

EdgeX - Application Working Group

Kamakura

11/30/2021

Attendees:



Topics:

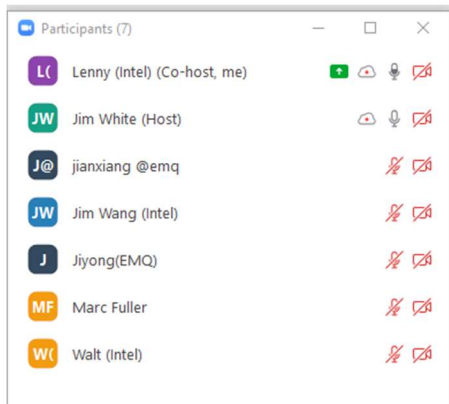
- Call for additional agenda items
 - o None
- [Review Project Board](#)
 - o New Issues (0)
 - o Kamakura Release Backlog (9)
 - o In Progress (0)
 - o Code Review (1)
 - [Migrate LLRP App service](#)
 - o Newly Complete (2)
 - ASC & SDK updates for latest go-mod-messaging w/o ZMQ on Windows
 - App Service examples update to using Jakarta 2.1.0 SDK
 - o Ice Box (3)
 - [TensorFlow](#)
 - Continue to hold in Ice Box to see if we get pull for this
- New Kamakura Defects (0)
- eKuiper update
 - o Finalizing 1.4.0 release for Dec 2nd
 - <https://github.com/lf-edge/kuiper/milestone/3?closed=1>
 - o Will add documentation on how to upgrade Jakarta compose file to use 1.4.0
- Opens
 - o
- Next meeting is **December 7th at 8am PST (Eaton's C++ App/Device Service)**

Jakarta

11/17/2021

Attendees:

EdgeX - Application Working Group



Topics:

- Call for additional agenda items
 - o None
- [Review Project Board](#)
 - o New Issues (0)
 - o Jakarta Backlog (0)
 - o Kamakura Release Backlog (9)
 - Quick review of items planned
 - o In Progress (0)
 - o Code Review (1)
 - [Migrate LLRP App service](#)
 - o Newly Complete (0)
 - o Ice Box (3)
 - [TensorFlow](#)
 - Continue to hold in Ice Box to see if we get pull for this
 - [Fork Pipeline](#)
 - Will close as `wontfix` after Jakarta release
 - [Cloud Events](#)
 - Will close as `wontfix` after Jakarta release
- New Ireland Defects (0)
 - o CVE for Encryption function ready and will be published once Jakarta is released.
- eKuiper update
 - o Working on release of 1.4 on Dec 2nd
 - o <https://github.com/lf-edge/ekuiper/milestone/3>
 - o <https://github.com/lf-edge/ekuiper/milestone/3?closed=1>
- Opens
 - o
- Next meeting is **November 30th at 2:30 PST**

EdgeX - Application Working Group

11/09/2021

Attendees:



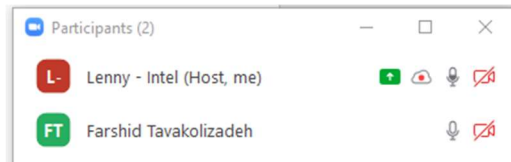
Topics:

- Call for additional agenda items
 - o None
- [Review Project Board](#)
 - o New Issues (0)
 - o Release Backlog (0)
 - o **Kamakura Release Backlog (9)**
 - o In Progress (0)
 - o Code Review (1)
 - [Migrate LLRP App service](#)
 - o **Newly Complete**
 - Cleaned up ASC readme
 - Fixed bug in SDK for configurable Encrypt with aes256 algo
 - Initvector not require or used.
 - Fixed bug in ASC for sample ase256 key incorrect
 - New AES256 Encrypt function and documentation
 - Deprecated old function
 - Fixed MQTT Store and Forward bug
 - Custom trigger rework for multi-pipelines
 - CORS support added to SDK and ASC
 - o Ice Box (2)
 - Fork the pipeline will be closed (won't fix) once Jakarta is released.
 - Keeping TensorFlow issue for now
- New Ireland Defects (1)
 - o MQTT Store and Forward bug
 - o CVE for Encryption function WIP. Will publish once 2.1 released with new function.
- Kamakura
 - o Create the **Kamakura Release Backlog** and populated it with items for planning meetings.
- Opens
 - o None
- Next meeting is **November 16th at 2:30 PST**

EdgeX - Application Working Group

10/26/2021

Attendees:



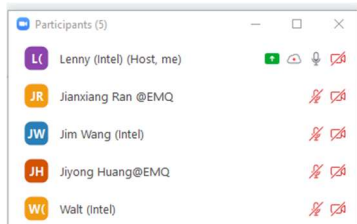
Topics:

- Call for additional agenda items
 - o None
- [Review Project Board](#)
 - o New Issues (1)
 - 1 new question (answered, waiting on final response)
 - 2 others moved to Ice Box to deal with in Kamakura
 - o Backlog (0)
 - o In Progress (2)
 - [Migrate LLRP App service](#)
 - o Code Review (1)
 - [New Encryption function](#)
 - o Newly Complete
 - CORS support
 - [TAF test for external MQTT](#)
 - [New IsEventData option for Batch](#)
 - o Ice Box (8)
- New Ireland Defects (0)
 - o CVE for Encryption function. Will work Bryon once 2.1 released with new function.
- eKuiper
 - o Created PRs in edgex-go and edgex-compose for injecting credentials into connections file.
 - o **Canonical is looking at separating out eKuiper into its own snap**
- Opens
 - o None
- Topics for Kamakura Planning?
 - o
- Next meeting is **November 9th at 9am PDT**

10/19/2021

Attendees:

EdgeX - Application Working Group



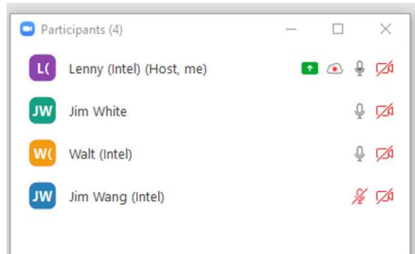
Topics:

- Call for additional agenda items
 - o None
- [Review Project Board](#)
 - o New Issues (2)
 - 2 remaining in new are waiting on response
 - o Backlog (1)
 - [Migrate LLRP App service](#)
 - o In Progress (2)
 - [TAF test for external MQTT](#)
 - [New Encryption function](#)
 - o Code Review (1)
 - [New IsEventData option for Batch](#)
 - o Ice Box (6)
 - Moved here - [Tests should run cleanly when passed the "-race" argument_#209](#)
- New Ireland Defects (0)
 - o CVE for Encryption function? Will revisit this with Bryon.
- eKuiper Update
 - o Update status on 1.4.0 release on approx. Nov 12th
 - o New shared connection configuration (Demoed)
 - o Need to enhance Secret Store Setup to also write this new Connections configuration in order to support this in Jakarta for the future.
- Opens
 - o None
- Topics for Kamakura Planning?
 - o Reviewed the ICE box items. No one has any new items
 - o Will revisit this next meeting
- Next meeting is **October 26st at 9am PDT**

10/5/2021

Attendees:

EdgeX - Application Working Group



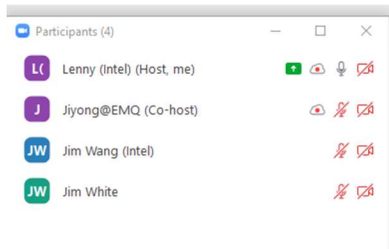
Topics:

- Call for additional agenda items
 - o None
- Review Project Board
 - o New Issues (4 => 2)
 - Reviewed board and accepted 2 new issues into backlog
 - [Enable tags pipeline function for new generic type #959](#)
 - [Tests should run cleanly when passed the "-race" argument_#209](#)
 - 2 remaining in new are waiting on response
 - o Backlog (4)
 - One is for TAF
 - Another is for LLRP
 - Other two are from above
 - o Dispositioned Jakarta docs to be merged column
 - All pending merges completed
- New Ireland Defects (0)
- eKuiper Update
 - o None – Team is on national holiday
- Opens
 - o None
- Next meeting is **October 19st at 3:30pm PDT**
 - o No meeting next week

9/21/2021

Attendees:

EdgeX - Application Working Group



Topics:

- Call for additional agenda items
 - o None
- Review Project Board
 - o Waiting on response to <https://github.com/orgs/edgexfoundry/projects/23> to determine if bug should be created for Mqtt Export and Store and Forward
 - o Will close MaxResultCount & MaxRequestSize as will not implement
 - o Old issue found and put on the board. One should have already been addressed. Lenny will verify.
- New Ireland Defects (0)
- eKuiper Update
 - o Working on 1.40 (<https://github.com/lf-edge/ekuiper/milestones>)
 - o New Plugin using nano message protocol using IPC
 - o Implemented env overrides for configuration
 - o Connection Pool to share connections between Sources and Syncs (Edgex and MQTT)
- Review of EdgeX SecretStore and Vault
 - o Reviewed how to configure Security service to create tokens and seed redis password.
 - o Talk about how eKuiper could just use Vault API to get the redis password
 - Would have to have go func to keep token TTL current.
 - o Not a priority now with connect pool if EdgeX sync shares EdgeX source connection which already has redis password from config injection.
- Opens
 - o none
- Next meeting is **September 28st at 9am PDT**

9/14/2021

Attendees:

EdgeX - Application Working Group



Topics:

- Call for additional agenda items
 - o none
- Pipeline Per Topic update
 - o Initial PR merged
 - Doc per approved. Merge on-hold
 - o Add on PR for custom triggers merged
 - Doc per approved. Merge on-hold
 - o Enhancement PR for multiple topics in review
 - Original Doc PR updated for enhancement
- LLRP RFID Inventory app service migration to V2
- Review Project Board
 - o
- New Ireland Defects (0)
- Opens
 - o **Jim White: Any items at risk for making it into Jakarta? Nope.**
- Next meeting is September 21st at 3:30pm PDT

9/7/2021

Meeting canceled

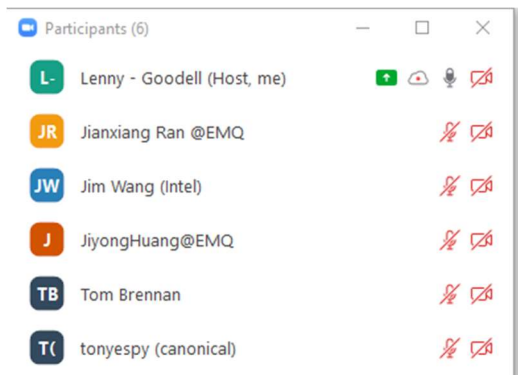
8/31/2021

Meeting canceled

8/24/2021

Attendees:

EdgeX - Application Working Group



Topics:

- eKuiper Update
 - o Reviewed project boards
 - <https://github.com/lf-edge/kuiper/projects/16>
 - Proposed enhancement to Synchronize Source and Sink to use same client
 - o 1.3.1 plan release next week
 - <https://github.com/lf-edge/kuiper/issues?q=is%3Aopen+is%3Aissue+milestone%3A1.3.1>
 - o EdgeX Sink for publishing back to EdgeX MessageBus Demo
 - Will not work with Secure MessageBus yet
 - Synchronize Source and Sink would fix this
- C/C++ Application Service SDK – Tom Brennan (Eaton)
 - o Industrial
 - o North side servers that talk these protocols
 - o All libraires written in C/C++
 - o Starting with Device Service SDK
 - Leverage existing infrastructure for MessageBus, etc.
 - Needs to listen to MessageBus
 - o Purpose is to create digital twin for all the devices on the north side for a single protocol
 - Not a general-purpose App Service SDK like we have in Go
- Pipeline Per Topic update
 - o PRs open for Docs, SDK & ASC
- LLRP RFID Inventory 1.0.0 app service released
- Opens
 - o **August 31st WG meeting canceled**

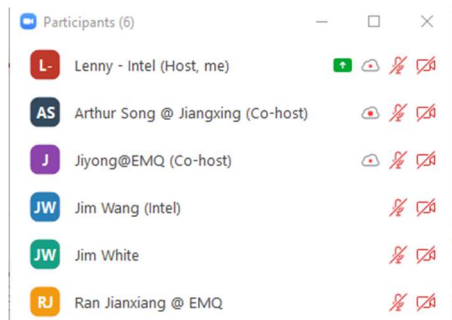
8/17/2021

Meeting canceled

EdgeX - Application Working Group

8/10/2021

Attendees:



Topics:

- eKuiper Update
 - o New Project board for EdgeX Integration
<https://github.com/lf-edge/kuiper/projects/16>
 - o Docker Image size reduced
 - Still a little bigger than image used in Hanoi
 - o New Tutorial for EdgeX Integration
 - **AR: Jim White**
Add link in EdgeX Docs examples to this tutorial
 - o 1.3.0 planned release August 12th
- AI/ML Framework (Arthur - Jianxing Intelligence)
 - o Code Name: Trueno (Spanish for Thunder)
 - o ML/AI Pipeline
 - o Create/configure pipeline via REST API
 - o Next Steps
 - Create example of EdgeX integration in edgex-example repo
- Board Review (<https://github.com/orgs/edgexfoundry/projects/23>)
 - o Review Bugs
 - 0 – Critical
 - 0 – High
 - 0 – Medium
 - 1 – Low (need to reproduce)
- Opens
 - o None

EdgeX - Application Working Group

8/3/2021

Attendees:

- Lenny Goodell
- Jim White
- Jim Wang

Topics:

- Opens
 - None
- SDK 2.0.1 and ASC 2.0.1
 - SDK and ASC release on 7/30/2021
 - Compose files update waiting for eKuiper 1.3.0
- App Functions SDK for other programming languages (C, Python) – Jim White
 - Python AI/ML shops
 - Eaton showing interest (Power equipment)
 - Talking about joining community and making contributions
 - Interested in App Functions SDK in C
 - Using EdgeX in tiered way
 - 1st Next to devices
 - 2nd Gateway collecting data from other instances
 - Want to export data in standard industrial protocols (BACNet, OPC-UA, etc.)
 - Have their own C libraries for this??
 - Why not us CGO call into C libraries from existing SDK?
 - If in C, does whole SDK need to be replicated?
 - Next step is to have Eaton come to future WG meeting.
- LLRP Update:
 - One more round of validation after fix in Device LLRP
- Pipeline per Topic
 - Started prototyping
- Additional TAF Integration tests
 - Reviewed capabilities for unit test ability
 - External MQTT Trigger is only one left that need TAF integration tests

2.0.1 patch of SDK and App Service Configurable release on 7/30/2021

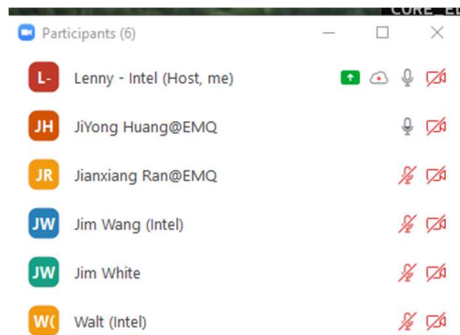
- [SDK] FilterByResource creates new event without required fields [#922](#) (CRITICAL) (FIXED)
- [SDK] Call to log correlation ID in log message results in "unsupported value type" [#923](#) (LOW) (FIXED)

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- [\[SDK\] App service panics when MQTTServerSend AuthMode is blank_#920 \(LOW\) \(FIXED\)](#)

7/27/2021

Attendees:



Topics:

- Opens
 - o None
- **Planning patch of SDK and ASC**
 - o **Examples need to be bumped also**
- Board Review (<https://github.com/orgs/edgexfoundry/projects/23>)
 - o Review Bugs
 - 1 - Critical (**triggers patch release**)
 - 0 – High
 - 0 – Medium
 - 2 - Low
- Documentation Updates
 - o Examples list updated
 - o Elizabeth from Intel proofread App Service docs and submitted PR for changes.
- LLRP Update:
 - o Repo renamed to **app-rfid-llrp-inventory**
 - o CI pipeline in place and working
 - o Intel validation complete for both App and Device service.
 - V1 release pending triage of seemingly unrelated error in Device service logs.
- Example migrations
 - o All Complete
 - o Cloud examples collapsed into one cloud-mqtt-export example
 - Have profile for AWS & Azure with just changes MQTT connection details
- Pipeline per Topic design discussion
 - o From API perspective I was thinking
 - AddFunctionsPipelineByTopic(topic string, transforms ...AppFunction) error
 - o Implementation wise:

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- Accepts wildcards for the topic same as our subscribe topics.
- This should fail if Trigger not set to EdgeX MessageBus or External MQTT, i.e. if set to HTTP.
- Store the new functions pipeline in a collection (TBD) so that we can match one or more to the incoming topic
- For each match we simply call ProcessMessage??
- Things to consider when multiple function pipelines get triggered from a single received message.
 - How to handle store and forward, i.e. we will need to also have an ID attached to each functions pipeline that gets saved with the data so it can restart the correct pipeline.
 - Handling of ResponseData for each functions pipeline, i.e. does the trigger need to publish the response data from each functions pipeline that has set ResponseData
 - Probably more things that haven't been consider yet...
 - What is if one pipeline fails and other doesn't. Will treat them as independent pipelines.
- Concern is one app service with multiple pipelines not scaling like old export services.
 - Add warning in documentation to use sparingly
- eKuiper Update
 - Connecting directly to data from Core/Device (by pass app-rules) service receives AddEventRequest.
 - Enhanced to handle AddEventRequest and want to release with SDK patch
 - Reviewed Project board.
 - Worked on reducing size of docker image
 - Found that the binary being duplicated. Reduced from 74MB to 16MB
 - Completed OpenYurt integration
 - Edgex Hackathon training

7/20/2021

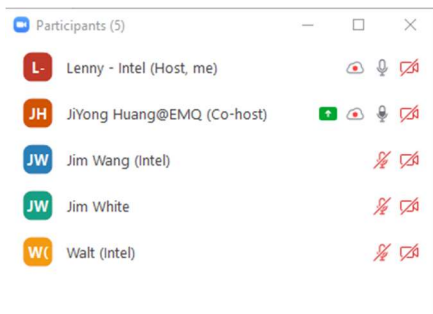
Attendees:

Just Lenny so meeting canceled. 😞

7/13/2021

Attendees:

EdgeX - Application Working Group



Topics:

- Opens
 - o none
- Board Review (<https://github.com/orgs/edgexfoundry/projects/23>)
 - o Jakarta items added to new column
 - o **Dispositioned all new items to appropriate columns**
- Documentation Updates
 - o All complete (One PR open)
 - o **Now example list needs updating**
- LLRP Update:
 - o Moved out of holding
 - o CI pipeline fixes in place
 - o Repo is named **rfid-llrp-inventory-service**
 - Recommend renaming to **app-rfid-llrp-inventory**
 - **Lenny will submit ticket to LF to rename**
- Example migrations
 - o Mostly done
 - o Cloud examples need discussion
 - Nothing cloud specific in these examples
 - **Refactor to a single example with profiles.**
- eKuiper update
 - o EdgeX Docs updated to change to new name and repo
 - o eKuiper had their TSC kick-off meeting on 7/12/2021
 - o Reviewed project board
 - o **TAF Performance tests see image size doubling, need to confirm.**
 - Working on smaller image
 - **Jim will get data for next time on July 27th**

Ireland

6/29/2021

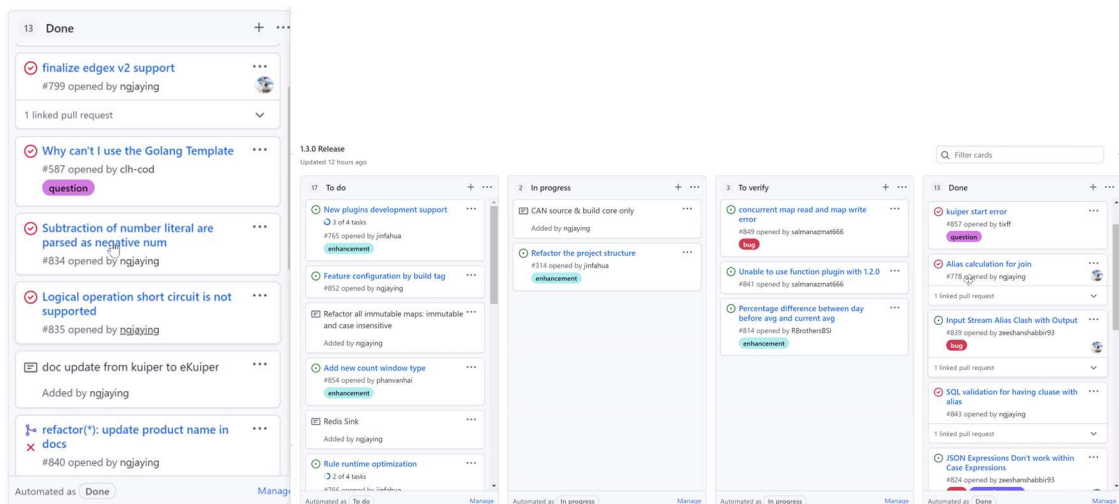
Attendees:

EdgeX - Application Working Group



Topics:

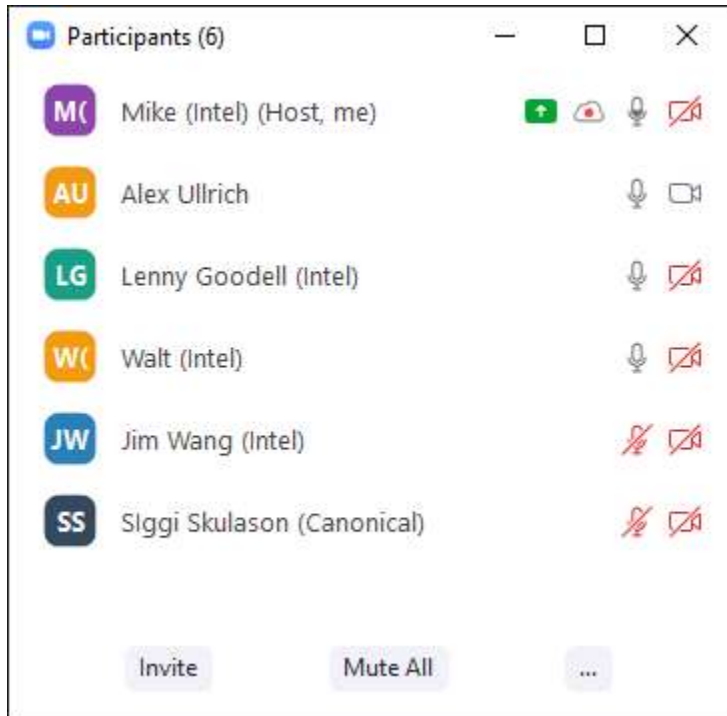
- Opens
 - o none
- Board Review
 - o Reviewed
- LLRP Update:
 - o Custom **[Aliases]** config section in TOML completed
 - o Ready for TSC vote
- Documentation Updates
 - o Mostly complete.
 - o Working on ApplicationService API which will complete the updates expect for minor tweaks to links and adding **!!! edgexy** notes to Context API doc.
- Next week's meeting is cancelled (Lenny on vacation)
- Kuiper update
 - o Released 1.2.1 for use in EdgeX 2.0 (Ireland)
 - o Board Review – Done and next release (1.3.0)



6/18/2021

Attendees:

EdgeX - Application Working Group










Topics:

- No Opens
 - o Draft PRs on Changelog
- LLRP Update:
 - o Move Alias for a reader in toml file, eventually move to a custom config when migrating to 2.0

EdgeX - Application Working Group

6/10/2021

Attendees:

-  Lenny - Intel (Co-host, me) ‹
-  Jim White (Host) ‹
-  JiYong Huang... (Co-host) ‹
-  Brian McGinn (Intel)
-  Jim Wang (Intel)
-  Rocky Jin
-  Walt (Intel)

Topics:

- Board Reviewed
 - Reviewed recent completed items
 - Backlog slim
 - Minor tech debt item
 - Issue Siemens devs working on
 - Moved other items to ICE box that will not make it for the Ireland release
 - LLRP Inventory Service
 - Almost ready for TSC vote
 - One enhancement for adding Alias to TOML file so they can be populated from static list rather than the Consul UI.
- Kuiper update

EdgeX - Application Working Group

EMQ Status

- **Done**
 - Release 1.2.1 beta for [EdgeX v2](#) integration
 - Support [EdgeX](#) binary reading
 - Bug fixes: password hidden, join problem
- **Ongoing**
 - Customer requested enhancements: shared source instance, window time functions
 - Fix any problems found for [EdgeX V2](#) integration
- **TODO**
 - New minor release 1.2.1, to be released at June
 - Finalize [edgex v2](#) support
 - Any bug fixes
 - New release 1.3.0, to be released at June
 - New plugin system based on [rpc](#)
 - Window runtime optimization

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5/27/2021

Attendees:

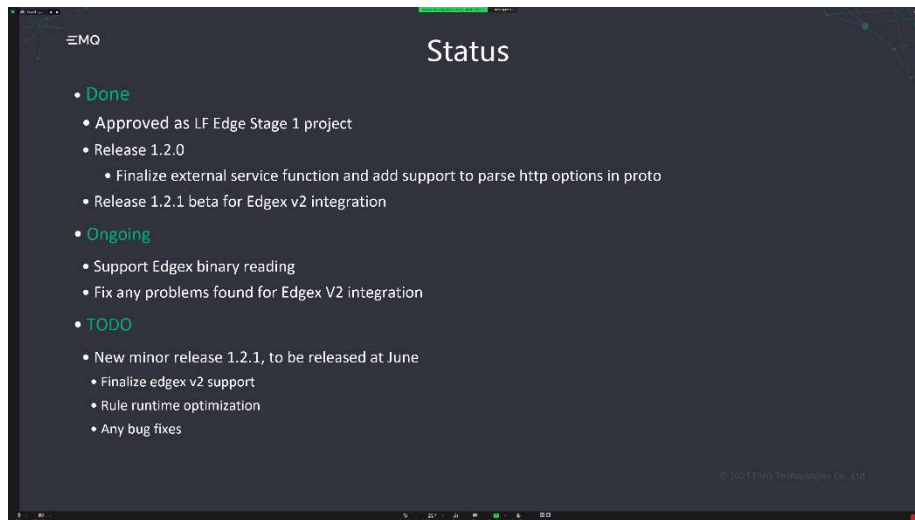
MJ	Mike Johanson (In... (Host, me)			
LG	Lenny Goodell (Intel)	Mute	More >	
AE	Admin EMQ			
JW	Jim White			
JH	Jiyong Huang			
WC	Walt (Intel)			

Topics:

- Opens

EdgeX - Application Working Group

- Kuiper Integration – tested with latest compose files, testing in non-secure mode. To be done: security bootstrap needs to be written to write redis password to file that's volume mounted into Kuiper container (tbd: snap)
-
- Board
- Kuiper Update
-




EdgeX - Application Working Group


5/21/2021

Attendees:

 Participants (5)

 Mike (Intel) (Host, me)

 Lenny Goodell (Intel)

 Jim White

 Siggi Skulason (Canonical)

 Walt (Intel)

Topics:


- Opens
 - Any update on Multiple Exports
 - Would like MQTT topics to be a bit more dynamic
 - Suggestion for chaining for
`HTTPExport("",true).HTTPExport("",true).HTTPExport("",false)`
 - Parameters:
 - Address
 - Return Input Data
 - ContinueOnFailure
 - Kuiper integration timing
 - Dilemma was new features in 1.2.0 that could be used in Hanoi
 - LLRP Update:
 - Getting close! Hanoi target
- Board Review
 - Ports Updated – will allocate ~20 ports for different app profiles to run along side each other (for apps running native/snap)

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5/13/2021

Attendees:

 Mike (intel) (Host, me)

 Jim White (Co-host)

 Jim Wang (Intel)

 Ji Yong Huang@EMQ

 Walt (Intel)

Topics:

- Opens
 - Multiple HTTP Export – Any input?
 - KISS to start – stay flexible for customer input
 -
- Board Review
- Kuiper Update

EdgeX - Application Working Group

EdgeX - Application Working Group

5/7/2021

Attendees:

	Mike (Intel) (Host, me)			
	Lenny Goodell (Intel)			
	Jim Wang (Intel)			

Topics:

- Opens
 - Lenny on vacation next week (hoping for release next week)
 - Multiple Exports Feature might get started
 - Dynamic export location (placeholders in topic for example) like handlebars {{ }}
- Board Review
- Kuiper Update

EdgeX - Application Working Group

4/29/2021

Attendees:

Topics:

- Opens
 - Security Topic: Kuiper Secrets POC is successful, this will be our path forward. Will use 1.2.0 release for validation and E2E testing of integration.
 - Timing Release for Kuiper – we will “release” modules (without dev tag) before main EdgeX Release for Kuiper and EdgeX to consume modules.
 - Propose version 1.2.1 for Kuiper, for EdgeX Release
- Board Review
- Kuiper Update

EdgeX - Application Working Group

4/15/2021

Attendees:

Participants (5)

-  Mike (Intel) (Host, me)
-  Lenny Goodell (Intel)
-  Ji Yong Huang
-  Jim Wang (Intel)
-  Rocky Jin

Topics:

- LGTM on SDK repo (Jim's latest email)
 - Jim to place LF Ticket to add LGTM to SDK (Not App Service Configurable)
 - Now CodeQL
- Injecting MessageBus creds into Kuiper.
 - Used example as provided by Ji Yong, was able to get secrets inject use file mount
 - Successfully subscribed, but still need to see an event off of the bus to make sure it is working 100%
 - Would like to not have knowledge of Kuiper user – currently POC, need to get it a bit more robust
- Redis pub/sub topics (fixed)
 - Redis Streams vs Pub/Sub, every topic name is a stream, converted to pub/sub
 - Message Envelope now has receiver topic to know which topic and event came in on (PR to be submitted)
- Opens
- Board Review

EdgeX - Application Working Group

The screenshot shows a presentation slide with a dark background and white text. The title 'Status' is centered at the top. Below it, there are three main categories: 'Done', 'Ongoing', and 'TODO', each with a list of items. The 'Done' category includes support for static data sources and contributing to LF Edge. The 'Ongoing' category includes discussions with Thundersoft & Jiangxing Intelligence, volume mounting problems, and another contribution to LF Edge. The 'TODO' category includes a new minor release (1.2.0) and several specific tasks like continuous table support, function support, memory optimization, message-bus integration, and bug fixes. A copyright notice '© 2021 EMQ Technologies Co., Ltd.' is visible in the bottom right corner of the slide.

EMQ

Status

- **Done**
 - Support to join data from static source (from file or db etc). E.g, sensor only send sensor data, but more logical or biz data need to be filled before sending to cloud service (e.g, device name and other info)
 - Contribute Kuiper to LF Edge, submitted
- **Ongoing**
 - Discussed with Thundersoft & Jiangxing Intelligence about new design, now is under development
 - Volume mounting problem from edgex security bootstrapper
 - Contribute Kuiper to LF Edge
- **TODO**
 - New minor release 1.2.0, to be released at Apr or May
 - Continuous table
 - The last function support (from EdgeX community)
 - Memory optimization for windows operations
 - New EdgeX message-bus integration
 - Any bug fixes

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4/9/2021

Attendees:

Topics:

- Opens
 - Kuiper Secrets -- need to figure out how to handle both volume mounted config file and ENV variables. Currently it overwrites the file. Will work with Kuiper in next APP Wg Meeting.
 - Security Items for Consul – set profile name to app-[name], no longer mixed case
 - New Function – publishing back the response, “TriggerResponse”, allow specific topic
- Github Actions
 - Change to make build instead of go build
- Board Review

EdgeX - Application Working Group

4/1/2021

Attendees:



Topics:

- Kuiper with Secure RedisStreams
 - How can we inject the redis password into the Kuiper container?
 - Password auto-generated in secure mode for RedisStreams (but need to consider any secure authentication against any messagebus).
 - Plan is to leverage a volume mount to overwrite configuration file – Kuiper Team to provide location in container to be overwritten via email.
 - TBD: when the secret/config file is injected
- Pipeline per subscribe topic.
 - Should the optional publish topic also be per pipeline?
 - This will also give us multiple export destinations if we allow multiple pipeline per subscribe topic. i.e fork from beginning.
 - Plan: for publishing back to message bus – remove notion of publishing back, but add a new Export Transform function that accomplish the same thing that can be added to each pipeline.
- Github Actions

TODO:

EdgeX - Application Working Group

need to start working documentation

Flogo Sample

EdgeX - Application Working Group

Status

• Done

- CASE statement support
- Discussed with Thundersoft & Jiangxing Intelligence for AI function support
- Support to join data from static source (from file or db etc). E.g, sensor only send sensor data, but more logical or biz data need to be filled before sending to cloud service (e.g, device name and other info)

• Ongoing

- Discussed with Thundersoft & Jiangxing Intelligence about new design, now is under development
- Plugin implementation optimization
- Contribute Kuiper to LF Edge, under submission
- New design for plugin development

• TODO

- New minor release 1.2.0, to be released at Apr or May
 - The last function support (from EdgeX community)
 - Memory optimization for windows operations
- New maintenance release 1.1.3, to be released at Mar
 - New EdgeX message-bus integration
 - Any bug fixes



3/26/2021 - Cancelled

3/18/2021

Attendees:

Participants (5)

- MJ Mike Johanson (Intel) (Host, me)
- JW Jim White
- R Rocky@EMQ
- JW Jim Wang (Intel)
- JH Jiyong Huang (Emqx)

Topics:

- Add LGTM (security scanner) integration to app-service-configurable (LF ticket) as guinea pig

EdgeX - Application Working Group

- <https://github.com/marketplace/lgtm>
- Update of major Refactoring PRs
 - Merged in
- Demo of Custom Configuration prototype for App Services
- Flogo discussion
 - Any Further Discussion?
 - Put some samples together – try some examples (Aim to demonstrate understanding of EdgeX Events)
 - ZMQ triggers/activities to connect
 - Lenny and Mike to review docs from Jim
- Lenny figured out how to do custom configuration section
- TODO: need to start working documentation

Status

• Done

- CASE statement support
- Discussed with Thundersoft & Jiangxing Intelligence for AI function support

• Ongoing

- Plugin implementation optimization
- Contribute Kuiper to LF Edge, will be submit soon
- New design for plugin development
- Support to join data from static source (from file or db etc). E.g, sensor only send sensor data, but more logical or biz data need to be filled before sending to cloud service (e.g, device name and other info).
- New design for the AI function invocation wrapper.

• TODO

- New minor release 1.2.0, to be released at Apr or May
 - The last function support (from EdgeX community)
 - Memory optimization for windows operations
- New maintenance release 1.1.3, to be released at Mar
 - New EdgeX message-bus integration
 - Any bug fixes



EdgeX - Application Working Group


3/12/2021

Attendees:

 Mike Johanson (Intel) (Host, me)

 Jim White (Co-host)

 Lenny Goodell (Intel)

 Siggí Skulason

 Walt (Intel)

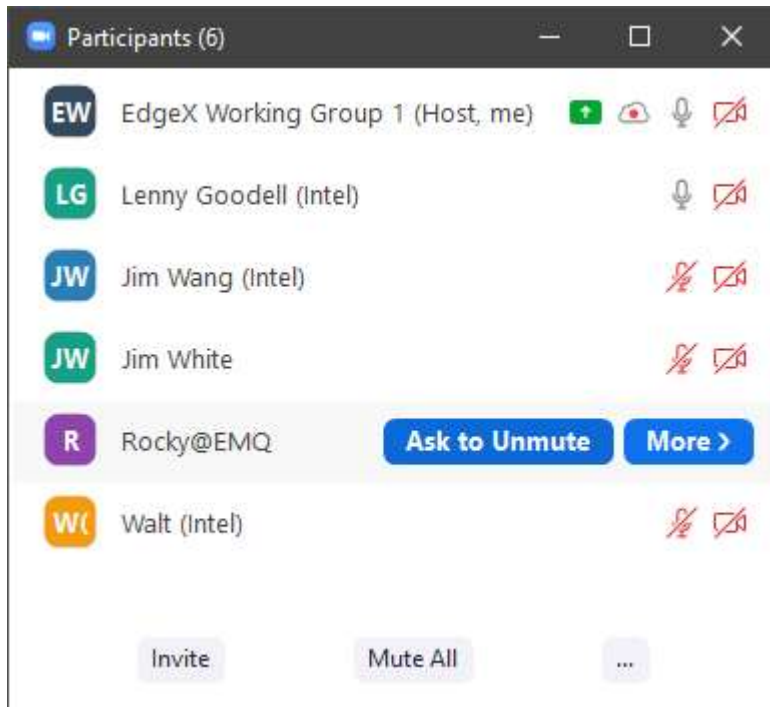
Topics:

- Configuration migration for 2.0
 - **Bare minimum: Documentation that maps old config -> new config**
 - **Include ENV override names for ASC**
 - Explore go cli utility that inputs a old config file and spits out a new file – potentially add to edgex cli “migrate appsdk ./conffile” – Lenny to explore
 - Major changes:
 - Binding Changing to Trigger
 - Exclusive Secret Store removed
 - How are changes propagated to Consul for existing ASC – Out of scope for changes that exists on Consul that haven’t been made in the TOML file.
- App Functions SDK Refactoring and impacts to custom services
 - Interfaces for App Services and Context interface, cascading changes
- Flogo discussion
 - What would the expectations look like?
- Lenny figured out how to do custom configuration section

EdgeX - Application Working Group

3/4/2021

Attendees:



Topics:

- Rocky Update

EdgeX - Application Working Group

Status

- Version 1.1.2 was released at 3rd, Mar
 - Integration with TensorFlowLite
 - Sample plugin LabelImage to leverage pre-trained TensorFlowLite model to label images
 - Tutorial about Run TensorFlow Lite model with Kuiper function plugin
 - Plugin enhancements
 - Support multiple functions in one function plugin
 - Support to get Kuiper root path in context `ctx.GetRootPath()`
 - Refactor image functions to one plugin
 - Add GeoHash plugin to support several geo hash functions
 - Build
 - Add `--trimpath` build option for `kuiperd` build. Since this release, this property is required to build extended plugins
 - Run process/container as `kuiper` user to avoid security risk
 - Support negative array index such as `array[:-1]`
 - Add built in function `cardinality(array)` to get the length of array
 - Add rule property `sendError` to specify if runtime errors will send to the sink
 - Fixes
 - Fix stop rule memory clean up problem
 - Restore `httpPull` `dataSource` support
 - Fixed describe stream issue for `bytea` type
 - Fixed arbitrary session window error at the first input
 - Remove unused empty folders inside data
 - Documentation fixes
 - Fix several links
 - Fix an index error for built-in functions doc



-
- Opens
 - LLRP App Service PR Open
 - Review from Mike and Lenny on Friday
- Board


EdgeX - Application Working Group

2/26/2021

Attendees:

 Lenny (Intel) (Host, me)

 Jim White (Co-host)

 Jim Wang (Intel)

 Siggi Skulason (Canonical)

 Walt (Intel)

Topics:

- Status
 - Completed
 - Remove deprecated environment variables.
 - Rename MqttBroker configuration section to ExternalMqtt to match binding type name.
 - Change HTTP Export Secret key names so the value is overridable.
 - Updated ASC for SecretStore config addition of Type='vault'
 - **Fixed:** Failure in reloading Configurable Pipeline doesn't cause execute errors, thus hidden.
 - **Fixed:** V2 HTTP Trigger with invalid event returns 500
 - WIP
 - Refactor Binding configuration. Trigger coincides better with implementation and documentation. Sub-configuration belongs under Trigger configuration.
 - **[Binding] => [Trigger]**
 - **[MessageBus] => [Trigger.EdgeXMessageBus]**
 - **[ExternalMqtt] => [Trigger. ExternalMqtt]**
 - Up next
 - Refactor SDK: Add interfaces for AppSdk and AppContext so services can mock them for unit testing.
 - Lots of Documentation
 - Refactor Initialization of SDK
 - Consume core services V2 APIs via go-mod-core-contracts **(On-hold)**
 - **Waiting on V2 clients to be 100% complete**
- More configuration refactor?

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- App Service Configurable 's Nops
 - Compression – Change to Type parameter
- Move ApplicationSettings to writables
 - Add func to register callback when ApplicationSettings change.
- Review of LLRP App Service
 - Need to create PR
 - Need volunteers
 - Lenny & Siggie & Jim
- Caching of DeviceResources – Where to implement?
 - core-contracts Client? **Yes**
 - SDK?
- Opens
- Board

EdgeX - Application Working Group

2/18/2021

Attendees:



Topics:

- Opens
- Board
- Rocky Update
- Ireland Status Update (Any calls on what's out?)
 - Board updated – Fork Pipeline, Topic/Pipeline is at risk/out of scope for Ireland
 - Stretch goal for Multiple Export

EdgeX - Application Working Group

2/12/2021

Attendees:

-  Mike (Intel) (Host, me)
-  Lenny Goodell (Intel)
-  Walt (Intel)
-  Brian McGinn (Intel)
-  Jim Wang (Intel)
-  Jim White

Topics:


- Fix for handling AddEventRequest vs Event DTO and how that is now working.
 - First event from Core is correct, Event DTO is put on message bus, but next App Services in chain expecting AddEventRequest.
 - Couldn't chain App Services together
 - Added bool for expecting EventDTO in order to allow chaining of app services
 - Explore if we could do this interpretation implicitly without config (Lenny will take a look)
- Opens
- Board

EdgeX - Application Working Group

2/4/2021

Attendees:

 Mike Johanson (Intel) (Co-host, me)

 Jim White (Host)

 Lenny Goodell (Intel)

 Rocky Jin@EMQ

 Beau Frusetta (Intel)

 Brian McGinn (Intel)

 Jim Wang (Intel)

 Walt (Intel)

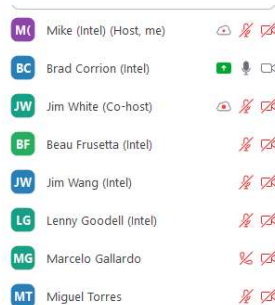
Topics:

- Revisit template location and SDK version it uses
 - Master is using latest SDK, release/before tag/ ensure that template is using tagged SDK.
 - Add Echo statement to makefile to ensure version being used is clear
- Preview of App Service template so far
- Board
- Opens
 - Kuiper
 - Revisit implications when V2 is more complete to understand impacts to Kuiper
 - Clients modules not used, Restful call used, go-mod-messaging is used, along with models
 - 1 month-ish timeframe (2/4)
 - Decide about ValueDescriptor Name
- Kuiper Team

EdgeX - Application Working Group

1/29/2021

Attendees:



Topics:

- Brad Corrion OpenVINO Model Serving Demo
 - TF on port 8500,8501, open vino model serving port 9000.
 - Single docker command to run open vino model serving
 - Goal: Single file go application
 - (20 min build time with go cv) – clunky experiment, min 200MB application
 - 7MB Application with single resize dependency
 - 4D Int Array, Challenge in understanding format of model (i.e BGR vs RGB), can't assume, have to research and read documentation of who created model
 - Had to rebuild and change edgex-device-camera-go
 - Discussion Item: MQTT Default for Windows, add build flags to avoid ZMQ issues on Windows when building
 - Discussion: Should we add CBOR functions to SDK? i.e Resize?
 - Biggest issue: every model has a different structure
- Docs – need to check links
- Where do we put the App Service template?
 - Examples or SDK?
 - Create an empty template for both device services and new app services, would be nice to have cli generate templates for you, but manual to start. More documentation on what, when, and how things are called.
 - Separate repo for each template
- Rules Engine Issue: <https://github.com/edgexfoundry/edgex-go/issues/3009>
 - Rocky will get with Gavin to check on Issue
 -
- Do we still need PushToCore? **YES**

EdgeX - Application Working Group

- - Investigate LLRP service to see if this is a requirement (lenny will take a look)
- Opens
 -
- Review Board
- Brad's Feedback:

Issues uncovered:

1. Bitten by lost time configuring and re-configuring camera device service TOML, as it was not clear I wasn't actually changing things
 1. Need to separate device service configuration from device instance configurations (e.g. cameras)
2. device-camera-go uses an edgex digest algo. It failed with Amcrest cameras, but this one worked: "github.com/xinsnake/go-http-digest-auth-client" (BSD License)
3. Links in section 3.6.1.4 are broken <https://fuji-docs.edgexfoundry.org/Ch-ApplicationServices.html>
4. CBOR events are not fun, can't observe contents watching the event bus
5. Developer documentation doesn't make it clear how to pass an Event onwards. I know to use the Complete() call in the App Svc SDK, but do I need to create a new Event and serialize it? Just push a payload into the byte buffer?
7. If using the MQTT as message bus, why not use a rich topic? /edgex/events/ds/device-camera-go/Camera001/onvif_snapshot -- MQTT wildcards make filtering a snap
8. Seems confusing to use a ValueDescriptor to have to know that a payload is in CBOR
 1. Prefer the CloudEvents model where data and type are identified separately

TOML file that worked for the MQTT message bus:

```
``TOML
```

```
[MessageBus]
```

```
Type = 'mqtt'
```

```
[MessageBus.SubscribeHost]
```

```
Protocol = 'tcp'
```

```
Host = 'host.docker.internal'
```

```
Port = 1883
```

EdgeX - Application Working Group

```
[MessageBus.PublishHost]
Protocol = 'tcp'
Host = 'host.docker.internal'
Port = 1883
```

```
[MessageBus.Optional]
ClientId = "CoreData"
# Connection information
Qos      = "0" # Quality of Service values are 0 (At most once), 1 (At least once) or 2 (Exactly once)
KeepAlive = "10" # Seconds (must be 2 or greater)
Retained  = "false"
AutoReconnect = "true"
ConnectTimeout = "5" # Seconds
```

...



EdgeX - Application Working Group

EdgeX - Application Working Group

1/21/2021

Attendees:

-  Michael Johanson (Intel) (Co-host, me)
-  Jim White (Host)
-  Jin Rocky (Co-host)
-  Lenny Goodell (Intel) (Co-host)
-  Jim Wang (Intel)
-  Beau Frusetta (Intel)

Topics:

- Rules Engine Issue: <https://github.com/edgexfoundry/edgex-go/issues/3009>
 - Rocky will get with Gavin to check on Issue
 -
- Do we still need PushToCore?
 - Investigate LLRP service to see if this is a requirement (lenny will take a look)
- Opens
 - FYI: Beau working on running containers as non-root (Contribution to Kuiper)
 - Kuiper team to resolve remaining issues on PR (<https://github.com/emqx/kuiper/pull/689>)
 - Need to update compose file in EdgeX to use next release? ~About next month
- Review Board
- Revisit Docs Conversation in a couple weeks.
 - Mike will make a PR for 2.0 Docs
 - <https://github.com/edgexfoundry/edgex-docs/issues/299> (Closed)
 - <https://github.com/edgexfoundry/edgex-docs/issues/298> (Open)
 - Raspberry Pi PR – Lenny to review

EdgeX - Application Working Group

1/15/2021

Attendees:

 EdgeX Working Grou... (Co-host, me) 

 Jim White (Host)

 Lenny Goodell (Intel)

 Walt (Intel)

+Jim Wang

Topics:

- Event DTO and progress...
 - Multiple Events were backed-out – going back to Single Event
- Opens
 - FYI: Beau working on running containers as non-root (Contribution to Kuiper)
 - Issue #3009 edgex-go – investigate and ping team if any issue with Kuiper or not
- Review Board
- Revisit Docs Conversation in a couple weeks.
 - Mike will make a PR for 2.0 Docs
 - <https://github.com/edgexfoundry/edgex-docs/issues/299> (Closed)
 - <https://github.com/edgexfoundry/edgex-docs/issues/298> (Open)
 - Raspberry Pi PR – Lenny to review

EdgeX - Application Working Group

1/7/2021

Attendees:



A screenshot of a meeting attendee list. The list is displayed in a vertical column. At the top, there is a header bar with a green 'MJ' icon, the name 'Michael Johanson (Int... (Me)', and two buttons: 'Unmute' and 'More >'. Below this, there are five entries, each with a colored circular icon, a name, and status icons for video, audio, and chat. The entries are: 1. 'JR' (green icon) for 'Jin Rocky' with video, audio, and chat icons. 2. 'LG' (green icon) for 'Lenny Goodell (Intel)' with audio and chat icons. 3. 'W(' (orange icon) for 'Walt (Intel)' with audio and chat icons. 4. A black and red patterned icon for 'Jim White' with audio and chat icons.

+ Jim Wang

Topics:

- Kuiper Dot Release for ZMQ Issue
 - For EdgeX Dot Release – Kuiper team will release 1.1.1 with updated go-mod-messaging library with ZMQ fix along with new Kuiper features.
- When do we update examples for current WIP?
 - Topic to be re-raised in core WG to tag examples so lock compatibility with a current release. No CI/CD needs to be implemented. Want to do this so that examples can be updated along with current changes for next version of EdgeX.
 - ~~DO IT! Tag examples independent of main EdgeX, include a changelog/readme that describes updated examples. Each example has readme~~
 - Branch examples at Major EdgeX Version only (ie.1.0 branch), and main becomes 2.0 compatible only
 - No Immediate Action
- Opens
- Review Board
- Revisit Docs Conversation in a couple weeks.

EdgeX - Application Working Group

12/10/2020

Attendees:


Topics:

- Code Removal going well
- Community Contribution .Stop()
 - Wants MakeItRun() to exit gracefully without exiting the application. Need to get more details on use case.
- <https://github.com/emqx/kuiper/issues/614>
- When do we update examples for current WIP?
 - Topic to be re-raised in core WG to tag examples so lock compatibility with a current release. No CI/CD needs to be implemented. Want to do this so that examples can be updated along with current changes for next version of EdgeX.
- Review Board
- Opens

EdgeX - Application Working Group

12/04/2020

Attendees:

 EdgeX Working Group 1 (Host, me)

 Lenny Goodell (Intel)

 Jim Wang (Intel)

 Jim White

 Walt (Intel)




Topics:

- When do we update examples for current WIP?
 - Topic to be re-raised in core WG to tag examples so lock compatability with a current release. No CI/CD needs to be implemented. Want to do this so that examples can be updated along with current changes for next version of EdgeX.
- Review Board
- Opens

EdgeX - Application Working Group

11/20/2020

Attendees:

-  Michael Johanson (Intel) (Host, me)
-  Anthony (Intel) (Co-host)
-  Lenny Goodell (Intel)
-  Anthony
-  Jim Wang (Intel)
-  Jim White
-  Rex St. John
-  Walt (Intel)

Topics:

- LLRP RFID App Service – Anthony Casagrande
- Review Board
- Opens

EdgeX - Application Working Group

Hanoi

11/06/2020

Attendees:

Topics:

- <https://github.com/edgexfoundry/app-service-configurable/issues/131>
- Review Board
- Opens

EdgeX - Application Working Group

10/29/2020

Attendees:

Jim White

Lenny Goodell

Mike Johanson

Rocky Jin

Jim Wang

Beau Frusetta

Topics:

- Anything for code freeze?
- Do we have anything else that's outstanding for this release?
 - No, all good for release!
- Review Board
- Opens

EdgeX - Application Working Group

10/23/2020

Attendees:

Jim

Lenny

Mike

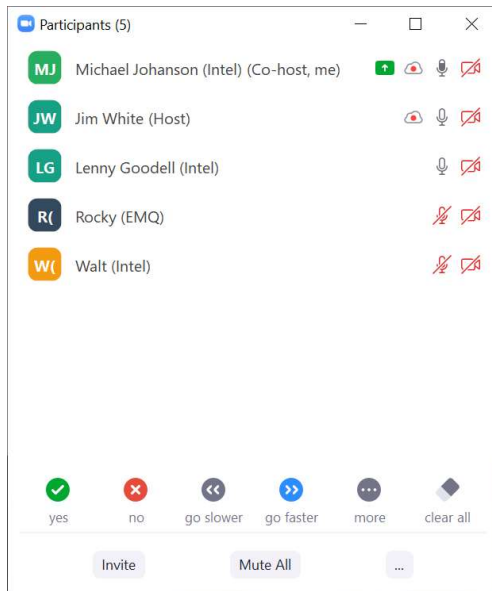
Topics:

- Do we have anything else that's outstanding for this release?
 - No, we're all good!
- Review Board
- Opens

EdgeX - Application Working Group

10/15/2020

Attendees:



Topics:

- **Scaling App Services**
 - “Shared Subscriptions” – MQTT
 - “\$\$share/group1/edgex/events” – Round Robin
 - Lenny to update Cloud on method.
 - Store and Forward should be tested for behavior when scaled.
 - Batch recommended for time
 - Service Key Generation needs to be done for dynamic scaling, requires manual keys for scaling at this point.--> maybe?
- **Refactoring for Ireland**
 - Unit tests of main, because SDK it is not an interface. Implment as interface.
 - Naming of SDK
- **Review Board**
- **Opens**

EdgeX - Application Working Group

10/1/2020

Attendees:



MJ	Michael Johanson (Int... (Me)	Unmute	More >
JR	Jin Rocky	↑	🔊 🔇
LG	Lenny Goodell (Intel)	🔊	🔇
W(Walt (Intel)	🔊	🔇
	Jim White	🔇	🔇

Topics:

- HTTP PUT:
https://edgexfoundry.slack.com/archives/CE48UTVQ9/p1601550691017100?thread_ts=1600968004.005800&cid=CE48UTVQ9
 - Will Create a separate HTTPPut function alongside HTTPPost
- Review Board
- Opens

EdgeX - Application Working Group

EdgeX - Application Working Group

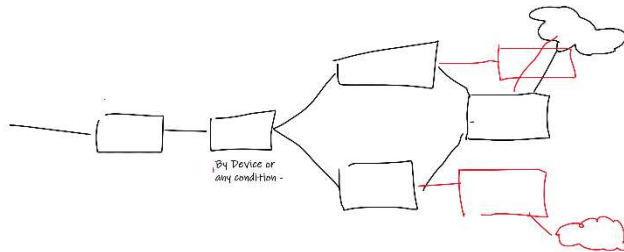
9/17/2020

Attendees:



Topics:

- Topics for Ireland
 - V2 API Consumption
 - New Event DTO on the bus
 - App Service leverage notification/alert service (Reference Design for Intel Loss Prevention)
 - Subscription added to client APIs
 - Implementation of DS to App Services via Message Bus
 - Tech Debt:
 - Handley Array of types w/ JSON Logic?
 - Filter based on value type (such as int)
 - Within the same app service
 - “Conditionalizing/Branch” the pipeline



- Pipeline per topic or device
- Multiple Export Destinations
- Relook at TensorFlow (or others) Example
 - Predictive Analysis (Temp, Vibration Data, Combination)
- Data Streaming support?
- Media Streaming (Audio/Video) Support
 - Recommend for Device Service integration to retrieve inference data (media streaming outside of edgex)
 - Transform to monitor object in stream (Object Recognition inference data)
- Integrate w/ OpenVINO
 - Send commands to control device for streaming
- Plugin for App Services to integrate/leverage Accelerators?
 - OpenVINO can handle this directly

EdgeX - Application Working Group

- Output aggregator/multiplexor? Something to think about ---
- Review Board
- Opens





EdgeX - Application Working Group

9/17/2020

Attendees:

Topics:

- Store Secret w/o path issue
 - IOTech has been testing V2, can't add a secret with a blank path – this is because base path is not accessible due to permissions. Need to require that a path be there
 - Provide error/warning message when blank path has been specified – needs to be enforced sooner (detect configuration)
 - Not forced for configuration
 - V1 Shouldn't be a breaking change
 - V2 won't be a breaking change
 - The name "path" is frowned upon, should be "namespace" or something similar? – do this for V2? – Address as part of Secret Provider ADR for abstraction – no immediate changes for now
- MQTT Trigger design/requirements
 - Lenny has started initial impl
 - Name to be internal/external
 - Detect cbor/json
- Conventional Commits update
 - Remove "improvement" and "chore" type
 - Scopes proposal:
 - - config
 - Remove configuration
 - - security (rather than secrets)
 - Internal
 - util
- Go 1.15.2 update
 - **Done**
- s
- Rules Engine Update - Rocky

-  Mike (Me)
-  Jim White (Host)
-  Bryon Nevis (Intel)
-  Brian McGinn (Intel)
-  Jim Wang (Intel)
-  Jin Rocky
-  Lenny Goodell (Intel)
-  Malini Bhandaru
-  Walt (Intel)

EdgeX - Application Working Group

9/11/2020

EdgeX - Application Working Group

9/3/2020

Attendees:

Topics:

- Tag EdgeX Examples Repository for each release?
 - Start adding examples that require new features of the current release that aren't in previous releases
 - Could we add a read me/change log of when examples are added and what version of EdgeX they are compatible with
 - **Propose topic for TSC Level – Architects meeting (Jim to add to Agenda)**
- Review Board
- Opens
- Rules Engine Update - Rocky



EdgeX - Application Working Group

8/28/2020

Attendees:

Topics:

Jim – Any update about Fledge? – Lower priority nothing for us to work

EdgeX CLI

Thoughts on capabilities needed?

Once telemetry/metrics is added to AppServices and EdgeX in general

Could this be retrieved via CLI command?

App Service Configurable – what about commands for managing ASC.

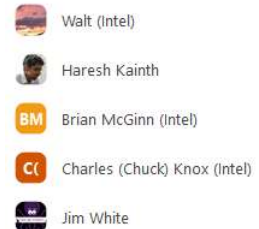
Turning functions on/off in a pipeline

Deploying new App Service Configurable

```
./edgexcli asc deploy "NewASC" ./config.toml
```

Review Board

Opens

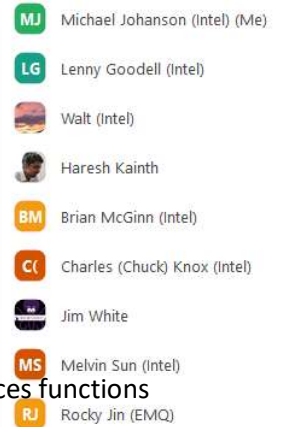


EdgeX - Application Working Group

8/20/2020

Attendees:

Topics:



- MQTT Trigger
 - Be able to connect to a cloud based MQTT broker – to trigger App Services functions and also enabling Commands
 - Can use HTTP Trigger and Messagebus trigger as example implementations/reference for new MQTT implementation
 - Create Issue on board a “spike” and meet with Felix/Cloud to understand more detail
 - Expand Commanding Capability w/ App Services?
 - **Jim to get more detail**
- Metadata about the “gateway” or host platform
 - Tags to be added to event model/DTO
 - **Lenny to add**
 - Need to create transform that populates **(Intel team to scope)**
 - To be populated in [Writable] section of config
 - Needs to be able to be leveraged from ASC
 - Append – but don’t override/ or remove duplicates
 - App Service Specific tags
 - Out of scope:
 - Core Metadata – generic tags
 - Location Hierarchy
 - Name of instance
- Fledge Transform
 - Custom App Service example to be created by Jim
 - Goal is to create connectors
 - The “other” IoT Project in LF Edge
 - No built-in transform
- Board Review

EdgeX - Application Working Group

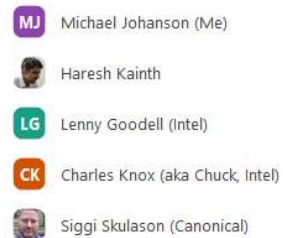
8/14/2020

Attendees:

Topics:

V2 Status updates

- PR for Secrets Endpoint wrapped up – status codes misunderstanding, shouldn't be returning 207, PR open for fix – 400/500 will be used for errors, 201 is created
- V2 Wrapped up after fix for status codes, TAF Tests will be handled by QA.



Board Review

Opens:

- Performance Concerns when Analytics start being included – should specify minimum requirements.
- Re-surface “gateway identification” in core WG meeting.
 - o Enrichment Transform – add fields to JSON/ possibly create new type
 - Gateway Name/ID
 - Location
- High Availability
 - o Configuration w/ Consul needs to be re-evaluated
 - o Health needs to be adapted for particular orchestrators
-

EdgeX - Application Working Group

8/6/2020

Topics:

- V2 Endpoint for Trigger
 - o will not be implemented as "V2" with DTOs as it is to the rest of EdgeX
 - o V2 will be identical to V1 – despite no changes
- Keep V1 Endpoints longer?
 - o /ping, /config, /metrics – if EdgeX is sole caller why keep V1
 - o Plan to revoke on same schedule as rest of EdgeX
-

EdgeX - Application Working Group

7/30/2020

Topics:

Status Updates:

- Startup duration fix in SDK PR merge soon (Merged)
- V2 Swagger complete – Complete and merged, ready to implement
- V2 Ping with any new V2 layers about to get started.
 - a. Starting with this endpoint first for V2 – Standard GETs
- Individual issues created for each V2 endpoint.
 - a. Will work on these after Ping

Log start-up time merged, but has issue


Need to adjust location to accurately measure time


Opens – Add Security Endpoint integration with UI in the future

Scheduling suggestions


- Every other week – alternate between Thursday Afternoon @430PM PDT, Friday Morning @ 8AM PDT

Review Board


 Michael Johanson (Me)


 Jim White (Host)


 Lenny Goodell (Intel)

 Walt (Intel)

 Brian McGinn (Intel)

 Gavin Lu

 Jim Wang (Intel)

 Jin Rocky

EdgeX - Application Working Group

7/23/2020

Topics:

Application Configurable UI integration complete – woohoo!

Enhancements:

- **Team to Brainstorm Validation techniques for order**
 - Metadata for input/outputs to enforce
- Change “Download Profile” to “Download Configuration”
- Support re-ordering of functions
- Indicate when changes have been made, but not yet deployed

EMQ UI Demo

Improvement for commands:

Rocky: Need to make sure it is REST Request

Rocky to get with Sheng Qi on ways to improve UI



EdgeX - Application Working Group

7/16/2020

Attendees:

Michael Johanson (Me, part

Jim White (Host)

Jin Rocky

Walt (Intel)

Bill Mahoney (Intel)

Chuck Knox (Intel)

Eno Udoko

Jim Wang (Intel)

Lenny Goodell (Intel)

Topics:

Review Bot PRs for ASC and SDK

App Functions SDK Examples “Hello World” – include in main repo?

Breaking out go.mod per example in example repo is good enough

Leaving in examples – not adding to main repo

Restructure App Service Config such that it can be expanded

Want “On the fly configuration” which requires ASC components with custom function

Low Priority/tech debt – create issue – determine if knowledge gap or missing need

Revert Mongo Removal – to be discussed at next Architects Meeting

Push Meeting to 4:30 – 5:30PM

EdgeX - Application Working Group

New Topic: Cloud control of EdgeX deployment/Device commands to be relayed to devices

Possibility: Kuiper to connect to cloud MQTT Broker to receive messages and connect to command service


Challenge: Listing of supported commands of a given EdgeX deployment reported out to cloud.





Rocky to put together proposal for a possible way to accomplish this

Board Review

7/10/2020

Attendees:

 Participants (4)

-  Michael Johanson (Me)
-  Brian McGinn (Intel)
-  Lenny Goodell (Intel)
-  Walt (Intel)

Topics:

- Add Restriction on scope
 - Transforms
 - secrets
 - Store-forward
 - Configuration
 - SDK
 - Triggers
 - Context
- Mike: Verbose error messages for bot to determine why
- Review PRs
- Review Board

EdgeX - Application Working Group

6/26/2020

Attendees:

 Michael Johanson (Me)

 Lenny Goodell (Intel)

 tkthimma

 Brian McGinn (Intel)

 Eno Udoko

 Walt (Intel)

+Jim White

Topics:

Review Dependency Updates

Quick chat about TensorFlow.

Example service is good move to start

Core Agenda Item -

Created timestamp being omitted before broadcasting to bus

Board Review

6/19/2020

Attendees:

 Michael Johans... (Me,

 Jim White

 Walt (Intel)

EdgeX - Application Working Group

Topics:

- Dependabot
 - Mike to add bot to sdk and ASC.
- Mike to Ping Jim about getting Github Actions on Agenda for Architects meeting
- Continuing Doc Updates
 - How to Add app service endpoint to Kong – Issue created – Assigned to Jim Wang
 - ~~Need to add section for accessing Context when using AddRoute function~~
- Review board

EdgeX - Application Working Group

6/12/2020

Attendees:



Michael Johanson (Me)



Jim White



Lenny Goodell (Intel)



Walt (Intel)

Topics:

- All good for .release?
 - YES!
- ASC Snap Version
 - Can we grab the tag for accurate versioning of Snapcraft.yml - currently it is hardcoded
 - Lenny to Check w/ Lisa if we can grab this from the pipeline
- Examples Config & versions
 - Update db to redis
 - Copy and move go.mod to individual examples
 - Document version compatibility for examples
- Docs Restructure
- Board Review
- Flag Parsing issue in go-mod-bootstrap
 - “=” fix for now
- (Jim) - AI/ML Exposure – TensorFlow, FogHorn, -- focus on structured sensor data first
 - Mike to explore some basics

EdgeX - Application Working Group

6/5/2020

Attendees:



Michael Johanson (Me)



Brian McGinn (Intel)



Jim White



Lenny Goodell (Intel)



Walt (Intel)

Topics:

LLRP App Services

- Configuration Service
- Break-up service
- Rally the troops from Intel to present
- How do we start organizing App Services by vertical

Need a template – w/ go.mod, dockerfile, main.go for everything to scaffold an app service.

Brainstorm Batch Persistence (What do we do if the service crashes while batch is being created)

Option 1:

Do Nothing – value of data lost after few seconds – it becomes irrelevant and the data is no longer actionable – new data should be flowing when system comes up again.

Make an option/flag on whether or not persistence is turned on for batching data.

Option 2:

Rest query to core data for non-pushed data on startup – sorted by datetime -- re-running the pipeline if needing to be retried.

PreReqs: Persistence turned on and **MarkAsPushed** is being used

Query based on markaspushed and related filters(I.e. devicesfilters, valdescriptors)

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Option on CoreData re-push everything on the bus after crash that hasn't been "markaspushed".

MarkAsPushed – First to update problem – What if multiple services use same data and only one successfully processed.

Thought: MarkAsPUshed per app service DB

Option 3:

Write every record to the database that is mid batch – and purge when batch is ready.

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5/29/2020 - Cancelled

5/22/2020 - Cancelled

5/15/2020

Attendees:



Michael Johanson (Me)



Jim White



Trevor Conn



Walt (Intel)



Lenny Goodell (Intel)

Topics:

Review Board

Check w/ Tony/Ian on #32 for a status update

TBD - Couple weeks out: Discuss Implementation of #258, ways to store data without duplicating data in another persistent store

Architect Meeting Topic – Gateway Identity

EdgeX - Application Working Group

Geneva

5/8/2020

Attendees:



Michael Johanson (Me)



Lenny Goodell (Intel)



Trevor Conn



Jim White



Walt (Intel)

Topics:

- When *exactly* are we tagging? **5/12/2020 by EOD**
 - SDK First, then ASC
 - MQTTS Secret Manual Integration Test
- Add “Semantic PR” to App Service Configurable
 - **Mike will submit LF Ticket for Semantic PR**
 - Revisit when to roll out to rest of WG
- PR For Documentation
 - App Service Configurable update docs w/ limitations and list of support functions (mappings to SDK funcs)
 - Breakout App Functions SDK section into more logical sections
 - **Jim to bring up to TSC appropriate time to “rev” docs**
- Generate Changelog
- Check In w/ Tony for ASC Snap
- Kuiper – Documentation
 - **Jim to reach out to Rocky on documentation for Kuiper**

EdgeX - Application Working Group

5/1/2020 - Hanoi Planning

4/24/2020 - Cancelled

4/17/2020

Attendees:

 Michael Johanson (Me)

 Lenny Goodell (Intel)

 Trevor Conn

 Eno Udoko

 Jim White

 Walt M

Topics:

Kuiper Update:

- will merge latest update of compose
- Had conversions errors – provided example on how to decode floats properly
- **Lenny to put together small demo for Hanoi Talks on EMQ X Kuiper**

Review Board

Go-mod-bootstrap update?


Going well – has reduced code in SDK startup

Will release v1.1 of SDK and subsequently the Configurable App Service once SDK has been tagged for release

EdgeX - Application Working Group

4/10/2020

Attendees:



Participants (5)

- M Mike (Me, participant ID: 475806)
- LG Lenny Goodell (Intel)
- TC Trevor Conn
- WM Walt M
-  Jim White

Topics:

Status Update:

- 2nd SecretClient complete
 - Mike - Need to figure out whats wrong with App-service-example for Secrets
- bootstrap integration in progress.
 - Lenny needs to get with Michael Estrin – can't get compiler syntax to work for signal via channel for type when config has been updated.
 - Handlers for SDK still need to be done
- Cloud event has been completed as an example
 - Closed out cloud event transformation issues

Review Board

New Items

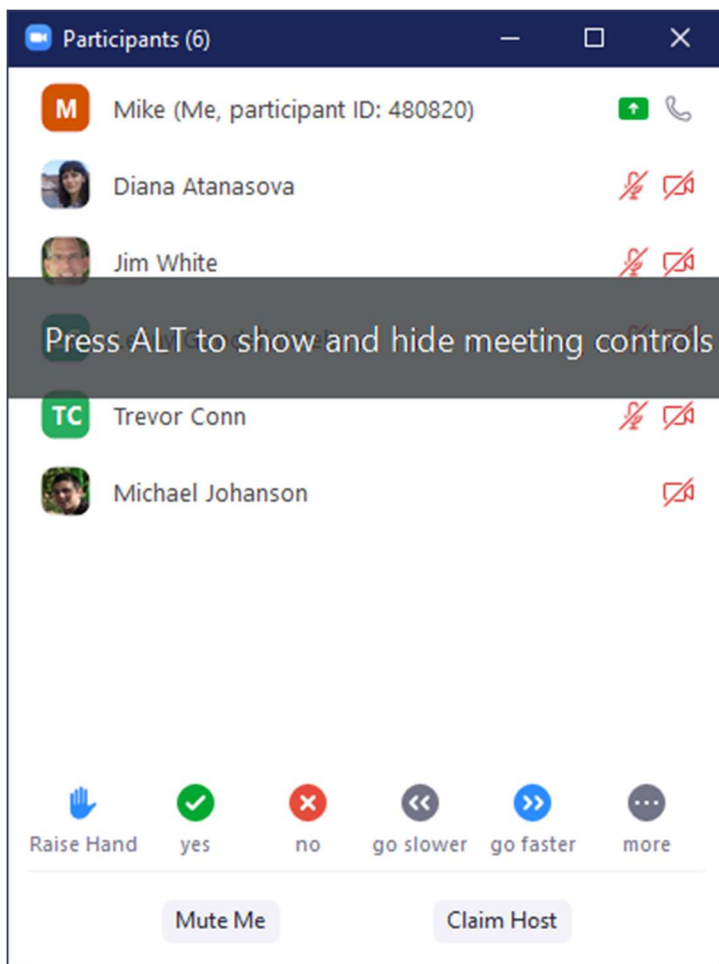
EdgeX go may need secrets to connect/authenticate w/ MQTT BRoker – need to loop in Bryan Nevis - Jim to add this to Hanoi Planning discussion. Need to get secrets into vault for authenticated broker.

Shouldn't require exec into EMQ X Kuiper container to configure it – need more discussion on containerized version of rules engine.

EdgeX - Application Working Group

4/3/2020

Attendees:



Topics:

CloudEvent Dependencies

No-Go on pulling in the cloudevent SDK into the App Func SDK

Options:

1) Create an app service example that pulls in the cloud event SDK to show how it can be leveraged

2) Conform to V1 Spec only w/out Cloud Event SDK and provide to/from transform in App SDK

3) Fugghedaboutit

MQTT


- Create option to specify type of authentication method

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3/27/2020

Attendees:

 Mike (Me, participant ID: 49)

 Eno Udoko

 Lenny Goodell (Intel)

 Walt (Intel)

 Adam Mitchell

Topics:

- Status Update:
 - Updating ASC w/ latest features
 - MQTT / HTTP Export w/ Secrets Support
 - MQTT Export /w secrets will be a new transform, for Geneva will have 2 MQTT Exports – one with secrets, one without, will deprecate v1 in Hanoi
- Documentation updates for Edgex Docs
 - Will move documentation from App Functions SDK repo to be over in edgex-docs exclusively
 - Need to move ASC readme to edgex-docs as well
 - Create an issue for both
- CloudEvent type can be added as TargetType for ASC after CloudEvent conversion is supported
- TAF tests – sync with QA/Test group to get this effort started – specifically for Store and Forward - Lenny to talk w/ team
- Review the Board

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Hanoi Release Planning:

Application Services / App Functions SDK / Analytics Integration

New feature(s)

- Kuiper – next release
 - Decouple from EdgeX
- Deprecate Drools rules engine
- Support Cloud Event export - will be in for Geneva
- Support additional northbound endpoints and protocol types and formats. Examples include:
 - Tencent
 - Alibaba
 - IBM Watson
 - IoTivity
 - SAP HANA
 - DDS
 - AMQP
 - Haystack
 - OPC UA
- Support enrichment functions (an EAI concept) in export services (or application services). Allow additional data or information to be added to the flow of sensor data to the northbound side. This might be information about the sensor/device that captured it or information about the commands to actuate back down on a sensor/device. - Supported w/ any custom build App Service built on top of SDK
- Integrate to edge software/agents - w/ Data Plane
 - AWS Greengrass
 - Microsoft IoT Edge
- App Service Configurable – Allow same function twice
- Fork the pipeline?
 - Allow various paths for different sensors for example
- Support multiple topics in SDK - go mod messaging- update SDK config for support of this
- Multiplexor to split out data from device services - transform that breaks down an event with multiple readings into events with single readings
- Pipeline per topic +1
- OMQ export function

Tech Debt

- Improve binary data support
 - Local edge analytics may be fed binary data and create intelligence from it to allow for actuation at the edge based on the binary data (example: examine an image and detect the presence of a person of interest).
 - Support alternate message formats for service-to-service exchange (Protobuf, XML, etc.)

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- ~~Update SDK to use new persistence service~~

New Items:

All Good!

3/20/2020 Cancelled

3/13/2020

Attendees:

- Lenny
- Mike
- Jim

Topics:

- Anthony completed PR to message bus in SDK.
 - Now need to use that in a new profile for ASC.
 - Update the SDK in ASC
 - Add the Profile
- Jason fixed bug where Connect wasn't called.
- Review board: <https://github.com/orgs/edgexfoundry/projects/23>

New Business:

- Topics for Hanoi (brainstorming ideas)
 - V2 for SDK
 - Extended Kuiper Integration?
 - App Service Configurable – Allow same function twice??
 - Fork the pipeline?
 - Allow various paths for different sensors for example
 - Support multiple topics in SDK – go mod messaging
 - Multiplexor to split out data from device services
 - Pipeline per topic

3/6/2020

Attendees:

- Lenny

EdgeX - Application Working Group

- Trevor
- Mike

Topics:

Rules Engine Recap from Yesterday -

Choosing Method A as opposed to B:

Interpretation: Pre-Filtering on device is removed from “EMQ X Stream” (option B) and is assumed to happen in AppFunctions or in where clause in “EMQ X Rule”. *Topics aren’t a means for filtering on devices or data in the stream.*

Event Stream Example: `SELECT * FROM source WHERE device in ["Device1","Device2", "Device4"] AND temperature > 30`

Provisioning/Onboarding Stream Example: `SELECT * FROM source WHERE device in ["Device1","Device2", "Device4"]`

Would like to be able update incrementally (I.e. add a new device to list “Device 8”) - need clarity on whether this possible or if whole rule needs to be updated with complete list of devices. -- For phase 1 – will manage the whole list in the provision watcher and update rule when it changes.

//

Approaches for Kuiper stream definition in EdgeX

	a) Multiple devices in one stream (schemaless)	b) One device – one stream (schemaless)	c) One device – one stream (schema)
Stream creation	Yes, but only ONE pre-defined stream need to be created in the docker image. <code>CREATE STREAM edgex() WITH (FORMAT="JSON", TYPE="edgex")</code>	Need to create a stream with every device but not necessary to specify data types. <code>CREATE STREAM demo() WITH (FORMAT="JSON", DATASOURCE="demo" TYPE="edgex")</code>	Need to create a stream with every device, and specify necessary field types. <code>CREATE STREAM demo (temperature float, humidity) WITH (FORMAT="JSON", DATASOURCE="demo" TYPE="edgex")</code>
SQL	<code>SELECT * FROM edgex WHERE meta("device") = "demo" AND temperature > 30</code>	<code>SELECT * FROM demo WHERE temperature > 30</code>	<code>SELECT * FROM demo WHERE temperature > 30</code>

Proposal is [a] or [b]

- [a]
 - As in relational database: All devices are in the same table, and distinguish devices by add a condition in WHERE clause.
- [b]
 - As in relational database: Create one table for one device. FROM clause distinguishes the device.
 - Higher efficiency: Data could be filtered at the 1st process node

[c] is not suggested

- The data types are already defined in v descriptors

EdgeX - Application Working Group

2/28/2020

Attendees:

 MJ Mike Johanson (Me, p

 M Marcelo Gallardo

 TE tony espy

 LG Lenny Goodell (Intel)

 TC Trevor Conn

Topics:

Marcelo Gallardo – TIBCO – Hackathon @ End of March – Palo Alto

- Integrating big data with backend applications
- Been using export client and services pretty heavily for the last 6 months
 - very easy, and flexible before hand
- Migrating to SDK – few challenges have been uncovered
 - Really like the direction- understand the direction
 - Little bit more work
 - Want to be able to dynamically add endpoints via rest
 - Want to see what is running from an export perspective from client (Android app)
 - /Config endpoint would provide current pipeline in App Service Configurable—not available in SDK built service
 - SMA has a gap in that you must know the service key of the non-registered service to get its information (I.e. config)
 - TL;DR; - need a way to see what's running on box with 1+ services built on SDK – 1 endpoint
- Possible enhancement: Would like to have a way to query SMA for status of class of services (I.e. all device services or all app services).

Tony Espy – Snaps

- Snaps for app service configurable – disconnect on versions
- SemVer shenanigans caused versioning issues
- 1.0.0 is newer than 1.1.0-dev7 for hackathon
- Tony will update snap to be 1.0.0

Insecure Secrets and store secrets are merged

Examples being created for how to use insecure secrets and vault secrets

EdgeX - Application Working Group

Readme/documentation updated appropriately

Kanban Board Review

2/21/2020

Attendees:

 Lenny Goodell (Intel) (Me)

 Jim White

 Trevor Conn

+Michael

Topics:

- JSONLogic – Sneakpeak
 - <https://github.com/edgexfoundry/app-functions-sdk-go/pull/292>
 - <http://jsonlogic.com/operations.html>
 - Only support Boolean operations is good enough.
 - How app services participate in blacklisting Devices?
 - Blacklisted device on-boarded is an event
 - Need to be able to detect and take action with JsonLogic function?
 - comkick it out
 - Send notification
 - Need to update device name list dynamically
 - Need Sensor event vs Control events
- Thoughts on Rules Engine next steps from meeting yesterday
 - Went well.
 - May not be right approach to consume core-contracts.
 - Use endpoints instead.
 - Also use to understand Event/Reading model.
 - Liked that they used go-mod-messaging.
 - It is an OS effort that we could contribute to.
 - Very encouraged!!
- In progress
 - PUT for secrets
 - Batch documentation
- Kanban review
 - <https://github.com/orgs/edgexfoundry/projects/23>

EdgeX - Application Working Group

2/14/2020

Attendees:



Mike Johanson (Me, part



Brian McGinn (Intel)



Jim White



Lenny Goodell (Intel)



Trevor Conn

+ Michael Estrin

Topics:

Go-mod-bootstrap back on for Geneva

- Wait time specifications – converted 1000 to 1s in config in app sdk – bootstrap is expecting integers – when data is returned transform structure that has strings (wait durations) to ms
 - For hanoi would want to ensure this common across services
- Self seeding to bootstrap is the last thing to be accepted – Lenny helping Jim with ADR

Kanban Board Review

Eno from our team still working on handling of insecure secrets

3:30 Meeting with EMQ X Team – bi weekly meeting

2/7/2020

Attendees:

EdgeX - Application Working Group

 Mike Johanson (Me)

 Lenny Goodell (Intel)

 Michael Estrin

 Jim White

 Trevor Conn

Topics:

- go-mod-bootstrap adoption

What would need to change in this module?

- Self-seed for bootstrap -- needs to be integrated – Lenny has done this in a branch – need to have issue taken off hold
 - Want agreement on various bootstrap components that need to be added – don't want disconnected implementations
 - Jim will work on putting together ADR for self-seeding
- The way we adapt how startup occurs --
 - Explore experimental – Michael E. doesn't suggest using a go routine to wrap bootstrap in order to ensure a non-breaking change to sdk
 - **Wait til Hanoi to adopt go-mod-bootstrap for breaking change**

What would change in the SDK – specifically the surface/to the developer?

- GetSecrets() from Vault is complete

Intel team is Working on support for insecure secrets

- Rules Engine – Next Steps
 - Guidance for Rocky?
 - **Schedule w/ Rocky a couple checkpoints to ensure keeping on path with integration**
 - **Trevor will be going a POC – will provided feedback**
 - JSON Logic
 - **Mike to make decision on feasibility for implementing in this release**
- Review Backlog
 -

EdgeX - Application Working Group

1/24/2020

Attendees:



Mike Johanson (



Michael Estrin



Trevor Conn



Eno Udoko

+ Jim White

Topics:

- Command Line Flag for `-registry / -r`

In the ADR I specified that the `-r/-registry` it would be removed and in its place, we would add the **Enable** field in the RegistryInfo struct.

Example:

```
[Registry]
Host = 'localhost'
Port = 8500
Type = 'consul'
Enabled = true
```

Option #1 – to support both config and command line option

Option #2 – continue supporting command line option (not in config) -- aka leave as is – this will be the decision

Lenny will update the ADR with this decision - Add context to decision section and update appropriately

Rules Engine Discussion from Demo


EdgeX - Application Working Group

- Requests
- Next Steps
 - Scale testing – how many rules can be supported on various hardware setups
 - CLI today, REST API will be coming
 - How is EMQ X Kuiper Integrated
 - Agree that it shouldn't be part of edgex-go
 - In general, want to be separate from EdgeX, suggest to add ZMQ connector along with MQTT/REST
 - Anti-corruption layer
 - Should find out if plugins are a part of their architecture – windows support in native environment?
 - Should be able to be containerized independently
 - Should not be in EdgeX Foundry organization in github – leave in EMQ organization
- Is this the right path?
 - **Yes, we should continue down this path**

EdgeX - Application Working Group

1/17/2020

Attendees:

 Mike Johanson (Me)

 Brandon Forster

 Jim White

 Lenny Goodell (Intel)

 Trevor Conn

Today's Topics:

App Service Persistence – Lenny

Need a separate service for managing the database. When you have multiple app services want to centralize db management. Problem is that multiple services accessing the same database collection – breaks microservice patterns. DB Credentials are created for a single service – In talking with Bryon Nevis, as we move to per service tokens perception was that single token wouldn't work/isn't secure.

As a counter, Each service could have its own DB and collection. Seeding credentials is the challenge.

Need to go back to Bryon N and discuss sharing tokens for each instance of app service. Or each service having its own db/collection.

Secrets Abstraction for Vault

GoModSecrets is not an abstraction around secret store – specific to vault

Need to add abstraction so can support non-secure implementation

Will us in-memory keystore when in non-secure mode

Lenny will wrap up the description and content into an ADR for decoupling from Vault

Need to determine if this necessary for Geneva – **right thing to do, however, can crawl with the way go-mod-secrets is today.** Plan is to use secretprovider similar to store n' forward, will add a new function for getsecrets() next to getdbcredentials()

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Service keys will be added to compose/env variables. **We need a dynamic token provisioning service – need to bring this up in Security WG.**

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1/10/2020

Attendees:



Mike Johanson (Me)



Michael Estrin



Trevor Conn



Jim White

Today's Topics:

Batch and Send – First Look

Absolute or relative timer – allow for both based on configuration values – allow for different strategies

When no data, send empty array? or nothing at all? -- consider cloud

Higher level question – should we duplicate and store data for batch and send before transforms? After? -- BatchTransformSend or TransformBatchSend – when to store?

Name should just be batch

EMQX Rules Engine Demo w/ EdgeX - Jan 23rd 3PM PST (Beijing Time is 7AM, Jan 24th).

Determine how good is the EdgeX integration – is it ready for primetime? For Geneva?

For handling secrets – suggest to allow for put of secrets in go-mod-secrets – still should allow for storage of secrets if not in secure mode -- look at go-mod-bootstrap, put implementation in same place – Michael Estrin, use as sounding board

EdgeX - Application Working Group

12/20/2019

Attendees:



Mike Johanson (Me)



Jim White



Trevor Conn



Lenny Goodell (Intel)

Today's Topics:

EMQ X Kuiper Review – Jim [Powerpoint Presentation](#)

Mike to reach out to EMQ team for a demo w/ EdgeX in January

EdgeX - Application Working Group

12/13/2019

Attendees:



Mike Johanson (Me)



Lenny Goodell (Intel)



Trevor Conn



Jim White



Michael Estrin

Today's Topics:

- Export Services Removed – Yay!
 - But...Marcello:
 - <https://edgexfoundry.slack.com/archives/CE48UTVQ9/p1571677356039900>
 - https://edgexfoundry.slack.com/archives/CE6902Q6S/p1575999030074900?thead_ts=1575998734.074700&cid=CE6902Q6S
 - Get more information about use case
 - Encourage to use multiple app services
 - Encourage a contribution :)
 - How can we address multiple HTTP Endpoints
 - Scale problems – hold the line – export distro going away that is on purpose
 - Encourage multiple services if needing different endpoints
 - Only support multiple endpoints if pipeline transformations are the same.
- UI Updates – what should we encourage?
 - App Service Configurable
 - Deployment of App Services (add/remove)
 - Generate TOML files
 - Update consul
 - Designer – Drag N’ Drop of built in functions
 - App Services (longer term – not now)
 - Editor for your own function?
 - Generate and deploy app services for you
 - Lots of complexity here – could be overlapped with SMA
 - Lots of deployment considerations
 - I.e Docker and images – being pushed/built
- HTTPS Support for App Functions SDK – community contribution

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- System Metrics – Not committed for Geneva -- Stretch
 - Set granularity of telemetry based on INFO, DEBUG, VERBOSE?
 - TelemetryLevel option in config
 - Timer
 - Processing time for a pipeline
 - Evaluate at Function level – Sum of functions should equal entire pipeline – only in Debug mode
 - DB access Times
 - Counter
 - How often are we failing export to be sent to db to be retried at a later time
 - Queue Size
 - How much data is being sent to an endpoint (Volume)
 - Focus on Important/Expected/Common Error Counts/Stats
 - Define what is important
 - Invalid Events – Malformed Data – Can't unmarshall
 - Number of events being received into SDK – ~~compare to Filtered?~~
 - Unmarshalled and given to pipeline
- Version Issue – App Service Configurable failing version check against core due to “master” being returned from api/version on core.
 - Need to talk to Lisa about adding a version number prefix to nightly build in CI pipeline for core related services – **Lenny**
- Can we integrate Service level testing into every PR
 - Rest APIs to be tested in Go
 - TAF tests can live in each repo if necessary
 - Leave the E2E tests to the testing team
 - Try to use the best tool for the job
 - Newman requires service to be running – run tests in IDE – leverage this same thing for unit test but run full stack application level tests instead w/ Go
 - Concern around leveraging Go environment could hinder C/C++ tests and other languages
 - No decision here in App WG – we do want community agreement
 - Need TAF or GoLang for testing something like Store and Forward – needs to be in the repo

Topics from last time:

EdgeX - Application Working Group

12/6/2019

Attendees:



Mike Johanson (Me)



Lenny Goodell (Intel)



Jim White



Michael Estrin

Topics from last time:

- Rules Engine
 - Couple concerns – Size is one --Compared to Drools it is pretty small
 - Custom SQL Engine for Rules
 - Should we do a test-run of it? It is open-source - Jim will draw a preliminary comparison
 - **Thought is to pursue JsonLogic for now – encourage development and integration of EMQ X Kuiper for future – however current recommendation is not a full replacement for existing Drools Rules Engine**
 -

Today's Topics:

- Review New Issues
- Prioritize Work
 - <https://github.com/orgs/edgexfoundry/projects/23>

EdgeX - Application Working Group

11/29/2019 - US Holiday Weekend

11/22/2019

Attendees:

Topics from last time:

Batch and Send – Saving for Lenny

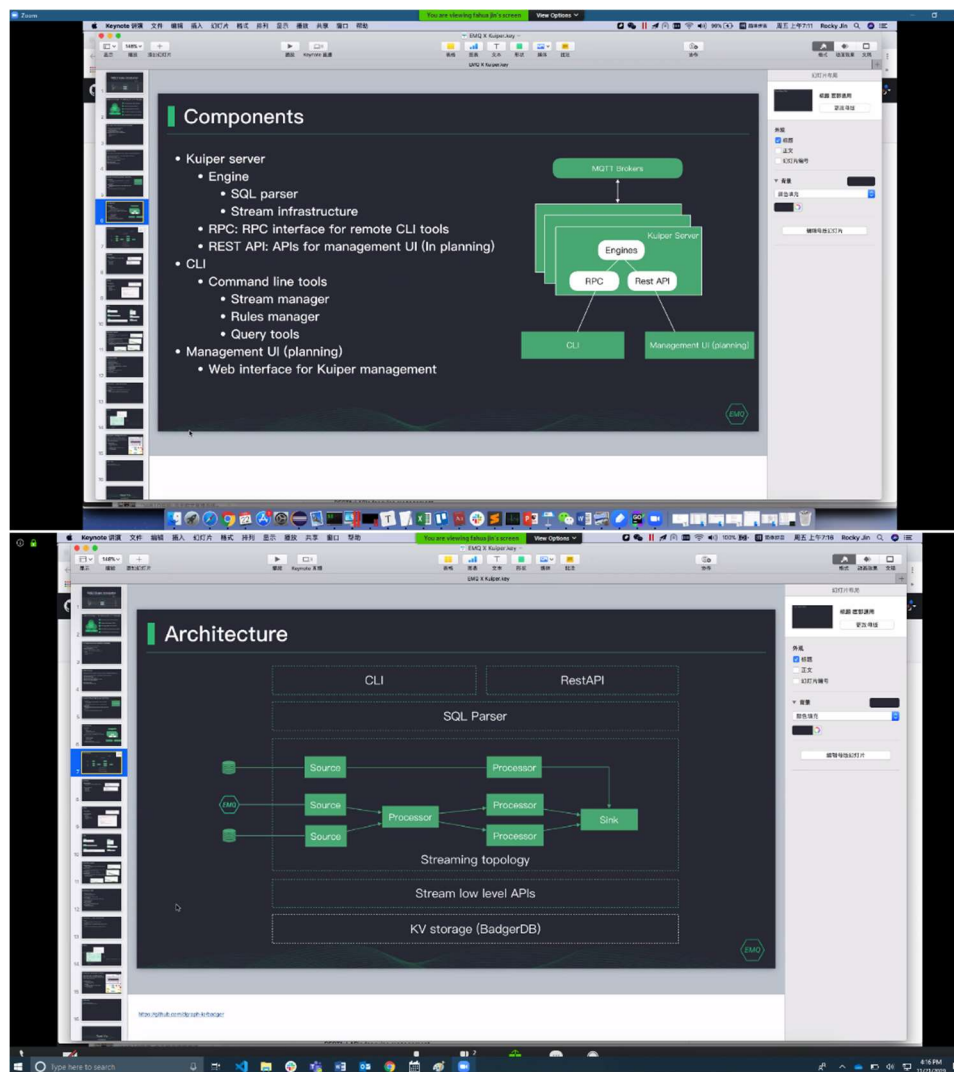
Config/Registry refactor – saved for Architects meeting

Today's Topics:

Rules Rules Rules:

- EMQ X Kuiper
 - Open Source project
 - 6 years
 - Can be deployed from Edge to cloud
 - “Messaging Middleware Software”
 - Challenges to address:
 - Constrained devices
 - Agile
 - Install/upgrade/monitors apps for large #
 - A SQL Based IoT Rule engine – custom engine
 - ~7MB package, support Linux/MacOS ARM too
 - SQL Based
 - Built in support For MQTT Source
 - Extensible
 - <https://github.com/emqx/kuiper>
 - Restful API for rules Management
 - Couple layers of abstraction
 - Lowlevel API - MQTT based – protocol specific, flexible, but not easy to develop streaming applications
 - Streaming API
 - SQL

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○

○

○ Source = ZMQ, MQTT, etc...

○ BadgerDB current KV storage – currently too much memory looking to replace

○

Evaluate footprint to see what it looks like alongside EdgeX.

JsonLogic: <https://github.com/edgexfoundry/app-functions-sdk-go/issues/252>

- <https://github.com/jwadham/json-logic/issues/8> -- Two implementations
- Leaning towards <https://github.com/diegoholiveira/jsonlogic>
- How would we see this being integrated into the functions pipeline/SDK?
 - Add a route POST /rules to allow for dynamic changing of rules while running?

```
{ "and" : [  
  { "<" : [ { "var" : "temp" }, 110 ] },
```

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```
{ "==" : [ { "var" : "pie.filling" }, "apple" ] }  
]}
```

- Example Pipeline:
 - FilterByDeviceName
 - ConvertToCelcius
 - TransformToJSON
 - ApplyJSONLogic
 - HTTPPost
- Storage/Persistence of rules – it is JSON, so rules.json? Specify path in TOML? Embed directly in TOML with no JSON file?
 - Stick with file in rules.json for example
- Only want one reference implementation, wouldn't want both. (Jim)

Moved all examples underneath app-service-examples in holding

Ok that history was lost, not a way to keep it

Fuji

11/15/2019

Attendees:

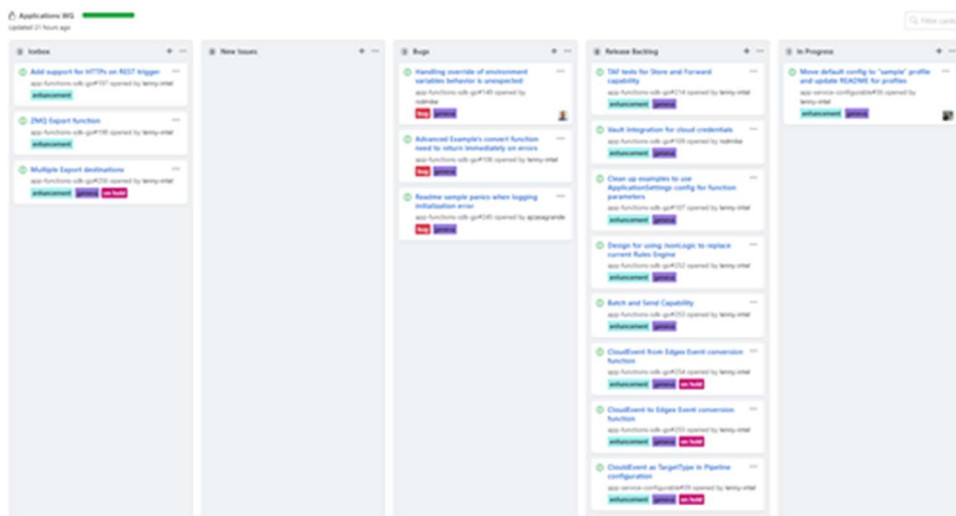
 LG	Lenny Goodell (Intel) (Me)	
 DR	Dave Rensberger	
 JW	Jim White	
 JP	Joe Pearson (IBM)	
	Michael Estrin	
 TC	Trevor Conn	

Today's topics

- Work Completed since last meeting
 - Vault integration for database credentials
 - Compose files updated for App Service Configurable to replace Export Srvs for Rules engine.
 - Replaced docker profiles with env var overrides for App Service Configurable
 - Moved SDK Examples into new **app-service-examples** repo in holding
 - Tagged SDK & App Service Configurable as release 1.0.0
 - Snap created for Fuji with ASC replacing Export Srvs for Rules engine

EdgeX - Application Working Group

- Added issues for Geneva items (<https://github.com/orgs/edgexfoundry/projects/23>)



- Detailed discussion on Batch and Send
 - Consensus of concept of a Batch function
 - Discussion of in memory vs DB and designing for future scale out
 - Batched in memory by default. Use DB for durability (crawl). What about load balanced (Run)? Use semaphore in Redis?
 - Will require new DB interface? Or can we expand on the current one used for Store and Forward since the data persisted is just binary.
- ZMQ export remain in Ice Box (aka long-term backlog)
- HTTPs for REST trigger remain in Ice Box until HTTPs for all services is solved/implemented.
- Multiple Export destination moved to Ice Box
 - Concern is this basically recreates Export Distro and its scalability issues.
 - Want to revisit the use case for this to better understand if it can be solved in a scalable way.

- Review of issues in GIT Project (Geneva scope)
 - Cross cutting concerns for Geneva
 - Alt message bus
 - Event/Reading type data added
 - New models
 - API refactoring for Client used by SDK
 - Just need to latest core contracts.
 - API refactoring pattern applied in SDK?
 - Moving to TAF framework

EdgeX - Application Working Group

- Generic error handling
- Design review of Refactoring Registry Design
 - The goal is to separate the responsibilities of configuration and service discovery.
 - Preliminary PR <https://github.com/edgexfoundry/edgex-go/pull/2133>
 - Config Provider config also in TOML?
 - Add changes for config-seed

EdgeX - Application Working Group

11/1/2019 Cancelled

11/8/2019 Cancelled – Geneva F2F Planning

EdgeX - Application Working Group

10/25/2019

Topics for Today:

Feature Request: Dynamic Subscription(Adding and removing) of Cloud Endpoints. This translates currently to adding/removing pipelines – which is synonymous with instances of the ASC. How do we address this?

- **Explore:** Multiple pipelines in single ASC?
- Rely on some sort of remote deployment mechanism?
- Say use the SDK and create your own endpoint to manage adding and removing HTTP endpoints?
- **Explore:** Support multiple addresses in HTTPPost?
 - Implications for S&F – add persist per endpoint?

Preparing for training of App Functions SDK and App Service Configurable

- Any particular topics we want to focus on? Any Requests?
 - Clear articulation of how this is used, ways to use it
 - Configuring custom settings in Application Service w/ SDK

Review recently completed PR's

Swagger – need to follow up on where this gets uploaded/delivered

Duration Strings – would be nice to be consistent across services – **should be brought up in core**

WG

App Config Rules replacing Export Client/Distro

- PR #1992 for config-seed changes to Rules Engine properties.
- Compose files will be updated after merge
- Need to determine how this affects BlackBox Tests for rules engine, and what needs to change
-

Do we need vault integration for S&F DB creds when security is on? -- file this as bug to get included for Fuji

- Need to reach out Tingyu, leverage common implementation in core-services w/ bootstrap handler to get credentials.
- Initiate discussion to create re-usable component for retrieving credentials from Vault.
- Wait until docker-compose for secty is stable for validation of S&F

Opens:

None

EdgeX - Application Working Group

10/18/2019

Topics for Today:

- Move all examples into app-functions-examples repo in holding?
 - Move them ALL (don't leave one behind) into an example repo in holding
- Store and Forward complete!
 - Ready for Fuji! YAY!
 - Need to determine when to move edgex-taf-common repo – to main
- MQTT Tweaks
 - SkipVerify will be a flag (Currently hardcoded to true 😞)
 - Refactoring
- Swagger generation from Code
 - Bring to Core – discuss with larger audience
 - How do we deploy this across the entire framework?
 - How do you make discovery of swagger spec seamless? Where would you go to find API documentation?
- Snap for App Service Configurable – Tony

Operations Focused:

- Changelog example
 - Add to Core agenda to demonstrate traceability and standard structure for commit messages – Create an issue in core
- PR Template

Forward Looking:

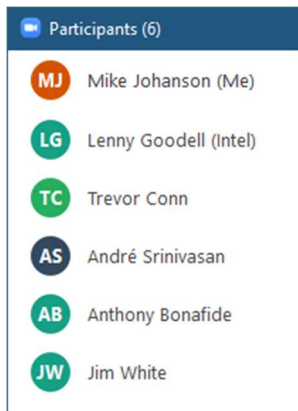
- Update all configurations to use Environment Variables to override for Docker
 - Lenny working on it
- Validate Version against Core Version (w/ option to disable)
- Blackbox tests for Store n' Forward TBD
 - Want to use TAF for this
- Geneva Items
 - Application services should provide for batch and send modes. In other words, take a collection of event/readings over time, and send on certain intervals or triggers. Store and forward based on a schedule.
 - Create a design and implement a means for application services to feed data back into core data (through a device service, via the core data API, etc.). For example, feed application services back into core data (example: aggregate readings, separate readings one per event, perform transformation from F to C on temp and return these to core) - (maybe)
 - Core Data may become more of general store of data – never meant to be long lived
 - Need to be aware of the nuances of implementing this
 -

EdgeX - Application Working Group

EdgeX - Application Working Group

10/8/2019 - Cancelled (EdgeX Open)

10/1/2019



Participants (6)

- MJ** Mike Johanson (Me)
- LG** Lenny Goodell (Intel)
- TC** Trevor Conn
- AS** André Srinivasan
- AB** Anthony Bonafide
- JW** Jim White

Topics for Today:

- Store and Forward PR – open
- AWS PR - Merged
- Black Box Tests finally merged -- yay!
- EdgeX Hackathon Prep

Opens:

EdgeX - Application Working Group

9/24/2019 - Cancelled

9/17/2019



Mike Johanson (Me)



Lenny Goodell (Intel)



Brandon Forster

Topics for Today:

AWS Export – Provided some PR feedback – still WIP

Store and Forward update – Lenny

Brainstorm Geneva Ideas:

Opens:

EdgeX - Application Working Group

9/9/2019

Topics for Today:

- AWS Export – WIP – Alex
- Store N Forward Update
 - DB Updates – Brandon
 - For persistence, want to not have leaky abstraction. Leverage the pattern used in edgex-go.
 - DB mocks – Can we use Mockery? Stub the interface, not the DB implementation. CI ignores tests for db unless explicitly set
 - Scheduler Discussion – Lenny
 - Original Plan: Use scheduler - seems complicated for what we need
 - Can we just create our own “AutoEvent” to retry sending data.
 - Named return values
 - Lets be explicit for now, consider switching in future
- General Updates
 - Attribution file
 - Clients Added (Notification, Command, Scheduler, etc...)
 - <https://github.com/edgexfoundry/app-functions-sdk-go/issues/124>
 - Push to Core merged


Opens:

Examples for AWS and Azure

EdgeX - Application Working Group

EdgeX - Application Working Group

9/3/2019

 Mike Johanson (Me)

 Doug Migliori

 Jim White

 Lenny Goodell (Intel)

 Rodney Hess

 Trevor Conn

 Brandon Forster

 Michael Estrin

 Steve Osselton

Topics for today:

- AWS Updates
 - Contact Mainflux for AWS & Azure account credentials for LF
- Store N' Forward Updates
 - DB updates from Dell (Brandon)
 - Started - WIP
 - How is SNF integrated with CoreData - concern around having separate DBs - CD is pipe for raw data events - Data Structure is different thus it can't be in same collection
 - Microservice architecture encourages separate db per service
 - Not necessarily separate physical dbs - but separate collections or logical DBs
 - Goal is to eliminate hidden DB dependencies
- "Push to Core"
 - Intel use cases require this for Fuji
 - ValueDescriptor changes would affect this
 - Add a splitter to breakout readings from a single into multiple individual events with a single reading

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- **Messaging needs to be a topic at pre-f2f on the 9th** - especially around pub/sub
- Annotate as Experimental - Not guaranteed to stay around
- Ideas for a generic Restful service?
- Telemetry data - should this be a device service? What about a telegraf device service that supports all the telegraf plugins?
- WebServer Exposure
 - Want to give developer ability to add their own endpoint.
 - Consequence: Developer would spin up their own - requiring a second webserver be setup
 - Kong Implications?
 - `sdk.AddEndpoint('/myendpoint', myHandler, 'GET');`
- Progress Updates
 - Combed Configuration to ensure proper usage
 - Error return on HTTP Trigger
- ZMQ - Separate bus - raw connection to bus - without wrapper
 - Need to include this for Fuji - Requirement from Industrial Team from Intel
- Any update from Mainflux about XMPP?
 - Lost in space - OK not to bring over

EdgeX - Application Working Group

8/26/2019

Topics for today:

Mainly Status Updates for today:

- Cloud Exports
 - Azure - PR Merged! W00t! <https://github.com/edgexfoundry-holding/app-functions-azure>
 - AWS - Alex C.
 - PR by Thursday
- Store and Forward
 - Kickoff has begun, db layer has started - Thanks Brandon!
 - Should mark as handled is stored?
 - Not for crawl
 - Need to extend mongo-init for the Store.
 - Good with batch not for Fuji.
- Bug Fixes:
 - Fixed a bunch of unused configuration values in the SDK (i.e. Timeout)

Anbody know anything about XMPP? It exists in the export services, is this something we want to copy over to the SDK? Do we have a pulse on any customers using it? Might be an opportunity to leave behind, thoughts?

- Jim is somewhat familiar.
- Out of scope for now?
- Jim will ping Mainflux

“Push To Core” Request from #applications - Marcelo

Brad from Commerce Working Group, Internal Intel teams.

Could be implemented with something like:

```
PushToCore(deviceName string, valueDescriptorName string, value interface{})
```

I think we have enough folks asking for this?

EdgeX - Application Working Group

- Is this really needed for Fuji?
- Brad come to next week's meeting to discuss priority?

Opens?

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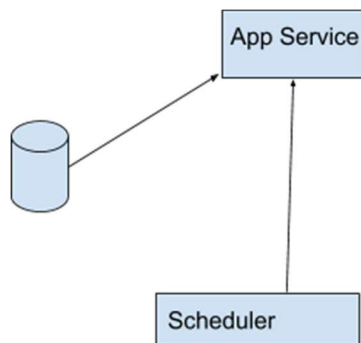
8/20/2019

Other Updates:

- TargetType is implemented to support custom types to be used between App Services (no longer requiring an EdgeX Event)
- Environment Variables -

Summary of Store and Forward:

Data will be stored upon error on export functions (HTTPPost, MQTTSend) enabled by a true/false flag "persistOnError". The following breaks out areas that would be affected that are exposed to the developer at a surface level. Internal workings are not detailed here (except the db)



Questions/Opens:

Is batch needed? - Not for now, not related to store/forward - lets leave this on the table as stretch goal.

Do we need a flush? - Push it off?

- QoS for Mqtt how does it related to MaxRetryCount - Need to determine

How do we handle orphaned data? -- Do we care? - Do we have a TTL?

Crawl - ignored

Walk - Storage Service to manage data

- Opens: How is scheduler updated with URLs? Synced with consul?
- MarkAsPushed - handling for multiple app services than ingest the same event (how to know *all* successfully pushed) - same problem exists with export services
- Storage Service - discuss with TSC for Geneva?????

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Assumptions:

- Data will be discarded if pipeline changes
- Data is removed after success
- Remove/ColumnName Changes to persistent store requires wipe?

New Initialization Parameters:

- RetryInterval (in minutes).
 - 0 = Do Not Retry and will remove any schedules from scheduler
 - > 0 = Register this app service with scheduler
- MaxRetryCount
 - 0 = Keep Trying Forever (only deletes upon success)
 - Threshold for when to remove the data from the db after so many retries
 - Provide traceability for when data is removed (i.e. Logging)

New Endpoint Added:

- /api/v1/RetryPipeline
 - Called by scheduler based on interval.

New Context Function:

- PersistPayload(payload []byte) - the function that will call the Create/Update dbPkg to persist the data

SDK Functions to be Affected:

- HTTPPost(persistOnError=true/false)
- MQTTSend(persistOnError=true/false)

Database Implementation (Help Wanted):

- Leverage official mongo driver: <https://github.com/mongodb/mongo-go-driver> (License: Apache 2.0)

DB: AppServices

CollectionName: RetryDataV1?

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Columns:

- ID (uniqueId,guid) - unique identifier for this record
- AppServiceKey (string) - identifies the app service to which this data belongs
- Payload (byte[]) - the data to be exported (
- RetryCount (int) - how many times this has tried to be exported
- PipelinePosition (int) - where to pickup in the pipeline
- Version (string) - hash of the functions to know if the pipeline has changed
- CorrelationId - from EdgeX to track this individual record as it moves
- EventId/Checksum - in order to identify edgeX event from core and mark as pushed

CollectionName: SchemaVersion

Columns:

SDKVersion: schema

DB Pkg - ideally abstracted for implementation for Redis and Mongo

Create() - Store()

Retrieve() - RetrieveFromStore()

Update() - UpdateRetryCount()

Delete() - RemoveFromStore()

Example:

Filter


Compress - return value of this would be persisted

HttpPost

EdgeX - Application Working Group

8/13/2019

Attendees:

 Mike Johanson (Me, participant ID: 16)

 Brad Corrion (Intel)


 Rodney Hess

 Brandon Forster


 Bryan Rodriguez

 Dave Rensberger

 eno u

 IOTech

 Lenny Goodell (Intel)

 Malini Bhandaru

 Michael Estrin

 Steve Osselton

Topics for Today:

EdgeX - Application Working Group

- Store & Forward Goals:
 - When connectivity is lost
 - Support Batch Mode and sending Data on a schedule

Proposal

- Leverage existing reference implementations MongoDB and Redis
 - Probably best way to go to create its own connection and its own db collection
 - Can use same mongo instance or other - ensure isolated
- Add new parameter/option to Export functions (HTTPExport, MQTTSend) to persist on error
 - Persist on error would store event data to db on failed request
 - Should we consider a timeout for data persisted for it to be aged out

- Add new function - Batch(count int) - to hold messages until count is reached before outputting to next function
- Provide /endpoint for scheduler to call in order to retry previously failed requests
- Need to be clear with examples of how and when voluminous data versus occasional data can be persisted or dropped
- When processing is picked up again, its done at the export point, not the beginning of the pipeline
- Need identity of pipeline of that originated the data as well as where in the pipeline it was.
 - App Service Configurable - pipeline changes, what do you do with the data if the stage in the pipeline no longer exists
- Future consideration - Fork Pipeline based on conditions
- Example pipeline 1 (Valuable occasional data):
 - FilterByDeviceName()
 - TransformToJSON
 - Batch(50)
 - CompressWithGZIP
 - HTTPPost(persist=**true**)
 - MarkAsPushed - not called until connectivity is restored
- Example pipeline 2 (voluminous telemetry data drop it if we fail to send it out):
 - FilterByDeviceName()
 - TransformToJSON
 - HTTPPost(persist=**false**)

- Feature Requests - Brad Corrion

EdgeX - Application Working Group

EdgeX - Application Working Group

8/6/2019

Topics for today:

- Update from Cloud Export Meeting this morning
 - Mike to share module for extending App Functions SDK
 - Alex will start working on AWS Export
 - Cloud will port existing implementation so that it can extend the app functions SDK
 - Brad will share feature enhancements in the Application Working group meeting
 - CloudEvent should be added as an export formatter
 - Put it in holding along with the other cloud/north bound exports
 - Defer decisions to move to main edgexrepo until popular
- Feature Requests from Commerce Working Group
 -
- App Service Configurable - Ready for TSC Approval?
 - Yes, go for TSC Approval Wed Aug 7th
 - Export to rules engine
 - BlackBox testing
 - Ci/CD pipeline needs to be in place
- Ready to close <https://github.com/edgexfoundry/app-functions-sdk-go/issues/110?>
 - Vault integration is captured as separate issue
 - Still waiting for module to leverage vault
- MarkAsPushed - break it out from HTTP and MQTT
 - Currently baked in,
 - Will move this into its own transform to be called manually
 - **TOPIC FOR FUTURE:** What is the thing that determines that the item is removed from the gateway. How and when?
 - Maybe its just a delete? Avoid mutability
- BlackBox Testing
 - ZMQ through HTTP Export out of scope

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7/30/2019

Topics for today:

Black Box Tests - Walkthrough for App Service Configurable

HTTPS Export -- We are at parity now(Good for Fuji) - Stretch goal to extend scope to the following:

- mTLS?
- OAuth?
- Token Based Auth for header?

Azure Export

How many services do we want to provide an example for?

- Support existing Azure IoT Hub (via MQTT)
- Create issues for other Azure services that could be helpful with “help-wanted” tag
 - Blob Storage

Refactoring of Functions

Port Allocation:

- Default is 48095 today
- Option to support ephemeral ports (OS Picks).

Any Bugs needing to be discussed?

<https://github.com/edgexfoundry/go-mod-messaging/issues/31>

Any Other Updates?

Still in Beta today - Will match major release of EdgeX once released.

EdgeX - Application Working Group

EdgeX - Application Working Group

Edinburg

7/16/2019

Attendees:

- [Jim White](#)(Dell)
- [Trevor Conn](#) (Dell)
- [Anthony Bonafide](#) (Dell)
- Doug Migliori (ControlBEAM)
- [Joe Pearson](#) (OBM)
- Michael Estrin (Dell)

Topics for today:

Export Distro ([Issue #512](#)) / go-mod-messaging ([Issue #28](#))

- Only able to recreate with core-data running in docker
- Found new issue where core-data stopped publishing events
 - No errors or crash.
 - Stopping DS(s) and restarting mongo resolved until both DSs running.
 - Dropping Events & Readings collections from Mongo resolves issue
- Lenny will merge fix and update edgex-go and retest
- Lenny will create issue for new issue where Core Data stopped publishing.
 - Lenny will take his test case to the QA/Test WG.

App-service-configurable Docker

- Profile specified from compose file 'cmd:' or docker run.
- Default run without profile will cause error.
- Will start with the following profiles:
 - rules-engine
 - mqtt-export
 - http-export
 - docker
 - Default sample (filter & xml transform)
- Current filter function need to pass-thru if filter values empty, currently none passed thru.

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- This allows more flexibility with configurable pipeline

Blackbox Testing

- First pass on existing REST API using current tooling and scripts to set config
 - Will also use REST Trigger to drive testing function pipeline
 - Post event
 - Pipeline runs
 - Result send back as HTTP response
- More Robust test once we have Robot (dependent on QA/Test WG)
 - Above race condition and previous expose that we don't have sufficient full scale integration and stress testing.
 -

Any Bugs needing to be discussed?

Any Other Updates?

- Rules engine update
 - Jim working on it to handle MessageEnvelope
 - Looking for recommendation for CBOR package for Java
- Environment variable override has been merged.

EdgeX - Application Working Group

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7/9/2019

Topics for today:

- Possible Race Issue -- we good?
 - MacOS impacted for go-mod-messaging - pending PR from trevor
 - Cloud/IO tech -- error message - need to dig a little deeper here - topic is getting written twice - need to root cause for possible dot release of Edinburgh - 5 min on Toms system to reproduce
 - Lenny to reach out to schedule a debug session to diagnose.
- Pull Request Feedback <https://github.com/edgexfoundry/app-functions-sdk-go/pull/123>
 - Profile
 - Consul Registry Stem
- Updates on Rules Engine? - Jim
- Summary Slide of App Functions SDK for User Facing Consumption (per Keith from TSC)

Any Bugs needing to be discussed?

<https://github.com/edgexfoundry/app-functions-sdk-go/issues/124>

Any Other Updates?

EdgeX - Application Working Group

6/28/2019

Topics for today:

- Dynamic Func Pipeline Updates
 - Profile for different versions
- Rules Engine Issue - Handling envelope from App Function SDK/Core Data
 - Jim to update Rules Engine - Minor Version Update to Rule Engine
 - Will handle both from Core Data (wrapped w/ Envelope) directly and from Export Services (unwrapped)
- CI/CD Pipeline updated using what Lisa demoed in DevOps working group
 -
- Repo created for “app-service-configurable” service in EdgeX-Holding

Any Bugs needing to be discussed?

Any Other Updates?

6/18/2019

Topics for today:

- Demo of Dynamic Pipeline
- Version is not 1.0 so which one do we like? 0.1? 0.5?
 - Version 0.0.1 - Work with Devops to get tagging working - reach out to Jacob/Lisa about version file - replace with pipeline job
- Need to request a repo in holding for the “app-service-configurable” service
 - Send an email to LF helpdesk - can ask James for exact process to do it.
- <https://github.com/edgexfoundry/app-functions-sdk-go/projects/2>

EdgeX - Application Working Group

Any Bugs needing to be discussed?

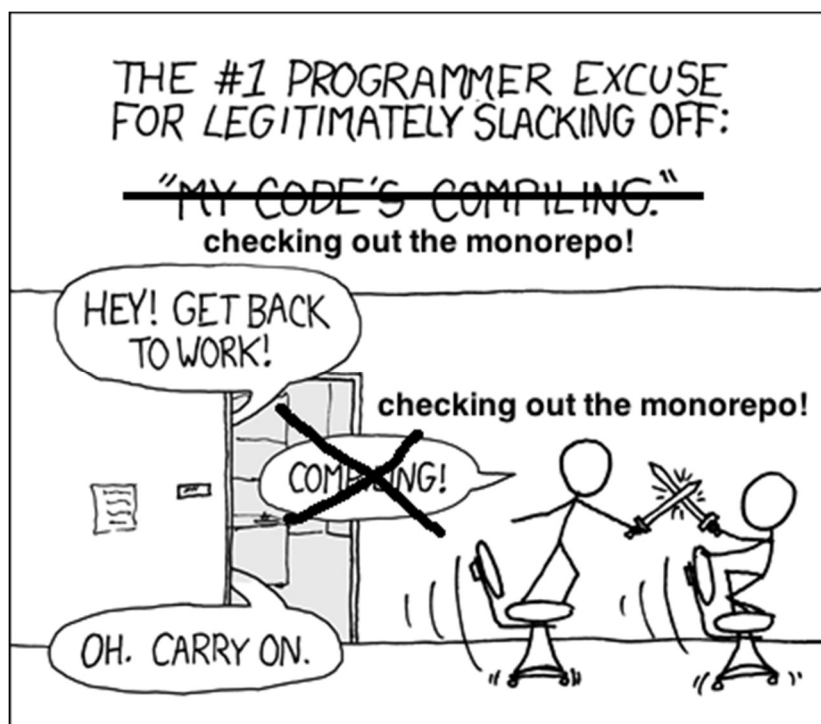
Any Other Updates?

EdgeX - Application Working Group

6/11/2019

Topics for today:

- **Ideas for repos for EdgeX hosted app services**
 - Rules Engine/Configurable App Service
 - **Separate Repos: +Mike +Jim**
 - App-services-default
 - Pro: create own release strategy
 - **Single/mono Repo:**
 - app-services-examples
 - /rules-engine
 - /configurable
 - /azure
 - /aws
 - /alibabacloud



EdgeX - Application Working Group

- Our thoughts on Configurable Pipeline Service:

```
[Pipeline]
  [Pipeline.DeviceNameFilter]
    deviceNames = [ "red", "yellow", "green" ]
  [Pipeline.ValueDescriptorFilter]
    valueDescriptors = [ "red", "yellow", "green" ]
  [Pipeline.JSONTransform]
  [Pipeline.HTTPPost]
    url = "http://"
    mimeType = "" #OPTIONAL - default application/json
```

1. Pipeline should watch for changes from registry if configuration changes (aka Dynamic Pipeline)
2. Documentation should be created
3. All Functions should match exactly the name and parameters as they are in the SDK with what is in the Configuration

Any Bugs needing to be discussed?

Any Other Updates?

Versioning to be discussed

EdgeX - Application Working Group

6/4/2019

Topics for today:

Version.go file vs Version - do we need this?

Demo of E2E CBOR - Lenny

Fuji Review !!!!

4. Prebuild App Service that looks to configuration for defining pipeline - eliminating need to for code development - **Intel - Lenny/Mike**
 - a. Prepares data for Rules Engine - discuss function in sdk vs service - pre-baked service readily available to send events to rules engine. - **Jim to consult**
 - i. Don't force rules engine to handle CBOR, let app functions sdk handle it and sending it as json
5. Black Box Tests - **Intel - Walt - w/ James DevOps and QA group**
 - b. Document Proposal to share w/ other working groups
 - c. Working w/ QA to get Test Runner up and running
 - d. Prebuilt Service Perhaps to use for testing
 - e. Items to test (a couple sample services):
 - ii. Endpoints - SMA Config, Metrics
 - iii. HTTP Trigger
 - iv. MessageBus integration
6. Vault Integration - let Molini know that we are looking to integrate
7. Export Services Parity - **Intel**
 - f. Compression
 - g. Encryption
 - h. HTTPS/MQTTS
 - i. Cloud References/Examples
8. Store and Forward Ability

Other Items For Consideration (Stretch Goals):

- Ability to process other types of data from bus
- [Add API support for notifications and Commanding](#)
- SMA Integration, push control data - alternate use of app services.
- Other Abstractions/Implementation for go-mod-messaging? MQTT

Any Bugs needing to be addressed?

<https://github.com/edgexfoundry/app-functions-sdk-go/issues/83> - Fixed, samples updated.

EdgeX - Application Working Group

Any Other Updates?

None

EdgeX - Application Working Group

5/28/2019

CODE FREEZE DAY!!!



Features from last week:

9. MarkAsPushed
10. CBOR Implementation

On Deck:

11. Documentation Updates

Any Bugs/Issues needing to be addressed:

<https://github.com/edgexfoundry/app-functions-sdk-go/issues/83>

EdgeX - Application Working Group

Any Other Updates?