NS
18
NIAGARA
SUMMIT
CONNECTING
THE WORLD

Niagara 4 TCP Advanced Training

Damon Riddell

Senior Training Engineer

Problem?

- Need to compare multiple data and give result report
- Need logic to be dynamic

Solution!

- Series Transforms

Series Transforms

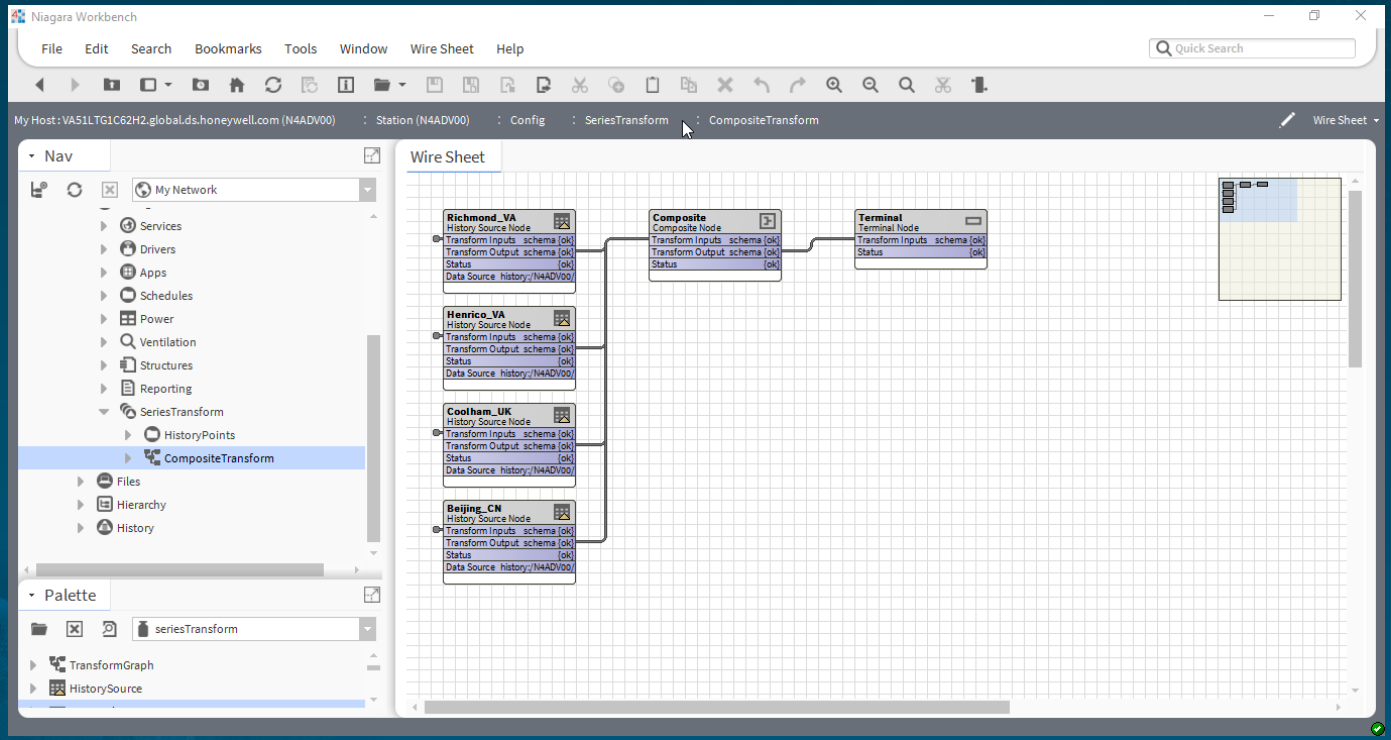
- Composite Node
- Aggregate Node
- Rollup Node
- TimeShift node

Series Transforms

- Composite Node
- Aggregate Node
- Rollup Node
- TimeShift node

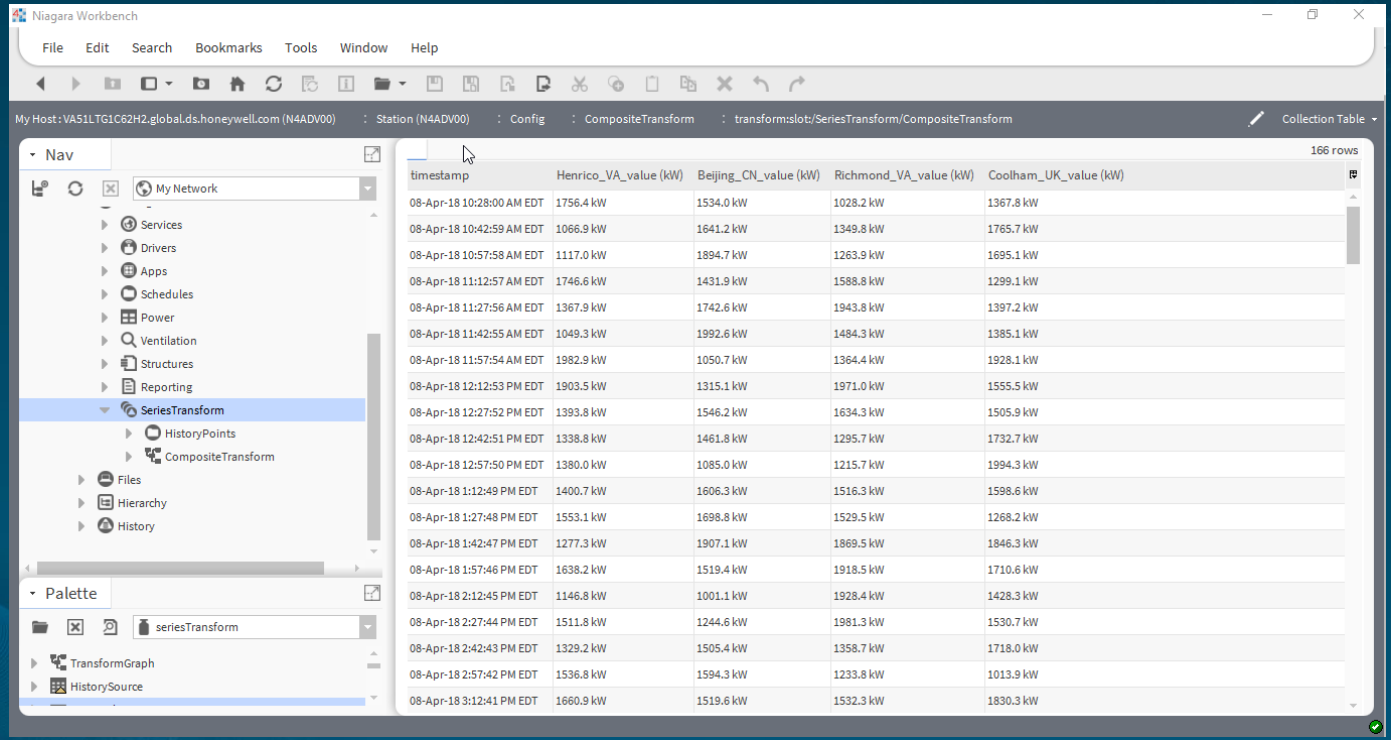
Series Transform

Composite Node



Series Transform

Composite Node

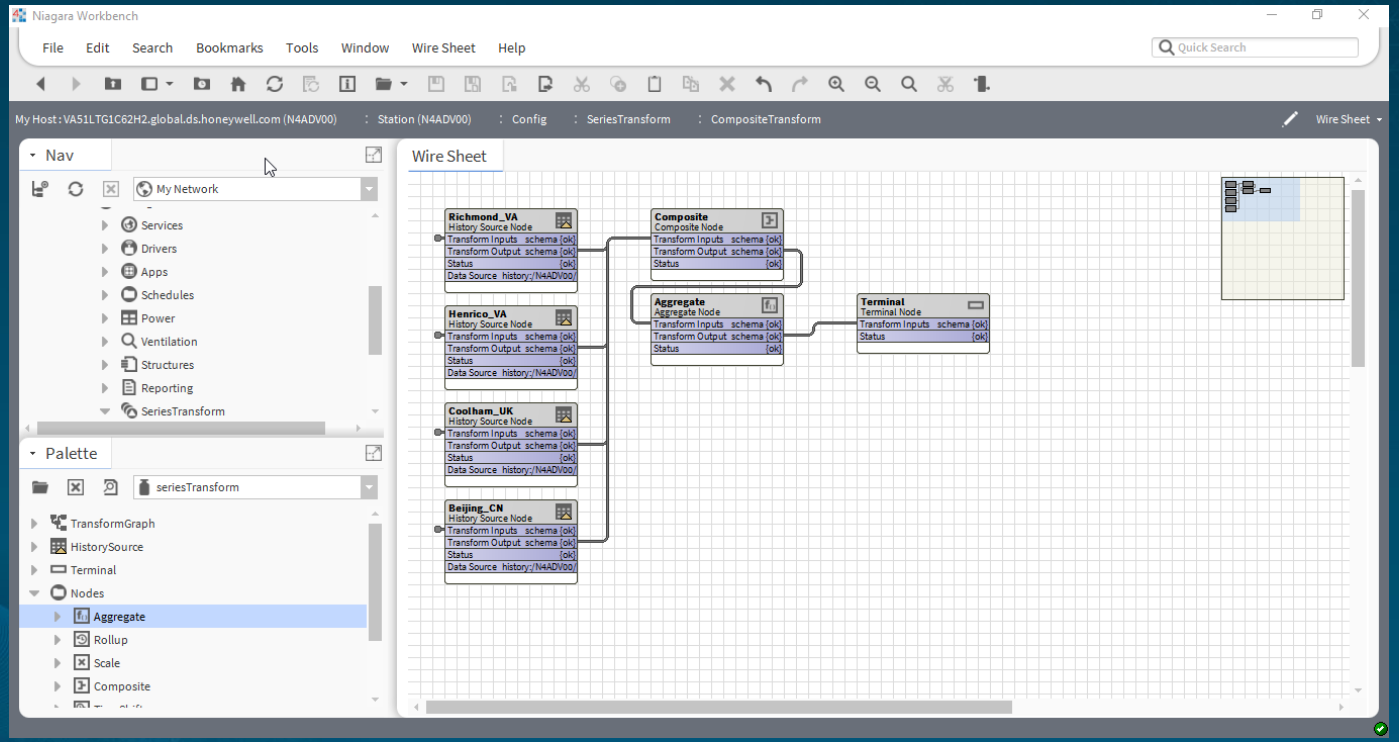


Series Transforms

- Composite Node
- Aggregate Node
- Rollup Node
- TimeShift node

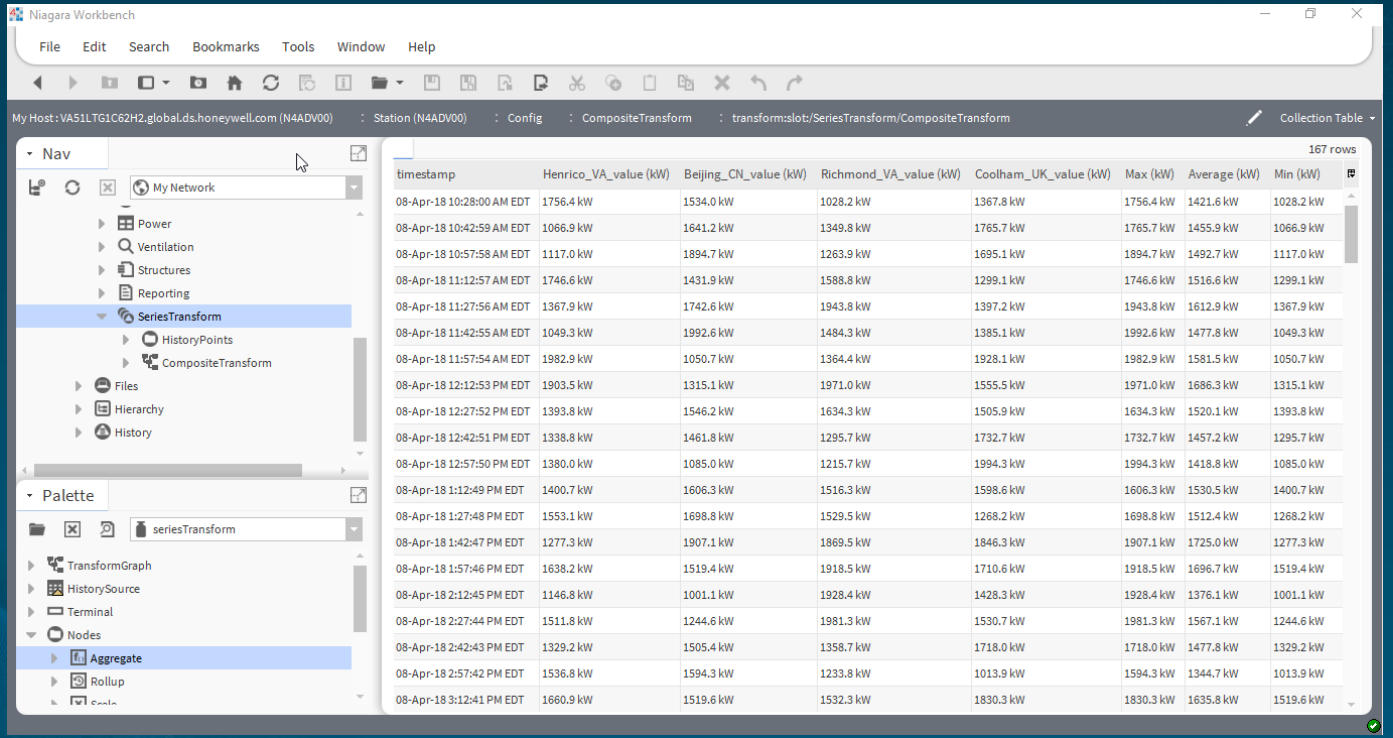
Series Transform

Aggregate Node



Series Transform

Aggregate Node



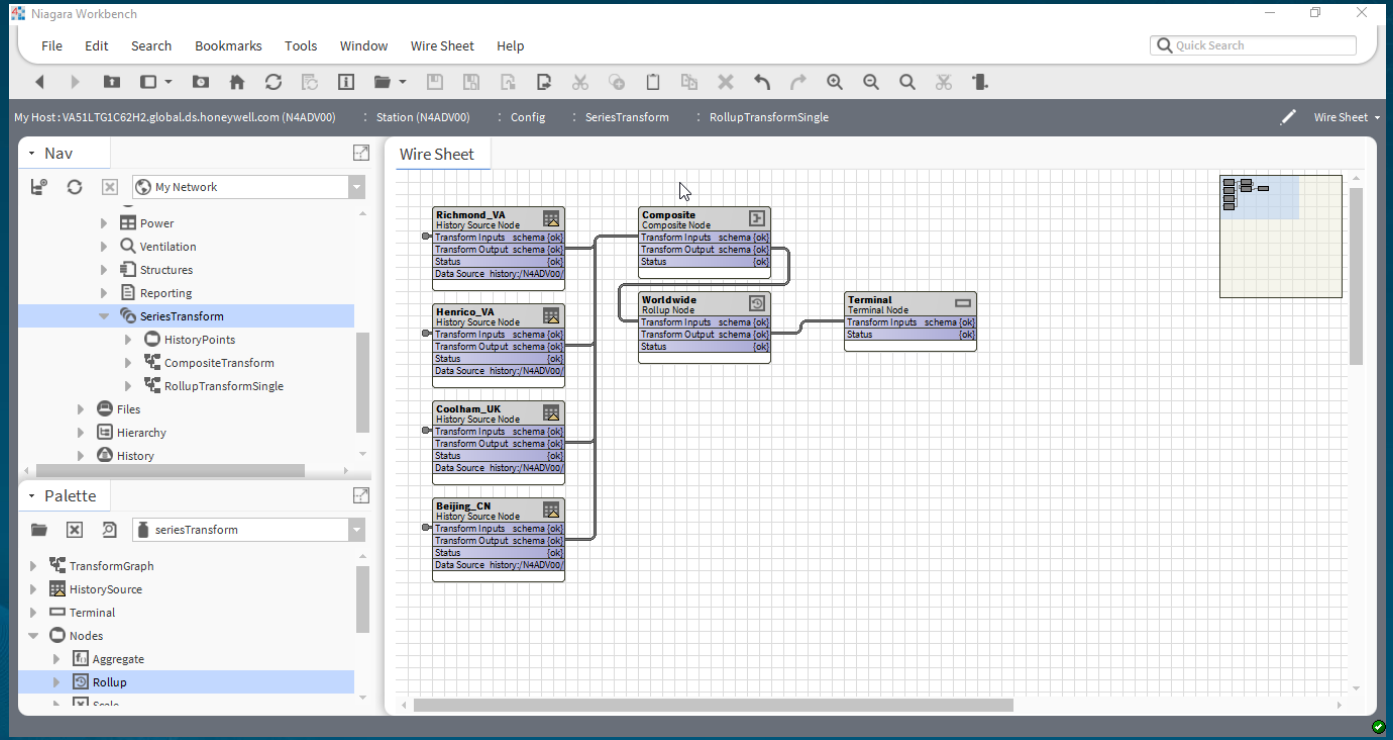
timestamp	Henrico_VA_value (kW)	Beijing_CN_value (kW)	Richmond_VA_value (kW)	Coolham_UK_value (kW)	Max (kW)	Average (kW)	Min (kW)
08-Apr-18 10:28:00 AM EDT	1756.4 kW	1534.0 kW	1028.2 kW	1367.8 kW	1756.4 kW	1421.6 kW	1028.2 kW
08-Apr-18 10:42:59 AM EDT	1066.9 kW	1641.2 kW	1349.8 kW	1765.7 kW	1765.7 kW	1455.9 kW	1066.9 kW
08-Apr-18 10:57:58 AM EDT	1117.0 kW	1894.7 kW	1263.9 kW	1695.1 kW	1894.7 kW	1492.7 kW	1117.0 kW
08-Apr-18 11:12:57 AM EDT	1746.6 kW	1431.9 kW	1588.8 kW	1299.1 kW	1746.6 kW	1516.6 kW	1299.1 kW
08-Apr-18 11:27:56 AM EDT	1367.9 kW	1742.6 kW	1943.8 kW	1397.2 kW	1943.8 kW	1612.9 kW	1367.9 kW
08-Apr-18 11:42:55 AM EDT	1049.3 kW	1992.6 kW	1484.3 kW	1385.1 kW	1992.6 kW	1477.8 kW	1049.3 kW
08-Apr-18 11:57:54 AM EDT	1982.9 kW	1050.7 kW	1364.4 kW	1928.1 kW	1982.9 kW	1581.5 kW	1050.7 kW
08-Apr-18 12:12:53 PM EDT	1903.5 kW	1315.1 kW	1971.0 kW	1555.5 kW	1971.0 kW	1686.3 kW	1315.1 kW
08-Apr-18 12:27:52 PM EDT	1393.8 kW	1546.2 kW	1634.3 kW	1505.9 kW	1634.3 kW	1520.1 kW	1393.8 kW
08-Apr-18 12:42:51 PM EDT	1338.8 kW	1461.8 kW	1295.7 kW	1732.7 kW	1732.7 kW	1457.2 kW	1295.7 kW
08-Apr-18 12:57:50 PM EDT	1380.0 kW	1085.0 kW	1215.7 kW	1994.3 kW	1994.3 kW	1418.8 kW	1085.0 kW
08-Apr-18 1:12:49 PM EDT	1400.7 kW	1606.3 kW	1516.3 kW	1598.6 kW	1606.3 kW	1530.5 kW	1400.7 kW
08-Apr-18 1:27:48 PM EDT	1553.1 kW	1698.8 kW	1529.5 kW	1268.2 kW	1698.8 kW	1512.4 kW	1268.2 kW
08-Apr-18 1:42:47 PM EDT	1277.3 kW	1907.1 kW	1869.5 kW	1846.3 kW	1907.1 kW	1725.0 kW	1277.3 kW
08-Apr-18 1:57:46 PM EDT	1638.2 kW	1519.4 kW	1918.5 kW	1710.6 kW	1918.5 kW	1696.7 kW	1519.4 kW
08-Apr-18 2:12:45 PM EDT	1146.8 kW	1001.1 kW	1928.4 kW	1428.3 kW	1928.4 kW	1376.1 kW	1001.1 kW
08-Apr-18 2:27:44 PM EDT	1511.8 kW	1244.6 kW	1981.3 kW	1530.7 kW	1981.3 kW	1567.1 kW	1244.6 kW
08-Apr-18 2:42:43 PM EDT	1329.2 kW	1505.4 kW	1358.7 kW	1718.0 kW	1718.0 kW	1477.8 kW	1329.2 kW
08-Apr-18 2:57:42 PM EDT	1536.8 kW	1594.3 kW	1233.8 kW	1013.9 kW	1594.3 kW	1344.7 kW	1013.9 kW
08-Apr-18 3:12:41 PM EDT	1660.9 kW	1519.6 kW	1532.3 kW	1830.3 kW	1830.3 kW	1635.8 kW	1519.6 kW

Series Transforms

- Composite Node
- Aggregate Node
- Rollup Node
- TimeShift node

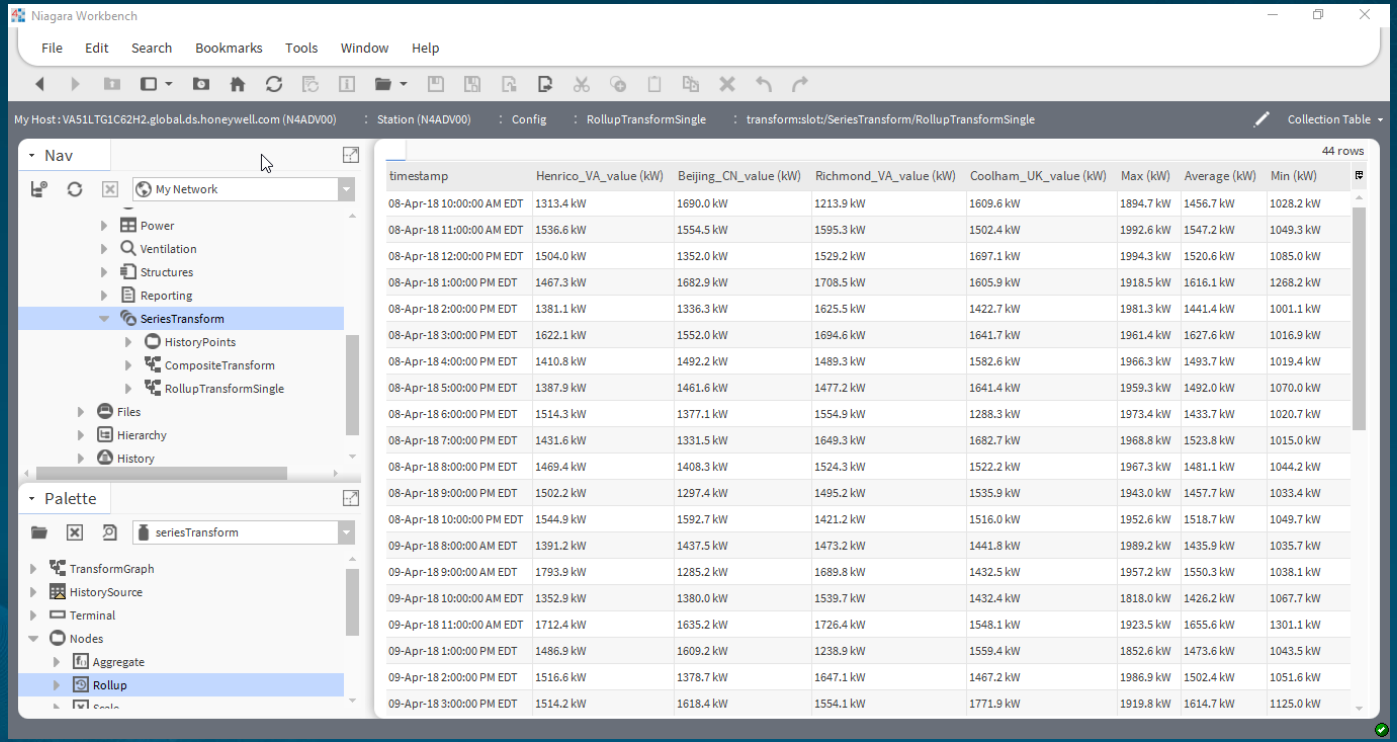
Series Transform

Rollup Node



Series Transform

Rollup Node



timestamp	Henrico_VA_value (kW)	Beijing_CN_value (kW)	Richmond_VA_value (kW)	Coolham_UK_value (kW)	Max (kW)	Average (kW)	Min (kW)
08-Apr-18 10:00:00 AM EDT	1313.4 kW	1690.0 kW	1213.9 kW	1609.6 kW	1894.7 kW	1456.7 kW	1028.2 kW
08-Apr-18 11:00:00 AM EDT	1536.6 kW	1554.5 kW	1595.3 kW	1502.4 kW	1992.6 kW	1547.2 kW	1049.3 kW
08-Apr-18 12:00:00 PM EDT	1504.0 kW	1352.0 kW	1529.2 kW	1697.1 kW	1994.3 kW	1520.6 kW	1085.0 kW
08-Apr-18 1:00:00 PM EDT	1467.3 kW	1682.9 kW	1708.5 kW	1605.9 kW	1918.5 kW	1616.1 kW	1268.2 kW
08-Apr-18 2:00:00 PM EDT	1381.1 kW	1336.3 kW	1625.5 kW	1422.7 kW	1981.3 kW	1441.4 kW	1001.1 kW
08-Apr-18 3:00:00 PM EDT	1622.1 kW	1552.0 kW	1694.6 kW	1641.7 kW	1961.4 kW	1627.6 kW	1016.9 kW
08-Apr-18 4:00:00 PM EDT	1410.8 kW	1492.2 kW	1489.3 kW	1582.6 kW	1966.3 kW	1493.7 kW	1019.4 kW
08-Apr-18 5:00:00 PM EDT	1387.9 kW	1461.6 kW	1477.2 kW	1641.4 kW	1959.3 kW	1492.0 kW	1070.0 kW
08-Apr-18 6:00:00 PM EDT	1514.3 kW	1377.1 kW	1554.9 kW	1288.3 kW	1973.4 kW	1433.7 kW	1020.7 kW
08-Apr-18 7:00:00 PM EDT	1431.6 kW	1331.5 kW	1649.3 kW	1682.7 kW	1968.8 kW	1523.8 kW	1015.0 kW
08-Apr-18 8:00:00 PM EDT	1469.4 kW	1408.3 kW	1524.3 kW	1522.2 kW	1967.3 kW	1481.1 kW	1044.2 kW
08-Apr-18 9:00:00 PM EDT	1502.2 kW	1297.4 kW	1495.2 kW	1535.9 kW	1943.0 kW	1457.7 kW	1033.4 kW
08-Apr-18 10:00:00 PM EDT	1544.9 kW	1592.7 kW	1421.2 kW	1516.0 kW	1952.6 kW	1518.7 kW	1049.7 kW
09-Apr-18 8:00:00 AM EDT	1391.2 kW	1437.5 kW	1473.2 kW	1441.8 kW	1989.2 kW	1435.9 kW	1035.7 kW
09-Apr-18 9:00:00 AM EDT	1793.9 kW	1285.2 kW	1689.8 kW	1432.5 kW	1957.2 kW	1550.3 kW	1038.1 kW
09-Apr-18 10:00:00 AM EDT	1352.9 kW	1380.0 kW	1539.7 kW	1432.4 kW	1818.0 kW	1426.2 kW	1067.7 kW
09-Apr-18 11:00:00 AM EDT	1712.4 kW	1635.2 kW	1726.4 kW	1548.1 kW	1923.5 kW	1655.6 kW	1301.1 kW
09-Apr-18 1:00:00 PM EDT	1486.9 kW	1609.2 kW	1238.9 kW	1559.4 kW	1852.6 kW	1473.6 kW	1043.5 kW
09-Apr-18 2:00:00 PM EDT	1516.6 kW	1378.7 kW	1647.1 kW	1467.2 kW	1986.9 kW	1502.4 kW	1051.6 kW
09-Apr-18 3:00:00 PM EDT	1514.2 kW	1618.4 kW	1554.1 kW	1771.9 kW	1919.8 kW	1614.7 kW	1125.0 kW

Series Transforms

- Composite Node
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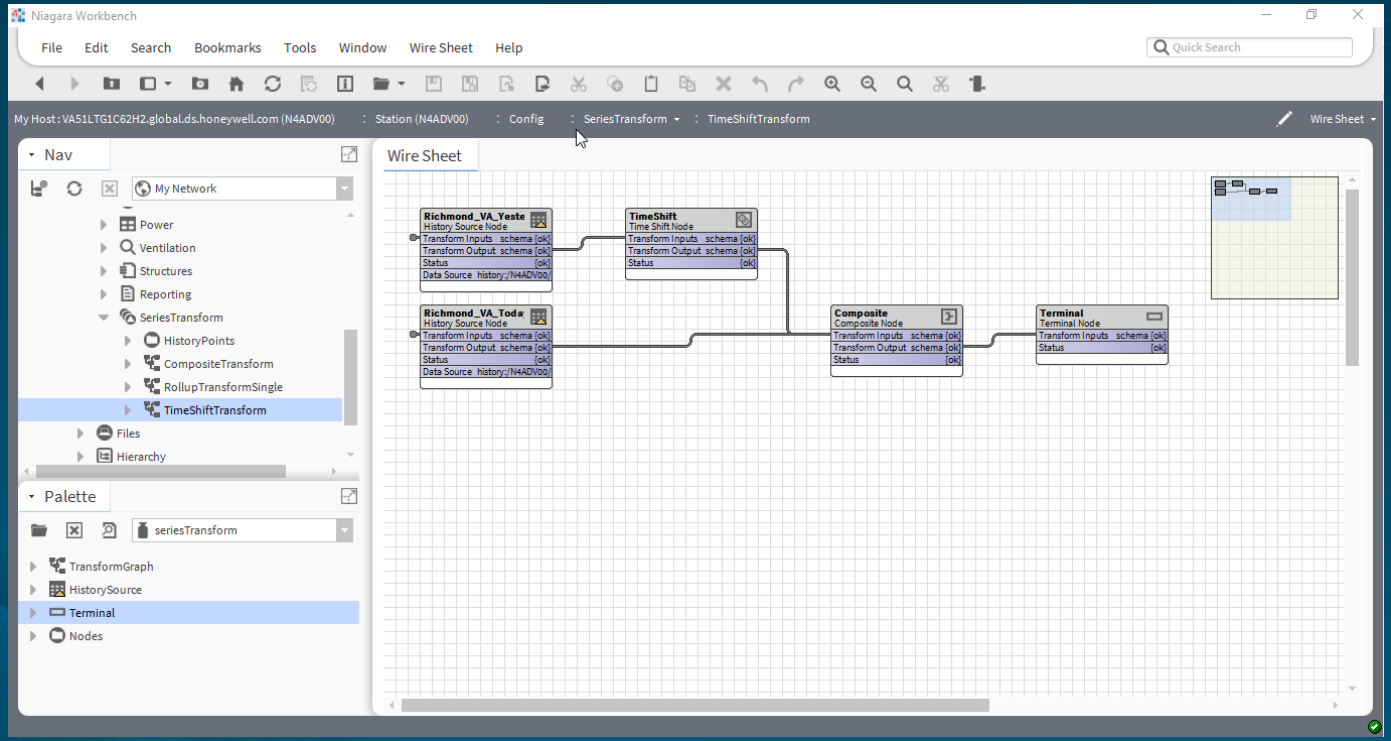
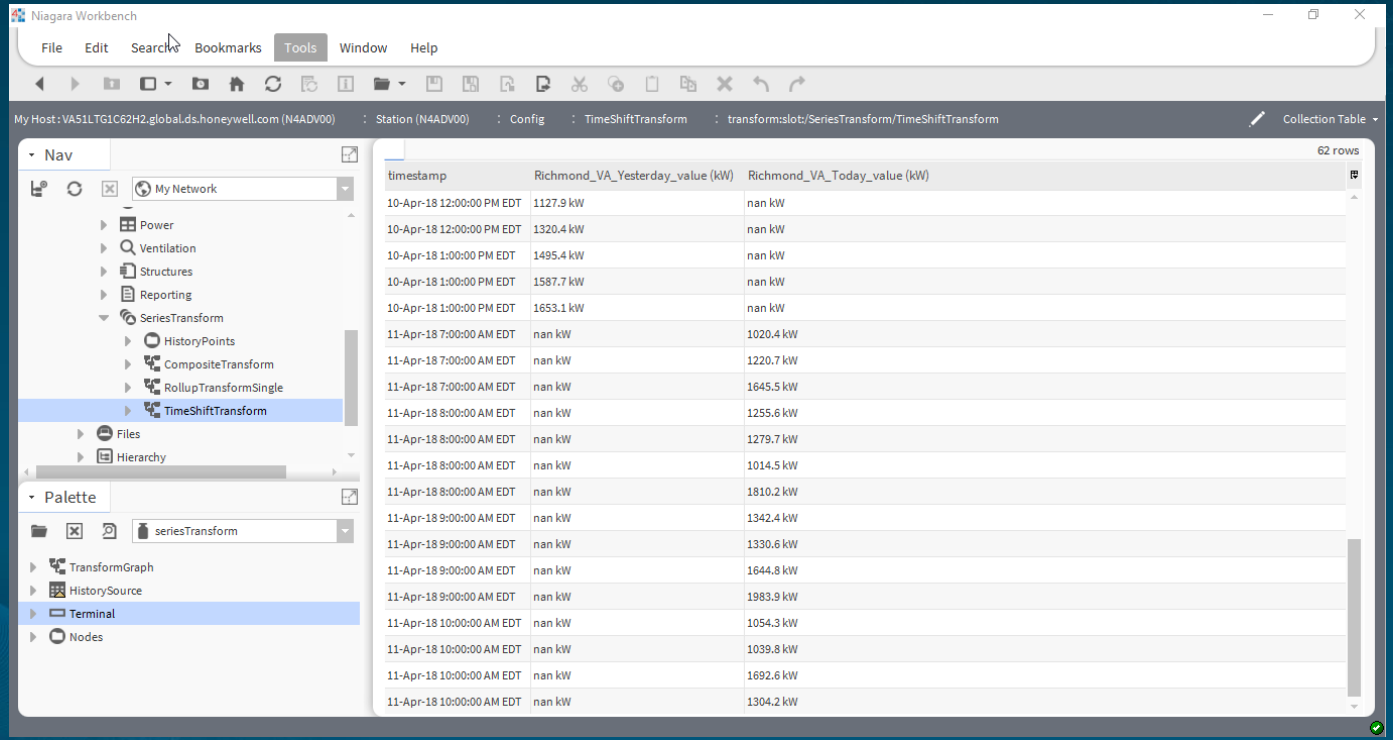
Series Transform

TimeShift Node



Series Transform

TimeShift Node



timestamp	Richmond_VA_Yesterday_value (kW)	Richmond_VA_Today_value (kW)
10-Apr-18 12:00:00 PM EDT	1127.9 kW	nan kW
10-Apr-18 12:00:00 PM EDT	1320.4 kW	nan kW
10-Apr-18 1:00:00 PM EDT	1495.4 kW	nan kW
10-Apr-18 1:00:00 PM EDT	1587.7 kW	nan kW
10-Apr-18 1:00:00 PM EDT	1653.1 kW	nan kW
11-Apr-18 7:00:00 AM EDT	nan kW	1020.4 kW
11-Apr-18 7:00:00 AM EDT	nan kW	1220.7 kW
11-Apr-18 7:00:00 AM EDT	nan kW	1645.5 kW
11-Apr-18 8:00:00 AM EDT	nan kW	1255.6 kW
11-Apr-18 8:00:00 AM EDT	nan kW	1279.7 kW
11-Apr-18 8:00:00 AM EDT	nan kW	1014.5 kW
11-Apr-18 8:00:00 AM EDT	nan kW	1810.2 kW
11-Apr-18 9:00:00 AM EDT	nan kW	1342.4 kW
11-Apr-18 9:00:00 AM EDT	nan kW	1330.6 kW
11-Apr-18 9:00:00 AM EDT	nan kW	1644.8 kW
11-Apr-18 9:00:00 AM EDT	nan kW	1983.9 kW
11-Apr-18 10:00:00 AM EDT	nan kW	1054.3 kW
11-Apr-18 10:00:00 AM EDT	nan kW	1039.8 kW
11-Apr-18 10:00:00 AM EDT	nan kW	1692.6 kW
11-Apr-18 10:00:00 AM EDT	nan kW	1304.2 kW

Problem?

- Need to display results from Series Transforms
- Need to export results from Series Transforms
- Need to conveniently organize data as an array

Solution!

- Reports and Charts

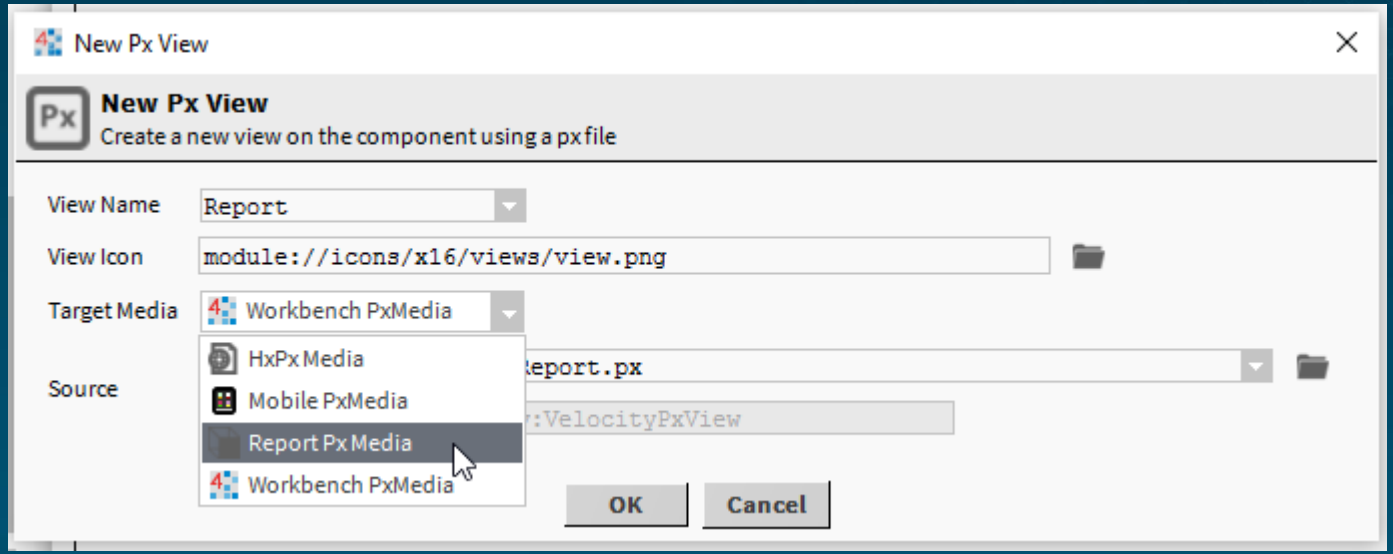
Reports

- Report Px View
- Component Grid
- Output Report to file

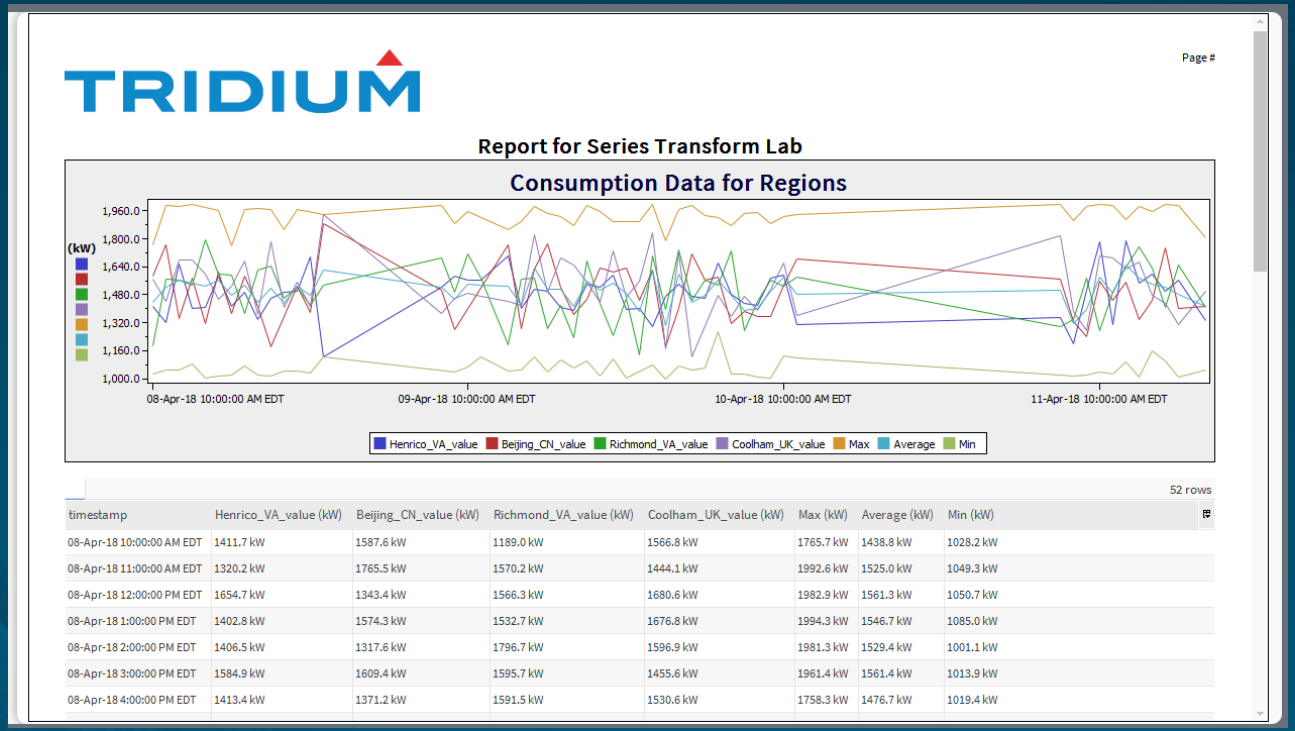
Reports

- Report Px View
- Component Grid
- Output Report to file

Report Px View



Report Px View



TRIDIUM

Page #

Report for Series Transform Lab

Consumption Data for Regions

52 rows

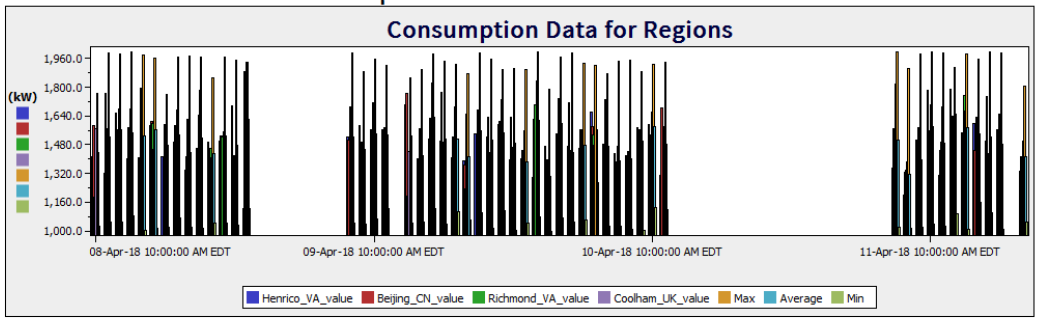
timestamp	Henrico_VA_value (kW)	Beijing_CN_value (kW)	Richmond_VA_value (kW)	Coolham_UK_value (kW)	Max (kW)	Average (kW)	Min (kW)
08-Apr-18 10:00:00 AM EDT	1411.7 kW	1587.6 kW	1189.0 kW	1566.8 kW	1765.7 kW	1438.8 kW	1028.2 kW
08-Apr-18 11:00:00 AM EDT	1320.2 kW	1765.5 kW	1570.2 kW	1444.1 kW	1992.6 kW	1525.0 kW	1049.3 kW
08-Apr-18 12:00:00 PM EDT	1654.7 kW	1343.4 kW	1566.3 kW	1680.6 kW	1982.9 kW	1561.3 kW	1050.7 kW
08-Apr-18 1:00:00 PM EDT	1402.8 kW	1574.3 kW	1532.7 kW	1676.8 kW	1994.3 kW	1546.7 kW	1085.0 kW
08-Apr-18 2:00:00 PM EDT	1406.5 kW	1317.6 kW	1796.7 kW	1596.9 kW	1981.3 kW	1529.4 kW	1001.1 kW
08-Apr-18 3:00:00 PM EDT	1584.9 kW	1609.4 kW	1595.7 kW	1455.6 kW	1961.4 kW	1561.4 kW	1013.9 kW
08-Apr-18 4:00:00 PM EDT	1413.4 kW	1371.2 kW	1591.5 kW	1530.6 kW	1758.3 kW	1476.7 kW	1019.4 kW

Report Px View

TRIDIUM

Page #

Report for Series Transform Lab



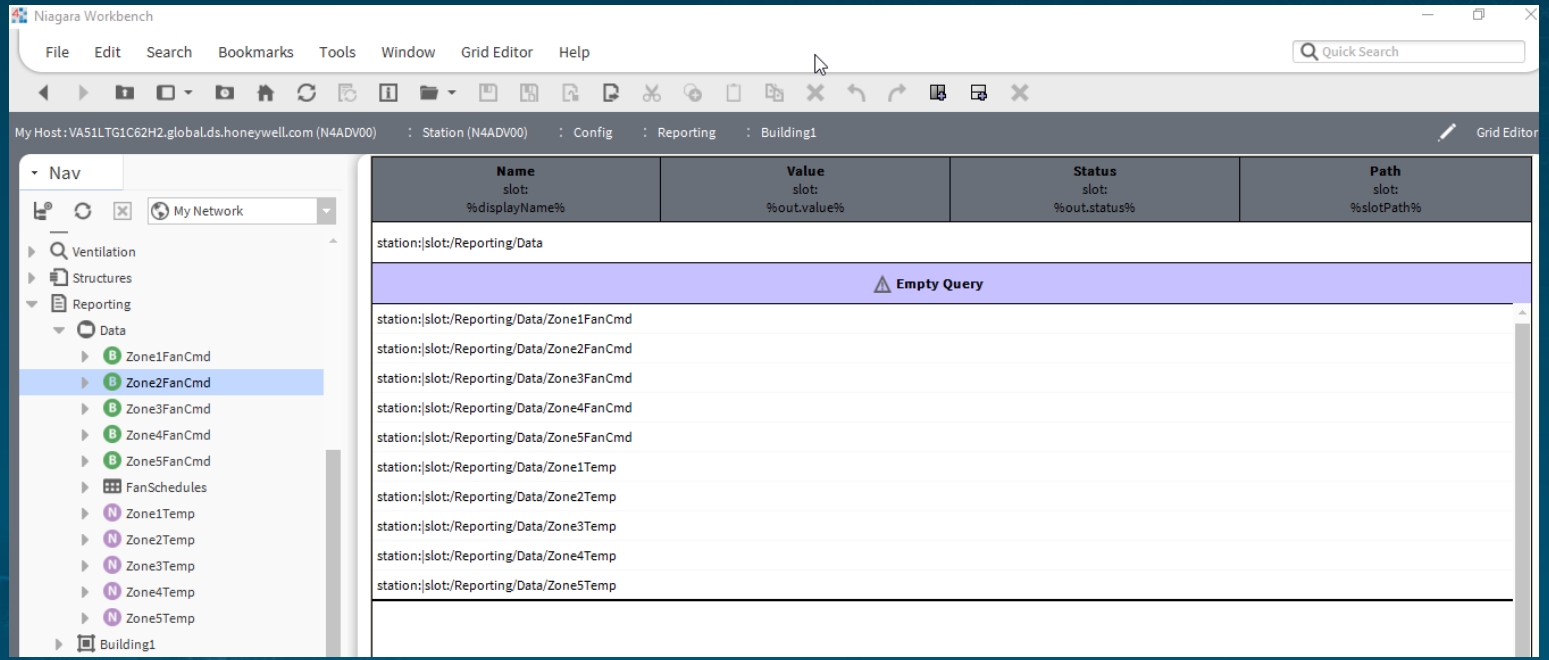
52 rows

timestamp	Henrico_VA_value (kW)	Beijing_CN_value (kW)	Richmond_VA_value (kW)	Coolham_UK_value (kW)	Max (kW)	Average (kW)	Min (kW)
08-Apr-18 10:00:00 AM EDT	1411.7 kW	1587.6 kW	1189.0 kW	1566.8 kW	1765.7 kW	1438.8 kW	1028.2 kW
08-Apr-18 11:00:00 AM EDT	1320.2 kW	1765.5 kW	1570.2 kW	1444.1 kW	1992.6 kW	1525.0 kW	1049.3 kW
08-Apr-18 12:00:00 PM EDT	1654.7 kW	1343.4 kW	1566.3 kW	1680.6 kW	1982.9 kW	1561.3 kW	1050.7 kW
08-Apr-18 1:00:00 PM EDT	1402.8 kW	1574.3 kW	1532.7 kW	1676.8 kW	1994.3 kW	1546.7 kW	1085.0 kW
08-Apr-18 2:00:00 PM EDT	1406.5 kW	1317.6 kW	1796.7 kW	1596.9 kW	1981.3 kW	1529.4 kW	1001.1 kW
08-Apr-18 3:00:00 PM EDT	1584.9 kW	1609.4 kW	1595.7 kW	1455.6 kW	1961.4 kW	1561.4 kW	1013.9 kW
08-Apr-18 4:00:00 PM EDT	1413.4 kW	1371.2 kW	1591.5 kW	1530.6 kW	1758.3 kW	1476.7 kW	1019.4 kW

Reports

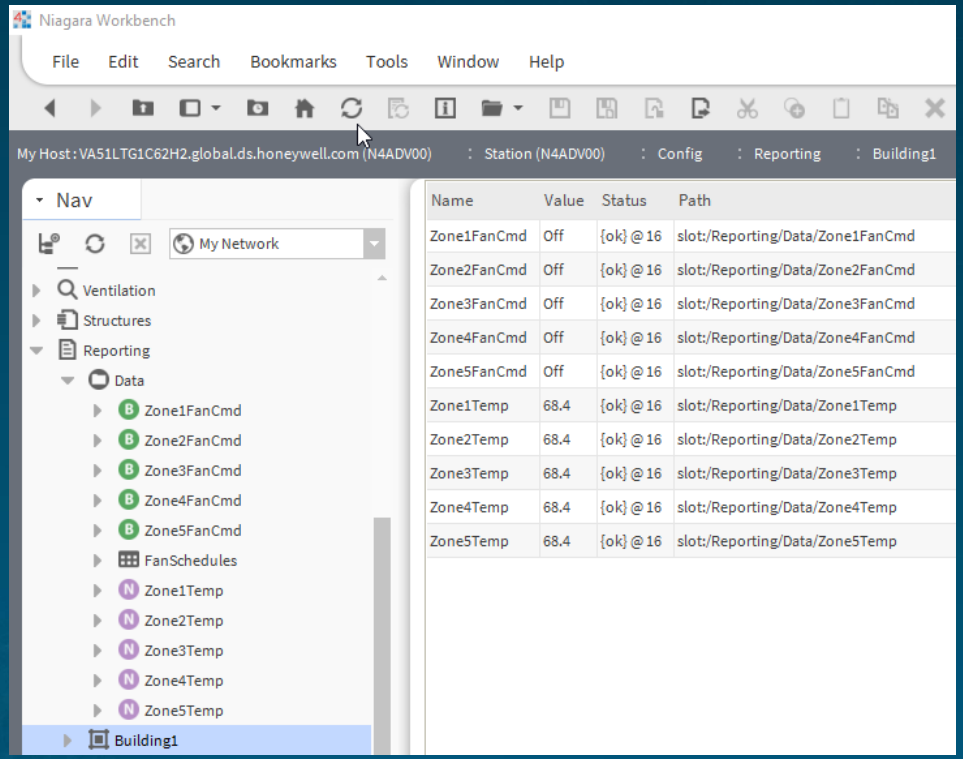
- Report Px View
- Component Grid
- Output Report to file

Component Grid

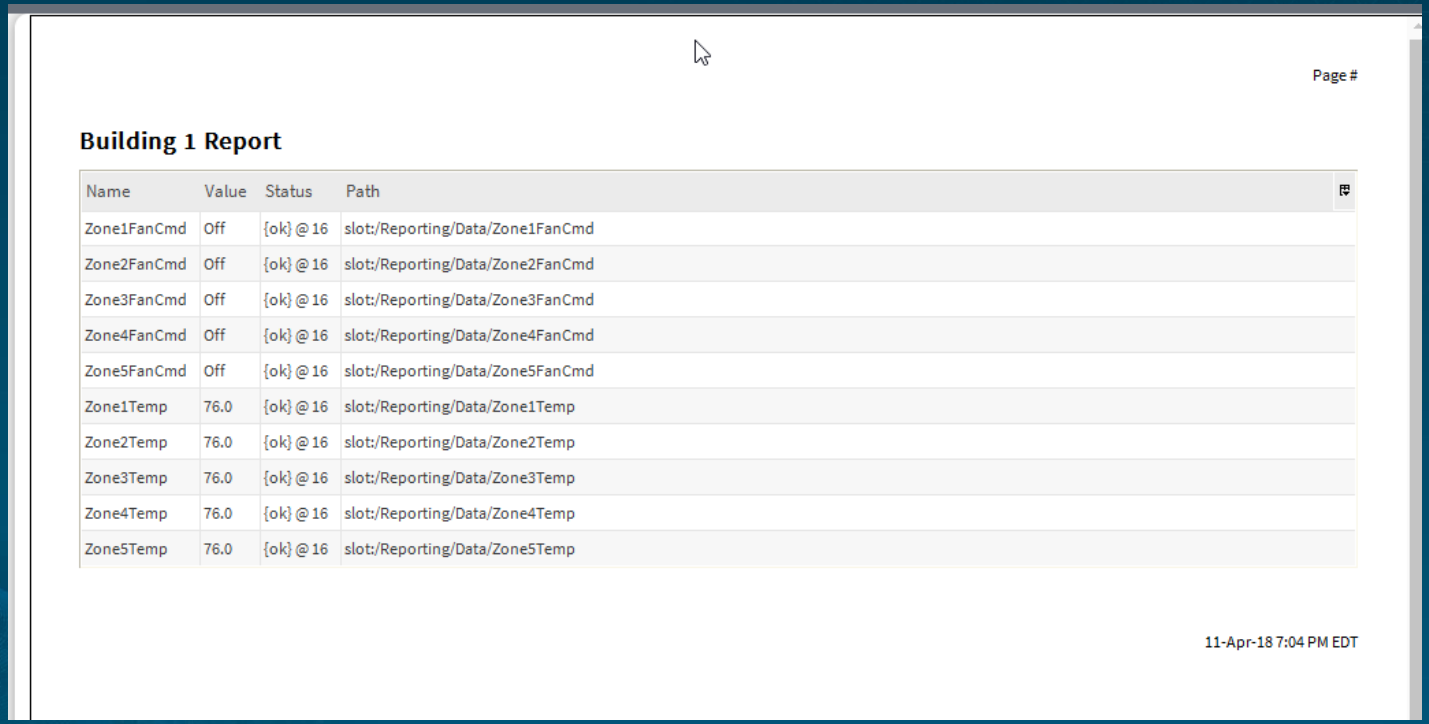


Reports

Component Grid



Component Grid in Px View



Page #

Building 1 Report

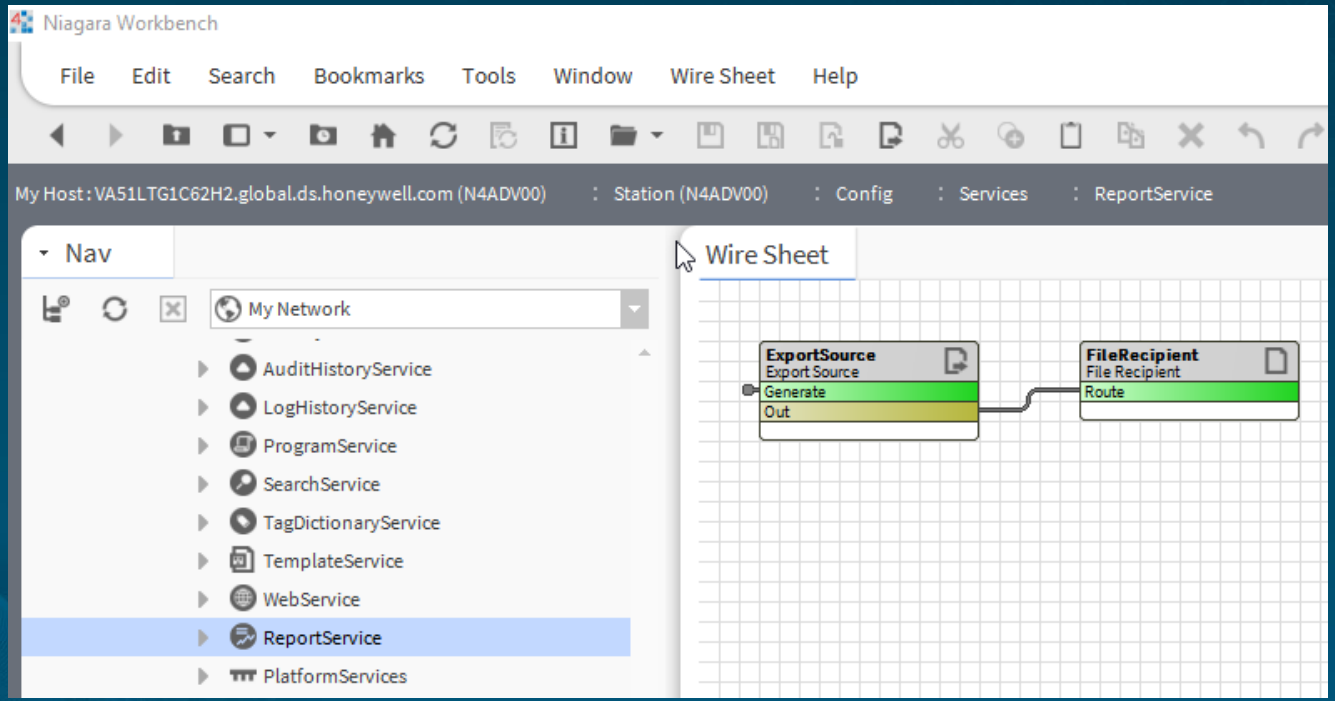
Name	Value	Status	Path
Zone1FanCmd	Off	{ok} @ 16	slot:/Reporting/Data/Zone1FanCmd
Zone2FanCmd	Off	{ok} @ 16	slot:/Reporting/Data/Zone2FanCmd
Zone3FanCmd	Off	{ok} @ 16	slot:/Reporting/Data/Zone3FanCmd
Zone4FanCmd	Off	{ok} @ 16	slot:/Reporting/Data/Zone4FanCmd
Zone5FanCmd	Off	{ok} @ 16	slot:/Reporting/Data/Zone5FanCmd
Zone1Temp	76.0	{ok} @ 16	slot:/Reporting/Data/Zone1Temp
Zone2Temp	76.0	{ok} @ 16	slot:/Reporting/Data/Zone2Temp
Zone3Temp	76.0	{ok} @ 16	slot:/Reporting/Data/Zone3Temp
Zone4Temp	76.0	{ok} @ 16	slot:/Reporting/Data/Zone4Temp
Zone5Temp	76.0	{ok} @ 16	slot:/Reporting/Data/Zone5Temp

11-Apr-18 7:04 PM EDT

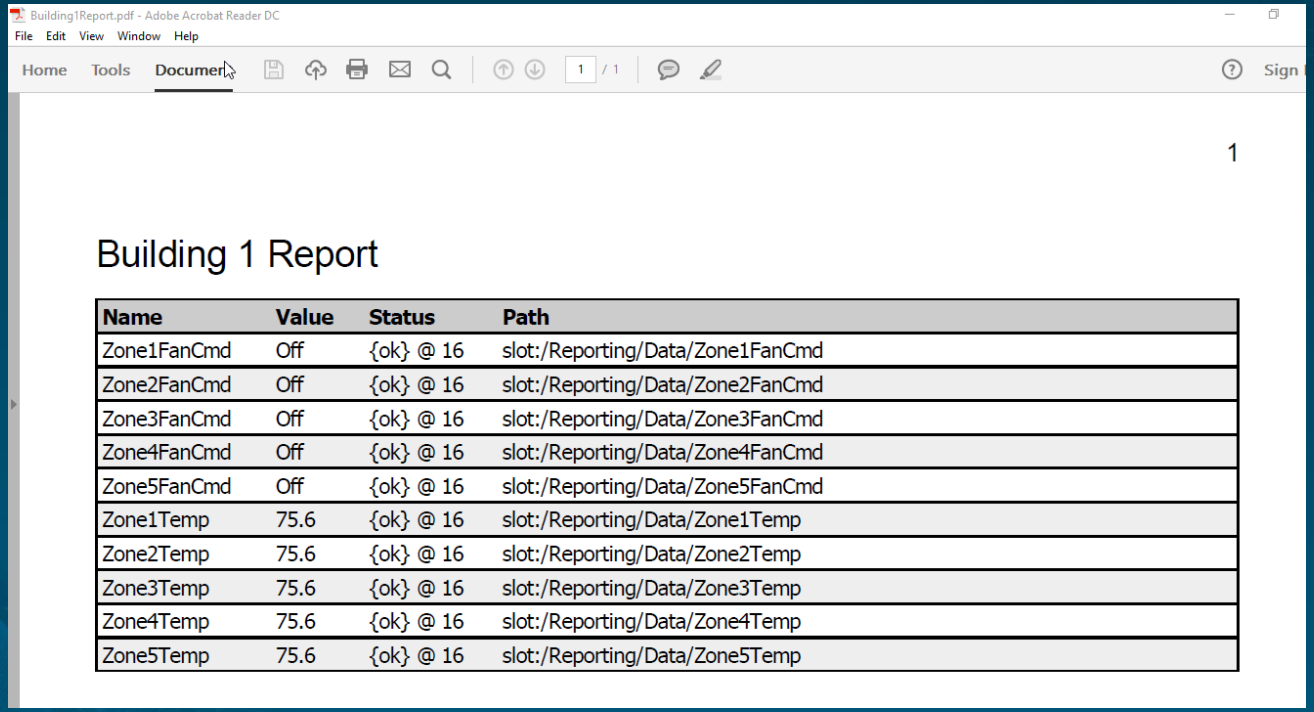
Reports

- Report Px View
- Component Grid
- Output Report to file

Output Report to File



Output Report to File



Name	Value	Status	Path
Zone1FanCmd	Off	{ok} @ 16	slot:/Reporting/Data/Zone1FanCmd
Zone2FanCmd	Off	{ok} @ 16	slot:/Reporting/Data/Zone2FanCmd
Zone3FanCmd	Off	{ok} @ 16	slot:/Reporting/Data/Zone3FanCmd
Zone4FanCmd	Off	{ok} @ 16	slot:/Reporting/Data/Zone4FanCmd
Zone5FanCmd	Off	{ok} @ 16	slot:/Reporting/Data/Zone5FanCmd
Zone1Temp	75.6	{ok} @ 16	slot:/Reporting/Data/Zone1Temp
Zone2Temp	75.6	{ok} @ 16	slot:/Reporting/Data/Zone2Temp
Zone3Temp	75.6	{ok} @ 16	slot:/Reporting/Data/Zone3Temp
Zone4Temp	75.6	{ok} @ 16	slot:/Reporting/Data/Zone4Temp
Zone5Temp	75.6	{ok} @ 16	slot:/Reporting/Data/Zone5Temp

Problem?

- Need to combine data and perform extensive analytics on results
- Need tool that is robust and can do more than basics of Series Transforms

Solution!

- Niagara 4 Analytics

Niagara 4 Analytics

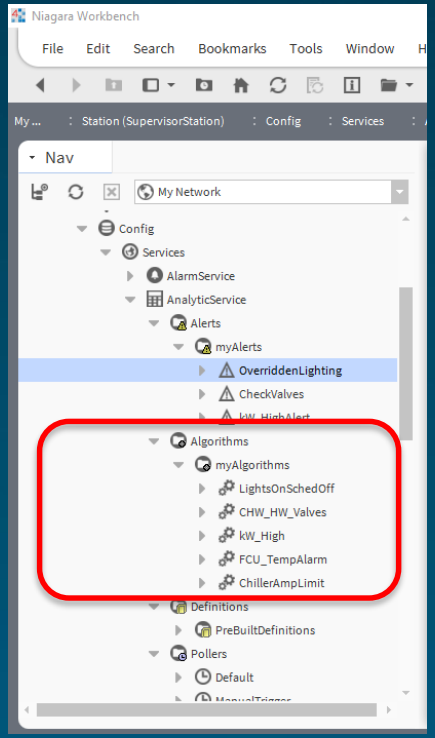
- Algorithms
- Alerts
- Analytic Graphics

Niagara 4 Analytics

- Algorithms
- Alerts
- Analytic Graphics

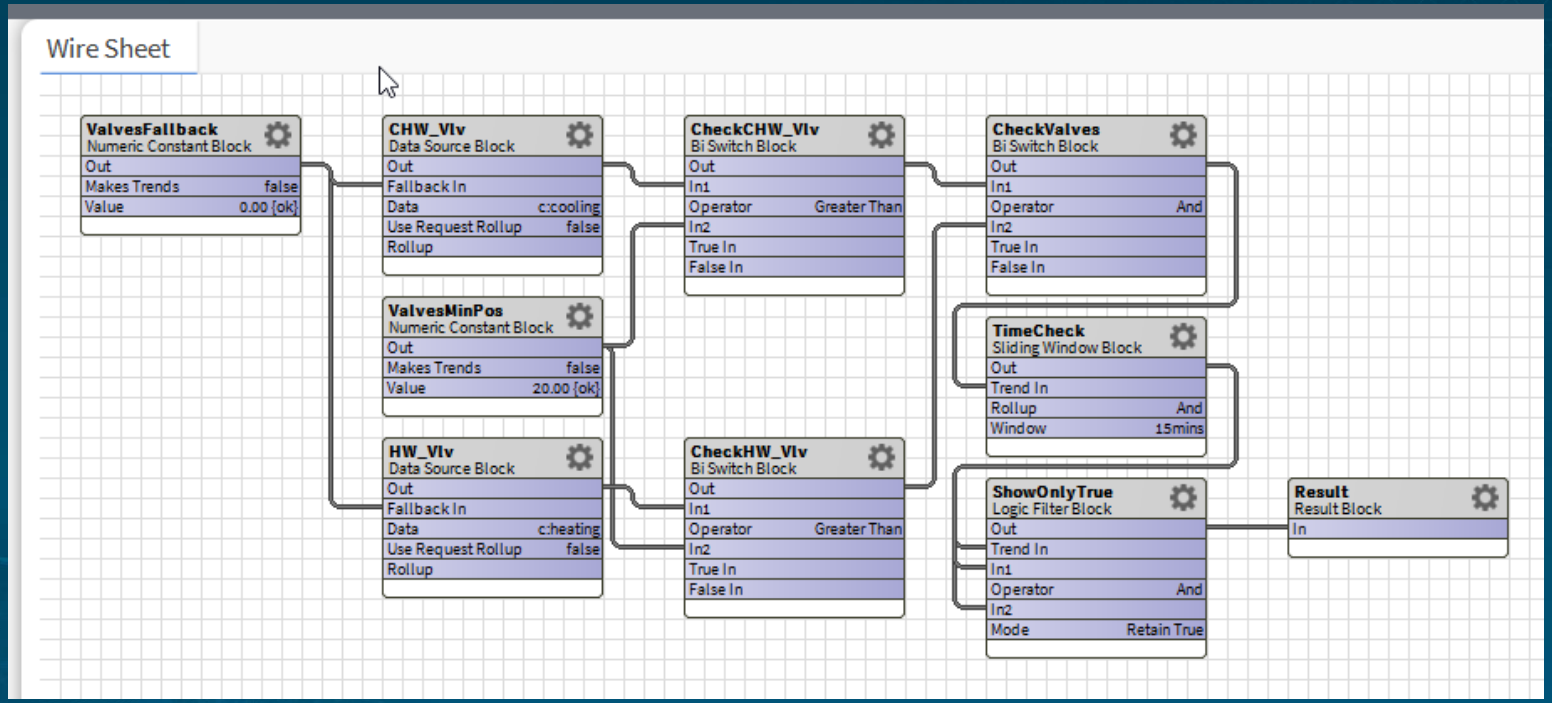
Niagara 4 Analytics

Algorithms



Niagara 4 Analytics

Algorithms

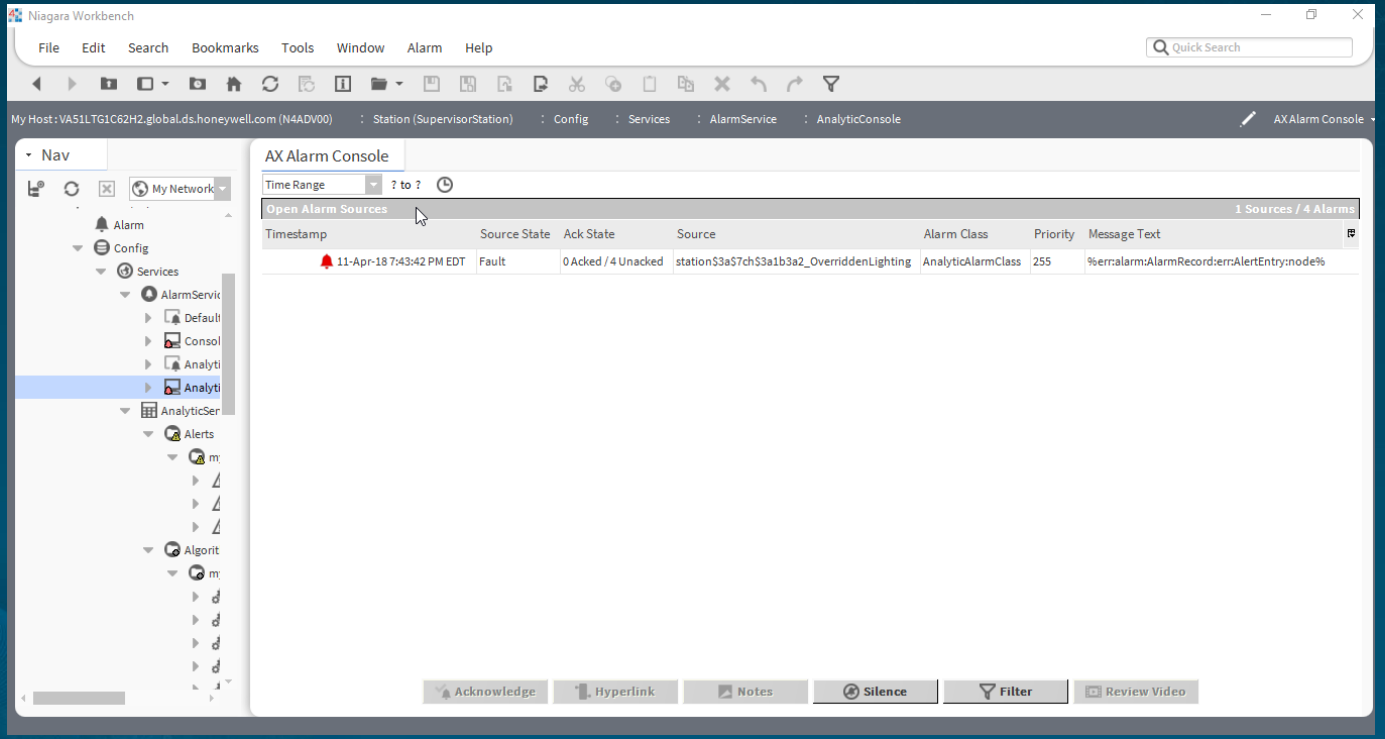


Niagara 4 Analytics

- Algorithms
- Alerts
- Analytic Graphics

Niagara 4 Analytics

Alerts

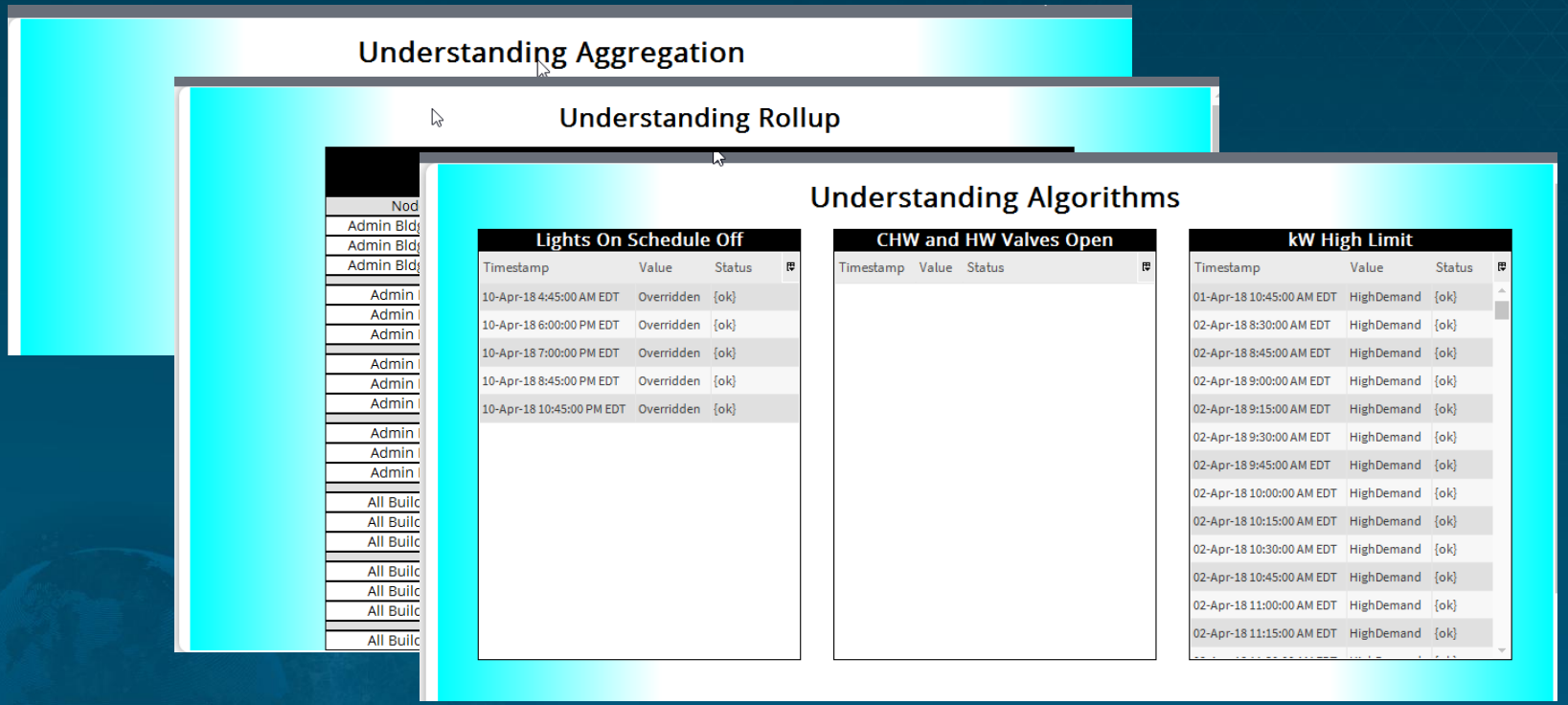


Niagara 4 Analytics

- Algorithms
- Alerts
- Analytic Graphics

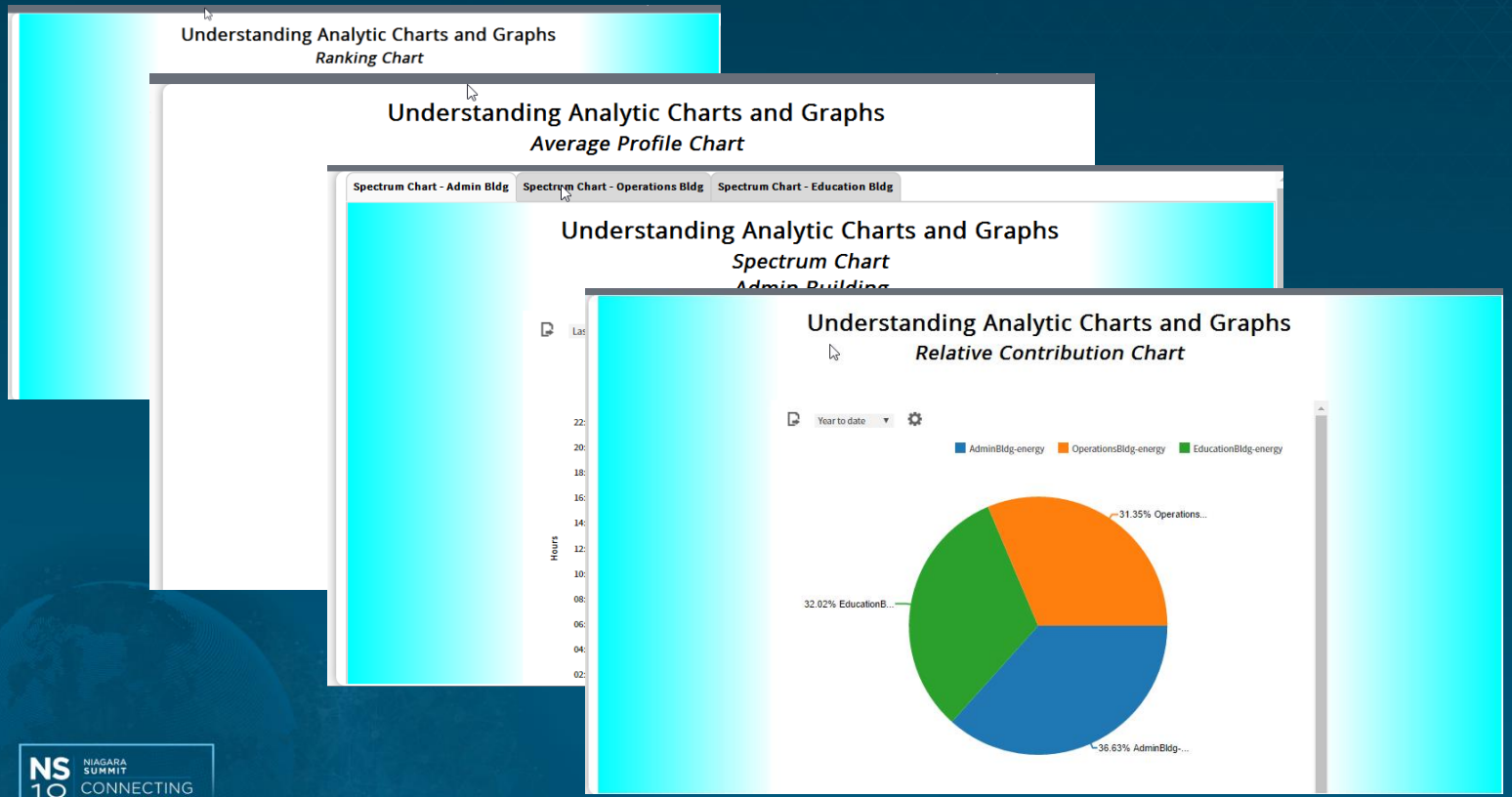
Niagara 4 Analytics

Tables



Niagara 4 Analytics

Charts



Problem?

- Need convenient way to navigate through station
- As project grows need custom navigation to dynamically update without additional work by programmer

Solution!

- Hierarchies

Hierarchies

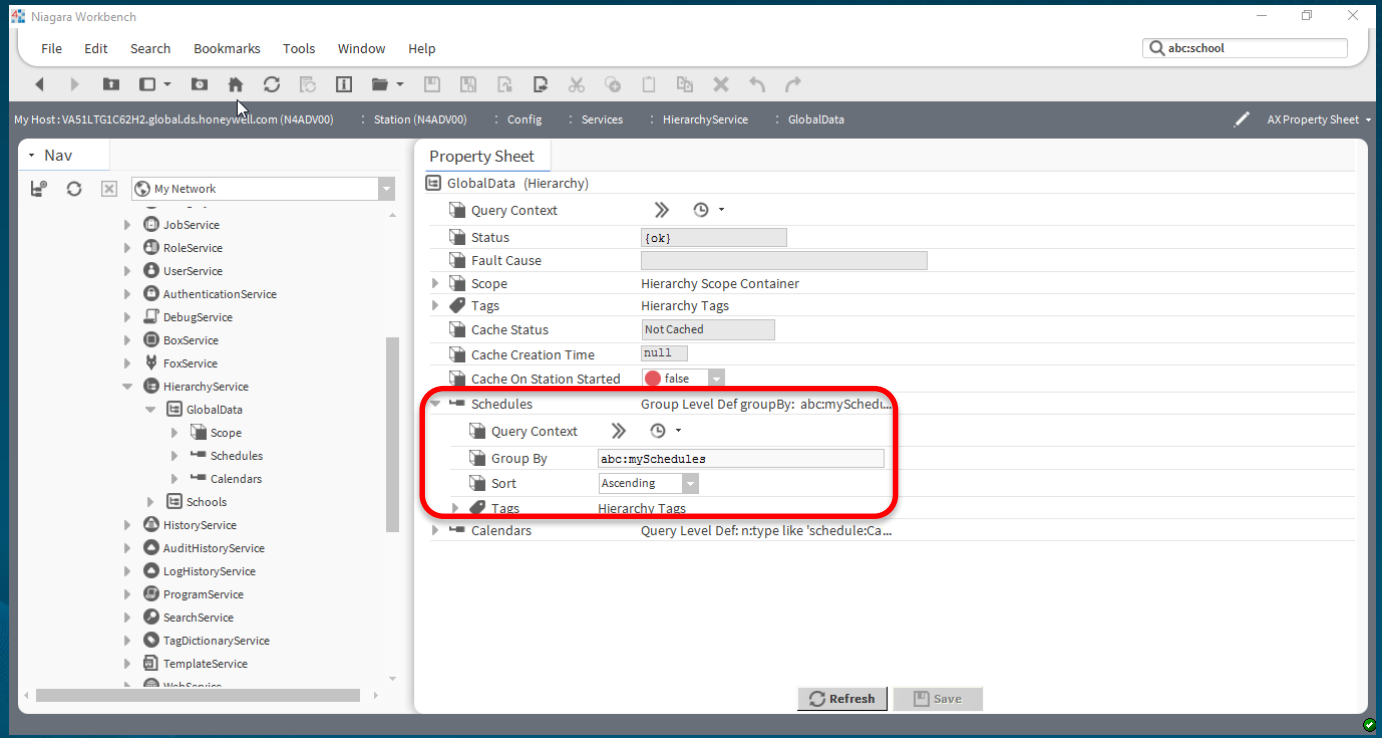
- GroupLevelDef
- ListLevelDef/NamedGroupDef
- QueryLevelDef
- RelationLevelDef

Hierarchies

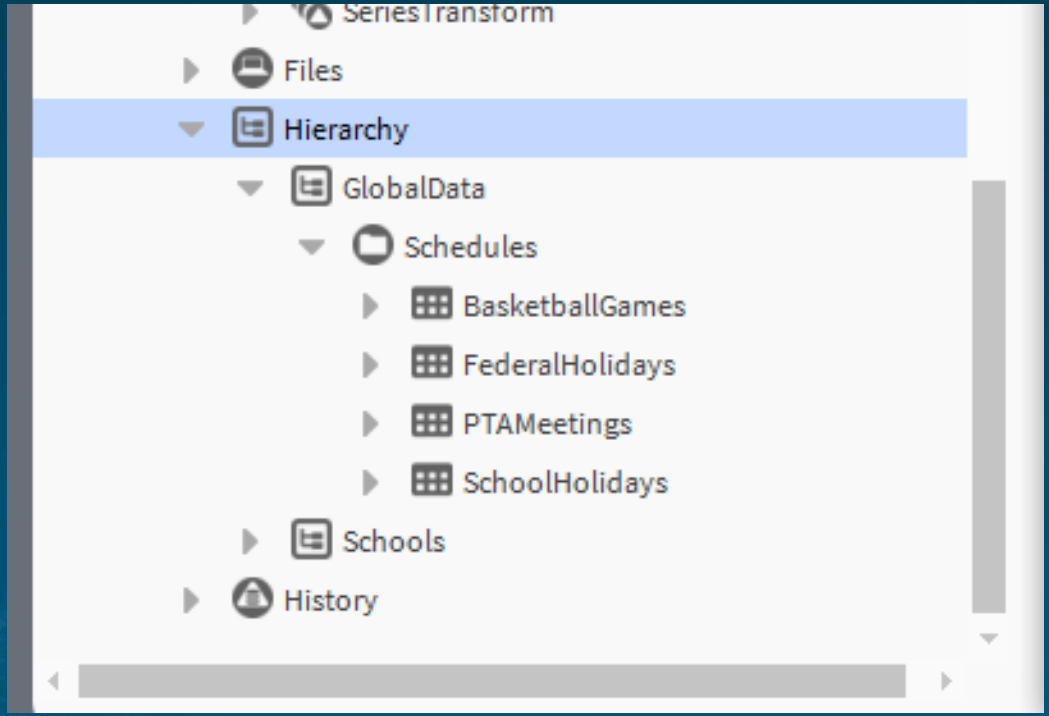
- GroupLevelDef
- ListLevelDef/NamedGroupDef
- QueryLevelDef
- RelationLevelDef

Hierarchies

GroupLevelDef



GroupLevelDef

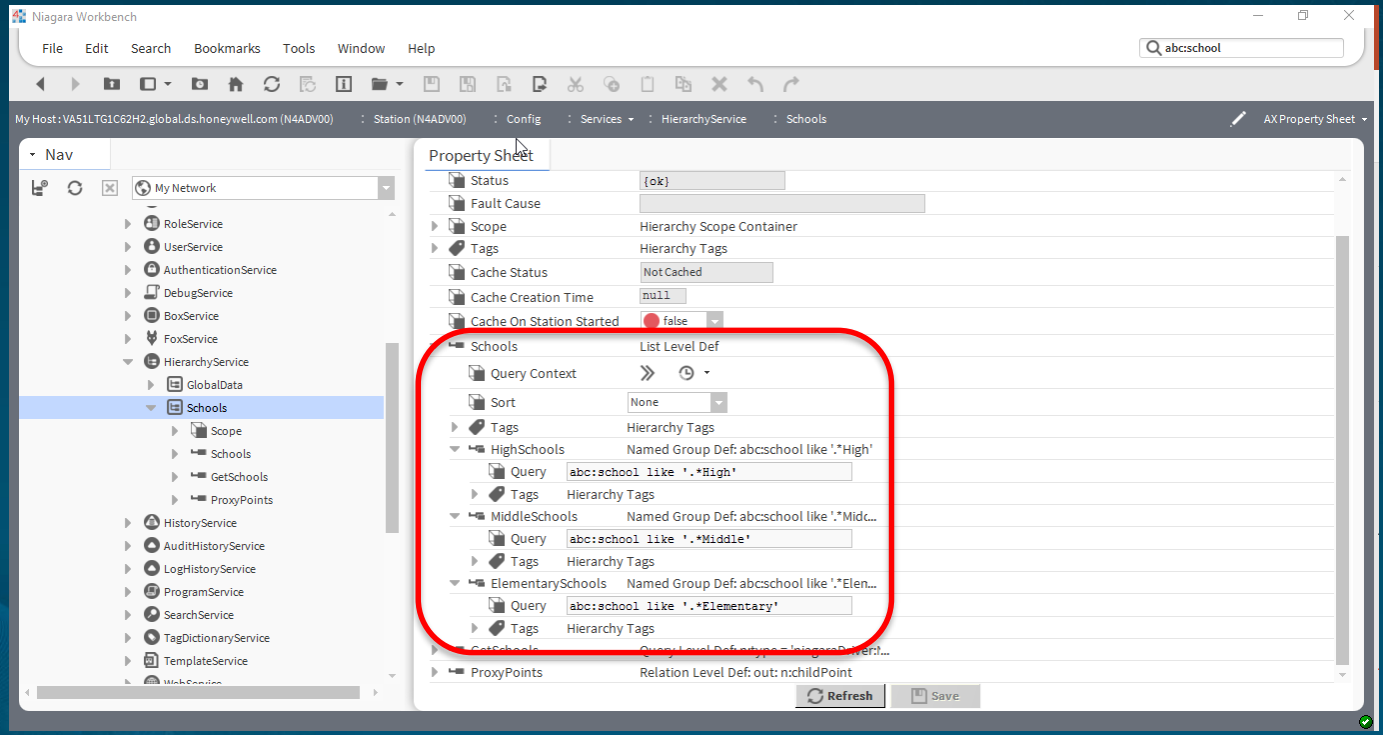


Hierarchies

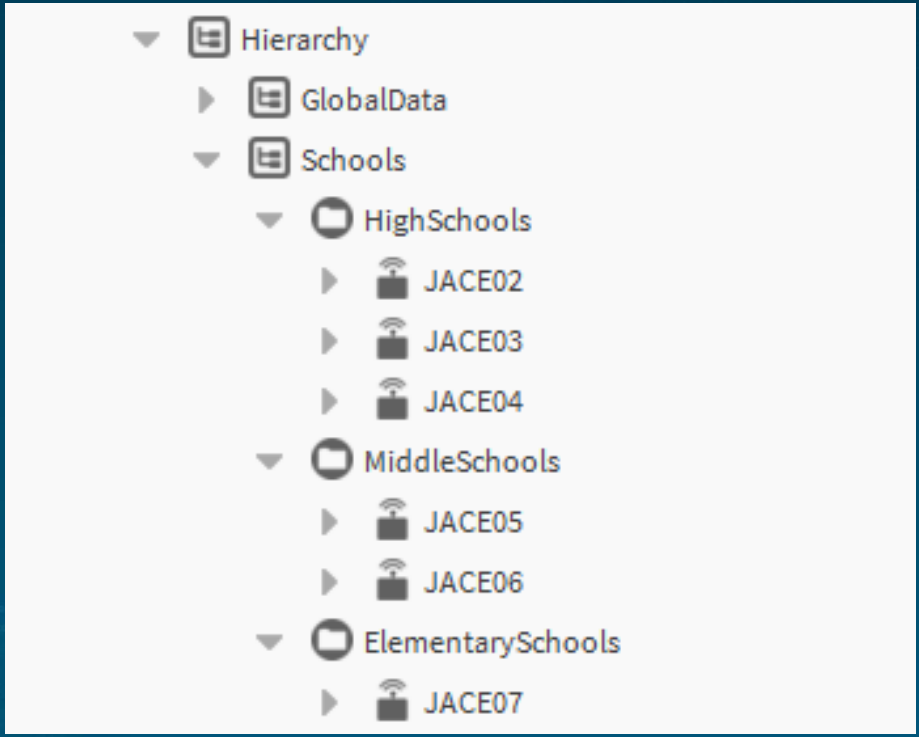
- GroupLevelDef
- ListLevelDef/NamedGroupDef
- QueryLevelDef
- RelationLevelDef

Hierarchies

ListLevelDef/NamedGroupDef



ListLevelDef/NamedGroupDef

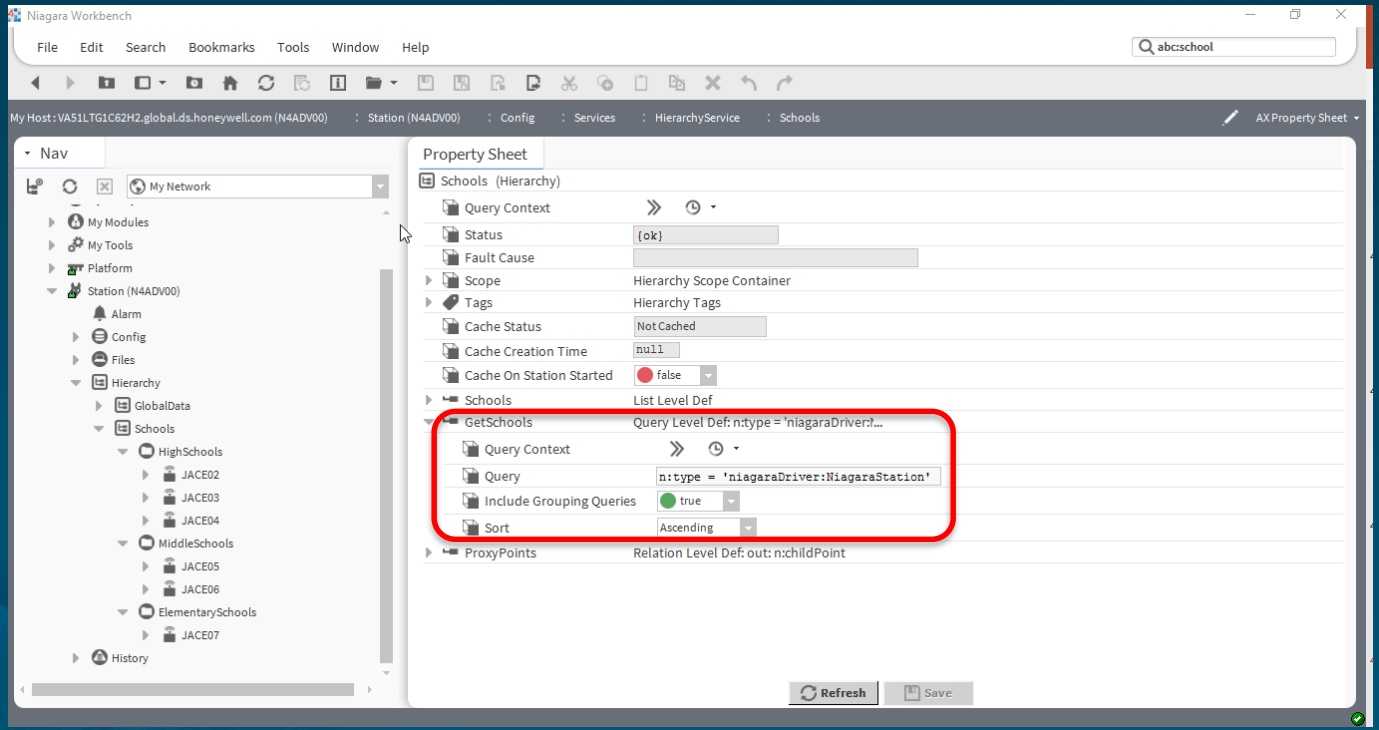


Hierarchies

- GroupLevelDef
- ListLevelDef/NamedGroupDef
- QueryLevelDef
- RelationLevelDef

Hierarchies

QueryLevelDef

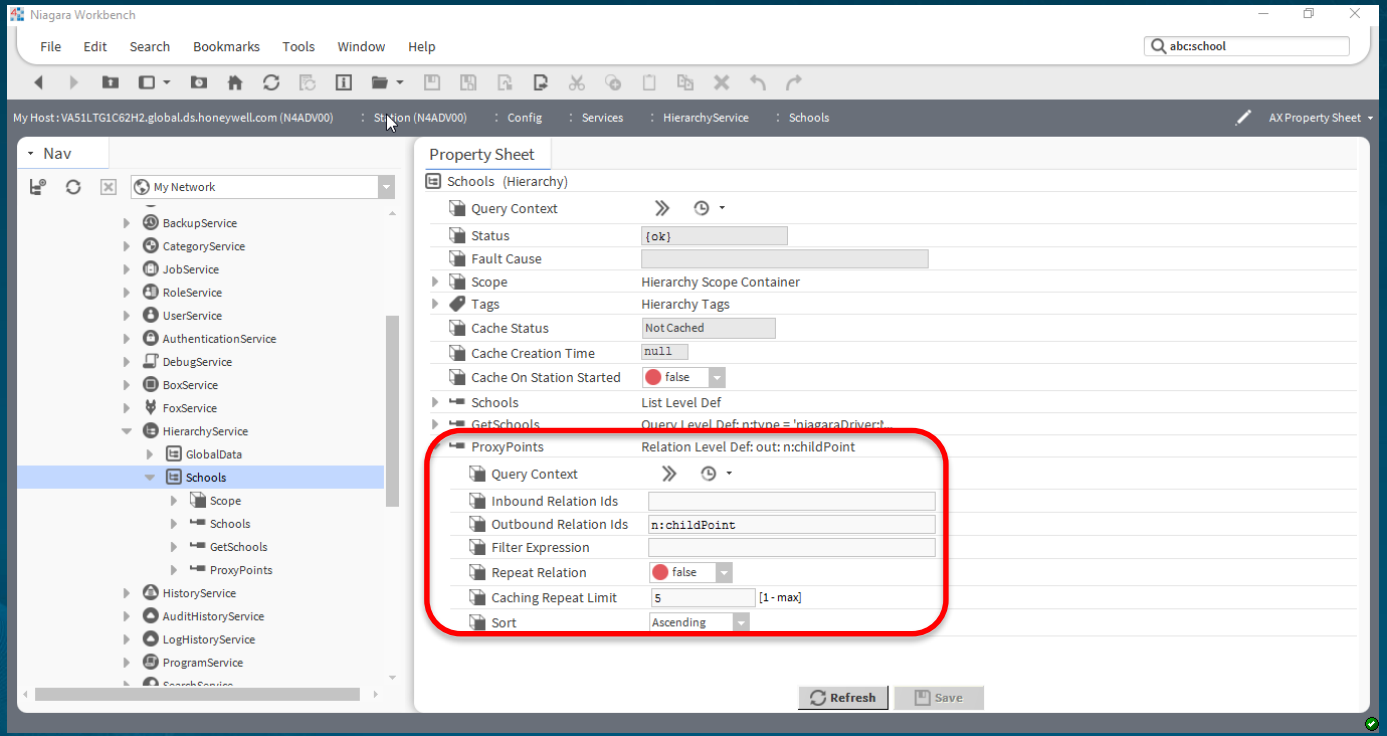


Hierarchies

- GroupLevelDef
- ListLevelDef/NamedGroupDef
- QueryLevelDef
- RelationLevelDef

Hierarchies

RelationLevelDef



Problem?

- Need to reduce time to upgrade small job to large job
- Do not want to spend time ‘re-doing’ work that was done previously

Solution!

- Exports Tags

Export Tags

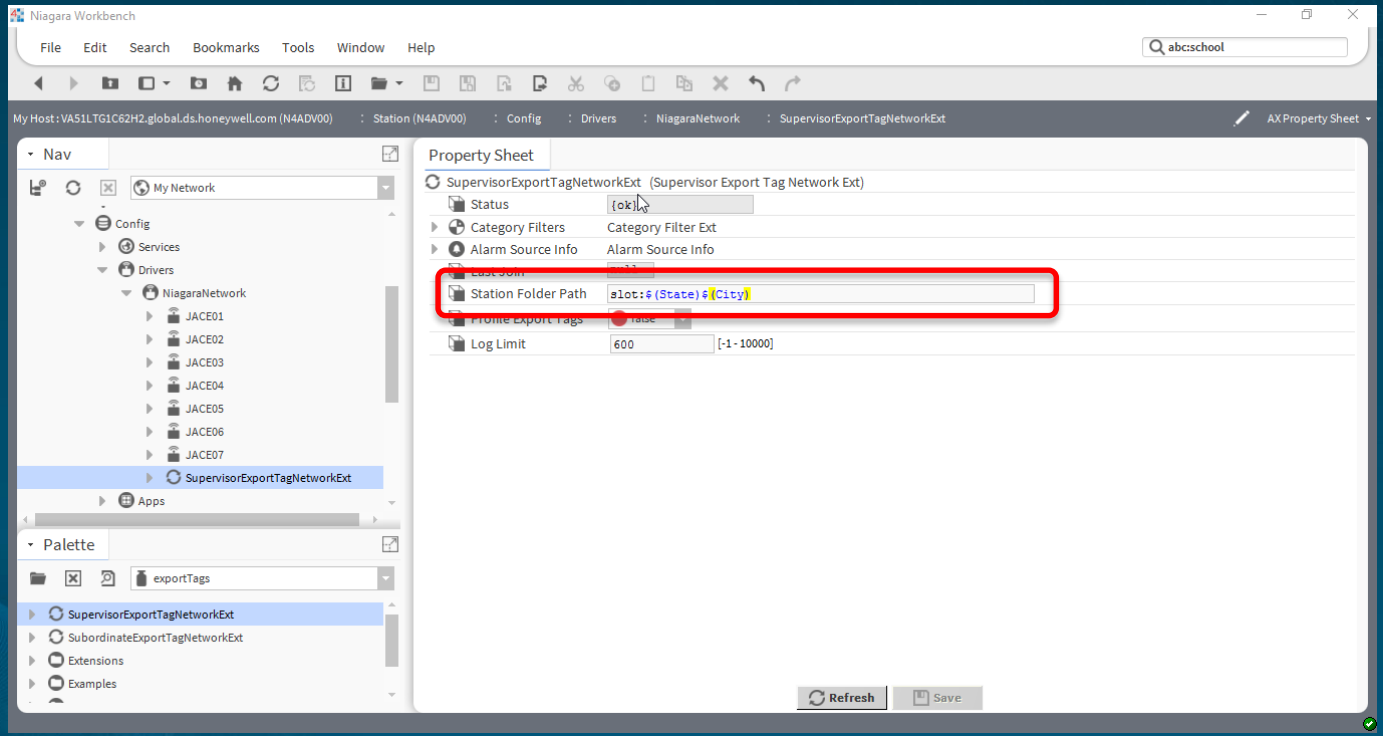
- Prepare Supervisor Station
- Prepare JACE Station
- Merge Stations

Export Tags

- Prepare Supervisor Station
- Prepare JACE Station
- Merge Stations

Export Tags

Prepare Supervisor Station

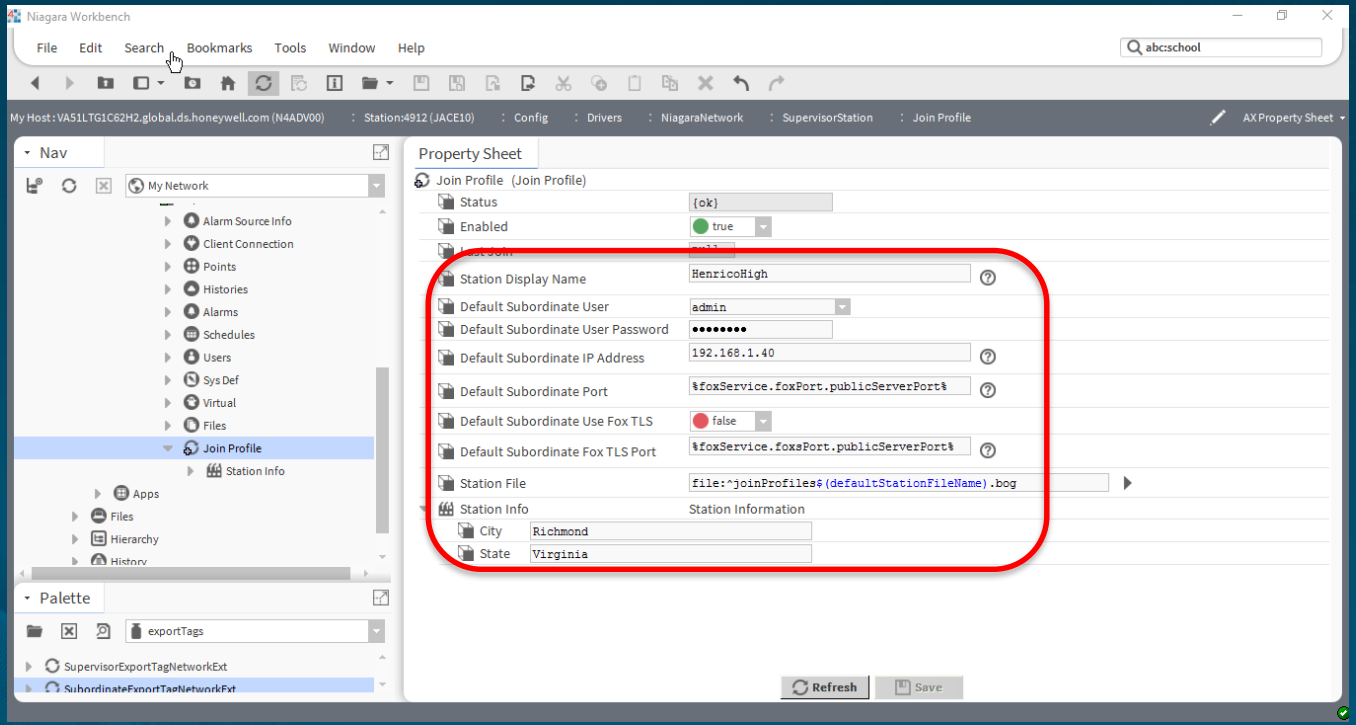


Export Tags

- Prepare Supervisor Station
- Prepare JACE Station
- Merge Stations

Export Tags

Prepare JACE Station

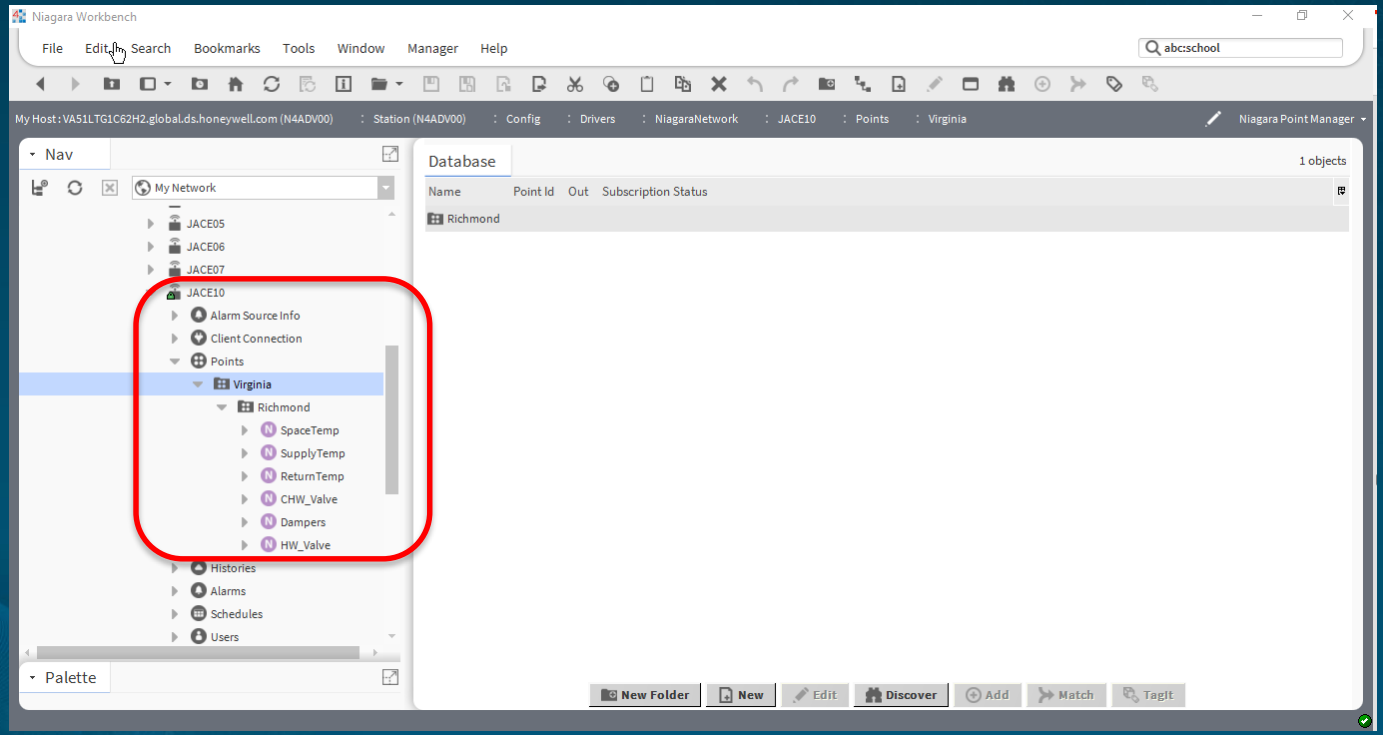


Export Tags

- Prepare Supervisor Station
- Prepare JACE Station
- Merge Stations

Export Tags

Merge Stations



Problem?

- Need to efficiently backup stations on a large site
- Need to efficiently update modules on a large site
- Need to efficiently manage a large site

Solution!

- Provisioning Niagara

Provisioning Niagara

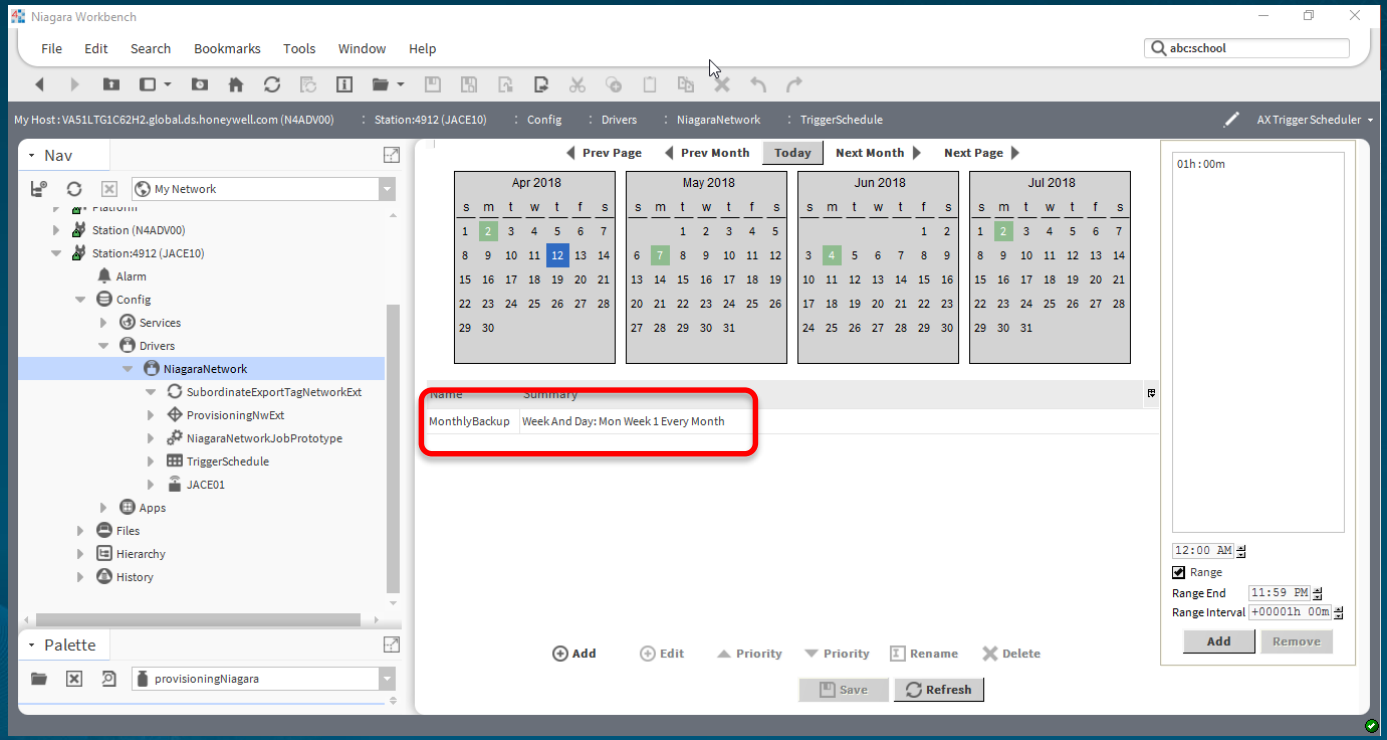
- Backup Stations
- Updates Stations

Provisioning Niagara

- Backup Stations
- Update Stations

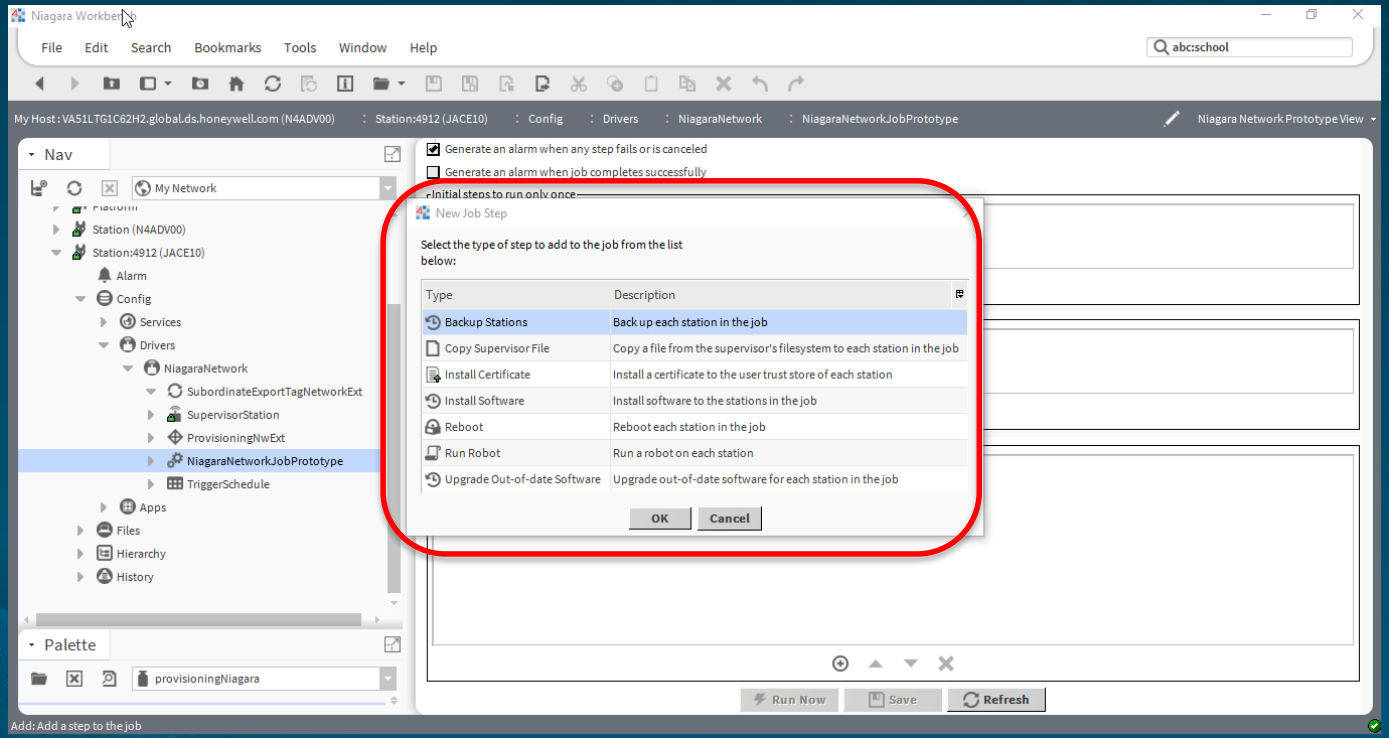
Provisioning Niagara

Backup Stations



Provisioning Niagara

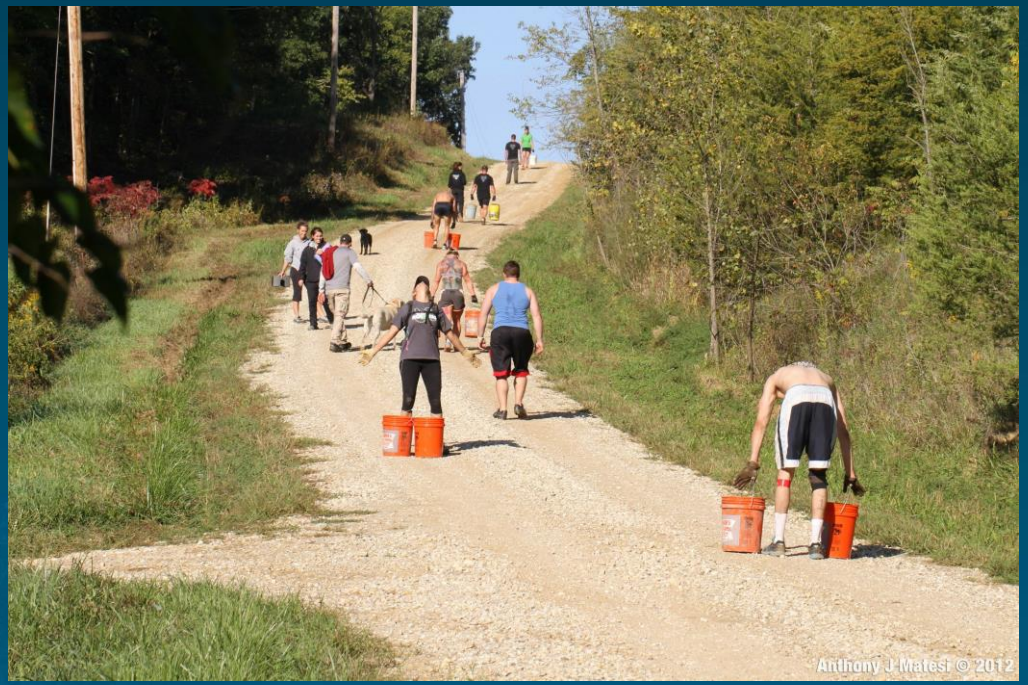
Update Stations



Examples

Summary

Don’t be part of the ‘Bucket Brigade’



Summary

Take advantage of the new features in Niagara 4

How?

Niagara 4 Advanced Technical Certification Program (TCP) (AMER)

STATUS: Enrolled | KEYWORDS: ilt english amer | LANGUAGE: English | TYPE: Event

Educates students to an Advanced level of technical expertise to effectively and efficiently design, engineer, and program "cyber-secure", enterprise-wide, supervisor projects using the Niagara 4 Framework and demonstrate how to migrate existing Niagara AX stations to the N4 model. | Prerequisites: Niagara 4 certification | Audience: Systems Integrators, OEMs, distributors, and other business partners | Certification: Niagara 4 Advanced TCP | 5-day, Instructor Led Training, Part #: TRN-CRS-N4-ADV, Price: $2890 USD

Material	Description	Instructions	Downloads
Agenda N4 Advanced TCP (5.15.17)	Brief class agenda.	Download PDF and review.	[Niagara 4 Advanced Training Agenda (5.15.17).pdf]
Training Locations (10.24.16)	List of recommended accommodations and travel instructions.	Don't book travel until you have received enrollment confirmation.	[Training Locations AMER 10-24-16.pdf]

Thanks

Niagara 4 Advanced TCP (Tridium)

- May 7 - 11, 2018 Stanford University – Palo Alto, CA
- May 14 - 18, 2018 Tridium HQ – Richmond, VA
- Jul 30 - Aug 3, 2018 Tridium EMEA HQ – Coolham, UK
- May 28 - Jun 1, 2018 Padova, Italy
- Jun 11 - 15, 2018 Monza, Italy
- Jun 18 - 22, 2018 Kuala Lumpur, Malaysia
- Jun 25 - 29, 2018 Adelaide, Australia

TRIDIUM

Cochrane Technical Service

- Jun 4 - 8, 2018 Madison Heights, MI
- Jun 18 - 22, 2018 Cleveland OH

TRIDIUM

Honeywell

• Apr 23 - 27, 2018	Minvalco	Minneapolis, MN
• May 7 - 11, 2018	Control Depot	Omaha, NE
• Jun 4 - 8, 2018	G&O Thermal	Chicago, IL
• Oct 22 - 26, 2018	Jackson Controls	Indianapolis, IN
• Nov 5 - 9, 2018	USG	Cedar Knolls, NJ

TRIDIUM

Vardell Technical Training

- Apr 23 - 27, 2018 Green Bay, WI
- Jun 4 - 8, 2018 Philadelphia, PA
- Jul 30 – Aug 3, 2018 Lake Forest, CA

TRIDIUM

MOV Training

• Jul 30 - Aug 4, 2018	Minneapolis, MN
• Aug 27 - 31, 2018	Wisconsin (exact location pending)
• Sep 17 - 21, 2018	Chicago, IL
• Dec 10 - 14, 2018	Houston, TX
• Jan 14 - 18, 2019	Dallas, TX

TRIDIUM

Thanks Again