THE LINUX FOUNDATION
MEMBER SUMMIT

SUSTAINABILITY ALL THE WAY DOWN

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SENIOR VP, ENGINEERING | ITRENEW

Sustainability Implications Demand Comprehensive Approaches

Renewable progress is great, and necessary, but **INSUFFICIENT**

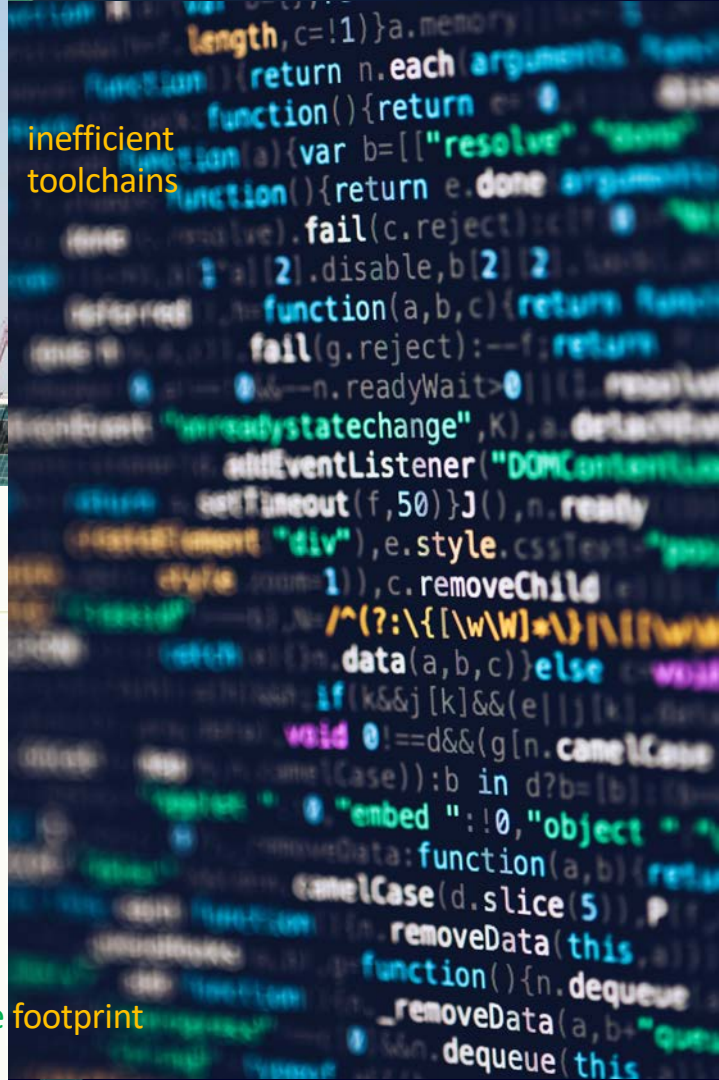
carbon

footprint

growth

clouds
drive
demand

inefficient
toolchains



Green
Software
Foundation

About Working Groups Projects Resources Articles

We are building a trusted ecosystem of people, standards, tooling and best practices for

GREEN SOFTWARE

Sign up to our newsletter...

Sign up

https://greensoftware.foundation/

software footprint

Sustainability, ESG, …, OSPO

Pursuing sustainable software can be a partnership between a corporate sustainability program and an OSPO

=> like other cross-silo corporate projects

Perhaps controversial to say that software sustainability belongs in an OSPO – cross-department, company-wide – and we should have that debate

The role of OSPOs and Sofware Sustainability is a topic for a future talk!

Happy to entertain questions at the end

Open Is Necessary, But Not Sufficient Per Se

design, engineering and product expertise, rigorous commitment to component quality

[software]

requires baseline partnership across hardware & software

[hardware]

design, engineering and product expertise, rigorous commitment to component quality

devops – collaboration from designers & developers to operations

ORCHESTRATING AN OPEN HARDWARE + OPEN SOFTWARE STACK

from capacitors to CAP theorem to cognitive load

wide dynamic range of skills must be applied & appreciated

automation, analytics, and machine learning for all the things

OPEN HARDWARE, OPEN SPECIFICATIONS

- instead of every company making their own unique specifications
- we work together on common elements to think about
- specifications that maximize cooling and reduce heat
- high density servers for maximum computation per floor tile
- form factors that can use any space in any location – under desks, in closets of various sizes, outdoors – to drive edge computing
- design for use of off-the-shelf components that are already efficient in mass production
- re-use, re-purpose, revamp the Hardware Supply Chain

Sesame by ITRenew integrated rack-scale solutions

ENGINEERED SYSTEMS READY TO DEPLOY

Engineered, tested, supported as a single stack

Roll it in, turn it on

FLEXIBLE SCALE & CAPACITY

6 to 96 nodes per rack

>1,000 nodes per cluster

25/100G networking

PURPOSE-BUILT CONFIGURATIONS

Open Systems (Disaggregated)

Converged (HCI)

AI/ML

STANDARD RACK SIZE & POWER

No data center redesign

Leverage existing power

TECHNOLOGY PARTNERS

kubernetes OPENSHIFT RANCHER SUSE vmware

DIGITAL BUILDER Your daily construction blog TRENDS STORIES TIPS & TOOLS PRODUCT NEWS

What Are As Built Drawings?

https://constructionblog.autodesk.com/as-built-drawings/

OPERATIONS | By Grace Ellis | September 1, 2021 | 13 min read

challenge in hardware over software – need "as-built" documentation

the "ground truth" isn't necessarily the most recent git commit

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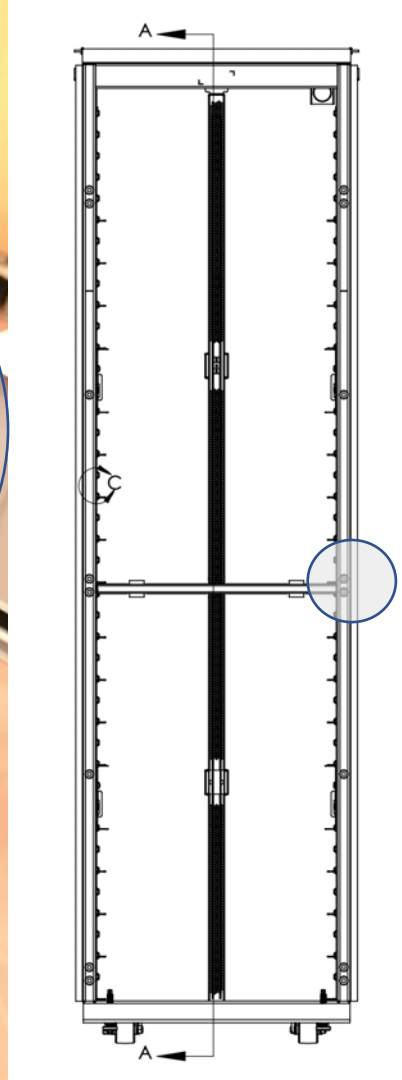
screws in the CAD became welds in the build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NET WT. NOT TO EXCEED

These are not pie in the sky ideas – they are already actively implemented under the aegis of the Open Compute Project and the Linux Foundation

Platinum

2crsi (since 2018)

3M (since 2018)

Alibaba (since 2017)

Arista Networks (since 2019)

Inspur (since 2016)

Intel (since 2011)

ITRenew (since 2018)

Microsoft (since 2014)

ARM (since 2018)

Asperitas (since 2017)

ASUS (since 2019)

AT&T (since 2015)

MiTAC (since 2017)

Nokia (since 2015)

NVIDIA Networking – Mellanox (since 2012)

Quanta Cloud Technology (since 2012)

Baidu (since 2019)

Cumulus Networks (since 2013)

Delta Electronics (since 2016)

Deutsche Telekom (since 2016)

Rackspace (since 2011)

Rittal (since 2017)

Schneider (since 2014)

Silicom (since 2018)

Edgecore Networks (since 2016)

Facebook (since 2011)

Goldman Sachs (since 2011)

Google (since 2015)

STORDIS (since 2019)

Submer (since 2018)

Tencent (since 2018)

VeriSilicon (since 2020)

HPE (since 2015)

Huawei (since 2018)

Hyve Solutions (since 2012)

IBM (since 2013)

Wiwynn (since 2014)

Yahoo! Japan (since 2017)

Gold

ITOCHU Techno-Solutions Corporation (since 2014)

Samsung Electronics (since 2019)

Seagate (since 2017)

ZT Systems (since 2019)

Silver

Circle B (since 2016)

Cisco (since 2014)

Inventec (since 2014)

NVIDIA (since 2017)

OPEN Compute Project®

members

Data Center Facility

Sub-Projects:
Modular Data Center
Critical Facility Operations - Incubation
Advanced Cooling Facility - Incubation

Hardware Management

Sub-Projects:
OpenRMC
Hardware Management Module - Incubation
Hardware Fault Management - Incubation

Networking

Sub-Projects:
ONIE
Open Network Linux
SAI
SONiC

Open System Firmware

Rack & Power

Sub-Projects:
ACS Immersion
ACS Cold Plate
ACS Door Heat Exchange

Security

Server

Sub-Projects:
High Performance Computing - Incubation
Mezz (NIC)
Open Accelerator Infrastructure
Open Domain-Specific Architecture

Storage

Telco

Sub-Projects:
openEDGE

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projects

Project

- [ ] Server (65)
- [ ] Networking (48)
- [ ] Rack & Power (36)
- [ ] Telco (21)
- [ ] Data Center Facility (15)
- [ ] Storage (13)
- [ ] Security (Incubation) (2)

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- [ ] AT&T (6)
- [ ] Delta Electronics (6)
- [ ] Inspur (6)

Show more

Family

- [ ] Network Switch (38)
- [ ] OpenRack v2 (24)
- [ ] OCS (18)
- [ ] OTHER (15)
- [ ] Olympus (14)
- [ ] Data Center (10)
- [ ] Storage (8)
- [ ] Telco (8)
- [ ] Power (7)
- [ ] OpenRack (6)
- [ ] SOC Boards (6)
- [ ] Server (6)
- [ ] 19" Server (5)
- [ ] Software (5)
- [ ] Accessory (4)
- [ ] Optical NW (4)
- [ ] ACS (3)
- [ ] CG-Openrack-19 (3)
- [ ] PCI Card (3)
- [ ] Access Point (2)
- [ ] Barreleye (2)
- [ ] Mezz Card (2)
- [ ] OCP Mezzanine (2)
- [ ] Security (2)
- [ ] uCPE (2)
- [ ] Debug Card (1)
- [ ] Honey Badger (1)
- [ ] Information (1)
- [ ] Open Vault Storage (1)

CNCF Cloud Native Landscape

2020-05-05T22:49:53Z 8a2f76a

Overwhelmed? Please see the CNCF Trail Map. That and the interactive landscape are at l.cncf.io

Database

Streaming & Messaging

Application Definition & Image Build

Continuous Integration & Delivery

App Definition and Development

Scheduling & Orchestration

Coordination & Service Discovery

Remote Procedure Call

Service Proxy

API Gateway

Service Mesh

Orchestration & Management

Cloud Native Storage

Container Runtime

Cloud Native Network

Runtime

Automation & Configuration

Container Registry

Security & Compliance

Key Management

Provisioning

Platform

Certified Kubernetes - Distribution

Certified Kubernetes - Hosted

Certified Kubernetes - Installer

PaaS/Container Service

Observability and Analysis

Monitoring

Logging

Tracing

Chaos Engineering

CLOUD NATIVE Landscape

CLOUD NATIVE COMPUTING FOUNDATION

Redpoint Amplify

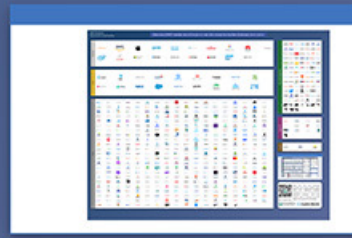
l.cncf.io

This landscape is intended as a map through the previously uncharted terrain of cloud native technologies. There are many routes to deploying a cloud native application, with CNCF Projects representing a particularly well-traveled path.

Kubernetes Certified Service Provider

Kubernetes Training Partner

Special



REAL WORLD EXAMPLES

Blockheating uses the waste product of water cooled servers to greenhouses to produce tomatoes

https://www.datacenterdynamics.com/en/news/itrenew-and-blockheating-combine-edge-data-centers-greenhouses/

Open Compute open specifications on heating, cooling, and rack design

https://www.opencompute.org/wiki/Open_Rack/SpecsAndDesigns

https://www.opencompute.org/projects/advanced-cooling-facilities-incubation

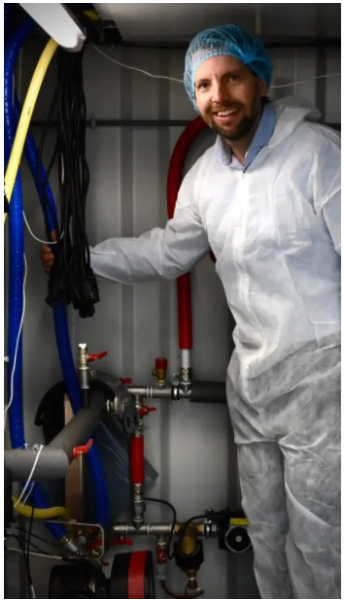
Open Compute Cross Project Sustainability Initiative

https://www.opencompute.org/projects/sustainability-initiative

CASE STUDY – AMSTERDAM

SESAME
BY ITRENEW

…FOR GREENHOUSES



blockheating
Recycling datacenter energy

CASE STUDY – AMSTERDAM

Green data centers require innovative partners

blockheating
Recycling datacenter energy

SESAME BY ITRENEW

"WE'RE SAVING **20 – 30% ON AIR-CONDITIONING COSTS** BY GOING WITH OUR DECENTRALIZED APPROACH. **CONSTRUCTION TIMES ARE ALSO SIGNIFICANTLY** REDUCED. THOSE BENEFITS ALLOW US TO BE **SUSTAINABLE AND ECONOMICALLY COMPETITIVE AT THE SAME TIME**."

*"WE CHOSE ITRENEW FOR THEIR **SUSTAINABILITY CREDENTIALS, SUPERIOR TECHNOLOGY, 'OPEN COMPUTE' FLEXIBILITY**, AND THE SKILL OF THEIR ENGINEERING TEAM TO DELIVER ON OUR REQUIREMENTS AT SCALE—ALL OF WHICH HAVE **ENABLED US TO ACCELERATE OUR DEVELOPMENT**."*

JEROEN BURKS, CEO
BLOCKHEATING

THE CIRCULAR IT HARDWARE INDUSTRY IN PRACTICE

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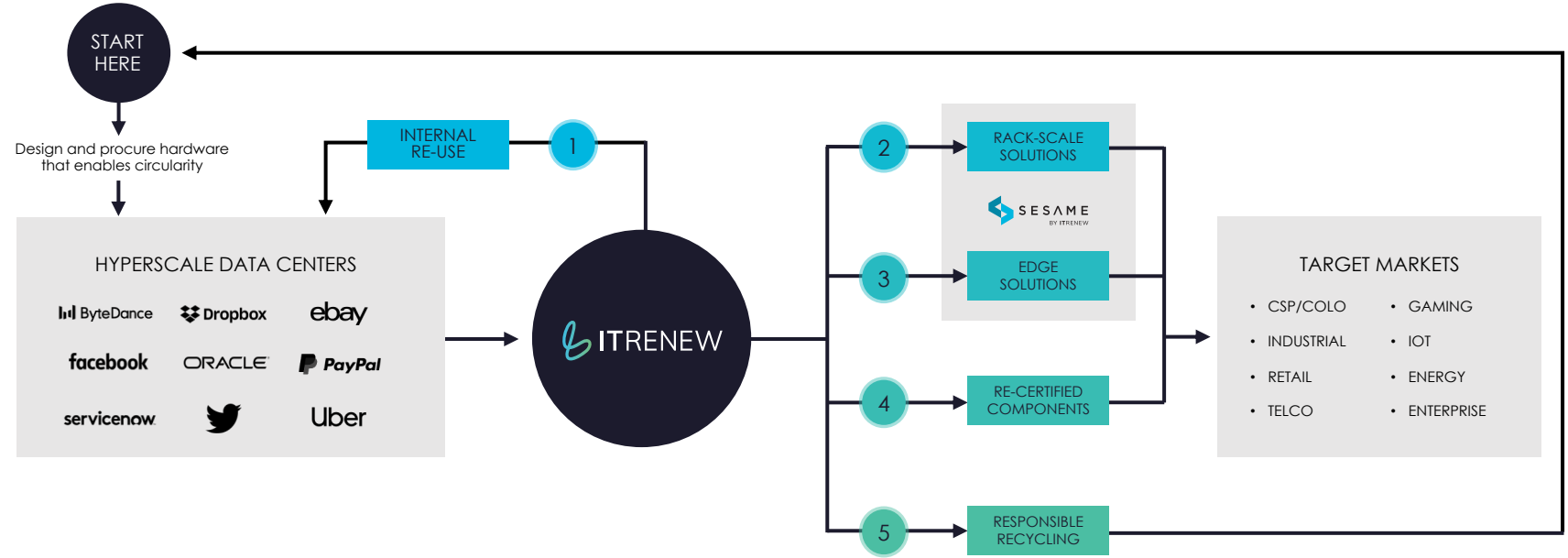

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CIRCULAR ECONOMY – SOFTWARE

The circular economy enables

- Near metal open source toolchains like coreboot, linuxboot, u-root to keep older machines in the market longer based on community support

- Open hardware can be re-designed for new uses like modular datacenter, edge computing at near neutral carbon cost at cheaper TCO than new hardware

- Open Hardware doesn't just mean servers, but also switches

- Augments software projects like LF's OpenSwitch [https://www.openswitch.net/]

- Any software project that supports using off the shelf parts to build open infrastructure can leverage the supply chain provided by the circular economy

SUMMARY

YES – improve the software toolchain to improve open source projects so that the hardware is used at high utilization and high efficiency through efforts like the Green Software Foundation

YES - leverage the supply chain of the circular economy and benefit from open hardware and near neutral carbon costs of recertified equipment

YES - adapt your infrastructure to use open hardware that runs open source infrastructure hardware – e.g. SONiC, openswitch, k8s, OpenBMC

YES – Find ways to re-use the output of your on-prem cloud or datacenter

Sustainability all the way down – means we don't stop at just software but explore everything below it as well

If you have a sustainability program at your company – leverage the OSPO to navigate the cross-silo collaboration required to support open sustainable infrastructure as well as open code

Photo acknowledgement and thanks:

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Who are we?

Sesame by ITRenew – building sustainable hardware solutions for hyperscalers and more – www.sesame.com

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Twitter: @sramkrishna, email: sriram.ramkrishna @ itrenew.com


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The ITRenew Difference

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Circular data center solutions that enable profitable, sustainable global growth for our customers

Two decades working with hyperscale technology and data centers

World's most secure decommissioning & data sanitization

Operations worldwide with 11 facilities globally

ByteDance Dropbox ebay facebook

ORACLE PayPal servicenow Uber

400+ employees

OPEN Compute Project®

Leader in driving the circular economy and data center transformation

First-ever sustainably sourced open HW compute, storage and networking solutions

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THE CIRCULAR IT HARDWARE INDUSTRY OPPORTUNITY

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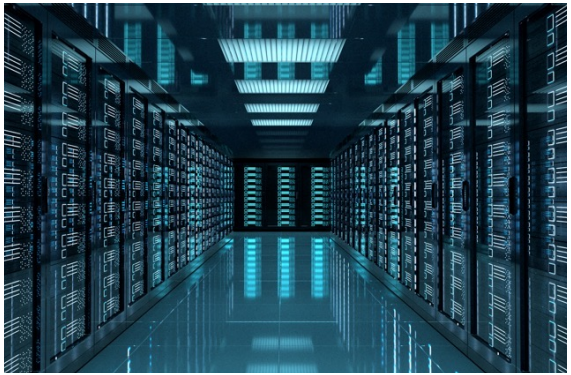
WHAT IF…



46

million servers

›

31

million tonnes CO2e

=

6.7

million cars' annual emissions