# LF AI & Data Technical Advisory Council

Biweekly call - May 2, 2024

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# Recording of Calls

TAC calls are recorded and available for viewing on the TAC Wiki

# LF AI & Data Useful Links

- Web site: lfaidata.foundation
- Wiki: wiki.lfaidata.foundation
- GitHub: github.com/lfai
- Landscape: https://landscape.lfaidata.foundation
- Mail Lists: https://lists.lfaidata.foundation
- Slack: https://slack.lfaidata.foundation
- Youtube: https://www.youtube.com/channel/UCfasaeqXJBCAJMNO9HcHfbA
- LF AI Logos: https://github.com/lfai/artwork
- PPT Template: https://drive.google.com/file/d/1eiDNJvXCqSZHT4Zk_-czASlz2GTBRZk2/view
- Events: https://lfaidata.foundation/events/
- Events Calendar https://wiki.lfaidata.foundation/pages/viewpage.action?pageId=12091544
- Event Wiki https://wiki.lfaidata.foundation/pages/viewpage.action?pageId=10518553

# Agenda

- Roll Call  (1 mins)
- Approval of Minutes from previous meeting  (2 mins)
- IREE Requesting Sandbox (AMD, Google) (35 mins)
- Q&A  (10 mins)
- Voting  (5 mins)
- Next TAC Meetings (2 mins)
- Open Discussion

# TAC Voting Members

Note: we still need a few designated backups specified on [wiki]

| Company or Graduated Project | Level or Project Level | Eligibility | | | Representative Alternates |
|---|---|---|---|---|---|
| 4paradigm | Premier | Voting Member | China | Zhongyi Tan | |
| Microsoft | Premier | Voting Member | USA | Ali Dalloul | |
| Amazon Web Services | Premier | Voting Member | USA | Brian Granger | Mark Atwood |
| Ericsson | Premier | Voting Member | Sweden | Rani Yadav-Ranjan | |
| Huawei | Premier | Voting Member | China | Howard (Huang Zhipeng) | Charlotte (Xiaoman Hu), Leon (Hui Wang) |
| IBM | Premier | Voting Member | USA | Susan Malaika | Beat Buesser, Alexandre Eichenberger |
| OPPO | Premier | Voting Member | China | Jimmy (Hongmin Xu) | |
| Bytedance | General | Voting Member | USA | Vini Jaiswal* | |
| Sas | Premier | Voting Member | USA | Ruth Akintunde | Liz McIntosh |
| ZTE | Premier | Voting Member | China | Wei Meng | Liya Yuan |
| Adversarial Robustness Toolbox Project | Graduated Technical Project | Voting Member | USA | Beat Buesser | Kevin Eykholt |
| Angel Project | Graduated Technical Project | Voting Member | China | Jun Yao | |
| Egeria Project | Graduated Technical Project | Voting Member | UK | Mandy Chessell | Nigel Jones, David Radley, Maryna Strelchuk, Ljupcho Palashevski, Chris Grote |
| Flyte Project | Graduated Technical Project | Voting Member | USA | Ketan Umare | |
| Horovod Project | Graduated Technical Project | Voting Member | USA | Travis Addair | |
| Milvus Project | Graduated Technical Project | Voting Member | China | Xiaofan Luan | Jun Gu |
| ONNX Project | Graduated Technical Project | Voting Member | USA | Alexandre Eichenberger | Andreas Fehlner, Prasanth Pulavarthi, Jim Spohrer |
| Pyro Project | Graduated Technical Project | Voting Member | USA | Fritz Obermeyer | |
| Open Lineage Project | Graduated Technical Project | Voting Member | USA | Julien Le Dem | Michael Robinson, Mandy Chessell |
| Marquez Project | Graduated Technical Project | Voting Member | USA | Willy Lulciuc | TBD |

# Minutes approval

# Approval of April 4, 2024 Minutes

Draft minutes from the April 4, 2024, TAC call were previously distributed to the TAC members via the mailing list and available on the TAC wiki.

**Proposed Resolution:**

- That the minutes of the April 4, 2024, meeting of the Technical Advisory Council of the LF AI & Data Foundation are hereby approved.

# IREE

https://github.com/iree-org/iree/

Proposal to add in LF AI & Data at Sandbox level

# LF AI & Data proposal: IREE

Jacques Pienaar (Google) and Stella Laurenzo (AMD)
on behalf of IREE community

## vision | why we're here

The potential of ML remains unfathomed but can be discovered by providing a means to realize compelling performance on the continuously-evolving corpus of models expressed on its ever-mutating set of input forms on nascent, dynamic and heterogeneous hardware targets.

## mission | what we do

Build a suite of extensible, composable, re-targetable OSS tools for efficiently deploying popular and emerging ML model representations to popular and emerging targets ranging from embedded systems to datacenter. Biased for world class versatility with very good performance.

# Goals

- Unlock access to the hardware ecosystem from any framework
- Deliver industry-leading out-of-the-box performance and reduced TCO
- Becomes de facto toolkit for heterogeneous compute (IBM PC / LLVM analogy)
- Build an enduring compiler platform for the ML community to use and extend
- Increase the speed of ML innovation for all ML practitioners

# IREE in a nutshell

IREE is a toolkit that's designed to simplify the deployment of ML programs to a range of architectures and power regimes.

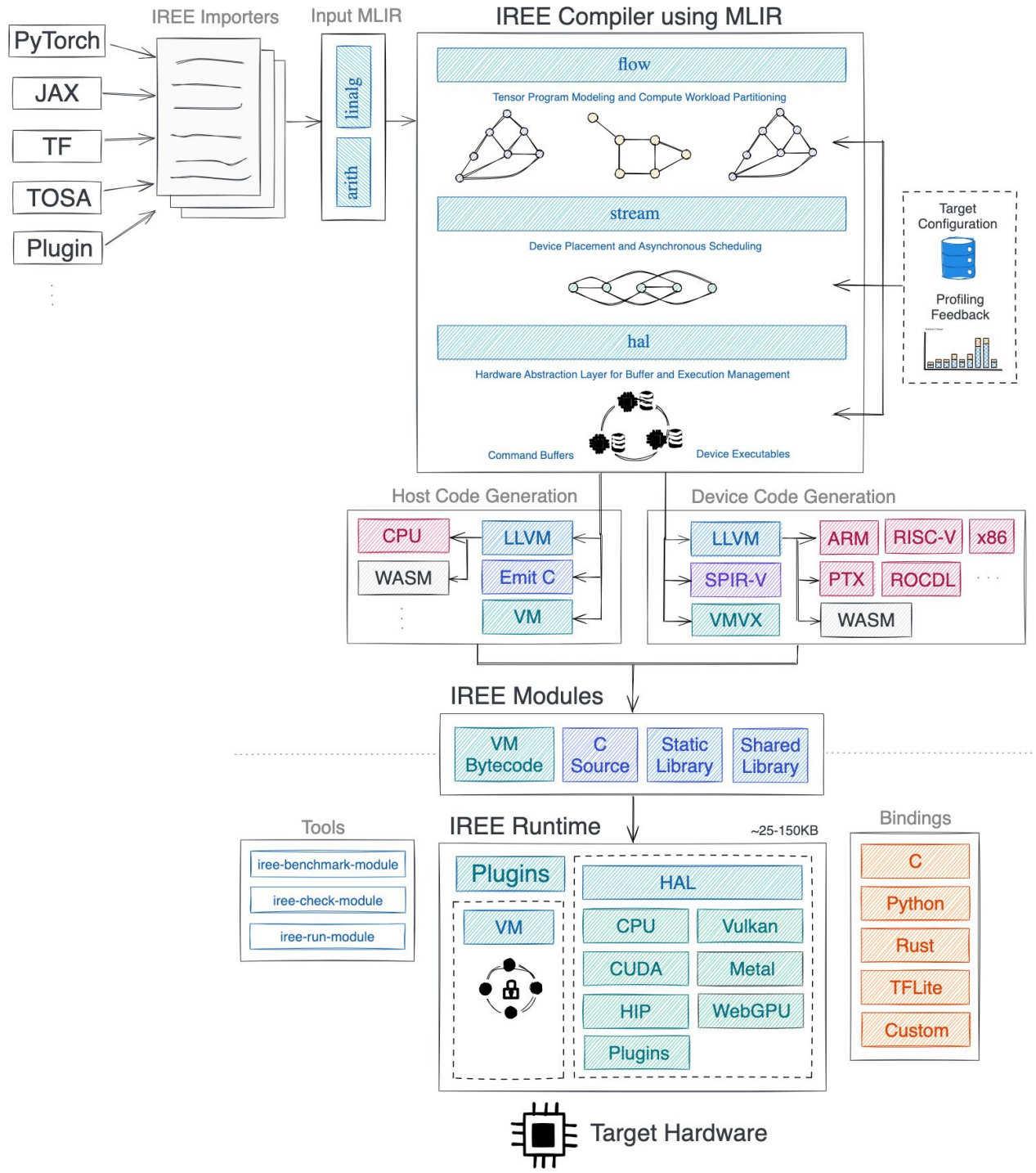
It compiles ML programs into deployable artifacts comprised of:

- Device-specific code representing the "kernels" of the program (as expressed in x86/Arm machine code, SPIR-V, PTX, etc.).
- Device-agnostic code that expresses the dataflow between these kernels.

A lightweight runtime executes these artifacts, providing flexible deployment and optimal execution.

# Architecture

- Extensible architecture with plugins for
  - Input/importers
  - Compiler backends
  - Devices (behind HAL)
- Build on top of efficient runtime
- Custom language bindings



# IREE Workflow

← Frameworks/integrations

## Compiler → Artifacts → Runtime

- Native integration with PyTorch via Dynamo/FX.
- Accepts StableHLO but also upstream MLIR dialects using tensors like arith, math, linalg, and TOSA.
- Importers for TensorFlow SavedModels, TFLite Flatbuffers, XLA protos, etc
- Partitions programs into host- and device-side logic and schedules execution
- Bakes out artifacts (IREE VM FlatBuffers, EmitC .c files, etc)

- Shared library-like modules
- Link against IREE built-in modules like the HAL or other user modules
- Contains the partitioned host program and embedded device programs ("executables") in various formats, like a fat binary
- Logic for device selection, branching paths for different device types, etc - *it's just code*

- Dynamic linker for loading modules into isolated contexts
- Optional bytecode VM for running host programs
- HAL (Hardware Abstraction Layer) API and backends (CPU, Vulkan, CUDA, etc)
- Utility APIs for ease of use (session-style invocation)
- Low-level; designed to be wrapped in bindings for languages/environments

# Target Platforms supported

Primary Platforms with committed investment:

- AMD HIP
- AMD XDNA (via in-progress plugin)
- CPUs generally, with a focus on x86_64 and aarch64
- NVIDIA CUDA
- Vulkan/SPIR-V for GPUs generally

Experimental or community projects:

- Apple Metal (via SPIR-V interop)
- RISC-V CPUs and ecosystem
- WebAssembly
- WebGPU

# Framework Integration

Full Featured:

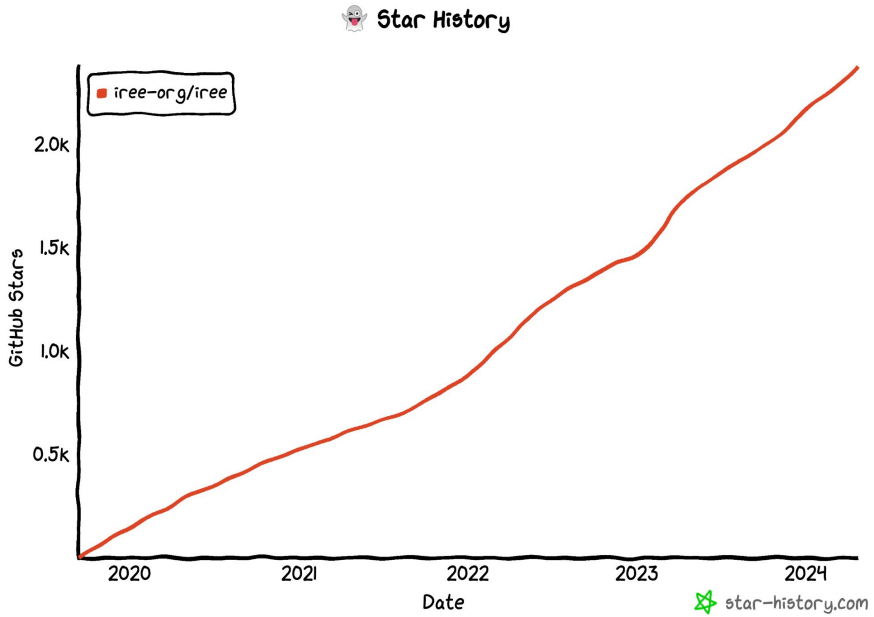
- Torch
  - IR compatibility via co-investment in torch-mlir
  - Full framework integration via IREE Turbine (née SHARK Turbine – repo migration in progress)
- ONNX
  - IR compatibility via co-investment in torch-mlir ONNX compatibility layer
  - Full tooling and EP prototyped and under development

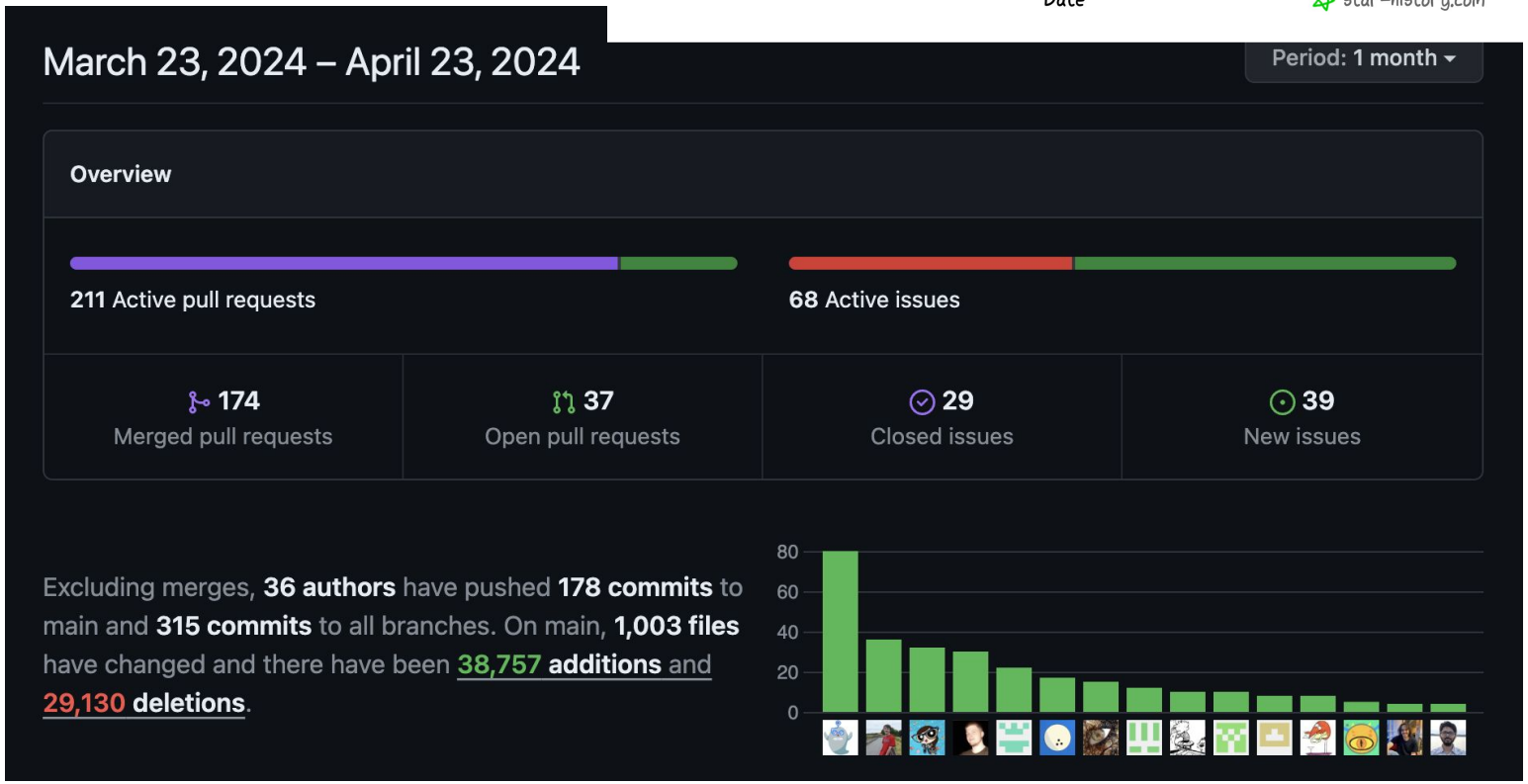
Compiler IR Compatibility:

- JAX (via StableHLO and PJRT)
- TFLite (via TOSA export)
- TensorFlow (via StableHLO)

# Community

- Open source since Sep 18, 2019
- 2.4K Stars
- 190 Contributors
- Well into 3rd-4th generation contributors that have spanned companies over the years
- Active community on Discord, mailing list, etc



# Why donate IREE?

Neutral holding ground

- Vendor-neutral, equal collaboration

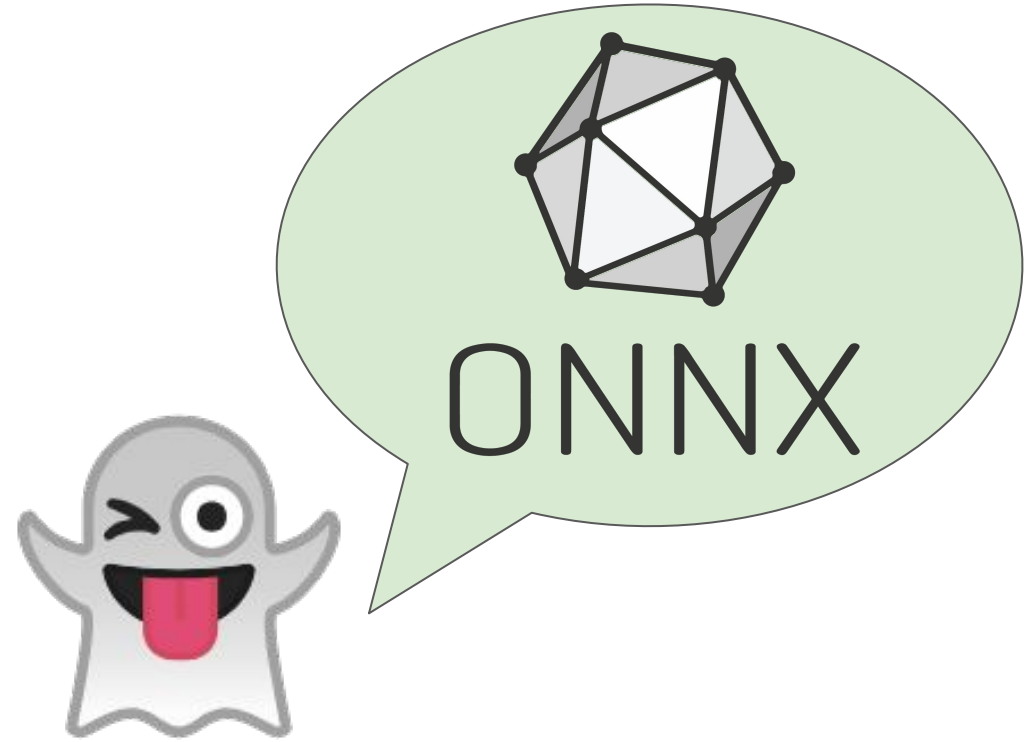
Growing community

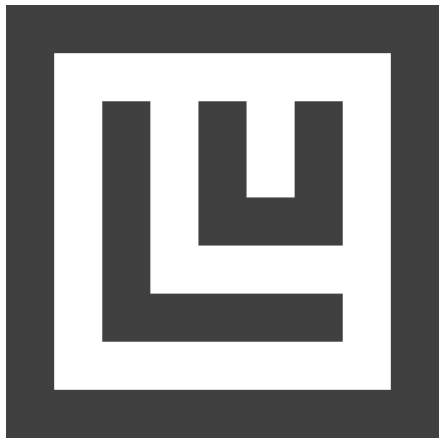
- Increase contributors by converting new & existing users
- Opportunities to collaborate with other hosted projects
- Increase users by broader outreach through the foundation

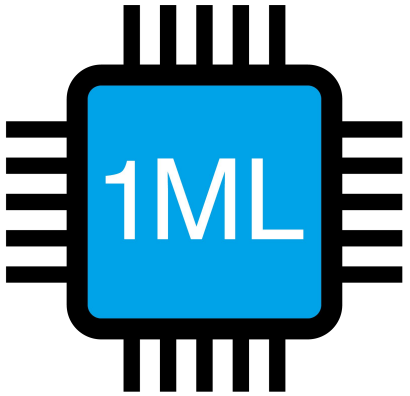
Open Governance model

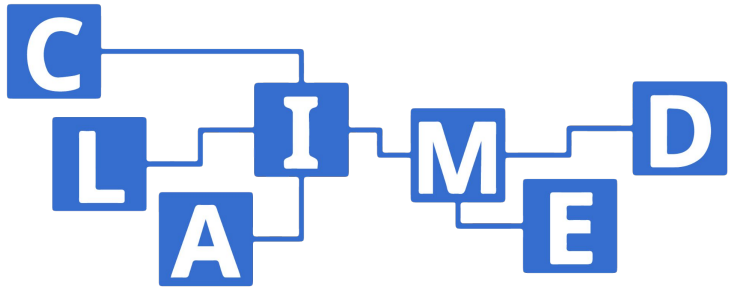
- Open governance + open source license
- Distills trust in the running & management of the project
- Neutral management of projects' assets by the foundation

# Possible collaborations with existing projects






ShaderNN

# Summary

- IREE focuses on scalable ML model deployment
- Connectivity bits across multiple input frameworks to multiple backends
- Toolbox to enable exploiting from application specialized deployment to hardware specialization
- Open community, using & driving standards to target many platforms

# Request to TAC

We'd like to contribute IREE to Linux Foundation's AI & Data foundation as sandbox project

We would like to work with you to address any concerns

# Thanks!

# Questions / Discussion on IREE

# Proposed Resolution

**Proposed Resolution:**

- That the Technical Advisory Council of LF AI & Data Foundation approves the IREE project at the Sandbox level

# Next steps

- The LF AI & Data team will follow up with the AMD on onboarding the project and integrating it with our services.
- Once completed, an announcement will follow.

# Open Discussion

# Call for Action

- **Nominate representatives** to our re-launched Outreach Committee (OC)
  - 1 appointed voting representative from each Premier Member
  - 1 appointed non-voting representative from each General Member

LF AI & DATA

OUTREACH COMMITTEE

# Upcoming TAC Meetings

| | |
|---|---|
| 05/16 | Delta Lake requesting addition to LF AI and Data |
| 05/30 | TRULENS requesting incubation |
| 06/13 | *ML Spec (Tentative)* |
| TBD | Invited talks: Harvard + Horovod project + Open Voice |

If you have a topic idea or agenda item, please send agenda topic requests to tac-general@lists.lfaidata.foundation

# TAC Meeting Details

TAC Biweekly Meeting LF AI & Data

Ways to join meeting:

1. Join from PC, Mac, iPad, or Android

https://zoom-lfx.platform.linuxfoundation.org/meeting/95332329356?password=c708f2ee-fb78-4a12-91a3-47daa19b708f

2. Join via audio

One tap mobile:

US: +12532158782,,95332329356# or +13462487799,,95332329356

Or dial:

US: +1 253 215 8782 or +1 346 248 7799 or +1 669 900 6833 or +1 301 715 8592 or +1 312 626 6799 or +1 646 374 8656 or 877 369 0926 (Toll Free) or 855 880 1246 (Toll Free)

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Meeting ID: 95332329356

Meeting Passcode: 040721

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