also have an effect on the bacteria the network runs on.

Chuck's avatar grunts out a thanks and vanishes. Chuck doesn't log out yet, as it is time for the morning gripe meeting with his team. He pops into existence at the opening of a cave overlooking a jungle environment. Most of his team are already present.

Chloe, appearing as a unicorn, is talking about the user satisfaction index being down. Chuck counters by pointing out that the problem comes from the scientists, as usual. Chloe timidly mentions that she down-weighted the scientists' portion of the index, and it is still in the orange. Chuck opens a window display and zooms in. Chloe is right. Even with the adjustment, many users are still not satisfied.

With some more digging, the team discovers that the naming server had a partial core failure last night, and fewer than half the processor cores are still resolving names. With only 128 cores to handle the DNSSecv2 response verification signatures, name resolving was taking twice as long as usual, up to 30 milliseconds, a noticeable difference. A warm reset of the offline

processor cores provided a temporary solution to the issue. Chuck gestures out another trouble ticket, so that someone can get to the underlying issue before the problem becomes permanent.

After the meeting concludes, Chuck decides he needs a little exercise, and joins a group of warriors on a quest. As he swings his heavy sword, electrodes built into his real-life bed/lounge stimulate his muscles. When Chuck emerges from his virtual visit, his body is gleaming in sweat. Not bad, he thinks, for fifteen vigorous minutes of mock-fighting. He feels great.

Now, back to work . . .

## Lineup

Has storage really been getting large enough to require TFODs? You should read the LISA summaries in this issue or watch the video of the presentation about building petabyte-sized disk storage systems [5]. You can also check out the slides or the video of another LISA IT about water-cooled datacenters that can resell their "waste" heat for home heating (Bruno Michel, Friday). We also have summaries from the Advanced Topics, University Issues, and Government and Military System Administration workshops.

After several attempts, I finally managed to include an article about building a Hadoop cluster. Jochen Leidner and Gary Berosik have built several clusters and provide details on building their own cluster using commodity PCs. They also cover some of the reasons behind the interest in clusters.

Besides the articles by Couch and Kamath I've mentioned, we have another sysadmin-related article. Jarle Bjørgeengen was working on a project at his university where they needed to replace an older configuration management system. Björgeengen also wanted to create an experiment where he could scientifically examine performance differences between Puppet and Cfengine3. His results should surprise no one who understands how these tools work, but they are sure to stir things up anyway.

I was able to attend SOSP in Montana this fall, where I got to hear a great panel on "Rethinking File Systems." Only one panelist managed to finish an article for this issue, Erez Zadok (with co-authors Vasily Tarasov and Priya Sehgal), but I hope to have more visions of the future of file systems in future issues.

Angelos Keromytis presents research he has done into known VoIP and IMS vulnerabilities. As Keromytis points out, the RFCs for VoIP are enormous and flexible, and there are many correct but dangerous implementations. He closes his article with suggestions about what you can do to harden your VoIP systems.

Choffnes and Bustamante point out a clever way of improving BitTorrent performance. They show that it is better for participants who share the same provider to also be assigned to the same torrent, as bandwidth within a provider is usually much higher than inter-provider bandwidth.

Dave Piscitello has written an article about the new duties of ICANN. Piscitello works with ICANN, as well as having a long history of Internet-related activities, and provides accurate information about long-awaited changes.

Rudi van Drunen has written about wireless technology. Rudi provides details about how wireless works, as well as a case study in designing a medium-haul wireless network.

David Blank-Edelman takes the time to cover time in Perl, as well as useful modules that don't ship with the core. Dave Josephsen fills us in on turmoil

in Nagios, as a fork appears (or is it just marketing and maneuvering?). Robert Ferrell explains how project management works, or doesn't. And Elizabeth Zwicky opens our book reviews section with several excellent reviews.

Fifty years ago, Dick Tracy's wristwatch radio was science fiction. Now we see people walking around apparently talking to themselves all the time. Intel has followed up on their TeraGrid 80-core demonstration chip with a more exciting 48-core Simple Cloud Computing chip [3]. Perhaps my future vision of sysadmin is not that far off the mark.

## REFERENCES


[1] Charles Stross, *Accelerando* (Ace, 2005), in hardcover, paperback, and free ebook: http://www.antipope.org/charlie/accelerando/.

[2] Emin Gün Sirer and Rik Farrow, "Some Lesser-Known Laws of Computer Science": http://www.usenix.org/publications/login/2007-08/pdfs/sirer.pdf.

[3] Ryan Shrout, "Intel Shows 48-core x86 Processor as Single-chip Cloud Computer," *PC Perspective*: http://www.pcper.com/article.php?aid=825.

[4] Bruno Michel, "Towards Zero-Emission Datacenters through Direct Reuse of Waste Heat," IBM Zurich Research Laboratory: http://www.usenix.org/events/lisa09/tech/slides/michel.pdf.

[5] Raymond L. Paden, "How to Build a PB Sized Disk Storage System," IBM Deep Computing: http://www.usenix.org/events/lisa09/tech/slides/paden.pdf.