Antitrust Policy Notice

Linux Foundation meetings involve participation by industry competitors, and it is the intention of the Linux Foundation to conduct all of its activities in accordance with applicable antitrust and competition laws. It is therefore extremely important that attendees adhere to meeting agendas, and be aware of, and not participate in, any activities that are prohibited under applicable US state, federal or foreign antitrust and competition laws.

Examples of types of actions that are prohibited at Linux Foundation meetings and in connection with Linux Foundation activities are described in the Linux Foundation Antitrust Policy available at http://www.linuxfoundation.org/antitrust-policy. If you have questions about these matters, please contact your company counsel, or if you are a member of the Linux Foundation, feel free to contact Andrew Updegrove of the firm of Gesmer Updegrove LLP, which provides legal counsel to the Linux Foundation.
Agenda

Opening (25 Minutes)
- Landscape updates
- TAC Sponsors for projects
- Summary of last TAC meeting & Updates from the Board Meeting

TAC Business (60 Minutes)
- LFX Security Presentation
- LF Architecture Model
- GPX Presentation
- JDF Transition for Standards and Specifications

Closing and Next Meeting (5 Minutes)
## TAC Voting Members

**New members in bold**

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Landscape now with more project info!

We are using the LF Energy Landscape to showcase more project information:

- Mailing List/Slack Channel
- LFX Insights
- SBOM
- Wiki
- TSC Meeting Notes
- Calendar
- Contribution Guidelines

ACTION: Project leads please review your entry and ensure it is accurate; issue PR for any changes needed.
The Power of Together

As part of the benefit for LF Energy projects, the TAC has a sponsor for each project.

“Appointment of an existing TAC member by the TAC that will act as a sponsor of the project and provide recommendations regarding governance best practices.”

**ASK: Volunteer to be a TAC sponsor for a project**

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</tbody>
</table>
Summary of last TAC meeting


Updates from the Board
Agenda

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Closing and Next Meeting (5 Minutes)
LFX Security Presentation
LF Architecture Model Presentation
A functional reference architecture to accelerate open-source development of power system applications

LF Energy FAWG Meeting
25 April 2022

Sean Crimmins, EPRI
Laura Crowley, EPRI
Jonas van den Bogaard, Alliander
Benoit Jeanson, RTE
Agenda

- Motivation for building a reference architecture
- ArchiMate primer
- Model demo:
  - Metamodel
  - Generic reference architecture
  - LF Energy projects views:
    - OpenSTEF
    - SOGNO
    - PowSyBl
  - Collaborative modelling with Archi and GitHub
- Feedback and next steps
Benefits of the reference architecture for open-source development & LF Energy

- Engage stakeholders in LF Energy’s open-source projects
  - Communicates the purpose and scope of an LF Energy projects
- Facilitate systems integration
  - Communicates the data objects that are exchanged between software
- Facilitate interoperability
  - Data exchange standards
- Create alignment within the LF Energy open-source community
  - Identifies gaps and overlaps in the portfolio of projects
- Allow utilities to align/compare their strategic development with the LF energy portfolio
What is a Reference Architecture

- A few definitions:

“A reference architecture … provides a template solution for an architecture for a particular domain. It also provides a common vocabulary with which to discuss implementations” Wikipedia

“Reference Architectures are standardized architectures that provide a frame of reference for a vertical domain or sector. Reference models or architectures provide a common vocabulary, reusable designs, and industry best practices.” LeanIX

- More than just software
  - Business Architectures
  - Business Practices
  - Application
  - Technology
What is a Functional Reference Architecture

A reference architecture:

▪ Defines the functions and data required to implement a capability independent of applications and technology

▪ Provides a vocabulary and definitions that enable:
  – Planning and roadmapping in terms of functional components without committing to a particular application
  – Requirements analysis while delaying design, deployment and purchasing decisions
  – Analysis of possible implementation options and a modularization of complex application suites.
  – Identification of data exchanges between application components and the corresponding standards.
ArchiMate primer

- The ArchiMate framework separates the Business layer from the Application layer⁠¹.
- An Application Function represents automated behavior that can be performed by an application component.
- A data object represents data structured for automated processing.
- A data object can be accessed by an application function.

¹ https://pubs.opengroup.org/architecture/archimate3-doc/chap09.html

ArchiMate is framework that is implemented in the Enterprise Architect software.
Reading the reference architecture

A small example of SCADA and State Estimation

- SCADA and State Estimation are application functions.
- Telemetry is a data object and is an input to the SCADA application function.
- The Telemetry Set is an output of the SCADA application function.
High Level overview of the reference architecture
Data Exchange Standards
Contingency Analysis – a closer look

- Power System State
- Contingency Definitions
- Equipment Model

Contingency Analysis
- Scenario Simulator
- Severity Ranking of Contingency Violations

Contingency Violations

Most severe single contingency
Model demo

- Metamodel
- Generic reference architecture
- LF Energy projects views:
  - OpenSTEF
  - SOGNO
  - PowSyBl
- Collaborative modelling with Archi and GitHub

All models are licenced under Creative Commons Attribution 4.0 International License
Feedback and next Steps

▪ Do you think lfenergyfunctionalarchitecture useful for LFEnergy and its members?
▪ Who wants to be involved?
▪ What are the most critical domains?
▪ Extend the reference architecture to demonstrate technical services (e.g., messaging, gateway, ESB)
▪ Present at the TAC

GitHub: https://github.com/lfenergyarchitecturemodel
Slack: https://lfenergy.slack.com/archives/C03A1U5APP
Appendix A: LF Energy Architecture Model installation

Installation

The use the LF Energy Archimate models you need Archi.

Step-by-step guide for Archi

1. Download and install the archi software. This can be downloaded from the following location https://www.archimatetool.com/
2. Download the following Archi plugin “coArchi – Model Collaboration for Archi” (https://www.archimatetool.com/plugins/#coArchi) to share and version the created models.
4. Open Archi and via the menu option → Collaboration → Import Remote Model to Workplace
5. Fill in the archimate model !https://github.com/lfenergy/architecturamodel/xxx.git, your username and the personal access token.

6. The model is cloned from github and shown in archi. The following steps may still be required to get the model under "Models:
Collaboration → Toggle Collaboration Workspace. The Collaboration Workspace opens on the right side of the screen. The project is visible. Double click on the model. The model is added under 'Models' on the left side of the screen and can be edited.
Appendix B: LF Energy Architecture Metamodel

Business Function
A business function represents a collection of business behavior based on a chosen set of criteria. Typically required business resources and/or commodity inputs, likely aligned to an organization, but not necessarily explicitly generated by the organization.

A business function may be defined in terms of how it processes information. Some processes related to the function are external to the organization, while others are internal. The function can be defined by a business process (a sequence of activities that lead to a specific outcome) or by the behavior of a business object.

There is a potential for many business functions to share internal processes that share some information. For instance, a business process that involves the creation of a product for delivery may interact with a business process that involves the delivery of the product. The two processes may involve the same resources, such as a warehouse or a logistics department.

Application Function
An application function represents an automated behavior that can be performed by an application component.

An application function describes the internal behavior of an application component. It is defined by a set of rules that describe how the component behaves in response to input. An application function may be defined by a business function or an application service.

An application function may be realized in one or more application services. Application services of other application layers and technology services may also be realized as application functions.

Application Component
An application component represents an encapsulation of application functionality aligned to an implementation structure, which includes modules and services. An application component is a self-contained unit that is independently deployable and replaceable. An application component performs one or more application functions. It encapsulates the behavior and data that supports a function and makes them available through interfaces. Coupled application components are connected in a hierarchy, often referred to as a composition architecture.

An application component may be assigned one or more application functions. An application component may have one or more application interfaces, which expose its functionality. Application interfaces of other application components may use the services of an application component.

Definition of Relationships
- Realization: Represents that an entity plays a critical role in the creation, achievement, utilization, or expenditure of resources, data objects, or access to resources, data objects, or access to access to resources, data objects.
- Realization: Represents the ability of behavior and action to deliver resources to observe or access resources.
- Composition: Represents that an element consists of one or more other concepts.
- Association: An associative relationship represents an association that is realized by another realizable relationship, in turn that is not represented by another realizable relationship.

Business Object
A business object represents a concept used within a particular business domain.

As explained in Section 3.3.6, the ArcheType Language is designed to model the behavior of types. Real-world instances of a type have a specific behavior that is inherent to the behavior of the type. Behavioral objects represent the interface of a type, which is implemented using a type that has one or more instances. A type may have multiple instances, but each instance represents a unique behavior. Behavioral objects may have multiple interfaces, but each interface represents a specific behavior.

Application Services
A service is a set of operations that can be invoked within the context of a business or technology service. An application service may be realized as an application component or an application function.

Data Object
A data object represents a data structure for automated processing.

A data object is used by the organization to maintain information with a focus on business intelligence, often used in operational applications. An example of such an application is a customer database, which stores information about customers.

Technology Collaboration
A technology collaboration represents an aggregate of two or more technology interfaces and/or resources that interact, often with a focus on business intelligence. An example of such a collaboration is a technology interface.
Appendix C: LF Energy Architecture Model – Generic reference architecture
Appendix C: LF Energy Architecture Model - OpenSTEF
Appendix C: LF Energy Architecture Model - SOGNO
Appendix C: LF Energy Architecture Model - PowSyBI
Appendix C: LF Energy Architecture Model - PowSyBI
ABOUT US

Founded in 1972, EPRI is the world’s preeminent independent, non-profit energy research and development organization, with offices around the world. EPRI’s trusted experts collaborate with more than 450 companies in 45 countries, driving innovation to ensure the public has clean, safe, reliable, affordable, and equitable access to electricity across the globe. Together, we are shaping the future of energy.
Vision
To be a world leader in advancing science and technology solutions for a clean energy future

Mission
Advancing safe, reliable, affordable, and clean energy for society through global collaboration, science and technology innovation, and applied research.

Together...Shaping the Future of Energy™
GPX Presentation
Presentation May 30, 2022
GPX SW+HW dev

In 3 steps
1. Information
2. Options
3. Consequences
1. Information – general 3/1

1) Groupmeter gathers (max 10) individual meters

2) Social interactive concept

3) Software open source
   https://github.com/GPXenergy
   Dashboard = groupmeter + individual meter

4) Hardware
   GPXconnector connects via wifi meter > server

5) Server use until end November 2022
1. Information – general 3/2

Past

GPX since 1999 in energy origin disclosure
1) In 2019 Jelle HAN/AIM set-up dashboard+HW
2) In 2020 payed improvement to present status

Future

3) GPX = non-profit, aim > GPXFoundation
4) Looking for board members
1. Information – general 3/3

Participants

1) Are satisfied but expect development
2) Believe in promising future with this idea
3) Small troubles installing HW by different guides
4) Exiting current clamp situation between wires
2. Option – general 3/1

Ideal situation architecture

- Auctions & bilaterals etc
  - 
- Contracts
  - My Energy Balance
- Transfers
  - Clearing
- Accounts
  - Dynamic banking

GPX Energiebank
2. Option – general 3/2
2. Option – general 3/3

1. Dashboard plus chat-functionality
2. Groupmeter with graph-functionality
3. Groups to form in clusters
4. Windpark & solarfield connecting
5. Together in energy-neutral ‘experience’
6. Better hardware (no adapter)
7. GPXFFoundation (open source & non-profit)
3. Consequences

- What if then else – effort & results
- SWOT – scalability to micro & macro!
- LFE (Linux) interested
- NL-AIC (Artificial Intelligence) interested
- Participants do not like surprises in GDPR
- Data ownership very delicate
Last page
Financial consequences
Way to cooperate and
How to move forward

Thank you.
Contact: https://www.gpx.nl/contactpagina/
Bonus slides 5/1
1: displayGroepsmeter(identifier)
1.1: getGroupMeter(identifier)
    groepdata
1.2: subscribeLiveUpdate(identifier)
    groepdata
    OK

2: timeToSend()
2.1: nieuweMeterdata(meterdata)
    OK

3: intervalTick()
3.1: getLiveGroepsmeter()
    groepsmeterdata
3.2: displayNewData()

1. Dashboard subscribed aan groepsmeter
2. GPX-Connectors sturen constant nieuwe data door
3. Socket update dashboard met live data
May30-2022 Egbert Bouwhuis
Contact:
https://dashboard.gpx.nl/info
https://gpx.nl
Google: groupmeter gpx
Phone NL 0031 6 20364506
JDF Transition for Standards and Specifications
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Closing and Next Meeting (5 Minutes)
The next meeting of the LF Energy TAC is scheduled for 21 June 2022 at 8:00 am US Pacific Time/11:00 am US Eastern Time/5:00 pm Central European Time.

NOTE: New meeting invite for series titled ‘LF Energy TAC meeting ( 2022 )’ from ‘LF Energy (LFE) - Meetings <meetings@lfx.linuxfoundation.org>’. Register for meeting at https://zoom-lfx.platform.linuxfoundation.org/meeting/98588947265 Please remove all other meeting invites.

Agenda will include:

- Recap of last TAC meeting/Governing Board updates
Thank you!
Outreach

- TFIR videos
  - [https://www.tfir.io/?s=lf+energy](https://www.tfir.io/?s=lf+energy)
- Recent press articles
  - [https://www.lfenergy.org/news/media-coverage/](https://www.lfenergy.org/news/media-coverage/)
- We want your project news!
  - Doesn’t need to be anything huge!
  - Examples of news:
    - New releases (example [https://github.com/powsybl/pypowsybl/releases](https://github.com/powsybl/pypowsybl/releases))
    - New features added
    - New maintainers/organizations involved
    - Upcoming plans