



Why Bare Metal Still Matters

Difference Engine – Computer History Museum (Joel Wirāmu Pauling) - Creative Commons : BY-SA

Joel Wirāmu Pauling
jwp@redhat.com

DEVOPS DAYS 2019



Mihi Paepae



Countries I've Visited

Argentina, Australia, Austria, Brazil, Brunei Darussalam, Cambodia, Canada, Chile, China, Cook Islands, Czech Republic, Denmark, England, Finland, Germany, Hong Kong, India, Indonesia, Ireland, Japan, Laos, Macao, Malaysia, Mexico, Myanmar, Norway, Philippines, Poland, Portugal, Samoa, Singapore, Spain, Sri Lanka, Sweden, Switzerland, Taiwan, Thailand, United States, Viet Nam

Countries I've Lived In

Canada, New Zealand, Singapore

OLD SCHOOL BADGES



Joel Wirāmu Pauling

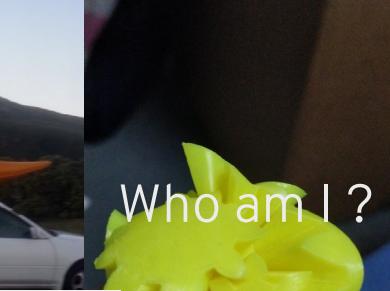
Senior Solutions Architect at Red Hat
Wellington & Wairarapa, New Zealand · 500+ connections



Joel Wirāmu, Pauling

@aenertia

aenertia@aenertia.net : Kiwi, Engineer, Geek, Psych/Social researcher, Couchsurfer, Red hat employee. Always have an opinion, sometimes it's worth something :-)



Red Hat

Victoria University of Wellington

Joel Wirāmu Pauling
aenertia

Edit profile

Wellington, New Zealand
aenertia@aenertia.net
<http://linkedin.com/in/aenertia>

Organizations

44 contributions in the last year

Contribution activity

Created an issue in esphome/feature-requests that received 5 comments

Allow DNS names in Yaml for such things as mqtt broker



Cloud Native Development doesn't exist in a closed ecosystem



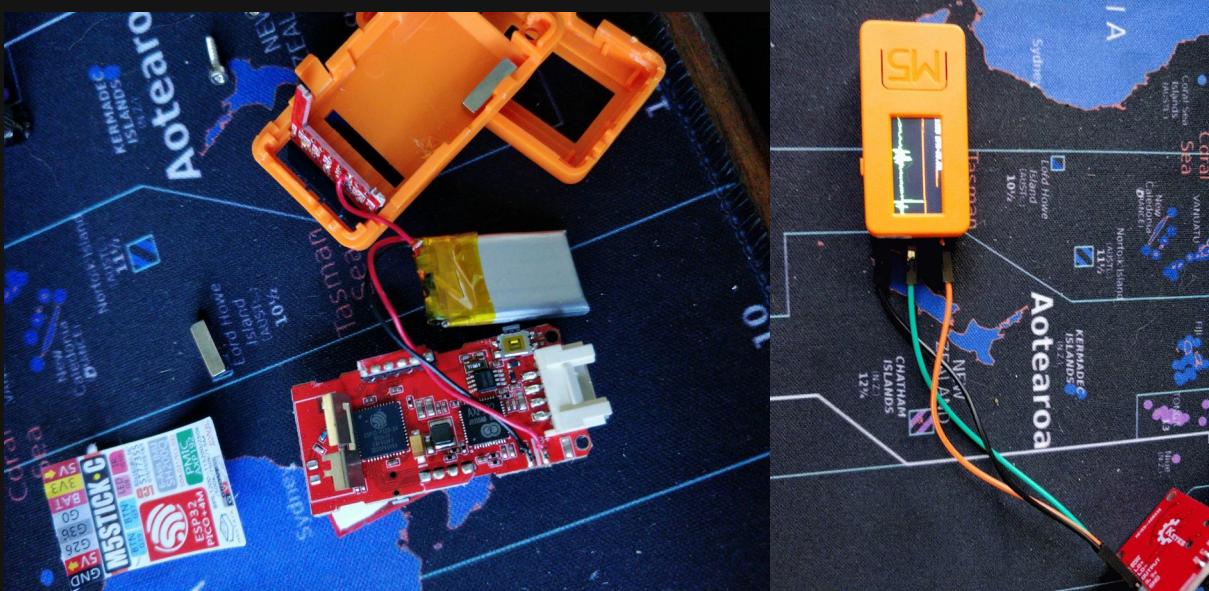
Bio Dome 2 – Arizona (Joel
Wirāmu Pauling)

<https://photos.google.com/share/AF1QipPgENfPxuTiSm8n3ZdPH8DlIGKncWady8jIVKvinnFLovNROfQjZ22jZBWOCNfqw?key=cDVlchBSkRCNIA0MXdsTOZYWklavK9yU2VXVDV3>

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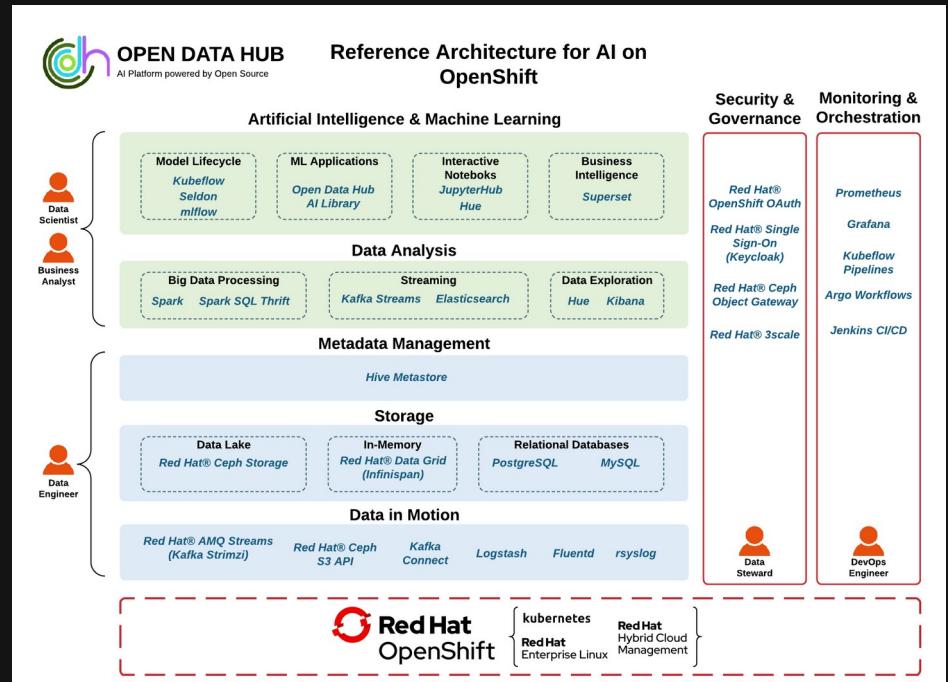
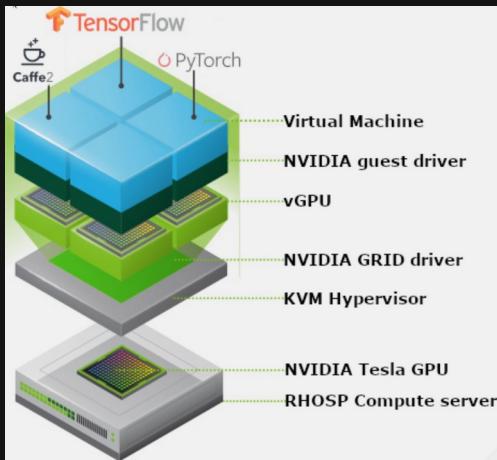
You don't get to forget about bare-metal when the core bits are concerned with GPIO's and Microcode

Internet of Things is more about the Microcontroller than the Microprocessor



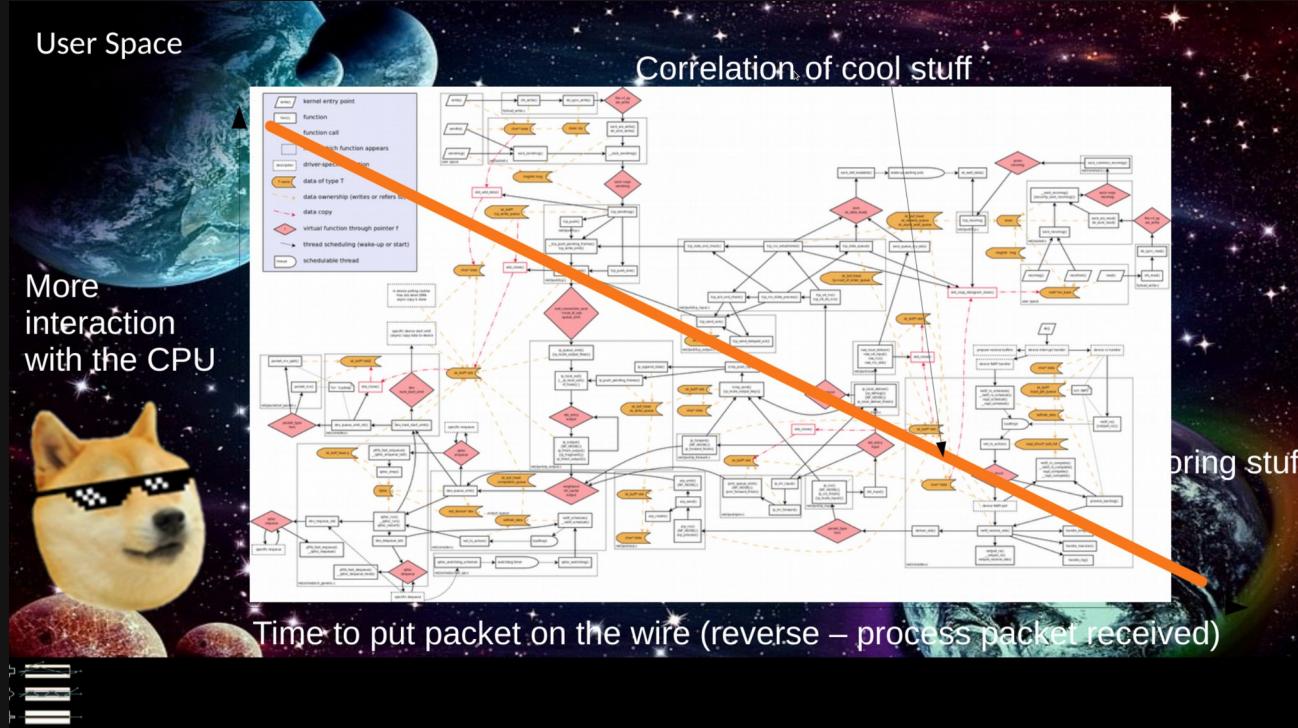
I destroyed an M5Stick so you don't have to (Joel Wirāmu Paung) <https://github.com/aenertia/m5stick-scope-ecg>

Big Data and AI/ML ; are all about Hardware acceleration/Offload

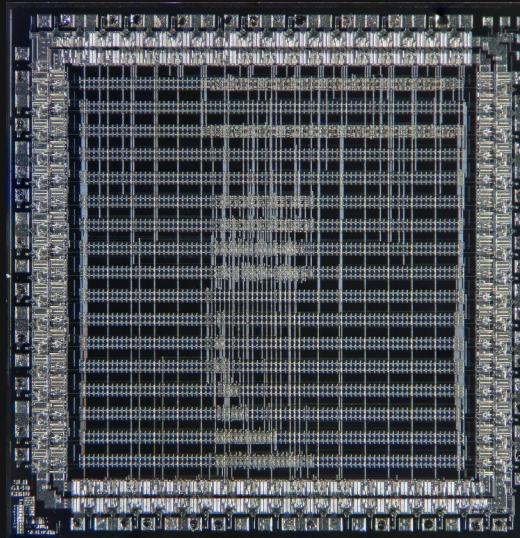


<https://opendatahub.io/docs/architecture.html>

Network Functions Virtualisation (NFV) Container Network Virtualization (CNVF) all need low level access

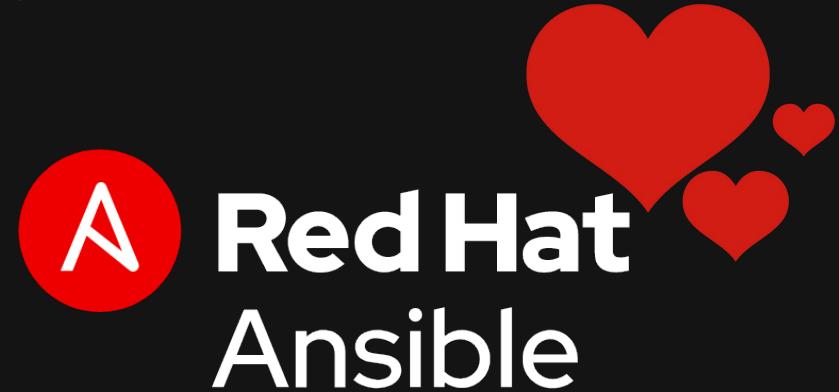
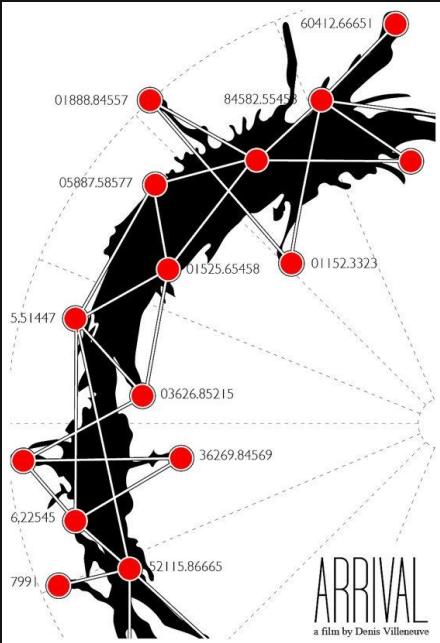


Open Standards based cloud accessible Field Programmable Gate Arrays (FPGA's) ; re-programmable ASICS (Application-specific integrated circuit) – are the current trajectory



(AnMicroscope photograph of a gate-array ASIC showing the predefined logic cells and custom interconnections. This particular design uses less than 20% of available logic gates. toine Bercovici) -
https://en.wikipedia.org/wiki/Application-specific_integrated_circuit#/media/File:S-MOS_Systems_ASIC_LA6140.jpg
CC: BY-SA

And there are all those weird specialized things like SCADA and Network Equipment that we might like to use dev-(...)ops methodologies with that will never be ‘cloud native’



Sustainability and Environmental accounting as much as technical, financial & cultural factors

Transaction Type	Potential Pros & Cons	Questions to Ask
Onsite Renewables Apple (NC & NV)	<ul style="list-style-type: none"> ▶ Direct impact with clear story for company ▶ Concentration of data center power demand and land restrictions may not align to allow for significant supply 	- Were RECs and other environmental attributes from the project retired/retained?
Power Purchase Agreement (PPA) Google AWS Microsoft Facebook HPE Equinix	<ul style="list-style-type: none"> ▶ Enables specific new renewable project ▶ Provides hedge to control energy costs ▶ Regulatory complexity in some markets ▶ Virtual PPAs may have limited impact on local utility portfolio ▶ Financial risk if energy prices drop below strike price 	<ul style="list-style-type: none"> - Does the company have data center/operations in the same electricity market as the PPA? - Has the company retained and retired the RECs and any other environmental attributes from the project?
Green Tariff (w/Sleeved PPAs) Google (NC) Apple (NC & NV) Switch (NV) IO (AZ)	<ul style="list-style-type: none"> ▶ Utility manages energy contract and load balancing ▶ Often have built-in price premium, regardless of contracted price of renewables ▶ Lack of flexibility in some markets 	<ul style="list-style-type: none"> - Does corporate buyer receive the benefit of lower RE price? - Is electricity price fixed, or only the premium? - Are RECs from the project passed to customer, or replaced with unbundled RECs?
Community Choice Aggregation	<ul style="list-style-type: none"> ▶ Typically lower rate than existing utility ▶ Supply/price risk born by CCA entity ▶ Enable local control over supply ▶ long process for establishing, often made longer due to strong opposition from existing utility 	- Will CCA contract create new renewable capacity?
Community Solar/Wind	<ul style="list-style-type: none"> ▶ Support distributed RE investment ▶ RE output delivered as bill credit ▶ Eliminates siting limitations of onsite ▶ RECs typically kept by project sponsor 	- How are RECs from project handled?
Direct Access Apple (CA & OR)	<ul style="list-style-type: none"> ▶ Ensures a local supply of renewables ▶ No fixed price premium ▶ May not be new or additional project ▶ Access may be limited or significant exit fees 	- Is project new/additional?

Greenpeace click-clean report 2017 <https://www.greenpeace.org/usa/global-warming/click-clean/>

Clamoring to expose bare-metal
consistently up the stack

Bare Metal still matters



Ironic ported to kubernetes - > Metal³

Pixie Boots is the mascot of the "Bear Metal" Provisioning Program for OpenStack, a.k.a Ironic

Virtualization has been great for segmentation & portability



Stress (*bottled_void*)

<https://www.flickr.com/photos/22964099@N05/2204059683>

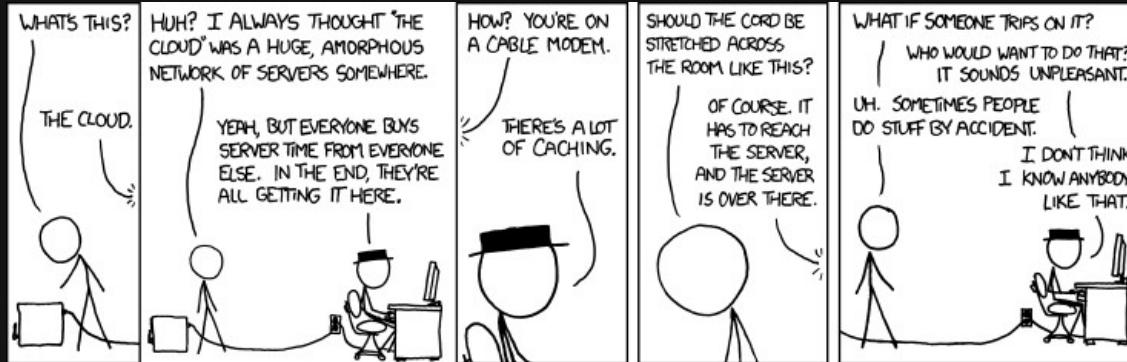
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But... it added layers of abstraction, complexity and separation in order to get to the ‘real’



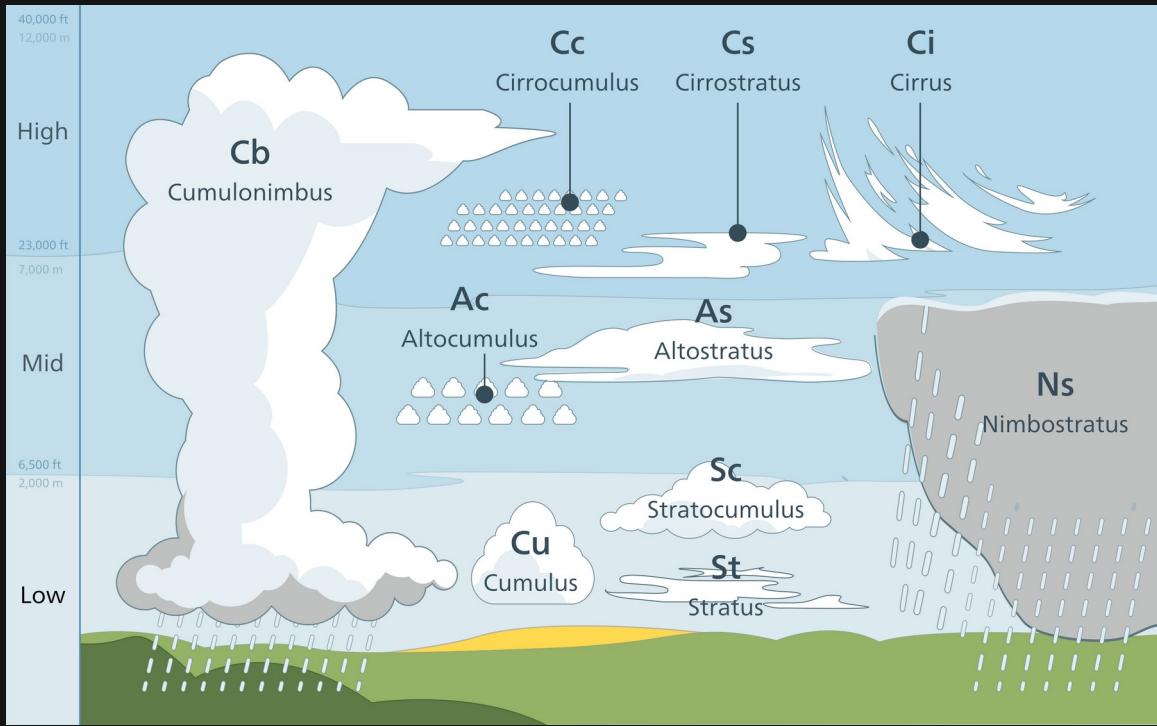
River terrapins (*Batagur baska*). Image was also uploaded to
<https://www.flickr.com/photos/pelf81/324890844/>

‘the cloud’ cliché has made us complacent



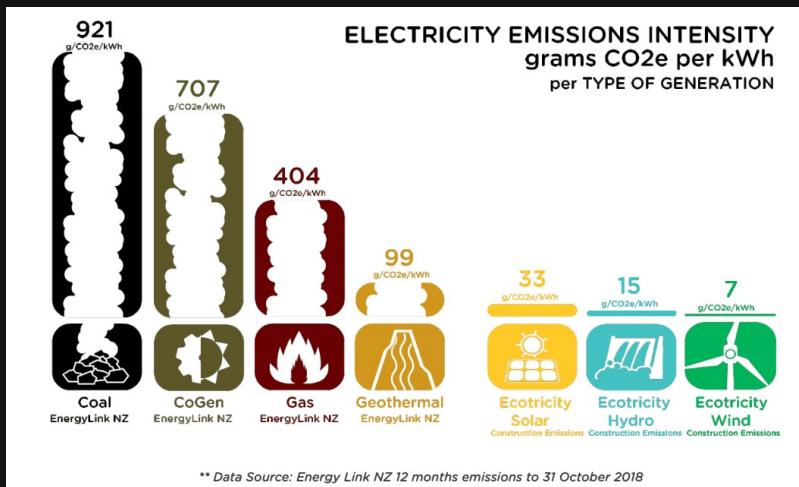
XKCD #908 (Randall Munroe) <https://xkcd.com/908/>

Oh yeah – cloud diversity ...

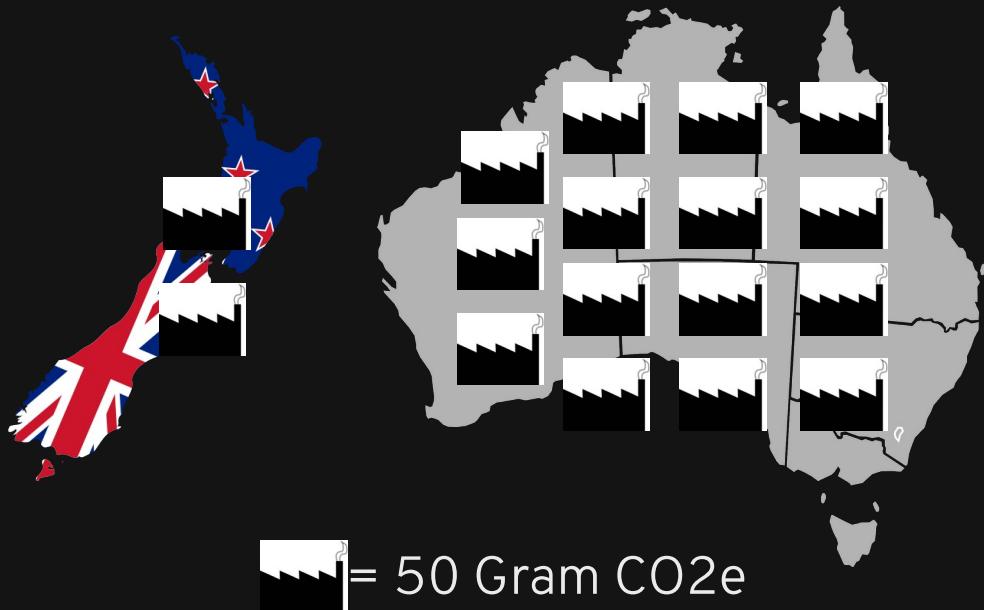


What about ... climate things?

Carbon Intensity per Kilowatt Hour Generated



<https://ecotricity.co.nz/news/carbon-knowledge/>



Source: Average for the 12 months ending June 2019, source: Energy Link NZ – 107G per kWh & Average for 2017-18 year, source: Clean Energy Regulator, Australian Government 750G per kWh

Data-sovereignty and a right to privacy ?



UN Right to Data Privacy in the Digital Age <https://www.ohchr.org/en/issues/digitalage/pages/digitalageindex.aspx> & <https://www.privacyinternational.org/press-release/3261/un-special-rapporteur-warns-beneficiaries-are-forced-give-their-right-privacy>

We care about vendor lock in right?

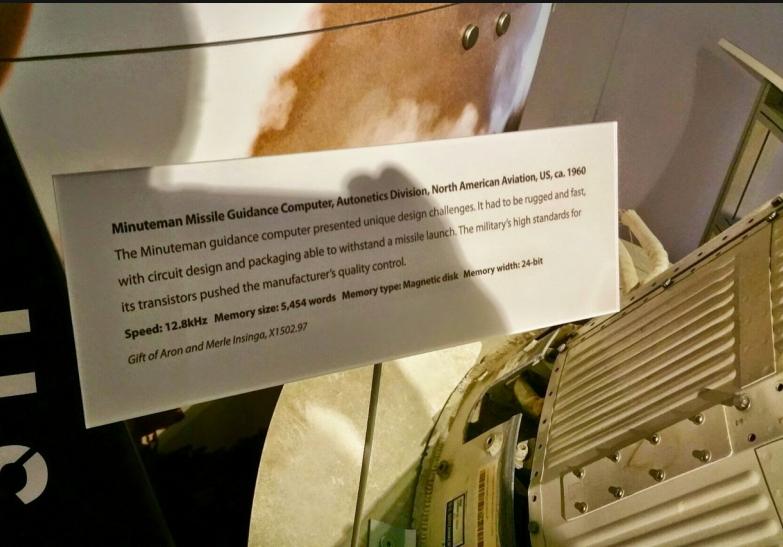


Toronto Bike Rack (Joel Wirāmu Pauling) – CC: BY-SA

Dev-(...)ops and Agile business values needs to build in Bare-metal considerations, not just at the aspiration/cultural organizational level



Nuclear Missile Control Computer (Joel Wirāmu Pauling) - CC:BY-SA



Bare Metal still matters

Minimum Viable Product ; should include the consideration for on what and where the workload is running.

Because the minimal viable product for all of us is this →

Blue Marble - NASA
<https://visibleearth.nasa.gov/images/57723/the-blue-marble>



Thank you. Ngā Mihi.

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we are hiring!

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