JNIOR Series 3

A Network I/O Resource
Utilizing the JAVA™ Platform

Data Collector Manual

Release 1.0

NOTE: JNIOR OS 3.4 or greater required

Last updated on: December 15, 2009

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1 What is Data Collector?

Data Collector consists of two programs that work together to provide the ability to log I/O information from one or more JNIORs to a database located on a central PC. A program is installed on the JNIOR called Buffer that logs data to the JNIOR memory and sends it to an application called the Collector Service running on a central PC. The Collector Service receives the information from one or more JNIORs and writes it to a database.

2 Overview of Data Collector

Data Collector provides the user of the JNIOR with an easy way to log I/O data for historical reasons, for use in other systems, and for reports. All the JNIOR I/O data can be brought back to a central location for ease of use and storage.

The Buffer program running on the JNIOR is configurable such that it can be set to record the I/O status, input counter values, input/output usage meters and the data associated with the various JNIOR expansion modules. The data is logged based on a user adjustable timer and then 'pushed' to the central PC based on a different time interval (also user configurable).

Data can also be logged and sent to the central PC based upon various 'interrupts'. Interrupts are changes in the state of a digital input or output on the JNIOR that cause an immediate logging of the I/O data. The user can configure one or more 'interrupts'. When the input or output goes from low to high or high to low (off-to-on or on-to-off), the JNIOR data will be logged and immediately sent to the central PC. The data continues to be logged at its normal logging interval and pushed to the central PC at its scheduled interval.

If the network connection or the central PC is unavailable, the Buffer program will continue to store each log record on the JNIOR until the connection is restored. The Buffer program is currently capable of storing up to 64K worth of data for the internal I/O and 64K worth of data for the external modules, both in a circular buffer. When the buffer fills, the oldest data will be overwritten. The total number of records that will be stored in each 64K buffer area depends upon the configuration and amount of data to be logged with each record.

The Collector Service running on the central PC runs as a background service waiting to accept connections from one or more JNIORs. Each time the data is sent from the JNIOR, the Collector Service will receive the data and store it in the appropriate database table. The user then has the ability to access this data via normal data base queries.

The combination of the Buffer and Collector Service programs provide a robust and reliable way to log I/O data from one or many JNIORs to a database for a variety of uses.

3 Guidelines on Installing Data Collector

The Data Collector system consists of one or more JNIORs and a central PC and requires the following software programs:

1. <u>Buffer Program</u> – the Buffer program must be installed on each JNIOR that will be reporting information back to the central database. The Buffer program is easily installed using the JNIOR Support Tool and the loader zip file provided by INTEG. There are several configuration parameters that can be set via the JNIOR Registry Editor using the main JNIOR Web page.

2. <u>Data Collector Service</u> – the Data Collector Service is easily installed using the Data Collector Service Installation program. The Data Collector Service utilizes an instance of Microsoft SQL Server 2005 Express Edition. The Express edition is free and supplied as part of the Data Collector Service installation. As an option, the user can associate the JNIOR database tables to their own instance of Microsoft SQL Server. A JNIOR Data Collector Console is available to view the timestamp of the last data record sent from each JNIOR to the central PC.

The JNIOR does not have a large hard disk or unlimited memory. However, the Buffer application provides a reliable way to handle brief interruptions (up to several hours or longer) of the network connection between the JNIOR and the central PC or when the central PC is down. The amount of data that can be buffered on the JNIOR before it is overwritten is a function of the amount of data being saved and the frequency of the logging. The Registry Keys used to set these features are described later in this manual.

4 JNIOR Buffer Program

The JNIOR Buffer program is installed using the JNIOR Support Tool and the loader zip file provided by INTEG. After the Buffer program is running on the JNIOR, a set of Registry Keys will be available to configure the Buffer functionality via the main JNIOR Web page.

4.1 Installing the Buffer Program on a JNIOR

NOTE: Please do NOT unzip the Buffer loader file. Please let the JNIOR Support Tool unzip it.

Please go to the Update tab in the JNIOR Support Tool and click on the Open Project link and then navigate to where you saved the Buffer loader zip file. After the project is shown in the Update tab, you can see the four steps used to install the Buffer program.

The only item that you must configure for your installation is to set the Server IP address of the central PC that will be running the Collector Service. Click on the Edit Project Configuration link and change the IP address in the Set Server Step to the correct address and then click on the Save & Close button.
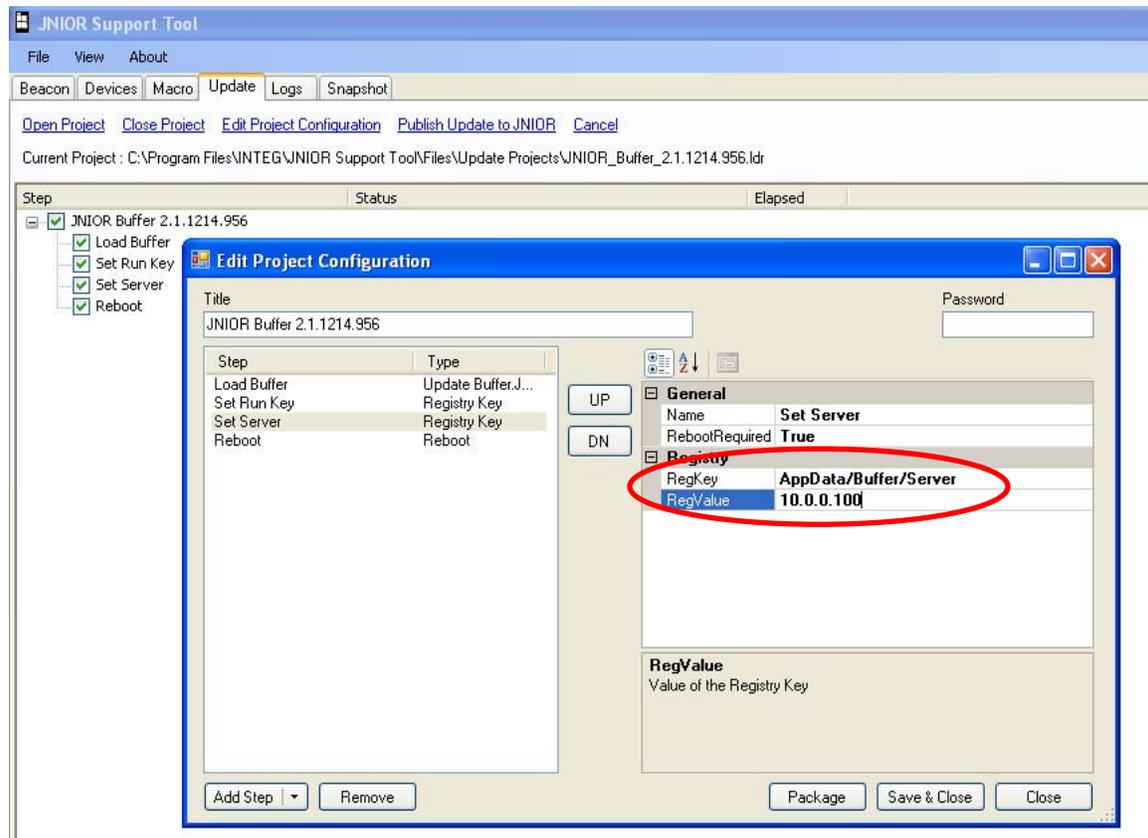

Next, click on the Publish Update to JNIOR link to load the software.

Since you must be using a JNIOR with JNIOR OS version 3.x, and assuming you did not disable the JNIOR Beacon functionality, your JNIOR should be displayed in the Beacon tab and be available for selection in the pop-up JNIOR Selection Window.

Please select your JNIOR and click on the OK button. The Buffer program will be loaded on your JNIOR and the JNIOR will be rebooted so that the Buffer program is started.

If your JNIOR IP address is not listed, you can manually enter the JNIOR IP address in case JNIOR Beacon was disabled on this JNIOR or it is on the other side of a router or you are using a VPN connection.

NOTE: In order to use the Update features in the JNIOR Support Tool, the PC running the JNIOR Support Tool must have an IP address similar to the JNIOR IP address so that they are compatible.
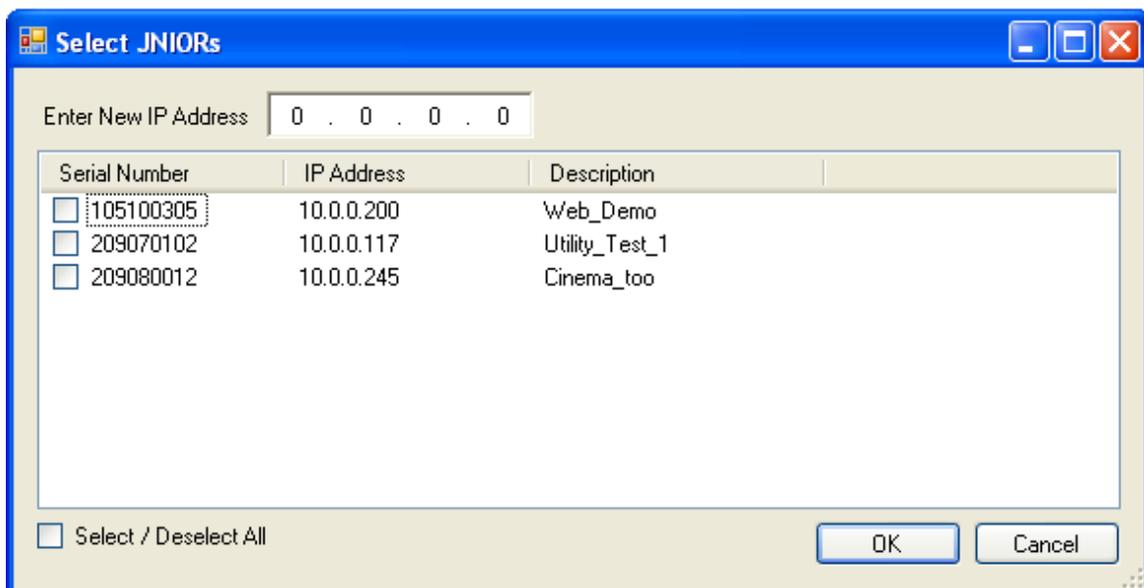
4.2 Configuring the Buffer Program

Once the Buffer program is running on the JNIOR, a series of Registry Keys will be available to configure the Buffer program to meet your needs. If you launch the main JNIOR Web page and go to the Registry Editor tab and then the AppData/Buffer folder, the following list of keys will be displayed. The default values are shown.
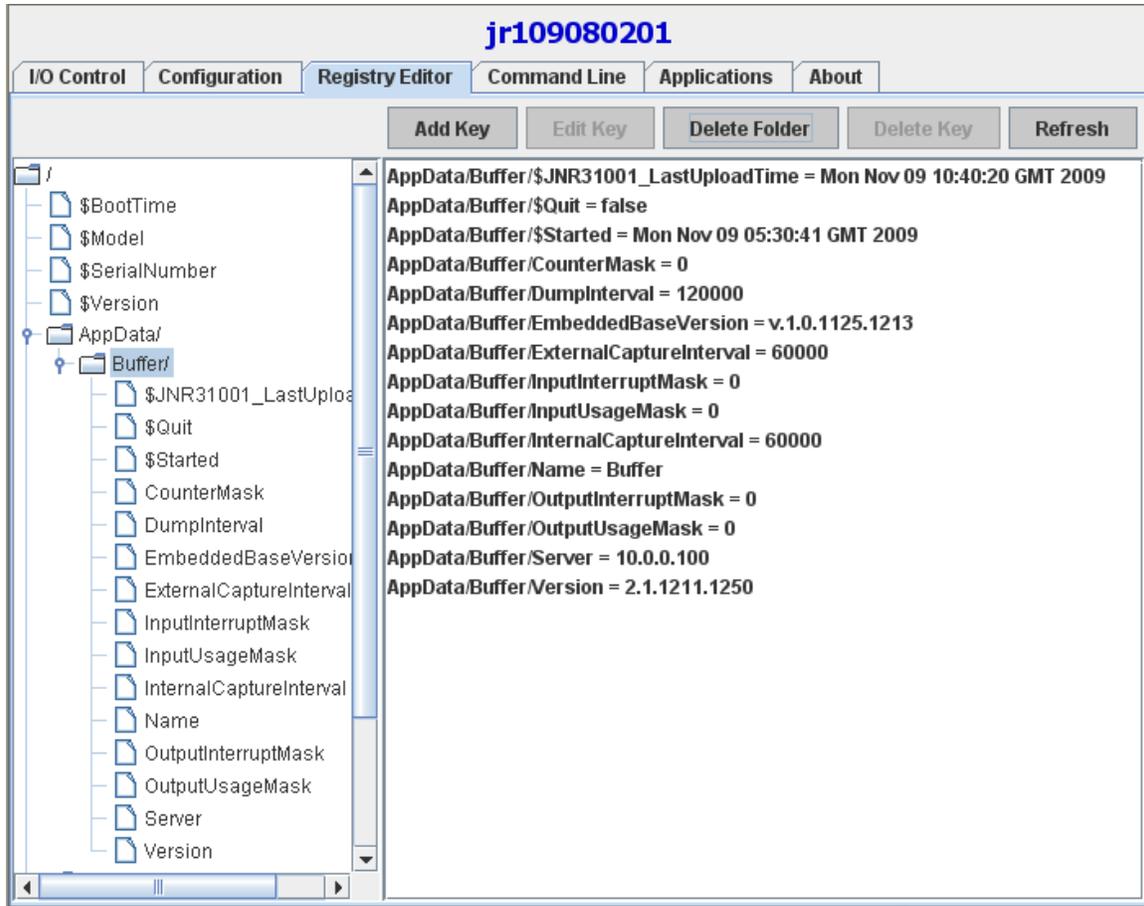
Mask Settings

Several of the keys use a 'mask' concept. Since there are 8 inputs and 8 outputs on the main JNIOR, there are a lot of combinations defining which inputs and outputs are to be logged. The information includes the input and output status, the input counters, and the input and output usage meters. Instead of defining a key for each input and output and associated item, a 'mask' concept was implemented where a number from 0 to 255 is entered to represent the inputs (or outputs) to be used. When the mask number is converted to binary, the user can see the pattern of the 8 bits representing the I/O to be used with the lowest numbered I/O point being the rightmost bit.

Below are some examples:

Mask	Binary Representation	Input or Output Number
1	00000001	Input 1 (or Output 1)
255	11111111	All Inputs (or All Outputs)
16	00010000	Input 5 (or Output 5)
175	10101111	Inputs 1,2,3,4,6,8 (or Outputs 1,2,3,4,6,8)

Appendix A contains a table that converts the decimal numbers 1 through 255 to binary. The table can be used as a guide to find the appropriate 'mask' for the Registry Keys.

The Registry Keys that are available for configuring the Buffer application are as follows:

Counter Mask – the 'mask' value to determine which input counters will be logged. The default value is 0.

DumpInterval – the frequency (in milliseconds) at which the data in the buffer will be sent to the central PC. The default value is 120000 (120 seconds).

ExternalCaptureInterval – the frequency (in milliseconds) at which the values from the external expansion modules (analog 4 – 20 mA, analog 0 – 10 VDC, analog RTD, 4 relay output, temperature sensor) will be saved in the buffer. The frequency for the external modules can be different than the frequency for the internal I/O. The default value is 60000 (60 seconds).

InputInterruptMask – the 'mask' value to determine which digital inputs on the JNIOR will cause an 'immediate' logging of the data to the JNIOR buffer. Normally, the data will log to the buffer at the frequency set in the InternalCaptureInterval and ExternalCaptureInterval Registry Keys. However, when any input defined with the InputInterrupMask goes from low to high or high to low, an immediate logging will occur in between the scheduled captures and be immediately sent to the central PC. This logging does not affect the timing of the scheduled logs. The default value is 0 (none).

InputUsageMask – the 'mask' value to determine which input usage meters will be logged. The default value is 0 (none).

InternalCaptureInterval – the frequency (in milliseconds) at which the values from the internal I/O (8 digital inputs and 8 relay outputs) will be saved in the buffer. The frequency for the internal I/O can be different than the frequency for the external modules. The default value is 60000 (60 seconds).

OutputInterruptMask – the 'mask' value to determine which digital outputs on the JNIOR will cause an 'immediate' logging of the data to the JNIOR buffer. Normally, the data will log to the buffer at the frequency set in the InternalCaptureInterval and ExternalCaptureInterval Registry Keys. However, when any output defined with the OutputInterrupMask goes from low to high or high to low, an immediate logging will occur in between the scheduled captures and be immediately sent to the central PC. This logging does not affect the timing of the scheduled logs. The default value is 0 (none).

OutputUsageMask – the 'mask' value to determine which output usage meters will be logged. The default value is 0 (none).

Server – the IP address of the PC that is running the JNIOR Data Collector service.

5 Installing the Data Collector Program on a PC

The Data Collector functionality consists of two main items that can be installed on two separate computers:

1. **Database Tables** – the database tables are associated with an Instance of the Microsoft SQL Server supplied by INTEG or with an Instance of Microsoft SQL Server already provided by the user.

2. **Data Collector Service** – the Data Collector Service is a program that runs in the background on a PC. This service can be installed on the same PC hosting the Microsoft SQL Server or a separate PC.

INTEG supplies an installation package with 4 Steps so the user can customize the installation to meet their needs. The four Steps are as follows:

1. Install Microsoft SQL Server 2005 Express Edition (if required)
2. Install the JNIOR database tables and associate them with the SQL Server
3. Install the Data Collector Windows Service
4. Install the License File

Installation on One Computer versus Two Computers

INTEG recommends that for ease of installation and separation of data to install the Data Collector system on one computer. If you are installing the system all one computer then you simply run all 4 steps on the same computer.

If you want to separate the installation between two computers, then you run the installation package twice, once on each computer as follows:

Computer number 1 – run steps 1 and 2 or optionally just step 2 if you are going to use an existing instance of SQL Server. You do not need to install the INTEG instance of SQL Server. Step 2 must be run on the computer containing the instance of SQL Server you intend to use.

Computer number 2 – run steps 3 and 4 to install the Data Collector Service and the license.

Getting Started

Please double click on the installation program (Data Collector Install.exe) and the following screen will be displayed. Please select which Steps you want to run.

NOTE: To display the revision level of the installer, click on the question mark.

5.1 Step 1 – Install Microsoft SQL Server

If you want to use the INTEG Instance of Microsoft SQL Server 2005 Express Edition with the JNIOR Data Collector, then click on the Install INTEG SQL Instance button.

If you want to use your own instance of Microsoft SQL Server, please skip this step by clicking on the Next button.
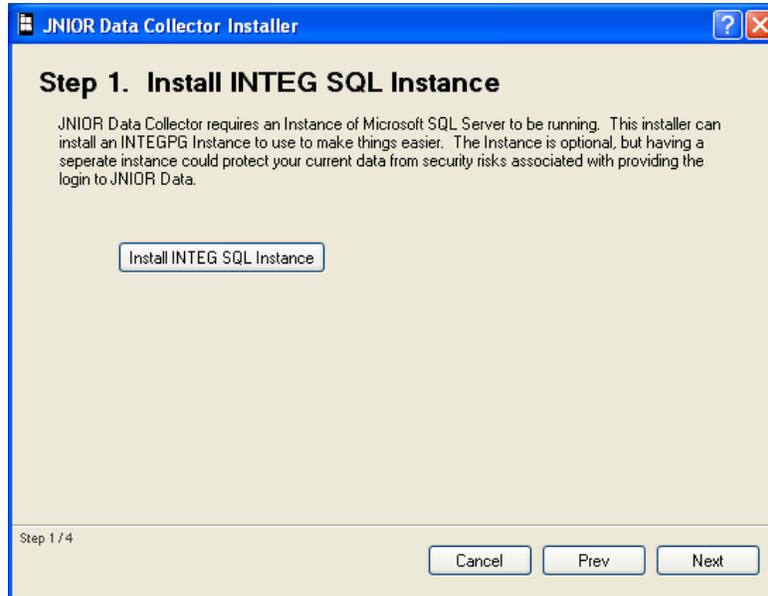
You will see the following screen during the Microsoft SQL Server installation.
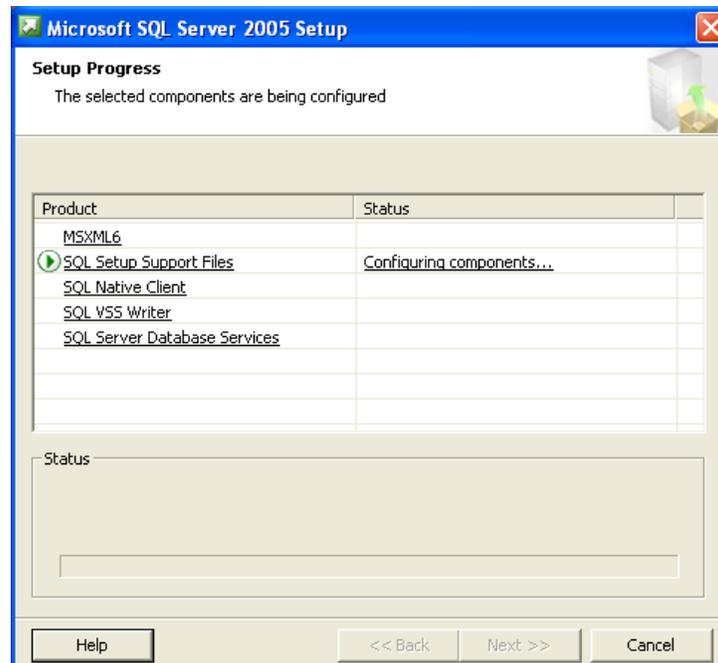
The following screen will be displayed upon completion. Click on the Next button to proceed to Step 2.
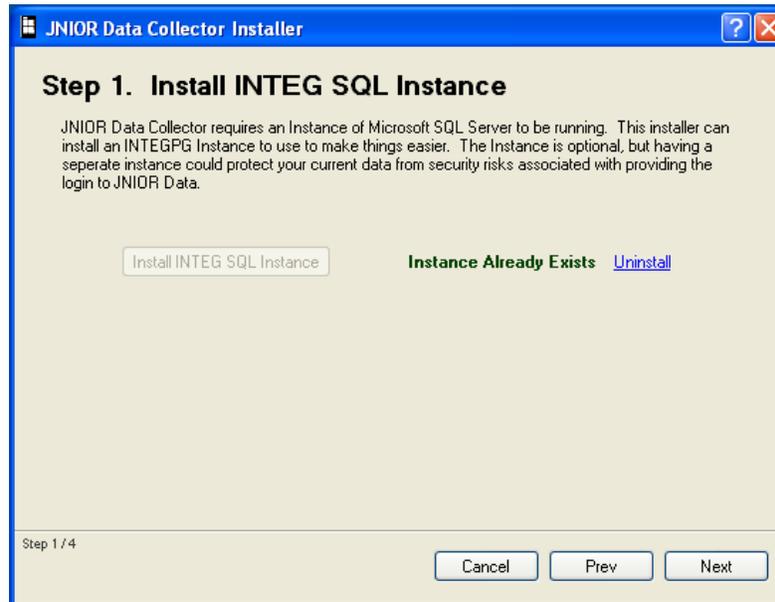
5.2 Step 2 – Installing the JNIOR Database

If you are using the INTEG Instance of SQL Server, then leave the box checked and click on the Install Database button.
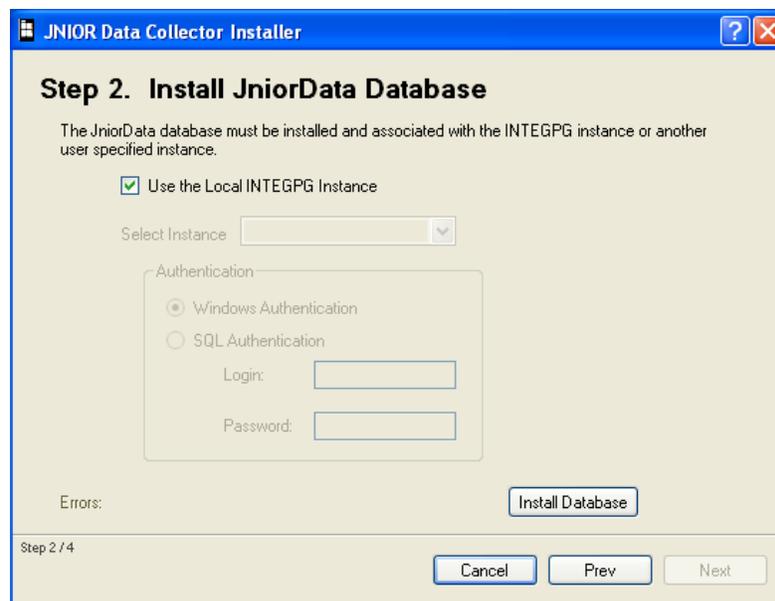
After the JNIOR Database has been installed, you will see the following screen. If you see any Errors (a non-zero value) in the lower left corner, please click on the Errors link to view the errors and take the appropriate action. If you do not have any errors (a 0 value is displayed), then click on the Next button to proceed to Step 3.
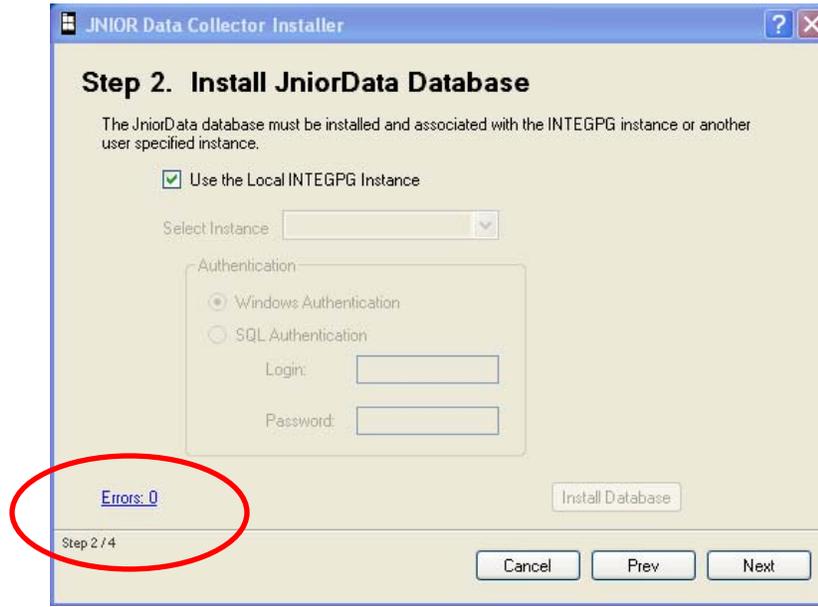
Clicking on the Errors link for a good installation (0 errors) will display the following.

The INTEG Instance of Microsoft SQL Server Express Edition 2005 is installed in your Program Files folder under the Microsoft SQL Server folder. The following screen shot shows the JNIOR database installation files that are added.
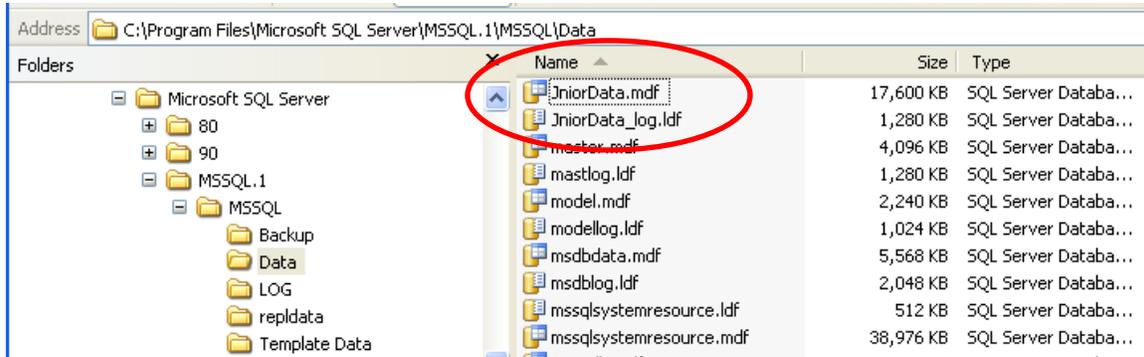
If you are going to install the JNIOR database with your own existing instance of SQL Server, then leave the box unchecked and select your Instance from the pull down box. **You must run this step on the PC which has your instance of SQL Server, however, it can be a different PC than the one where you will install the Data Collector Service.** Select your mode of Authentication and click on the Install Database button. When complete, click on the Next button to proceed to Step 3.

5.3 Step 3 – Installing the Data Collector Windows Service

Click on the Install JNIOR Data Collector Windows Service button and the application will be installed on your PC.
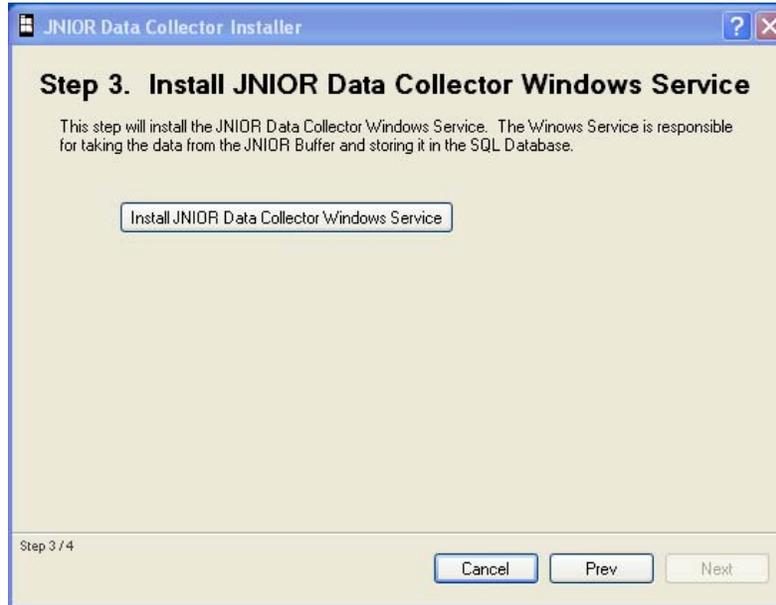
After the service is successfully installed, the following screen will be displayed. Please click on the Next button to proceed to Step 4.
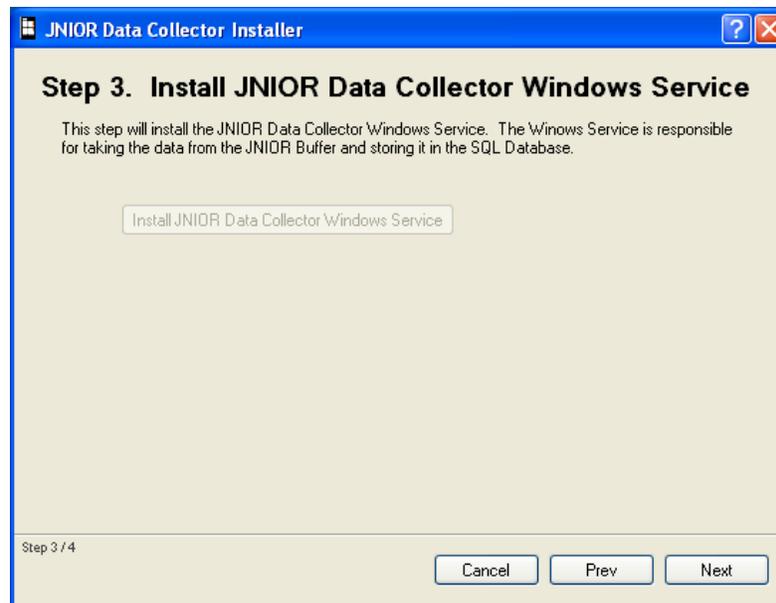
5.4 Step 4 – Installing the Data Collector License

INTEG will provide you with a license file that is installed in Step 4. If you purchased the JNOR Data Collector, then your license will be set to run as 'perpetual' (forever). If you are installing a trial version, then your license will be set to expire on a certain calendar day. Please save the license file (license.oms) to your PC and then click on the Select License File link and navigate to the folder where it was saved.
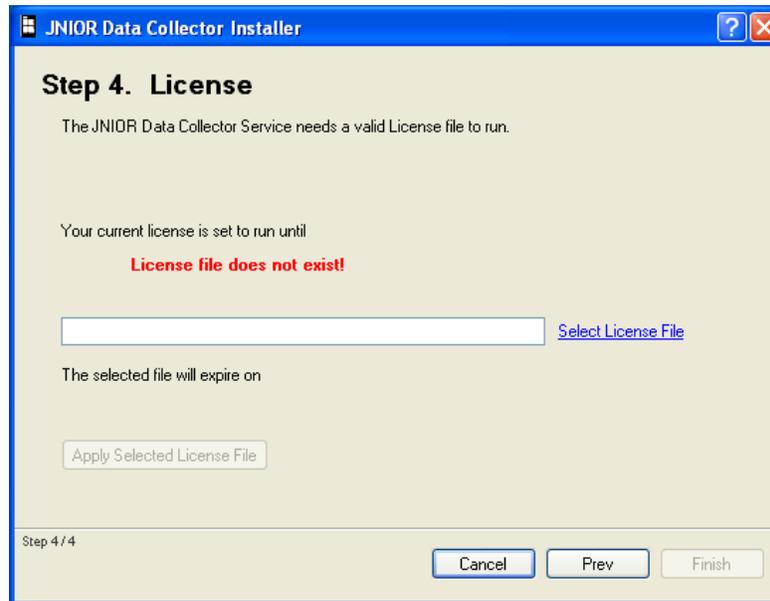
Once you select the file, the installation program will read the date or indentify it as a perpetual license and display the expiration date. Click on the Apply Selected License File button.
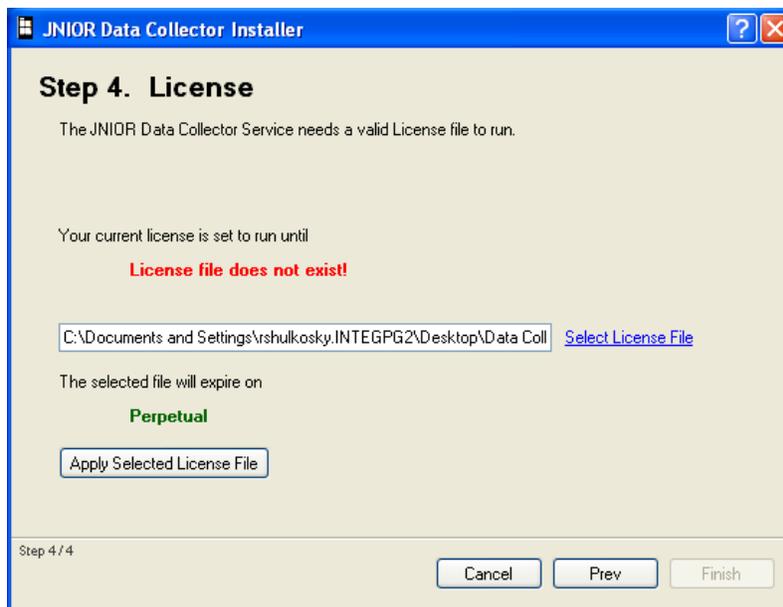
If the license file is successfully installed, the date the license will expire will be displayed as shown in the screen below.
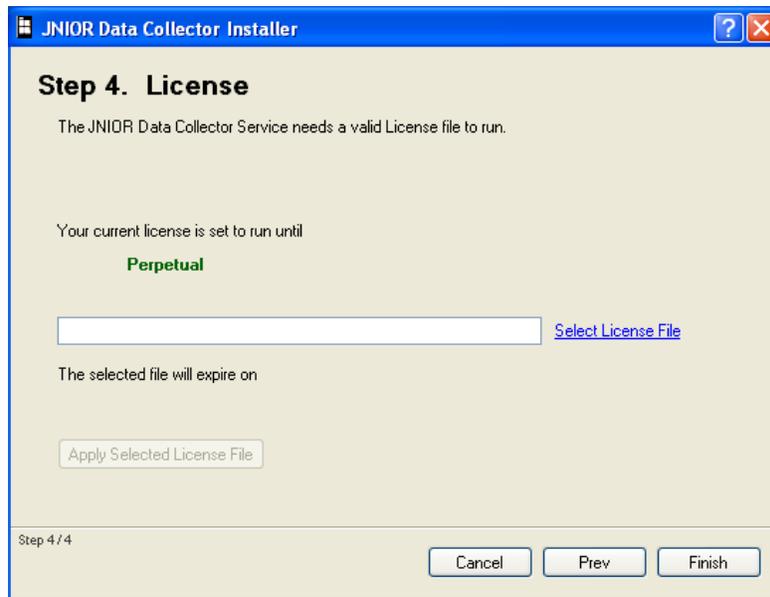
The JNIOR Data Collector application on the PC should now be complete and you can click on the Finish button to close the installer.

6 Data Collector Console

After you have installed the JNIOR Buffer application on one or more JNIORs, including configuring the IP address of the Data Collector Service, and installing the Data Collector Service and database tables, the JNIORs should automatically start buffering data and sending it back to the central PC.

One way to tell that your installation is working correctly is to use the Data Collector Console. When the central PC first boots up, it will install the Data Collector Service and display the Data Collector Console pop-up window. If the Data Collector Console window is not displayed, you can launch it by going to Start – Programs – INTEG – Data Collector and selecting the JNIOR Data Collector Console.
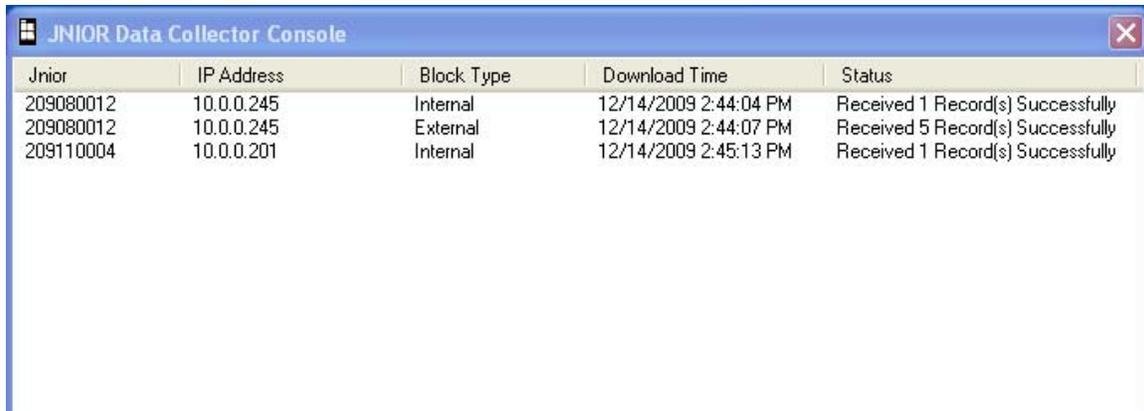
Jnior	IP Address	Block Type	Download Time	Status
209080012	10.0.0.245	Internal	12/14/2009 2:44:04 PM	Received 1 Record(s) Successfully
209080012	10.0.0.245	External	12/14/2009 2:44:07 PM	Received 5 Record(s) Successfully
209110004	10.0.0.201	Internal	12/14/2009 2:45:13 PM	Received 1 Record(s) Successfully

A JNIOR icon should be displayed in your lower Windows task bar area and you can right click on it to open the console window or exit.

If the pop-up console window contains the message "There are no JNIORs reporting", then please check that the IP address entered for the server in the Buffer registry key is correct and that the JNIORs are on the same network scheme.
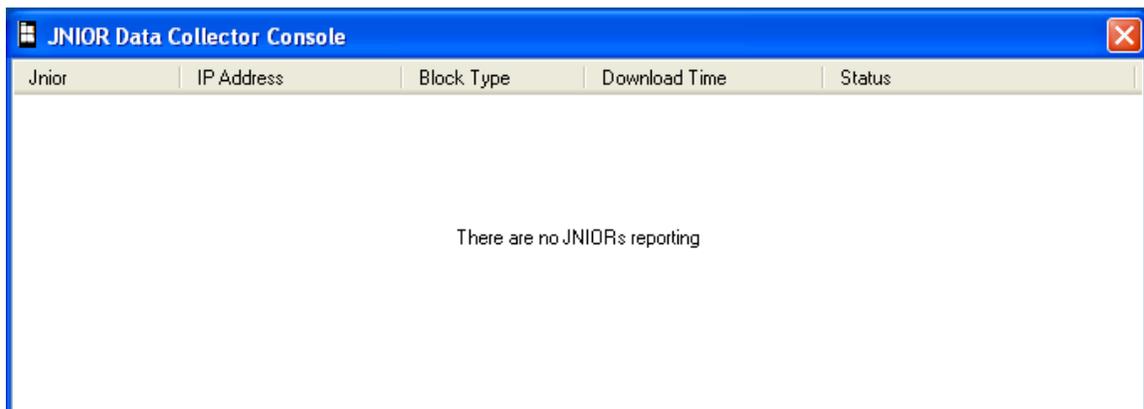
Jnior	IP Address	Block Type	Download Time	Status
			There are no JNIORs reporting	

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7 Data Collector Database

The Data Collector database is a collection of tables that are responsible for storing information about the state of the JNIORs and their external modules. The user can interact with this data using normal database techniques.

This section discusses some key points to understand about the organization of the JNIOR Data Collector Database. The list of the tables is provided in section 7.1. A detailed listing of the data in each table is provided in Appendix B.

Learning SQL or how to interact with an SQL programmatically is beyond the scope of this manual. Some examples are provided in Appendix C to illustrate how you might query the JNIOR data.

Section 7.2 provides you with a method to view the data tables using the free Microsoft SQL Server Management Studio Express software package.

JNIOR ID

When a JNIOR makes a connection to the Data Collector Service, it is given a unique ID (Jniors_Id). This ID is used to identify the source of the data in the Jnr310 data table. Below is a screen show of the Jniors table that contains two JNIORs.

Jniors_Id	Jniors_D...	Jniors_Alias	Jniors_IpAddress	Jniors_LastUpdate
1	NULL	10.0.0.201:61400	10.0.0.201:6231	12/15/2009 9:54:47 AM
2	NULL	10.0.0.245:48192	10.0.0.245:4871	12/15/2009 9:53:15 AM
* NULL	NULL	NULL	NULL	NULL

Devices

The Devices Type table lists all the "potential" type of devices that can be used with the JNIOR Data Collector system. This includes the JNIORs and expansion modules. You will see that each device type is given a unique device type ID.

DeviceType_Id	DeviceType_Description
10	Temperature
28	Temperature
FB	4 Relay Out
FC	RTD
FD	0-10 V
FE	4-20 ma
FF	jnior 310
* NULL	NULL

The Devices table list all the devices ever used with this installation of the JNIOR Data Collector system. As JNIORs or expansion modules are added, they are given a unique device ID. For expansion modules, the "parent ID" is the JNIOR they are connected to. If a JNIOR or expansion module is removed from the system, the device ID still remains in the table since data records remain in other tables that are still associated with this device.

Table - dbo.Devices	Table - dbo.Jnr310	Summary		
Device_Id	Device_Serial	Device_TypeId	Device_ParentId	
1	209110004	FF	NULL	
2	209080012	FF	NULL	
3	91111091125005fd	fd	2	
4	2b10000000236bfe	fe	2	
5	771000000022d2fe	fe	2	

The data for all the JNIORs is stored in the Jnr310 table. In the screen shot below, you will see two JNIORs with Jnr310_id 1 and 2.

Table - dbo.Jnr310	Summary				
Jnr310_Id	Jnr310_TimeStamp	Jnr310_InputStates	Jnr310_OutputStates	Jnr310_Cnt1	Jnr310_Cnt2
1	12/15/2009 11:22:02 AM	0	25	0	0
1	12/15/2009 11:23:02 AM	0	25	0	0
1	12/15/2009 11:23:42 AM	0	2	0	0
2	12/14/2009 12:18:00 PM	0	0	22	NULL
2	12/14/2009 12:20:15 PM	0	0	22	NULL

The data for each expansion module is stored in a table named for the type of expansion module. All expansion modules of that type are stored in the expansion module type table regardless of which JNIOR it is connected to. In the screen shot below, you will see two 4 – 20 mA expansion modules with DeviceId 4 and 5. The Devices table (above) indicates which JNIOR each module is connected to.

Table - dbo.External420	Summary		
Ext420_DeviceId	Ext420_Timestamp	Ext420_In1	Ext420_In2
4	12/15/2009 10:46:01 AM	0	0
4	12/15/2009 10:46:30 AM	0	0
5	12/15/2009 10:41:46 AM	0	0
5	12/15/2009 10:42:01 AM	0	0
5	12/15/2009 10:42:31 AM	0	0

Event Type

When the data is stored in the database, an "event type" is associated with each record in the Jnr310 table and expansion module table indicating the circumstances under which the data was stored. The "event type" field contains the number 1, 2 or 3.

1. Normal – The buffer application is running normally and the data record was stored as part of the normal logging. The number 1 is in the "event type" data field.

2. Blackout – The JNIOR just rebooted or the Buffer application was otherwise restarted. This is the first record since the application restart. This indicates that the data since this record and the one prior to this record is unknown because the JNIOR was not operating (or Buffer was not running) to record it. There is a data "gap" or blackout period. The number 2 is in the "event type" data field.

3. Overwrite – The buffer is full and this record overwrote the oldest record in the buffer on the JNIOR. The number 3 is in the "event type" data field.

In the screen shot below, you can see a "normal" event type (1) and a "blackout" event type (2) in the Jnr310 table. The blackout occurred because of a reboot of the JNIOR. This is a warning that a restart of the Buffer application occurred and there is most likely a gap in the data.

In the first column below, you will see the Jnr310_Id is 1 indicating this was JNIOR number one. From the JNIORs table we know this is the JNIOR with IP address 10.0.0.201.

In the screen shot below, you can see a "normal" event type (1) and an "overwrite" event type (3). The overwrite occurred during the night when the central PC was off-line. Eventually the JNIOR buffer had to start overwriting its data because it became full.

When the central PC is back on-line, the Data Collector Console will show that the first data transmission contained many records as the JNIOR buffer downloaded all its stored data to the central PC. This is shown in the screen shot below. The amount of records is a function of how the Buffer program is configured (i.e. what data to log, the frequency, etc.).
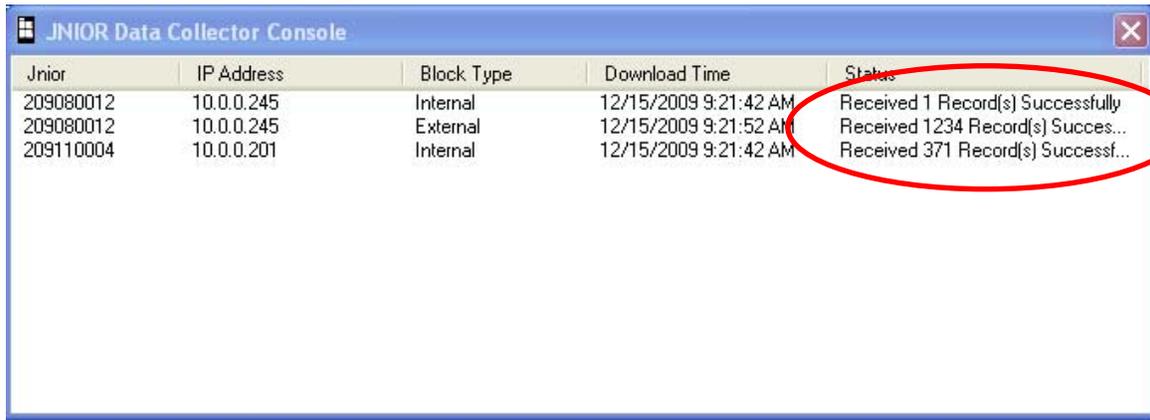
Connection

To keep any data stored in other database tables separate from the JNIOR data, INTEG has included the steps to create a new SQL instance as part of our Data Collector installer. Microsoft recommends that the authentication method should be Windows Authentication. However, this is not always easy to explain or setup. Since INTEG is not on site to assist in all installations, a different authentication method was chosen for an INTEG Instance of SQL Server. INTEG has chosen to use SQL Authentication. The connection string is located in the applications .config file. This way the SQL authentication login only pertains to this new instance of the SQL Server.

The default connection for the local INTEGPG instance using SQL Server 2005 is:

```
Data Source=.\SQLExpress;Initial Catalog=master;User
Id=integ;Password=integ
```

You may choose to not install a separate instance of SQL Server and instead choose to load the JNIOR database on a computer with an existing instance of SQL Server.

7.1 Database Tables

The format for the database tables is included in Appendix B. A general description is provided below.

BarCode

When the Buffer application is configured to work with a bar code scanner, the scanned barcodes will be logged to this table. (Future feature)

Debug

This table holds debugging information generated by the Data Collector Windows Service. Entries can be informative describing events such as the service starting or they can be errors such as the JNIOR disconnecting in the middle of the Buffer download operation. This information is useful to INTEG should the application not function properly.

Devices

This table contains all of the connected JNIORs and the external modules that are configured to log. Using the *[ParentId]* column we can determine which JNIOR the external module belongs to.

DeviceTypes

This table is a definition table that holds the description of the standard External Devices as well as other information critical to determining how to convert raw data for each device type to valid scaled values.

External10v

This table holds records containing the 10volt Module logged values. These values are not adjusted to the actual signal scale. These are raw values and must be scaled by the user. Each record also holds a timestamp and an event type. Please refer to the Event Type explanation at the beginning of this section.

External420

This table holds records containing the 4-20ma Module logged values. These values are not adjusted to the actual signal scale. These are raw values and must be scaled by the user. Each record also holds a timestamp and an event type. Please refer to the Event Type explanation at the beginning of this section.

External4RelayOut

This table holds records containing the 4 Relay Output Module logged states. Each record also holds a timestamp and an event type. Please refer to the Event Type explanation at the beginning of this section.

ExternalRtd

This table holds records containing the RTD Module logged values. These values are not adjusted to the actual signal scale. These are raw values and must be scaled by the user. Each record also holds a timestamp and an event type. Please refer to the Event Type explanation at the beginning of this section.

ExternalTemperature

This table holds records containing the External Temperature Probe logged values. Each record also holds a timestamp and an event type. Please refer to the Event Type explanation at the beginning of this section.

Jniors

This table holds the list of JNIORs and JNIOR specific information in regards to the Buffer connection and Buffer configuration.

Jnr310

This table holds records containing the logs of the internal states of the JNIOR I/O, Input Counters, and I/O Usage Meters. Each record also holds a timestamp and an Event Type. Please refer to the Event Type explanation at the beginning of this section.

SchemaAudit

This table is not used by anyone other than INTEG. It is designed for tracking development changes.

Signals

This is a table that is populated as the database inserts records for new devices.

Version

This table holds the version of the Data Collector Service that is populating the database. It also holds the current state of the license file. The states for the license file are simply true or false indicating the validity of the license file.

7.2 Viewing Data

You can view the JNIOR database tables by installing Microsoft SQL Server Management Studio Express. The login information is as follows using the INTEG installed Microsoft SQL Server Instance.

Login: integ
Password: integ

After you Connect, you can view the data tables by right clicking on a table name and selecting Open Table as shown in the screen shot below.

Each table is described in the previous section and the table format is described in Appendix B.
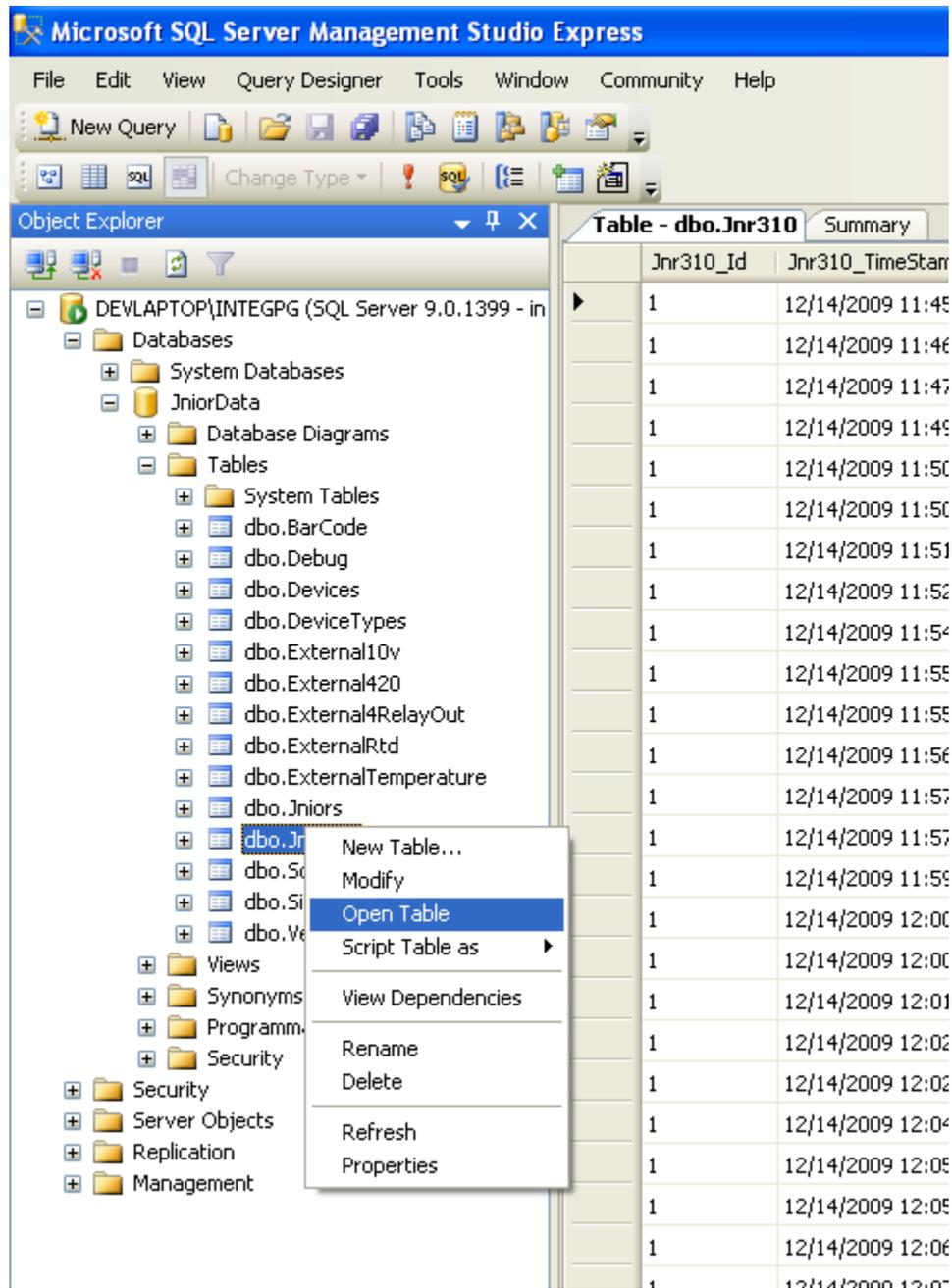
Appendix A – Decimal to Binary Table

The following table can be used to help determine the appropriate 'mask' to use.

Dec	Hex	Oct	Bin	Dec	Hex	Oct	Bin	Dec	Hex	Oct	Bin	Dec	Hex	Oct	Bin
0	0	000	00000000	16	10	020	00010000	32	20	040	00100000	48	30	060	00110000
1	1	001	00000001	17	11	021	00010001	33	21	041	00100001	49	31	061	00110001
2	2	002	00000010	18	12	022	00010010	34	22	042	00100010	50	32	062	00110010
3	3	003	00000011	19	13	023	00010011	35	23	043	00100011	51	33	063	00110011
4	4	004	00000100	20	14	024	00010100	36	24	044	00100100	52	34	064	00110100
5	5	005	00000101	21	15	025	00010101	37	25	045	00100101	53	35	065	00110101
6	6	006	00000110	22	16	026	00010110	38	26	046	00100110	54	36	066	00110110
7	7	007	00000111	23	17	027	00010111	39	27	047	00100111	55	37	067	00110111
8	8	010	00001000	24	18	030	00011000	40	28	050	00101000	56	38	070	00111000
9	9	011	00001001	25	19	031	00011001	41	29	051	00101001	57	39	071	00111001
10	A	012	00001010	26	1A	032	00011010	42	2A	052	00101010	58	3A	072	00111010
11	B	013	00001011	27	1B	033	00011011	43	2B	053	00101011	59	3B	073	00111011
12	C	014	00001100	28	1C	034	00011100	44	2C	054	00101100	60	3C	074	00111100
13	D	015	00001101	29	1D	035	00011101	45	2D	055	00101101	61	3D	075	00111101
14	E	016	00001110	30	1E	036	00011110	46	2E	056	00101110	62	3E	076	00111110
15	F	017	00001111	31	1F	037	00011111	47	2F	057	00101111	63	3F	077	00111111

Dec	Hex	Oct	Bin	Dec	Hex	Oct	Bin	Dec	Hex	Oct	Bin	Dec	Hex	Oct	Bin
64	40	100	01000000	80	50	120	01010000	96	60	140	01100000	112	70	160	01110000
65	41	101	01000001	81	51	121	01010001	97	61	141	01100001	113	71	161	01110001
66	42	102	01000010	82	52	122	01010010	98	62	142	01100010	114	72	162	01110010
67	43	103	01000011	83	53	123	01010011	99	63	143	01100011	115	73	163	01110011
68	44	104	01000100	84	54	124	01010100	100	64	144	01100100	116	74	164	01110100
69	45	105	01000101	85	55	125	01010101	101	65	145	01100101	117	75	165	01110101
70	46	106	01000110	86	56	126	01010110	102	66	146	01100110	118	76	166	01110110
71	47	107	01000111	87	57	127	01010111	103	67	147	01100111	119	77	167	01110111
72	48	110	01001000	88	58	130	01011000	104	68	150	01101000	120	78	170	01111000
73	49	111	01001001	89	59	131	01011001	105	69	151	01101001	121	79	171	01111001
74	4A	112	01001010	90	5A	132	01011010	106	6A	152	01101010	122	7A	172	01111010
75	4B	113	01001011	91	5B	133	01011011	107	6B	153	01101011	123	7B	173	01111011
76	4C	114	01001100	92	5C	134	01011100	108	6C	154	01101100	124	7C	174	01111100
77	4D	115	01001101	93	5D	135	01011101	109	6D	155	01101101	125	7D	175	01111101
78	4E	116	01001110	94	5E	136	01011110	110	6E	156	01101110	126	7E	176	01111110
79	4F	117	01001111	95	5F	137	01011111	111	6F	157	01101111	127	7F	177	01111111

Dec	Hex	Oct	Bin	Dec	Hex	Oct	Bin	Dec	Hex	Oct	Bin	Dec	Hex	Oct	Bin
128	80	200	10000000	144	90	220	10010000	160	A0	240	10100000	176	B0	260	10110000
129	81	201	10000001	145	91	221	10010001	161	A1	241	10100001	177	B1	261	10110001
130	82	202	10000010	146	92	222	10010010	162	A2	242	10100010	178	B2	262	10110010
131	83	203	10000011	147	93	223	10010011	163	A3	243	10100011	179	B3	263	10110011
132	84	204	10000100	148	94	224	10010100	164	A4	244	10100100	180	B4	264	10110100
133	85	205	10000101	149	95	225	10010101	165	A5	245	10100101	181	B5	265	10110101
134	86	206	10000110	150	96	226	10010110	166	A6	246	10100110	182	B6	266	10110110
135	87	207	10000111	151	97	227	10010111	167	A7	247	10100111	183	B7	267	10110111
136	88	210	10001000	152	98	230	10011000	168	A8	250	10101000	184	B8	270	10111000
137	89	211	10001001	153	99	231	10011001	169	A9	251	10101001	185	B9	271	10111001
138	8A	212	10001010	154	9A	232	10011010	170	AA	252	10101010	186	BA	272	10111010
139	8B	213	10001011	155	9B	233	10011011	171	AB	253	10101011	187	BB	273	10111011
140	8C	214	10001100	156	9C	234	10011100	172	AC	254	10101100	188	BC	274	10111100
141	8D	215	10001101	157	9D	235	10011101	173	AD	255	10101101	189	BD	275	10111101
142	8E	216	10001110	158	9E	236	10011110	174	AE	256	10101110	190	BE	276	10111110
143	8F	217	10001111	159	9F	237	10011111	175	AF	257	10101111	191	BF	277	10111111

Dec	Hex	Oct	Bin	Dec	Hex	Oct	Bin	Dec	Hex	Oct	Bin	Dec	Hex	Oct	Bin
192	C0	300	11000000	208	D0	320	11010000	224	E0	340	11100000	240	F0	360	11110000
193	C1	301	11000001	209	D1	321	11010001	225	E1	341	11100001	241	F1	361	11110001
194	C2	302	11000010	210	D2	322	11010010	226	E2	342	11100010	242	F2	362	11110010
195	C3	303	11000011	211	D3	323	11010011	227	E3	343	11100011	243	F3	363	11110011
196	C4	304	11000100	212	D4	324	11010100	228	E4	344	11100100	244	F4	364	11110100
197	C5	305	11000101	213	D5	325	11010101	229	E5	345	11100101	245	F5	365	11110101
198	C6	306	11000110	214	D6	326	11010110	230	E6	346	11100110	246	F6	366	11110110
199	C7	307	11000111	215	D7	327	11010111	231	E7	347	11100111	247	F7	367	11110111
200	C8	310	11001000	216	D8	330	11011000	232	E8	350	11101000	248	F8	370	11111000
201	C9	311	11001001	217	D9	331	11011001	233	E9	351	11101001	249	F9	371	11111001
202	CA	312	11001010	218	DA	332	11011010	234	EA	352	11101010	250	FA	372	11111010
203	CB	313	11001011	219	DB	333	11011011	235	EB	353	11101011	251	FB	373	11111011
204	CC	314	11001100	220	DC	334	11011100	236	EC	354	11101100	252	FC	374	11111100
205	CD	315	11001101	221	DD	335	11011101	237	ED	355	11101101	253	FD	375	11111101
206	CE	316	11001110	222	DE	336	11011110	238	EE	356	11101110	254	FE	376	11111110
207	CF	317	11001111	223	DF	337	11011111	239	EF	357	11101111	255	FF	377	11111111

Appendix B – Database Tables Layout

The following is a list of the various database tables and the data format for each record.

BarCode

Barcode_DeviceId	int
Barcode_Timestamp	datetime
Barcode_Scan	varchar(50)

Debug

Debug_Id	int
Debug_Type	int
Debug_Time	datetime
Debug_Source	varchar(50)
Debug_Description	varchar(4096)
Debug_Data	varbinary(1024)

Devices

Device_Id	int
Device_Serial	varchar(50)
Device_TypeId	char(2)
Device_ParentId	int
Device_In1Min	int
Device_In1Max	int
Device_In1Units	varchar(50)
Device_In2Min	int
Device_In2Max	int
Device_In2Units	varchar(50)
Device_In3Min	int
Device_In3Max	int
Device_In3Units	varchar(50)
Device_In4Min	int
Device_In4Max	int
Device_In4Units	varchar(50)

DeviceTypes

DeviceType_Id	char(2)
DeviceType_Description	varchar(50)
DeviceType_FullScaleIn	int
DeviceType_FullScaleOut	int

External10v

Ext10v_DeviceId	int
Ext10v_Timestamp	datetime
Ext10v_In1	int
Ext10v_In2	int

Ext10v_In3	int
Ext10v_In4	int
Ext10v_Out1	int
Ext10v_Out2	int
Ext10v_EventType	int

External420

Ext420_DeviceId	int
Ext420_Timestamp	datetime
Ext420_In1	int
Ext420_In2	int
Ext420_In3	int
Ext420_In4	int
Ext420_Out1	int
Ext420_Out2	int
Ext420_EventType	int

External4RelayOut

Ext4Rout_DeviceId	int
Ext4Rout_Timestamp	datetime
Ext4Rout_States	int
Ext4Rout_EventType	int

ExternalRtd

ExtRtd_DeviceId	int
ExtRtd_Timestamp	datetime
ExtRtd_InCelcius1	float
ExtRtd_InCelcius2	float
ExtRtd_InCelcius3	float
ExtRtd_InCelcius4	float
ExtRtd_InFahrenheit1	float
ExtRtd_InFahrenheit2	float
ExtRtd_InFahrenheit3	float
ExtRtd_InFahrenheit4	float
ExtRtd_EventType	int

ExternalTemperature

Temp_DeviceId	int
Temp_Timestamp	datetime
Temp_Celcius	float
Temp_Fahrenheit	float
Temp_EventType	int

Jniors

Jniors_Id	int
Jniors_DeviceTypeId	int

Jniors_Alias	varchar(32)
Jniors_IpAddress	varchar(15)
Jniors_LastUpdate	datetime
Jniors_InputCounterMask	int
Jniors_InputUsageMask	int
Jniors_OutputUsageMask	int
Jniors_ActiveFalg	bit
Jniors_NewConfig	bit
Jniors_LastAttempt	varchar(16)
Jniors_Versions	archar(50)
Jniors_CollectorIp	varchar(15)

Jnr310

Jnr310_Id	int
Jnr310_TimeStamp	datetime
Jnr310_InputStates	int
Jnr310_OutputStates	int
Jnr310_Cnt1	int
Jnr310_Cnt2	int
Jnr310_Cnt3	int
Jnr310_Cnt4	int
Jnr310_Cnt5	int
Jnr310_Cnt6	int
Jnr310_Cnt7	int
Jnr310_Cnt8	int
Jnr310_Use1	float
Jnr310_Use2	float
Jnr310_Use3	float
Jnr310_Use4	float
Jnr310_Use5	float
Jnr310_Use6	float
Jnr310_Use7	float
Jnr310_Use8	float
Jnr310_Use9	float
Jnr310_Use10	float
Jnr310_Use11	float
Jnr310_Use12	float
Jnr310_Use13	float
Jnr310_Use14	float
Jnr310_Use15	float
Jnr310_Use16	float
Jnr310_EventType	int

SchemaAudit

EventID	int
EventData	xml

Signals

Signal_Id	int
Signal_DeviceTypeId	char(2)
Signal_Name	varchar(50)

Version

Version_AppName	varchar(50)
Version_AppVersion	varchar(50)

Appendix C – Example Database Queries

The following are several examples of how you might query the data stored in the JNIOR database tables.

Example 1

To get all records for a certain JNIOR with serial number "106080089" you would execute the following SQL statement:

```
SELECT * FROM [Jnr310]
JOIN [Devices] ON [Jnr310].[Jnr310_Id] = [Devices].[Device_Id]
WHERE [Devices].[Device_Serial] = '106080089'
```

Example 2

To get all records for a certain 10 volt external module with id "45110000725e68fd" you would execute the following SQL statement:

```
SELECT * FROM [External10v]
JOIN [Devices] ON [External10v].[Ext10v_DeviceId] =
[Devices].[Device_Id]
WHERE [Devices].[Device_Serial] = '45110000725e68fd'
```

Example 3

To get all the JNIOR Internal I/O records for a given JNIOR "106080089" on a given day "10/1/2008" you would execute the following SQL statement:

```
SELECT * FROM [Jnr310]
JOIN [Devices] ON [Jnr310].[Jnr310_Id] = [Devices].[Device_Id]
WHERE [Devices].[Device_Serial] = '106080089'
AND [Jnr310].[Jnr310_Timestamp] >= '10/1/2008'
AND [Jnr310].[Jnr310_Timestamp] < '10/2/2008'
```

Summary

Thank you for purchasing the **JNIOR**. Hopefully this manual made the getting-to-know process of your new **JNIOR** very quick and easy. The **JNIOR** has many more wonderful tools and features available, and are explained in detail in the supplied documents.

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