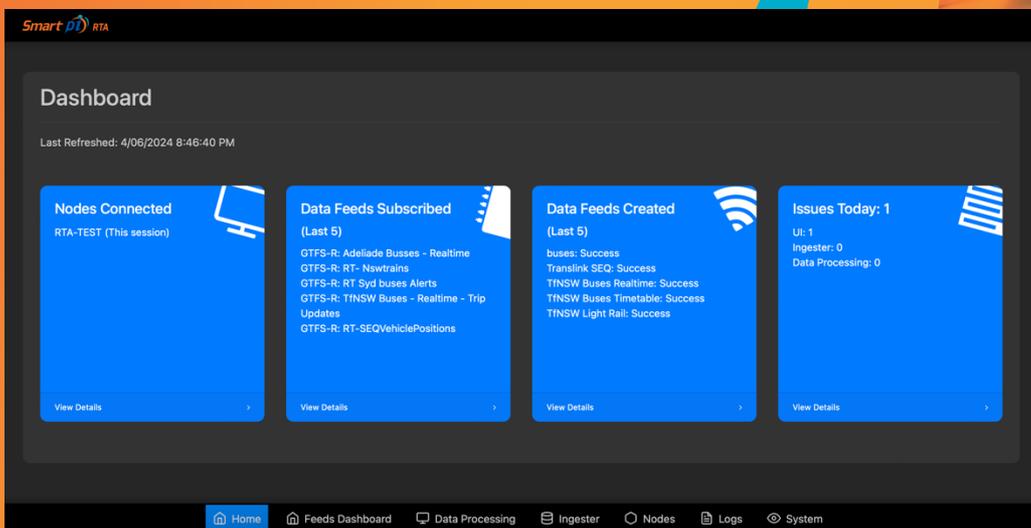


Smart *PI* ECOsystem



Smart *PI* RTA

USER GUIDE

Revision: May, 2024

Version: 1.7.0

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1. INTRODUCTION

The Smart pi RTA (Real Time Aggregator) is a node-based software application that can process large feeds of real-time data in GTFS and GTFS-R formats, supporting both single and multiple agencies.

The Smart pi RTA has fast processing times of 70 seconds for GTFS and less than 5 seconds for GTFS-R.

Smart pi RTA can filter feeds by agency and/or create new feeds with only the required agencies, it is also possible to merge multiple feeds together and remove unused data from feeds such as shape data, ensuring downstream systems only process the data required (Smart pi RTA, Smart pi DVA etc).

The Smart pi RTA application is written on the .NET platform and is managed via a built-in web interface.

The RTA node server can be installed and run on Windows and/or Linux servers and can be installed on premises, in the cloud or as a hybrid installation.

All user interfaces are HTML5 based and can be used with any browser, LDAP integration is available for security permissions and single sign on, the .NET application self-hosts the user interface for ease of installation, upgrades and management.

Smart pi RTA is node-based for easy expansion and has a fully redundant architecture.

For the latest version information and downloads please visit the Smart pi portal.
<https://portal.smart-pi.info>

2. APPLICATIONS

2.1 Smart pi RTA Node

The Smart pi RTA Node application is a web interface that allows you to configure and monitor all the features of the smart pi RTA system.

The Smart pi RTA Node application supports LDAP user authentication and permissions, which means you can use your existing user accounts and roles to access and use the application. You can also assign different permissions to different users, depending on their functions and responsibilities.

The Smart pi RTA Ingestor is part of the Smart pi RTA node that ingests all external feeds for the Smart pi RTA system. The Smart pi RTA Node application allows you to integrate and process various types of external feeds for your Smart pi RTA system.

The Smart pi RTA Node application supports multiple GTFS and GTFS-R feeds from many different agency types, including trains, buses, light rail, ferries, metro services, and more. GTFS and GTFS-R are standard formats for public transportation data that provide static and real-time information about schedules, routes, stops, and trips.

The Smart pi RTA Node application can process GTFS and GTFS-R data from different sources and agencies on your Smart pi ECO system.

A SIRI module is also available.

The Smart pi RTA can be installed on premises, cloud, or hybrid cloud. You can add more nodes to add both redundancy and capacity to your Smart pi RTA system. Each node can run on either Windows or Linux.

The Smart pi RTA is configured and managed from the Smart pi RTA web based User interface, which is a user-friendly, secure, and reliable web interface that can help you configure and monitor your Smart pi RTA system with ease and efficiency.

All log and audit reports are available in the Smart pi RTA interface.

2.4 Database

Maria DB is the recommended database engine.

It is recommended to use the latest available Long-Term Support (LTS) version.

A single Centralized Database structure is use with all nodes information stored in the same db/cluster.

3. HARDWARE REQUIREMENTS

Please ensure the below minimum requirements for Production installations, please note this is based off 1 feed being processed.

CPU	Memory	Storage
2 Cores at 1+Ghz	4GB+ RAM	50GB + depending on configuration

4. SYSTEM INSTALLATION

4.1 Requirements

Operating Systems

We recommend installing on either.

Windows: The Latest version Microsoft Windows Server edition

Linux: The latest Long-Term Support (LTS) version of ubuntu server

Other operating systems should be supported although are not tested.

Third Party Applications

Microsoft dotNET core 6.0

MariaDB Long Term Support (LTS)

4.2 Installation

- Install the Third-Party applications and configure them.
- Run the included .sql Database script to build the database.
- The Smart pi RTA application should be unzipped in the preferred directory and started. (It is recommended to start the application as a service to ensure automatic start/restart).
- Configure server settings (ports, db-usernames and passwords etc in appsettings.json)

5. User INTERFACE

All Smart pi RTA server settings and management functions are facilitated via the Smart pi RTA Master using a web browser. Your network administrator will supply the address to point your browser to.

Smart pi RTA server features a responsive web interface. It will detect whether it is being accessed by a desktop or mobile device (due to the complexity it is recommended to use a desktop environment except for user modes) and configure the display to suit accordingly.

The General Operation instructions assume that the system has previously been setup and configured and provides a guide to reviewing and changing configuration settings.

5.1 Home

The home page displays a summary dashboard which can be used to easily see the status of the system.

Additionally, you can click through the different options and see further information that is relevant.

The screenshot displays the Smart pi RTA Master interface. At the top left is the logo "Smart pi RTA". Below it is the title "Dashboard" and a timestamp "Last Refreshed: 20/05/2024 6:33:58 PM". The dashboard contains four blue widgets:

- Nodes Connected:** RTA-TEST (This session). Includes a "View Details" link.
- Data Feeds Subscribed (Last 5):** Lists feeds such as "GTFS: sydney buses area 6", "GTFS-R: RT-SEQVehiclePositions", "GTFS-R: Sydney Metro Test Vehicle Position", "GTFS-R: Sydney Metro Test Realtime", and "GTFS-R: Translink SEQ - Service Alerts". Includes a "View Details" link.
- Data Feeds Created (Last 5):** Lists feeds such as "buses: Success", "Translink SEQ: Success", "TNSW Buses Realtime: Success", "TNSW Buses Timetable: Success", and "TNSW Light Rail: Success". Includes a "View Details" link.
- Issues Today: 0:** Shows "UI: 0", "Ingester: 0", and "Data Processing: 0". Includes a "View Details" link.

At the bottom, there is a navigation bar with tabs: Home (highlighted with a red arrow), Feeds Dashboard, Data Processing, Ingester, Nodes, Logs, and System.

The home tab provides a robust overview or summary of the running operations like nodes, data processing, ingester logs, and system.

5.2 Feeds Dashboard

Feeds Dashboard displays an overview of all the feeds created and subscribed to. Here you can see the description of the feeds, last status and last status update. Use the search box to find a specific feed you're looking for, or sort the lists via last status or last updated.

Smart pi RTA

Feeds Overview

Data Feeds Subscribed

Description	Last Status	Last Updated
RT-SEQVehiclePositions	Completed	20/05/2024 6:50:11 PM
sydney buses area 6	Completed	20/05/2024 6:49:08 PM
SMBSC004	Completed	20/05/2024 6:47:33 PM
GSBC007	Completed	20/05/2024 6:47:34 PM
GSBC010	Completed	20/05/2024 6:47:36 PM
GSBC014	Completed	20/05/2024 6:44:40 PM
GSBC003	Completed	20/05/2024 6:47:38 PM

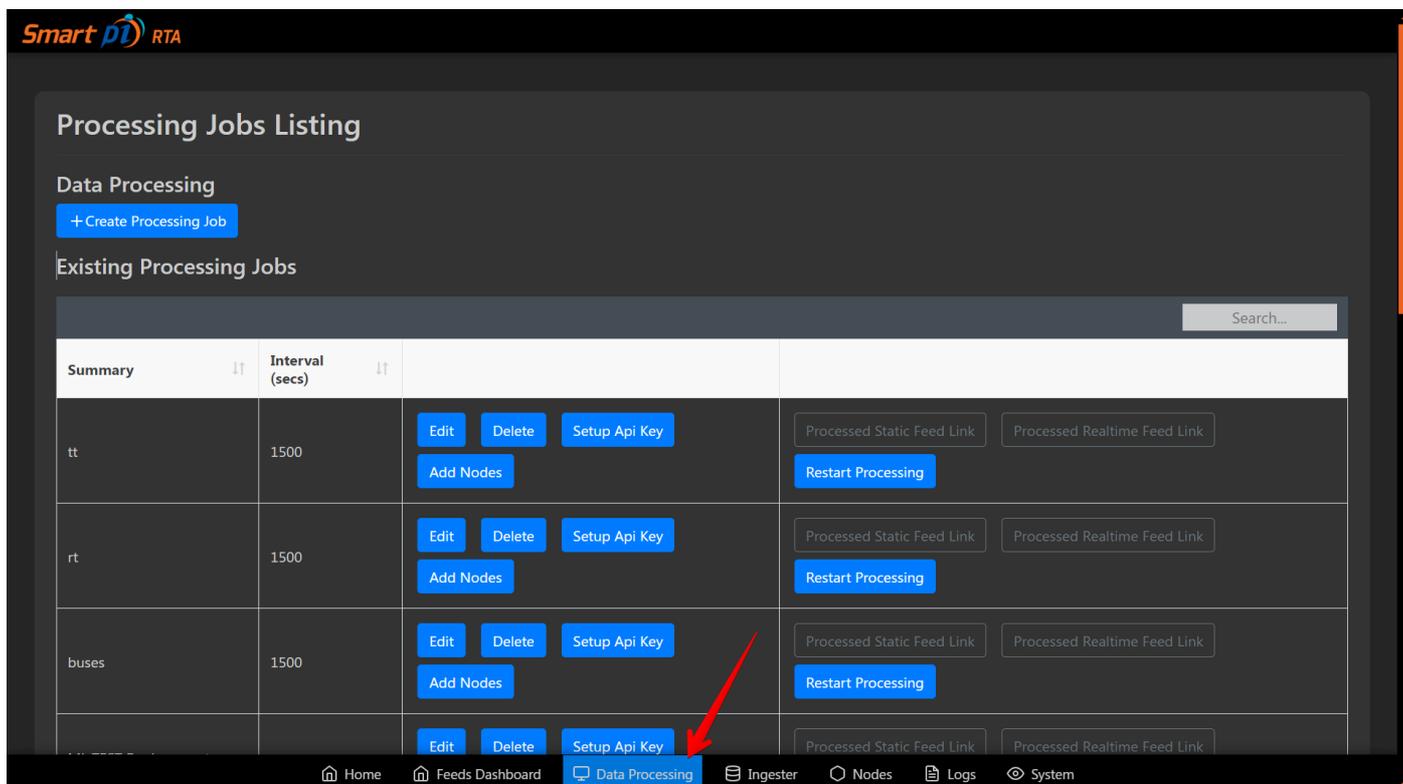
Data Feeds Created

Description	Last Status	Last Status Update
tt	Success	20/05/2024 6:50:07 PM
rt	Success	20/05/2024 6:26:13 PM
buses	Success	20/05/2024 6:50:10 PM
ML TEST Replacement Busses	Success	20/05/2024 6:26:02 PM
Sydney Metro	Success	20/05/2024 6:27:03 PM
Adelaide Busses	Success	20/05/2024 6:25:28 PM
TfNSW Light Rail	Success	20/05/2024 6:04:42 PM
TfNSW Light Rail Realtime	Success	20/05/2024 6:49:44 PM
TfNSW Buses Timetable	Success	20/05/2024 6:06:15 PM
TfNSW Buses Realtime	Success	20/05/2024 6:50:05 PM
Tranlink SEQ	Success	20/05/2024 6:05:46 PM

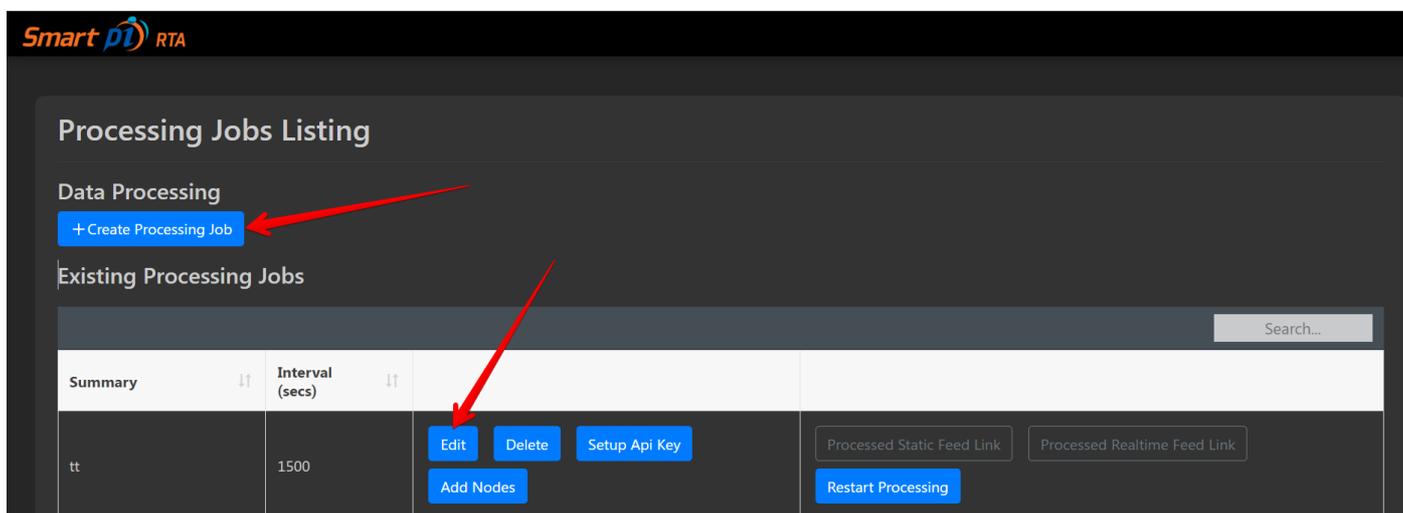
Navigation: Home | **Feeds Dashboard** | Data Processing | Ingestor | Nodes | Logs | System

5.3 Data Processing

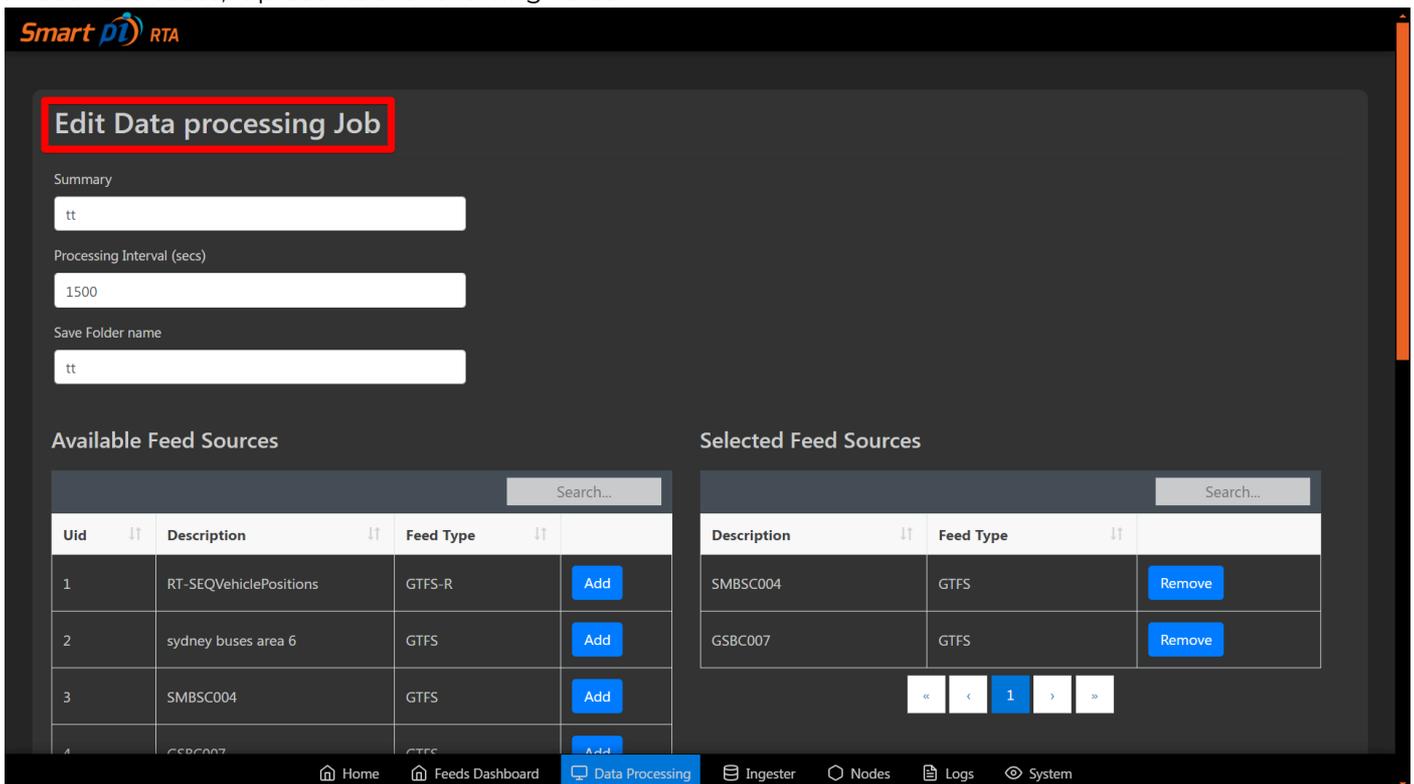
Smart Pi RTA has a **Data Processing** tab that displays all the existing processing jobs. Here you can edit or delete an existing job by clicking the **Edit** or **Delete** button. You also have the option to setup an API key and add notes if needed.



Click **+Create Processing Job** to create a new job, or click the **Edit** button to edit an existing one.

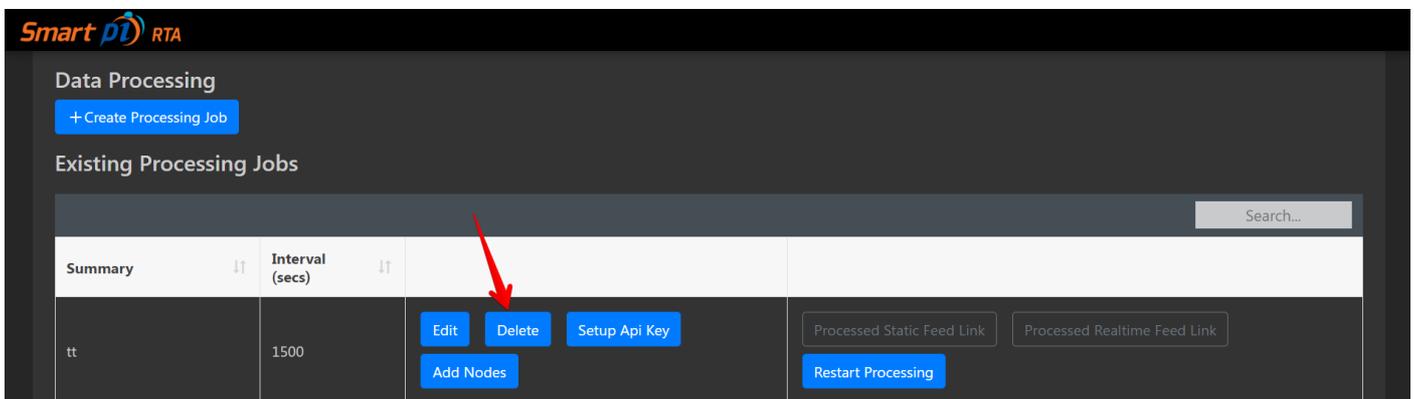


In both the cases, it presents the following fields:

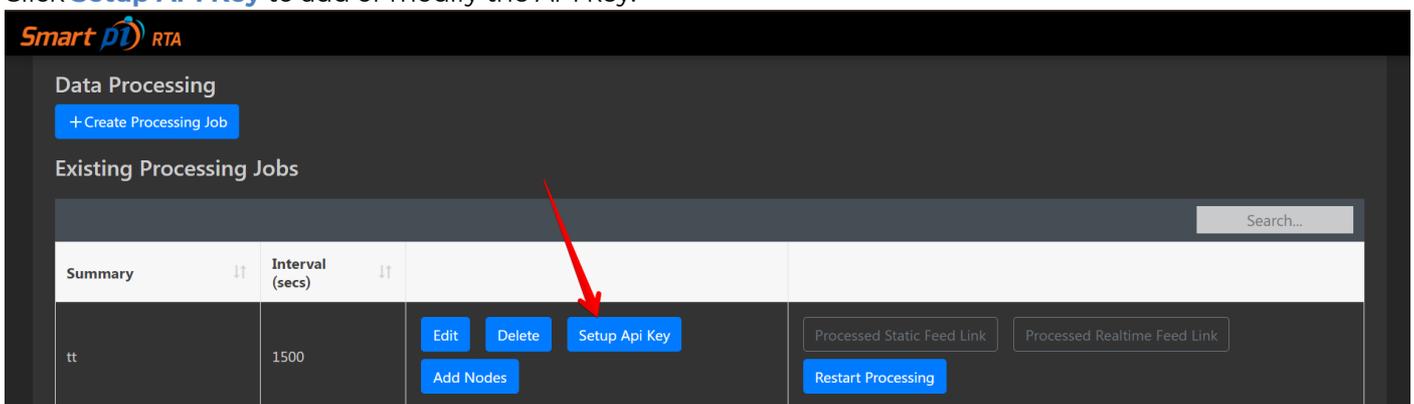


Enter the values in the Summary, Processing Interval (secs) and Save Folder name fields and add or remove feed sources from the sections available.

To delete an existing processing job, simply click the **Delete** button.



Click **Setup API Key** to add or modify the API key.



Enter the API key if you have one or click the **Generate API Key** button to generate a random key. Don't forget to click the **Update API Key Information** to save your changes.

Setup API key for Data processing Job

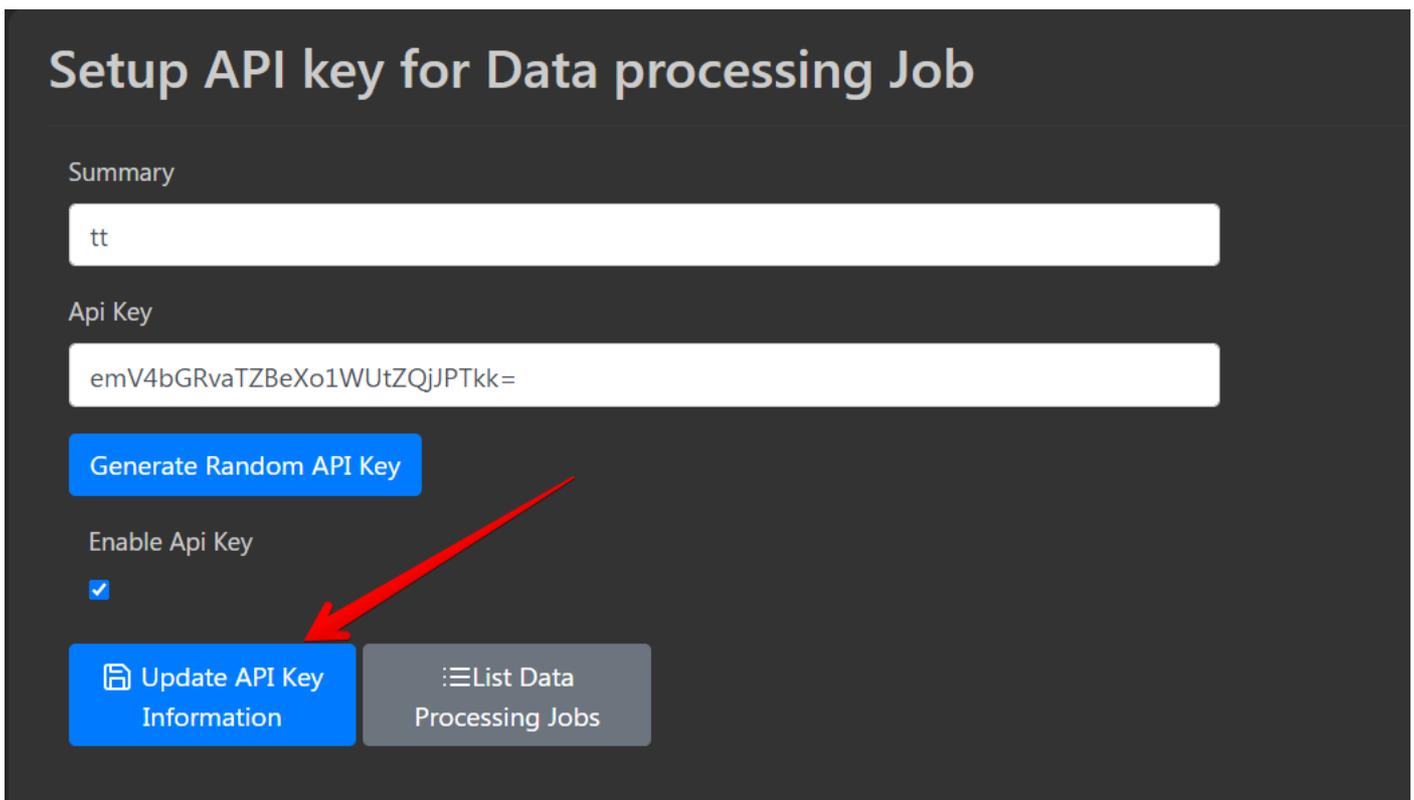
Summary

Api Key

Generate Random API Key

Enable Api Key

Update API Key Information **List Data Processing Jobs**



Click the **Add node** button to select nodes and assign them to your desired processing job.

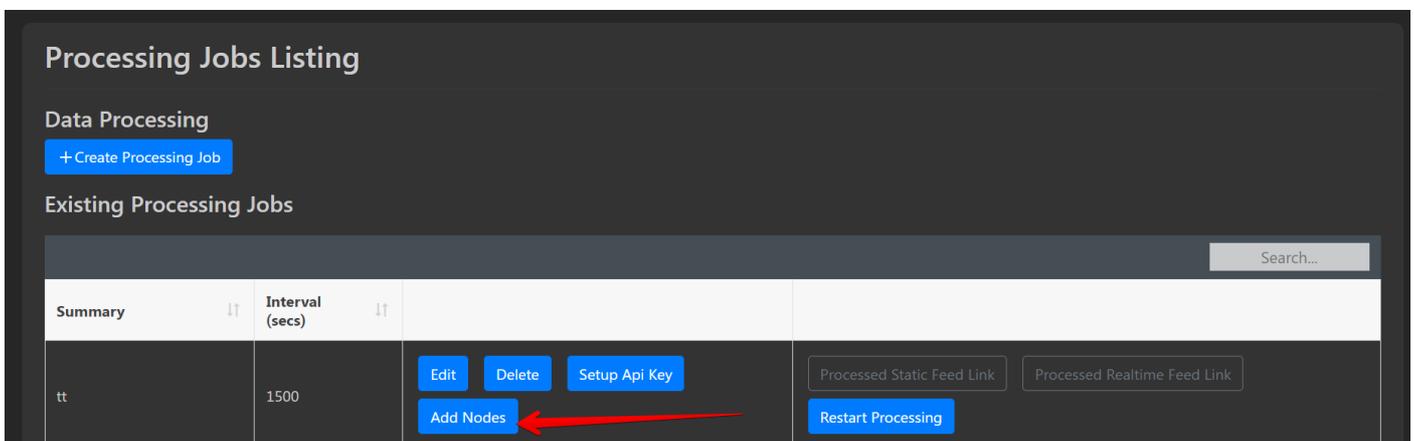
Processing Jobs Listing

Data Processing

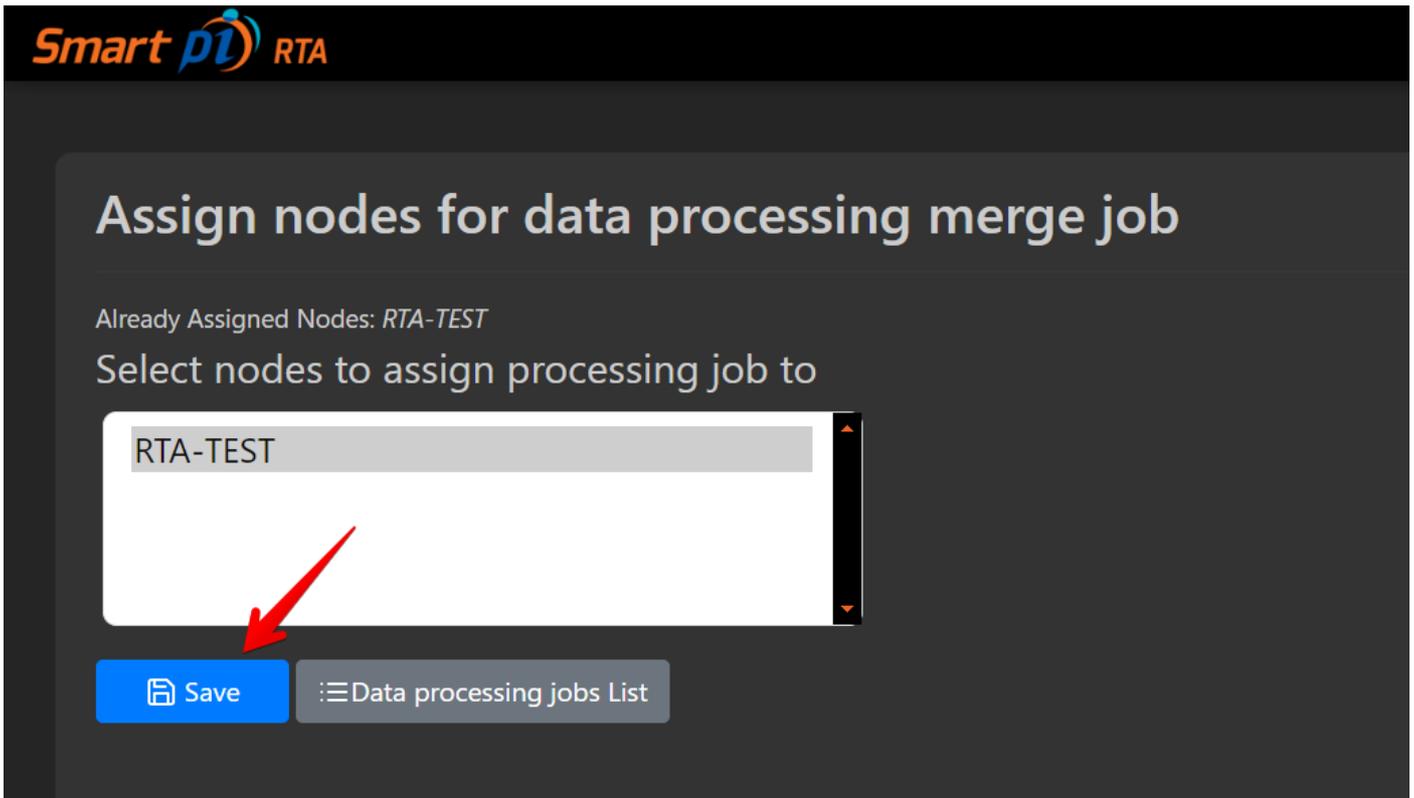
+ Create Processing Job

Existing Processing Jobs

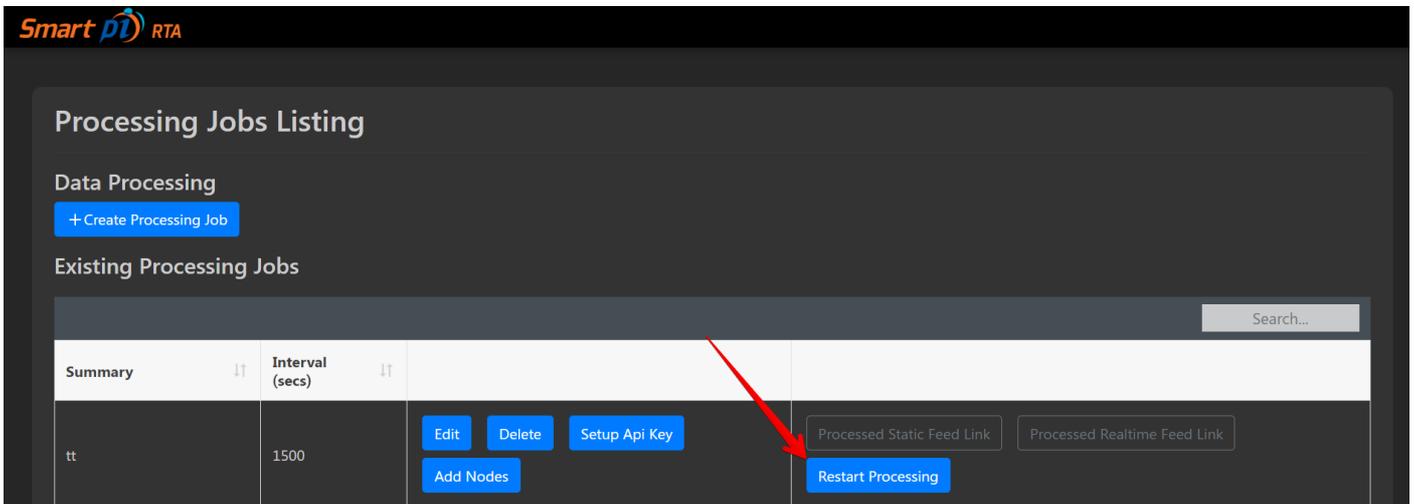
Summary	Interval (secs)		
tt	1500	Edit Delete Setup Api Key Add Nodes	Restart Processing Processed Static Feed Link Processed Realtime Feed Link



Click **Save** to save changes.

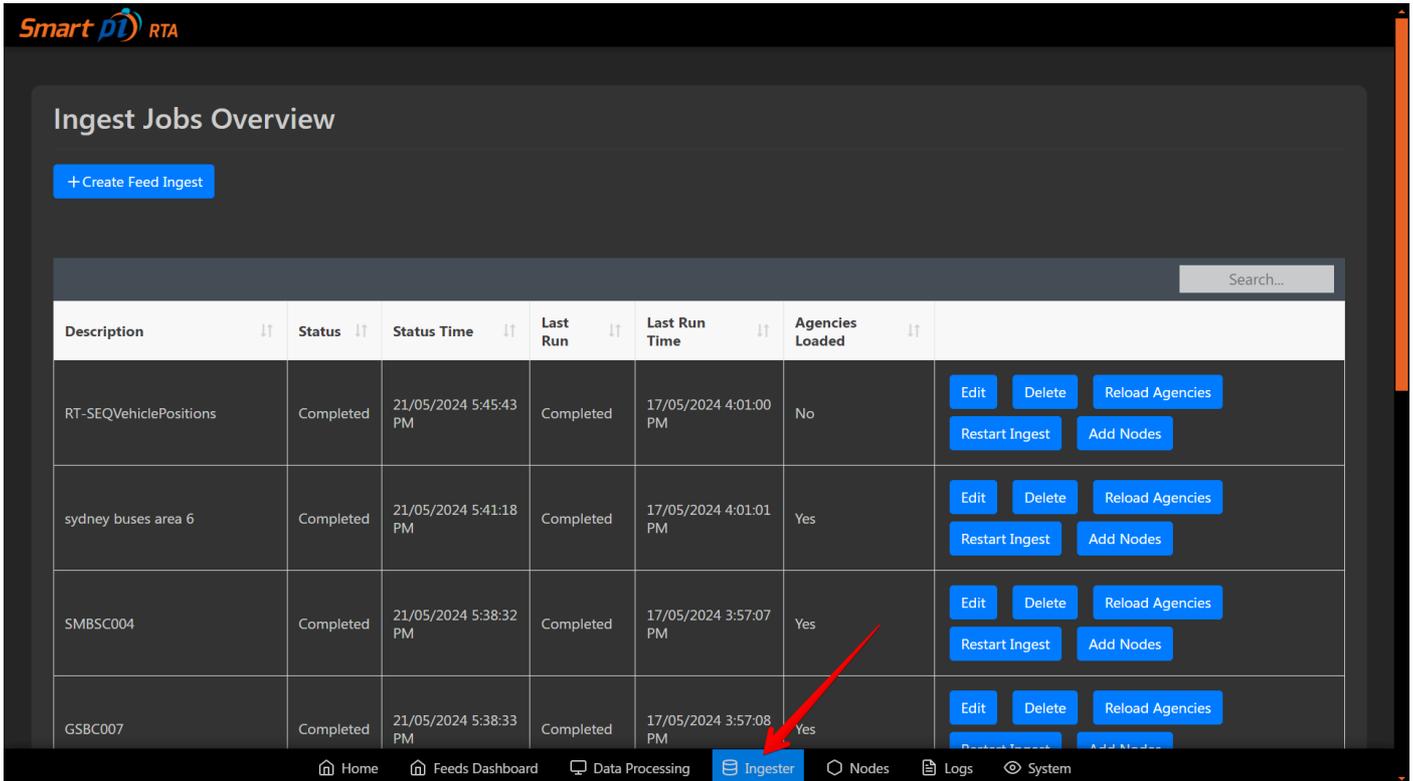


On the main **Data Processing** page, you can also restart the service by clicking the **Restart Processing** button.



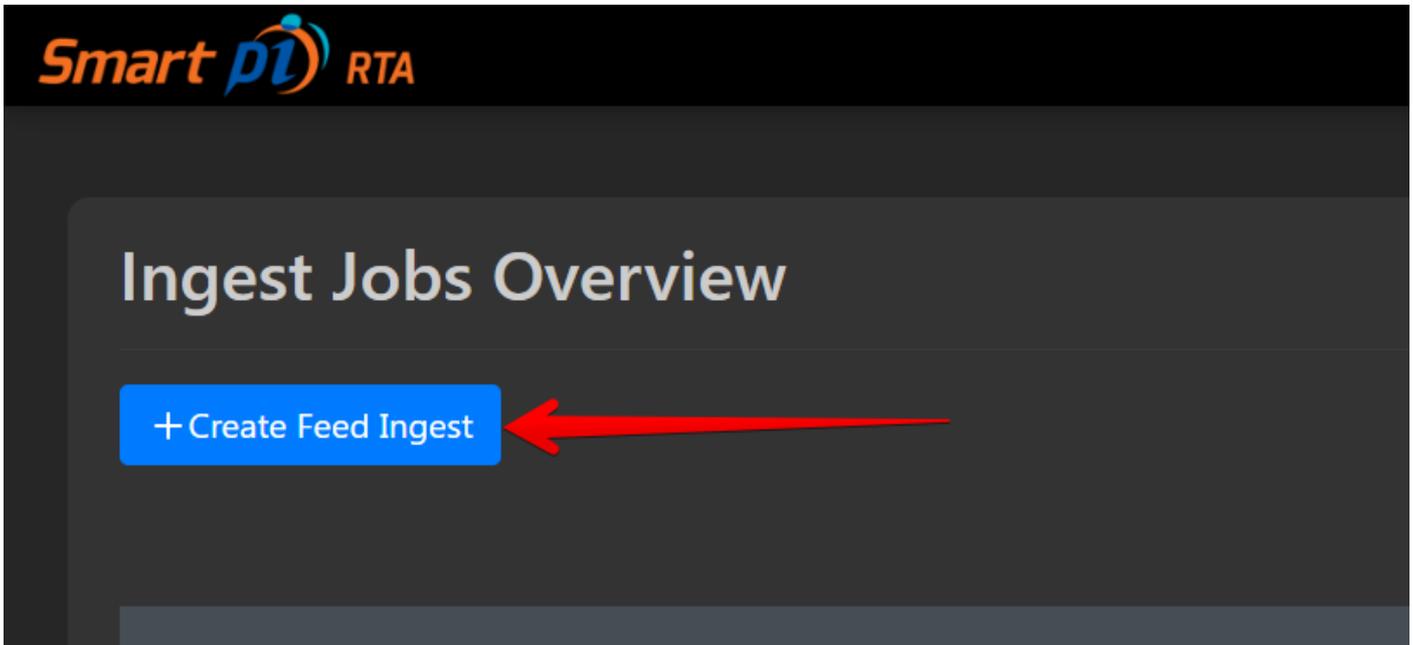
5.4 Ingestor

An ingestor is a program that reads data entering the system through a communications port. To access the ingestor menu, click **Ingestors** from the main dashboard.



It will already have the overview open where you can see the jobs, their status, last run time etc.

On the same screen, you can edit, delete, reload agencies, restart ingest and add nodes. Click **+Create Feed Ingest** to start adding one.



Select a Feed Type from the following options:

- GTFS (The General Transit Feed Specification (GTFS) is an Open Standard used to distribute relevant information about transit systems to riders.)
- GTFS-R (This is a feed specification that allows public transportation agencies to provide real-time updates about their fleet to application developers.)
- SIRI

Create Feed Ingestion

Feed Type

Description

Feed Url

Api Key

Refresh Interval (secs)

Fill in the Description, Feed URL, API Key and Refresh Interval (secs) fields and click **Save** to save changes.

On the main **Ingestor** tab, you can edit an existing ingest job by clicking the **Edit** button.

Ingest Jobs Overview

[+ Create Feed Ingest](#)

Search...

Description	Status	Status Time	Last Run	Last Run Time	Agencies Loaded	
RT-SEQVehiclePositions	Completed	21/05/2024 6:09:01 PM	Completed	17/05/2024 4:01:00 PM	No	Edit Delete Reload Agencies Restart Ingest Add Nodes

Then fill in the following fields:

- Description
- Feed URL
- API Key
- Refresh Interval (secs)

Click **Delete** to delete an existing ingestor job. To reload an agency, click **Reload Agencies** and **Restart Ingest** to restart the selected ingest.

Finally, you can assign nodes to an ingest job by clicking the **Add Nodes** button.

Search...

Description	Status	Status Time	Last Run	Last Run Time	Agencies Loaded	
RT-SEQVehiclePositions	Completed	21/05/2024 6:45:52 PM	Completed	17/05/2024 4:01:00 PM	No	Edit Delete Reload Agencies Restart Ingest Add Nodes

Then select a node from the list and hit **Save**.

Assign nodes for Ingest Feed

Already Assigned Nodes: *RTA-TEST*

Select nodes to assign ingest job to

RTA-TEST

 Save

 Feeds List

5.5 Nodes

Click **Nodes** from the main dashboard to open up the nodes overview.

The screenshot displays the 'Nodes Overview' interface. At the top left is the 'Smart pi RTA' logo. Below it is a search bar. The main content is a table with the following data:

Node Name	Description	Status	User	Last Status Update	Ingest Sources	Processing Jobs
RTA-TEST	WS2022	Online	RTA-TEST	21/05/2024 6:47:12 PM	28	14

Below the table is a pagination control showing '1' in a blue box, indicating the first page. At the bottom, a navigation bar contains icons for Home, Feeds Dashboard, Data Processing, Ingester, Nodes (highlighted with a red arrow), Logs, and System.

The nodes page will allow you to view configured nodes and their current status.

This includes:

Item	Description
Node Name	The name configured within the node application
Description	Description of the node configured
Status	The current status of the node
User	User that created the node
Last Status Update	The last time the node status was changed
Ingest Sources	Number of ingest sources to that specific node
Processing jobs	Currently active number of processing jobs a node has

Notes:

- There is no limit to how many nodes are connected to a system apart from the licenses purchased.
- Nodes can be used to either add capacity, redundancy or a mixture of both.

5.6 Logs

Click **Logs** from the main dashboard to open up the Logs menu.

Smart RTA

Logs - Data Processing

Data Processing | Ingester | User Interface

Search...

Time	Log Level	Category	Message
21/05/2024 9:00:14 AM	Debug	FeedFetchMergeProcessor	GTFS archive reading from zip, file path: C:\Users\Administrator\Desktop\RTA publish 1.7\publish\InputFeeds\15\15_01716281713.zip
21/05/2024 9:00:14 AM	Information	FeedFetchMergeProcessor	Filtering Adelaide Busses by agency names: 2,3,4,41,5,51,52,8,81, IncludeShapeData: False
21/05/2024 9:00:14 AM	Information	FeedFetchMergeProcessor	MergeJob: (Adelaide Busses) is now in running state
21/05/2024 9:00:11 AM	Information	FeedFetchMergeProcessor	MergeJob: (buses) is now in idle state
21/05/2024 9:00:11 AM	Information	FeedFetchMergeProcessor	Successfully created merged history
21/05/2024 9:00:11 AM	Information	FeedFetchMergeProcessor	ADDING Vehicle Updates
21/05/2024 9:00:11 AM	Information	FeedFetchMergeProcessor	Writing individual GTFS B files in Merge job (buses) as a single ZIP

Home | Feeds Dashboard | Data Processing | Ingester | Nodes | **Logs** | System

Switch between Data Processing, Ingester and User Interface by clicking the respective button.

Smart RTA

Logs - Data Processing

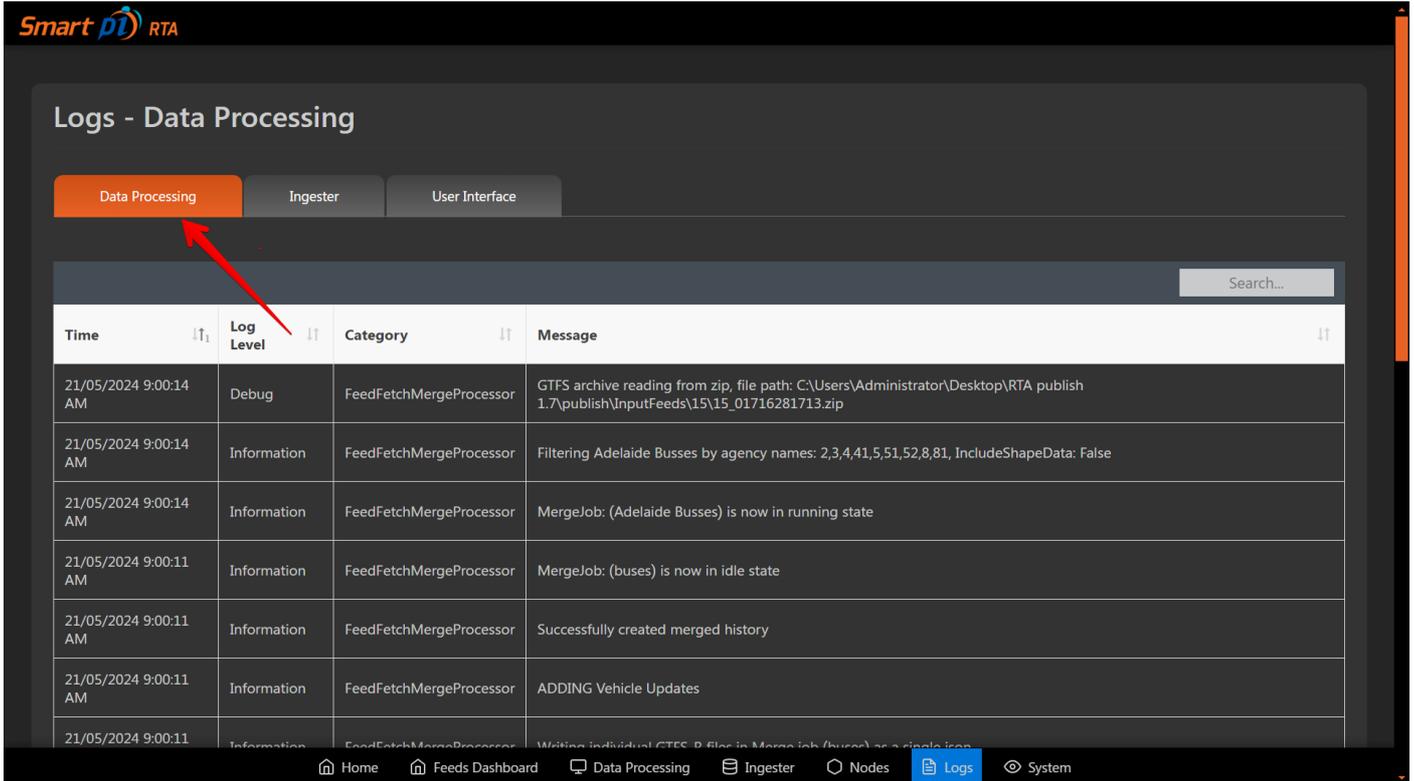
Data Processing | Ingester | User Interface

Search...

Time	Log Level	Category	Message
21/05/2024 9:00:14 AM	Debug	FeedFetchMergeProcessor	GTFS archive reading from zip, file path: C:\Users\Administrator\Desktop\RTA publish 1.7\publish\InputFeeds\15\15_01716281713.zip
21/05/2024 9:00:14 AM	Information	FeedFetchMergeProcessor	Filtering Adelaide Busses by agency names: 2,3,4,41,5,51,52,8,81, IncludeShapeData: False

5.6.1 Data Processing

To access Data Processing logs, simply click the **Data Processing** button.



The screenshot displays the 'Logs - Data Processing' interface. At the top, there are three tabs: 'Data Processing' (highlighted with a red arrow), 'Ingestor', and 'User Interface'. Below the tabs is a search bar and a table of logs. The table has the following columns: Time, Log Level, Category, and Message. The logs are as follows:

Time	Log Level	Category	Message
21/05/2024 9:00:14 AM	Debug	FeedFetchMergeProcessor	GTFS archive reading from zip, file path: C:\Users\Administrator\Desktop\RTA publish 1.7\publish\inputFeeds\15\15_01716281713.zip
21/05/2024 9:00:14 AM	Information	FeedFetchMergeProcessor	Filtering Adelaide Busses by agency names: 2,3,4,41,5,51,52,8,81, IncludeShapeData: False
21/05/2024 9:00:14 AM	Information	FeedFetchMergeProcessor	MergeJob: (Adelaide Busses) is now in running state
21/05/2024 9:00:11 AM	Information	FeedFetchMergeProcessor	MergeJob: (buses) is now in idle state
21/05/2024 9:00:11 AM	Information	FeedFetchMergeProcessor	Successfully created merged history
21/05/2024 9:00:11 AM	Information	FeedFetchMergeProcessor	ADDING Vehicle Updates
21/05/2024 9:00:11 AM	Information	FeedFetchMergeProcessor	Writing individual GTFS B files in Merge job (buses) as a single icon

The bottom navigation bar includes: Home, Feeds Dashboard, Data Processing (active), Ingestor, Nodes, Logs, and System.

Here you can see the respective logs, the time they were created, log level, category and attached message.

5.6.2 Ingester

Click [Ingester](#) to open up ingester logs.

Smart pi RTA

Logs - Ingester

Data Processing **Ingester** User Interface

Search...

Time	Log Level	Category	Message
21/05/2024 9:04:17 AM	Information	FeedFetchMergeProcessor	Fetchd successfully: Adeliade Busses - Realtime
21/05/2024 9:04:17 AM	Information	FeedFetchMergeProcessor	Fetching GTFS-R type feed: Adeliade Busses - Realtime
21/05/2024 9:04:12 AM	Information	FeedFetchMergeProcessor	Fetchd successfully: RT- Nswtrains
21/05/2024 9:04:12 AM	Information	FeedFetchMergeProcessor	Fetching GTFS-R type feed: RT- Nswtrains
21/05/2024 9:04:11 AM	Information	FeedFetchMergeProcessor	Fetchd successfully: RT Syd buses Alerts
21/05/2024 9:04:11 AM	Information	FeedFetchMergeProcessor	Fetching GTFS-R type feed: RT Syd buses Alerts
21/05/2024 9:04:10 AM	Information	FeedFetchMergeProcessor	Fetchd successfully: RT sydney trains
21/05/2024 9:04:10 AM	Information	FeedFetchMergeProcessor	Fetching GTFS-R type feed: RT sydney trains
21/05/2024 9:04:09 AM	Information	FeedFetchMergeProcessor	Fetchd successfully: TfNSW Buses - Realtime - Trip Updates
21/05/2024 9:04:07 AM	Information	FeedFetchMergeProcessor	Fetching GTFS-R type feed: TfNSW Buses - Realtime - Trip Updates

Home Feeds Dashboard Data Processing **Ingester** Nodes **Logs** System

Here you can see the respective logs, the time they were created, log level, category and attached message.

5.6.3 User Interface

Similarly, click User Interface to pull up user interface logs.

Smart pi RTA

Logs - User Interface

Data Processing Ingester **User Interface**

Search...

Time	Log Level	Category	Message
21/05/2024 9:06:30 AM	Debug	DataProcessingController	Returning merged file: C:\Users\Administrator\Desktop\RTA publish 1.7\publish\MergedFeeds\tfnswlightrailrealtime\tfnswlightrailrealtime_01716282338.json
21/05/2024 9:06:30 AM	Debug	ApiKeyAuthFilter	API key not needed. AUTHORIZED the access
21/05/2024 9:06:30 AM	Debug	ApiKeyAuthFilter	Query string: ?folder=tfnswlightrailrealtime

Please note that you have the option to sort the logs with time, log level, category and message.

5.7 Systems Tab

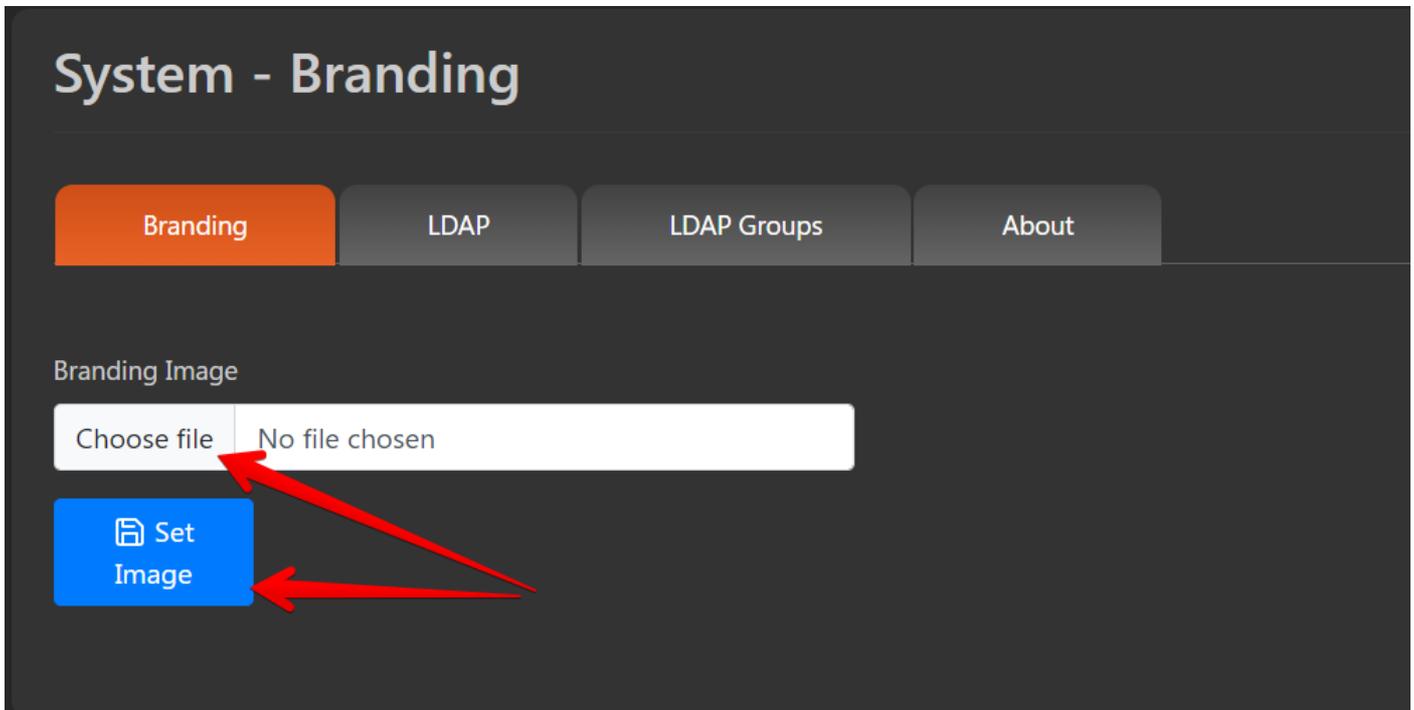
To access the administration interface please click on **System** tab from the bottom of the screen to enter further settings.

The Admin Panel of Smart pi RTA showcases settings required by an admin screen to control other connected screens. It comes with various sections like Branding, LDAP, LDAP Groups and About.

5.7.1 Branding

You can set your own branding/logo here in the Smart pi RTA. Simply click **Choose file** and then select an image from your computer. Once done, hit **Set Image** to save changes.

This will change the Smart pi RTA Logo to one of your choice throughout the system.



5.7.2 LDAP

This section allows you to use LDAP (Lightweight Directory Access Protocol) protocol for accessing and maintaining distributed directory information services over a network. Allowing user to limit access with login prompt.

Start by clicking the radio button of your choice to choose whether you'd like to enable or disable the login prompt.

Proceed with adding the values in these fields:

LDAP Server: Your LDAP Server address.

LDAP Server Port: Your LDAP Server Port.

LDAP User: Username for login.

LDAP Password: Password for login.

LDAP Users Base DN: The Base DN is the starting point an LDAP server uses when searching for users authentication within your Directory. The first output displayed is your Base DN: "DC=example-domain,DC=com"

LDAP User Search Filter: Add a user search filter as per your own preferences.

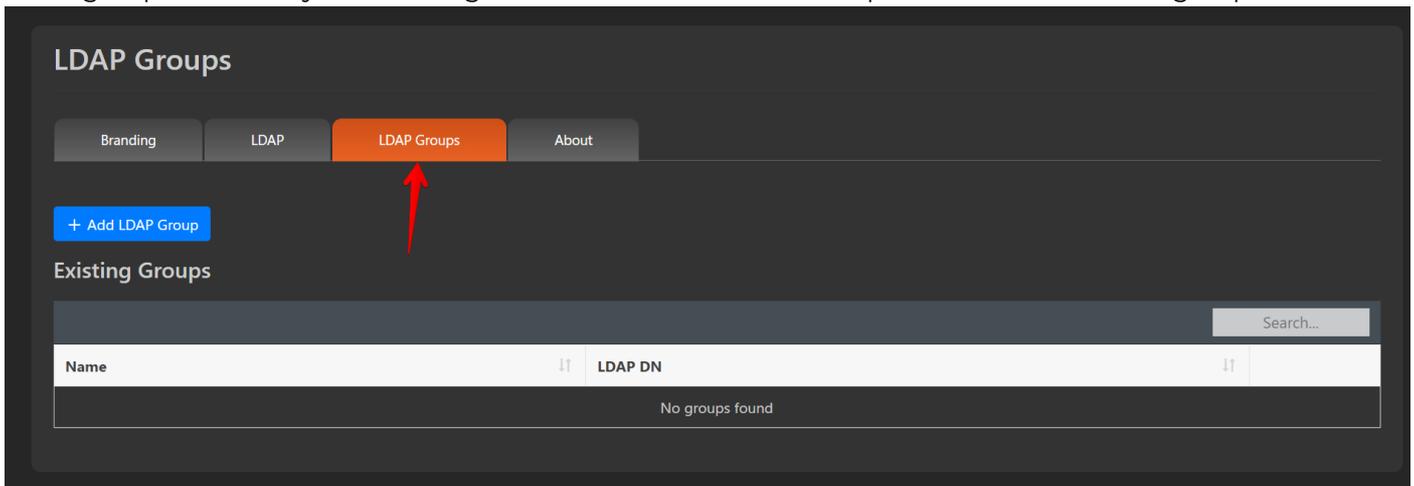
LDAP Admin Group: name entered in the ADMIN GROUP will represent a group of users with administrative privileges and special permissions within the directory or network.

Notes:

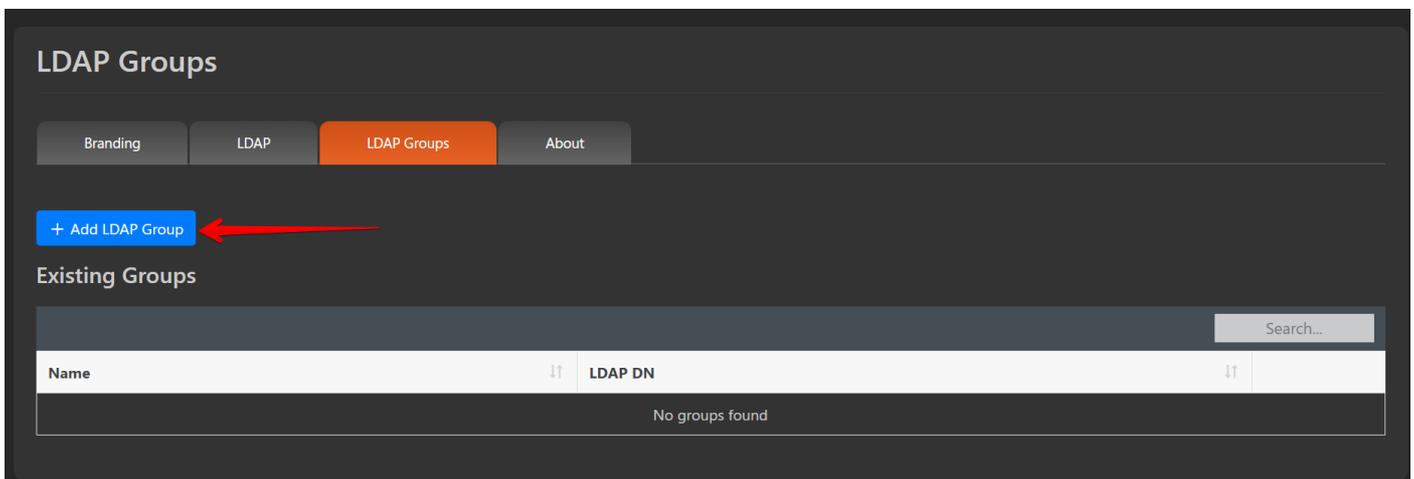
- Users can only access the user modes section and are not able to administer the system.
- It is possible to be in both the Users and Admin groups if access to both parts of the system is required.
- LDAP groups is used for the user modes section to limit access to different groups as needed. Users can be members of multiple groups.

5.7.3 LDAP Groups

LDAP groups will allow you to manage which users have access to specific user modes and groups.



Click **+Add LDAP Group** to continue.



Give it a name and a Query String (The LDAP DN String).

Once added, click **Save**.

LDAP Group - Create

Branding

LDAP

LDAP Groups

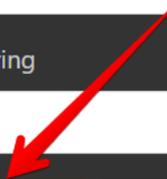
About

[System](#) > [LDAP Groups](#) > [Create](#)

Ldap Group

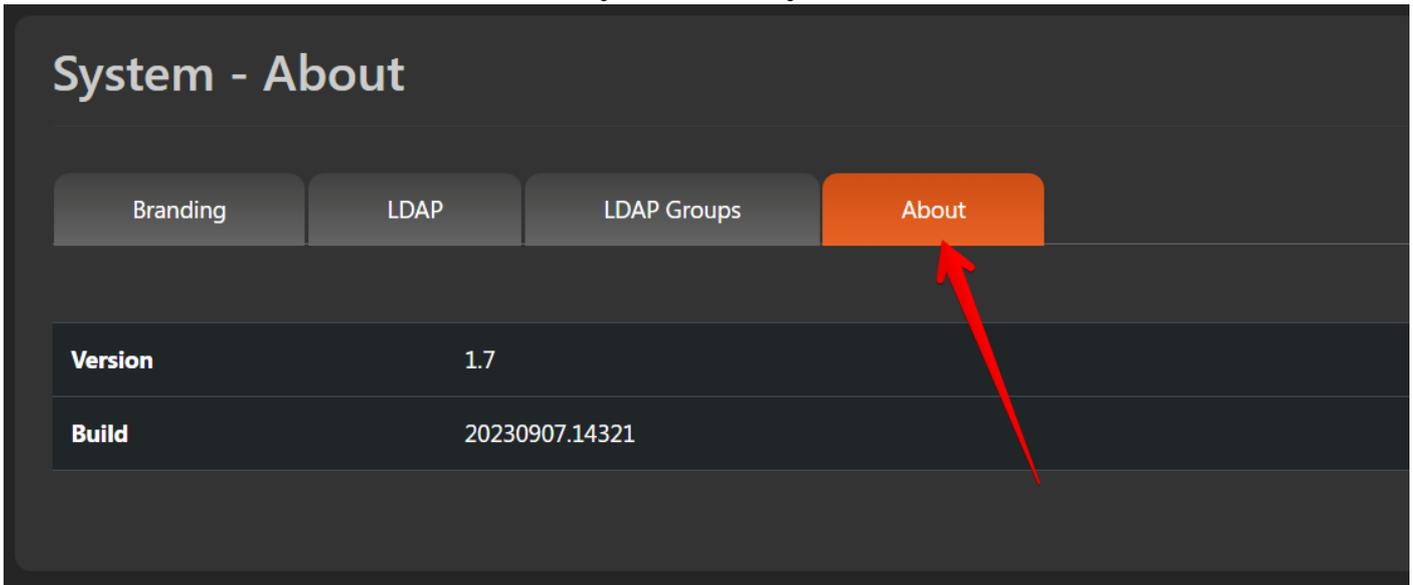
Name

QueryString

 Save LDAP Group List

5.7.4 About

The about section shows the version and build you're currently on.



System - About

Branding LDAP LDAP Groups **About**

Version	1.7
Build	20230907.14321

