



Niagara 4.13 Feature Preview - Multi-Tiered System Database (Db)

March 30, 2023

Q&A

1. When will 4.10u5 be posted on Niagara Community?

It has been delivered to all OEMs and will post however they provide downloads.

Also, anyone with a developer agreement should see the posted download that goes to OEMs.

2. I have a large customer that will not let me go past 4.9 for several reasons that he has concern with. Will there be any updates happening for 4.9 or will it just be 4.10?

Updates will be to 4.10 as that's our current long term supported release. I encourage you to work with the customer to understand their concerns with upgrades and allow us to debunk some of the myths out there that keep customers from upgrading.

3. Can a Master JACE running 4.13 pull in multiple JACEs on 4.10 and then into a Supervisor running 4.13 and then into a Master Supervisor running 4.13 or does everything need to be on 4.13? The 4.10 JACEs would be in the secondary port of the Master JACE 4.13.

The multi-tier System Indexing utilizes the existing NiagaraNetwork connections (e.g. NiagaraStations) along station routes (hops) where Niagara virtuals are enabled. The top-most supervisor (where the System Database is running) and any mid-level stations (any Niagara platform) need to be 4.13 or later. The edge most stations must be running 4.4 or later. Since the existing NiagaraNetwork connections within each station (hop along a route) are being utilized to perform the System Indexing, any enabled NiagaraStations within the NiagaraNetworks (with Niagara virtuals enabled) along such routes are eligible, regardless of network topology.

4. I'm a beginner with Niagara system. What are requirements to get necessary training?

Tridium University offers a wide range of training classes depending on your needs: <https://www.tridiumuniversity.com/student/catalog>.

5. Can you see the Web Wiresheet of the end edge device?

This question seems to relate to the views available on Niagara Virtual components (on-demand, transient representations of remote station components). The views available on Niagara Virtual components is a subset of the views available on the actual component in the remote station. The Web Wiresheet is not available on Niagara Virtual components due to the nature of virtuals. Since Niagara Virtual components are transient, links are not supported on them since any link changes would not be persisted on the actual remote component. The Property Sheet view is available on Niagara Virtual components for viewing and modifying existing properties (and invoking actions) on the remote component, but it cannot be used to add/remove dynamic properties. Virtual Px views are available where applicable. The HTML5 Scheduler view is available on Niagara virtuals representing a remote schedule to allow for viewing and configuring a remote schedule. If a matching history has been imported/exported to the supervisor, the Web Chart view is also available on Niagara virtual points when applicable. Other views may or may not be available depending on the use case.

6. What if I wanted to run a query for all Overridden values? Is that possible via the top tier of the system database?

The System Database stores Entity information and gets updated on a configurable, trigger interval basis (defaults to once a day). Entities have a unique identifier (typically an ORD), tags, and relations. As such, the information stored in the System Database is typically static in nature (once station configuration, including tagging, is complete). While some tag dictionaries may offer implied tags for current status/value, such tag values will often be stale for two reasons: (1) both indexing and query resolutions do not force a subscription on downstream proxy points and (2) the last index may have occurred some time in the past (index times will vary, so it's not something typically done at a fast interval).

That said, queries to the System Database are typically performed to find components (Entities) based on their "static" tags and relations. After the query is resolved, any Niagara virtual component results will asynchronously subscribe and update, so you would eventually be able to see the current status/value of all the matching results, but you cannot reliably filter for such "real-time" information in the initial query. You could pipe a BQL query onto the end of a NEQL query (run against the System Database) in an attempt to filter for the status/value, but even in that case, due to reason (1) above, the results could be stale and not reliable.

A general rule of thumb: query the System Database to find objects by their static tags/relations, and once found, then you can interact with other aspects of those objects (resolve and subscribe to them for updates, go to a history for the object, go to a view on the object, etc).

If you are looking for a way to find exceptional "real-time" conditions in your Niagara system, consider using alarming to get immediate notifications of such exceptional conditions.

7. Does the search reach devices on BACnet/Modbus/Lon network devices or only those on a Niagara network? What is the oldest version that can be reached?

By “search” in the context of this question, I think you could be referring to one of two different topics, so I’ll attempt to answer both. If by “search”, you are referring to the System Indexing process where the main supervisor is crawling the Niagara system (including reachable stations) looking for Entities to pull into the System Database, then the answer is that any Niagara components in the stations are eligible. So, for example, if you have already mapped BACnet/Modbus/Lon proxy points under proxy device components in your Niagara stations, then yes, those proxy components will be picked up. But it won’t cause additional communication over the actual BACnet/Modbus/Lon transports to look for data in the physical BACnet/Modbus/Lon devices. Again, it will only find components that have been mapped into a Niagara station, wherever that Niagara station is located in the system.

If by “search”, you are referring to the Search view on the main supervisor where you can enter any NEQL query against the (already populated) System Database, that search will only find Entities that have already been indexed into the System Database. If those Entities happen to model components in remote stations, they will resolve to Niagara virtuals which allow you to interact with them. Refer to the previous paragraph for what is eligible to be included in the System Database at index time.

8. Is there a way to adjust the lag time with virtual points?

Niagara virtuals resolve immediately, but if they aren’t already subscribed, they will asynchronously subscribe for updates to their properties in order to synchronize with their downstream counterparts that they (virtually) represent. The subscription and property updates happen over the Fox connections established via the NiagaraNetwork in each station along the route. If the Fox connections along the route are already open (engaged), the asynchronous subscription/update should be optimized. If the Fox connections are disengaged when a Niagara virtual is resolved (because of no recent activity), then you may notice a longer lag as it needs to re-engage the Fox connection(s) along the route.

If you want to keep the Fox connections engaged (open) at all times, regardless of activity, then there are multiple conditions that will pin the Fox connection in engagement. For example, you could reduce the ping frequency in the NiagaraNetwork or add a Niagara proxy point whose output is linked in order to keep the Fox connection engaged. There are other factors that can contribute to lag time as well, such as network conditions and CPU utilization on the stations involved.

9. Can you run BQL over NEQL query on the system database via the browser?

You can pipe a BQL query to the end of a NEQL query to resolve against the System Database, but there are a few caveats. First, it’s not something you can do in the Search view. Instead, it would have to be resolved as part of an ORD. You could manually type such an ORD in the browser using proper escape characters (scoped against the “sys:” base), and it would resolve to a Collection Table view. But it might be more common if you are creating a Px graphic at the supervisor level, then you might embed a table in the graphic whose binding ORD contains a NEQL query (and optional BQL query piped to the end).

The second thing to remember when piping BQL to the end of a NEQL query resolved against the System Database is that remote Entities in the System Database will resolve to Niagara virtuals, so the subsequent BQL query will resolve against the Niagara virtual

component representations, not the actual components that live in the downstream stations. So this may be a little confusing when setting up the BQL query, as it can only resolve properties on the virtual components. For example, the following relative ORD (host/session not included in this example, nor are the escape characters if you were to manually type this into a browser URL) would resolve to a collection table containing the display name and status property of the Niagara virtual devices that have the “hs:vav” tag in the System Database:

```
sys:|neql:hs:vav|bql:select displayName, status
```

The last thing to remember is that resolving a NEQL/BQL query in an ORD alone won't cause a subscription/update of properties. The subscription/update happens asynchronously after a component is resolved depending on the view in which it's being displayed. So viewing a collection table could contain stale information since it doesn't cause a subscription of the results. Conversely, the Search view results are “live”, as they cause an asynchronous subscription, as does the Property Sheet view and Px views, etc.

10. A little off topic but since you went into the spy tool. Where do you find the error logs on a web supervisor?

Through the spy pages, you'll see error logs on the stdout page. Within a station you can view them in the Log History. And if you're connected to the platform daemon, you'll see them in the Application Director.

11. Compared to using export tags is the system database slower at pulling information at the browser level? If a supervisor can't reach a device, what sort of error is thrown for the end user in a browser?

Export tags and Niagara virtuals use the same underlying code to support the Px views, so after the initial load (where it caches the Px view on the supervisor with virtualized ORD bindings), it should be the same in terms of performance. The System Database is not always required for the on-demand Px views on Niagara virtuals to display. In fact, it's only needed if your Px views contain any tag-based bindings (since those bindings resolve NEQL queries, which require the System Database to resolve for remote components). If a downstream station is temporarily unreachable, any Niagara virtuals on the supervisor that represent a component on or through that station won't be able to resolve fully, and therefore the Niagara virtual's on-demand Px view also won't be available. In such a case, the Niagara virtual's 'Virtual Info' property has a status that should indicate the failure to resolve.

12. Does this System DB and new functionality work in a JACE or only a WebSup?

The Niagara System Database is only licensed on supervisor platforms. So typically, it would be installed on your top-most supervisor (or possibly the regional supervisors if wanted, but not required). During multi-tier system indexing, the Niagara system will be crawled in search of Entities to pull into the supervisor's System Database, and it will reach to and through Niagara stations of *any* platform type since it's simply looking for stations in the NiagaraNetworks of any downstream stations.



13. When it pulls the Px graphics is it still rendering at the JACE/edge level and pushing up (like an IFrame) or is it using virtual points and rendering at server? I ask mainly for speed reasons.

It will pull the Px graphic source files up to the supervisor (and cache them locally for faster performance) and translate any ORD bindings contained in those Px graphics to Niagara Virtual ORDs so that the view can be resolved against the supervisor directly. This approach optimizes performance. That said, there are a small number of widgets in Px graphics that can't resolve against Niagara virtuals. For example, if you embed another view inside a Px view, and that view isn't supported against Niagara virtuals (see earlier question about supported/unsupported views on virtuals such as the Web Wiresheet), then that embedded widget may not display in the virtual Px representation served up from the supervisor. But the majority of standard and commonly used widgets (even third-party widgets) are supported.

14. Does the Supervisor have to have all the same modules that are inside a JACE to see/query the objects?

Not necessarily depending on the use cases, but it is both recommended and typical for the supervisor to have all of the modules used in its Niagara system. Since supervisor platforms typically have a lot of resources, it would be typical for them to have all of the modules installed, regardless of whether they are in use and/or licensed. If a JACE has a third-party module that isn't on the supervisor, you can use the platform tools in Workbench to transfer the modules to your supervisor.

15. For large campuses, is it better to have the graphics at the JACE and Edge 10 level, that are tunneled up to the Niagara Web Supervisor, from a speed standpoint? Or is it better to provide your graphics at the Niagara Web Supervisor server and why?

In both cases, the Px graphics are being served up from the supervisor (see response to question 13). That said, there will be a one-time initial load cost the first time a particular virtual Px view is loaded (while it is pulling up the source files from the downstream station to cache on the supervisor). After that, the virtual Px views should load directly from the supervisor, so they would be comparable, except that the ORD bindings in the view could take a moment to resolve since the Niagara virtuals may need to asynchronously subscribe and update if they aren't already. However, if you had Px graphics directly in the supervisor that had ORD bindings to Niagara proxy points, then you may experience a similar subscribe/update delay for the Niagara proxy points. So the performance should be comparable, depending on your use case. There are probably cases where you'd have a combination of Px graphics sourced directly on the supervisor (for aggregate summary information, supervisory navigation, etc) and on the downstream stations (for local viewing). Perhaps you have a subset of users that login directly to the JACE instead of the supervisor, you can offer the same graphics at every level.

16. When will the JACE 9000 be released?

Summer 2023.



17. Are there any additional configurations that need to happen on each of the Mid-tier stations/JACEs for this?

On the mid-tier stations, there are only two requirements:

- (1) They must be 4.13 or later.
- (2) They must have active NiagaraNetwork connections (with Niagara virtuals enabled) to the next tier of NiagaraStations.

Note that the final tier of stations in the system can be 4.4 or later, so they don't have the same two requirements above. Also, all stations in the Niagara system must have unique station names assigned.

18. How taxing is it on a JACE to be a mid-tiered hop, as opposed to bringing the edge devices directly to the supervisor? What would you recommend?

Typically, there is only a very small load placed on the stations (e.g. JACEs or other platform types) at the mid-tier hops. This load involves reviewing Fox traffic to peek at who those messages are targeted to, and if the message is intended for another "known" station, it simply pipes the message along to the next hop in the route. Having a direct connection from the supervisor to the edge stations will obviously offer the optimal communication performance (fewer hops means less network communication), but sometimes it isn't possible based on the network topology (e.g. the supervisor can only reach an edge station through an intermediary JACE due to firewall restrictions, etc), so this solution helps for such cases.

19. Can we import BACnet IP third party controllers in the supervisor using 4.13 version?

The Niagara BACnet driver (running on various supported Niagara platforms) can be used to integrate with third-party BACnet controllers. Once a proxy representation (e.g. devices and proxy points) are created in Niagara to interact with the actual BACnet controller, those Niagara components can be indexed into the System Database.

20. I have a customer that would like a report of all the alarms and their parameters in their system. Is there a way to use systemDB to create an alarm query for all the alarms in the system? They want to know the alarm extension parameter. i.e. high / low limits, time delays, etc.

The System Database does not store open alarms (alarms are still stored in the Niagara Alarm database). The System Database only stores Entities (see response to question 6). You use Entity tags/relations to query the System Database using NEQL. Therefore, you cannot query the System Database for open alarms, and furthermore, unless you have a custom tag dictionary to expose alarm ext configuration parameters as queryable value tags, you would only see those alarm extension parameters when the Entities are resolved to Niagara virtuals.



21. Is there a way to run a report for all the histories that are configured in the system? A full list of points with histories, and history extension parameters?

If I'm understanding the question correctly, the Niagara Tag Dictionary supplies an "n:history" implied tag on all points that have a history. So you could probably run a NEQL search similar to the following to find all points that have a history:

```
n:point and n:history
```

If this gives too many results, you could add more criteria to further filter the results.

22. Can I bring the Edge controller directly to the supervisor without using a JACE in between? As long as they are on the same network. Right?

Yes

23. Is there a guide to tag-based graphics and virtuals that shows what doesn't work? I put a lot of effort into converting some graphics to neql tag based graphics and was disappointed when many of the view wouldn't work as virtual Px view in a parent supervisor. The graphics worked fine locally.

Unfortunately, we don't have a guide, but this is mostly because we haven't seen everything folks have made from a graphics standpoint. My advice would be to try and when you see something that you'd like to see better supported just reach out to your tech support channel and let us know!

That said, tag-based graphics should work with virtual Px views as long as the System Database is available on the supervisor where you are resolving the graphics. It is also important to remember that the System Database must be indexed with all of the remote Entities needed to resolve the NEQL queries that result from the tag-based bindings you are using. It's possible that your System Database doesn't contain all of the Entities it needs. Check the index queries in the Global Niagara Network Indexer because you may need to add some additional 'Custom Index Queries' to pull in some additional Entities required to resolve the tag-based bindings. In Niagara 4.13, the new Orient System Db spy pages (available to super users) should help you visualize what has and hasn't been indexed into the System Database.

24. This multi-tiered system reminds me of tunneling, which was eliminated in N4 due to security reasons. Is there anything to be said about that in regard to this feature? Could tunneling return?

The tunneling you are referring to was implemented very differently than the multi-tier System Database, and that tunnel implementation will not return. For the multi-tier System Database, only specific Fox communication is allowed to be routed in the Niagara system. Furthermore, such routed communication is only allowed across pre-configured NiagaraNetwork connections which ensure authorization and authentication measures are enforced.

25. Can a 4.9 Supervisor connect to a 4.13 JACE over FOXS? Not for multi-tier just normally.

We recommend that the Supervisor be at the same (or higher) version than the JACEs to which it's connecting.



26. Does this now allow you to tunnel through a JACE from eth0 to eth1?

See question 3 response. Any stations actively connected via the NiagaraNetwork (with Niagara virtuals enabled) are eligible, with the version restrictions mentioned in the question 3 response.

27. Will the history chart populate on a virtual Px with data, if the history has not been imported to the supervisor?

Not currently. The supervisor must have the history imported (or exported) to it in order to display the historical data in such a virtual Px view. Currently, if the history exists multiple hops below the supervisor, you'll need to configure importing/exporting of the histories along the mid-tier stations to get them up to the supervisor in order for them to be available.

28. Is there a way to restrict hierarchies with user roles and categories? For example, a local service company should only see his home city's sites in the hierarchy.

As part of role configuration, you can specify which hierarchies are viewable for users with that role.