



iPRES 2022
G L A S G O W

**18th International Conference
On Digital Preservation**

Day 4 | Thursday, September 15, 2022

Collaborative Notes

Main Hall A/B/C

4:00 PM - 5:30 PM

Keynote: Steven Gonzalez Monserrate

After the Cloud: Rethinking Data Ecologies through Anthropology & Speculative Fiction

The cloud as a carbonivore: one data centre can use as much as 50,000 homes. (Correct?)¹

Talking about the cloud: its history, its present, its future

We are no strangers to time travellers as preservationists

1000 CE the quipu - computer spun from fabric, myths and maths, censuses

Only one cog in a well-oiled Andean information machine

Quipucamayok (readers of Quipu)

in Spanish 1583 decreed Quipu a blasphemy against their gods and ordered their destruction

But the Quipu has survived until today, thanks to indigenous struggle and survival

Last longer than a hard drive.

Oracle Bones - Shang Dynasty 1250 BCE (there's a collection at the National Museum of Scotland in Edinburgh)²

Sumerian Cuneiform

Why is the digital so fragile?

He believes it's cultural rather than physical limitation

Technologies reflect back the values of the culture

¹ "The Staggering Ecological Impacts of Computation and the Cloud." *The MIT Press Reader*, 14 Feb. 2022,

<https://thereader.mitpress.mit.edu/the-staggering-ecological-impacts-of-computation-and-the-cloud/>.

² "Oracle Bones." *National Museums Scotland*,

<https://www.nms.ac.uk/explore-our-collections/stories/global-arts-cultures-and-design/oracle-bones/>. Accessed 15 Sept. 2022.

The right to connect by 2020s

Grumpy cat memes (I had fun once, it was awful.)

Status updates, likes, clicks, views: our memories, our heritage

Cloud is what we say to convey an idea: It is an abstraction, a feel of connectivity, carried to our fingertips at the speed of light.

Entanglement (an Art Installation by Annex)

It's so entangled in our lives, we can scarcely see where it begins and where it ends

The cloud is light, carried by undersea fiber optic cables, it is bits and bytes anchored to servers living in data centers

Data centers are where the digital lives.

He's interested in the [stories](#) that the people who run the data centers have to tell.

He's worked in data centers, spent time at professional conferences, etc.

It's given him a perspective on data centers and their impact

Every data center is unique

Some are purpose built, some in military bunkers. They are found on every biome on earth.

Iceland and Arizona (desert)

- 1) Enterprise Data Centers (Government data centers, Archives)
- 2) Co-location Data Centers (CyrusOne, Digital Reality)
- 3) Hyperscale Data Centers (examples: Meta, Google, AWS)

If it weren't for the cloud, we wouldn't have survived the situation brought about by Covid-19 (so well). We can't imagine what would happen if the cloud went away.

Surviving electric squirrels (one of which took down Yahoo's data center)

Talking about Tom, cloud technician, has to deal with a different type of vermin.

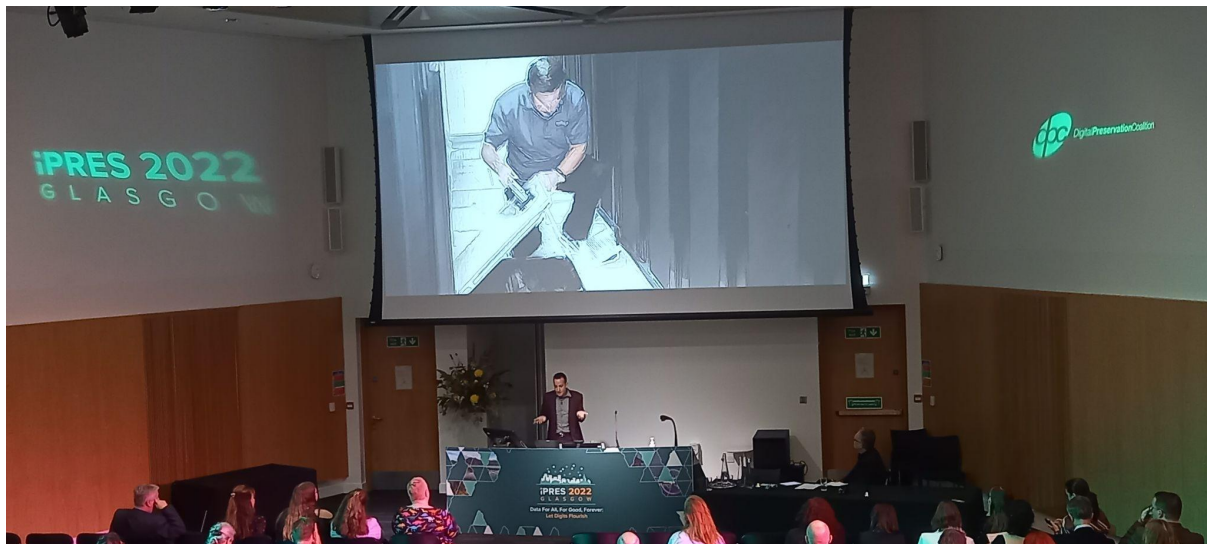


Image by Eilidh MacGlone, Licenced under [Attribution 4.0 International \(CC BY 4.0\)](https://creativecommons.org/licenses/by/4.0/)

He hears something, the server is hungry. “Hunger” behavior of a server. i.e. its overheating. He refers to himself as Elmer Fudge. He’s hunting heat. Hot spots. Thermal outage downed an Oracle Data Center this summer.

Tom taught him how to hear heat. Steven had assumed they relied on sensors for this, but he learned that it’s much more about embodied skills.

Computational Fluid Dynamics: models suggest how to optimize cooling, but these are often mess with skepticism and fear

The key to hunting hot spots means learning to hear the heat.

Downtime means loss of money, and for workers, maybe loss of their jobs.

Downtime is “emasculating” - a telling word.

Less than 10% of the workforce in the data center industry are women. there is real skepticism on women being involved in the data centre world (NB this is not Tom’s skepticism)

Tom mentions that he sees a therapist. My data center is killing me.

“Men are wasteful” - they crank up the air conditioning because they’re so afraid of downtime. SG accepts it’s a sweeping generalisation from one female data centre manager, but it ties in with observation of an overall cavalier attitude about sustainability and waste.

The cloud’s inner sanctums are not isolated from society’s cultural values.

Prioritizing uptime over minimizing waste.

Cloud workers seldom feel the consequences of the waste of data centers.

Chandler, Arizona. He hears the data center. The sound of suburbia (data center droning hum). It’s the din of the digital.

He asked Brenda how the noise pollution affects her life? No one will ever want to live with all that racket. Dull ringing in my ears. Constant nausea. There in my sleep and dreams.

Constant disruptive presence in their lives: the cloud never sleeps. The cloud run 24/7, 365.

Local residents tried to take action against the CyrusOne Data Center in Chandler, Arizona, but in fact even more

³

The cloud produces 3.7% of the world's emissions, similar to the airline industry. The cloud is a carbonivore.

Data Center Alley, Virginia, USA. Predominantly fueled by coal-powered energy

Zuni Cloud eater: dries up the water

Data center in Arizona: 2 million gallons of water a day (equivalent to the usage of 9000 homes). This water is rarely recycled.

20% of data centers rely on draught-stretched areas/ecosystems

The cloud's voracity also creates eWaste. Less than 20% of the electronic waste generated is recycled.

Asymmetry of supply a demand: many data centers will need to be built in the next 10 years.

No one can say for certain whether the cloud will be able to survive the expansive growth.

Must we preserve the cloud even as it burns us? Is the cloud beyond saving? Must the cloud come to an end?

Deficit of imagination:

Data as a commodity instead of our heritage; we see ourselves as consumers instead of stewards

How do we shed the market logics that condition us toward unsustainability?

User as consumer attitude?

Malka Older - a speculative fiction writer and author of [Infomocracy](#) - gives a possible answer to this communication issue. Use speculative fiction to imagine better: blueprints for what could be

Imagine a better world rather than a broken one.

Solar punk = radical political act

Speculate what might come after the cloud?

Scenario 1: submersible data center

³ "Loud Hum Consuming Chandler Neighborhood." *KNXV*, 26 Feb. 2019, <https://www.abc15.com/news/region-southeast-valley/chandler/loud-hum-consuming-chandler-neighborhood>. Accessed 15 Sept. 2022.

A city heated and powered by the residual warmth of the data centers - and this is not pure fiction. There is an experimental undersea data center going live this year, called [Natick](#). More are planned. Might the sea become the cloud's new home?

Scenario 2: data centers above the sky

An armada of satellites with onboard servers, cooled by space. This is also subject to experiment - 2021 HPE spaceborne computer was installed on the ISS.⁴

Scenario 3: a historian in the distant future uses a data cavern to access the long-obsolete 21st century disk. Laser-carved data - and again this is happening in 5D memory crystals already.

Scenario 4: in the 30th century an alien archaeologist finds... shelf upon shelf of clay tablets containing our entire digital heritage.

Exploring the history of how the cloud became clay, the expectations of the masses had to be retrained: a culture of excess and instant access tamed. Only highest priority data lived in hot storage in the cloud and the rest stayed in vaults, on clay. [Memory of Mankind](#) project is work on ceramic storage already.

Scenario 5: a future where data is grown.

Strings of ACTGs encoded in living cells. "[Genomic media](#)" [I missed the citation for this?] - how might concerns of sovereignty shift if we grow our own data, and are our own data centres. Touches on the [Grow Your own Cloud](#) project.

Scenario 6: beyond the binary

Moving into quantum computing. Quantum QBits are superpositional - 1s, 0s, both, somewhere in between. Requires a massive computer cooled almost to absolute zero, but what else can it do that a simple binary cannot?

Concluding: look past the dazzling tech, and imagine the worlds in which they might arise. Different models of access and stewardship, of collective effort, of sustainable sharing. Ruha Benjamin: "The facts alone will not save us" - we need stories to help in the effort to communicate and change climate thinking.

Ministry for the Future

Q Do we really need everything we are keeping as a result of demand - is appraisal the missing step?

A It is hard to know what will be valuable to future historians. Levels of redundancy and backup, how many versions do we need? Data centers are redundant to the point it is hard not to think it is waste - many idling diesel generators. Zombie servers kept up in case of need. As consumers need to think about what we are willing to tolerate.

⁴ *Spaceborne Computer: HPE and NASA Computer on SpaceX Mission.*

<https://www.hpe.com/us/en/compute/hpc/supercomputing/spaceborne.html>. Accessed 15 Sept. 2022.

Q: the scenarios were fascinating - but some seem to have predictably negative consequences (eg undersea storage/warming of oceans)? A: yes, and suggestions that there are no negatives are unproven, and questionably complete.

Q You mentioned agency; I wonder how you feel about scenarios where you have more agency - we know that we use cloud proprietary services for free and there are negatives to that - the price is lack of agency over the use of that data; if I carry my own data in myself, how does that change the relationship between the cloud and me, eg in terms of privacy, stewardship...

A I think it is essential that we reach a heterogeneous situation, a variety of clouds.

Q Debate in Ireland about energy used by data centres (possible blackouts) - Do digital preservationists need to talk about data centers more when we do advocacy, how do we do that?

A You need to use them and so you need to think about our values; think about what you actually need.

Closing Ceremony

An exercise in managing the unexpected: a Glasgow-wide quinoa shortage, an asteroid hitting Cumbernauld, the death of the monarch (and King Charles was in George Square this lunchtime), to mention just a few things that have impacted the conference planning and delivery.