TLDWorkerBee

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User Manual

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1. Introduction

We are pleased that you have chosen the TLD Worker Bee Data Viewing Tool for your business needs. TLD Worker Bee Data Viewing Tool is a powerful system for viewing TLD data that has been designed specifically to meet your needs.

Some of the key highlights include:

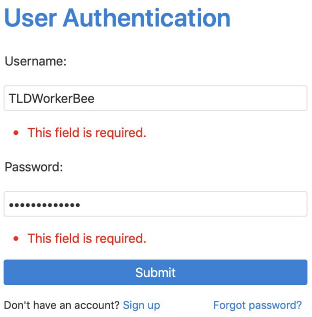
- Sidebar listing different aircrafts
- Ability to download the raw data file
- Table and Chart views of data

The purpose of this user manual is to help you successfully install, administer/ operate, and maintain the TLD Worker Bee Data Viewing Tool in your actual business context for Honeywell going forward. Our goal is to make sure you are able to utilize our product in your development process.

2. Installation

As part of the final product delivery, the TLD Worker Bee Data Viewing Tool should have been installed on a platform of your choice. As the TLD Worker Bee Data Viewing Tool is a web application, no installation is needed to use the system. To use the system, simply visit the website and log in.

- The TLD Worker Bee Data Viewing Tool is currently hosted on Amazon Elastic Beanstalk at http://tldapplication.ianty4vexu.us-west-1.elasticbeanstalk.com. Click on the “Sign In” button to be taken to the Login screen (Figure 1).
- Once you enter the login screen, use the test user credential below to sign in to the system (Figure 2):
  - Username: TLDWorkerBee
  - Password: Lumberjacks19



User Authentication

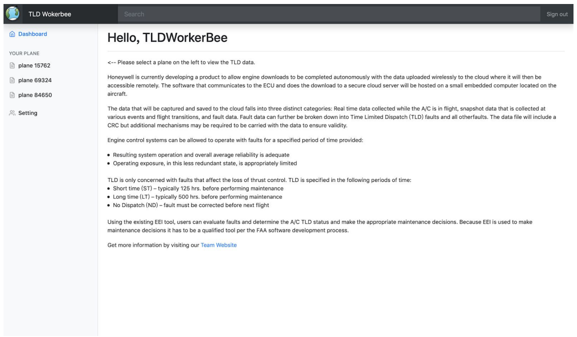
Username: TLDWorkerBee

- This field is required.

Password: •••••••••••••

- This field is required.

Figure 1. Login Screen



Hello, TLDWorkerBee

<-- Please select a plane on the left to view the TLD data.

Honeywell is currently developing a product to allow engine downloads to be completed autonomously with the data uploaded wirelessly to the cloud where it will then be accessible remotely. The software that communicates to the ECU and does the download to a secure cloud server will be hosted on a small embedded computer located on the aircraft.

The data that will be captured and saved to the cloud falls into three distinct categories: Real time data collected while the A/C is in flight, snapshot data that is collected at various events and flight transitions, and fault data. Fault data can further be broken down into Time Limited Dispatch (TLD) faults and all otherfaults. The data file will include a CRC but additional mechanisms may be required to be carried with the data to ensure validity.

Engine control systems can be allowed to operate with faults for a specified period of time provided:

- Resulting system operation and overall average reliability is adequate
- Operating exposure, in this less redundant state, is appropriately limited

TLD is only concerned with faults that affect the loss of thrust control. TLD is specified in the following periods of time:

- Short time (ST) – typically 125 hrs. before performing maintenance
- Long time (LT) – typically 500 hrs. before performing maintenance
- No Dispatch (ND) – fault must be corrected before next flight

Using the existing EEI tool, users can evaluate faults and determine the A/C TLD status and make the appropriate maintenance decisions. Because EEI is used to make maintenance decisions it has to be a qualified tool per the FAA software development process.

Get more information by visiting our Team Website

Figure 2. Dashboard

Over time, however, you may want to move to a new platform or re-install the product. In the following section, this manual will show you how to deploy and install the program to the Amazon AWS platform.

Note:

1. We use Amazon AWS as an example, but you can definitely deploy it to the platform you choose.
2. Amazon AWS provides 12 months free tier for the eligible user. Current free trial ends on November 15, 2019. You would need to pay for the Amazon AWS services if you still want to keep program running

2.1 System Requirements

Python 3.6 & Django 2.2.1
Unix Based Operating System Recommended (Linux, MacOS, Ubuntu, CentOS, etc)

2.2 Create an AWS account

To deploy this program, you need to create an Amazon AWS account (link: https://portal.aws.amazon.com/). Amazon AWS provides different services and solutions with different price and usage limit. However, for this project, we would need at least 3 services: Amazon S3 (To store the raw TLD file), RDS (local database) and Elastic Beanstalk (runtime environment).

2.3 RDS Database Setup

To create a database through Amazon RDS:

- Go to the AWS Management Console
- Click on the **RDS** link below the database column
- Click on the Create database button
- On the following pages, select **MySQL** -> **Production - MySQL**

Enter the DB instance identifier, Master Username, and Master Password

- On the following page, click on the Create database button to complete creating a database

Once you create a database through RDS, you would have database hostname, username, and password. Keep this information since you would need them in the following steps.

2.4 AWS S3 Setup

To create a bucket that stores the raw TLD file on the cloud through AWS S3:

- Go to the AWS Management Console
- Click on the **S3** link below the storage column
- Click on the + Create bucket button
- Name your bucket as TLD.cloud
- On the following page, click on the Create bucket button to complete creating a bucket on AWS S3.
- Upload a raw TLD file (ECFR_1hour_data_dump.txt) to the bucket you just created.

2.5 Set up the environment on local machine

Before deploying the program to the elastic beanstalk, we need to make sure that the program run perfectly in the local virtual environment. That means you need to install the following required components and libraries in your local machine first:

- Python 3.6
- Pip
- Virtualenv
- awsebcli

Amazon AWS provides the document on how to set up the python development environment. Follow the instructions (Link: https://docs.aws.amazon.com/elasticbeanstalk/latest/dg/python-development-environment.html) to set up the environment.

Besides, part of this project relies on Urllib3 to transfer the data from cloud to local environment. Install it first (link: https://urllib3.readthedocs.io/en/latest/) before the next steps.

2.6 Deploy Django Application to Elastic Beanstalk

As a part of the final delivery, we provide a zip file contains with all program source code. You can also download it from the project Github (link: https://github.com/fssongwei/Capstone).

Simply follow the instructions provided by Amazon AWS (link: https://docs.aws.amazon.com/elasticbeanstalk/latest/dg/create-deploy-python-django.html) to deploy the program to Elastic Beanstalk.

Now that you have a running TLD application on Elastic Beanstalk. To learn about configuration, see section 3.

3. Configuration and Daily Operation

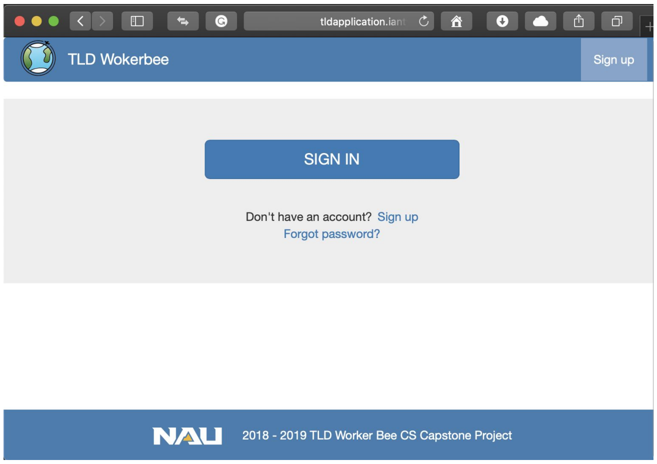
3.1. Create an account

You would need an account to login to the system and get access to the data. This application has two types of the user account with different level of access to the system. The normal user account will only have access to the assigned specific aircraft data. The administrator user account can view the aircraft data (if assigned), and also has access to the administration panel, where you can add/delete users, or change a normal user account to the administrator user account.

3.1.1 Normal User Account

There are two ways to create a normal user account: through Registration Panel, or created by an administrator user account.

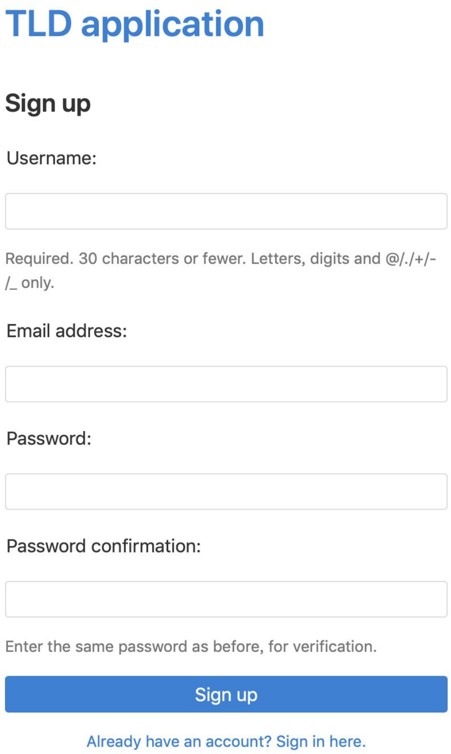
To sign up for an account, open the web application (Figure 3) (URL:http://tldapplication.ianty4vexu.us-west-1.elasticbeanstalk.com) through a web browser. (Recommend Browsers: Google Chrome, Apple Safari or Mozilla Firefox)



Don't have an account? Sign up
Forgot password?

2018 - 2019 TLD Worker Bee CS Capstone Project

Figure 3. Web Application Front Page



TLD application

Sign up

Username:

Required. 30 characters or fewer. Letters, digits and @/./+/-/_ only.

Email address:

Password:

Password confirmation:

Enter the same password as before, for verification.

Already have an account? Sign in here.

Figure 4. Sign Up Panel

- Click on the **Sign Up** button on the top right corner. This will let the browser jump to the sign up panel (Figure 4).

- Enter the valid information such as **username**, **email address** and **password**, and click on the **Sign Up** button to finish creating a new normal user account.
    - Notice that the system didn't allow duplicate username or email address in the database.
    - Password needs to fulfill the following requirements: At least 8 digits, must include one capital letter, one lowercase letter and one special character.

To create an account through administrator panel, see section 3.1.2

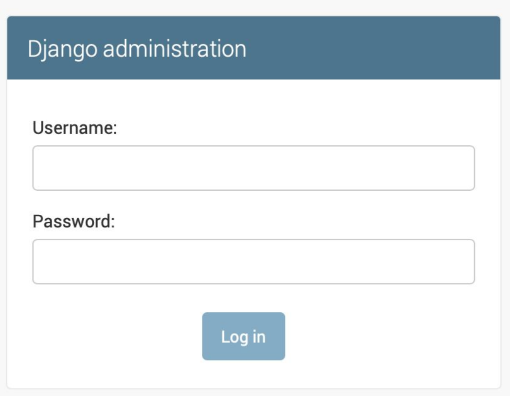
3.1.2 Administrator user account

We have already created an administrator user account. Below is the credential of this account:

- Username: root
- Password: root

(Notice that you can also use this administrator user account to log in to the data viewing tool. Except for the access to the administrator panel, there is no difference between an administrator or normal user account)

Use the credential above to sign in the Administrator panel (Figure 5)
(URL: http://tldapplication.ianty4vexu.us-west-1.elasticbeanstalk.com/admin/)



Django administration

Username:

Password:

Figure 5. Django Administration Panel

Once you login to the administration panel, you will see a dashboard (Figure 6), where you can manage groups, users, or view your recent activities.

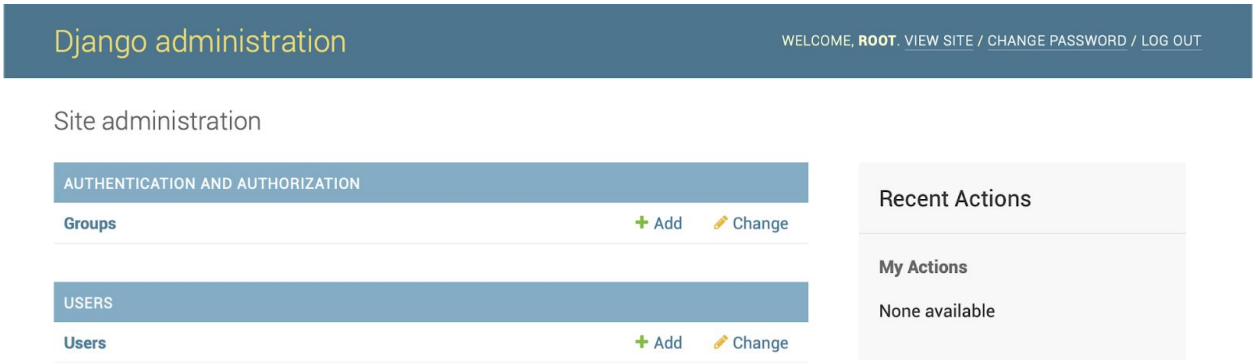
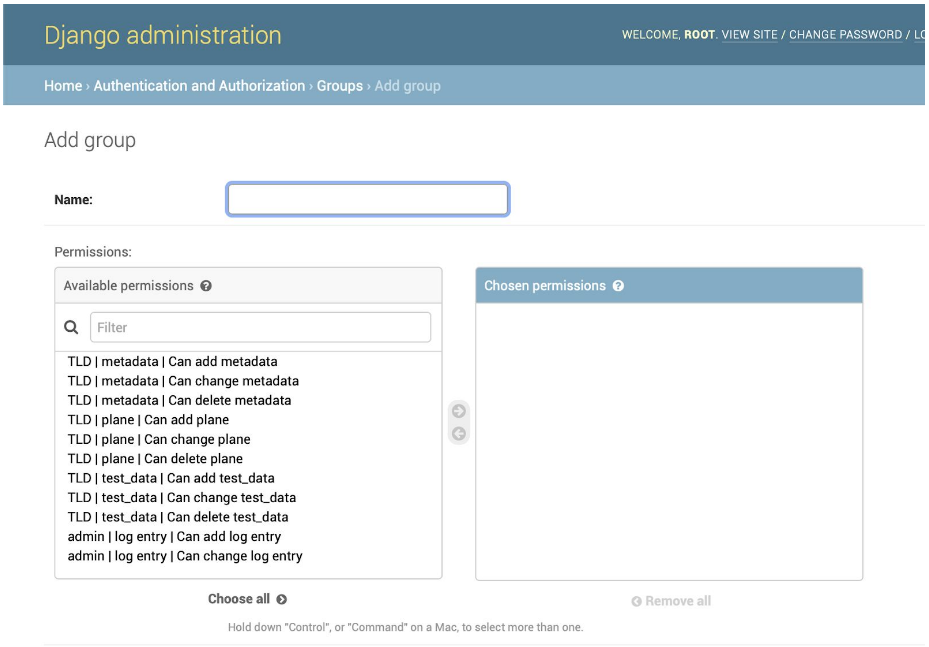


Figure 6. Django Administration Dashboard

Groups is an easy way to manage a certain group of users. You can classify the users into groups, and give access permissions accordingly.

To create a group, click on the + Add button below the AUTHENTICATION AND AUTHORIZATION header. This will jump to another page (Figure 7), where you can name the group you create, and select the access permissions you want to add to this groups. For example, you can set one group of users only have access to view the data, and the other group of people have permission to delete data.



TLD | metadata | Can add metadata
TLD | metadata | Can change metadata
TLD | metadata | Can delete metadata
TLD | plane | Can add plane
TLD | plane | Can change plane
TLD | plane | Can delete plane
TLD | test_data | Can add test_data
TLD | test_data | Can change test_data
TLD | test_data | Can delete test_data
admin | log entry | Can add log entry
admin | log entry | Can change log entry

Hold down "Control", or "Command" on a Mac, to select more than one.

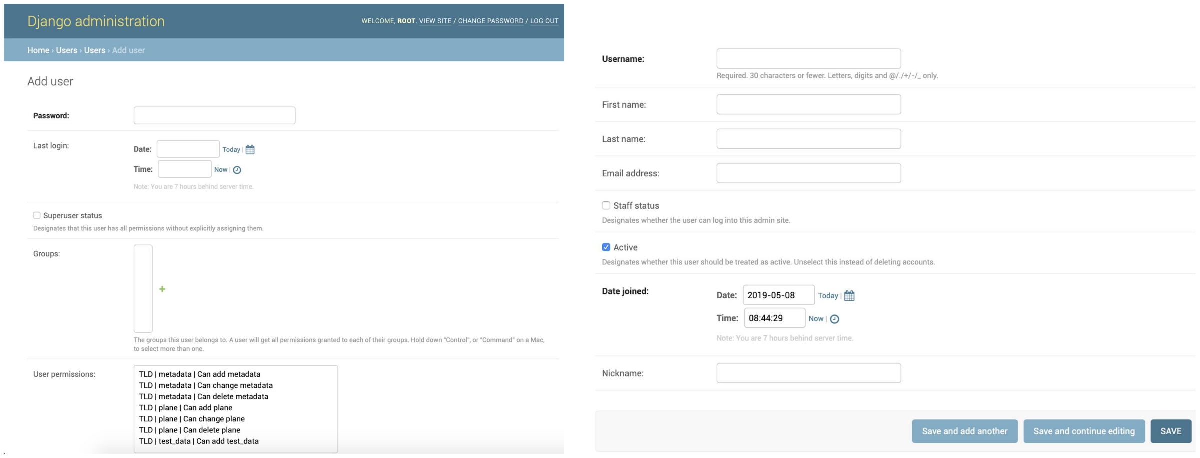
Figure 7. Add Group

To view or update the group's list, click on the Groups link or Change link, and select the specific group for operations like delete, name change or adding users or permissions.

Besides the way to create an account through registration panel (see section 2.1.1), an account can also be created by an administrator user account through the administration panel.

To create a user, click on the ✚ Add button below the USERS header. In the following pages (Figure 8), enter the necessary information including:

- Username
- Password
- Superuser Status (which user will have all access permissions)
- Groups
- User permissions
- First and Last name
- Staff Status (which user can log in to the administration panel)
- Active (select to allow a user to login to the viewing tool)


Django administration
WELCOME, ROOT. VIEW SITE / CHANGE PASSWORD / LOG OUT
Home › Users › Users › Add user
Today
Now
Save and add another
Save and continue editing
SAVE

Add user

Password:

Last login: **Date:** **Time:**

Note: You are 7 hours behind server time.

□ Superuser status

Designates that this user has all permissions without explicitly assigning them.

Groups:

The groups this user belongs to. A user will get all permissions granted to each of their groups. Hold down "Control", or "Command" on a Mac, to select more than one.

User permissions:

TLD | metadata | Can add metadata
TLD | metadata | Can change metadata
TLD | metadata | Can delete metadata
TLD | plane | Can add plane
TLD | plane | Can change plane
TLD | plane | Can delete plane
TLD | test_data | Can add test_data

Username:

Required. 30 characters or fewer. Letters, digits and @/./+/-/_ only.

First name:

Last name:

Email address:

□ Staff status

Designates whether the user can log into this admin site.

☑ Active

Designates whether this user should be treated as active. Unselect this instead of deleting accounts.

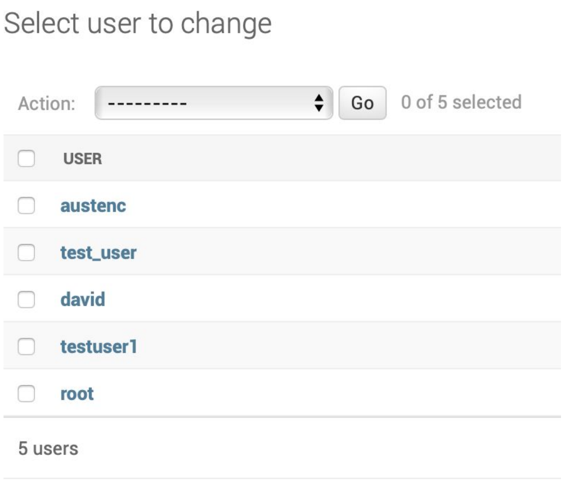
Date joined: **Date:** 2019-05-08 **Time:** 08:44:29

Note: You are 7 hours behind server time.

Nickname:

Figure 8. Add User

To view or update the user's list, click on the Users link or Change link, and select the specific user for more operations (Figure 9).



Select user to change

Action: --------- Go 0 of 5 selected

☐	USER
☐	austenc
☐	test_user
☐	david
☐	testuser1
☐	root

5 users

Figure 9. User list

3.2 Database Setting

After you create an account and sign in to the data viewing tool, you would need to assign the aircraft and related TLD data to the specific user. Since this project is a prototype TLD application, we simulate the process that the raw TLD data download from the cloud and parsing to the local environment, and all aircraft will share the same TLD data in order to simulate this process. Even so, each account is still required to be assigned at least one aircraft, in order to visualize the data. Meanwhile, although we uploaded the configure file with parameter usernames and related block ID to the database, you are required to upload the new version of config file if you change the order or forms of raw TLD data.

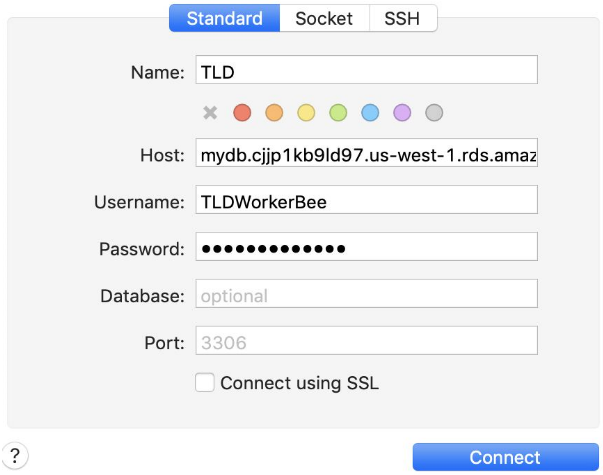
3.2.1 Access to the database

Our database is based on MySQL, and there are many ways to connect to a MySQL database.

- If you are familiar with MySQL command, you can use command line tools and install the latest MySQL version (To learn how to install the MySQL command line tool, visit https://dev.mysql.com/downloads/).
- If you are not familiar with MySQL, you can still operate the database with database visualizers. Windows users can use MySQLWorkbench (Download: https://dev.mysql.com/downloads/workbench/) or similar tools. Mac users can use Sequel Pro (Download: https://www.sequelpro.com) or similar tools. (Note: the following database instructions demo will base on Sequel Pro. However, operations should be similar in other tools)

Once you got your database tools installed, you can access and operate the database with the following credential:

- Host: mydb.cjjp1kb9ld97.us-west-1.rds.amazonaws.com
- Port: 3306
- Username: TLDWorkerBee
- Password: Lumberjacks19
- Database: TLD



Name: TLD

Host: mydb.cjjp1kb9ld97.us-west-1.rds.amaz

Username: TLDWorkerBee

Password: •••••••••••••

Database: optional

Port: 3306

□ Connect using SSL

Figure 10. Database Login

The structure of the database and tables (ER Diagram) are shown below:

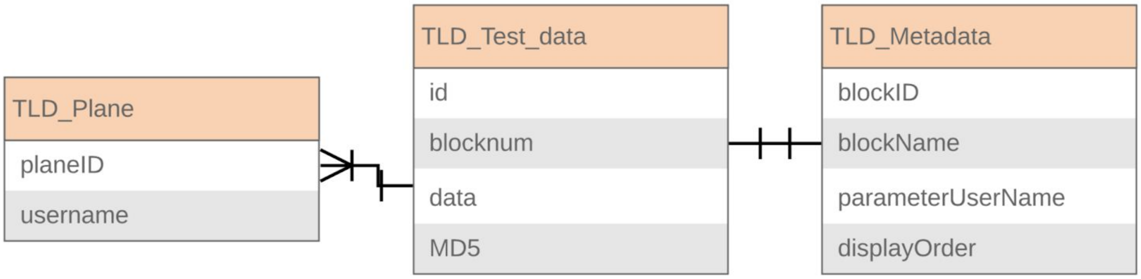


Figure 11. ER Diagram of Database

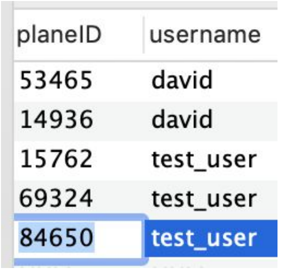
3.2.2 Add aircrafts to the user

To add aircraft to the user, select the TLD_Plane table, and upload the planeID and related username through the following command:

<u>INSERT INTO TLD_Plane VALUES("planeID, username", “test_planeID”, “test_user”);</u>

(substitute the test_planeID and test_user with the plane id and username)

This operation could also be done simply by double click on the cells in the TLD_plane table and input the aircraft id and username through a data visualizers (Figure 12).



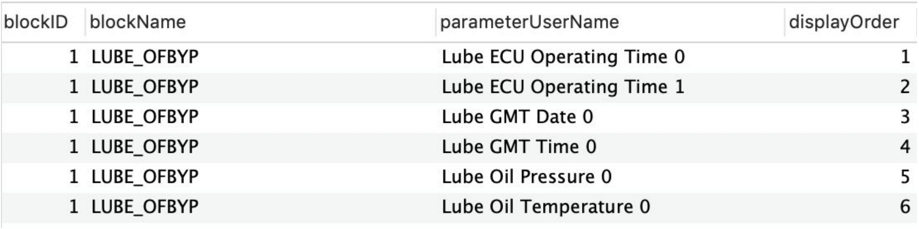
planeID	username
53465	david
14936	david
15762	test_user
69324	test_user
84650	test_user

Figure 12. Add aircrafts through a data visualizers

3.2.3 Upload config file

This system is embedded with a config file contains with informations include: block ID, block Name, parameter username and display order. However, in the future use, if you want to change the format of TLD data, e.g. adding block, changing orders or parameter names, you would need to upload another version of config file to the database. Otherwise it may cause problems like the data and the parameter name not match, or missing TLD data.

To update the config file, you need to format your configurations like this: [blockID blockName parameterUserName displayOrder]. Here is an example of how you should format your config file (Figure 13).



blockID	blockName	parameterUserName	displayOrder
1	LUBE_OFBYP	Lube ECU Operating Time 0	1
1	LUBE_OFBYP	Lube ECU Operating Time 1	2
1	LUBE_OFBYP	Lube GMT Date 0	3
1	LUBE_OFBYP	Lube GMT Time 0	4
1	LUBE_OFBYP	Lube Oil Pressure 0	5
1	LUBE_OFBYP	Lube Oil Temperature 0	6

Figure 13. Formatted Config File

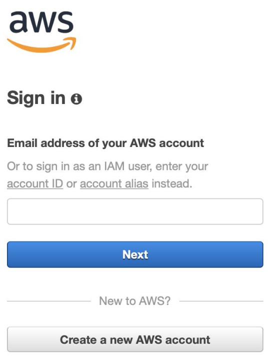
Once you got your formatted config file (.cfg) ready, you can upload it to the TLD_metadata table. Make sure that the new config file will cover the old one. You can use MySQL command to process this. Another easy way is to import the config file using a data visualizers, which allows you to upload the config file directly.

3.3 Cloud Setting

We use Amazon S3 for storage. There is one raw TLD data file already in the cloud. You can also upload a new TLD data file to the cloud, and then parsing it to the local database.

To upload a raw TLD data file (.txt):

- Open the Amazon AWS Management Console (link: https://signin.aws.amazon.com/)
- Use the following credential to log in the AWS Management Console (Figure 14)
  - Username: TLDWorkerBee@gmail.com
  - Password: Lumberjacks19

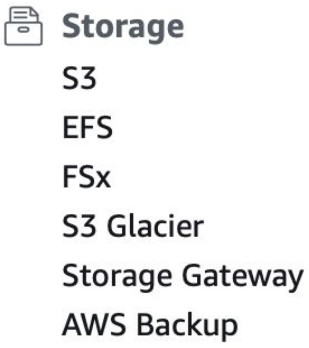


aws

Sign in

Email address of your AWS account

Or to sign in as an IAM user, enter your account ID or account alias instead.



Storage

S3

EFS

FSx

S3 Glacier

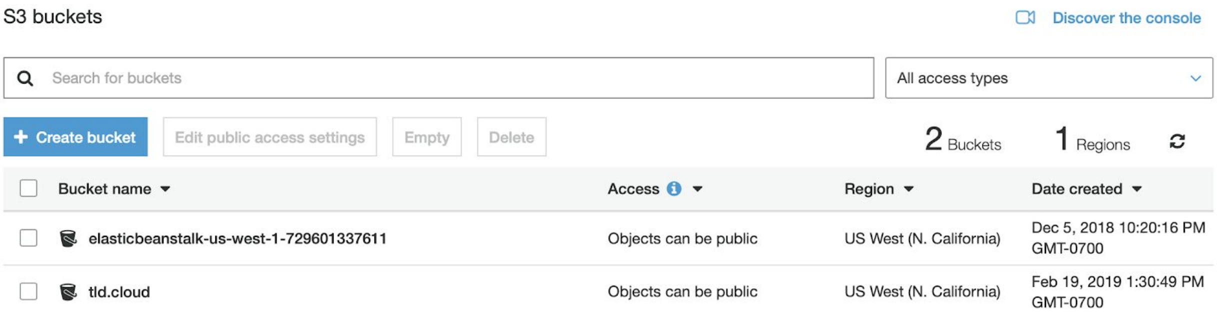
Storage Gateway

AWS Backup

Figure 14. AWS Sign In

Figure 15. AWS Management Console

- Once you enter the AWS Management Console, click on the **S3** link under the Storage column (Figure 15). This will jump to the S3 buckets (Figure 16).



S3 buckets

2 Buckets   1 Regions

	Bucket name	Access	Region	Date created
□	elasticbeanstalk-us-west-1-729601337611	Objects can be public	US West (N. California)	Dec 5, 2018 10:20:16 PM GMT-0700
□	tld.cloud	Objects can be public	US West (N. California)	Feb 19, 2019 1:30:49 PM GMT-0700

Figure 16. AWS S3 Buckets

- There are two buckets. The "elasticbeanstalk-us-west" bucket stores the program. The "**tld.cloud**" bucket stores all raw TLD file. Click on the **tld.cloud** bucket to upload your raw TLD file (.txt).

- Before you upload TLD data file, make sure that the bucket is empty (you need to delete the existing raw TLD data file before uploading). Click on Upload button, and follow the instructions to upload the TLD data file.
- Once you upload the raw TLD data file to the cloud, you can then parsing them to the local database by clicking on the Refreh button on the table view or chart view inside the data viewing tool (This operation may take a while).

4. Maintenance

The only maintenance that should be regularly conducted is to check the storage space of the database and the cloud, ensuring that our product isn't taking up too much memory. If the database or cloud does take up too much memory. Our team recommends compressing old data and storing it in a separate archive.

5. Troubleshooting

If any problem arises with the network, a usual webapp troubleshoot of closing the browser and reopening it should help fix the problem. If there is any problem with the database, cloud, or webapp that isn't fixed by restarting the browser, then you should contact AWS customer support.

If any problem arises with the data being displayed, hitting the refresh button in the top right hand side of the screen should reparse the data into the database giving you a new, accurate, data set.

6. Conclusion

Thank you for choosing the TLD Worker Bee Data Viewing Tool for your use in viewing TLD data. We wish you many years of productive and satisfied use of the product and we are happy to have been able to help build this product.

Although Senior Capstone Design is over, we would be happy to answer any questions in the upcoming months to help you get the product deployed and operating fully.

We can be reached via Email at: alc588@nau.edu (Austen Christensen), mnl72@nau.edu (Morgan Lovato), and ws328@nau.edu (Wei Song).

With the best wishes from your TLD Worker Bee Data Viewing Tool developers:
Austen Christensen, Morgan Lovato, and Wei Song.