THE **LINUX** FOUNDATION

Annual Report 2020

Advancing open collaboration amid the challenges of a lifetime

www.linuxfoundation.org

Decentralized Innovation.
Built on Trust.

Our Mission:
Create the
greatest shared
technology
investment in
the history of
the world

Executive Director Update

2020 has been a year of challenges for the Linux Foundation ("LF") and our hosted communities. During this pandemic, we've all seen our daily lives and those of many of our colleagues, friends, and family around the world completely changed. Too many in our community also grieved over the loss of family and friends.

It was uplifting to see LF members join the fight against COVID-19. Our members worldwide contributed technical resources for scientific researchers, offered assistance to struggling families and individuals, contributed to national and international efforts, and some even came together to create open source projects under LF Public Health to help countries deal with the pandemic.

Our project communities continued to grow this year, with new initiatives across many open technology segments, open standards, open data, and open hardware. We welcomed over 150 new communities to the LF this year, including the FINOS Foundation which serves as an umbrella home for open source financial services projects.

Our events team had to undergo a significant transformation, pivoting over a few weeks from in-person to virtual events ranging from under 100 to tens of thousands of participants. These virtual gatherings helped many in our communities connect during this difficult time. We also learned much about potentially offering a more inclusive experience by providing hybrid in-person events with virtual experiences in the future. We've missed seeing many in our communities in person this year and look forward to seeing you all again when it is safe to do so.

Our training and certification team was able to help over 1.7 million individuals who enrolled in our free training courses. I want to congratulate the over 40,000 individuals who received LF certifications this year. The LF's 2020 Jobs Report shows trained and certified open source professionals are in demand and can easily demonstrate their value despite the challenging business environment.

As part of our ongoing diversity efforts and in joining the fight against inequality, our communities are focused on how they use language in their projects and finding mentors to guide the next generation

of contributors. Our communities, such as as the [Linux kernel team](#) and the [Inclusive Naming Initiative](#) launched at KubeCon North America, stepped up to enable progress in how we interact.

This year was a breakout year for our [Joint Development Foundation](#) and open standards communities. We welcomed six new projects building open standards. JDF has also been approved as an ISO/IEC JTC 1 Publicly Available Specification (PAS) Submitter. This year also marked that our first open standard community, [OpenChain](#), was formally recognized as an international standard through the PAS process. Today the Linux Foundation can take our communities from open source repository to a recognized global standard.

Many in our ecosystem have stepped up to help with security efforts this year. A new community, [Open Source Security Foundation](#) (OpenSSF), launched to coordinate efforts focused on improving the security of open-source software.

While we continue to battle challenges in the US, we also reaffirm that the LF is part of a global community. Our members had to navigate a year of changes in international trade policies and learned open source thrives despite politics. From around the world, our member communities engage in open collaboration because it is open, neutral, and transparent. Those participants clearly desire to continue collaborating with their global peers on challenges large and small.

At the end of a difficult year, all this taken together leaves us assured that open collaboration is the model for solving the world's most complex challenges. No single person, organization, or government alone can create the technology we need to solve our most pressing problems. On behalf of the entire Linux Foundation team, we look forward to helping you and our communities take on whatever challenges come next.

Jim

Jim Zemlin
Executive Director, *The Linux Foundation*

Update from the Chair of the Board of Directors

2020 has been an unprecedented year of challenges for us all. This year the Linux Foundation focused on delivering in the face of what are hopefully once in a lifetime challenges. We surveyed and interviewed developers, maintainers, and executives, asking why they support the Foundation throughout this year.

Overwhelmingly, the responses showed the LF had earned its reputation for being a neutral, global, trusted home for open collaboration. Further, we have confirmed that members value the Foundation's support programs, enabling our open communities to scale and build ecosystems.

The Linux Foundation remains financially strong thanks to the support of our 1,960 global members. The diversity of this support means no one member accounts for more than 2% of the financial sponsorship received this year. Our membership also comes from all industries and segments, enabling the Foundation to reinforce its place as a neutral and stable home.

In return, the LF staff have continued their energy, creativity, and countless hours to enabling open source communities to thrive in one of the most disruptive years I can ever recall. We continue to enable new industries and communities to discover the power of open source collaboration.

On behalf of The Linux Foundation Board of Directors, we thank you for your continued support of the open collaboration model that benefits thousands of organizations, industries, society, and billions of individuals worldwide. We wish you well in the coming year.

Nithya Ruff
Head of Open Source Program Office, *Comcast*
Chair of Board of Directors, *The Linux Foundation*

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Contents

Home to over 450 of the most important open source projects

Over the last 20 years, the Linux Foundation has expanded from supporting a single project, the Linux kernel, to many distinct project communities. Over 1,900 members and hundreds of thousands of developers are engaged in some of the most important and active open source projects, collaborating in cross-industry technology domains, such as cloud, security, blockchain, and the web.

Linux Foundation community projects by percentage of overall technology segment activity

- Cloud, Containers & Virtualization **19.0%**
- Networking & Edge **18.8%**
- Web & Application Development **11.2%**
- Cross-Technology **8.8%**
- System Engineering & Administration **8.8%**
- AI, ML, Data & Analytics **8.0%**
- DevOps, CI/CD & Site Reliability **5.7%**
- IoT & Embedded **5.1%**
- Blockchain **4.6%**
- Open Source Best Practices **4.1%**
- Linux Kernel **3.2%**
- Safety-Critical Systems **1.1%**
- Open Hardware **1.0%**
- Storage **0.6%**
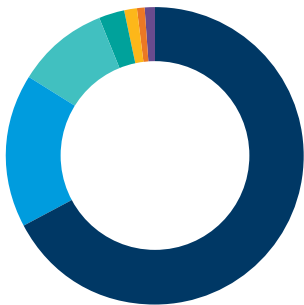
LF Projects by Industry Vertical

- Cross-Industry **67.3%**
- Telecommunications **16.6%**
- Financials **10.0%**
- Energy & Climate **2.9%**
- Motion Pictures **1.5%**
- Public Health & Disaster **0.7%**
- Automotive **1.0%**
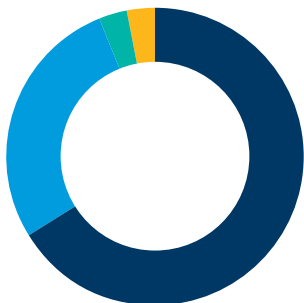
In the last 2 years, LF communities expanded into open standards, open data, and open hardware

- Open Source Software **66.4%**
- Open Standard/Specification **27.6%**
- Open Data **3.3%**
- Open Hardware **2.8%**

Our supported communities occupy a leadership role in the technology industry

From high-performance to computing to mobile devices, Linux is the most pervasive operating system in scientific research, as well as the technology and consumer electronics ndustries:

100%
of the world's supercomputers use Linux*

60%
of global auto shipments use Automotive Grade Linux

69%
of all embedded devices use Linux*

Let's Encrypt is the largest Certificate Authority in the world.*

Our leadership goes beyond Linux in cross-industry applications:

70%
of all the world's mobile telecom providers run ONAP

100%
of all public clouds use Kubernetes

50%
of the Fortune top 50 enterprise blockchain deployments use Hyperledger*

1B
Node.Js packages are downloaded every day

A sustainable community model: contributors and supporting members

Contributors

The Linux Foundation's open technology communities have been collaborating at scale this year. We are fortunate to be able to support the cooperation of the world's most important technology communities. And collaborate they did this year.

~1B	11,520	12.5M	10.8M
Total Lines of Code	Repositories	Lines of Code Added Weekly	Lines of Code Deleted Weekly

View more project statistics on

This year we also welcomed over 150 new projects, including the FINOS Foundation, which enables open technology collaboration for the financial services industry. Our new projects span open source software, open standards, open hardware, and open data.

The net results of these collaborative efforts are astounding. Just within our 450+ project communities alone, our communities have accumulated over time.

890K+
contributors including 440K core developers

18K+
companies contributing around the world

We wish to thank every person in our communities for the contribution of their expertise and time. While there are many ways to develop software, it often takes more work to do it in an open, productive, and collaborative manner. These communities have become the backbone of the world's society and operations.

Supporting Members

The Linux Foundation itself benefits from the support of a global membership of over 1,000 members. The Linux Foundation community of projects remains financially strong thanks to the support of nearly 2,000 global member organizations across all our project communities and entities. The diversity of our membership community means no single member accounts for more than 2% of the financial support received this year.

The Linux Foundation has made many investments to spread the benefits of open source throughout the world, and that has yielded strong support from countries including China, Japan, Germany, the UK, India, Canada, France, and Switzerland.

Our member community is global

- Americas **46%**
- EMEA **32%**
- APAC **22%**
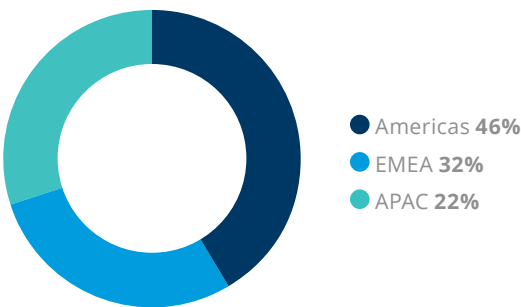
In the last 5 years...

800+
new members
added

+200%
growth in
membership

Thanking our communities and members, and building positive momentum as we look to 2021

The twin challenges of the COVID-19 pandemic and the resulting economic disruption have pressured traditional means of conducting business. Companies have needed to shift long-term plans and budgets abruptly, and uncertainty has been top of mind for most of the year. Despite these hurdles, this year, we have seen organizations further embrace open collaboration and open source principles, resulting in an acceleration in new technical efforts.

Not only have we seen strong new project additions this year, but these projects are bringing new organizations into our community. During the first 3 quarters of 2020, new project launches have attracted 75 new companies and organizations to join and participate as Linux Foundation members.

As we look to 2021, we see a diverse and growing pipeline of new projects across open source and standards and new demand to guide and develop projects centered around open data and open governance networks. Through the stress test of 2020, we remain focused on open collaboration as the means for enabling the technologies and solutions of the future.

We thank our communities and members for your continued confidence in our ability to navigate these uncertain times and for your lasting and productive partnerships. We wish you prosperity and success in 2021.

Members

Platinum

AT&T

ERICSSON

Facebook Open Source

FUJITSU

Google

HITACHI Inspire the Next

HUAWEI

IBM

intel

Microsoft

NEC

ORACLE

Qualcomm Qualcomm Technologies, Inc.

Red Hat

SAMSUNG

Tencent 腾讯

vmware

Gold

accenture

Alibaba Cloud

Baidu 百度

BLACKROCK

citrix

DELL EMC

Panasonic

RENESAS

SONY

TOSHIBA

TOYOTA

Uber

verizon media

WeBank 微众银行

Silver

#

1Kosmos Inc.
1NCE GmbH
2 Twelve Solutions
2ndQuadrant
6WIND S.A.
8base Inc.
99Cloud Inc.

A

A10 Networks
Aarna Networks
ABN AMRO
Abstract Destiny Lda
ACC ICT
Accurics
acend gmbh
Acornsoft
ACTIA Group
Acumatica Inc.
Adafruit
Adaptive Financial Consulting
    Limited
Adfolks LLC
Adobe Systems, Inc.
Adoriasoft Inc.
Adtran
Adva Optical Networking SE
Advanced Driver Information
    Technology
Advanced Micro Devices, Inc.
Adventium Labs
aeolabs
Aerospike
Aetna Inc.
Affirmed Networks Inc.
AfterShip Limited
Agenda d.o.o.
Agile Stacks
AGSX Pte. Ltd. (Amihan
    Global Strategies)
Ahana Cloud, Inc.
Airbiquity

Airbnb
Airbus SAS
AirMap,Inc.
Aisin AW Co., Ltd.
Aiven Inc
Akatsuki inc.
Alauda
Alcide
Alerant Zrt.
AllCloud Platforms Ltd
Alluxio, Inc.
Allwinner Technology, Co. Ltd.
Alpha Bravo
ALPS ALPINE
Altair
Alter Way Cloud Consulting
Altinity
Altoros
Altran Technologies
Amantya Technologies, Inc
Amazon Web Services, Inc.
Ambassador Labs
Amdocs (Development
    Limited)
American Express
American Superconductor
Ampere Computing
Anchnet
Anchore Inc.
Anheuser-Busch InBev SA/NV
Animal Logic Pty Ltd
Anjuna Security, Inc.
Anne Inc.
Anonyome Labs, Inc.
Anqlave Pte Ltd
Ant Small and Micro Financial
    Services Group Co., Ltd.
Anthem, Inc.
ANTMICRO LTD
anynines GmbH
Apolicy.io, Inc.
Apollo GraphQL
Appddiction Studio

Apple
Apptio
Appvia Ltd.
Aqua Security Software, Inc.
ArangoDB
Arcadyan
Arcontech Group PLC
Arctiq Inc.
Arduino
Arista Networks
Arkamys
Arm
Armory Inc
Arrikto Inc.
AsiaInfo Technologies (China)
    Co., Ltd.
Aspen Mesh
Astra Linux
ASUS Cloud Corporation
Atlassian Inc.
Audiokinetic Inc.
AuriStor Inc.
Autodesk
Automatic Data Processing, Inc.
Avanza Innovations IT
    Solutions LLC
Aviz Networks
Axelerant Technologies, Inc.
Axis Communications

B

Balena, Inc.
Bank of America Corporation
Bank of New York Mellon
Banzai Cloud
basysKom GmbH
BayLibre Inc.
BearingPoint GmbH
BedRock Systems Inc.
Beechwoods Software, Inc.
Beijing Big Data Co.,Ltd.
Beijing ByteDance Network
    Technology Co., Ltd.

Beijing Kingsoft Cloud
    Internet Technology
Beijing Proinsight Technology
    Co., Ltd.
Beijing Teamsun Technology
    Co., Ltd
Beijing Truth Technology Co.,
    Ltd.
Beijing Xuyun Technology
    Co., Ltd
Bell Canada
Benchmark Corporation
BeOpenIt
BinaryStar
Biqmind Pte Ltd
BitDefender
Blameless Inc
Blockchain Technology
    Partners
Blockchain Training Alliance
Blockforce
Blockstream
Bloomberg L.P.
Blue Sentry
Blue Sky Studios, Inc.
BMW
BondEvalue Pte. Ltd.
Booz Allen Hamilton
Bosch
Bose Corporation
BoxBoat Technologies
Breakaway Consulting
Bridgecrew
BrightHive Inc
Brison Inc.
Broadcom Corporation
Broadridge Financial Solutions
Brobridge
BSOS Tech
Buoyant, Inc.
Business-intelligence
    of Oriental Nations
    Corporation Ltd

C

CA Technologies
CableLabs
Caicloud
Calastone Limited
Camptocamp SA
Candera GmbH
Canonical Group Limited
Capital One Services Inc.
Capsule8
Carbon Relay
Catalyst Cloud
CertusNet Inc.
Chainstack
Chainyard
Change Healthcare
Charter Communications
ChartIQ, Inc.
Chef Software Inc.
Chengdu Yuan Lai Yun Zhi
    Technologies Inc.
China Merchants Bank
China Mobile Communication
    Company Ltd
China Standard Software
    (Beijing) CO., LTD
China Systems Holdings
    Limited
China Telecommunications
    Corporation
China Unicom
China-ASEAN Information
    Harbor Co., Ltd
Chronosphere, Inc.
Ciena Corporation
Cinemo GmbH
Cirba d/b/a Densify
CircleCI
Circulor Ltd.
Cirrus Logic
Cisco Systems Inc.
Citi
Clear Blockchain
    Technologies Pte Ltd
Cloud 66
Cloud CMX Pty Ltd

Cloud9 Technologies LLC
Cloudbase Computer System
    (Jinan) Co., Ltd.
CloudBase Solutions
CloudBees, Inc.
CloudBolt Software
Cloudbrink Inc.
CloudCover Pte. Ltd.
Cloudeasier
Cloudera Inc.
CloudHero
Cloudical
Cloudify Platform Ltd.
CloudIQ Technologies
Cloudocracy
CloudOps Inc.
Cloudreach
CloudRoute Solutions
Cloudsoft Corporation Ltd
CloudThat Technologies
CloudWize
CloudYuga
CLS Bank International
Clyso GmbH
CME Group Inc.
Cockroach Labs
Codasip s.r.o.
Codefresh, Inc.
Codethink
CodiLime Sp. z o.o.
Cog Systems
Cognition Foundry
Cognizant Technology
    Solutions
Collabora Ltd.
Comcast
comforte AG
Common Computer
CommScope Inc.
Commvault
Component Soft
Concept Reply
Concurrent Real-Time Inc.
Conductor Technologies, Inc
Conduent
Conoa AB

ConsenSys AG
Container Solutions BV
Continental Automotive
    Systems
Contino
Continuum Loop Inc.
ControlPlane
CoreHive Computing LLC
Cosmian Tech SAS
CoSoSys S.R.L.
Couchbase, Inc.
crave
Cray Inc.
Creationline, Inc.
Creativehill
credativ International GmbH
croit GmbH
Crunchy Data Solutions, Inc.
Cryptape Technology Co., Ltd.
CTO.ai
CubeIGX
Cuemby Inc.
CULedger, LLC
Cumulus Networks, Inc.
Cyber Armor
CyberArk Software, Inc.
Cybertrust Japan Co., Ltd.
Cybozu
Cycloid

D

D2iQ
DAIMLER TSS GmbH
DaoCloud (Shanghai
    DaoCloud Network
    Technology Co, LTD)
Darumatic
DATA AHEAD AG
Data Essential
Databricks Inc.
DataCore
Datadog, Inc.
Datadrivers
DataStax, Inc.
Datto, Inc.
Daynix Computing LTD

DB Systel GmbH
DBE Core
Debricked
Deepdive Digital Technologies
    International Inc.
Deepfence
Deepshore GmbH
Dellfer, Inc.
Deloitte Consulting LLP
Delta Electronics Worldwide
Dembach Goo Informatik
    GmbH & Co. KG
DENSO CORPORATION
DENX Software Engineering
DeployHub, Inc.
Depository Trust and
    Clearing Corporation
    (DTCC)
Desay SV Automotive
Desotech srl
Deutsche Bank AG
Deutsche Borse AG
Deutsche Telekom AG
DevOps Institute
DevSpace Technologies Inc.
Dgraph Labs, Inc.
Dhiway Networks Private
    Limited
Diamanti
Dianomic
Diffblue Ltd
DigiCert, Inc.
Digital Asset Holdings, LLC
DigitalOcean
Discover Financial Services
Distributed Ledger
    Technologies (DLT) Pte Ltd.
DLT Global Inc.
DNEG
Doc.ai
Docker, Inc.
DoiT International
DornerWorks, Ltd.
Dotscience
dq technologies AG
DrimAES

DriveNets
DriveScale, Inc.
Dynatrace LLC

E

Easy Visible Supply Chain
   Management Company
   Limited
EasyStack Inc.
eBaoTech International Pte Ltd
eBay, Inc.
EDF
Edgecore Network
   Corporation
Edgeless Systems
EDMI Limited
efabless Corporation
effx inc.
Eficode Oy
Elasticsearch, Inc.
Elastisys AB
ELASTX
Electronics and
   Telecommunications
   Research Institute (ETRI)
Elektrobit Automotive GmbH
Elementl
Elering AS
Elotl
emlix GmbH
EMURGO
Endocode
ENEA Software AB
EngineerBetter Ltd
Entigo OÜ
EPAM Systems
Epic Games, Inc.
Epsagon
Equinix
Equinix Metal
esatus AG
Esperanto Technologies Inc.
Estateably Inc.
Evernym, Inc.
EWELL TECHNOLOGY Co., LTD
Exoscale

Exotanium Inc.
Experian Information
   Solutions, Inc.
Extreme Networks, Inc.

F

F5 Networks, Inc.
Fairwinds Ops, Inc
Fauna
Federal Express
Federated Wireless
Fidelity Investments
Finicity
Flant
Flowchain
Flowmill Inc.
FogHorn Systems
Ford Motor Company
ForgeRock US, Inc.
Fortanix
FOSSA
FossID
Foundries.io LTD
Foxconn Industrial Internet
   Co. Ltd.
Freddie Mac
ftrack AB
Fullstaq
Futurewei Technologies, Inc.

G

G-Research
Garden Technologies Inc.
Gatsby Inc
GE
Genesis Global Technology
   Limited
Genesys
Geometer
Ghost Locomotion Inc.
Giant Swarm
GitHub, Inc.
GitLab, Inc.
Gitpod
Global Peersafe Technology
   Corp

Globe Telecom, Inc.
Globo
GoDaddy
Goldman Sachs
Grafana Labs
Grape Up Sp. z.o.o.
Gravitational, Inc.
Green Hills Software LLC
GreenKey Technologies
Gremlin, Inc.
Grey Matter
GT Software, Inc.
Guangdong OPPO Mobile
   Telecommunications
   Corp., Ltd.
Guangzhishu (Beijing)
   Technology Co., Ltd.
Guida

H

HackerOne
Hammerspace
Hangzhou Eastcom Software
   Technology Co., Ltd
HANGZHOU EMQ
   TECHNOLOGIES CO., LTD.
Hangzhou FIT2CLOUD
   Information Technology
   Co., Ltd
Hangzhou HarmonyCloud
   Technology LTD.
Hangzhou Langhe Technology
   Co. Ltd. (Netease)
Hangzhou Launcher
   Technology Co., Ltd
HAProxy Technologies
Harness.io
HashiCorp
Hasura Technologies
HCL Technologies Ltd.
Hedera Hashgraph LLC
HENSOLDT Cyber GmbH
HERE Global B.V.
Herron Tech
Hewlett Packard Enterprise
High Peak Data, inc

HomeAway.com, Inc.
Honda R & D Co. Ltd.
Hortonworks, Inc. (acquired
   by Cloudera)
HP Inc.
HSA Foundation
HSBC
Humio
Hyperloop One
Hyundai Mobis Co., Ltd.
Hyundai Motor Company
Hyve Managed Hosting

I

IdRamp
iExec Blockchain Tech
IFS World Operations AB
Igalia S.L.
IGNW
iguazio
ILKI FRANCE
Imagination Technologies
   Group Ltd.
Imperas Software Ltd
In2tive FZCO
Indeed, Inc.
InfluxData Inc
Infoblox Inc.
InfoSiftr, LLC
Infosys Limited
Infracloud Technologies INC
Infranetes sp. z o. o.
infranics
innogrit Corporation
Innovium, Inc.
iNNOVO Cloud Gmbh
inovex GmbH
Input Output HK Limited
INS Lab Inc.
Inspur
Instaclustr
Instana
IntellectEU
Intelligent Systems Services
Intrinsyc Software, Inc.
Intuit, Inc.

Intuitive Technology
    Partners, Inc.
InwinSTACK
Ionir
IOS Foundation
IoT.bzh
IOTech Systems Limited
IOV Labs Ltd
IPChain Association
ITGilde B.V.
ITRenew
IVIS Automotive Solutions

J

JD Cloud
Jetstack
JFrog Inc.
Joisto Group Oy
JPMorgan Chase
Jump Operations, LLC
Juniper Networks, Inc.
JVC KENWOOD Corporation

K

KABN Systems North
    America Inc.
Kaloom Inc.
Kasten, Inc.
KBSYS Inc
KDDI Corporation
Kentik
kerlink
Kernkonzept GmbH
Keysight Technologies, Inc.
Kinvolk GmbH
Kioxia Corporation
Kiratech
Kloia
KNS Group LLC (trademark
    YADRO)
KodeKloud
KompiTech
Kong Inc.
Konsulko Group
Korea Securities Depository
KPIT Technologies Limited

Krypc Corporation
KubeMQ Ltd.
Kubermatic
Kubernative GmbH
Kublr
KUKA Deutschland GmbH
Kumina B.V

L

L4B Software GmbH
Lablup Inc.
Lacework
Laird Connectivity, Inc
Lawrence Livermore National
    Labs
Layer5
LeanIX Gmbh
Lear Corporation
Ledger Leopard
LedgerDomain Inc
Lenovo (United States) Inc.
Lenses.io Ltd.
LF AI Foundation
LG Electronics
Liferay, Inc.
Lightbend
LightStep, Inc.
Linaro Limited
LINBIT
Lineo Solutions, Inc.
LinkedIn Corporation
Linode
Linutronix GmbH
Liquidus
LMAX Exchange Ltd
LogDNA
Logiq.ai Inc.
Logz.io
LPI.org
Lumedic Acquisition Corp
Luxoft Global Operations
    GmbH

M

MacStadium
MADANA

Magalix Corporation
Mail.Ru Cloud Solutions
Marelli Corporation
Marvell International Ltd
MasterCard Incorporated
MathWorks, Inc.
Matrix I.T CloudZone LTD
MATRIXX Software
Mattermost Inc.
Mavenir Systems, Inc.
MayaData
Mazda Motor Corporation
MBDA Italia S.p.A
McKinsey & Company
Mechanical Rock
MediaTek USA Inc.
MediConCen Limited
MegaEase, Inc.
Meinberg Funkuhren GmbH
    & Co KG
Mellanox Technologies, Ltd
MERA
Metrics Design Automation Inc.
MetroStar Systems
Mia-Platform
Micro Focus
Microchip Technology
    Germany GmbH
Micron Technology
Micware Co. Ltd.
Milligan Partners
Mindtree Limited
Minio, Inc
Mirantis Inc.
Mitsubishi Electric
    Corporation
Mitsubishi Motors
    Corporation
MobiledgeX
Mobilise Cloud Services
Mocana Corporation
Monax Industries Limited
Monetago Inc
Monostream AG
MontaVista Software, LLC
Morgan Stanley

Morpheus Data
Moscow Exchange (MICEX-RTS)
MotionMobs
Moxa Inc.
MSys Technologies
MUFG Union Bank
Murphy & McGonigle, P.C.
MYCOM OSI

N

N-Able Opleidingen B.V.
N3NCLOUD
NAMUTECH Co., Ltd.
Nanjing eCloud Technology
    Co., Ltd.
National Instruments
    Corporation
Navitas Business Consulting
    Inc.
NCC Group
NCSOFT Corporation
Nebulaworks
Nebulon
Neo4j, Inc.
NEOS
NetApp, Inc.
Netdata
Netflix
NetFoundry
Netgate
Netris
Netronome Systems, Inc.
NetScout Systems, Inc.
NETSIA Inc.
Neualto Technologies Private
    Limited
NeuVector Inc.
New Context
New H3C Technologies Co.,
    Ltd.
New Relic, Inc.
nexB Inc.
NexCloud
Nextiva
NGINX International Limited
NIPA

Nippon Seiki Co. Ltd.

Nirmata

Nobl9

Nokia Corporation

Nomura Group

Nordic Semiconductor ASA

Noris Network AG

NS1

NTC IT ROSA LLC

NTT Corporation

NTT DATA MSE
CORPORATION

NUC Chain

Nutanix, Inc.

NVIDIA Corporation

NXP Semiconductors
Netherlands B.V.

O

OctopusDeploy

OGIS-RI Co., Ltd.

Okta Inc.

Omnibond Systems LLC

Open Source Consulting Inc.

Openet

OpenFin

OpenNebula

OpenNode

OpenSynergy GmbH

Opsani

opscruise

OpsMx

Optherium Labs

Opto 22

Orange S.A.

Ori Industries

Origoss Solutions

OSADL eG

Osaka NDS Co., Ltd.

OSIsoft

Oteemo

Oticon A/S

OverOps Inc.

OVH SAS

OVO Automotive Ltd

Ovoo Spó?ka z o. o.

P

Padok

Palo Alto Networks

Pantheon.tech

Paragon Software GmbH

Paramount Software
Solutions Inc.

Particule

PayPal

Pegasystems Inc.

phala network

Phoenix Software International

pileus

Ping An Technology
(Shenzhen) Co., Ltd

Pinterest

Pioneer Corporation

Pixie Labs Inc.

PJSC "MMC" Norilsk Nickel

PlanetScale Data

Plat'Home Co., Ltd

Platform9 Systems, Inc.

Platformer Cloud Pty Ltd

Polar Squad

Polyverse Corporation

Portainer.io

Portshift

Portworx Inc.

Poste Italiane SPA

Postman

Pramati Prism, Inc.

Pravici LLC

Precisely Holdings, LLC

Pricewaterhouse Coopers LLP

Prisma - Graphcool, Inc.

PRODYNA

Projixi Europe

ProsperOps

PT Biznet Gio Nusantara

PT Boer Technology (BTech)

Public Mint Inc

Pulumi

Puppet, Inc.

Puzzle ITC GmbH

Q

Qamcom Group AB

QAware GmbH

QingCloud Technologies
Corp.

Qiniu Limited

Qovery

Quant Network

Quanta Cloud Technology Inc.

Quobyte

R

R3 LLC

RackN, Inc.

Rackner

Rackspace US, Inc.

Radisys Corporation

Rafay Systems

Raft

Rakuten, Inc.

Rancher Federal

Rancher Labs Inc

RBC Capital Markets, LLC

rdx.net

Reblaze

Recurve

Red Kubes B.V.

Redeploy

Redis Labs

Refinitiv

ReGov Technologies Sdn Bhd

Reliance Jio Infocomm
Limited

Replicated, Inc.

Revelry Labs

Ribbon Communications
Operating Company, Inc.

Ricker Lyman Robotic
Company, Inc. (Hivecell)

Ricoh Company, Ltd.

RIFT, Inc.

Ripple, Inc.

Robin.io

Rocket Software, Inc.

RodeoFX

Rookout

Root9B, LLC

RStudio PBC

RTE (Reseau de Transport
dElectricite)

RX-M, LLC

S

SAIC

SAIC Foundation Ltd.

SAIC Motor Corporation Ltd

Sakura Internet Inc.

Salesforce.com

Salsify

SANCLOUD LTD

SAP

Sauce Labs

Savoir-faire Linux

SBERBANK

Scaleway

Scality

Scalyr

ScanTrust SA

Schréder S.A.

Schwarz IT KG

Seagate Technology LLC

Section

SecureKey Technologies, Inc.

Sensu, Inc

Serverless

servicememe

SES Networks

Shanghai Fusion Fintech Co.
Ltd

Shanghai Pudong
Development Bank

Shanghai Vonechain
Information Technology
Co., Ltd

Shenzhen Forms Syntron
Information Co. Ltd

Shenzhen Goodix Technology
Co.,Ltd.

Shenzhen Jiangxing
Intelligence Inc.

Shenzhen Wise2C
Technology Co.,Ltd

Shenzhen Yunduan Software Ltd.

Shenzhen ZhiLiu Technology Co., Ltd.

Shipa

Shopify

Sibros Technologies

SICPA SA

SideFX (Side Effects Software Inc)

Siemens AG

SiFive

SIGHUP s.r.l.

SignalFx

Silicon Valley Bank

SIMBA Chain

Sine Nomine Associates

SingleStore

Sinorail Hongyuan (Beijing) Software Technology Co., Ltd.

Sirius XM Radio Inc.

SiteWhere LLC

Sivantos GmbH

SIX Digital Exchange (SDX)

Smart Block Laboratory

SmartBear Software

Smartiful, Inc.

Snapt

Snyk Ltd.

Softax SP.j.

SoftIron Inc

Software AG

SOFTWARE ENGINEERING GmbH

SoKube

Solo.io

Sonatus, Inc.

Soramitsu Company Ltd

Sosivio

Southbridge LLC

Sparkfabrik

Spectral

Spectro Cloud Inc

Spirent Communications Inc

Spireon, Inc.

Splunk Inc.

Spotify Sweden AB

Sprint Corporation

SquareSpace

StackHawk

StackPulse

StackRox

Stackwatch Inc

Stakater AB

Starburst

Stark & Wayne LLC

Sterlite Technologies Limited

STMicroelectronics International N.V.

StorageOS Ltd

Storj Labs

Storm Reply GmbH

StorPool Storage AD

StreamNative

Structsure, LLC

Styra

SUBARU CORPORATION

Sugon Cloud Computing Group Co., Ltd.

Sumo Logic

Super Micro Computer, Inc.

SUSE LLC

Suzhou Beyondcent & Software Co., Ltd. (BoCloud)

Suzuki Motor Corporation

SVA System Vertrieb Alexander GmbH

SWIFT, INC.

Swisscom

Symbridge LLC

Symphony Communication Services LLC

Synadia Communications

Synopsys

Sysdig

SysEleven Gmbh

SYSGO GmbH

T

Talend, Inc.

Talos Systems

Tangem AG

Target Corporation

Tata Communications Limited

TDT AG

Tech Mahindra Ltd.

Tecton, Inc.

Tectonic Labs Ltd.

teenage engineering

Telechips, Inc.

Telecom Italia Mobile (TIM) S.p.A.

Telefonica

TenneT

Tensor Networks

TenxCloud

TeraSky

Ternary

Tetrate.io

Teuto.net Netzdienste GmbH

Texas Instruments Incorporated

Thales

The Foundry Visionmongers Limited

The Guild

The Qt Company

The Scale Factory

The Walt Disney Studios

Thought Machine Group Ltd.

Threat Stack Inc.

Thunder Software Technology Co. Ltd.

Tidelift

Tigera

Timescale

Timspirit

TmaxA&C

Tokentrust AG

TORO Cloud

Total Cross

Toyota Tsusho Corporation

Traefik Labs

Trail of Bits

Transwarp Technology

(Shanghai) Co., Ltd

Travelping GmbH

TriggerMesh Inc.

Trilio Data

Troon Technologies

Tufin Technologies

Turbonomic (fka VMTurbo)

Turbot

Türk Telekomünikasyon A.S.

Tuxera Inc.

Twitter

Tyk Technologies Ltd.

TYNYBAY Inc

U

Ubiquitous AI Corporation

UBS Business Services AG

UCloud Information Technology (HK) Limited

ULAK HABERLESME A.S.

Unbound Tech Ltd.

Unicorn systems a.s.

Unity Technologies

Univa Corporation

Upbound

Upsolver, Inc.

USAA

V

VA Linux Systems Japan K.K.

Valid Network

Valve Corporation

Vapor IO

vChain, Inc.

Vela

Ventus Cloud AG

Verizon Communications

VEXXHOST, Inc.

Viable Data

Vicom Infinity, Inc.

Virtasant

Visa

Visma Connect BV

VitalHub Corp.

vivo Mobile Communication Co., Ltd

VLINGO LLC

VNC Automotive Limited

Vodafone Group Services
Limited

VoerEir AB

Volkswagen
Aktiengesellschaft

Volterra Inc

Vonage Holdings Corp.

VSHN AG

W

Wallarm

Walmart

Wangsu Science &
Technology Co., Ltd.

We.Trade Innovation DAC

Weaveworks

Wegmans Food Markets

Wells Fargo

Western Digital Corporation

Weta Digital Limited

WhaTap Labs Inc

WhiteSource

WhizUs GmbH

Wind River Systems, Inc.

Windmill Engineering

Wipro Limited

Wistron NeWeb Corp.

Witekio Holding

Witz Corporation

Wrapious Marketing Co Ltd

Wuhan Deepin Technology
Co.,Ltd

X

x-ion GmbH

XenonStack Inc.

Xevo (formerly UIEvolution)

Xi'an Zhigui Internet
Technology Ltd.

Xiaoju Science Technology
(Hong Kong) Limited

Xilinx, Inc.

Xooa Inc

XSKY (Beijing) Data
Technology Corporation
Limited

Y

Yahoo Japan Corporation

YLD! Limited

Z

Zafin Labs Americas Inc.

Zebrium, Inc.

ZEDEDA, Inc.

Zenlayer Inc

Zerto

Zettabytes, Inc.

Zettaset, Inc.

ZF North America, Inc.

Zhongchao CreditCard
Industry Development Co.,
Ltd. Hangzhou Blockchain
Technology Research
Institute

Zilliz

Zoss Team, LLC

ZTE Corporation

2020:
A Year of Challenges

2020 presented many challenges for the LF, our communities, members, and staff. A global pandemic, trade wars, and an inability to meet in person raised the bar for collaboration

In Memoriam: Dan Kohn

Dan Kohn played a special role at the Linux Foundation. He helped establish the organization that we are today and oversaw the fastest growing open source community in history, the Cloud Native Computing Foundation. Dan was also a pioneer. In 1994 he conducted the first secure commercial transaction on the internet after building the first web shopping cart.

What you may not know about Dan was his lifelong desire to help others. From serving as a volunteer firefighter in college to stepping aside from his role in the Cloud Native Computing Foundation to incubate and found the Linux Foundation Public Health initiative, which helps authorities around the world combat COVID-19, Dan could always be counted on in a crisis. He was truly proud to have impacted so many lives through his work here.

It was his wish that we carry on in the spirit of collaboration and generosity in establishing LF Public Health as a shared resource not just to fight the coronavirus, but to combat future health crises. We will honor his legacy by doing just that, not only in public health but in all of the important work we do.

Our communities take on COVID-19

☐LF PUBLIC HEALTH

LF Public Health (LFPH) is the newest vertical industry community at the Linux Foundation. LFPH was born out of public health authorities' need to address the COVID-19 pandemic with technology-driven solutions. Its first projects, COVID Green and COVID Shield, are open source implementations of exposure notification apps using APIs implemented by Apple and Google for their respective mobile platforms (GAEN).

Besides hosting these two open source projects, LF Public Health provides various collaboration opportunities via its Implementer's Forum to enable countries and regional governments to decide on and implement best practices. Notable topics for discussion within the forum among participants include Bluetooth attenuation settings, adoption and rollout campaigns, privacy, and legal documentation. Whether public health authorities use one of the LFPH-hosted apps or a different option, they benefit from access to a neutral forum for collaboration.

We've focused this year on growing this community and developing deep relationships with public health authorities. As a result, we've got 504 members in our Slack community and representatives from 19 US states and territories and 22 countries (as of this writing). Our two projects are in production in 6 countries plus 4 US states with more on the way. Also, we've started a monthly cadence of events providing in-depth information on the GAEN framework and have been able to spur some meaningful engagement from them.

LFPH represents the future of where open source industry collaboration can go to address global pandemics and other societal issues.

ISRG

[Internet Security Research Group (ISRG)](#) is a public charity providing the digital infrastructure for a more secure and privacy-respecting world. They operate Let's Encrypt, the world's largest certificate authority, securing traffic for more than 225 million websites.

Let's Encrypt

[Let's Encrypt](#) is focused on ease of use and efficiency. Ease of use breaks down technological and education barriers to security, and efficiency allows them to offer free services globally.

Their focus on efficiency is also what makes them one of the best places to invest in a more secure and privacy-respecting world. As a nonprofit, they depend on corporate sponsorship and individual giving to continue providing their critical services.

ISRG will soon launch its second major service—ISRG Prio Services. In partnership with Linux Foundation Public Health, ISRG Prio Services will use Prio technology to protect the metrics data collected by COVID-19 Exposure Notification applications. COVID-19 applications can only be effective if people use them, and people will only use them if they trust that the metrics collected will not be abused. ISRG is one of the most widely trusted technology nonprofits and is ideally positioned to bring trust to application ecosystems.

"The global pandemic may divide us, but the LFX Linux Kernel Mentorship Program connected me back to the world. Thanks to my mentor, Greg Kroah-Hartman, I was able to fix 19 bugs all over the kernel. I learned how to work with the welcoming kernel community and deepened my understanding of how the kernel works. It has been an exhilarating and meaningful experience. I would definitely recommend it to you!"

Peilin Ye
Linux Kernel Bug Fixing
Project Mentee
(seen here climbing Mount Fuji)

OPEN MAINFRAME PROJECT

COBOL
Programming Course

More than [12 million people in the United States have filed for unemployment](#) amid the COVID-19 global pandemic. As these numbers continue to grow, governments and businesses are overwhelmed by both health and technology challenges. For example, states were not equipped to process the unprecedented volume of unemployment claims in such a highly accelerated time frame.

Mainframes have been quietly managing large data processing for decades as their reliability, availability, security, scalability, and performance cannot be matched. A part of this core system is COBOL, a programming language that has helped run some of the world's largest companies' most mission-critical services applications. There are an estimated 220 billion lines of COBOL in use today, and recent events have showcased a continued need for developers skilled in this language.

In response to the urgent need for COBOL talent, [Open Mainframe Project](#) worked with members to quickly create resources that helped connect, educate, and train new or seasoned developers with those who needed them the most.

The project launched a [COBOL volunteer resource](#) that connects developers seeking employment with agencies and business, [a Q&A forum](#) for new developers, [a Training Course](#), which offers introductory-level materials and hands-on labs, and [a COBOL Working Group](#) that aims to promote its continued usage, learning, and discourse at colleges and universities. To date, these resources have helped connect or educate more than 5,000 COBOL developers, students, and mainframe professionals.

Simply put—there was a call for help, and the Linux Foundation's Open Mainframe Project answered that call.

Resiliency in the face of global challenges

Our communities were resilient in spite of global challenges, continuing to collaborate, meet virtually, and achieve milestone releases with their software projects

"I went from learning to send patches to contributing to the core kernel participating in the Linux Kernel Mentorship Program. **The pre-requisite and skill-evaluation tasks during the application process are designed such that even beginners can start contributing.** With support from a great mentor and different subsystem maintainers and reviewers, I learned a lot working on the RCU Hardening project. I strongly recommend LKMP to everyone interested in contributing to the Linux Kernel."

Madhuparna Bhowmik
Linux Kernel Mentorship RCU Hardening Project Graduate

The Linux kernel: One million code commits and still going strong since 1991

Linux kernel version 5.8 release was the largest release in the 29 years of history of the kernel. The release occurred during the pandemic and contributions from 1,991 individuals (oddly 1991 is the year the Linux kernel was started). The online kernel community culture remains vibrant and engaged despite the global pandemic. The 5.9 maintenance release included the one millionth commit to the Linux kernel, a contribution from Ricardo Neri-Calderón at Intel. The initial 5.10–rc1 release is already nearly as large as the 5.8 release, with over 1,700 people contributing—so far.

The Foundation's 2020 Linux Kernel History report was the first to use the code archaeology tool cregit from the CHAOSS project to detail the kernel history trends since creation. One interesting finding is there are still many remnants of the original kernel releases, and roughly 50% of the kernel codebase was contributed within the last 6 years.
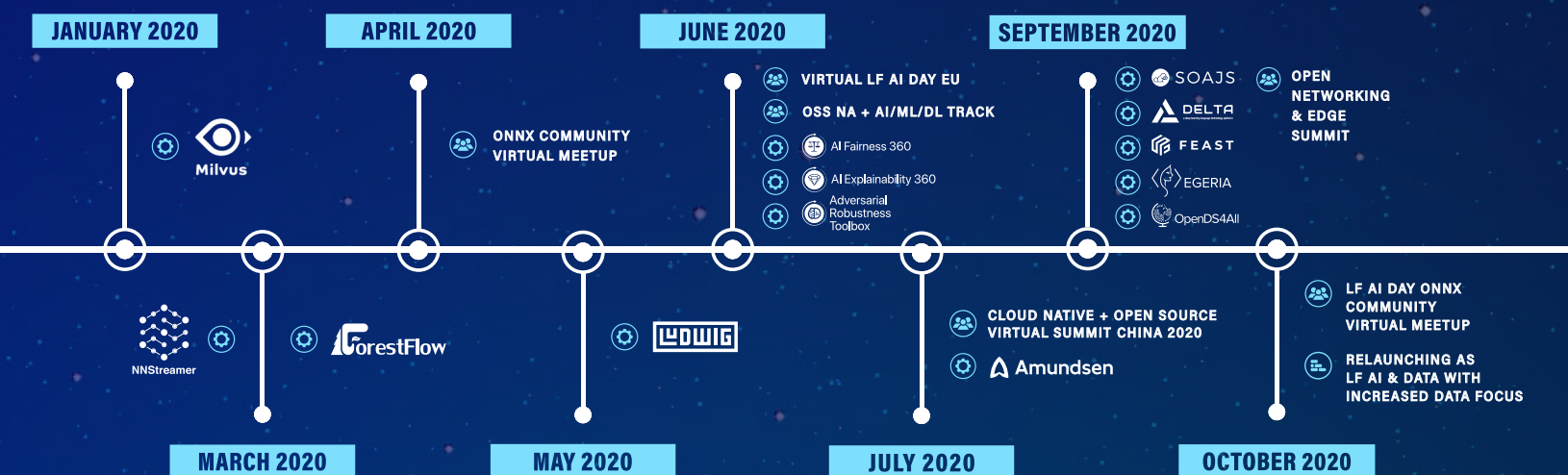
In 2020, the Linux kernel earned a gold CII best practices badge, demonstrating that the project applies security best practices. This is important as we see the Linux kernel now being used in products where security and safety-critical considerations are essential, from medical devices to autonomous vehicles and spacecraft. Congratulations to the Linux kernel developer community on an amazing year.

Community Highlight

The LF AI & Data Foundation builds and supports an open community and a growing ecosystem of open source AI, data, and analytics projects by accelerating development and innovation, enabling collaboration, and creating new opportunities for all the community members.

LF AI started just focused on AI projects. This year our communities focused on data analytics saw value in collaborating, and multiple communities joined together to create "LF AI & Data." With an expanded scope, our community continues to grow both in terms of members and projects. On average, we're adding one new member and one new project per month. At the time of writing this report, LF AI & Data has 37 members and hosts 22 projects. The projects cover open source, open data initiatives, and open standards that everyone in the world relies on for AI and data analytic systems.

Timeline

JANUARY 2020
- Milvus

MARCH 2020
- NNStreamer
- ForestFlow

APRIL 2020
- ONNX COMMUNITY VIRTUAL MEETUP

MAY 2020
- LUDWIG

JUNE 2020
- VIRTUAL LF AI DAY EU
- OSS NA + AI/ML/DL TRACK
- AI Fairness 360
- AI Explainability 360
- Adversarial Robustness Toolbox

JULY 2020
- CLOUD NATIVE + OPEN SOURCE VIRTUAL SUMMIT CHINA 2020
- Amundsen

SEPTEMBER 2020
- SOAJS
- DELTA
- FEAST
- EGERIA
- OpenDS4All
- OPEN NETWORKING & EDGE SUMMIT

OCTOBER 2020
- LF AI DAY ONNX COMMUNITY VIRTUAL MEETUP
- RELAUNCHING AS LF AI & DATA WITH INCREASED DATA FOCUS

INFO@LFAI.FOUNDATION   TECHNICAL PROJECTS   FOUNDATION   COMMUNITY

Ecosystem Building & Value Creation Transition

Our supported communities and members create centers of gravity for open collaboration across technology and vertical segments

Community Highlight

FINOS
Fintech Open Source Foundation

FINOS (Fintech Open Source Foundation) was founded in 2018 to accelerate collaboration in the financial services industry through open source software, standards and development practices. In a short time, the nonprofit has become the trusted forum for open source collaboration among major financial institutions, including 7 of the top ten investment banks globally. FINOS formally became part of the Linux Foundation in 2020.

Early on, FINOS members recognized that as part of a highly regulated industry they would face unique challenges when contributing to open source projects and standards. The FINOS community began working together to develop resources that they could all use to advance their open source maturity. Initial resources included guides explaining the business value of participating in open source, a license compliance handbook, and an open source readiness guide. This work continues in the FINOS Open Source Readiness initiative and the FINOS Open Developer Platform project.

Helping banks establish the policies and processes that enable them to not only to further consume open source but most importantly to contribute in a safe and compliant manner is an essential step to unlocking the open source potential of the financial services industry. Combining this with FINOS' position as a neutral body that provides appropriate governance, processes, and policies for this highly regulated industry has proven to be a successful strategy as FINOS has seen a record number of open source contributions from banks in 2020.

With 30+ member firms and participants from the buy-side, sell-side, technology, and services firms, FINOS is the umbrella for collaboration on projects that provide both technical and business value to its community. Visit landscape.finos.org to learn more about the FINOS projects and standards, including Goldman Sachs' flagship data management and data governance platform, Legend, contributed in October 2020.

Our communities are driving innovation across the technology spectrum and in key industry verticals.

[Vertical industries are under constant pressure to innovate](#), facing the challenges of supply chains, diverse customer requirements, regulations, and a lack of talent to do everything leadership may envision in any complex business.

These industries understand that their individual ownership of intellectual property for parts of their software stack is limiting in terms of business opportunity and expensive in terms of development and maintenance. To accelerate adoption, openly working together on common infrastructure components presents more opportunities for business growth.

While all of these vertical industries have unique open source projects and communities, they also share a common thread: all of them realize that open collaboration presents opportunities for reducing costs, reducing time to market, improving quality and increasing innovation, and opening new areas of competition.

Our members in the automotive, motion picture, fintech, telecommunications, energy, and public health verticals are transforming business processes and assets into software-defined assets, building strategic frameworks that gives them a competitive edge that only open source can provide.

"Top-quartile company adoption of open source has three times the impact on innovation than companies in other quartiles."

Source: McKinsey and Co, April 2020, "[Developer Velocity: How Software Excellence Fuels Business Performance](#)."

Communities Building Ecosystems

⊓LF NETWORKING

The global pandemic has made clear just how important networking technologies are to our societies and economies. And the only way these networks can continue to meet our global community's needs is through software-defined networking, a hybrid model for network functions, cloud-native applications running increasingly over the edge, and private, public, and hybrid clouds.

LF Networking focuses on collaboration across the global telecommunications ecosystem, improving contributions to open source projects, and enabling a commercial ecosystem to support operators in their deployments. Leveraging open source power to accelerate software development while collaborating and harmonizing with networking standards bodies, open source software releases are now coming **every 6-9 months vs. 3-6 years** from just a decade ago.

Open source networking is also an excellent example of Eric von Hippel's user-centered innovation process with end-users contributing directly to the products, ensuring that project outputs meet their requirements.

2020 MENTORSHIP PROGRAM PARTICIPANT TESTIMONIAL

"**The Expanded Mentorship program for** stress-ng **was a very positive and successful 3-month project.** Mentee contributed 200 commits to `stress-ng` and got a working knowledge of a wide range of kernel interfaces, learned how to measure kernel coverage with GCOV, and a lot of practice in the open source patch submission/review process. As a Mentor, it was great to share domain knowledge, pass on good coding practice techniques, and gain valuable `stress-ng` improvements. A positive outcome, well worth the time and effort."

Colin King Senior Kernel Engineer, Canonical Ltd

In fact, 4 of the top 10 contributors to the ONAP project are network operators (end users). A vibrant End User Advisory Group (EUAG) is also actively contributing by developing surveys, writing whitepapers, exploring various consumption models, building compliance and verification testing for faster deployments based on LFN, and more.
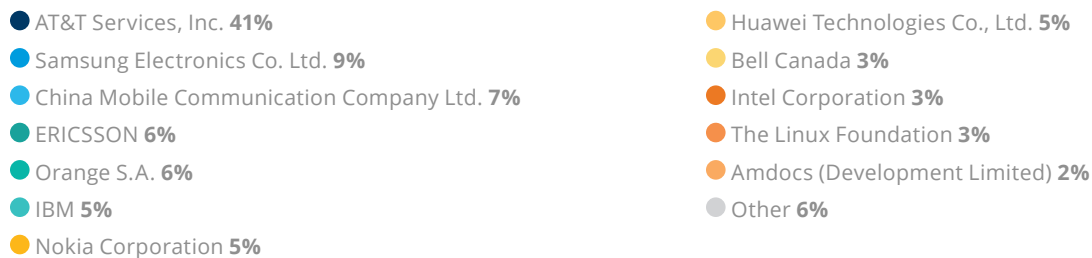
From consumption to contribution

14,132 Commits   439 Code Authors   200 Repositories

4 of the top 10 contributions in ONAP Frankfurt release are from end users

34 Organizations contributing code

- AT&T Services, Inc. **41%**
- Samsung Electronics Co. Ltd. **9%**
- China Mobile Communication Company Ltd. **7%**
- ERICSSON **6%**
- Orange S.A. **6%**
- IBM **5%**
- Nokia Corporation **5%**

- Huawei Technologies Co., Ltd. **5%**
- Bell Canada **3%**
- Intel Corporation **3%**
- The Linux Foundation **3%**
- Amdocs (Development Limited) **2%**
- Other **6%**

2020 MENTORSHIP PROGRAM PARTICIPANT TESTIMONIAL

"I have been mentoring several interns for my company, so when I signed up to be a Linux Kernel Mentorship Program mentor, I expected a similar experience. However, remotely guiding a mentee through the mentorship project and the Linux kernel development turned out to be a profoundly different experience. The best analogy is that it is similar to differences in working on a closed source vs. open source projects. The Linux Kernel Mentorship program has greatly impacted on how I see contributing to and maintaining Linux kernel code and how I think about open source development in general.

Mentoring is an absolute must for anyone serious about growing their open source development and collaboration skills."

Brendan Higgins Kernel Maintainer

Across a wide range of industry verticals, organizations are not only using open source but building open source into the fabric of their R&D and development models. This is because open collaboration enables user-centered innovation, achieving faster development cycles, time to market, and increased interoperability and cost savings.

A recent McKinsey & Co. report described the "biggest differentiator" for top-quartile companies in an industry vertical was "open source adoption," where they shifted from users to contributors. The report's data shows that top-quartile company adoption of open source has three times the impact on innovation than companies in other quartiles.

In the case of LF Networking (LFN), the ability to enable global collaboration has led it to become the de-facto open source organization for open source networking development. Today, over 70% of the global subscribers (as measured by the participating service providers) are built on LFN's open source projects.

The investment to recreate LFN's 87 million lines of source code would exceed 700,000 person-months of development time, or $7.3 billion of capital.

2020 has also challenged us all to be adaptable and versatile. By collaborating closely, LFN has been able to pivot to a digital strategy that includes the successful execution of virtual Open Networking & Edge Summit (ONES) and technical events, webinars, and community-generated content highlighting the industry-leading innovation and thought leadership from our unparalleled community of technical experts and industry visionaries.

Over the next three years, we expect to see cloud networking, edge, and access networks align on open source solutions fueling a new wave of innovation, apps, and cost savings. And no matter what 2021 has in store, what's certain is that the lessons of 2020 have made us a stronger community and better prepared to face the networking challenges of tomorrow.

In 2020 we also made a dedicated effort to quantify LFN open source software's value and estimate capital investment required to replicate the LFN software platforms. We paired LFX Insights data for the total lines of source code with industry-standard estimates for labor costs using the COCOMO methodology.

Just within the LF Networking family of projects, the investment to recreate LFN's 87 million lines of source code would exceed 700,000 person-months of development time, or $7.3 billion of capital. Each contributing organization to LF Networking projects contributes a portion of that value, but the community ecosystem provides multiples of value in return back.

These results help explain why the industry shift toward open source has such a profound impact across industry verticals. We invite you to join us on this journey and determine how your company can take advantage of open source.

Value of Open Source Software

Total Value
$7.3B

- ONAP **50.9%**
- OpenDaylight **18.1%**
- FD.io **17.4%**
- OPNFV **11.5%**
- TF **1.2%**
- Other **0.9%**

Total Lines of Code
87.6M

- ONAP **47.9%**
- OpenDaylight **18.7%**
- FD.io **18.1%**
- OPNFV **12.4%**
- TF **1.6%**
- OPX **0.7%**
- Other **0.6%**
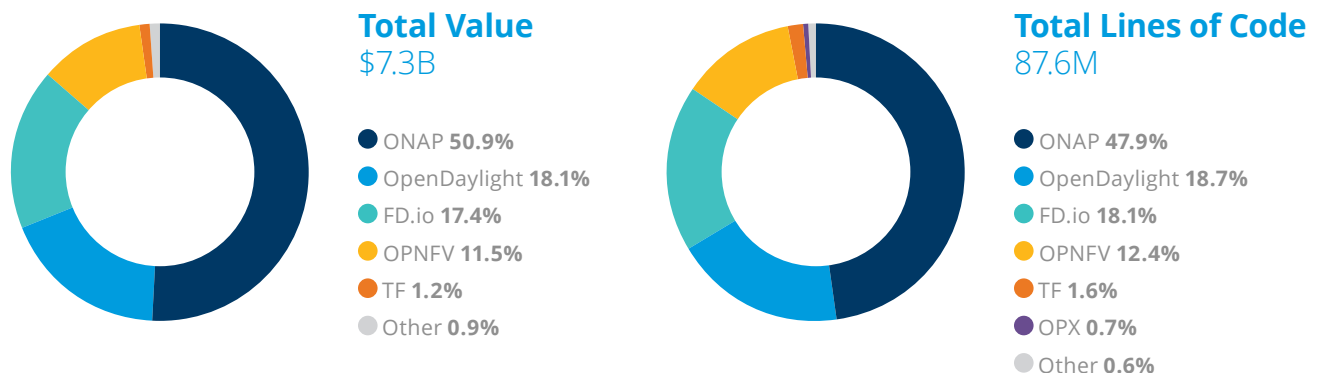
⊡LF EDGE

At four times the cloud market's size, the explosive growth of edge infrastructure and IoT-connected devices, along with new applications, will continue to drive the need for innovative edge computing solutions. This demand has sprouted hundreds of ecosystems that fragmented the industry in 2019. The Linux Foundation launched LF Edge almost two years ago, with continued massive global industry support to unify the global ecosystem across Telecom, IoT, Cloud, and Industrial IoT.

In this time, the community has built a strong and productive ecosystem. Some of the biggest takeaways:

- LF Edge has spearheaded alignment on vendor/analyst-neutral terminology and creating the open source edge market. Projects such as the Glossary of Edge Computing, the State of the Edge Report and a taxonomy white paper that unifies the industry and its terms are just some of the benefits.

- Unification of fragmented edge communities across telecom, IoT, enterprise, and cloud edge. Members join for collaboration with peers, market creation, and adoption acceleration (see this survey). More than 62% of members have either deployed products or services based on LF Edge Projects or plans to in the next few years.

- Accelerated open source deployments to production through proven Akraino blueprints offering interoperability and open testing, offering a clear path to production. Use cases span AI, automotive, AR/VR, IoT, gaming, CDN, 5G, and more.

With such a strong foundation, LF Edge is poised to make even more progress across the growing ecosystem in 2021, thanks to broad cross-industry collaboration. To learn more, visit https://www.lfedge.org/.
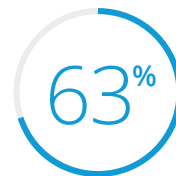
Why Open Source?

Our LF Edge ecosystem participated in a survey asking what drivers made open source an attractive business value proposition. Their responses were insightful. The Top 3:

71%
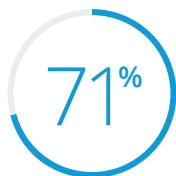
Improving adoption and acceleration of new market opportunities

69%

Opportunity to collaborate with peers

63%

Ability to influence the industry's direction

The Academy Software Foundation (ASWF) was developed in partnership with the Academy of Motion Picture Arts & Sciences, the home for the Academy Awards, commonly known as the Oscars. The motion picture industry was facing issues with a fragmented software infrastructure supporting the movie creation and visual effects development process. An industry survey run by the Academy found that more than 80% of the industry used open source software, particularly for animation and visual effects.

While the industry has had open source projects, there was little or no collaboration on those projects. Studios had released software under open source models, but they never took the next step to support outside stakeholders easily contributing back.

The Linux Foundation and the Academy of Motion Picture Arts and Science's Science and Technology Council presented the industry with an alternative path forward called the Academy Software Foundation, which was announced in 2018.

ASWF is currently composed of six major projects, three of which are in "adopted" status, and three are in "incubation." These projects have been critical to the creation of major motion pictures enjoyed by people around the world.

OpenVDB

Contributed by DreamWorks Animation, OpenVDB Is an industry-standard library for manipulating sparse dynamic volumes used by visual effects studios to create realistic volumetric images such as water/liquid simulations and environmental effects like clouds and ice. It has been used on films and shows, including *Frozen 2, Fantastic Beasts: The Crimes of Grindelwald, Stranger Things,* and *How to Train Your Dragon: The Hidden World.*

OpenVDB in use on The Croods.
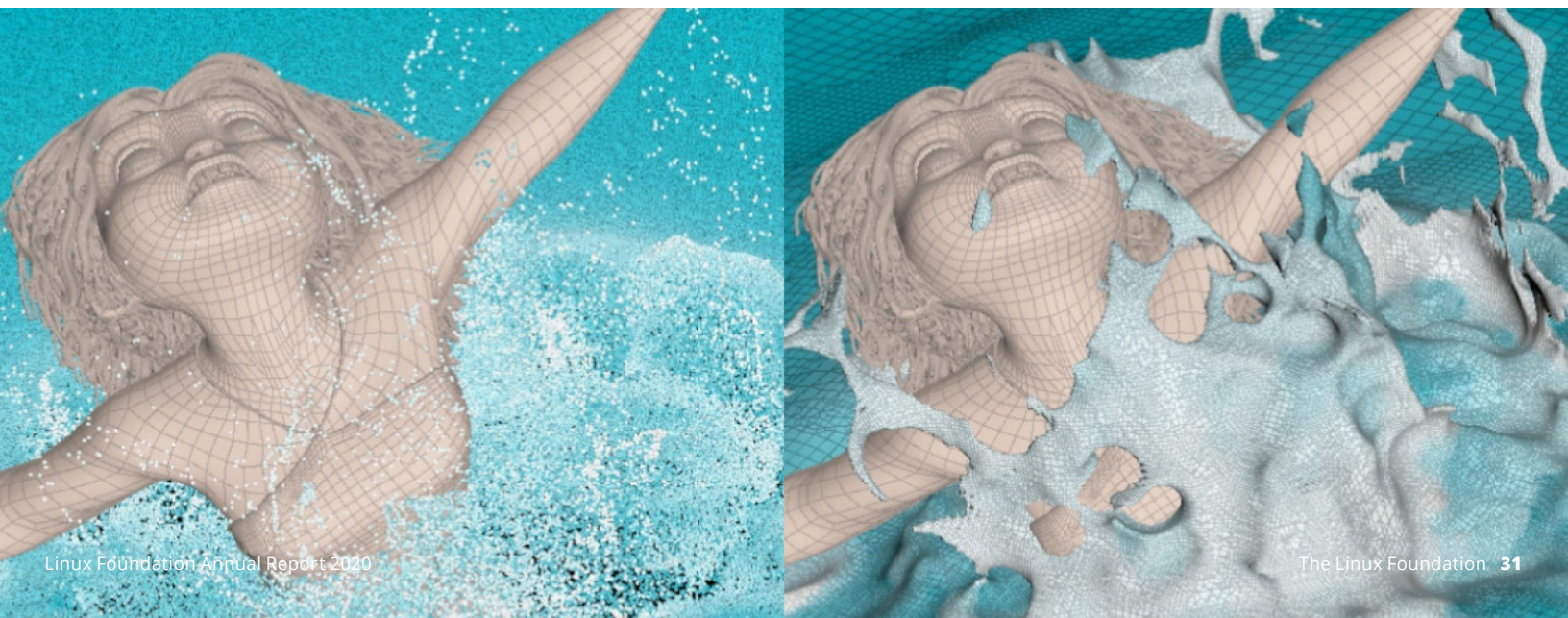
OpenColorIO

OpenColorIO is an industry standard for consistent color management across VFX and animation pipelines used on hundreds of feature film productions and touches nearly every pixel of every visual effects frame in most major motion pictures. It was contributed by Sony Pictures Imageworks, and has been used on films and shows including *Spider-Man™: Into the Spider-Verse, Spider-Man™: Homecoming, Hotel Transylvania 3, Ghostbusters, Alice in Wonderland, Cloudy with a Chance of Meatballs, Surf's Up,* and *Watchmen.*

OpenColorIO, Open Shading Language, OpenCue, OpenVDB, and OpenEXR were all used on *Spider-Man: Far From Home.*

OpenEXR

One of the foundational technologies in computer imaging, OpenEXR is a standard HDR image file format for high-quality image processing and storage. It was developed by Industrial Light & Magic (ILM) in 1999 and is the first release of a major open source project by a studio. Recent films and shows include *Frozen 2, Star Wars: The Rise of Skywalker, Solo: A Star Wars Story, Star Wars: The Last Jedi, Bumblebee, Stranger Things, Avengers: End Game,* and *Fantastic Beasts: The Crimes of Grindelwald.*

OpenCue

OpenCue is an open source render management system used to break down complex jobs into individual tasks. Developed by Google Cloud and Sony Pictures Imageworks, OpenCue is based on Sony's internal queuing system, Cue3, which has been developed and used in Sony production over the past 15 years to schedule and manage tens of thousands of shots over hundreds of projects. Recent films and shows include *Spider-Man™: Into the Spider-Verse, Spider-Man: Far From Home,* and *Jumanji: The Next Level.*

OpenTimelineIO

OpenTimelineIO is an Open Source application programming interface and interchange format for editorial timeline information, contributed by Pixar Animation Studios. It has been used in films including *Soul, Onward, Toy Story 5, Incredibles 2,* and *Coco.*

Open Shading Language (OSL)

Open Shading Language (OSL) is the de facto standard shading language for VFX and animation, developed by Sony Pictures Imageworks. It has been used on films and shows, including *Spider-Man: Far From Home, The Angry Birds Movie 2, Men in Black: International, Jumanji: The Next Level,* and *Watchmen.*

ASWF has also become a focal point for driving new interest in software development in the motion picture industry thanks to the "Behind the Screens" interview series highlighting software developers in the industry, along with the launch of a Diversity and Inclusion working group to raise the profile of underrepresented people in these roles.

Zephyr™ Project

Today's developers have a plethora of choices for platforms, boards, and other components. They are challenged to create secure products that integrate with other proprietary and legacy solutions. With the Zephyr Real-Time Operating System (RTOS), developers aren't locked into a particular architecture, back-end platform, or cloud provider. They will have the freedom to choose from an ecosystem of hardware. Zephyr offers a small memory footprint and a secure and flexible RTOS that is a modular, customizable, embedded open source platform that works with multiple hardware architectures. This is why Zephyr has become the preferred RTOS in the landscape.

The Zephyr Project has a robust and diverse developer community that is number one in total contributors (with more than 800) and total commits (which reached more than 45,000) compared to the other open source RTOS solutions. Zephyr's contributors' dedication and talent have played an integral role in advancing the RTOS with a high level of quality.

This year, as the world turned to technology to help with the pandemic, Zephyr saw an increase in products based on the RTOS, specifically those that help monitor COVID-19. From distance trackers to contact tracing wearables and smart safety shoes, developers leverage Zephyr because of its small footprint, integrated stacks, and dependability to speed time to market. In fact, many of these products were developed and deployed in less than 3 months.

These technical benefits are only part of why Zephyr is one of the fastest-growing adopted RTOS in the embedded landscape to use when Linux is too big. As part of the Linux Foundation ecosystem, the project leverages open governance that practices transparency, participation, and accountability, which attracted high-profile members Google and Facebook to select Zephyr for its next generation of products.

In 2021, the project is excited to release its next LTS and achieve IEC 61508 functional safety certification for the RTOS.

To learn more, visit: https://www.zephyrproject.org/
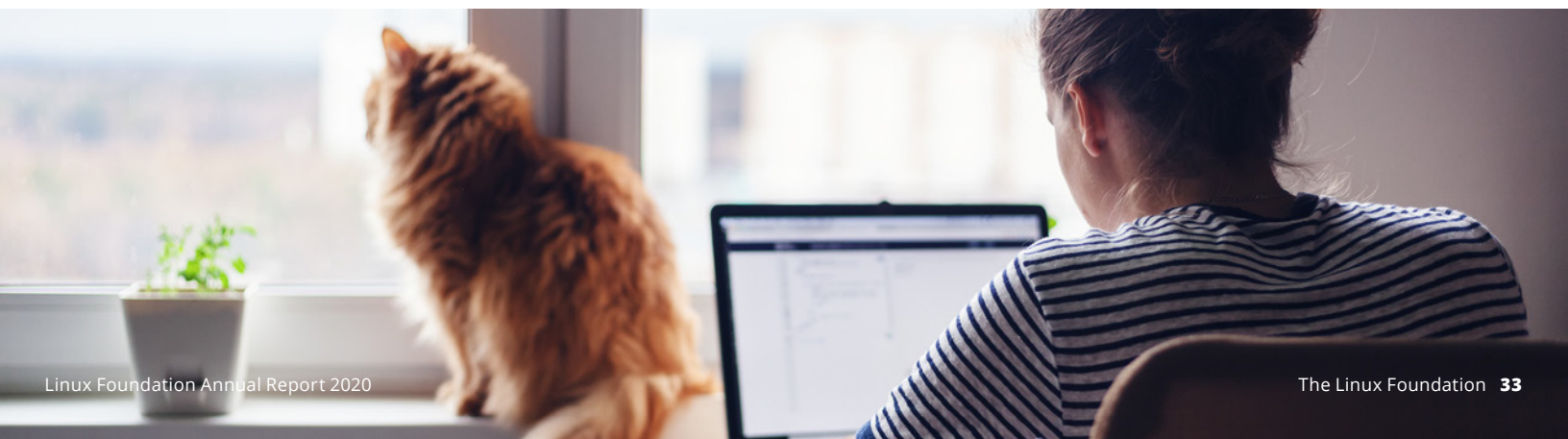
Coming Together... Virtually

With the onset of COVID-19, the opportunities to meet face-to-face disappeared. Our communities adapted to new ways of working together

Events

Pivoting to Virtual Gatherings

The worst pandemic of a lifetime didn't stop our communities from collaborating and sharing their insights at events this year. The Linux Foundation Events Team went into overdrive this spring, pivoting 45 events to virtual, simultaneously working to enact force majeure clauses across contracts while evaluating over 70 virtual events platforms to identify those that would work best for our diverse portfolio of events.

As our physical events shifted to virtual ones, we took thoughtful actions to ensure that the critical pieces of a successful event remained, with informative content, opportunities for collaboration, and an immersive experience—but that we also took advantage of new opportunities available in a virtual environment, and iterated throughout the year based on participant feedback.

A Silver Lining

With the financial and time constraints of in-person events removed, we've realized much larger attendance across all of our events, with some events gaining up to a 250% attendance increase than in 2019.

We successfully produced 108 virtual events, with 78,000+ people in attendance from 18,000 organizations in 179 countries worldwide. With all content from these events freely available online (much of it in multiple languages), thousands continue to benefit from the education and insights in this content.

We've learned a lot this year. With dozens of virtual events now under our belts, we feel we've learned what works, what doesn't work, and how we can best use a virtual environment to bring critical education collaboration opportunities to our communities.

And when it is safe again to meet in-person, we now have the skills and experience to move forward with a hybrid event model of both in-person and virtual components that will bring the best of our events both to those that attend in person, and those that join us online, connecting a larger global community and benefiting the open source ecosystem even more so than before.

KubeCon + CloudNativeCon Europe 2020

Initially slated to take place in Amsterdam in March, this event was first postponed to August in the hopes that it could still take place in person, and then changed to virtual once it became clear that wasn't going to happen.

When the decision was made to go virtual, over 10,000 attendees were already registered, 300+ speakers were already confirmed, and 150+ sponsors were already supporting the event. The event team quickly pivoted to make plans to produce the event online and ensure that we were not only meeting the critical requirements of a successful event—informative content, opportunities for collaboration, and an immersive experience—but that we were also meeting the needs of existing participants in terms of scheduling, expectations and more.

Over a quick few months, we worked to create an event that met all those needs. With KubeCon + CloudNativeCon Europe Virtual 2020 taking place August 17-20, we did so and gathered over 18,700 attendees—an almost 250% increase from the 2019 event. Survey results post-event indicated that 72% were first-time attendees and that 100% would recommend the event to a colleague.

It was also at KubeCon + CloudNativeCon Europe 2020 that we were proud to announce that Priyanka Sharma had joined the CNCF as its new General Manager. She was previously director of Cloud Native Americas at GitHub.

KubeCon + CloudNativeCon Europe 2020

Attendance

18.7K+
Registrants from
7,800 companies

13K+
Live Attendees from
130 countries

3.6K
End User
companies

208
Media & Analysts
in attendance

72%
First time
attendees

Participation

95.5K
messages sent
in event chats

61%
of attendees spent
10+ hours in the
virtual event

12
Experiences, from Peer
Workshops to a Live Songwriter
Showcase to Desktop Yoga with
54% of attendees participating

Speakers & Content

1,525
CFP submissions

90
Program committee members
+ 2 Program Chairs

384
Speakers

8
Co-located events

336
Sessions

89
Maintainer sessions

Diversity & Inclusion

438
diversity scholarships

74%
of keynote speakers
were women

15
languages available for
Live Sessions

Enabling tools for collaboration with LFX

Tools engineered to build and scale sustainable open ecosystems

The world runs on open source, and ecosystems need more than a project source control system to scale.

The Linux Foundation has evolved a proven methodology to transform projects into open ecosystems. LFX operationalizes aspects of this approach, providing a suite of tools built to facilitate open source development.

Critical projects must have their finger on the pulse of their entire developer ecosystem, with tools tailored to key stakeholders driving project development, including maintainers, contributors, community managers, security professionals, marketers, and more.

LFX features 10+ tools available to support our hundreds of open source projects, with several of them highlighted below.

Insights

Individual Dashboard

EasyCLA

Mentorship

Crowdfunding

Member Enrollment

Landscape

Community Events

Training Portal
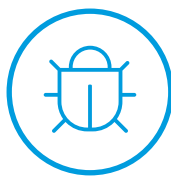
Security
(BETA AVAILABLE)

Project Control Center
(LIMITED ACCESS BETA
EARLY 2021)

Organization Dashboard
(LIMITED ACCESS BETA
EARLY 2021)

Tool Highlight - Insights

Projects are distributed by nature in their choice of development, operations, and marketing platforms

- Get a 360° view of a project, track the health of projects you rely on

- Reduce maintainer work, avoid maintainer burnout

- Enable frictionless contribution, while enabling legal best practices

- Highlight your organization's impact
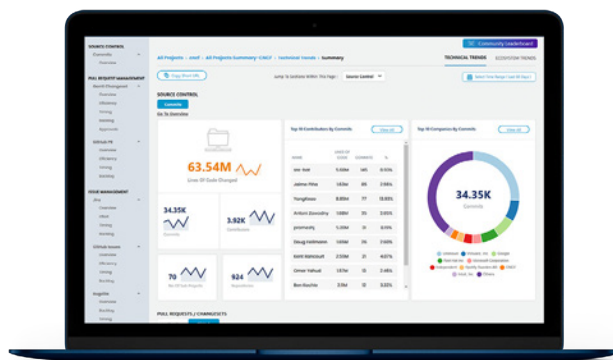
The world's critical technology projects use LFX to measure sustainability

~1B
Total Lines of Code

11,520
Repositories

12.5M
Lines of Code
Added Weekly

10.8M
Lines of Code
Deleted Weekly

11,233
CLAs Signed

19,442
Contributing Companies

263,499
Vulnerabilities Detected

4,677
Mentees Applied

830,820
Logged Issues

$772,173
Raised for Projects

4.4M
Email Messages
Sent

970,450
Project Builds

1.7M
Free Course Enrollments

78,023
Event Attendees This Year

26,998
2020 Community
Meetings

89.56K
Project Documents Get
Updated Per Year.

Learn more about Insights at lfx.dev/tools/insights

Tool Highlight - Security

Building trust with your community is key to project success. Earn your ecosystem's confidence and drive adoption by being transparent about vulnerabilities and ensuring that security is a top priority.

- Build secure code from the start

- Protect your open source investments
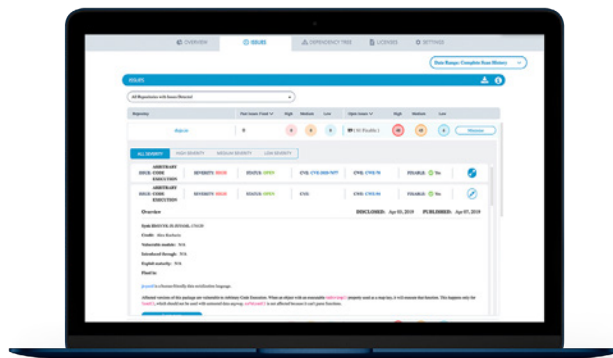
Join projects building secure code with vulnerability scans and recommended fixes from Security
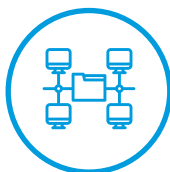
10,334	**263,499**	**21,597**	**13,802**
Scanned Repositories	Vulnerabilities Detected	Recommended Fixes	Vulnerabilities Fixed

Learn more about Security at lfx.dev/tools/security

Tool Highlight - Mentorship

Investing in new contributors and diversity helps sustain and grow your community

- Attract more project contributors

- Invest in talent development

- Give back to the community

- Grow your career
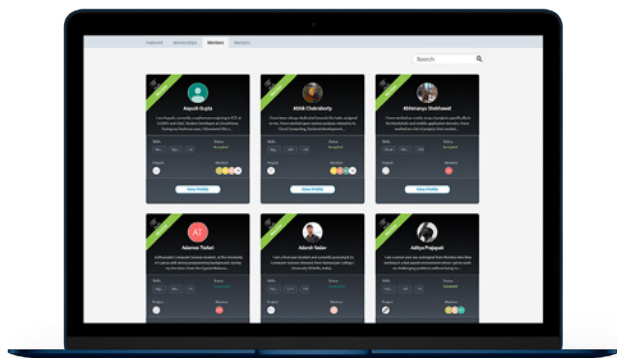
Grow the open source community by participating in Mentorship programs

4,677
Mentees Applied

179
Mentees Accepted
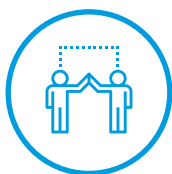
210
Active Mentors

452,147
Stipends Paid

"I am an OS/Kernel enthusiast. Being in college, I always felt a lack of practical knowledge to explore my interest until the Linux Kernel Mentorship Project filled the missing pieces of this puzzle. As a mentee, I worked to upgrade the power management framework support for PCI drivers. I didn't have any experience with either PCI or Linux Kernel Development itself. I was just a curious learner who was ready to experience the joy of learning while working with other developers and Kernel Maintainers. As a part of my work, I also played detective, looked for clues in other drivers, and found a new set of tasks that would improve framework support. I recently shared the success of my project in the form of a talk at Open Source Summit and Embedded Linux Conference, Europe 2020. **This journey has been a profound experience for me.**"

Vaibhav Gupta
Linux Kernel PCI:
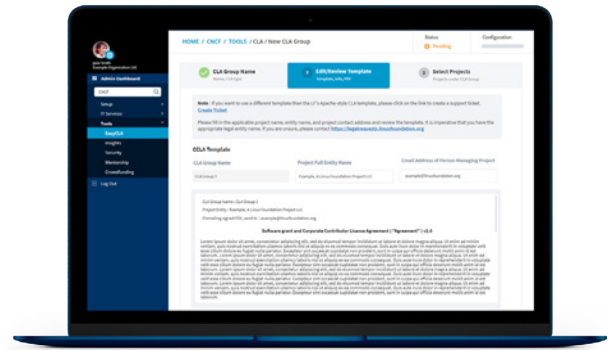Remove Legacy Power Management
Project graduate

Learn more about Mentorship at
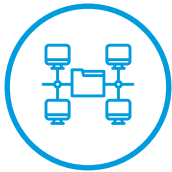lfx.dev/tools/mentorship

Tool Highlight - EasyCLA

If your project requires a contribution agreement, automating your policy helps to build trust

- Put your CLAs on auto-pilot

- Streamline employee contributions

- Enable contributors to contribute faster with no waiting

Join projects already streamlining their development workflow with EasyCLA
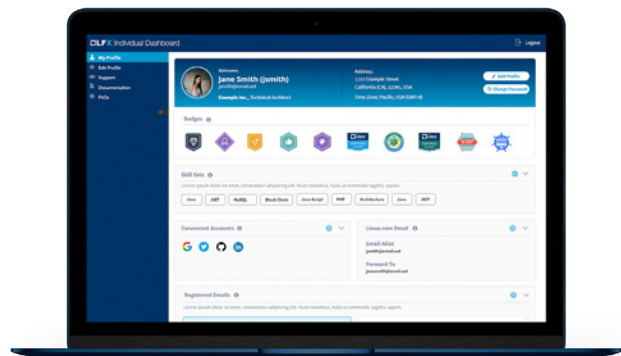
1,003
Repositories Covered

11,233
CLAs Signed

14,227
CLA Contributors

Learn more about EasyCLA at lfx.dev/tools/easycla

Tool Highlight - Individual Dashboard

Measure your impact across the entire open source ecosystem

- Showcase your accomplishments

Learn more about Individual Dashboard at lfx.dev/tools/individual-dashboard

Investing in our communities' futures

People are the heart of our communities. Our communities are focused on creating inclusive communities, mentoring the next generation of contributors and maintainers, and training the next generation of implementation and support professional

Addressing Diversity and Inclusion

A diversity of ideas and contributions—one that originates from a diverse community, from all walks of life, cultures, countries, and skin colors—is vital for building sustainable and healthy open source communities. Individuals from diverse backgrounds inject new and innovative ideas to advance an inclusive and welcoming ecosystem for all. Linux Foundation is committed to building diverse and inclusive communities.

Creating those diverse communities requires effort and commitment to creating inclusive and welcoming spaces. We continue to work to address this problem through various initiatives, including some of those expanded upon below.

Inclusive Language Efforts

Communities that adopt inclusive language and actions will be able to attract and retain individuals from diverse backgrounds. The Linux kernel community adapted inclusive language in Linux 5.8 release showing its commitment to Diversity and Inclusion. For other projects, the Inclusive Naming Initiative launched at KubeCon North America to standardize inclusive language across the industry.

SDDI

We are also focusing on Science and Research to Advance Diversity and Inclusion in Software Engineering. Our new Software Developer Diversity and Inclusion (SDDI) project will draw on science and research to deliver resources and best practices that increase D&I in software engineering.
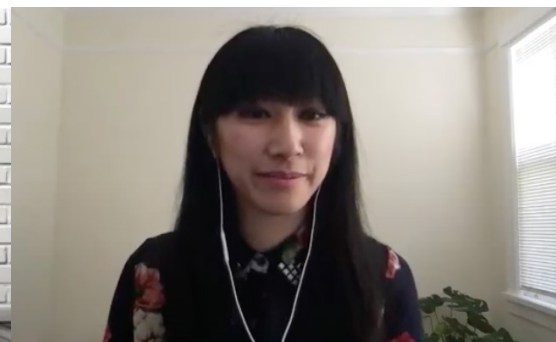
LF Mentorship Programs

Our LF Mentoring program is designed to help new developers with the necessary skills and resources to experiment, learn, and contribute effectively to open source communities. We also prioritize outreach to new developers for input on improving and developing new training and learning materials.

Over 50 new developers graduated from our Mentorship programs in 2020, and 129 mentees are actively learning and working on 88 mentorship projects. This year's initiatives include Expanded Mentorship Program, CNCF 2020 Mentorships, LF Networking Expanded Mentorship Program, Hyperledger, OpenHPC Fall Mentorship Program, and Linux Kernel Mentorship Program. New developers improved the quality and security of various open source projects, including the Linux kernel. Several bugs fixed, a new subsystem mentor and a new driver maintainer are now part of the community. Our sincere thanks to all our mentors for volunteering to share their expertise.

We also launched the LF Live Mentorship Series in October to complement our structured mentorship program. In this series, maintainers from the Linux Kernel and other projects serve as mentors for discussions around specific technology and topic areas that will help provide guidance and answer questions to help professionals fast forward their learning and career opportunities.

The Linux Foundation mentoring is a three-pronged approach to provide unstructured webinars, training courses, and structured mentoring programs. All of these efforts combine to advance a diverse, healthy, and vibrant open source community.

2020 MENTORSHIP PROGRAM PARTICIPANT TESTIMONIAL

"Working as a mentee in the Linux Kernel Mentorship Program was a great experience. **This remote internship provided me with a taste of what working with the kernel community is like, and it also initiated my software engineering career.** Contributing to big, established projects can be daunting, and usually, new members are unsure of where to start. The mentorship program and its mentors' structure is paramount to get new developers on track.

It goes without saying that this program introduced me to a great number of highly experienced developers from around the globe, with decades of experience in open source. They helped me through the iterative process that is getting a patch accepted into the kernel, and thus they opened my eyes to a career path that I had not considered before. It was also so much fun to be a part of! Needless to say, I will be contributing to the kernel for the foreseeable future."

Daniel W. S. Almeida
Linux Kernel Mentorship Virtual DVB Test Driver Project Graduate and Vidtv Maintainer

Being a person intrigued by the low-level interactions between hardware and software, operating systems, and computer architecture, LKMP was the perfect gateway to facilitate my understanding with the help of the Linux kernel. As a mentee, each day was an opportunity to learn something new. The Linux kernel is a product of decades of collaboration between experts. **Under the mentorship of these same experts, I learned about the theoretical aspects of the kernel and gained hands-on experience that made me realize the complexity of the Linux kernel and the scale for which it is built.** Moreover, the entire community was welcoming to new contributors like me, giving feedback and suggesting improvements on the patches I submitted. Collaborating with fellow mentees and experienced Linux kernel hackers was an experience of its own. Armed with the new knowledge and the connections I created, has opened pathways for career opportunities. Being a mentee was an enriching experience, and I could not have spent the time in any better way."

Amol Grover
Linux Kernel Mentorship RCU Hardening Project Graduate

"I had a wonderful experience with the Linux Foundation Mentorship Program. Mentors were quite helpful and polite. I learned a lot . Support from industry leaders is icing on the cake. **I'd recommend this to students anytime**."

Saloni Garg
moja global - Environmentally Sensitive Growth Module and Online Courses for Forest Greenhouse Gas Estimates Project Graduate

"There is real enjoyment in seeing learners understand a concept in a field you enjoy working in. It is a pleasure to watch them get excited about it. **The LFX mentorship program made it easy for the Open Horizon project to start mentoring by providing a wealth of qualified candidates eager to learn more about the project and get involved.** It was especially encouraging to see their continued engagement with the project to even after the term was over! LFX also took the complications and hassle out of administering the program by taking care of HR paperwork, expenses, and even paying the stipends. I wish this had been available back when I was a college student."

Joseph Pearson
Technology Strategist, IBM Cloud

Facing economic challenges: Open source opportunities are strong during times of crisis

Our recently published 2020 Open Source Jobs Report uncovered some good news: despite the COVID-19 pandemic, we continue to see high demand for open source talent and a corresponding shortage of that talent. The demand for open source talent is being driven primarily by organic growth within organizations, as reported by 70% of hiring managers (up from 65% in 2018).

The second most common response to our jobs survey was that the organization had increased its use of open source, leading to talent shortages, as reported by 56% of hiring managers. This increase in open source usage is a significant uptick from the 40% who stated this in 2018, implying that open source adoption may have accelerated due to the pandemic's economic conditions.

93% of hiring managers report difficulty finding sufficient talent with open source skills, up from 87% two years ago.

The tactics for dealing with shortages of open source talent continue to evolve. In 2018, the most common response to this question was to continue looking until the right applicant came along, which was employed by 50% of employers. That has dropped to 43% in 2020 and been surpassed by hiring outside consultants (48% in 2020 versus 38% in 2018) and training existing employees to gain the necessary skills, which is now the top tactic in 2020 utilized by 57% of employers (up from 42% two years ago).

> 93% of hiring managers report difficulty finding sufficient talent with open source skills, up from 87% two years ago.

Focus on: Training & Certifications

Our 2020 Open Source Jobs Report found 37% of hiring managers say they will be hiring even more skilled IT professionals in the next six months.

1.7M+
individuals have enrolled in free Linux Foundation training courses, providing them a great way to start exploring different open source technologies and deciding which is the best fit for them; this includes over a million students who have enrolled in our Introduction to Linux course on the edX platform

50+
eLearning courses, over 20 instructor-led courses, and a dozen certification exams which enable certified professionals to demonstrate their skills, with more being released every month

500
scholarships awarded in 2020 by The Linux Foundation for free training and certification to individuals from around the world, a 1,500% increase from prior years

40,000+
individuals have received verifiable certifications from The Linux Foundation

In late 2020,
we will launch a new Linux Foundation Certified IT Associate certification exam, which will serve as an entry-level certification for new IT professionals

2020
saw the launch of our first ever bootcamp programs, the Cloud Engineer Bootcamp and Advanced Cloud Engineer Bootcamp, which are helping thousands of students prepare for a lucrative cloud engineering career

Charting a future for the planet... and beyond

Many communities are focused on business and commercial engines of the economy— this year we welcomed projects focused on the health of our planet, a dependency we all rely on

LF: Addressing global challenges of climate change

The Linux Foundation has tremendous potential to help address the urgent global challenges stemming from climate change, threatening current and future generations with catastrophic disruptions in the physical world and the economy and dire health and social welfare crises. Several of LF projects are already working on various climate solutions. Hyperledger's Climate Action and Accounting Special Interest Group explores ways to apply blockchain in facilitating carbon markets. LF Energy is accelerating the transition to distributed clean energy. Automotive Grade Linux helps reduce greenhouse gases in transportation, the hardest sector to mitigate, by accelerating efficiency, electrification, and autonomous vehicles. OS-Climate is developing a platform of data and analytics to close the $1.2 Trillion gap in financing and investment required to achieve Paris Climate Accord goals. Other LF projects can play a substantial role in going forward, including FINOS and LF AI & Data. In this section, we take a more in-depth look at LF Energy and OS-Climate.
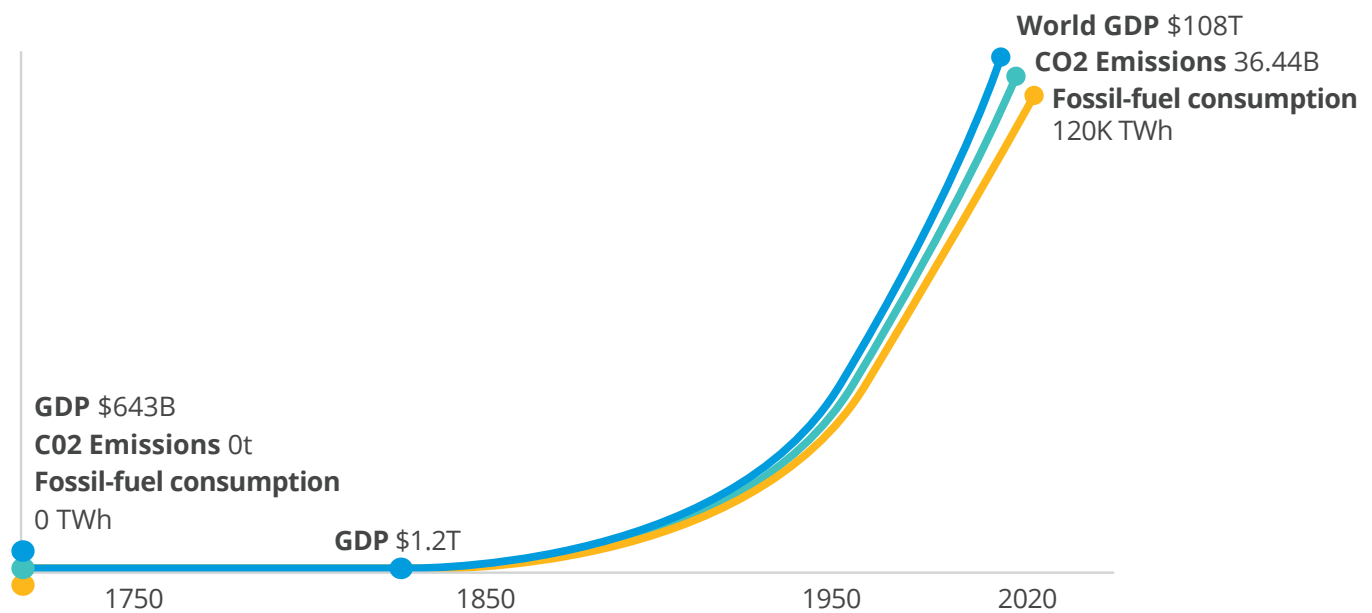
LF Energy

Addressing carbon emissions and climate challenges

Without any doubt, worldwide climate change is the greatest existential threat facing humanity since asteroids caused the 5th extinction, 65 million years ago. This time, our demise is entirely human-made. Since the mid-1800s, three charts reveal a lock-step progression of fossil-fuel, GDP, and carbon parts per million— the pollution that contributes to a warming world. The externalities that have driven the economic expansion of the last 150 years are now forcing a reconciliation. We are at the last possible moment. We have the tools to solve these problems together, within the global open source collaboration that The Linux Foundation fosters.

Collaboration is central to our finding a path to decarbonization. Since nearly all aspects of life on Earth will be touched, our future rests on cooperation over competition. This is the fundamental and profound paradigm shift facing humanity. Cooperation is also at the heart of why over the next 30 years, the Linux Foundation will undoubtedly play a central role as the planet negotiates the transformation of the world's largest machine—the electrical power grid.

The transition from centralized fossil-fuel generation to renewable and distributed energy resources is the most significant reimagining of power systems in over 140 years. Approximately 75% of our planetary carbon emissions can be mitigated through the electrification of energy and transportation. By adopting an open source strategy that maximizes flexibility, agility, and interoperability, we can learn to innovate at the speed of technology. Life on planet Earth depends on it.

World GDP $108T
CO2 Emissions 36.44B
Fossil-fuel consumption
120K TWh

GDP $643B
C02 Emissions 0t
Fossil-fuel consumption
0 TWh

GDP $1.2T

1750   1850   1950   2020

Composed from data found at OurWorldinData.org

Building a smarter grid

In the next 30 years, rapid innovations will transform how we create, distribute, and use energy. Software-defined infrastructure is one of the great leverage points for decarbonization. We see a convergence happening between energy, 5G, cloud, and automotive. This makes the Linux Foundation ground-zero for building the commodity, non-competing software for the future grid.

2020 marks a banner year for LF Energy in its mission to lead the energy transition through global open-source collaboration. We launched 4 new groundbreaking projects to add to our initial 5 projects. Anchor projects include GXF, CoMPAS, SEAPATH, and openLEADR. GXF, released in February, is a scalable, technology-agnostic Industrial Internet of Things (IIoT) platform that allows grid operators to more efficiently collect data and monitor, control, and manage smart devices on the grid. CoMPAS (Configuration Modules for Power industry Automation Systems) launched in June as part of LF Energy's Digital Substation Automation Systems (DSAS) initiative and seeks to build standardized software components that optimize existing substations.

In October, the organization launched openLEADR, which creates an open source implementation of OpenADR, the open standard for exchanging demand response information among global utilities, aggregators, and energy management and control systems to manage the supply and demand of energy better. In November, LF Energy will launch the second project in the DSAS family - SEAPATH (Software Enabled Automation Platform and Artifacts (Therein)).

LF Energy now has 35 members, growing our 2020 total membership of industry leaders worldwide by 10. As a sign of health, many LF Energy projects have a diverse community of non-members across vendors, suppliers, and utilities, indicating a vibrant, growing ecosystem.

OS-Climate: Closing the $1.2 trillion yearly shortfall in investment needed to address the climate emergency

Avoiding catastrophic global warming levels and ensuring resilience to climate impacts requires rapidly closing the $1.2 trillion gap in investment for climate solutions each year.

But pension funds, asset managers, banks, and corporations lack the data and analytics they require to reallocate financing toward decarbonization across their portfolios.

Through Linux Foundation, OS-Climate and its founding members Allianz, Amazon, Microsoft, and S&P Global along with key partners WWF, Ceres, and the Sustainability Accounting Standards Board (SASB) are building a Data Commons of climate-related corporate, industry, policy, technology, and physical data, as well as AI-enhanced analytics, to generate the refined data needed to price carbon into financial markets – the key to transitioning the global economy to Net Zero emissions and a sustainable future.
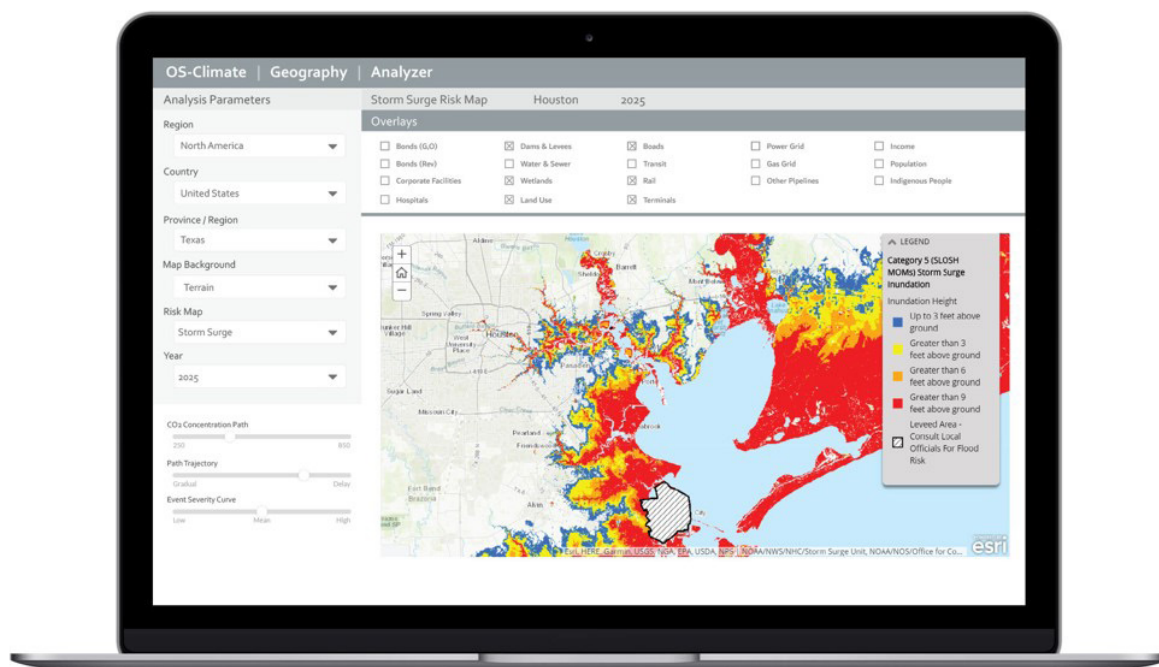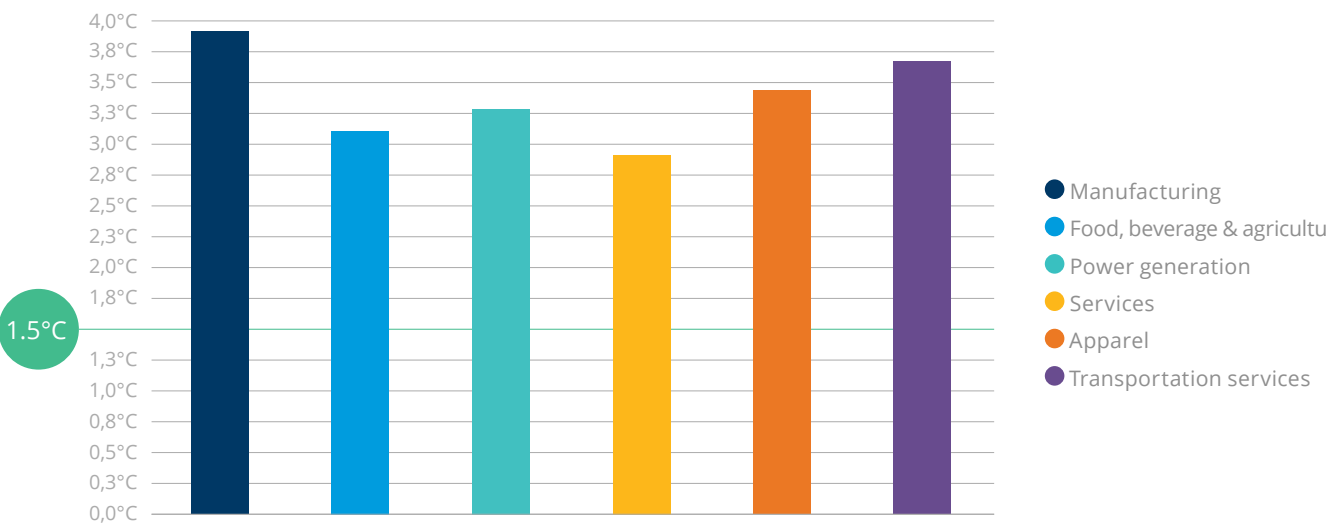
Forecasting Climate-Related Risk for Pension Funds and Investment Portfolios

By forecasting the impacts on investment portfolios of physical climate change and economic transition to a low carbon economy, OS-Climate will help preserve the retirement savings of millions of people while shifting their investment into climate solutions.

Measuring the Global Warming Outcomes of Investment Portfolios

By calculating the global temperature that would result from the combined impact of companies and financial instruments in a portfolio, based on their declared GHG reduction targets and their actual progress, OS-Climate will help investors to exit investments in the laggards and align portfolios with Paris Accord and Net Zero goals.

- ● Manufacturing
- ● Food, beverage & agriculture
- ● Power generation
- ● Services
- ● Apparel
- ● Transportation services

Addressing natural disasters

OpenEEW

Earthquakes killed [767,046 people between 2000 and 2010](#), and almost a third of the world's population lives in seismically-active regions.

An earthquake early warning (EEW) system sends real-time alerts to people before the shaking arrives. However, only several governments have attempted to build EEWs due to the incredibly high-cost of traditional seismometers, dedicated telecommunications, and bespoke software.

An IoT-based approach to EEW systems is not only within reach of many global citizens but performs as well if not better than government-run systems. By standardizing a mix of off-the-shelf components, software, and know-how, it will be possible to facilitate the creation of new community EEWs around the world.

Since 2017, [The Grillo Project](#) has developed and deployed IoT-based systems in Mexico and Chile and has been issuing public alerts via Twitter, a mobile app, and an alarm device. In 2019 the solution was benchmarked against the first public EEW in the world, Mexico's SASMEX, which has been developed for decades at a huge cost. The [results](#) speak for themselves. We are very proud of what we have achieved so far, but we have barely scratched the surface of what is possible. In today's world of IoT, cloud computing, and machine learning, the development of EEW systems can benefit from people's expertise from non-traditional backgrounds.

For this reason, The Linux Foundation decided to launch OpenEEW, an initiative to share our data, sensor technology, and detection algorithms, as a [Call for Code project](#). Not only will this enable others around the world to start building their own EEW systems based on our approach, but it will also, we hope, lead to the creation of a global community collaborating to develop ever-better EEW systems, always with the end goal of providing life-saving alerts and increasing resilience against earthquakes.

OpenJS Foundation

NASA Humans in Space program

With more than 96 percent of the world's 1.7 billion websites using JavaScript, OpenJS Foundation is the global epicenter for online commerce, economic growth, and innovation.

JavaScript is truly everywhere. It's even used in space.

At OpenJS World 2020, Robin Ginn, OpenJS Foundation Executive Director, hosted a keynote Q&A with NASA Astronaut Christina Koch to learn how aerospace engineering has benefited from open source technologies and areas where JavaScript is being used.

- The crew at the International Space Station (ISS) uses web apps tablets for work and entertainment – yes, they have the World Wide Web in space.

- They keep these web apps separate from all the IT systems powering the space station to help with security.

- The SpaceX Dragon UI was built on Chromium with JavaScript. The astronauts wore special spacesuits with gloves that support touch screen access.

- NASA spacesuits also are supported by a Node.js monitoring solution to help keep astronauts safe.

Koch touched on what life is like in outer space as an international crew member of the ISS to how that life is mirrored in the world we live in today. She also shared constructive experiences about being a woman in STEM. This galactic keynote can help serve young people -- particularly young women -- interested in STEM to feel impassioned about the science they can create.

The OpenJS Foundation was created by the merger last year of the Node.js and JS Foundations. OpenJS is a vibrant community today with a positive spirit of collaboration in developing the JavaScript and web ecosystem. Globally, 2020 has been turbulent, yet the OpenJS community continues to be a supportive and inclusive place to learn, collaborate, and grow.

OpenJS hosts some of the industry's most important projects, including AMP, Appium, Dojo, Electron, jQuery, Node.js, and webpack. Under the OpenJS umbrella, one-third of its hosted projects are in the top 100 JavaScript libraries used by the top 500K websites.

JavaScript is 25 years old this year. The OpenJS Foundation is excited about the future and honored to be the neutral home to keep JavaScript safe and modern for its astronomical user base.

Sources:
https://www.internetlivestats.com/total-number-of-websites/
https://w3techs.com/technologies/history_overview/client_side_language/all
https://httparchive.org/
*In addition to this keynote, Christina also participated in an interview with Jason Perlow of the Linux Foundation.
Read the entire post here. Thanks again to Christina for sharing her inspiring story and for all she does to advance science in space!

2020 MENTORSHIP PROGRAM PARTICIPANT TESTIMONIAL

"Coccinelle is a program analysis and transformation tool for C code, and it has really benefited from the interns we have hired via LFX, who have helped out with eliminating some technical debt, adding new features, and cleaning up our user-facing infrastructure. **We really appreciate the opportunity to make contact with great interns for these projects.**"

Julia Lawall
Kernel Maintainer, Senior Researcher @INRIA

Convening our members and communities on legal issues and security best practices

Global trade challenges and export controls

At its core, The Linux Foundation exists to enable open and transparent collaboration between and among diverse participants in the global community. This collaboration occurs across organizational boundaries, such as among many academic, company, non-profit, and individual contributors, each of whom may have different goals and motivations. It also occurs across national boundaries: open collaboration brings together participants from around the world to build technology together for the benefit of everyone. Open source has been and will be a global endeavor.

2020 has seen ongoing developments in country-level trade conflicts. This year, we have continued to emphasize that open collaboration can and will continue among worldwide participants in ways that are fully consistent with national regulations.

In July 2020, The Linux Foundation published a whitepaper (available in English and Chinese), providing an overview of the US Export Administration Regulations (EAR) as they relate to open source collaboration. In general, open source collaboration that is by definition publicly available will not be subject to the EAR, which is good for open source and global collaboration. In some circumstances there will be factors that require additional steps and we've outlined best practices for communities in the white paper.

We continue to believe, and to communicate to our communities that global cooperation in transparent, open source development is permitted, should be encouraged, and leads to the benefit of all countries and participants involved.

LF Legal Community Collaboration

Education and Publications

The Linux Foundation continues to serve as a neutral hub for collaboration among legal experts to benefit the community and promote the expanding use and growth of its open source projects. The LF member counsel community plays a critical role in enabling open dialogue across organizational boundaries. Participants in the community can tackle new legal, regulatory, and compliance-related topics transparently and collaboratively.

Throughout 2020, in addition to our regularly-occurring member legal counsel meetings, The Linux Foundation found other ways to assist the legal community in light of the pandemic's practical challenges. For example, we partnered with DLA Piper to provide four Continuing Legal Education courses, enabling in-house attorneys to easily obtain necessary CLE legal and ethics continuing education credits for their state bar requirements. At our recurring member counsel meetings, we continued to provide a forum for presentations and discussions of relevant legal topics of real-world concern to the open source ecosystem

As in prior years, the collaboration among the member counsel community has been a critical driver in finding solutions to common challenges. In 2020, The Linux Foundation published various whitepapers and blog posts regarding several emerging legal topics, areas of focus, and new structures for the collaborative development of technology.

These publications were the results of member counsels' participation in ongoing discussions — sometimes fervent debates, and sometimes continuing for months or years, to find the best answers collaboratively and openly. Some of these publications were written by external experts with support from The Linux Foundation, while other whitepapers and blogs were written by LF personnel. Topics included:

- An analysis of Docker containers and compliance considerations

- A guide to open source for procurement professionals

- Suggestions for copyright notice formats in open source projects

- An overview of conformance programs for project trademarks

- Open standards development via Community Specifications

- Collaborative operation of distributed data networks via Open Governance Networks

We are extremely grateful to all of our participants in the member counsel community for their wisdom, experience, and willingness to share with us and with each other.

Legal Summit

We held our annual member counsel Legal Summit in October 2020 as a virtual event for the first time. Over 130 lawyers, open source program officers, and compliance experts met to discuss various open source-related legal topics during the three-day event. Some presentations took a fresh look at long-standing issues, such as a deep dive into the nuances of the Apache-2.0 license. Other sessions covered new and emerging matters, such as API licensing implications, patent litigation in open source communities, and new approaches to managing compliance for containers.

Licensing Compliance and Automation

The Linux Foundation also continued to provide resources to help developers understand the importance of compliance with free and open source software licenses. In 2020 we refreshed and updated our free training course, Open Source Licensing Basics for Software Developers (LFC191). Over 5,000 developers have taken the course since its original launch.

We have also continued our support of the intersection of licensing and technical automation by helping to maintain the SPDX License List together with the SPDX legal community over the past ten years. 2020 saw an update and clarifications to the License Inclusion Principles, which among other changes, now explicitly permits source-available licenses to be included on the list. The team has published a new release of the License List every quarter, most recently v3.10 in August.

We are thankful for all the participants in the SPDX community. Special thanks in particular to Gary O'Neall for all of his work in developing the SPDX tooling, to keep it possible for developers across the ecosystem to adopt SPDX in their workflows; and to Jilayne Lovejoy for her tireless efforts in maintaining the SPDX License List over the past 10 years.

Encouraging best practices: cloud financial operations and open source program office networks

The [FinOps Foundation](#) joined the LF's family of communities in June of 2020. Its mission is to advance the discipline of cloud financial operations ("FinOps") through best practices, education, and standards among individuals responsible for cloud billing and operations.

The FinOps Foundation includes 2,500 individual members worldwide, representing more than 800 companies with more than $1 billion in revenue each. In the same way that DevOps revolutionized development by breaking down silos and increasing agility, FinOps increases the cloud's business value by bringing together technology, business, and finance professionals with a new cultural set, knowledge skills, and technical processes. https://www.finops.org/

[TODO](#) is an open group of companies who want to collaborate on practices, tools, and other ways to run successful and effective open source projects and programs. TODO Group functions as a community to bring the people managing Open Source Program Offices together in a meaningful way.

TODO Group publishes guides on collected best practices from the leading companies engaged in open source development. These guides aim to help organizations successfully implement and run an open source program office.

In September, the European Chapter of TODO Group published a whitepaper "[Why Open Source Matters to your enterprise](#)," which provides a balanced and quick overview of the business pros and cons of using open source software.

Addressing software supply chain and security challenges

OPEN SOURCE SECURITY FOUNDATION

The Open Source Security Foundation (OpenSSF) was publicly announced on August 3rd. It is a cross-industry collaboration that brings together leaders to improve the security of open source software (OSS) by building a broader community, targeted initiatives, and best practices. The OpenSSF combines multiple open source security initiatives under one foundation to accelerate work through cross-industry support, including the LF's Core Infrastructure Initiative (CII).

The OpenSSF governing board members are from AuriStor, Canonical, GitHub, Google, IBM, Intel, JPMorgan Chase, Microsoft, NCC Group, OWASP, and Red Hat. It has formed several working groups (WGs) to focus on various issues:

- Identifying Security Threats - security metrics for open source projects

- Security Tooling - state of the art, globally accessible security tools

- Best Practices - awareness and education of security best practices

- Vulnerability Disclosures - efficient vulnerability reporting and remediation

- Digital Identity Attestation - ensuring the provenance of open source code

- Securing Critical Projects - hands-on help for critical open source projects

The OpenSSF is just getting started but has already produced some results. It has released a trio of freely-available courses on EdX on developing secure software fundamentals, along with a professional certificate so developers can show they've understood it. It has collaboratively released the OWASP Security Knowledge Framework (SKF), including hands-on labs for developers. The CII Best Practices badge continues to grow; over 3,400 projects participate, and over 480 have earned passing badges. The OpenSSF is also working with Harvard to analyze a survey to understand OSS project security needs better.

To get involved, visit: https://openssf.org/getinvolved/

There are now 35 OpenSSF members:

Arduino
AuriStor Inc.
Canonical Group Limited
Debricked
Facebook, INC.
GitHub, INC.
GitLab, INC.
Google
HackerOne
Huawei Technologies CO., LTD.
iExec Blockchain Tech
Intel Corporation
IBM
JPMorgan Chase
Laboratory for Innovation Science at Harvard
Microsoft Corporation
NCC Group
Okta INC.
Open Source Technology Improvement Fund, INC.
Open Web Application Security Project
Polyverse Corporation
Purdue University
Red Hat INC.
Renesas Electronics Corporation
SAFECode
Samsung Electronics CO. LTD.
Spectral
StackHawk
SUSE LLC
Telefonica
Tencent Holdings LIMITED
Trail of Bits
Uber Technologies, INC.
VMware, INC.
WhiteSource

Improving open source software security:
FOSS Contributor Survey

In 2019-2020 the Linux Foundation's Core Infrastructure Initiative (CII) and the Laboratory for Innovation Science at Harvard (LISH) ran a census to identify the most popular FOSS software. The preliminary conclusions were published in February 2020.

In 2020 the LF and LISH surveyed FOSS contributors to identify key issues in improving FOSS security and sustainability, building on the census findings. Its purpose was to support proactive FOSS security improvements.

Below are key insights of this FOSS Contributor Survey (to be published December 2020).

1. The top three motivations for contributors are non-monetary.

Non-monetary motivations (adding a needed feature/fix, enjoying learning, and fulfilling a need for creative/ enjoyable work) were most frequently ranked in respondents' top three motivations for contributing.

2. There is a clear need to dedicate more effort to the security of FOSS, but the burden should not fall solely on contributors.

Respondents spend little of their time responding to security issues and do not want to increase this. Respondents reported that the most beneficial security contributions to their projects would be bug/ security fixes, free security audits, and simplified ways to add security-related tools to their CI pipelines.

3. As more contributors are paid by their employer to contribute, stakeholders need to balance corporate and project interests.

Nearly half (48.7%) of respondents are paid by their employer to contribute to FOSS. Increasing paid contributions could increase FOSS stability and sustainability, but concerns remain about support suddenly ceasing.

4. Continue the positive trend of corporate support for open source with more transparent policies for employees on FOSS contributions.

Respondents report they are freer to contribute to FOSS without asking permission vs. ten years ago (48.45% vs. 35.84%). However, many respondents' firms have unclear policies (17.48%) or they were unaware (5.59%) of them.

Going beyond source code

The Linux Foundation has expanded from its original mission by taking collaboration beyond source code to address industry issues like functional safety, certification, open hardware, and data as well
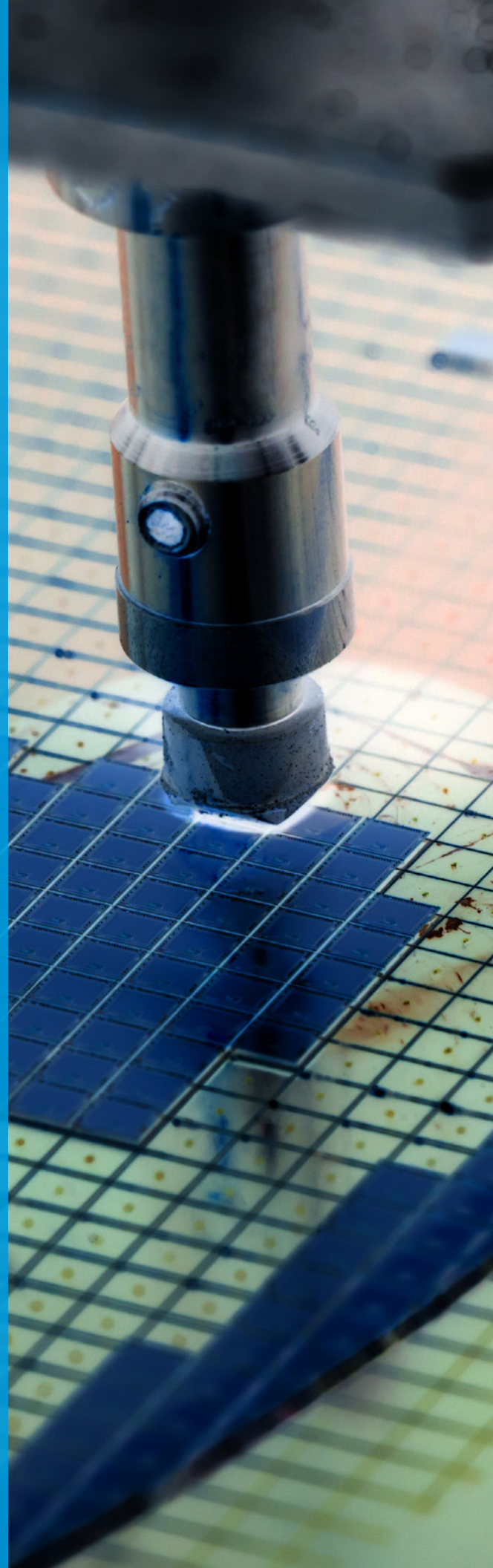
Addressing functional safety challenges

ELISA (Enabling Linux in Safety Applications) has been active now for over a year. The project aims to create a shared set of tools and processes to help companies build and certify Linux-based safety-critical applications and systems whose failure could result in the loss of human life, significant property damage, or environmental damage.

As Linux continues to be a key component in safety related applications like: autonomous vehicles, medical devices, and even rockets, ELISA will make it easier for companies to build, test and analyze these safety-critical systems. As a show of support for this business-critical initiative, several new members have joined the ELISA project. New members include Premier Member Intel/Mobileye, General Members ADIT, Elektrobit, Mentor, SiFive, Suzuki, Wind River, and Associate Members Automotive Grade Linux and Technical University of Applied Sciences Regensburg.

In parallel to incredible member growth, ELISA has established several workgroups to further the cross-industry project's crucial work toward advancing open source in safety-critical systems. These groups include Kernel Development Process, Safety Architecture, Medical Devices and an Automotive working group. The project just completed it's fifth workshop, and even though the last two had to be held virtually, the number of participants continues to grow, and participant satisfaction is high as we collaborate together to identify ways to bridge the gap between existing functional safety standards and the Linux kernel's development velocity.

To learn more, visit: https://elisa.tech/

Going beyond source code

Open Standards

In 2019, the Linux Foundation added the Joint Development Foundation (JDF) to its family of project communities. JDF is a Specifications setting body with a unique process that allows new projects to form quickly and collaborate under a standardized set of governance principles that ensure the resulting specification can be implemented with open source licenses.

Bringing Specifications into the Linux Foundation is the natural evolution for Open Source projects, allowing larger ecosystems to create interoperable protocols that are not dependent on a specific codebase. With over 15 projects in its portfolio, the JDF has enabled various new specifications to flourish.

In 2020, the JDF was granted Publicly Available Specification (PAS) submitter status by JTC1 / ISO / IEC, allowing its projects to apply for international recognition and adoption of its Specifications. The OpenChain supply chain specification was approved in September 2020, and the SPDX Specification has been submitted to JTC1 for balloting.

One of the most significant barriers to developing traditional specifications has been the expense and time associated with the formation and development of a bespoke non-profit association. The JDF has taken a different approach by creating a common template that adopts an array of best-practice terms, governance structures, and license options and forming each group as a distinct entity under an umbrella non-profit.

In Q3 of 2020, the JDF released Community Specifications, which allows collaborations to form independently. All governance principles are contained within a simple Github repository and where contributions are managed with automated tools available in the repository. The Linux Foundation in conjunction with the JDF has been consistent in creating a community where ever collaborators are willing to engage.

"With LF and JDF, a community can build a specification in a repository, and months after a release, achieve recognition as an international standard. No other standards body offers this sophistication."

In addition, JDF has recently added a new "Open Data" mode, which provides open data communities with the ability to start open data-related efforts quickly and easily under the JDF structure. This open data capability is not offered by any other organization, and provides an opportunity for LF and JDF to serve communities in the nascent and important open data space.

The JDF program has allowed a number of innovative new specifications to come to the public, including AV1, an open source streaming video codec developed at the Alliance for Open Media (AOM), a secure 3D printing protocol developed at 3MF, and several distributed identity specifications developed at the Distributed Identity Foundation (DIF) and Trust over IP (ToIP).

Some of the newer projects are an ambitious project at the Open Manufacturing Platform (OMP) that is working on common data models that will allow for interoperable exchange of data from the shop floor to the Cloud across a wide range of discrete and process manufacturing verticals.

Specifications allow companies to collaborate on common methods for how information can be structured, transported, and shared while allowing them to innovate and build services that ride on top of those protocols. The disciplines of neutral governance, openness, community, and developer engagement are enabled by the JDF program and amplified by the Linux Foundation community.

Open Hardware

RISC-V is the fastest growing open ISA in history, with more dedicated fabless design companies than any other architecture, rapid community growth, and hundreds of design wins moving into production. In 2020, RISC-V International has seen 60%+ membership and engagement growth to 700+ members evenly distributed across North America, Europe, and APAC, bringing 1,900+ contributors to 43 RISC-V workgroups and committees. We've launched several programs including RISC-V Exchange showcasing 240+ member developer boards, Cores, SoCs, software, and tools, RISC-V Learn to connect academia, online learning, and Training Partners, and an expansive developer advocacy program including our first eight Ambassadors, 25 local developer groups attracting 4,000 members around the world, and alliances formed with 15 open communities, standards organizations, industry, and geographic associations.
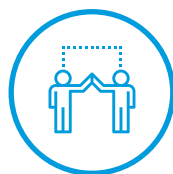
RISC-V is an open Instruction Set Architecture enabling microprocessor, hardware, and software innovations.

60%+
Membership & Engagement Growth to 700 members

1,900+
Contributors

43
Workgroups

240+
Member developer boards, Cores, SoCs, software, and tools

Community Highlight

OpenPOWER™

The OpenPOWER Foundation was founded in 2013 by some of the biggest names in technology, focusing on advancing the POWER architecture. 7 years later, the Foundation now hosts 350 members with over 100 open innovations in both hardware and software.

In 2020, The OpenPOWER Foundation also brought on new leadership with a new executive director and Technical Steering Committee TSC chair. Both experienced open source entrepreneurs and excited about growing the OpenPOWER community.

OpenPOWER continued its new journey set forth last year by fully open sourcing the POWER ISA and joining the Linux Foundation, accelerating the development of one of the most open, mature, and high-performance CPU architectures.

The foundation saw outstanding open source contributions from its community, including the fully open high-performance A2 POWER cores designed for high throughput and full customization. It had previously been used in supercomputers.

OpenPOWER has always been a leader in AI and accelerated computing. This year, OpenPOWER further enhanced its position with the community contribution of the Open Cognitive Environment software based on code from IBM's PowerAI project, making OpenPOWER a leading platform for building a complete environment of packages for AI development.

Finally, the foundation hosted its first fully virtual summit this year, which recorded the highest attendance in its history and helped increase awareness within the open source hardware and software community.

Community Highlight

CHIPS ALLIANCE

The CHIPS Alliance is a project that develops high-quality, open source hardware designs relevant to silicon devices and FPGAs. The goal of the CHIPS Alliance is to foster healthy collaboration around tooling and verification projects in the open hardware ecosystem.

The CHIPS Alliance leverages common hardware development efforts by developing IP blocks that can be broadly used, such as RISC-V cores and neural network accelerator cores. We recognize that verification contributions benefit all who participate in the project, and prioritize joint resources for design verification.

The scope of the Project includes hardware, software, and specification design and development under open source licenses:

- Verified IP blocks (compute cores, accelerators etc)

- Verified SoC designs (based on RISC-V and other open source cores)

- Open source software development tools for ASIC development

- High value IP including analog peripherals, mixed signal blocks and compute acceleration

- Exploration of new design flows such as Python-based design verification.

The CHIPS Alliance continues to grow in membership, notably including universities who are building classes and projects around tools developed by CHIPS Alliance working groups. In addition, we are working to refine the way that we host and manage projects and specifications.

While the global pandemic has impacted all plans for in-person events, the CHIPS Alliance has successfully hosted multiple virtual meetups and a virtual workshop. We continue to focus upon advocacy and education, and are working to formalize the way that we provide ongoing support and nurturing for CHIPS Alliance code and specification processes.

CHIPS Alliance is open to all organizations who are interested in collaborating on open source hardware or software tools to accelerate the creation of more efficient and innovative chip designs.

Open Data

We see great opportunity ahead of us in open data-focused collaboration. At the Linux Foundation, we have worked to bring together the core building blocks we see necessary to collaborating with data:

- Data-oriented license agreements

- Governance structures for data collaboration

- Community-driving development of data models

Together with our community, we crafted and published the Community Data License Agreement in both "permissive" and "sharing" flavors. We have tailored our standard governance models to reflect the unique aspects of collaborating on data. Finally, we have specification frameworks for developing data models and definitions and have various such projects either active (e.g., Cloud Information Model, the Open Glossary of Edge Computing) or soon to be announced.

 Last year, we launched our first data collaboration project, the Open Energy Data Initiative (OEDI), with the above foundation. This year, we are launching the OS-Climate Data Commons, supported by our OS-Climate project.

Open Governance Networks

Over the last ten years, we've seen the development of new tools that allow us to build better-distributed data networks without that critical need for a centralized database or institution holding all the keys and trust. These use distributed ledger technology (DLT) to build a single source of truth across a network of cooperating peers, and embed programmatic functionality as "smart contracts" or "chaincode" across the network.

The Linux Foundation has been very active in DLT, first with the launch of Hyperledger in December of 2015. The launch of the Trust Over IP Foundation earlier this year focused on the application of self-sovereign identity, and in many examples, usually using a DLT as the underlying utility network.

However, many of these networks need a critical mass of industry participants and have faced difficulty achieving their goal. A frequently cited reason is the lack of clear or vendor-neutral governance of the network.

To address this need, the Linux Foundation is adding "Open Governance Networks" to the types of projects we host. We have several such projects in development that will be announced before the end of the year.

These projects will operate very similarly to the Linux Foundation's open source software projects, but with some additional key functions. Their core activities will include:

- Hosting a technical steering committee to specify the software and standards used to build the network, to monitor the network's health, and to coordinate upgrades, configurations, and critical bug fixes

- Hosting a policy and legal committee to specify a network operating agreement the organizations must agree to for connecting their nodes to the network

- Running a system for identity on the network, so participants to trust other participants who they say they are, monitor the network for health, and take corrective action if required.

- Building out a set of vendors who can be hired to deploy peers-as-a-service on behalf of members, in addition to allowing members' technical staff to run their own if preferred.

- Convene a Governing Board composed of sponsoring members who oversee the budget and priorities.

- Advocate for the network's adoption by the relevant industry, including engaging relevant regulators and secondary users who don't run their own peers.

- Potentially manage an open "app store" approach to offering vetted re-usable deployable smart contracts of add-on apps for network users.
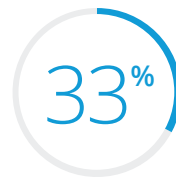
Profile of The Linux Foundation

Of our 205 employees, 52% are women, substantially above the average for major tech companies, which is 34.4%. Our employees are located around the world including the United States, Canada, Europe, Australia and Japan. Within the US we have employees in 32 states.

52% of our employees are women

33% of our management team are women

33% of our project leadership are women

32% of our Board of Directors are women

The Linux Foundation's revenue is derived from 4 primary fundraising sources, Memberships & Donations, Project Membership & Support, Training, Event Sponsorships & Registrations.

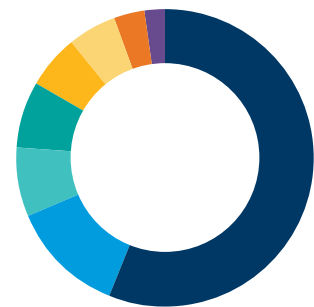In 2020 the Linux Foundation is forecasting to spend $148M supporting our mission.

Employee Worldwide Distribution

- US **87.3%**
- Canada **4.9%**
- Europe **2.9%**
- Japan **2.9%**
- Australia **2.0%**

Linux Foundation Fundraising Sources

- Membership & Donations **55.5%**
- Project Services **25.9%**
- Training **9.5%**
- Event Sponsorships & Registrations **8.9%**
- Other **0.2%**

Expenditures

- Project Support **56.3%**
- Community Infrastructure **12.5%**
- Community Training **7.4%**
- Community Tooling **7.2%**
- Corporate Operations **5.8%**
- Community Events **5.4%**
- Linux Kernel Support **3.4%**
- Internal Operations **2.0%**

Connect With Us

The Linux Foundation is the organization of choice for technologists, executives and other open source professionals who are building durable ecosystems to accelerate development as well as commercial adoption.

If you're new to open source, looking to step up your contributions or want to sharpen your technical skills, we want to hear from you. Similarly, if you have technology that would benefit from a neutral home and collaborative development, please contact us.

We invite you to be a part of our community and look forward to connecting with you.

twitter.com/linuxfoundation
facebook.com/TheLinuxFoundation
linkedin.com/company/the-linux-foundation
youtube.com/user/TheLinuxFoundation

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