

**HAMPEL
SOFTWARE
ENGINEERING**

Joerg Hampel

- ❑ 23 years of creating software for a living
- ❑ LabVIEW project work since 2007
- ❑ Founded HSE around 2015/2016
- ❑ First NI Center Of Excellence in Germany

Talk to me about

- ❑ Working in small teams
- ❑ Working in fixed-price scenarios
- ❑ Process & workflow standardisation/automation
- ❑ Inner Source and Open Source with and in LabVIEW



[linkedin.com/in/joerghampel/](https://www.linkedin.com/in/joerghampel/)



CREATE BETTER SOFTWARE!

We work with our customers to increase the quality of their software through improved development processes



DQMH GENERIC NETWORKING MODULES



AVAILABLE TODAY!
FREE & OPEN-SOURCE!



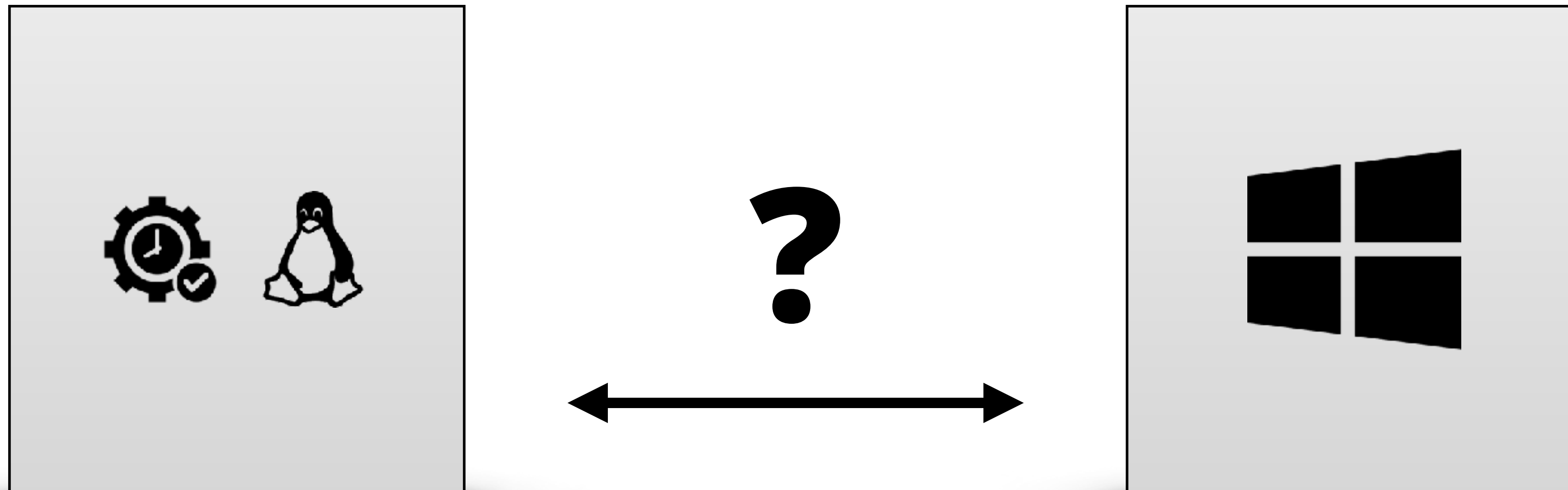
← Documentation

Source Code →



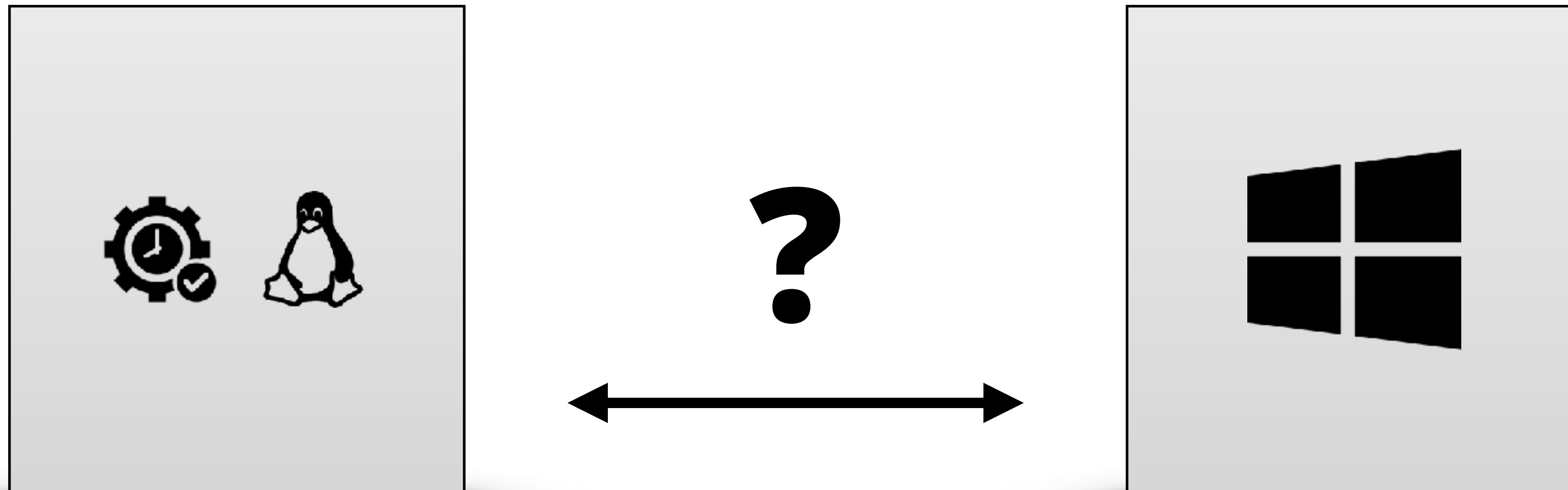
The Original Problem Statement

"How do I talk to my RT Targets from my Windows PC, and vice versa?"

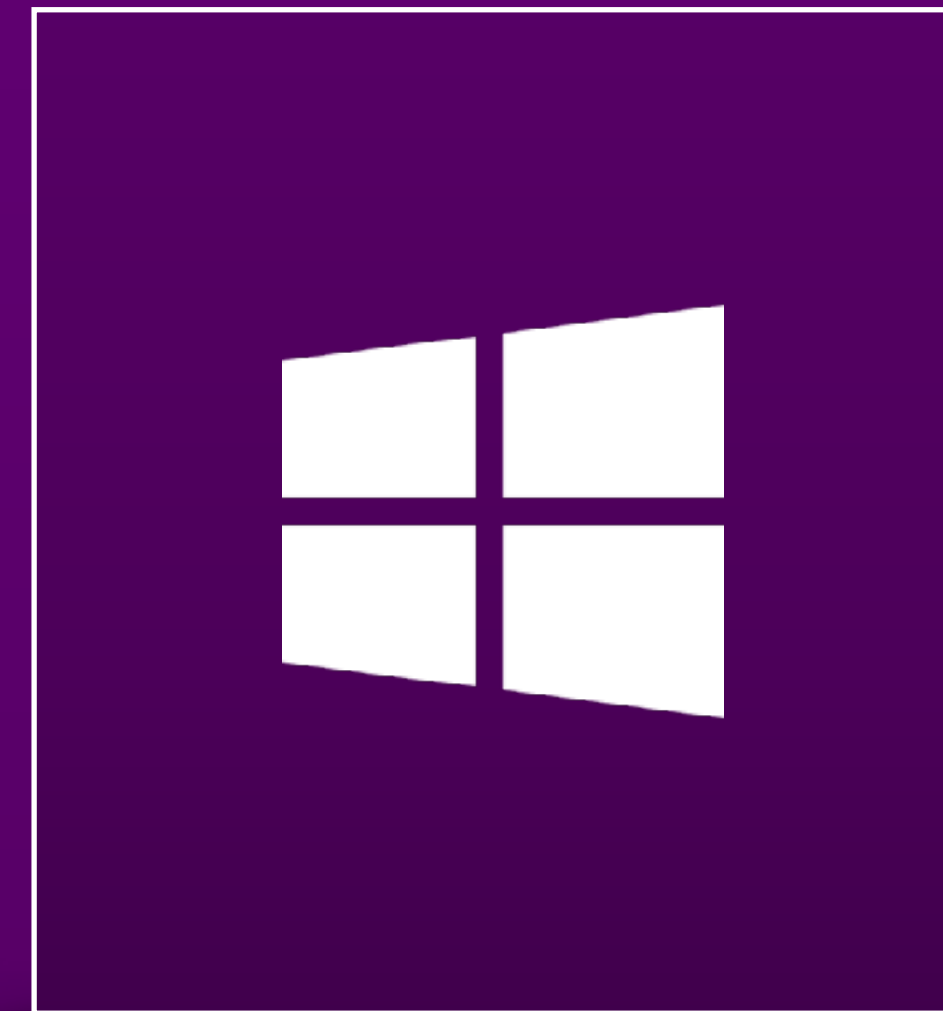
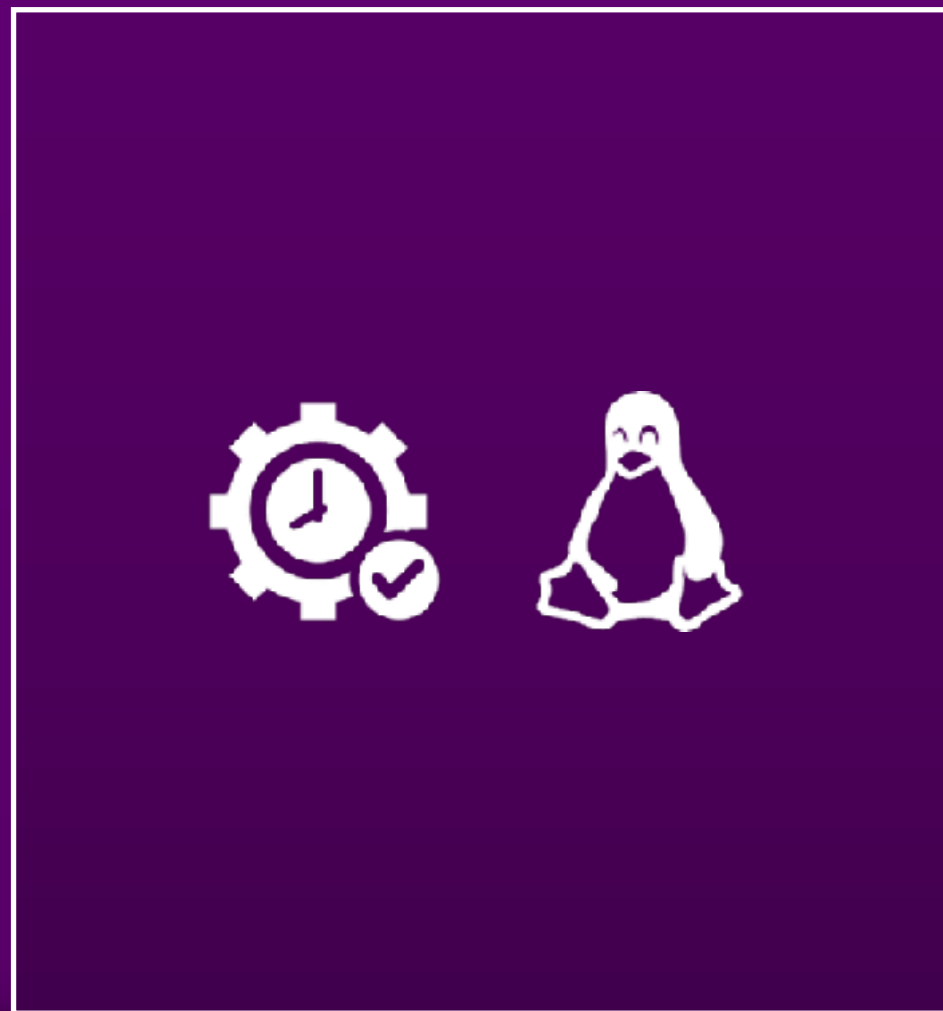


Agenda for this presentation

- ~~Introduction and Code Review~~
- ~~Feedback on how this could be more useful~~
- Lure you into giving these modules a try and falling for DQMH in the process



DQMH GENERIC NETWORKING MODULES



DQMH MODULES

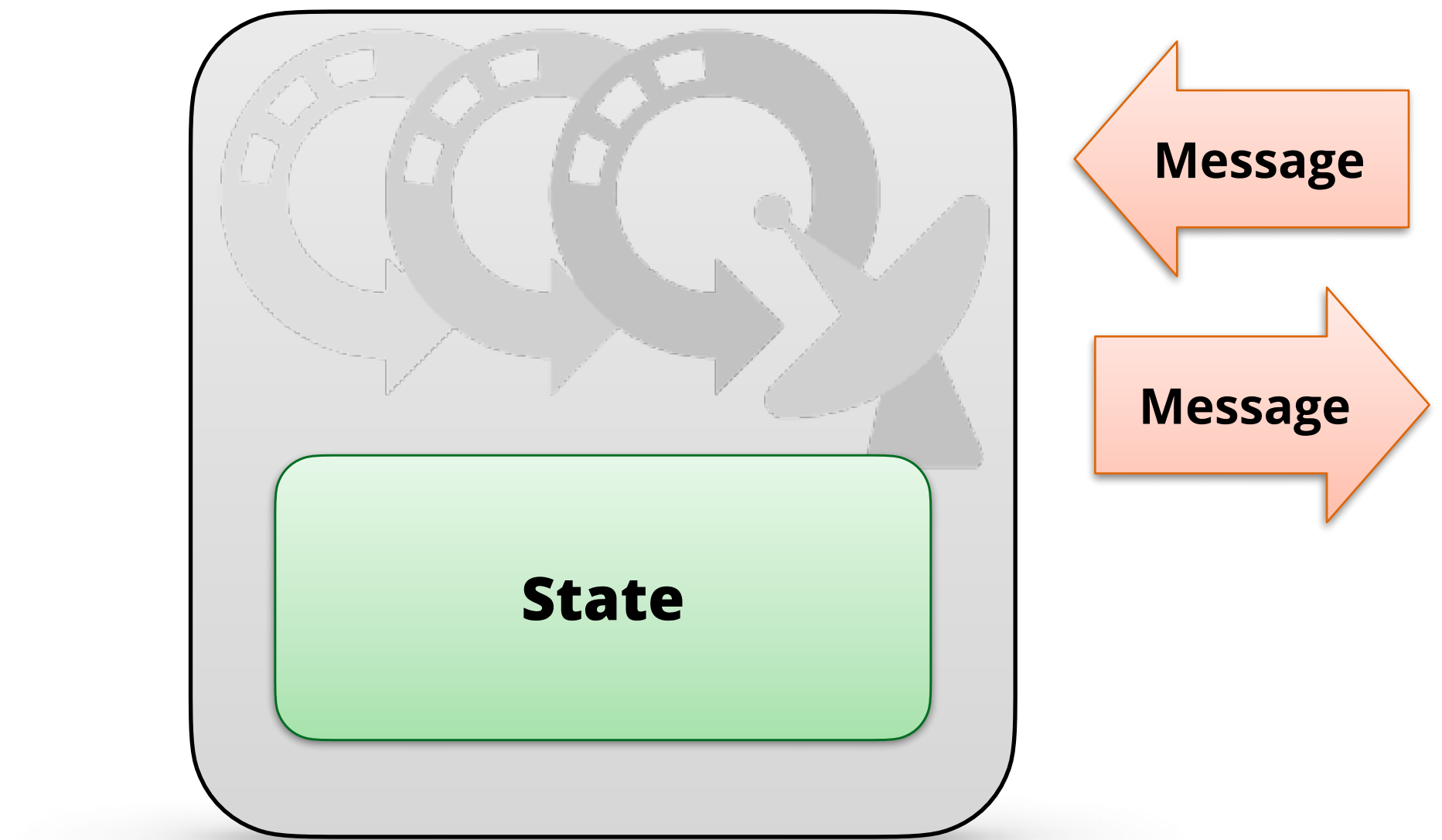
NETWORKING

GENERIC

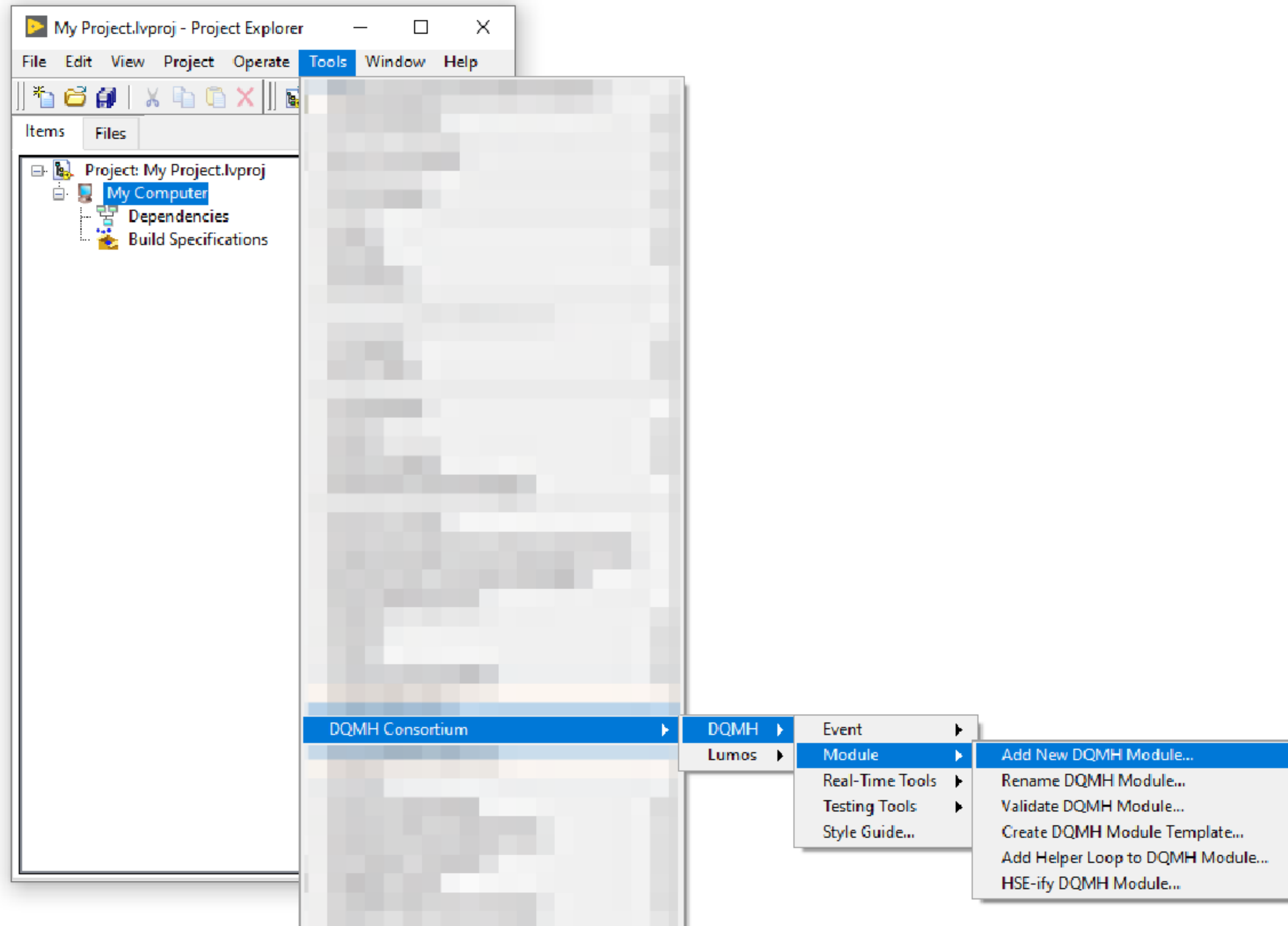
What is a DQMH Module?

- ❑ A LabVIEW Library...
 - ❑ containing VIs
 - ❑ in a certain structure
- ❑ A Main.vi...
 - ❑ that runs asynchronously
- ❑ An Actor (*)
 - ❑ Has state
 - ❑ Can send and receive messages

(*) https://en.wikipedia.org/wiki/Actor_model



How does DQMH work?



How does DQMH work?

Add New DQMH Module [Close]

Specify a name, save path, and source template for the new module. You can also optionally configure an icon overlay for the new library. Click **OK** to create the new DQMH module and have it added to the active project.

Name
Module 1

Save Path
C:_work\hampel-soft\courses\hse-dqmh-training\01 Demo\01a First Steps\Libraries\Module 1 [Browse]

Description (Optional)
[Text Area]

Virtual Folder for Tester (Optional): Testers
Virtual Folder for Library (Optional): Modules
[Reset Path and Folder Fields to Default]

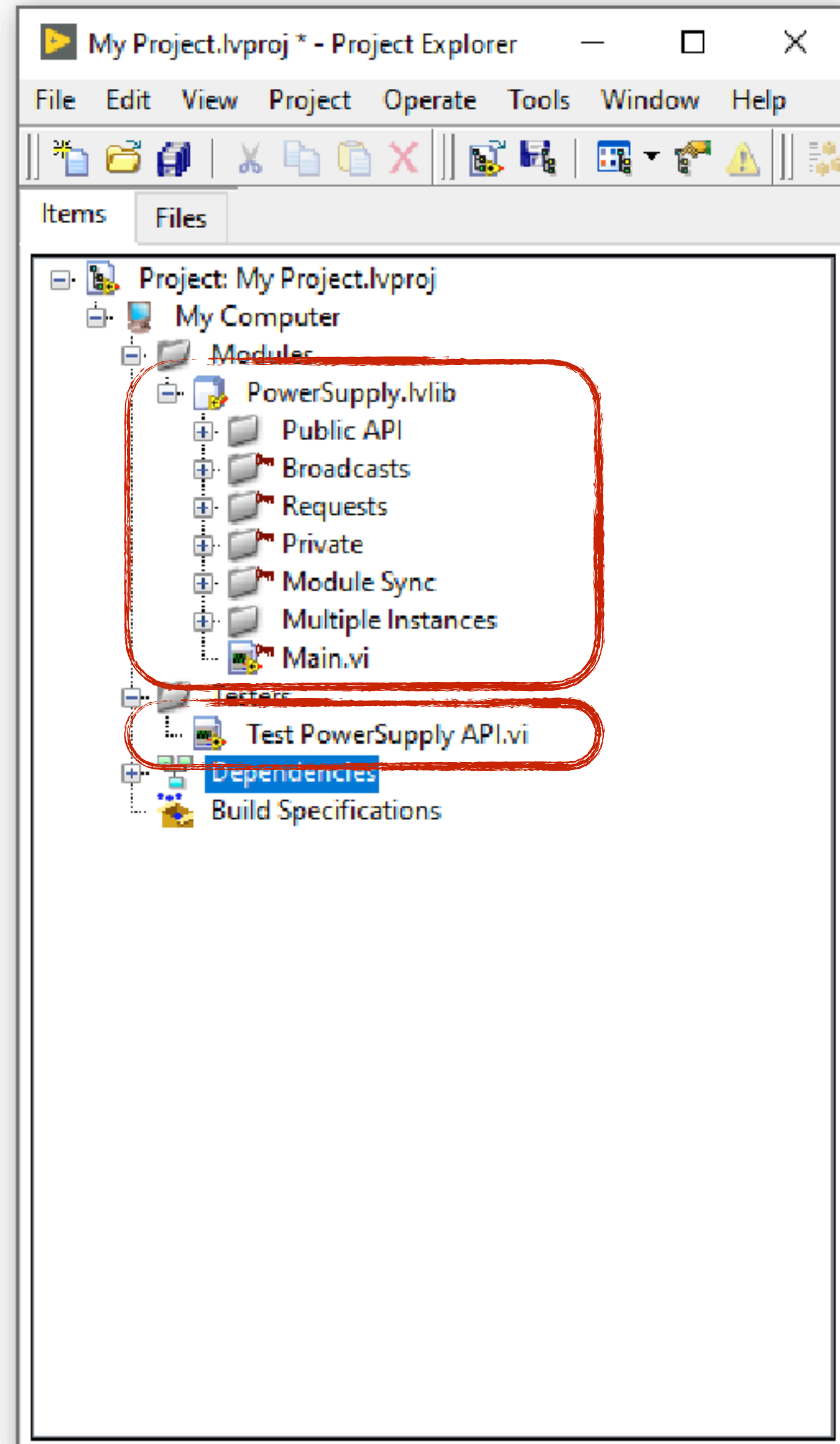
Template: Cloneable
A Cloneable module can have multiple reentrant instances running simultaneously.

Modify Icon (Optional)
[Icon] + [CLONE] = [Icon with CLONE]
[Edit Overlay]

Include "Do Something" events in new module?

[OK] [Cancel] [Help]

How does DQMH work?



DISCLAIMER

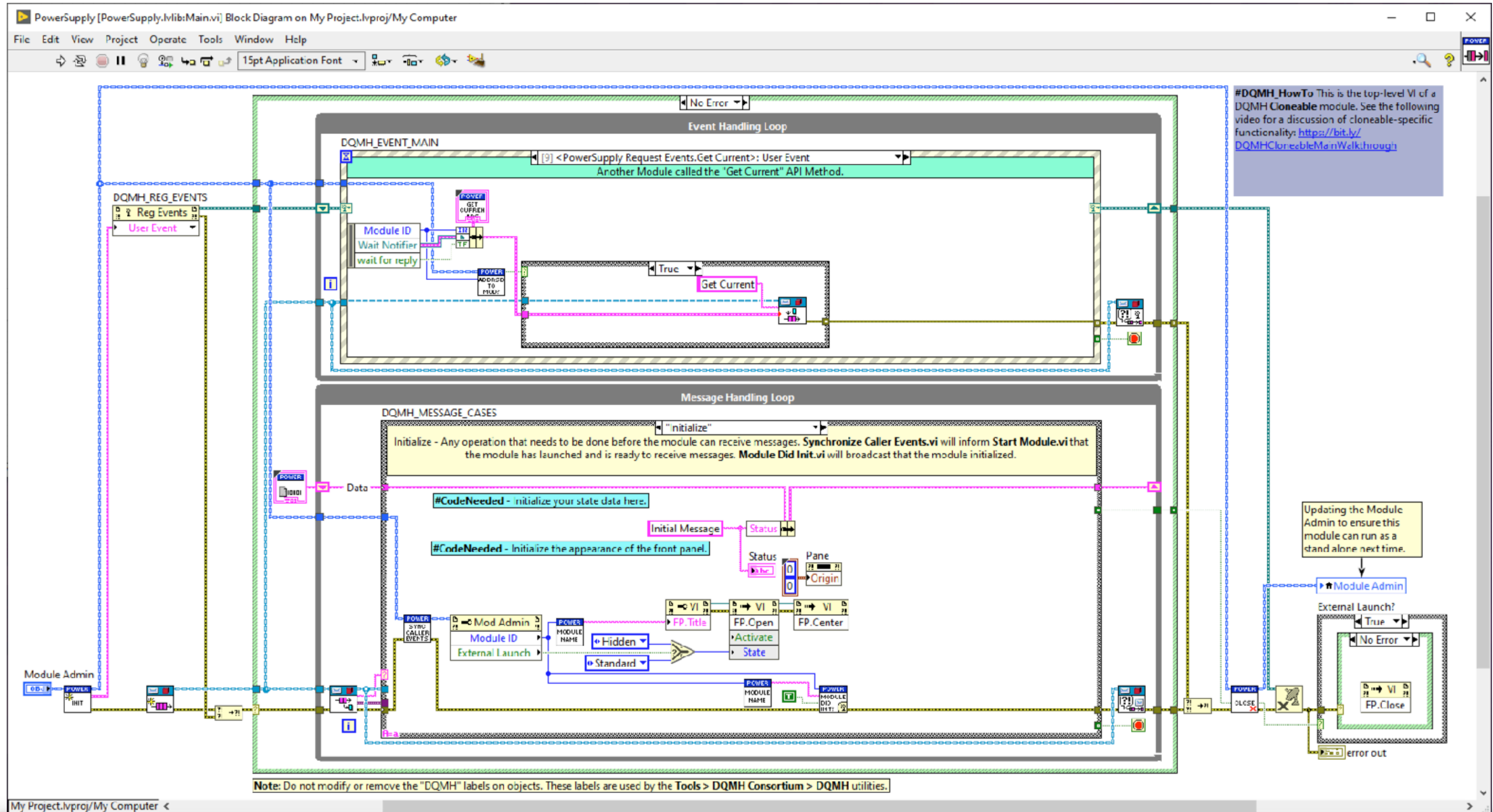
Screenshots shown on the following pages might not implement, adhere to or live up to the latest better practices regarding readability.

Learn more at <https://bit.ly/labviewreadability>

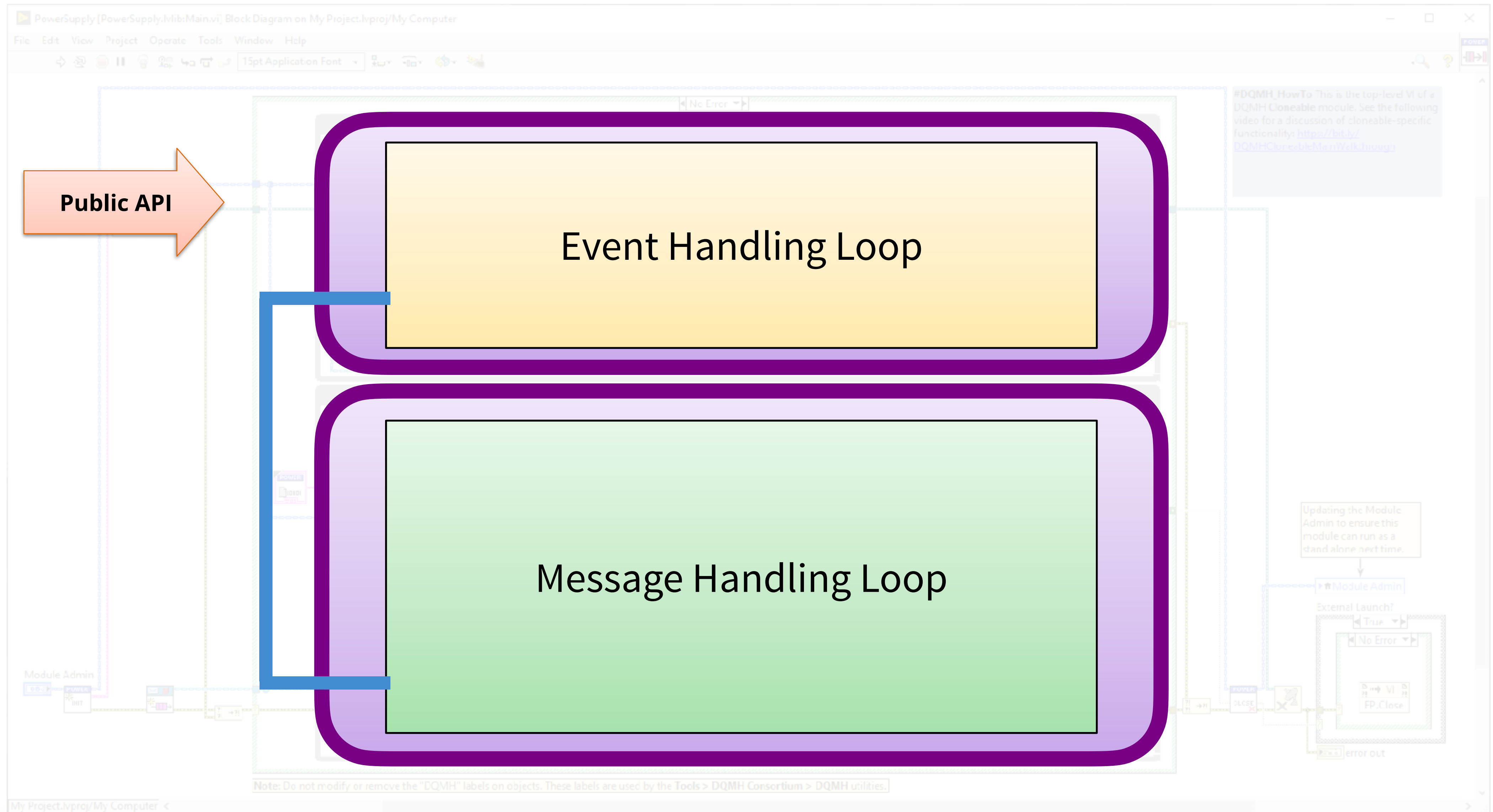


Darren Tiger, NI

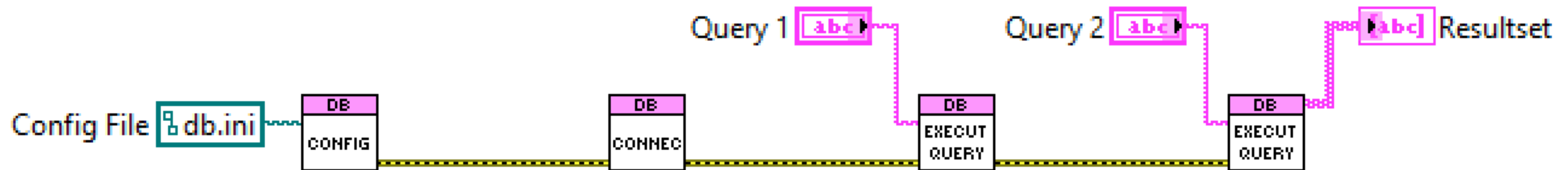
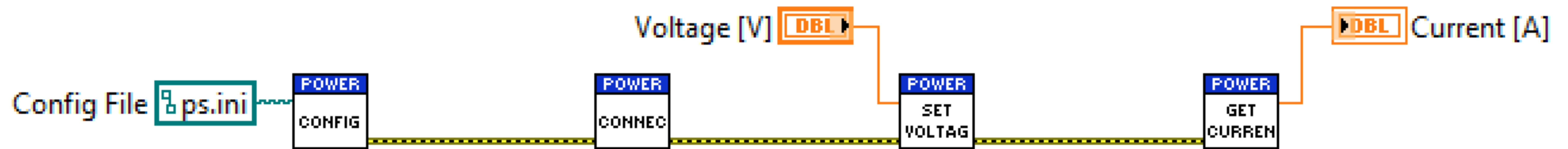
What does a DQMH Module look like?



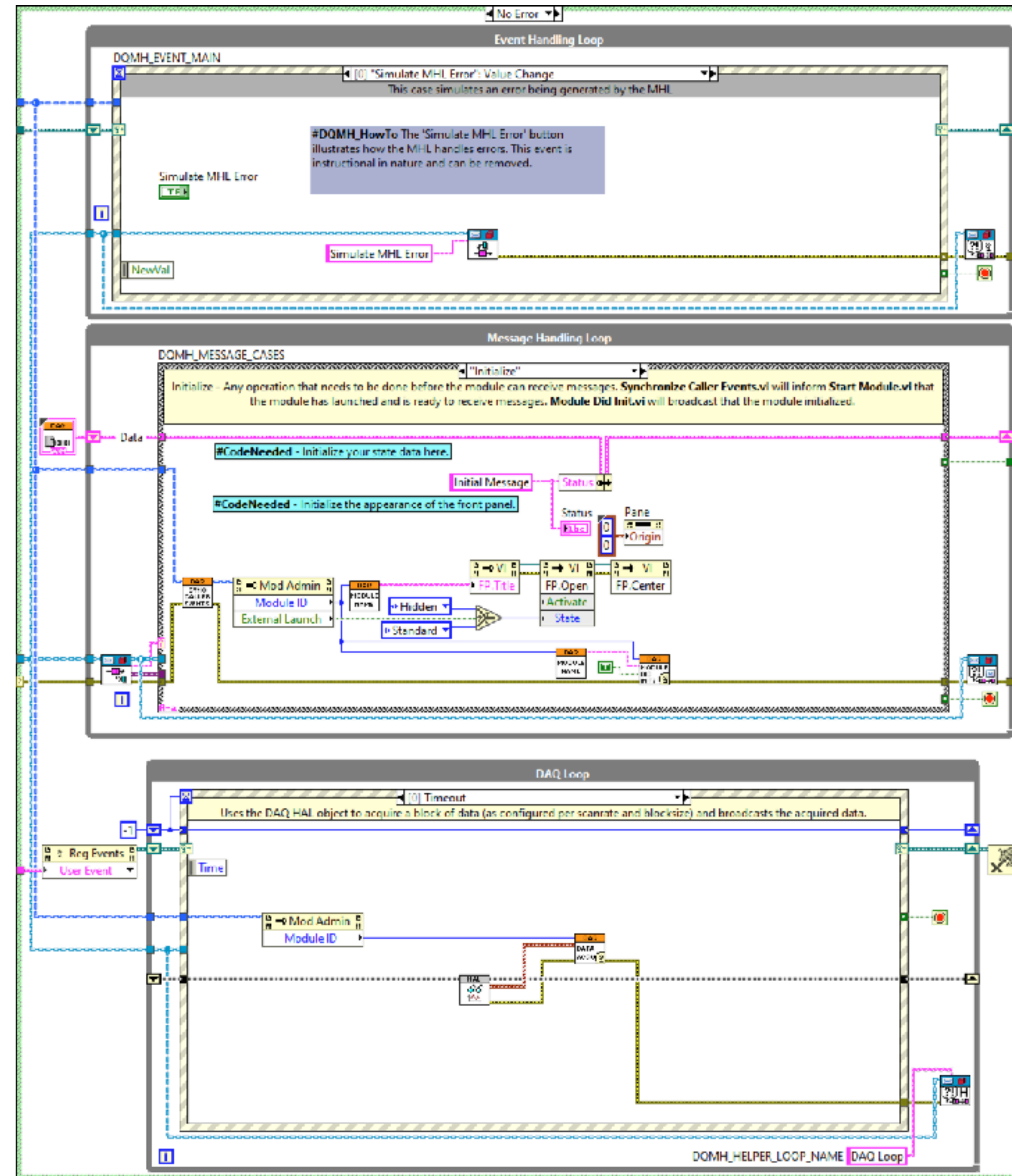
What does a DQMH Module look like?



Why have a DQMH Module? Modularity!



Why else have a DQMH Module? Parallel Processes!



DQMH MODULES

NETWORKING

GENERIC

MENTI.COM

3425 6602



Networking Buzz Words

sftp
rest
mqtt ni network streams
zeromq ssh tcp
https websockets
ftp grpc udp

Network Architectures

- ❑ Client-Server vs. Peer-to-Peer
- ❑ Publish/Subscribe vs. Request/Reply
- ❑ Connection-Oriented vs. Connection-Less
- ❑ Unidirectional vs. Bidirectional
- ❑ Message-based vs. Stream-based
- ❑ 1-to-1 vs. 1-to-many vs. many-to-many
- ❑ ...

DQMH MODULES

NETWORKING

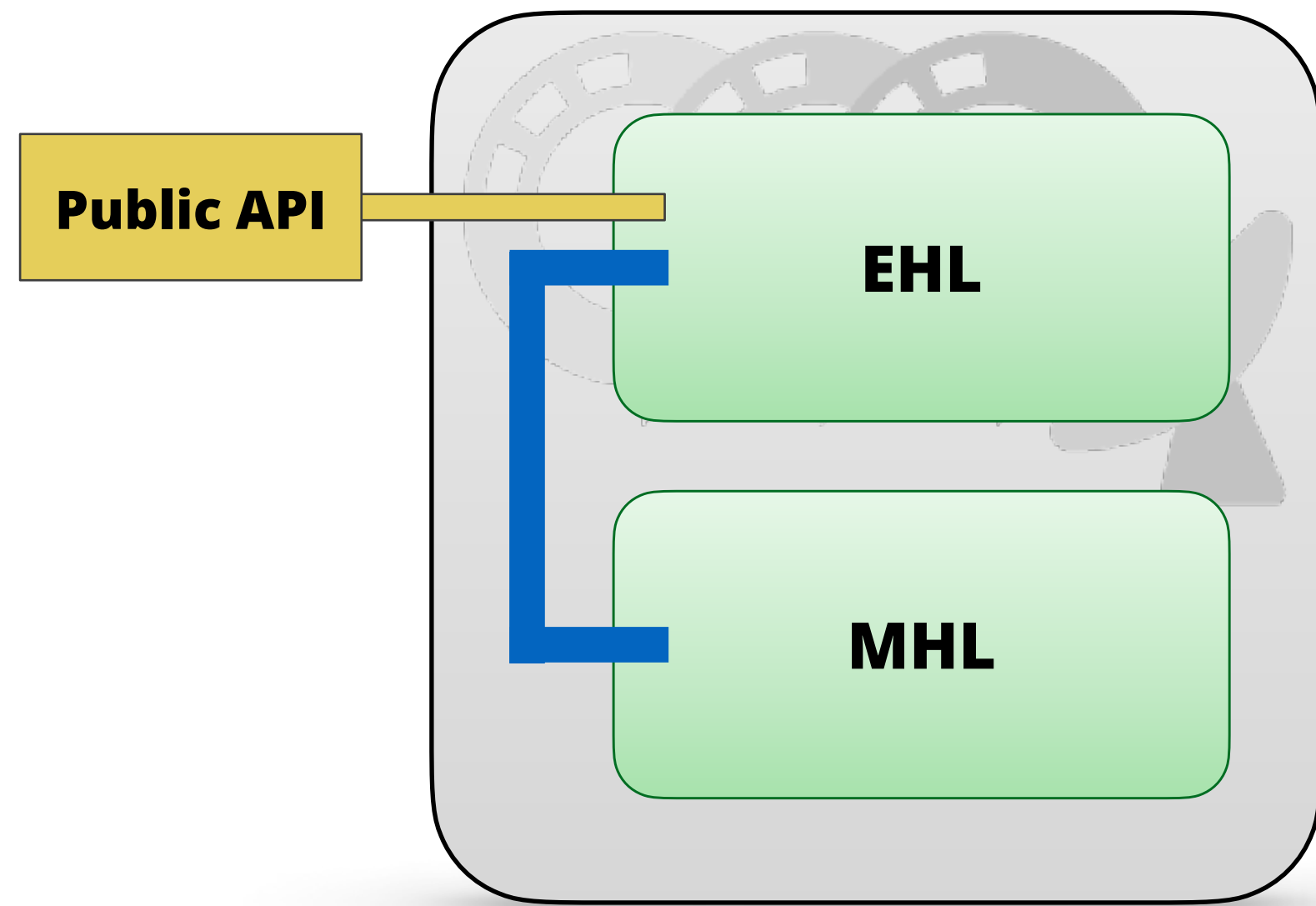
GENERIC

Generic?

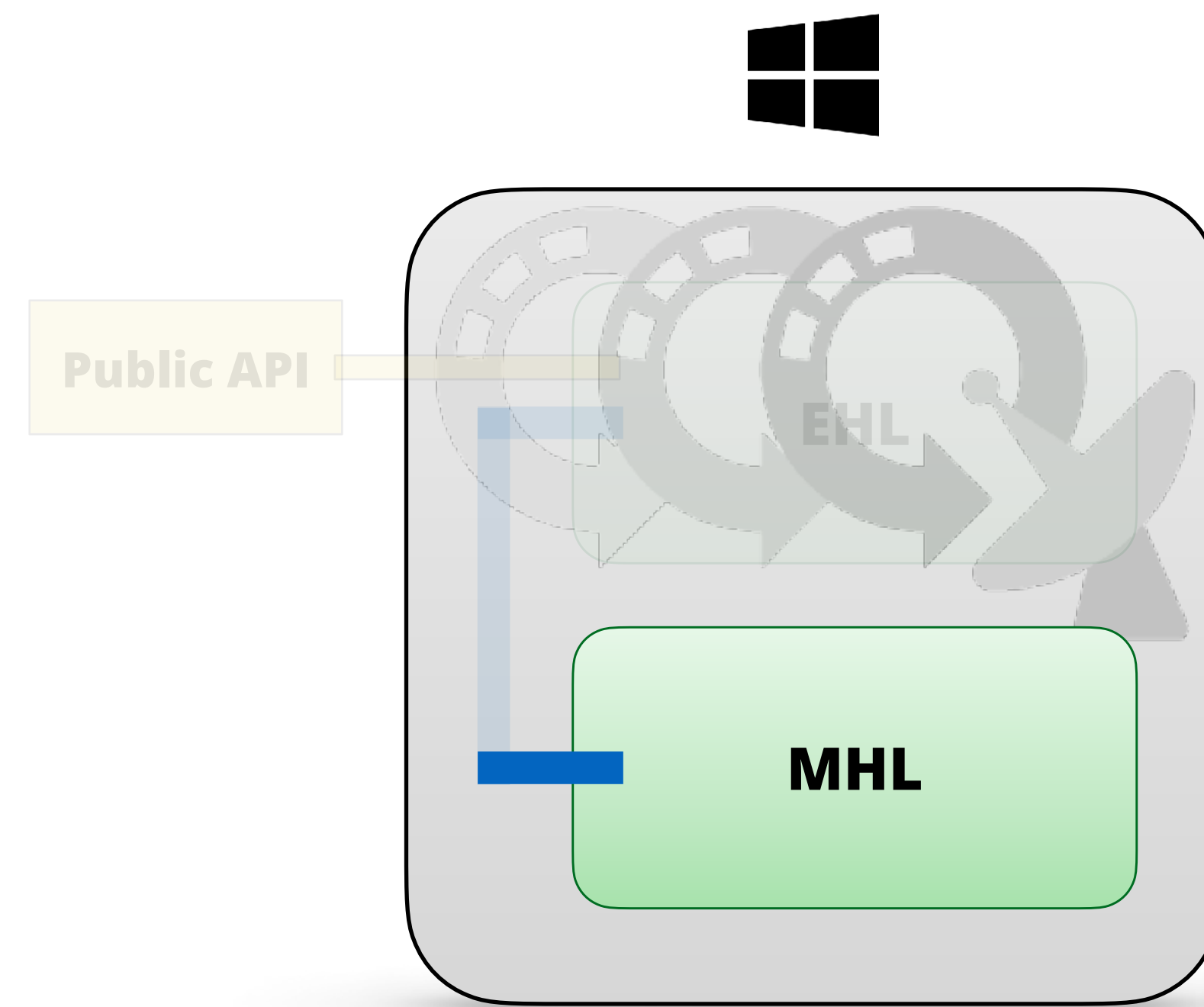
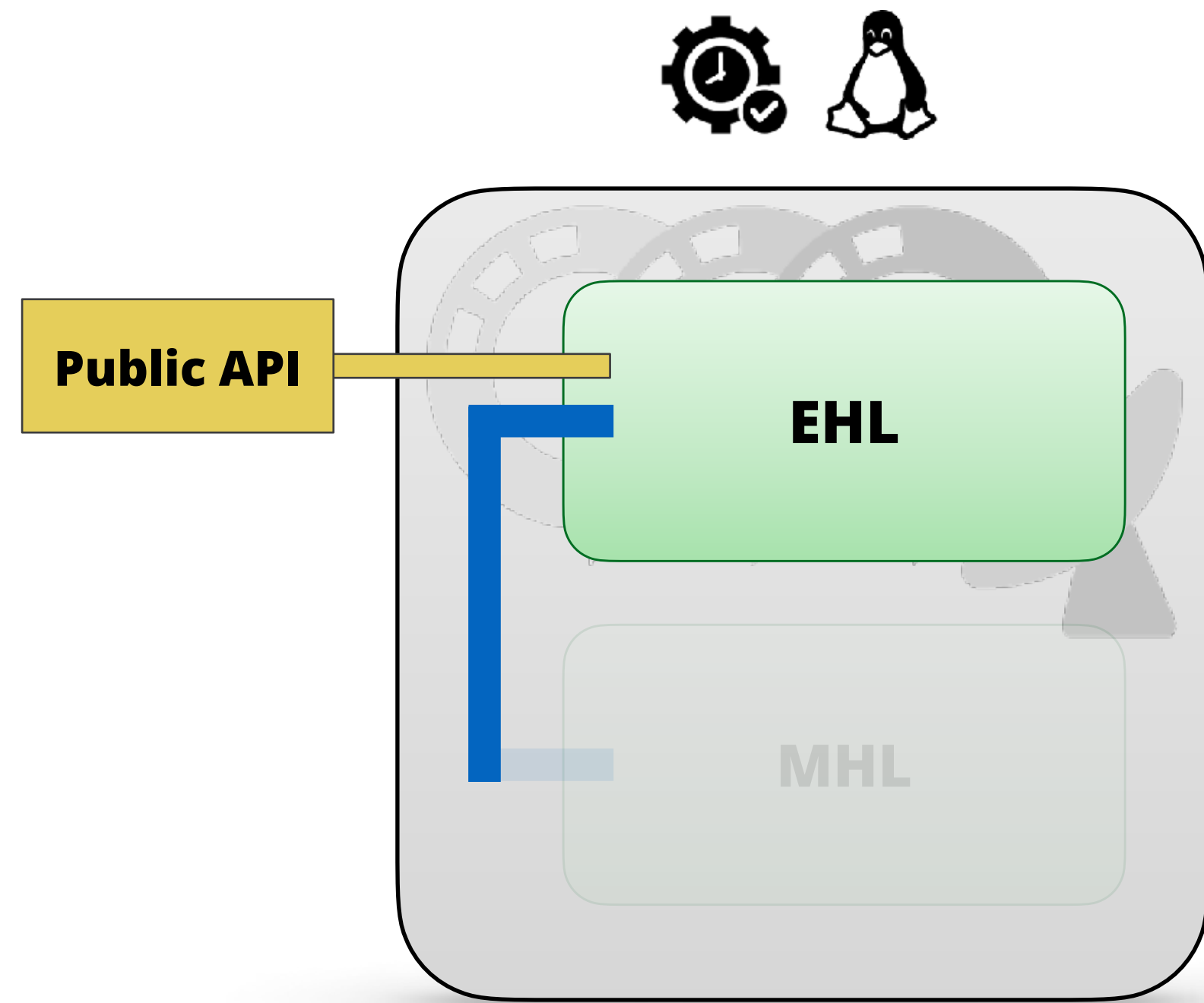
- ❑ A generic networking feature is...
 - ❑ built right into the framework
 - ❑ simple to leverage for the developer (configurable)
 - ❑ transparent to the user

- ❑ The „HSE DQMH GenNet“ should...
 - ❑ work with any custom-made DQMH module (YES - ALSO WITH YOURS!)
 - ❑ allow using a module's Public API
 - ❑ support run-time configuration (enable/disable client/server)

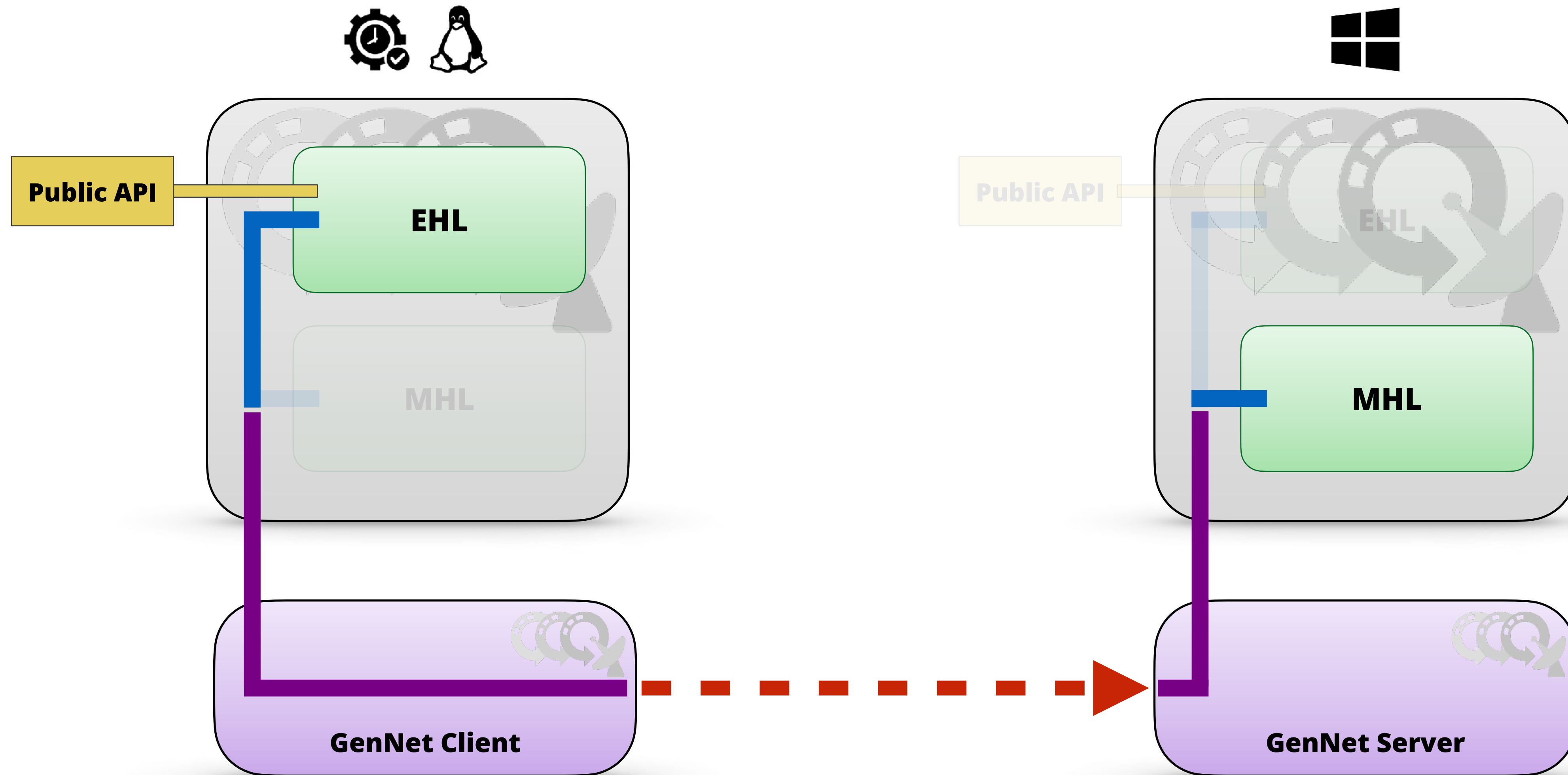
Generic Networking Architecture



Generic Networking Architecture



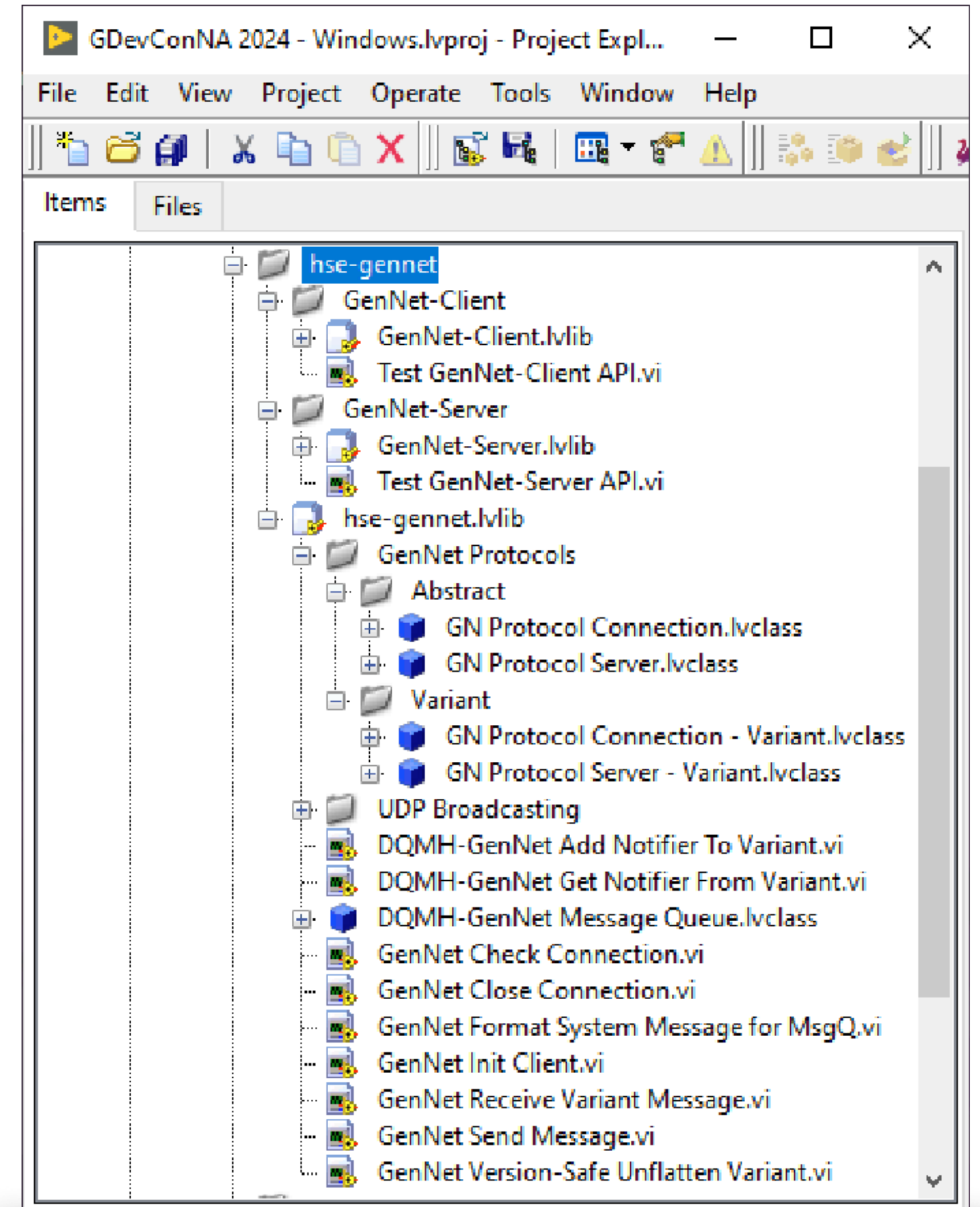
Generic Networking Architecture



IMPLEMENTATION

What do you need?

- ❑ Documentation ¹
- ❑ Source Code ²
 - ❑ Currently: From the repo
 - ❑ Soon: Via VIPM

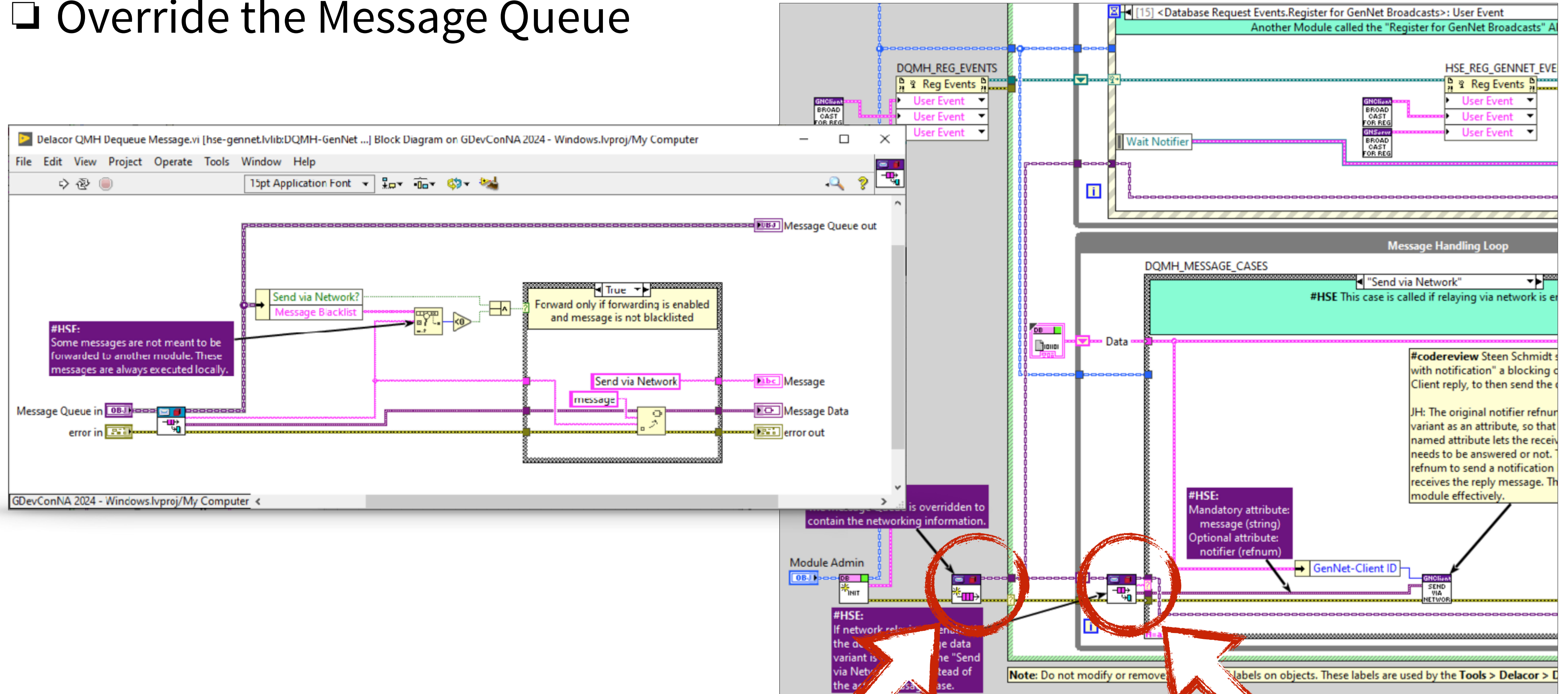


¹ <https://dokuwiki.hampel-soft.com/code/dqmh/generic-networking>

² <https://code.hampel-soft.com/open-source/dqmh/hse-gennet-example-modules>

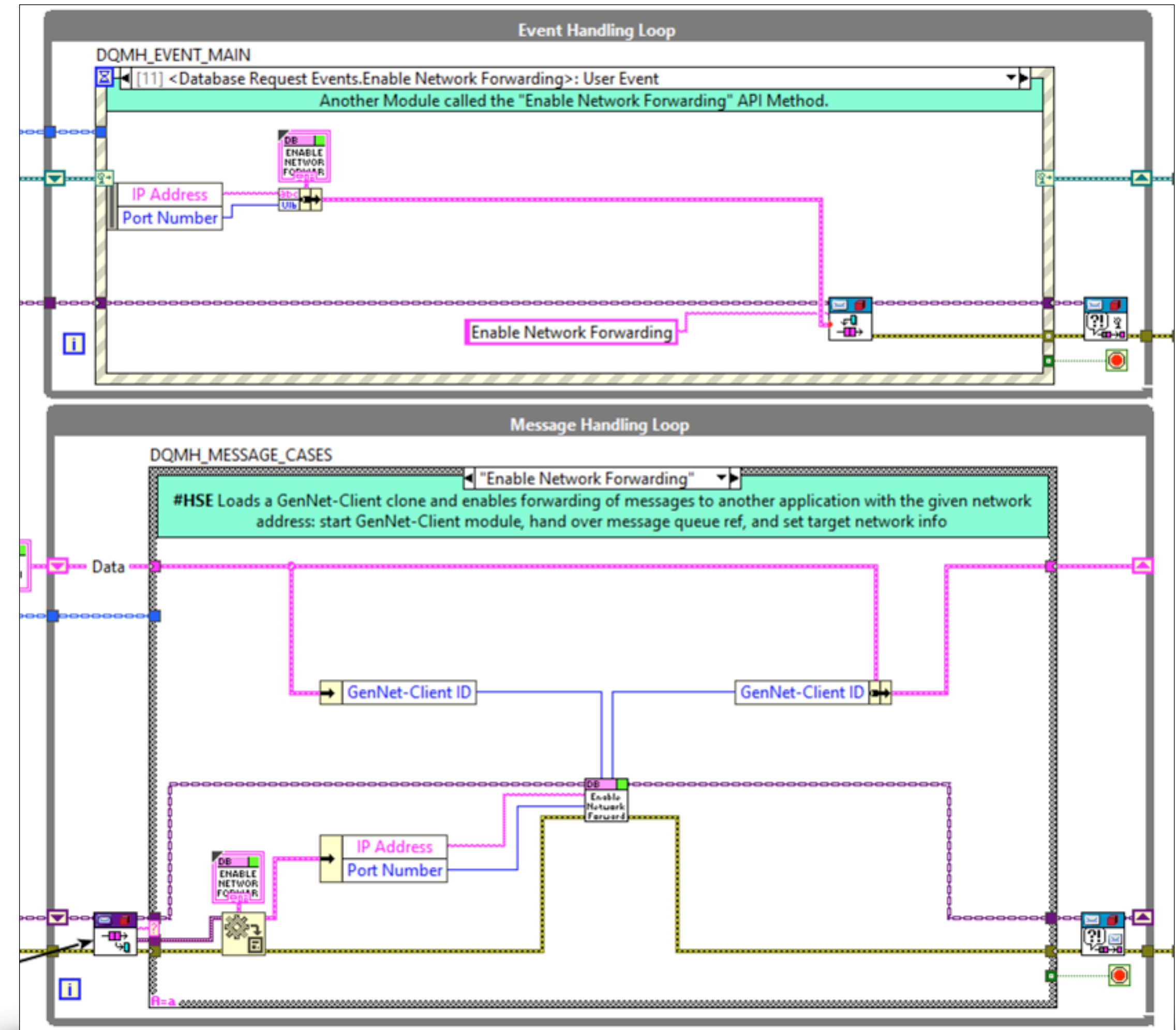
How do you make your DQMH module „GenNet-Enabled“?

❑ Override the Message Queue



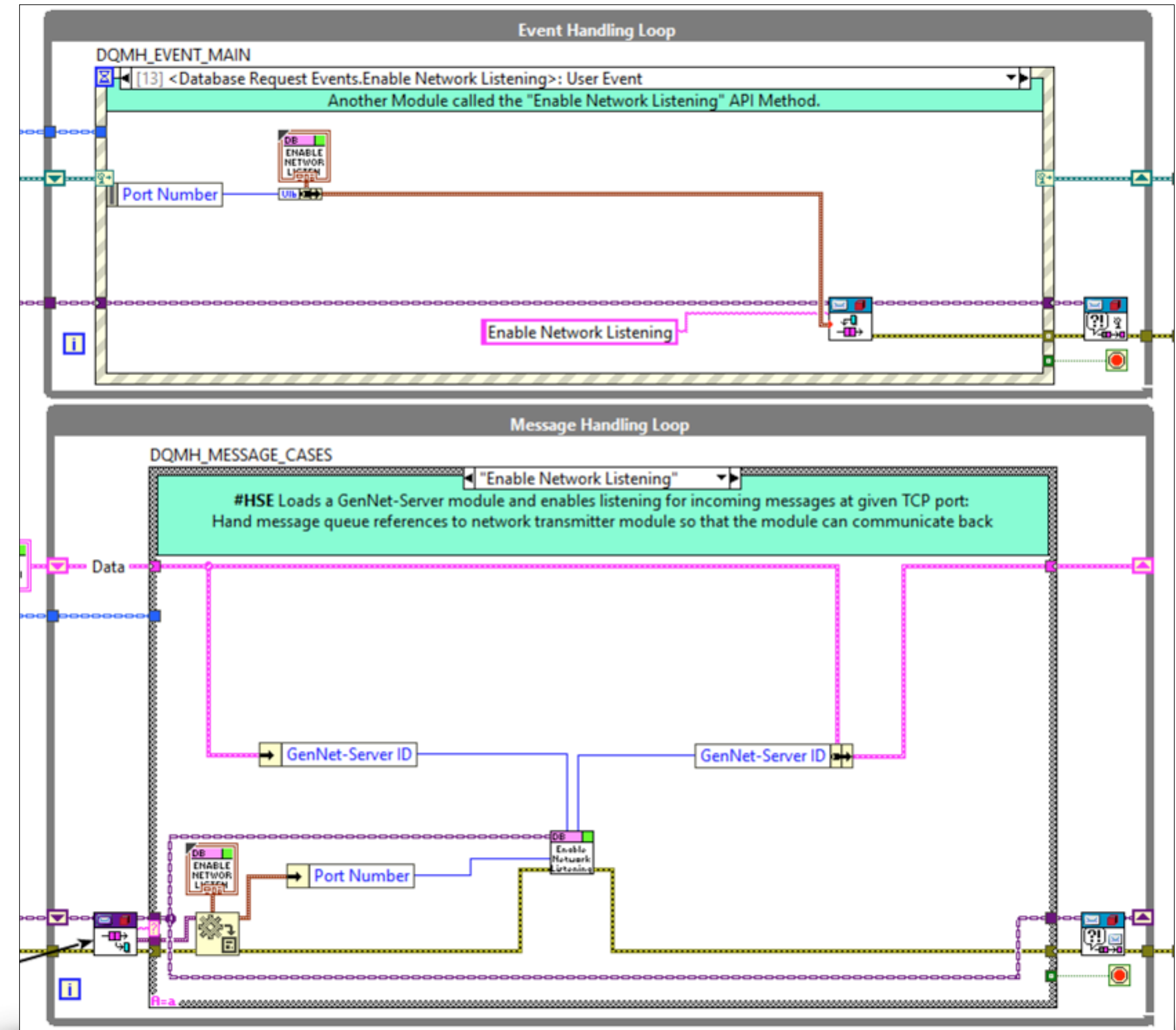
How do you make your DQMH module „GenNet-Enabled“?

- ❑ Override the Message Queue
- ❑ Add code for client mode (*forwarding*)



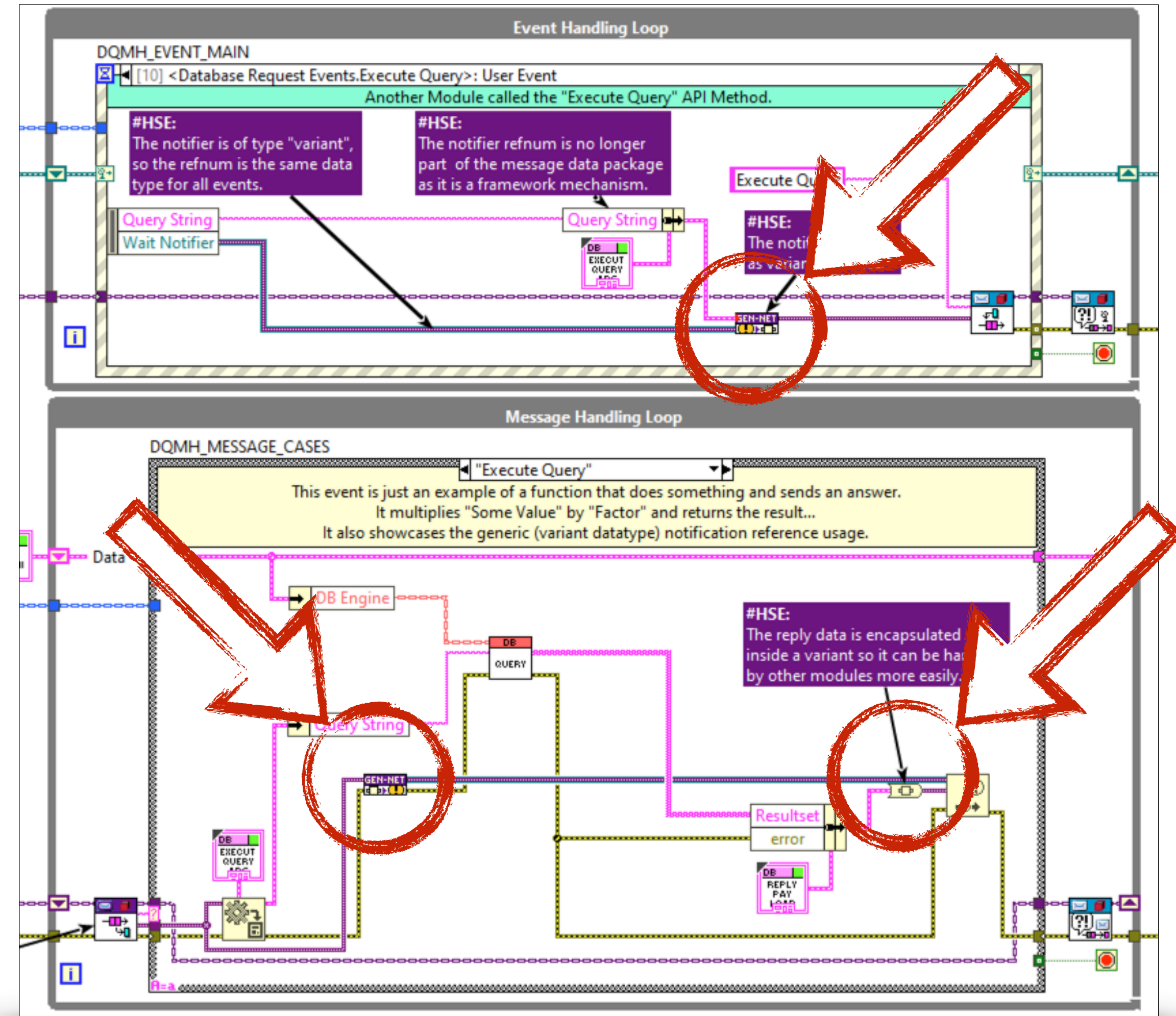
How do you make your DQMH module „GenNet-Enabled“?

- ❑ Override the Message Queue
- ❑ Add code for client mode (*forwarding*)
- ❑ Add code for server mode (*listening*)



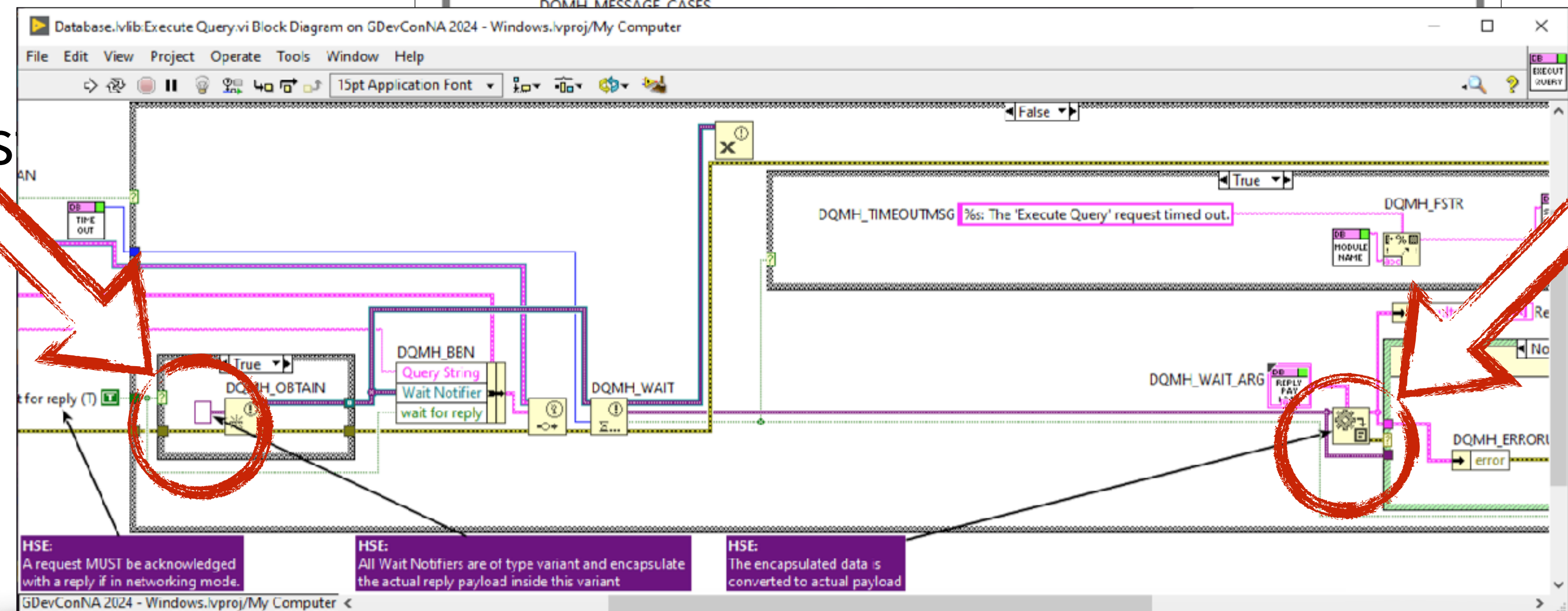
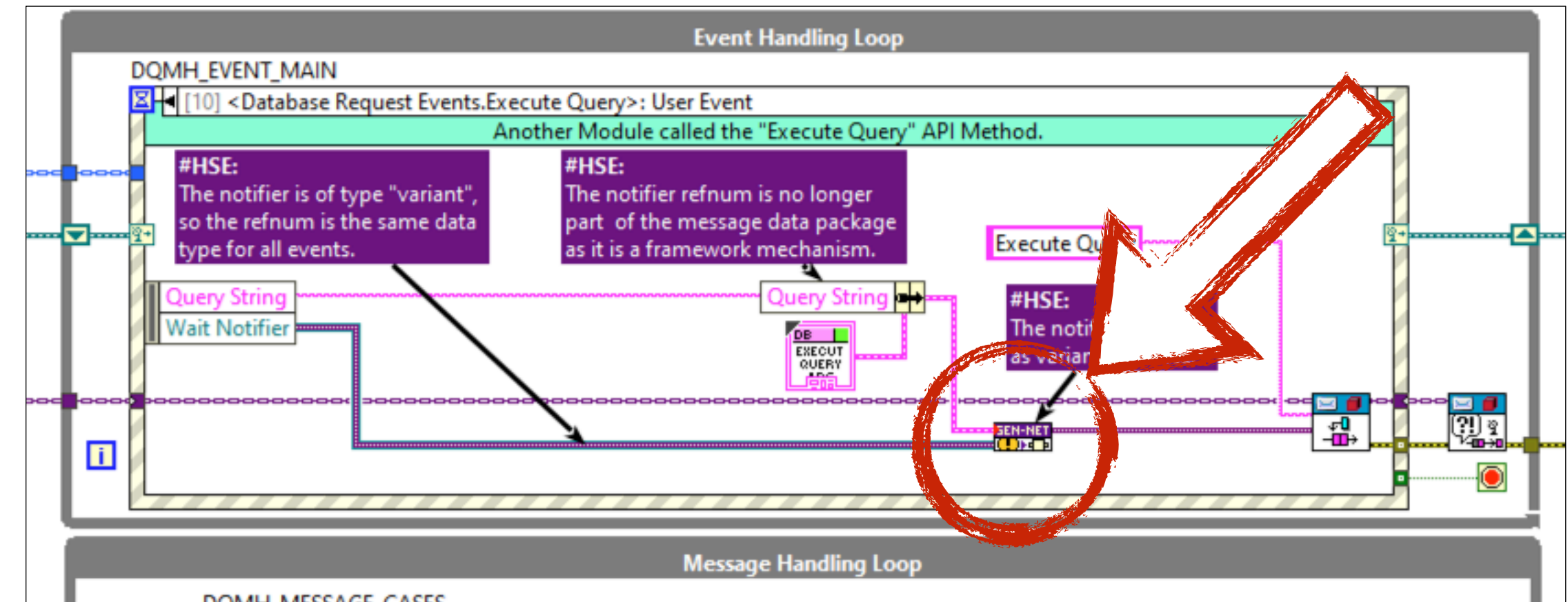
How do you make your DQMH module „GenNet-Enabled“?

- ❑ Override the Message Queue
- ❑ Add code for client mode (*forwarding*)
- ❑ Add code for server mode (*listening*)
- ❑ Augment each request

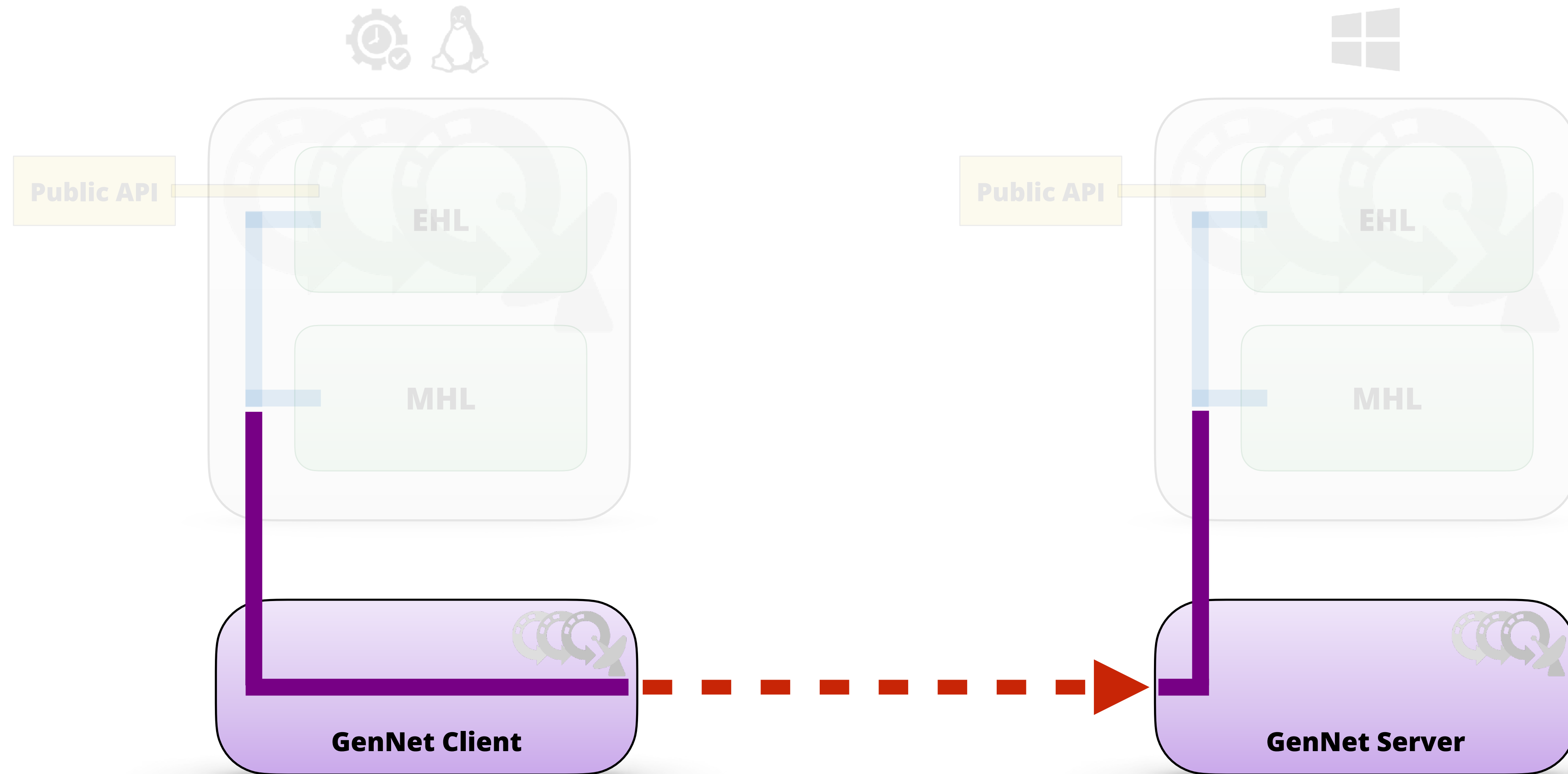


How do you make your DQMH module „GenNet-Enabled“?

- ❑ Override the Message Queue
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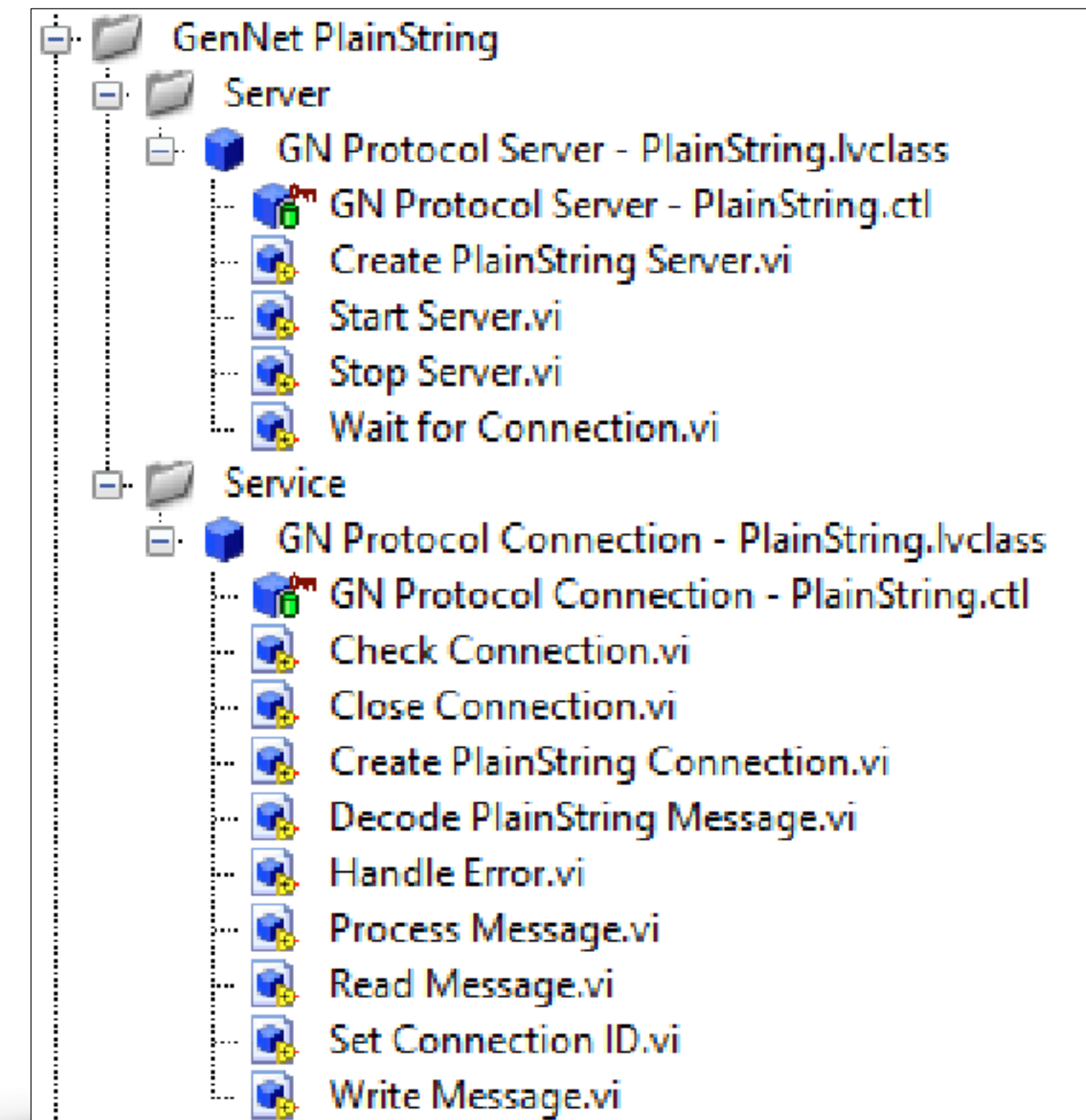
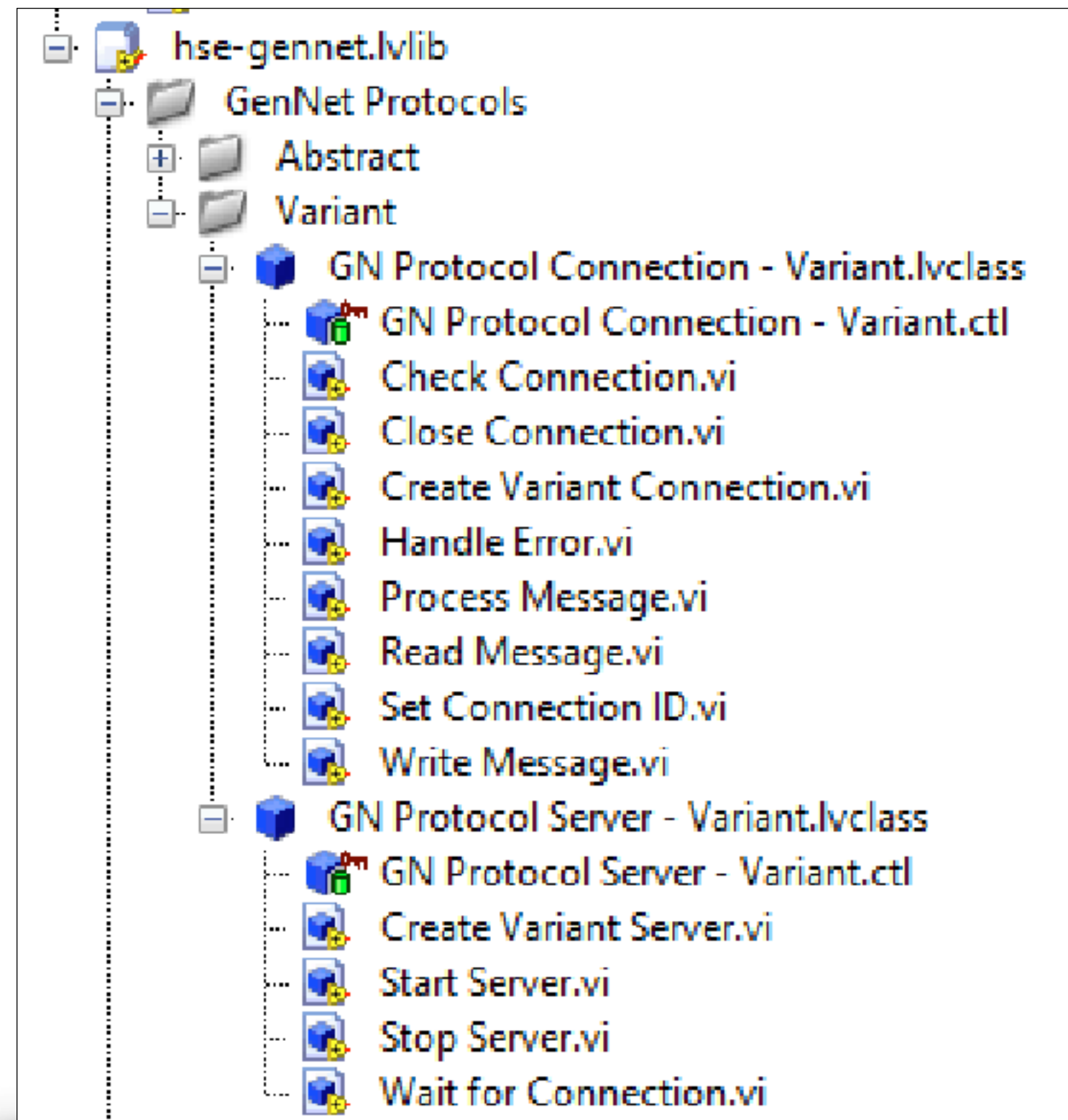


Generic Networking Architecture

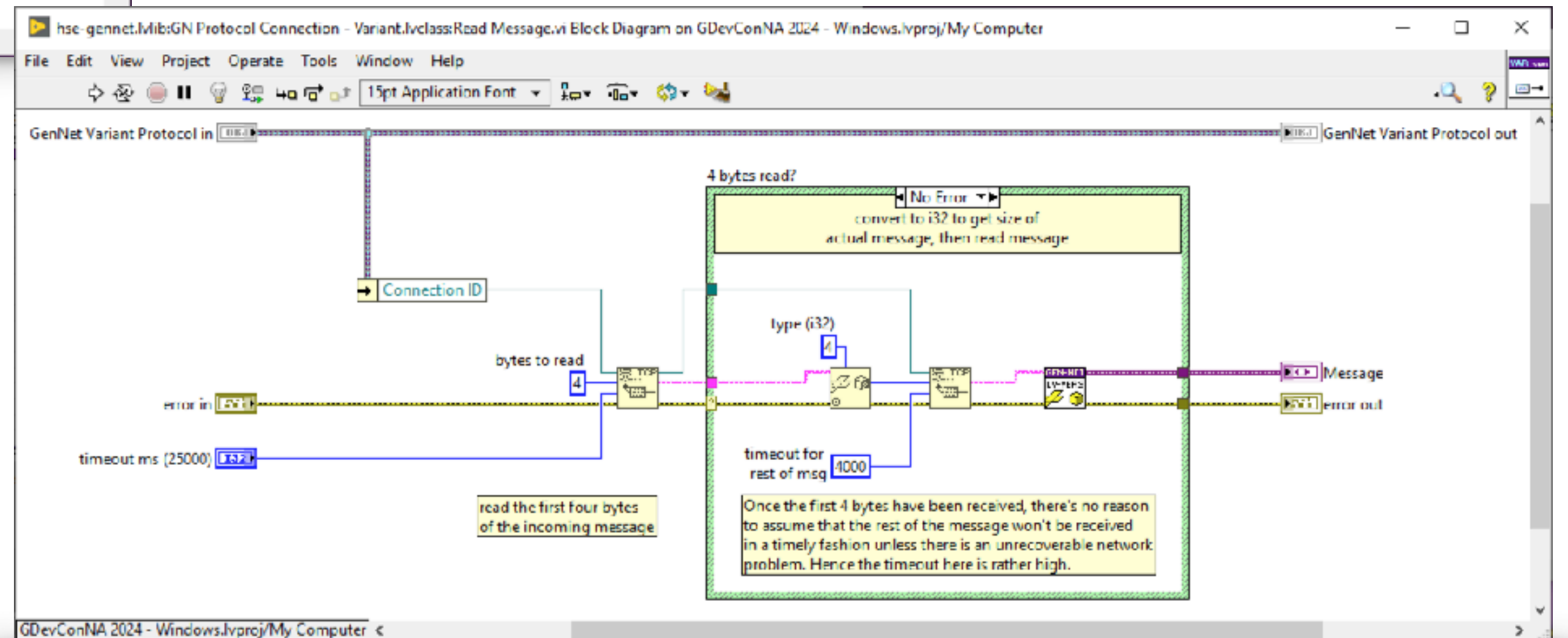
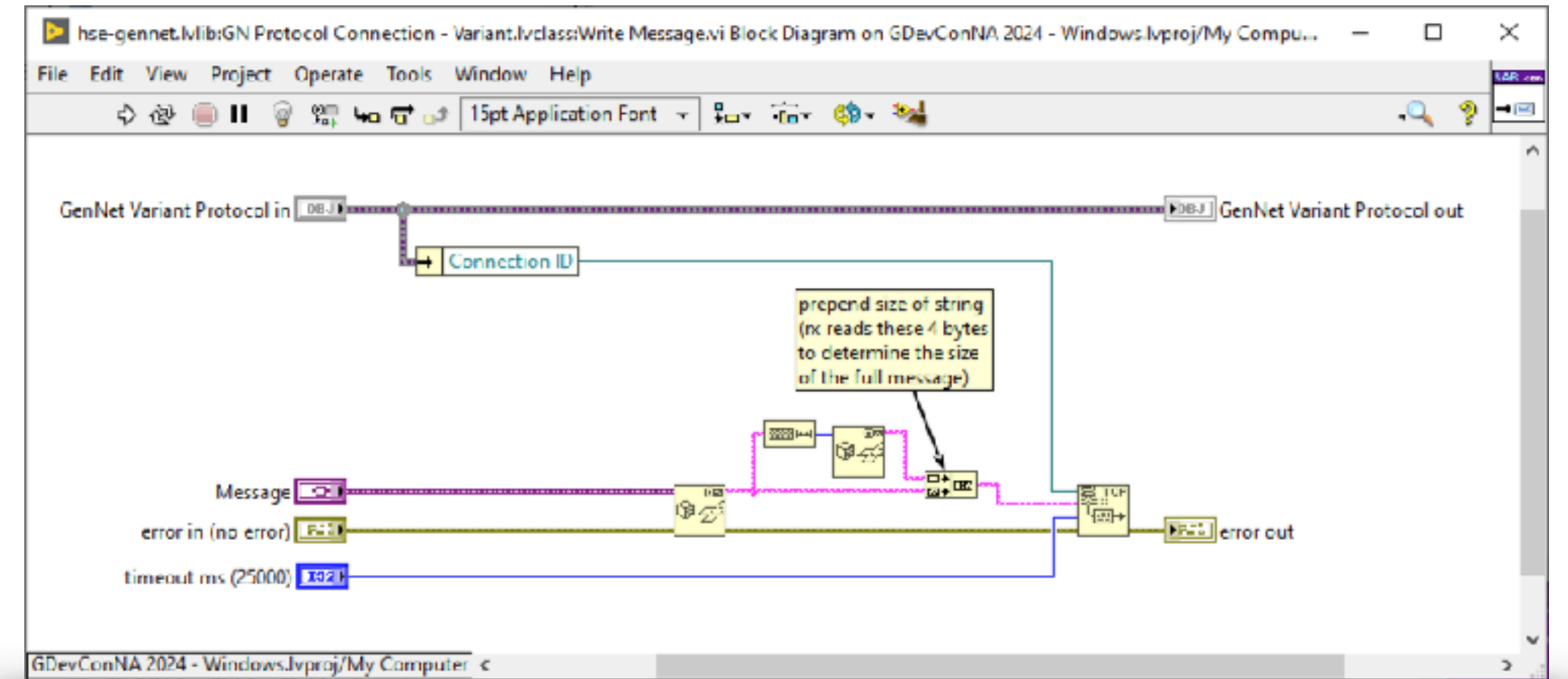
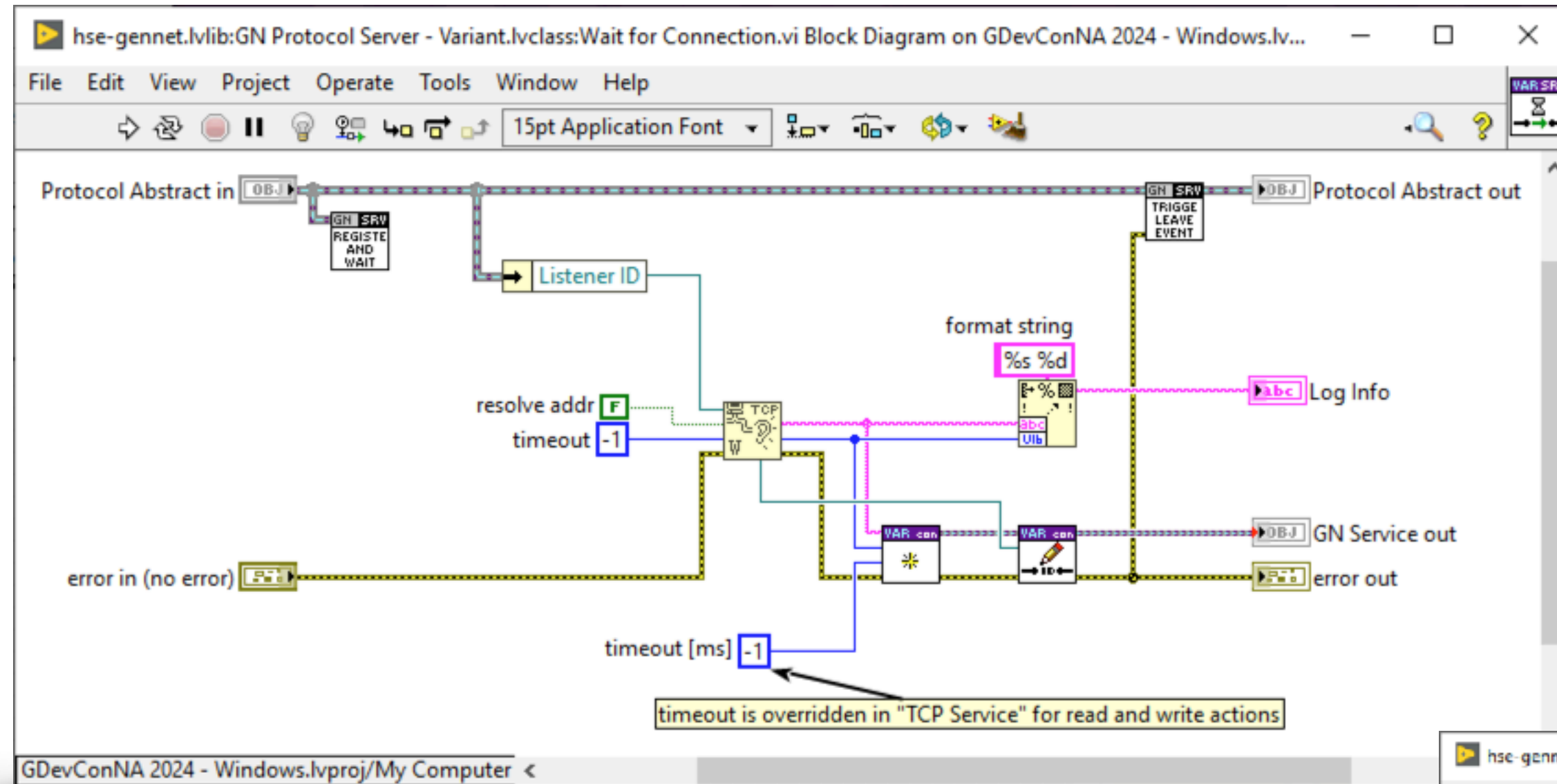


Communication Abstraction Layer

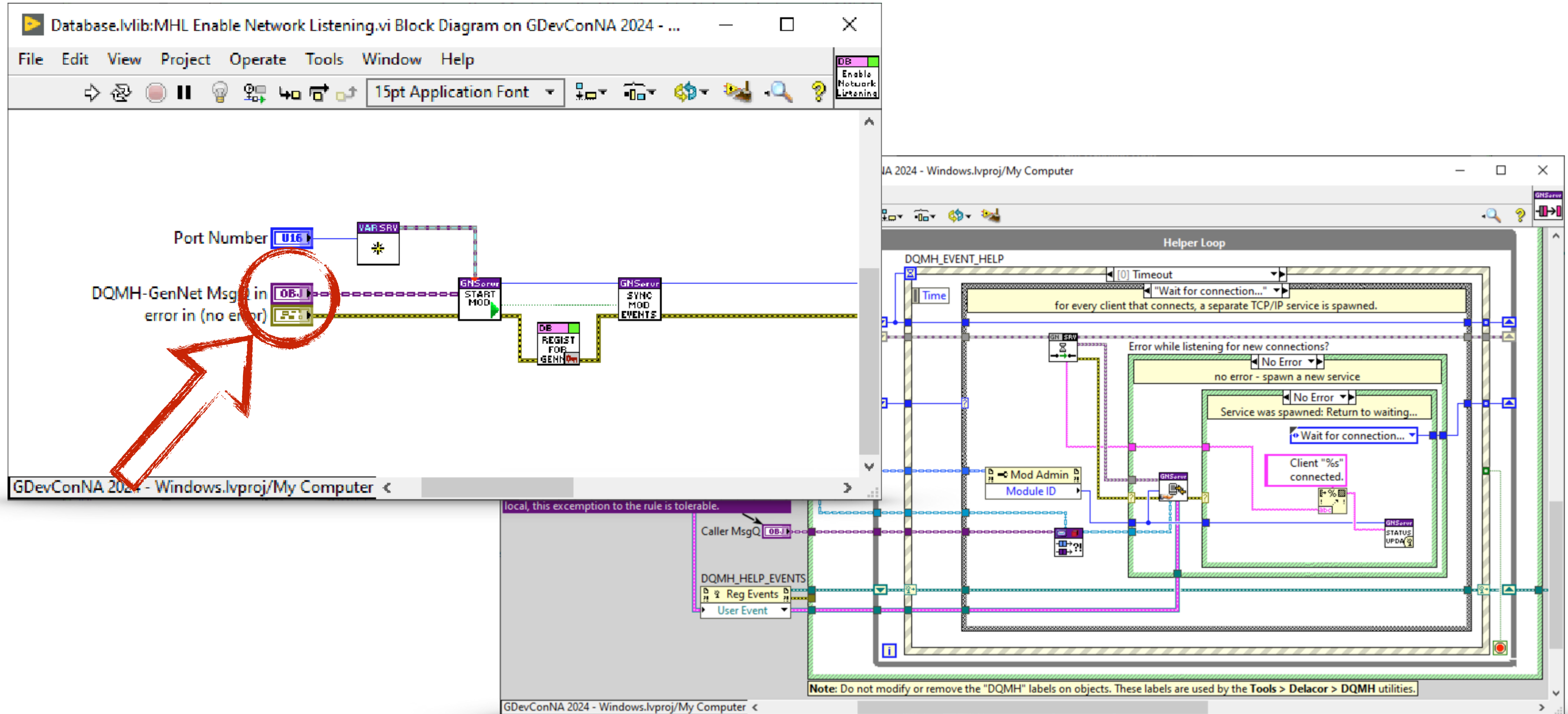
- ❑ GenNet calls this a *protocol*
- ❑ Ships with **Variant** and **PlainString** implementations



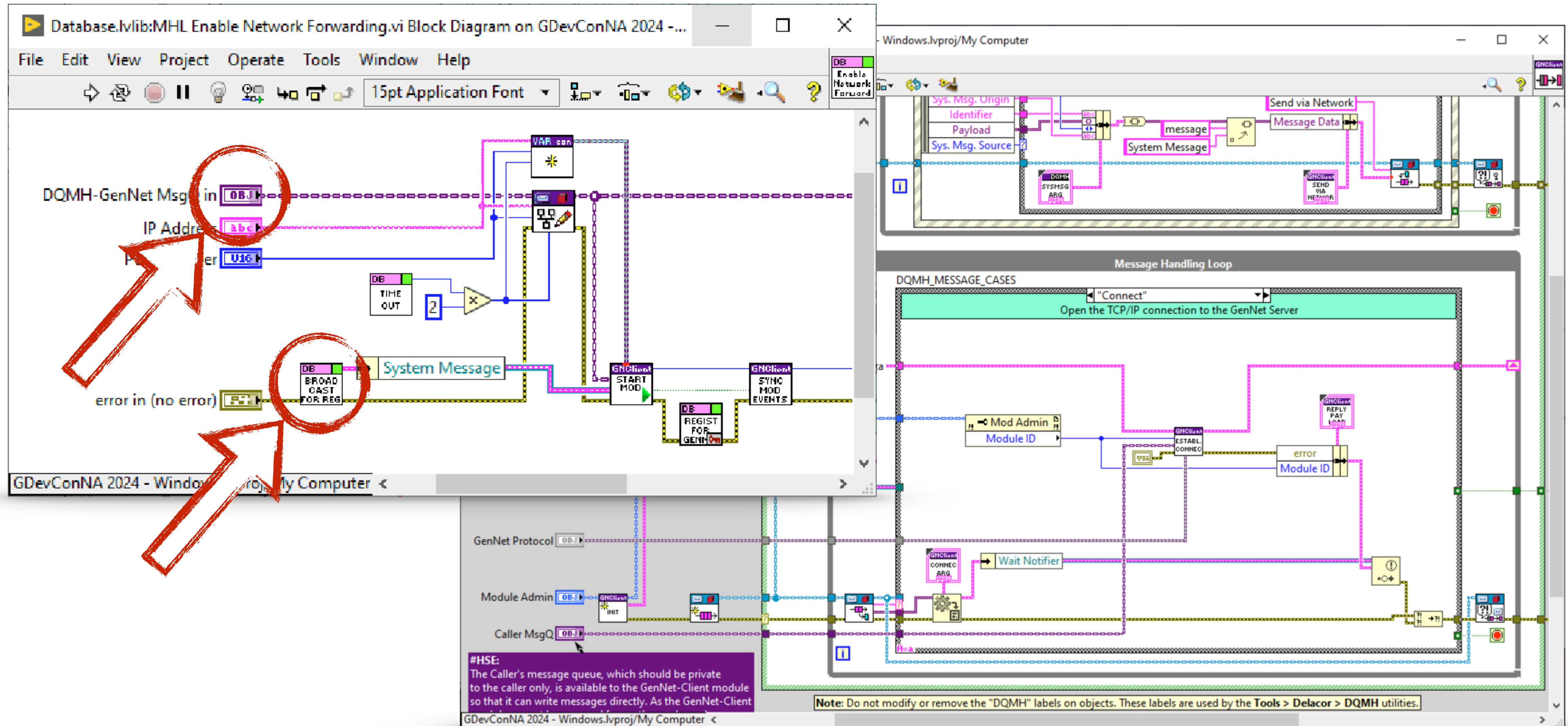
„Variant“ Protocol



GenNet-Server



GenNet-Client



Resources

- ❑ “HSE GenNet Example Modules” on the HSE Dokuwiki
 - ❑ <https://dokuwiki.hampel-soft.com/code/dqmh/generic-networking>
- ❑ “HSE GenNet Example Modules” on the HSE GitLab Server
 - ❑ <https://code.hampel-soft.com/open-source/dqmh/hse-gennet-example-modules>
- ❑ HSE Open Source Projects
 - ❑ <https://os.hampel-soft.com>
- ❑ HSE Way of Working - in case you want to contribute 😊
 - ❑ <https://www.createbettersoftware.com>

..IT'S OK TO HAVE FUN!

