



Database Start Here

v3

Alan Lomax

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Before you get Started

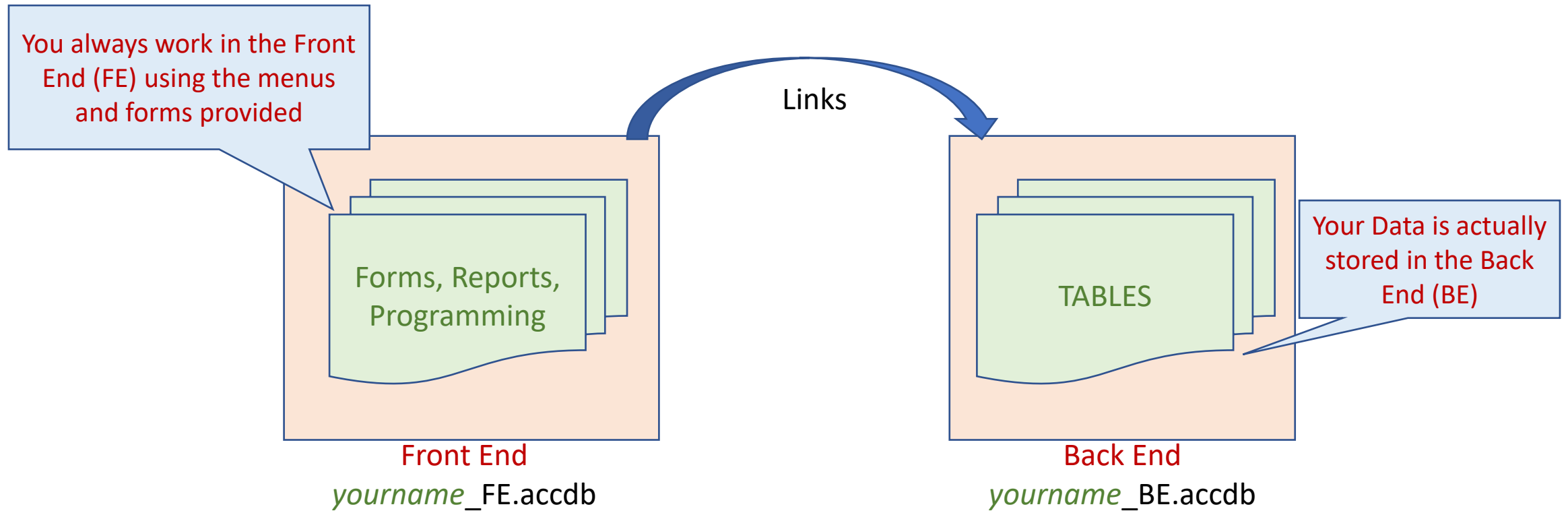
This database is written in and runs with Microsoft Access (2016). You only ***need*** Access if you want to modify the structure and the programming. To just use the database all you need is the Access 'Run Time' which is available from Microsoft here:

<https://www.microsoft.com/en-ca/download/details.aspx?id=50040>

The files that make up the system are described here:

1. This 'Start Here Guide' of course ... it is recommended you review it before diving in
2. The Access Database Front End and Back End files. I recommend you name them as a pair. The default name is NEW_FE.accdb and NEW_BE.accdb but you can change NEW to be anything you like.
3. In general you always only ever run the FE file ... and it 'attaches itself' to the back end. The first time you run the front end it may complain the back end is missing ... and you simply navigate to the back end file and click on it.
4. There is an Executable file for use with the StaRFishRail RFID system.
 - Additionally there is a library file (*.dll) that this executable needs and there is also a text config file
5. A software library called M2Mqtt.Net.tlb which is included. (for MQTT not Access)
6. **IF YOU ARE UPGRADING** see the caution note along with the list of changes in the change log [at the end of this presentation](#).

Front End and Back End

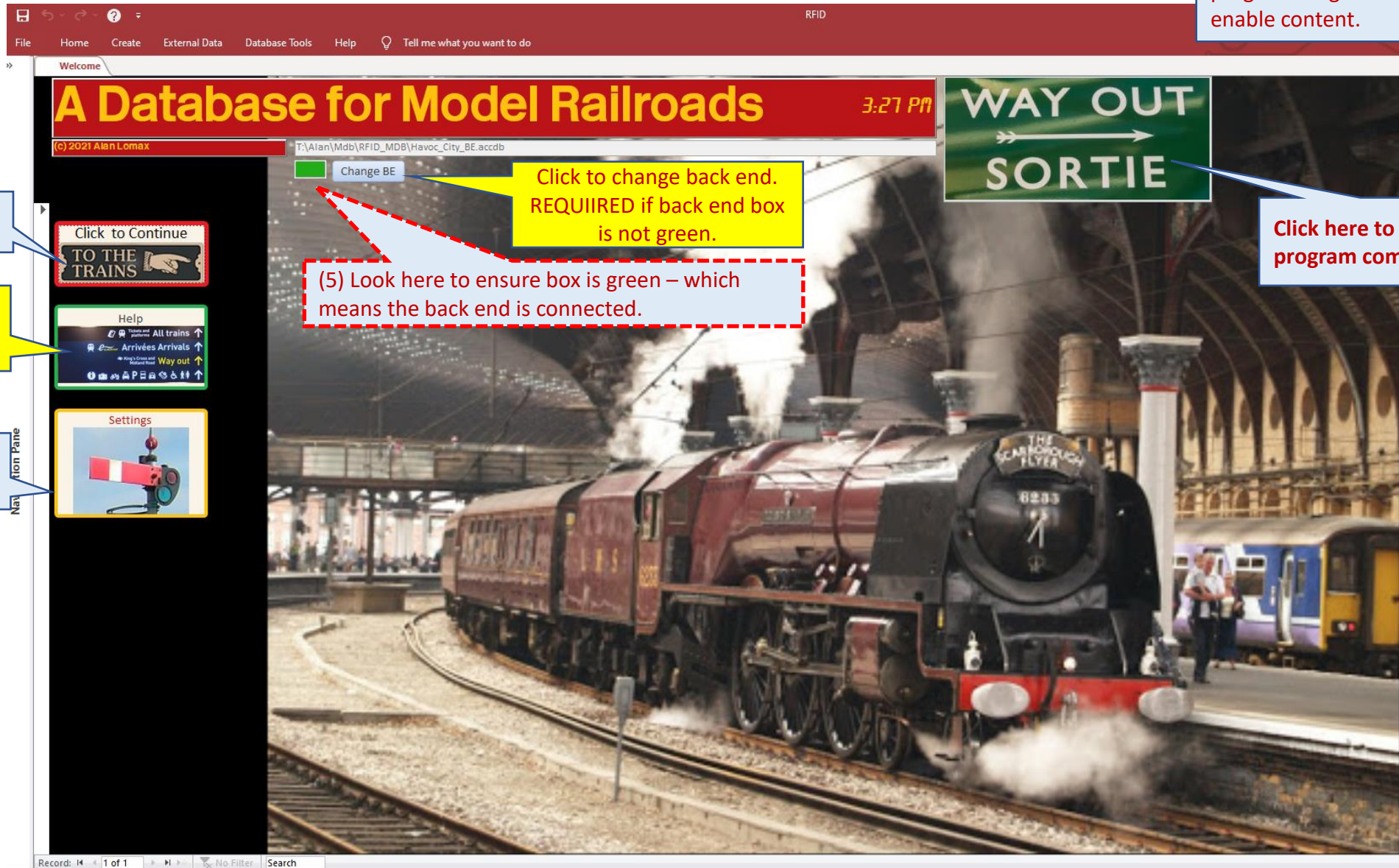


IMPORTANT:

Double Click the FE access database and it should launch automatically. It will test for and refresh the links to the BE. **If the two files are not in the same place then it won't know where the BE is and you will be prompted to locate the file.**

On the welcome page (the first page that comes up in the FE) there is a box on the top left that shows where the front end thinks the BE file is. If the box is green the file is found and the two are connected! Access won't ask again unless files are moved or renamed. There is a button to deliberately break the connection and connect to a different back end (desirable when testing).

The Welcome Screen



You may get a security warning like this. Since this database relies on programming to work you must click enable content.

Click to go to the main forms

**** START HERE ****
Some built in basic instructional pages

Change or review settings

Click to change back end. REQUIRED if back end box is not green.

(5) Look here to ensure box is green – which means the back end is connected.

Click here to Exit the program completely

The Help Screen

The screenshot shows a web-based help system interface. At the top, there are tabs for 'Welcome' and 'Help'. Below this is a blue header bar with the word 'Help' and a set of navigation buttons: 'New', 'First', 'Prev', 'Next', 'Last', and 'Exit'. The main content area is divided into several sections. A yellow callout box points to the 'Title' field, which contains the text 'Welcome'. Another yellow callout box points to the 'SortOrder' field, which contains the number '1'. A third yellow callout box points to the 'Enable Editing' checkbox, which is currently unchecked. A fourth yellow callout box points to the 'Getting Started' tab, which is the active tab. A fifth yellow callout box points to the 'Welcome to the Model Railroad Access Database.' heading. The main content area contains several paragraphs of text, including a welcome message and instructions on how to use the database. A yellow callout box points to the 'Getting Started' tab, which is the active tab. The text in the main content area includes: 'Welcome to the Model Railroad Access Database.', 'At its most basic level this database is a content management system (CMS) - in other words it is aimed at letting you manage your stuff.', 'Unlike a lot of CMS systems this one is very much focussed on railway rolling stock. In this database every individual piece of rolling stock is called an 'Entity'. This database is designed to help you manage your entities but in truth that is barely scratching the surface of what it can do.', 'As you will discover this database is a content management system (CMS) - in other words it is aimed at letting you manage your stuff. These forms often use checkboxes for yes/no type information but also if the drop downs are self populating which means as you enter some text once it then becomes a dropdown menu. Information new 'records' are created in the database.', 'Of course copy and paste makes bulk repetitive data entry even easier - populate one detailed record about a coach and then copy/paste if you have many of them.', 'Once some data has been entered there are generally two types of reports available:', '• Lists (shows some information about a lot of records)', '• Details (showing a lot of information about one record)', 'On the Welcome Screen are only a few buttons ...', '• "To the Trains" takes you on to the main database forms', '• "Options" Lets you review or change (rarely used) options.', '• "Help" brings you to the help system (this page is the first page of that help system).', 'On this form at the top you can search for additional help screens using the drop down "Search Title" Also you can add a new title (with a complete set of 5 new tabs) by using the button so named.', 'Finally ... All forms have an "Exit button" in the top right (An Icon of a door with the arrow pointing out.) So don't be timid take a look through the tabs on this form and any additional Titles of interest. Lets go Train Spotting!'

Help data is saved in the database like other records are. Each Record has a Title

For Each title there are 5 tabs worth of possible information

The title for each tab is also part of the data that is saved.

Editing is disabled by default but clicking here lets you add or edit the content.

Review the content on each of these 5 tabs for familiarity. You can always come back later.

Options and Settings

Green is Good. BE Version and required BE Version match

Mikes fudge factor. This constant is added to the internal session number and result is the displayed session number.

Click to filter out system entities from normal use. They are still in the tables but most forms and reports don't show them

Click to show more advanced information on this form. Initially this information is hidden just to minimize clutter.

Basic common definitions of each Era

On many forms and reports colour coding is used. Here the colours are defined using the common Red-Green-Blue set of 3 numbers (each 0-255). A color Value is calculated from these.

After clicking show advanced scroll down on form to see **very** rarely used stuff.

Navigation Pane

File Edit View Options External Data Database Tools Help Tell me what you want to do

Options

BE Version 3.0
BE Version Comment Upgraded Automatically
Back End Name T:\Alan\Mdb\Clean Version 3.0\New_BE.accdB
FE Version 2.1 MIN BE Version 3.0 Session Offset 100
FE Version Comment Added ability to mod back end programatically

☐ Show Advanced

☒ Filter Out System Entities
☐ Use JSON txt File
☐ Use MQTT Interface

Train Type Colour Codes Era (Basic look up Data)

LookUps (Color)

Service	ColorValue	ColorName	255	193	37
Heavy Express	2474495	Goldenrod1	255	193	37
Light Express	16436871	LightskyBlue	135	206	250
Local Pass	8441155	SeaGreen3	67	205	128
Goods	11842798	Rosybrown2	238	180	180
Heavy Goods	13421772	Grey80	204	204	204
Yard	16777215	White	255	255	255
Undefined	12632256	LightGrey	193	193	192
Passenger	13213315	BR Blue	135	193	37

Record: 1 of 11 No Filter Search

Service is used by the Entity form and if it matches one of these entries then the chosen color will be used as a keyword. (Add names to the list if you want to). ColorValue is a CALCULATED value corresponding to what colour to use. It is calculated from the 3 Red-Green-Blue values you put in. (You can find tables for these on the internet) The color name is just a descriptive reminder for yourself as to what color these numbers actually represent.

The Entity Form

Choose the section you want to work with.
Entities is at Top (most common)

Create a new entry.

Move through records in the database.

Back to the Welcome Screen

Delete Entity (you will be warned one last time)

Powerful Filtering. Button to clear filtering

This button will duplicate the current Entity (all specs and image). Only the maintenance records and Snag reports are not duplicated.

If you are using this entity record to document a RAKE of something enter the quantity here. For example enter 5 for a rake of 5 coaches. (Only use this where the rake would be broken apart.

The majority of fields have tool tips if you hover the mouse over them

Access provides built in tools to move through the records (same as the VCR type controls shown above)
You can also just type in a record number to go to it directly. There is a search box here too!
Most of the data fields have right click and filter capability which is also very powerful

Navigation Form

Entities

Trains

Roster

Sessions

Snags

Locations

RFID Tags

Reports

Advanced Filter

Report Filter

Clear Filter

Detail Report

Entities

Filter on Type

Filter on Service

Clear

1:22 PM

Name Bubble Car

Train On Shed

Road_Number 960010

Sort 1

Count 1

EN_ID 9

Delete Entity

Duplicate

Comment Bought to experiment with 'on the rails' camera streaming video at the point where interior seating has been carved out in places to cosmetic couplings, electrical cables, vacuum pipes and air pipe. Note that this model does not require destination blind/headcode. The decal sheet are generic to all versions of the Class 121.

Model Info

Maintenance

RFID Tags

Snag History

Comments

Class 121 single car DMU 'Bubblecar' 960010 in Railtrack 'coaching stock' maroon - Hatton's limit

Road_Number 960010

Wheel_Pattern 4-4

Service Local Pass

Service Code LP1

Owner/Operator Railtrack

Type DMU

Era 9 1995 2004 Initial Privatization

Record: 1 of 7

Search

Who Created Alan Lomax

When Created 10/27/2021

Entity Form (More)

The screenshot displays a web-based 'Entities' form. The top navigation bar includes 'File', 'Home', 'Create', 'External Data', 'Database Tools', 'Help', and 'Tell me what you want to do'. A sidebar on the left lists 'Entities', 'Trains', 'Roster', 'Sessions', 'Snags', 'Locations', 'RFID Tags', and 'Reports'. The main form area is titled 'Entities' and features a red header with 'Filter on Type' and 'Filter on Service' dropdowns, a 'Clear' button, and navigation icons. The form is for an entity named '20T Brake Van cw Duckets' with 'Train' set to 'Unassigned', 'Road_Number' '95088', 'Count' '1', and 'EN_ID' '10'. A comment box contains text about the chimney end and RFID tag. A small image of the train is shown with a 'Delete' button. Below the comment box are tabs for 'Model Info', 'Maintenance', 'RFID Tags', 'Snag History', and 'Comments'. The 'Model Info' tab is active, showing fields for 'Manufacturer' (Bachmann), 'Length (mm)' (0), 'Weight (g)' (empty), 'Manufacturer Number' (33-350), 'Paint Finish' (Pristine), 'Web Link #1' (a URL), and 'Web Link #2' (empty). There are checkboxes for 'NMRA Compliant Wheels', 'Powered (other than for Traction)', 'FlyWheel', 'Detail Pack Available', 'OEM Wheel', 'Interior Light', 'Exterior Light', 'Sound', 'Detail Pack Fitted', 'DCC Equipped / Ready', and 'Powered (for Traction)'. There are also dropdowns for 'Front Coupling Type' (Tension Lock), 'Rear Coupling Type' (Tension Lock), 'Part #' (empty), 'Bearings' (empty), and 'Incline Plane' (empty). A 'Tick box shows/hides relevant info' is shown next to the 'Owned' checkbox. The bottom section includes 'Where Bought' (My British Model Trains), 'When Bought' (01-Nov-19), 'Est Value \$' (\$20), 'Valued When' (06-Nov-21), 'Model Type' (RTR), 'Box Condition' (Good), and 'Running Condition' (Good).

Now with Two Weblinks. (eg vendor page and datasheet)

Both couplings individually spec'd with part number.

Weight of model in g

Standardized proportions for images (4:1 ratio width to height)

Double click to browse image library. (Also add a new image to the library, and pick the image for this entity.)

Many More Details

Many More Details

Generally a much more streamlined logical interface. With additional data fields and many cosmetic tweaks

Locations and RFID

Generally the RFID TAGs are mounted on your rolling stock. Aerials to read those tags are mounted under the rails. Each Aerial connects to a reader, and each reader to a Hub. Within the database all of this is defined as a 'location'. Below a location has been defined and the tick box 'Has RFID' is selected.

Home Create External Data Database Tools Help Tell me what you want to do

Welcome Navigation Form

Select

Sessions
Roster
Trains
Entities
RFID Tags
Snags
Locations
Reports

Locations

3:46 PM

Name: Locn_Type: Location Number:

Description:

Specific Track? ☒ Which Track: Has RFID? ☒

Comment:

Hub: ☒ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ A ☐ B ☐ C ☐ D ☐ E ☐ F

Reader: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8

Aerial: ☒ 1 ☐ 2 ☐ 3 ☐ 4

RFID

Sensor Number:

As Stored:

Scan List

ID	Scan Date	Entity Name	UID	D	Sns
442	11/5/2021 4:12:33 PM	20T Brake Van cw Duckets	50EF831233	C	005
441	11/5/2021 4:12:23 PM	20T Brake Van cw Duckets	50EF831233	C	005
440	11/5/2021 4:12:23 PM	20T Brake Van cw Duckets	50EF831233	C	005
438	11/5/2021 4:12:13 PM	20T Brake Van cw Duckets	50EF831233	C	005
437	11/5/2021 4:12:13 PM	20T Brake Van cw Duckets	50EF831233	C	005
436	11/5/2021 4:12:03 PM	20T Brake Van cw Duckets	50EF831233	C	005
435	11/5/2021 4:12:03 PM	20T Brake Van cw Duckets	50EF831233	C	005
431	11/5/2021 4:11:53 PM	20T Brake Van cw Duckets	50EF831233	C	005

Record: 1 of 347 No Filter Search

Who Modified: When Mod: Who Created: When:

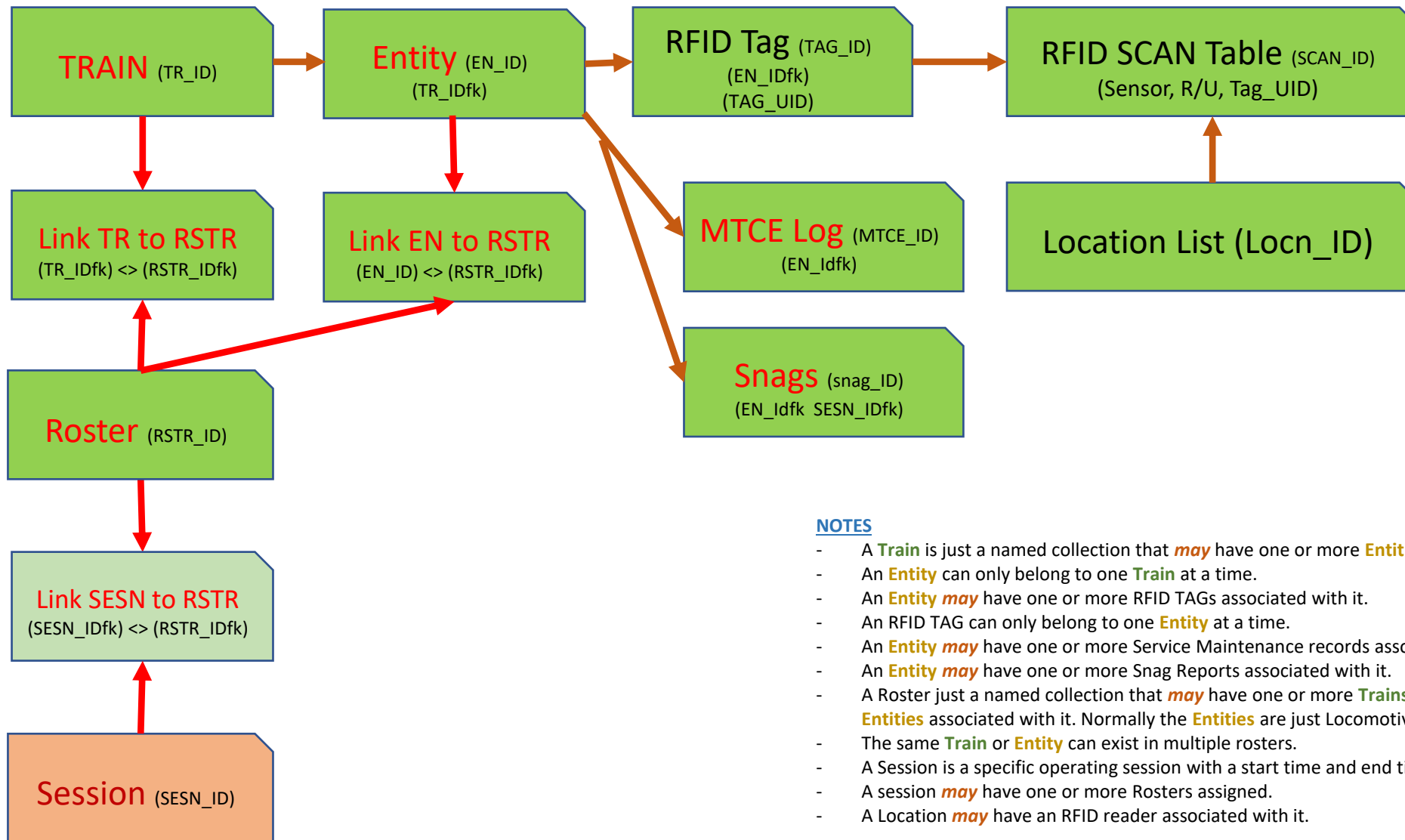
Ticking "Has RFID" will unhide the fields that allows a Hub reader and Aerial to be selected which results in a particular sensor # according to the design of the StaRFishRail system.

The Bottom line is a location can have a sensor associated with it and if it does this page will show the Scans Records for that location..

Additional Material

Additional material is FYI only

Database Main Table Design



NOTES

- A **Train** is just a named collection that **may** have one or more **Entities** associated with it.
- An **Entity** can only belong to one **Train** at a time.
- An **Entity** **may** have one or more RFID TAGs associated with it.
- An RFID TAG can only belong to one **Entity** at a time.
- An **Entity** **may** have one or more Service Maintenance records associated with it.
- An **Entity** **may** have one or more Snag Reports associated with it.
- A Roster just a named collection that **may** have one or more **Trains** and **may** have one or more **Entities** associated with it. Normally the **Entities** are just Locomotives but this is not required.
- The same **Train** or **Entity** can exist in multiple rosters.
- A Session is a specific operating session with a start time and end time (to be set loosely and wide).
- A session **may** have one or more Rosters assigned.
- A Location **may** have an RFID reader associated with it.

Where to Now?

I recommend looking through the forms for familiarity.

During testing I created and deleted several dummy records. (Flying Scotsman theme)

You could do similar just create records to see where the info shows up on various forms and reports. You can delete the records when done to clean up the database.

The central pillar for the database is without a doubt the Entity. There are forms for entering data, reports for listing and reviewing the data plus many sub forms.

A sub form shows how one set of data relates to another .. for example a “Train” is composed of related “entities”, or an “Entity” has “Maintenance records”.

There are three entities that are ‘**system**’ related and as such are not really dummy records. They are named ‘**Blank**’, ‘**System**’, and ‘**Unassigned**’. Initially these entities are filtered out on most forms and reports. (effectively ‘hidden’) There is an option on the settings screen to remove the filter and it is worth getting familiar with this behaviour.

All of these activities will help you get familiar with the database layout and operation.

System Entities

Another **system** record is simply called 'Undefined' which is used when RFID tags are scanned for the first time. Your workflow to install RFID tags should go like this: a) document entity in database b) Attach tag to an entity (unknown UID at this point) c) scan entity / tag. When first scanned a new RFID tag is created and it will be assigned (in the database) to the 'Undefined' entity. In the database you look at 'Undefined' and then reassign this tag away from the 'Undefined' entity and over to the correct entity that you just built.

The final **system** entity is called 'system' and it can be used for logging maintenance records not about your model railroad stuff but about your system in general. You could of course create your own entities for keeping track of other items also.

The three **system** entities are not required to be visible. There is an option on the 'options page' to effectively hide the three **system** entities from your forms and reports. You tick the setting and then the next time you go to the entity form there will be three less entities. See below:

Welcome frmOptions

A Collection of Rarely Used Options

BE Version	01 000
BE Version Comment	Good Back End
Back End fname	T:\Alan\Mdb\RFID_MDB\Clean Version 1.0\RFID_BE.accdb
FE Version	01 000
FE Version Comment	Intitial Version

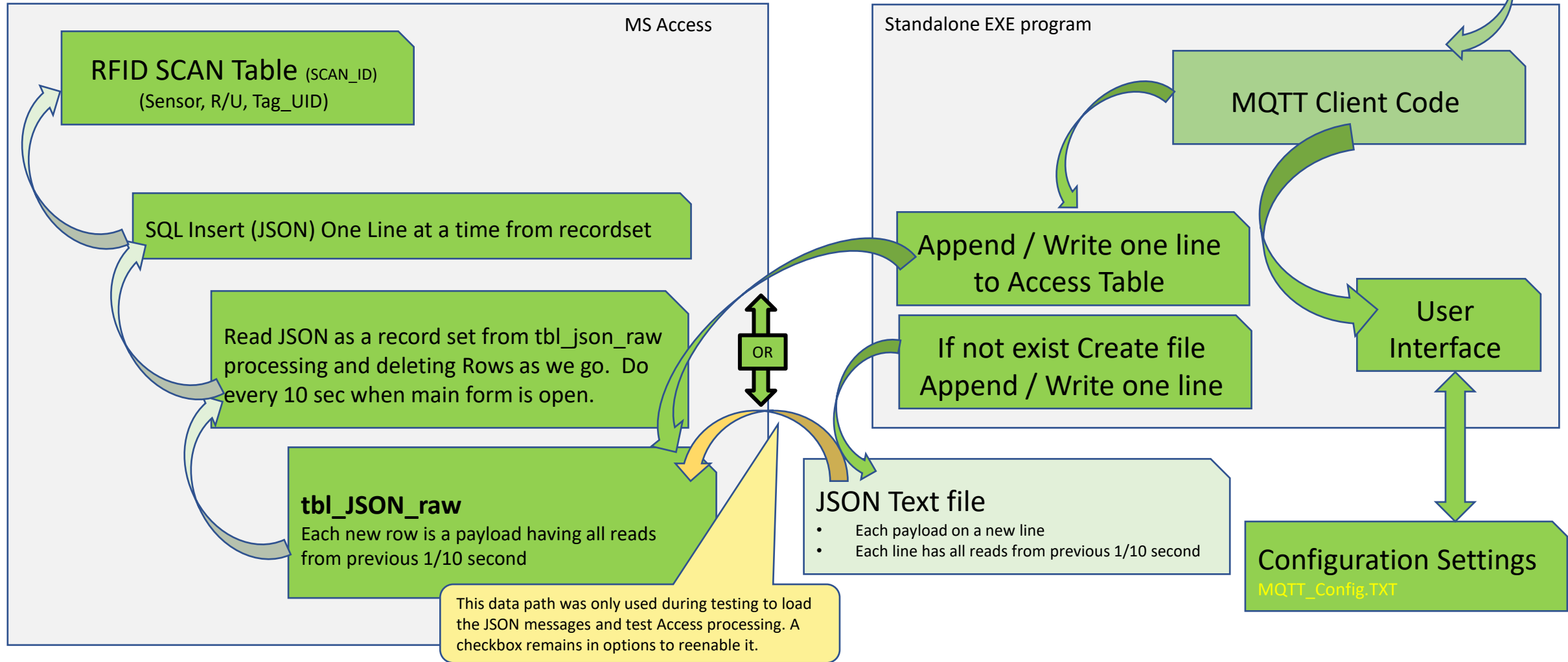
☐ Filter System Entities

RFID MQTT and Access

This database was written with the ability to read and process RFID tags.

1. Specifically a small 'client program' is provided for subscribing to especially formatted MQTT messages and loading them behind the scenes into a back end. (Specifically to the table: tbl_JSON_Raw)
2. The RFID system used publishes MQTT messages up to every 1/10 of a second as tags pass over the aerials. The message consists of the UID of the tag, the sensor # (aerial) and also the type of read (A new read, a ongoing read, or a loss of read)
3. Additionally the RFID Hub will send a 'keep alive' message every 20 seconds.
4. If configured (by default it is turned off) you can ask the Database to auto start the client program on the options page. Generally it is best if you manually launch the client first to ensure it connects, subscribes and is receiving MQTT messages. Once verified to be properly configured only then should it be auto started.
5. For test purposes the client can also log the MQTT messages to a text file for analysis.

Database MQTT Interface (Unified View)



MQTT RFID Tool

MQTT Test Client (V0.3)

IP Address or URL of MQTT Broker
Green when connected.

MQTT Topic to subscribe to.
Green when subscribed.

Name of Text file where payloads will be logged. (Can Locate using the button)
Green when logging

Name of Access BE Database where payloads will be logged.
(Can Locate using the button)
Green when logging

Log Payloads to txt file.

Auto start on open
(once configuration file is set of course).

Load and Save Configuration file (All of the above settings). See MQTT_Config.TXT

192.168.27.131

MQTT

RFID

C:\temp\Test1.txt

C:\temp\JSON_TEST.accdb

Log Payloads to List box.

Log Payloads to Access

Log Payloads to MQTT Output File

Log Direct to Access (see Notes)

Auto Start after open

Send Ping

SAVE CFG

LOAD CFG

> RUN

Finished Reading Config : MQTT_Config.TXT
Running Commenced at : 10/21/2021 5:40:41 PM

MQTT Traffic

Last Msg

< EXIT >

HUBS

0	8
1	9
2	A
3	B
4	C
5	D
6	E
7	F

Green when connected.
Red if disconnected

If you don't know what this is I can't help you

Green when traffic in last 20 seconds.
Yellow if no traffic in last 20 seconds.
Red if no traffic in 45 seconds

Time of most recent message

Which Hubs are reporting in. (0-F to match HUB address switch)
Green < 20 seconds
Yellow for > 20 seconds
Red for > 45 seconds

Manually start
Or restart if configuration has changed.

List box for messages.
Also shows MQTT payload if Log to Window is checked.

Publishes "PING" to broker using Topic. Sending and receiving is captured in window below.

Viewing Hub Message Counts

[illegible]

Click Here and two additional boxes will appear below the Hub Status lights.

Click the box again to hide them away.

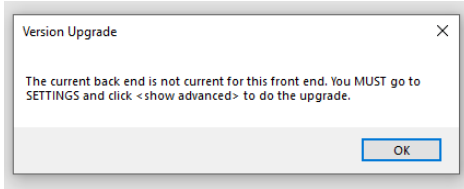
Select a HUB to monitor by clicking one of these boxes. Note Green hubs have sent messages in last 45 seconds. (Keep alive are sent every 20 seconds). Effectively this shows who is connected.

These two boxes show the currently selected HUB and the number of payloads received from that HUB. Here Hub 0 has sent 260 messages.

This list box is effectively an output screen. Here it is showing 'dummy' MQTT payloads generated by a completely separate Python program and being published to a MQTT broker running on a Raspberry Pi

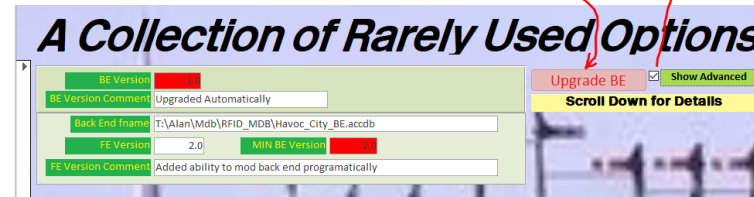
Changelog

- **CAUTION** – If you are upgrading **do NOT overwrite your back end database file.**
- You only need the new front end. The back end (with your data in it) will be upgraded in place.
- When you start the new Front End it first checks your Back End version and you will get the message box below left if an upgrade is needed.



If you get a message box like shown at left then do these steps :

- ☐ Click OK
- ☐ Go to the settings screen
- ☐ Click Show Advanced and
- ☐ press the Button to upgrade BE



- If you have several BE files you will need to connect to each BE and upgrade them one at a time. When complete the version numbers should be green once again.

Main Changes

- Bug Fixes resolving issues found during testing