

Presentation for demonstration

Productive 4.0

# evopro Arrowhead adaptor

## Introduction

Arrowhead Framework bi-weekly telco, 14.04.2020



it's possible!

**evopro**  
innovation

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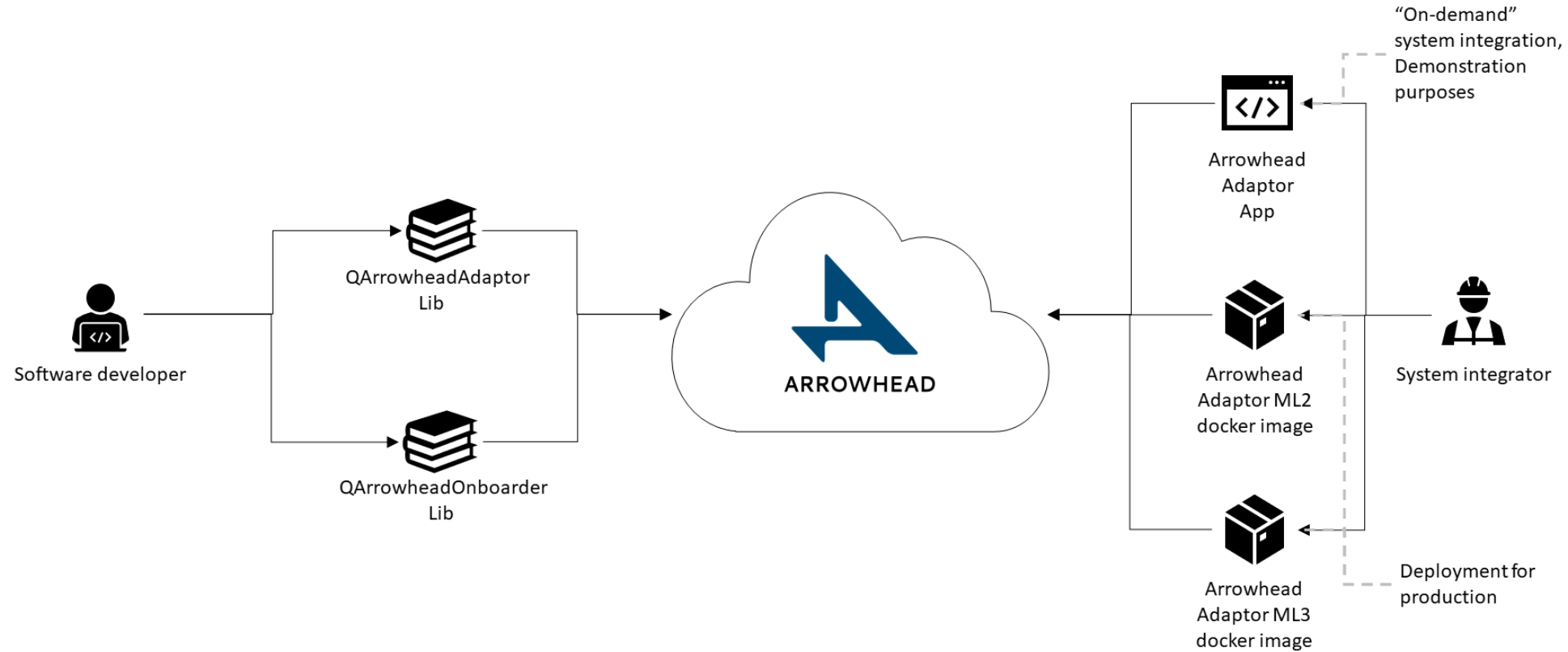
- What is evopro Arrowhead adaptor?
  - A software package for Arrowhead client application development and integration
- What is the content of Arrowhead Adaptor?
  - Static libraries
  - Command-line tool
  - Docker images

- Support system integrators
  - The Arrowhead technology has not relevant support above the developer layer (e.g. integrators, technology responsible without programming knowledge).
  - Simple configuration tools, which is intended to support system integrators deploying application services without the need for any (or decreased amount of) coding efforts.
  - Separation of development and integration responsibilities
  - To make legacy system adaptation easier for people who are not a programmer, or don't want to spend too much time on implementation (e.g. just want to test/demonstrate Arrowhead integration).
- Provide multi-platform solution
  - Embedded (edge), desktop, server
  - Qt/C++

# Target users



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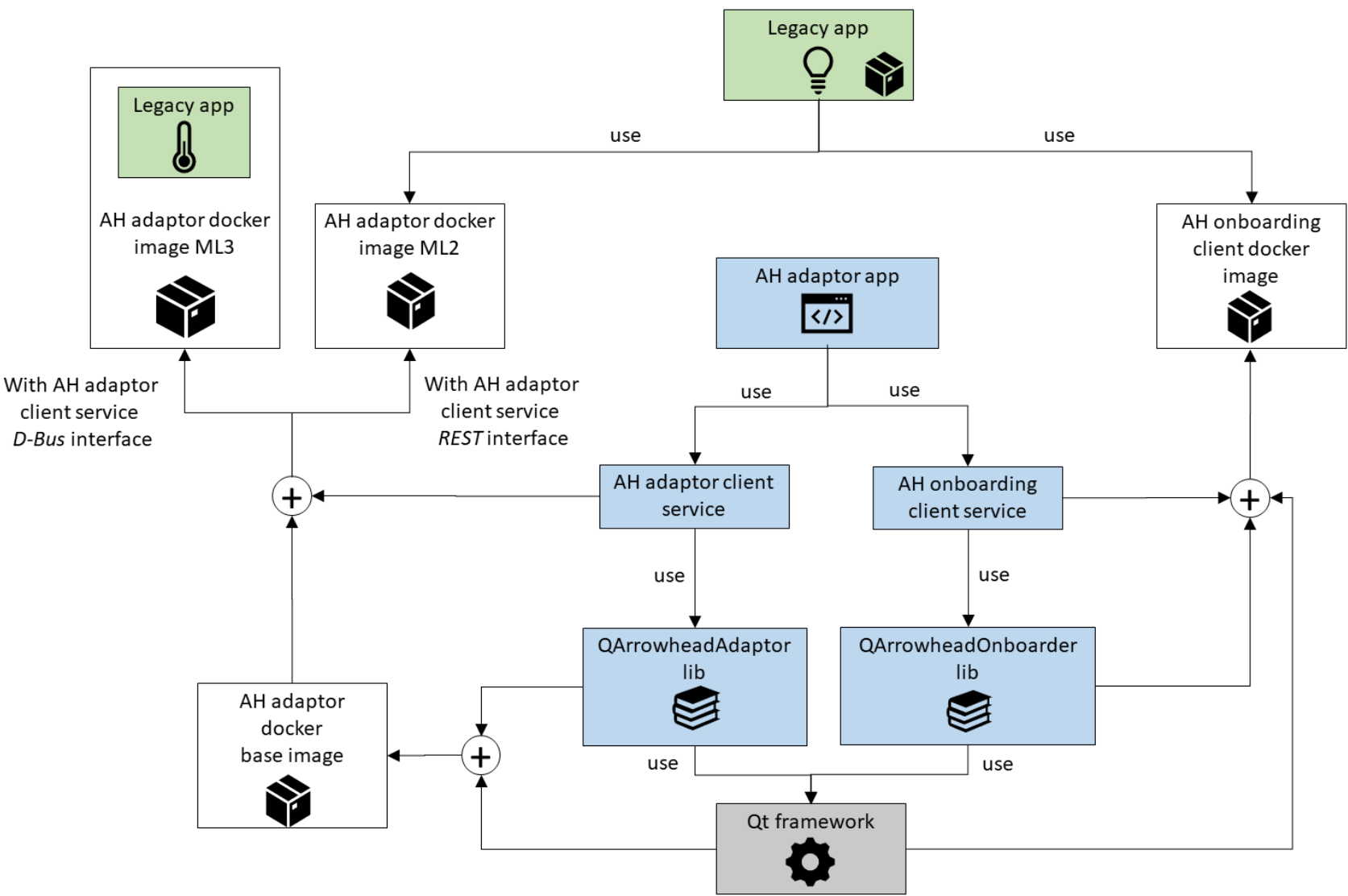


## Content

- QArrowheadAdaptor Lib
  - Qt/C++ based Arrowhead client-library (client-side implementation of mandatory core services)
- QArrowheadOnboarder Lib
  - Qt/C++ based Arrowhead onboarding-library (client-side implementation of onboarding core services)
- Arrowhead Adaptor App
  - Command-line application for Arrowhead application system integration and onboarding
- Arrowhead Adaptor docker base image
  - QArrowheadAdaptor Lib with dependencies
- Arrowhead Adaptor docker image ML2
  - Container image for maturity level 2 legacy app integration
- (+ Arrowhead Adaptor docker image ML3 example)



# Dependency graph



## QArrowheadAdaptor Lib

- Qt/C++ software library
  - Qt version: 5.12 LTS
  - Compiled and released as static library
- Implements Arrowhead client functionalities
  - Client-side implementation of mandatory core services
  - Supported Arrowhead version: 4.1.3
- Service Registry interface
  - register
  - unregister
  - query
- Authorization interface
  - get public key
- Orchestrator interface
  - orchestration
  - start store orchestration by id
- Target users:
  - software developers responsible for creating Arrowhead-compliant application systems and services

## QArrowheadOnboarder Lib

- Qt/C++ software library
  - Qt version: 5.12 LTS
  - Compiled and released as static library
- Implements Arrowhead onboarding client functionalities
  - Client-side implementation of onboarding core services
  - Supported Arrowhead version: 4.1.3
- System Registry interface
  - register
  - unregister
  - query
- Device Registry interface
  - register
  - unregister
  - query
- Onboarding interface
  - Onboarding with certificate and csr
- Abstraction layers: device vs system
  - separate lib is needed
- Target users:
  - software developers responsible for creating Arrowhead-compliant application systems and services



## Arrowhead Adaptor App

- Configurable software application
- Using QArrowheadAdaptorLib and QArrowheadOnboarderLib
  - (via Arrowhead Adaptor client service and Arrowhead Onboarding client service)
- Providing command line interface:
  - service registration/deregistration/query
  - orchestration request
  - system and device registration/deregistration/query
  - onboarding with name/csr based on certificate/shared secret
- Service interface description
  - OpenAPI (and others?)
- Target users:
  - System integrators responsible for making application systems interoperable using the Arrowhead framework (without any coding)
  - System integrators willing to attach standalone systems quickly (“on-demand”) to the Arrowhead local cloud
  - Arrowhead demo developer

## Arrowhead Adaptor docker base image

- QArrowheadAdaptorLib packaged together with its dependencies
  - Qt framework
- Docker base image for creating ML2 and ML3 user application integration
- Target users:
  - System integrators responsible for making application systems interoperable using the Arrowhead framework

## Arrowhead Adaptor docker image ML2


- Arrowhead Adaptor for legacy system integration
- Standalone docker image for Arrowhead Adaptor functionality (cf. Maturity Level 2)
- Using Arrowhead Adaptor Docker Base Image
- Using REST interface of Arrowhead Adaptor client service
- Legacy application deployed in a separate docker container
- Docker-level interfaces
- Cross-docker communication
  - Docker virtual network used for communication between legacy app and Arrowhead Adaptor
- Arrowhead maturity level 2: "The application system implements the consumption (AND/OR) production Arrowhead Framework services by using a software adaptor. The application system is thus modified by integrating the software adaptor into the system."
- Target users:
  - System integrators responsible for making application systems interoperable using the Arrowhead framework

## Arrowhead Adaptor docker image ML3 (example)

- Arrowhead Adaptor for legacy system integration
- Integrated docker image (cf. Maturity Level 3)
  - Legacy user application
  - Arrowhead Adaptor functionality
- Using Arrowhead Adaptor Docker Base Image
- Using D-Bus interface of Arrowhead Adaptor client service
- No cross-docker communication needed
- Arrowhead maturity level 3: "The application system implements the consumption (AND/OR) production of Arrowhead Framework compliant services without using any external components."
- Target users:
  - System integrators responsible for making application systems interoperable using the Arrowhead framework



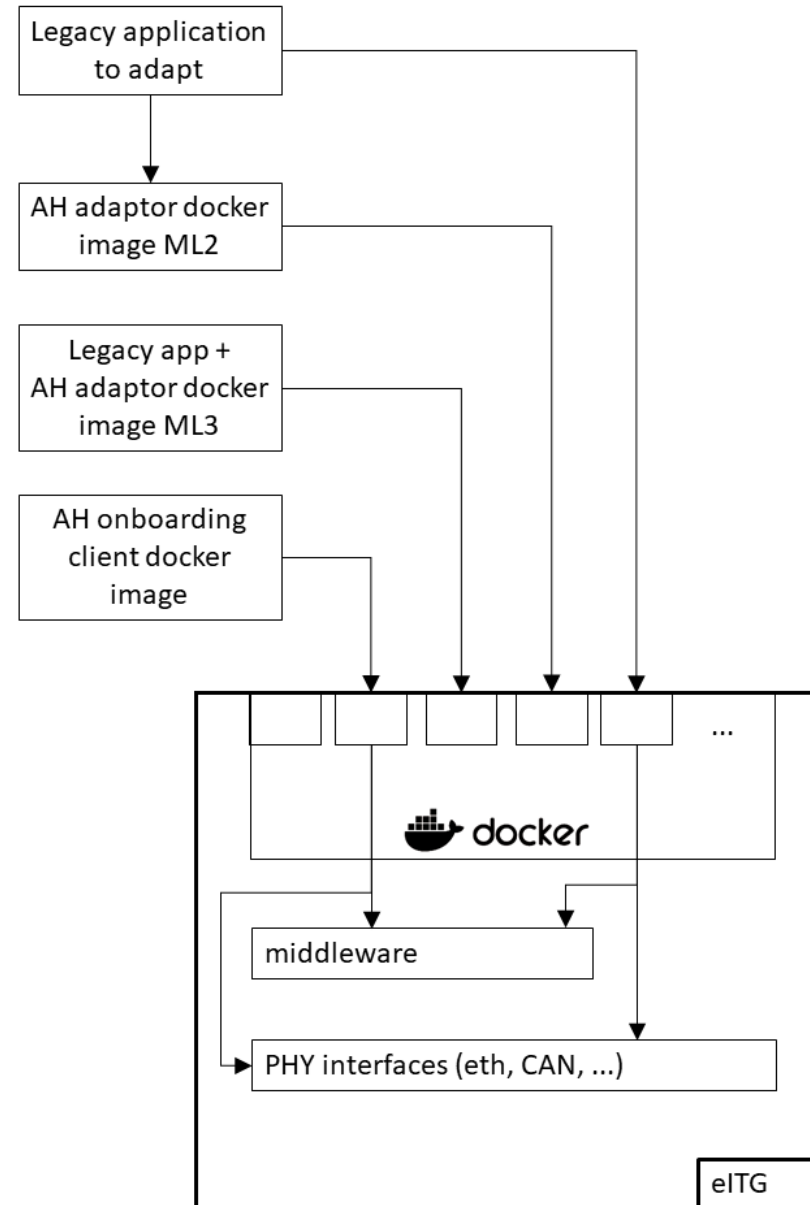
## Integration demo

- Legacy system integration
  - Using docker container architecture  docker
  - Virtual IP-network
    - Legacy app, Arrowhead adaptor and Onboarding client within the same network
    - Each container is reachable and discoverable (at a hostname identical to the container name) from the network
    - easy configuration and deployment (docker-compose, compose file)
- Hosted on edge gateway
  - evopro IT Guard (eITG)
  - physical interfaces: ETH, CAN, RS485



# Integration Demo

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## Timeline

- 2020-04-14: Introduction of evopro Arrowhead Adaptor
- 2020-04-24: QArrowheadAdaptorLib and QArrowheadOnboarderLib documentation released
- 2020-05-22: QArrowheadAdaptorLib released
- 2020-05-29: QArrowheadOnboardingLib released
- 2020-06-26: Arrowhead Adaptor app released
- 2020-07-10: Arrowhead Adaptor docker base image released
- 2020-07-24: Arrowhead onboarding client docker image and Arrowhead Adaptor docker image ML2 released
- 2020-07-31: Arrowhead Adaptor docker image ML3 released

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**Thank you for your attention!**

The participating countries are Austria, Belgium, Finland, France, Czech Republic, Denmark, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, Netherlands, Norway, Poland, Portugal, Spain, Sweden and Turkey.



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