Welcome to the HiveMQ Partner tech training

Who is this workshop for ?

This session is aimed at our partners' technical teams. We take a closer look at the platform, its different bricks and how they work.

We will cover topics like enterprise broker deployment and security, extension configuration, DataHub policies and transformations, HiveMQ Edge and it's protocol adapters.

Prerequisite :
- Have a good understanding of HiveMQ Platform.
- Have basic knowledge on kubernetes and linux.

What is the goal of the training ?

The aim of this workshop is to train our partners' teams in the installation and advanced configuration of the HiveMQ platform.
After attending the workshop, you will be able to implement a production site with best practices on security and enterprise extensions configured.

We wish you a pleasant training

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Preparations :

Have Docker, Docker Compose, Git, PgAdmin (optional) and the HiveMQ CLI installed:

https://docs.docker.com/engine/install/

https://docs.docker.com/compose/install/

HiveMQ CLI

Useful additional software :

PgAdmin

Git CLI or GitDesktop

MQTT explorer

To get the resources please run the following command in your terminal:

```
Unset
git clone https://github.com/hivemq/Orange_Workshop.git
```

In the Dockerfile you can selectively en/disable extensions:

```
# Default allow all extension, set this to false to disable it
ENV HIVEMQ_ALLOW_ALL_CLIENTS=true
# Enable ESE, set this to false to disable it
ENV HIVEMQ_ENABLE_ESE=false
# Enable Kafka extension, set this to false to disable it
ENV HIVEMQ_ENABLE_KAFKA=false
# Enable REST API default value
ENV HIVEMQ_REST_API_ENABLED=true
```

Please start with the above settings. Later in these sessions you can enable selective extensions one by one.

Use it / Start :

to start please `cd` into the `Orange_Workshop` directory and run the following commands:

```
Unset
export HIVEMQ_VERSION=4.38.0
export REDPANDA_VERSION=24.2.7
export REDPANDA_CONSOLE_VERSION=2.7.2
./build.sh # #### run once
docker-compose up -d  --build --force-recreate
```

and test it :

Send some MQTT data towards the Kafka propagation topic

```
Unset
mqtt pub -u superuser -pw supersecurepassword -t to-kafka/test -m kamiel
```

See in Redpanda console the MQTT sent message appear in the correct `kafka-topic` topic:

http://localhost:8090/topics/

Accessing HiveMQ and review directory structure

Connecting to the GUI

The HiveMQ GUI can be accessed for a local or dockerised broker on http://127.0.0.1 and by default on port 8080. The default credentials are **hivemq** and as password **admin** .

Please test.

Sending and receiving a MQTT message
A broker is not able to send MQTT packages so we need to have some MQTT client software (or devices) to do so. A number of options are available to your liking.

HiveMQ CLI both available for Mac and WIndows.
Downloadable at https://www.hivemq.com/blog/mqtt-cli/
We recommend this CLI because it provides a compact command line interface (CLI) for MQTT 3.1.1 and MQTT 5 clients that supports interactive command modes. It also supports access to the HiveMQ API in an easy to access way.

Good GU, Mac and WIndows based alternatives are:
MQTT.fx (payed): https://www.softblade.de/
MQTT explorer (free) : https://mqtt-explorer.com/
Except for the API interaction these GUI based tools can be used during this course.

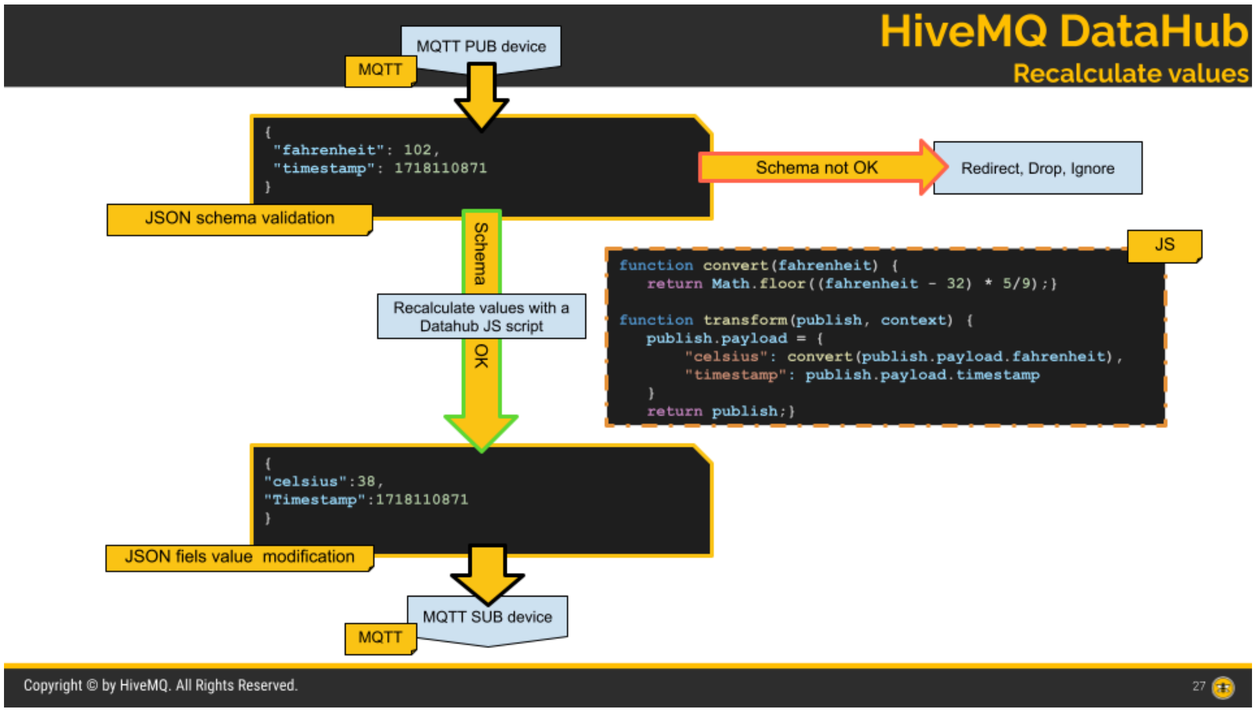
Please test your basic browser connectivity over mqtt by subscreibing to, and subsequent publishing to a known topic. This can be your local broker but also try your neighbors IP address.

Example:

`mqtt sub -h 127.0.0.1 -t “#”` (this command will ‘wait’ for input, try the -J option as well)
And is another window:
```
mqtt pub -h 127.0.0.1 -t “sensor/temp” -m “20.4 degrees”
```

Datahub

The HiveMQ Data Hub provides mechanisms to define how MQTT data and MQTT client behavior are handled in the HiveMQ broker. Data Validation in the HiveMQ Data Hub allows you to implement declarative policies that check whether your data sources are sending data in the data format you expect and provides the ability to even change it on the fly.



```
{
 "fahrenheit": 102,
 "timestamp": 1718110871
}
```

```
function convert(fahrenheit) {
   return Math.floor((fahrenheit - 32) * 5/9);}

function transform(publish, context) {
   publish.payload = {
        "celsius": convert(publish.payload.fahrenheit),
        "timestamp": publish.payload.timestamp
   }
   return publish;}
```

```
{
"celsius":38,
"Timestamp":1718110871
}
```

Open the GUI for the local broker (http://127.0.0.01 / hivemq/ admin) and select on the left menu 'Datahub/Schemas'. In the selected screen enable the 5 hour trail for datahub.

Now upload the two selected JSON schema definitions (schema-for.., schema-from..)

```
mqtt hivemq schema create --id schema-from-device --type json --file schema-from-device.json
mqtt hivemq schema create --id schema-for-fan --type json --file schema-for-fan.json
```

or copy paste their content in the schema definition fields.

Now do the same for the javascript:

```
mqtt hivemq script create --id=fahrenheit-to-celsius --file=script.js --type=transformation
```

or copy paste their content in the schema definition fields.

The policy can be manually created with the data policy entry on the left menu or can be uploaded over the API:

```
mqtt hivemq data-policy create --file policy.json
```

Or define it interactively in the GUI:
Matching Topic Filter : factory/#

Schema Validators
All Of - Schema with id *schema-from-device* and version *latest*

On Success Pipeline:

- operation- **Deserialize** Schema with id *schema-from-device*
- Operation- **Script** - fahrenheit-to-celsius - latest : Link to Scrip
- Operation- **Serdes** - Serialize id s*chema-for-fan*

On Failure Pipeline:
operation- Drop Message with Reason String: Your client ${clientId} sent invalid data according to the schema: ${validationResult}.

Now test :

```
mqtt pub -t factory/test  -m "{\"fahrenheit\": 102,\"timestamp\": 1718110871}"
```

Output of `mqtt sub -t “#”` should be like:

```
{"celsius":38,"timestamp":1718110871}
```