Data Processing & Structures

iMonnit

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IGNITION Living Lab

Contents

Normalisation

Sensor Data

UNF	1NF	2NF	3NF
Repeating attributes indented	Remove repeating attributes and identify PK	Remove partial dependencies	Remove non-key dependencies
sensorID	**sensorID**	**sensorID**	**sensorID**
sensorName	sensorName	sensorName	sensorName
applicationID	applicationID	applicationID	applicationID*
dataMessageGUID	networkID	networkID	networkID*
sensorState	**dataMessageGUID**	**dataMessageGUID**	**readingID**
messageDate	rawData	rawData	**dataMessageGUID**
rawData	dataValue	dataValue	sensorID*
dataType	plotValues	plotValues	dTypeID*
dataValue	messageDate	messageDate	plotLabelID*
plotValues			rawData
plotLabels			dataValue
bateryLevel			plotValues
signalStrength			messageDate
pendingChange	dataType	dataType	**dTypeID**
voltage			dataType
gatewayID	plotLabels	plotLabels	**plotLabelID**
gatewayName			plotLabels
accountID	batteryLevel	batteryLevel	**readingID***
networkID			**dataMessageGUID***
messageType			batteryLevel
gatewayPower	signalStrength	signalStrength	**readingID***
batteryLevel			**dataMessageGUID***
gatewayDate			signalStrength
gatewayCount	pendingChange	pendingChange	**readingID***
signalStrength			**dataMessageGUID***
pendingChange			pendingChange
	voltage	voltage	**readingID***
			dataMessageGUID*
			voltage
			applicationID
			applicationName
			networkID
			networkName
			accountID
			accountName
	gatewayID	**gatewayID**	**gatewayID**
	gatewayName	gatewayName	gatewayName
	accountID	accountID	accountID*
	messageType	messageType	messageType
	gatewayPower	gatewayPower	gatewayPower
	batteryLevel	batteryLevel	batteryLevel
	gatewayDate	gatewayDate	gatewayDate
	gatewayCount	gatewayCount	gatewayCount
	signalStrength	signalStrength	signalStrength
	pendingChange	pendingChange	pendingChange

Entity Relations

Sensor Data
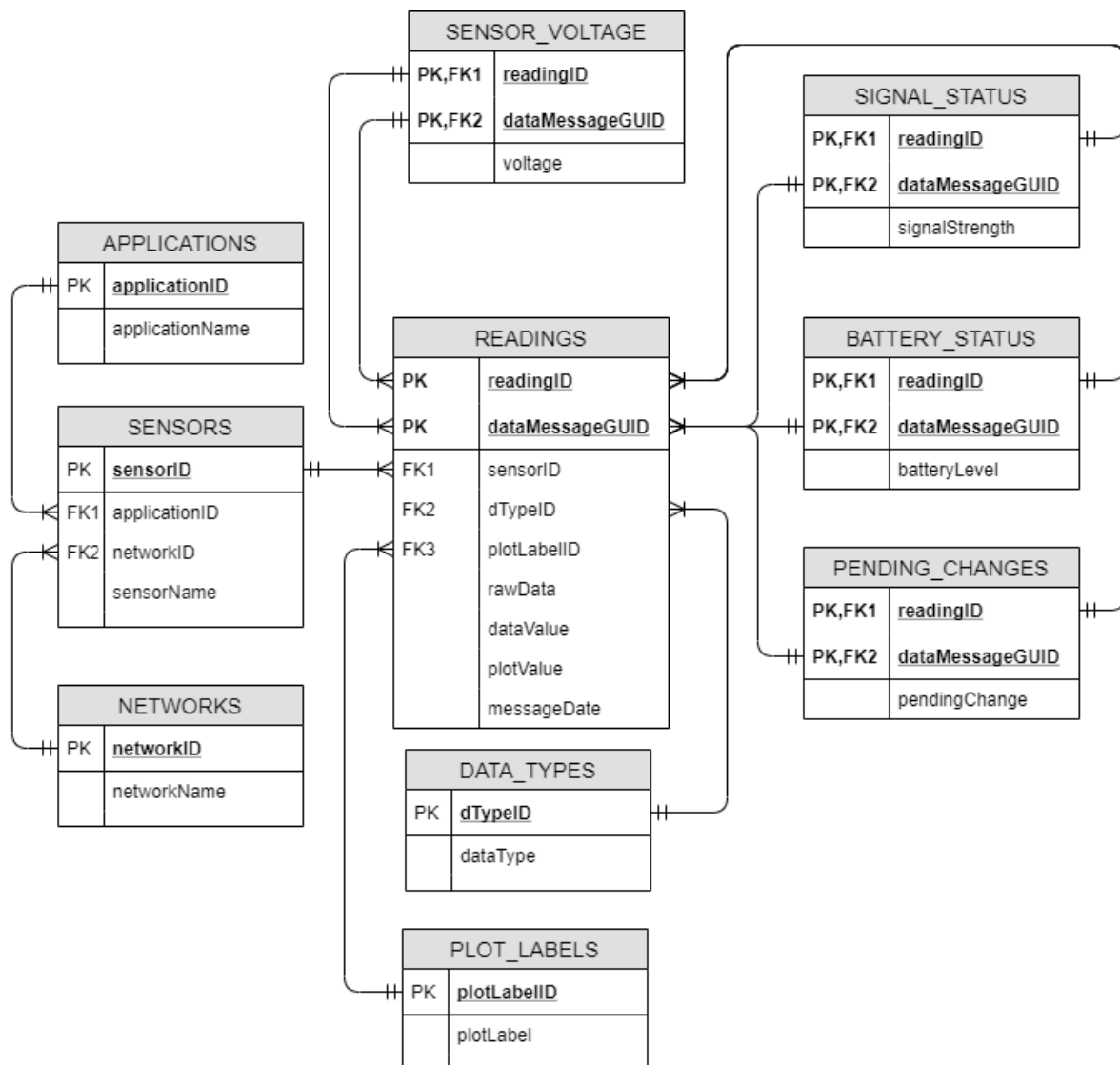
Data Dictionaries

Sensors

Sensors

Database:	salfordMove
Entity:	SENSORS
Definition:	Contains fixed data for individual sensors

Attribute	Key	Data Type	Size	Input Mask/Validation	Definition
sensorID	PK	GUID	-	N/A	GUID of a specific sensor, is unique because each sensor should only have one entry.
sensorName	-	NVARCHAR	20	N/A	The name of the sensor. Used for initially finding if a sensor exists in the DB.
applicationID	FK	INT	-	00000 - 99999	ID of the application that the sensor is associated with. (Data from MONNIT)
networkID	FK	INT	-	00000 - 99999	ID of the network that the sensor is associated with. (Data from MONNIT)

Readings

Database:	salfordMove
Entity:	READINGS
Definition:	Contains data relating to measurements collected by the installed sensors.

Attribute	Key	Data Type	Size	Input Mask/Validation	Definition
readingID	PK	GUID	-	N/A	GUID generated when a reading is written to the database.
dataMessage GUID	PK	GUID	-	N/A	GUID generated by MONNIT for a set of readings from a specific sensor. Some sensors have multiple measurands, so this field duplicates after data is split.
sensorID	FK	GUID	-	N/A	GUID for the sensor that collected the reading. Foreign key from Sensors table
rawData	-	NVARCHAR	5	N/A	The raw value recorded by the sensor.
dataValue	-	NVARCHAR	5	N/A	The value recorded by the sensor with respect to its data type. Actual difference from rawData unclear, likely interchangeable.
dataTypeID	FK	GUID	-	N/A	GUID for the data type of the current reading. Foreign key from Data Types table.
plotValue	-	NVARCHAR	5	N/A	The value recorded by the sensor with respect to its recorded Plot Label. Actual difference from rawData unclear, likely interchangeable.
plotLabelID	FK	GUID	-	N/A	GUID for the plot label of the current reading. Foreign key from Plot Labels table
messageDate	-	DATETIME	-	YYYY-MM-DD HH:MM:SS	The datetime when the reading was collected by the sensor.

Data Types

Database:	salfordMove
Entity:	DATA_TYPES
Definition:	Table for storing data relating to the data types of the readings stored in the Readings table

Attribute	Key	Data Type	Size	Input Mask/Validation	Definition
dTypeID	PK	GUID	-	N/A	GUID generated to identify a data type.
dataType	-	NVACHAR	10	N/A	The data type of a value in the Readings table.

Plot Labels

Database:	salfordMove
Entity:	PLOT_LABELS
Definition:	Table for storing data relating to the plot labels of the readings stored in the Readings table

Attribute	Key	Data Type	Size	Input Mask/Validation	Definition
plotLabelID	PK	GUID	-	N/A	GUID generated to identify a plot label.
dataType	-	NVARCHAR	10	N/A	The data type of a value in the Readings table.

Battery Status

Database:	salfordMove
Entity:	BATTERY_STATUS
Definition:	Table for storing the battery status of a sensor when a reading was taken.

Attribute	Key	Data Type	Size	Input Mask/Validation	Definition
readingID	PK/FK	GUID	-	N/A	GUID for a specific reading, referenced to the Readings table. Used as part of a composite key.
dataMessage GUID	PK/FK	GUID	-	N/A	GUID from the MONNIT dataset identifying a specific set of readings, used as part of a composite key.
batteryLevel	-	INT	-	N/A	Integer reading of the battery level of the sensor when a reading was taken.

Signal Status

Database:	salfordMove
Entity:	SIGNAL_STATUS
Definition:	Table for storing the signal strength of a sensor when a reading was taken.

Attribute	Key	Data Type	Size	Input Mask/Validation	Definition
readingID	PK/FK	GUID	-	N/A	GUID for a specific reading, referenced to the Readings table. Used as part of a composite key.
dataMessage GUID	PK/FK	GUID	-	N/A	GUID from the MONNIT dataset identifying a specific set of readings, used as part of a composite key.
signalStrength	-	FLOAT	-	N/A	Float representing the signal strength of a sensor when a reading was taken.

Pending Changes

Database:	salfordMove
Entity:	PENDING_CHANGES
Definition:	Table for storing if a sensor has any outstanding changes to be applied to its configuration when a reading was taken.

Attribute	Key	Data Type	Size	Input Mask/Validation	Definition
readingID	PK/FK	GUID	-	N/A	GUID for a specific reading, referenced to the Readings table. Used as part of a composite key.
dataMessage GUID	PK/FK	GUID	-	N/A	GUID from the MONNIT dataset identifying a specific set of readings, used as part of a composite key.
pendingChange	-	BIT	-	N/A	Boolean/Bit representing if a change was scheduled or not.

Sensor Voltage

Database:	salfordMove
Entity:	VOLTAGE
Definition:	Table for storing the current voltage reading of a sensor when a reading was taken.

Attribute	Key	Data Type	Size	Input Mask/Validation	Definition
readingID	PK/FK	GUID	-	N/A	GUID for a specific reading, referenced to the Readings table. Used as part of a composite key.
dataMessage GUID	PK/FK	GUID	-	N/A	GUID from the MONNIT dataset identifying a specific set of readings, used as part of a composite key.
voltage	-	FLOAT	-	N/A	Float representing the voltage level of a sensor when a reading was taken.

Miscellaneous

Applications

Database:	salfordMove
Entity:	APPLICATIONS
Definition:	Table for storing simple metadata about the applications the MONNIT sensors are assigned to. Data aggregated from MONNIT data JSON.

Attribute	Key	Data Type	Size	Input Mask/Validation	Definition
applicationID	PK	INT	-	00000 - 99999	ID of the application that the sensor is associated with. (Data from MONNIT)
applicationName	-	NVARCHAR	20	N/A	Name of an application.

Networks

Database:	salfordMove
Entity:	NETWORKS
Definition:	Table for storing simple metadata about the networks the MONNIT sensors are assigned to. Data aggregated from MONNIT data JSON.

Attribute	Key	Data Type	Size	Input Mask/Validation	Definition
networkID	PK	INT	-	00000 - 99999	ID of the network that the sensor is associated with. (Data from MONNIT)
networkName	-	NVARCHAR	20	N/A	Name of a network.

Accounts

Database:	salfordMove
Entity:	ACCOUNTS
Definition:	Table for storing simple metadata about the accounts the MONNIT sensors are assigned to. Data aggregated from MONNIT data JSON.

Attribute	Key	Data Type	Size	Input Mask/Validation	Definition
accountID	PK	INT	-	00000 - 99999	ID of the account that the gateway is associated with. (Data from MONNIT)
accountName	-	NVARCHAR	20	N/A	Name of an account.

Gateways

Database:	salfordMove
Entity:	GATEWAYS
Definition:	Data relating to gateways associated with the Monnit platform. Data is l

Attribute	Key	Data Type	Size	Input Mask/Validation	Definition
gatewayID	PK	INT	-	000000 - 999999	Integer generated by Monnit for identifying a specific gateway.
gatewayName	-	NVARCHAR	20	N/A	The name given to the gateway.
accountID	-	INT	-	N/A	Integer generated by Monnit for identifying an account the gateway is assigned to.
messageType	-	NVARCHAR	100	N/A	Data generated by Monnit. Unclear what its purpose is.
gatewayPower	-	INT	20	N/A	Likely represents if the gateway is online. Unclear why it's recorded.
batteryLevel	-	INT	-	N/A	Integer reading of the battery level of the sensor when a reading was taken.
gatewayDate	-	DATETIME		N/A	The datetime of the gateway when the data was sent.
gatewayCount	-	INT	-	N/A	Data generated by Monnit. Unclear what its purpose is.
signalStrength	-	INT	-	N/A	Float representing the signal strength of a gateway when the data was sent.
pendingChange	-	BIT	-	N/A	Boolean/Bit representing if a change was scheduled or not.