Niagara4 Technical Certification Program

student guide

day 1

- welcome
- course introduction
- platforms & stations
- niagara4 fundamentals
- simple logic: hot water pump control (thermostatic)
- simple logic: hot water pump control (freeze protection)
- simple logic: hot water pump control (simulating system variables)
- simple logic: hot water pump control (lead / lag)
- tagging and searching for components
- custom tag dictionary
- proportional only (gain-based, closed circuit) control loop
- alarm notification
- history / trend data collection

day 2

- review of day 1 / agenda for day 2
- building a simple px view, part 1 (banner)
- building a simple px view, part 2 (pump control)
- building a simple px view, part 3 (boiler control)
- simple control logic: zone temperature control loop
- simple px view: zone temp control
- network architecture / field bus integration
- bacnet ip integration
- tagging with the batch editor
- linking proxy points to other niagara objects
- commissioning a jace
- ax to n4 migration
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Agenda

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**DAY 3**

- Review of Day 2 / Agenda for Day 3
- Customizing the Workbench Environment
- Bacnet MS/TP Integration
- Lon Integration (Demo)
- Security & User Administration
- Hierarchies
- Security Categories
- User Roles
- User Accounts

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**DAY 4**

- Review of Day 3 / Agenda for Day 4
- Niagara Network Integration
- Configuring a Master Schedule
- Alarm Routing
- Alarm Portal
- Archiving History / Trend Data
- Dashboards
- Building a Custom Navigation Scheme
- Copying Stations
- Preparations for Certification Test

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**Day 5**

- Niagara4 Technical Certification Program Final Exam
DAY 1

Welcome

Introduction and Logistics

- Tridium
- Niagara Framework

Course Introduction

- Logistics
- Breaks
- Course Structure
- Materials

Platforms & Stations

- Niagara4 Workbench
- Platforms and Stations
- Niagara4 Platform Daemon
- Platform Services and Tools

Niagara4 Fundamentals

- Homes: User Home / Platform Daemon User Home
- New Station Wizard
- Security Overview
- Saving a Niagara Station

Creating a Station (Lab #1)

Simple Logic: Hot Water Pump Control (Thermostatic)

- Niagara objects – The Common Object Model
- Viewing & working with components
- Default/standard views
- Characteristics: Out property, Facets, Status flags, Priority levels
- Right-click, Action and New menus
- Palettes

Creating Folders and Points (LAB #2)

Simple Logic: Hot Water Pump Control (Freeze Protection)

- Schedules
- Special Events
- Null on Inactive

Prioritized Inputs (LAB #3)
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Agenda

Simple Logic: Hot Water Pump Control (Simulating System Variables)
- Ramp Object
- Special Events
- Null on Inactive

Simulation of a Fluctuating Analog Value (LAB #4)

Simple Logic: Hot Water Pump Control (Lead / Lag)
- Lead Lag Runtime Object
- Why Extensions?
- Categories of extensions
- What is a proxy extension?
- Types of control extensions
- Compositing: exposing child slots
- Using the Composite Editor
- Runtime Reset

Lead / Lag Control (LAB #5)

Tagging and Searching for Components
- Search Service
- Tag Dictionary Service
- Niagara and Haystack Tag Dictionaries
- Default Namespace ID
- Edit Tags
- Direct, Implied and Ad Hoc Tags.

Using Niagara and Haystack Tag Dictionaries (LAB #6)

Custom Tag Dictionary
- Tag Dictionary Palette
- Tag Definitions and Tag Groups
- Marker Tag
- String Tag

Creating a Tag Dictionary (LAB #7)

Proportional only (gain-based, closed circuit) control Loop
- PID loops
- Sine Wave Object
- Loop Point Object
- Linear sequencing

Creating a Boiler Control Loop (LAB #8)
Alarm Notification
- Alarm Service
- Alarm classes
- Alarm recipients
- Alarm extensions
- Viewing alarms
- Managing the alarm database
- Alarm portal

Alarms (LAB #9)

History / Trend Data Collection
- History Service
- History extensions – Boolean, Numeric, Enum, String
- History Names
- Viewing histories
- History Charts and History Tables
- History maintenance
- Using the History Chart Builder

Histories (LAB #10)
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Agenda

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<th>DAY 2</th>
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Review of Day 1 / Agenda for Day 2

**Building a Simple Px View, Part 1 (Banner)**
- Graphics challenge - The overall process
- What is Px? What is a Px view?
- Creating a new Px view
- Px Editor – View/Edit Modes
- Scroll Pane and Canvas Pane
- kitPX Palette
- PX Includes
- ORDs and BFormat Strings

Px Includes (LAB #11)

**Building a Simple Px View, Part 2 (Pump Control)**
- Widgets
- Binding to real data via ORDs
- Make Widget Wizard
- kitPxN4svg palette
- Widget properties
- Labels
- Hyperlinks
- Status Icons

Pump Control Px View (LAB #12)

**Building a Simple Px View, Part 3 (Boiler Control)**
- Widgets
- Bound Labels
- Formatting Text
- Display Name Labels
- Status Displays and Color
- Borders

Boiler Control Px View (LAB #13)

**Simple Control Logic: Zone Temperature Control Loop**
- Numeric Schedule for Setpoint Control
- Slot Sheet View
- Slots Types, Slot Details, Actions, Config Flags (h, s, t, o)

Zone Temp Control Loop (LAB #14)
Simple PX View: Zone Temp Control
- WebChart Palette
- Chart Widget
- Circular Gauge Widget
- Action Widgets and the Action Argument
- Status Icons

Zone Temp Control PX View (LAB #15)

Network Architecture / Field Bus Integration
- Common field bus concepts
- Driver architecture framework
- Discovering vs. creating devices and points

Bacnet IP Integration
- Network architecture
- Local device
- Bacnet Comm
- Tuning policies
- Device Manager
- Device objects

Bacnet/IP Integration – Adding Bacnet Network (LAB #16)

Bacnet Integration, continued
- Point Manager
- Bacnet Point Types
- Adding / Batch Editing Multiple Points
- Batch Tagging in the Bacnet Point Manager

Bacnet/IP Integration – Creating Proxy Points (LAB #17)

Tagging with the Batch Editor
- Program Service
- Batch Editor View
- BQL Query Builder
- Platform Backup vs Station Copy
- Adding / Batch Editing Multiple Points
- Restricting the Scope of a BQL Query

Tagging using the Batch Editor (LAB #18)

Linking Proxy Points to other Niagara Objects
- Flattening the Architecture
- Dependencies – Critical Parent / Child Relationships
- Moving or Copying Proxy Points (Restrictions, if any)
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Agenda

- Point Folder vs ordinary Folder
- Link Mark and the Link Editor
- Source vs Target

Linking Proxyed Points to Control Logic (LAB #19)

Commissioning a JACE

- Commissioning Wizard
- Platform Tools vs Platform Admin Tools vs Commissioning Steps
- Software Module Types (RT, UX, WB, SE, DOC)
- System Passphrase
- Bog File Protection – Force Passphrase Change (if necessary)

Commissioning a JACE (LAB #20)

AX to N4 Migration

- Reasons for Migration
- Station Backup
- Composing the Migration Command Line
- Station Templates
- Overwriting the Destination Station
- Migration Process Output: Errors and Exceptions, Migration Log
- Upgrading NiagaraAX Platforms to Niagara4
- Hardware Compatibility
- Communication Compatibility
- eLearning Module – AX to N4 Migration Tools and Processes

AX to N4 Migration (Demo Only)
### DAY 3

**Review of Day 2 / Agenda for Day 3**

**Customizing the Workbench Environment**
- User Home – options, mru.Options, recent Ords, Px Editor, Nav tree, credentials, recent history, etc.
- Managing tabs in the view pane
- Tools – Options
- Creating a personal palette
- Customizing the New Components and New Widgets menus

Customizing the Workbench (LAB #21)

**Bacnet MS/TP Integration**
- Network architecture
- Adding a MS/TP Port(s)
- Device Manager (Note: No provision for Discovery)
- Point Manager
- Proxy points
- Data Addresses, Register Types, Data Types, Status.

Bacnet MS/TP Integration- Adding an MS/TP Port(LAB #22)

**Bacnet MS/TP Integration – Device Management**
- Network architecture
- Device Management

Bacnet MS/TP Integration – Adding a Device (LAB #23)

**Bacnet MS/TP Integration – Proxy Points**
- Understanding Learn scenarios
- Bacnet Point Manager - Point Folders
- Bacnet Point Manager – Point Discovery
- Proxy Point Editing

Bacnet MS/TP Integration– Proxy Point Management (LAB #24)

**Bacnet MS/TP Integration – Linking and Scheduling**
- Bacnet Point Wiressheet
- Linking Schedules to Proxy Points
- Bacnet Setpoints

Bacnet MS/TP Integration – Scheduling and Setpoints (LAB #25)
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Bacnet MS/TP Integration – Alarm Notification
- Alarm Palette
- Types of Alarm Extensions
- Adding Alarm Extensions
- Alarm Message Formatting

Bacnet MS/TP Integration – Alarm Notification (LAB #26)

Optional Labs
- Emailing Alarms
- NRIO Network Integration: Part 1
- NRIO Network Integration: Part 2
- Banner PX Procedures

Security & User Administration

Hierarchies
- Creating Hierarchies for custom navigation
- Hierarchy Service
  - Level Definitions
  - Defining / Refining Query Criteria
  - Refresh / Test Hierarchy

Creating Hierarchies (LAB #27)

Security Categories
- Category Service
- Category Manager
- Category Browser
  - Assigning Categories
  - Inherited Category Assignments
- Authentication Service
  - Strong Passwords

Security Categories (LAB #28)

User Roles
- Role Service
- Role Manager
  - Permissions
  - Viewable Hierarchies
- Permissions Browser
  - Read / Write / Invoke
  - Operator vs Admin

Creating User Roles (LAB #29)
User Accounts

- User Service
- Password Lock Out Configuration
- User Manager
  - Adding, modifying, and deleting users
  - Assigning Roles
  - User profiles – Workbench and browser

Creating User Accounts (LAB #30)
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Agenda

DAY 4

Review of Day 3 / Agenda for Day 4

Niagara Network Integration
- Fox service
- Station Manager
- Station Learn and Discover
- Station-to-station connections
- History Import and Export Managers
- Schedule Import and Export Managers
- Point Manager

Niagara Network Proxy Points (Lab #31)

Configuring a Master Schedule
- Niagara Network
- Schedules Extension
- Schedule Import and Export Managers
- Pull (Import) Master Schedule into destination station
- Push (Export) Modified Master Schedule out to Subordinate Schedules

Configuring a Master Schedule (LAB #32)

Alarm Routing
- Niagara Network Connection
- Alarms Extension
- Route to Default Alarm Class
- Route to Existing Alarm Class

Routing Alarms to a Supervisor Station (LAB #33)

Alarm Portal
- Alarm Portal View
- Alarm Portal Options
- Alarm Console Monitor
- Alarm Popup

Configuring the Alarm Portal (LAB #34)

Archiving History / Trend Data
- Niagara Network Connection
- History Extension
- History Import / Export Manager Views
- History Policies

Archiving Histories to a Supervisor Station (LAB #35)
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Dashboards
- Dashboard Service
- Dashboard Palette
- webChart Palette
- Dashboard Pane
- Saving Persistently Configurable Charts and Gauges

Create a Dashboard PX View (LAB #36)

Building a Custom Navigation Scheme
- Flattening the Architecture
- Nav File Editor View
- Creating a custom Home node
- Assigning the Nav file to a specific user
- Testing the Nav file in the Workbench and in a web browser

Creating a Nav File (LAB #37)

Copying Stations
- Backup Service
- Station Copier Options
  - Station Alarm Data
  - Station History Data
- Copy Station from JACE
- Copy Station to Supervisor

Copy Stations (LAB #38)

Provisioning Service

Web Service

Time Synch Service

Weather Service

Course Review

Preparations for Certification Test

Niagara4 Technical Certification Program Final Exam

Day 5