



Vera C. Rubin Observatory Data Management

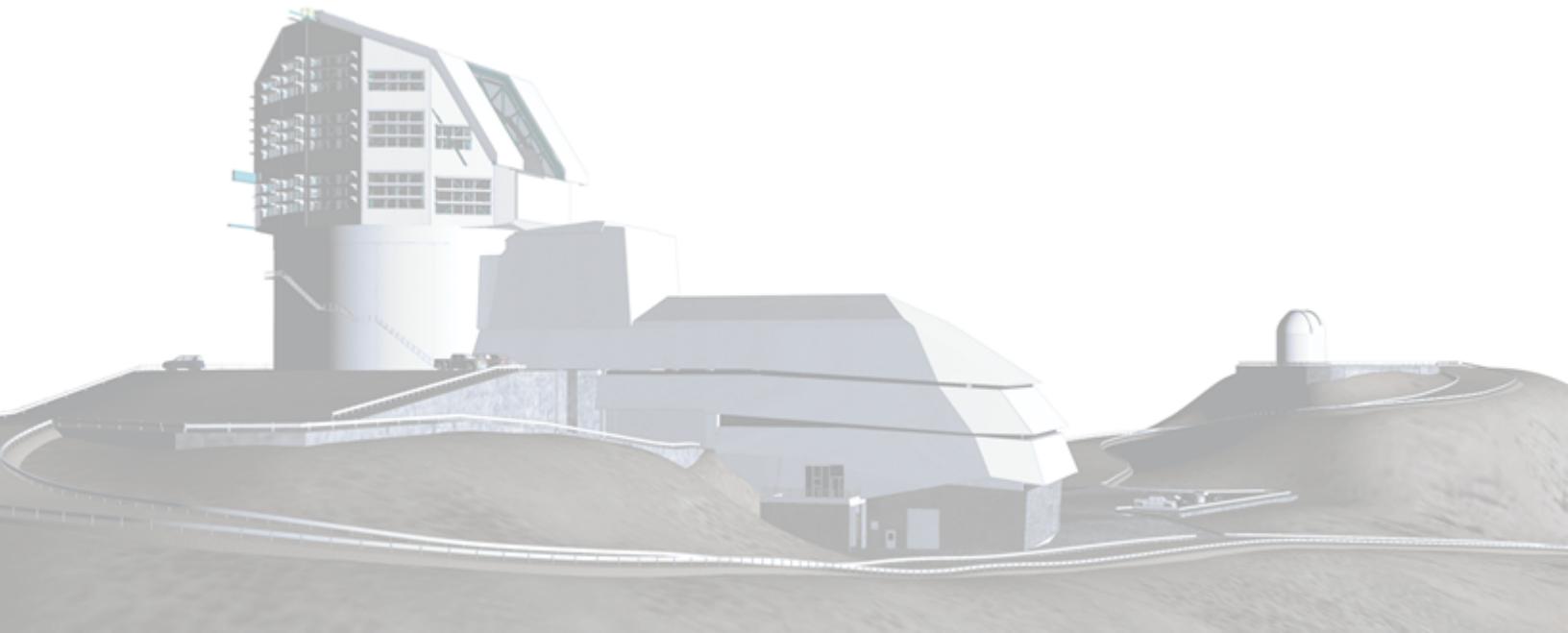
AIDA User Manual

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DRAFT



Abstract

This document is the software user manual of the web application AIDA (Advanced Infrastructure for Data Analysis), tool provided as deliverable for the In-Kind Contribution ITA-INA S23: *"Staff effort in support of Rubin commissioning: ML tools for instrumental monitoring and analysis"*.

AIDA is a portable and modular web application, designed to provide an efficient and intuitive software infrastructure to support monitoring of data acquiring systems over time, diagnostics and both scientific and engineering data quality analysis, particularly suited for astronomical instruments. Its versatility makes it possible to extend its functionalities, by integrating and customizing monitoring and diagnostics systems, as well as scientific data analysis solutions, including machine/deep learning and data mining techniques and methods.

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AIDA User Manual

1 Introduction

This document is the software user manual of the web application AIDA (Advanced Infrastructure for Data Analysis). AIDA is a portable and modular web application, designed to provide an efficient and intuitive software infrastructure to support monitoring of data acquiring systems over time, diagnostics and both scientific and engineering data quality analysis, particularly suited for astronomical instruments.

The AIDA design was mainly focused on the following goals:

- Daily mission operations, for instruments health assessment and reporting:
 - Monitoring and verifying the nominal quality of data;
 - Production of user-defined reports (automatic and/or on-demand);
- Short/Mid/Long term activities, to investigate and report instruments behaviour over time:
 - Analysis of instruments HouseKeeping/TeleMetry (HK/TM) trends;
 - Analysis of instruments systematic effects;
 - Detection and analysis of instrumental features, degradation and anomalies;
- Data Analysis:
 - Basic and on-demand advanced statistics for data correlation and quality assessment;
 - Machine/Deep Learning based classification/regression on data.

In the following we will use the term AidaHM, referring to a generic hosting machine on which AIDA is installed and running.



Hereafter, all text and items highlighted in red text are referred to work in progress and/or pending decisions.

Main AIDA functionalities are:

- **Instrument monitoring, report generation and delivery**
 - periodic report generation on a user-defined parameters list and possibility to deliver it to remote archives;
 - on demand customised report generation on a user selected parameter list, locally stored;
- **Visualization/Exploration**
 - Series of plots on user selected parameters/data products and ranges;
 - Observed images (static view, dynamic windowing, statistical characterization);
- **Statistics**
 - Standard (default) estimators;
 - Special estimations (tables/images);
 - mode, percentiles, biweight, σ -clipping; skewness;
 - Statistical analysis on image pixels;
 - mean, median, RMS, standard deviation, variance, minimum, maximum, MAD, NMAD, kurtosis, skewness;
 - **Machine/Deep** Learning based classification/regression/prediction on local data.
- **Additional features:**
 - Flagging System: association of a semaphore-like flag to each kind of experiment, to indicate its status and generate a related PDF report, summarizing its results and flags;
 - Local Data Analysis: generation of plots on data and visualize/analyze images uploaded from local machine;
 - Users and System Management:

- online user registration to be confirmed by administrators;
- User password recovery system by administrators;
- enable, disable or remove users;
- set Operating Mode (Nominal, Commissioning, Contingency);
- enable/disable and configure systems to monitor;
- set web app configuration (SMTP server, number of processors to use...);
- Logging System: each operation performed is logged into local DB;
- Easy Step-by-step Installation Procedure;
- Customizable plots graphics;
- Data backup system

2 Installation Procedure

The installation of the AIDA package on the AidaHM is automated by exploiting the docker virtualization technology. AIDA is developed as a double container, i.e. two standardized software units, respectively, the web application and the local database, allowing to isolate the application environment from the rest of the hosting machine. Figure 1 shows the architecture of the docking system.

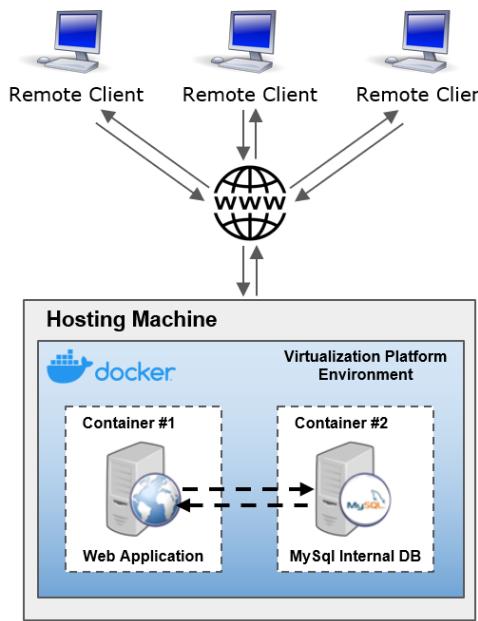


Figure 1: AIDA application environment installed through a docking system.

NOTE: In AIDA v0.1, an additional Docker container is available, containing a set of fake data for demonstration purposes¹. It will be automatically installed during the installation procedure described in Sec.2.1.

2.1 Installation

Installation procedure:

1. Install Docker² and Docker-Compose³. For instance, using Linux Ubuntu, it can be done

¹Fake data are available in date range [2023-01-01, 2023-02-12]

²<https://docs.docker.com/engine/install/>

³<https://docs.docker.com/compose/install/>

using the following command line:

- a. `sudo apt install docker docker-compose -y`
2. Download the complete AIDA files package⁴:
 - a. **docker-compose.yml**, the file defining the inner relations of the docker containers;
 - b. **Dockerfile**, the docker configuration;
 - c. **aidaCodeXX.tar.gz**, containing the aida code;
 - d. **apache2.conf**, needed for setting the environment of apache in the docker container (the file should be in the same folder of Dockerfile and could not be deleted);
 - e. **php.ini**, needed for setting the environment of php in the docker container (the file should be in the same folder of Dockerfile and could not be deleted);
 - f. **aidaDBXX.tar.gz**, containing an empty pre-configured DB.
 - g. **AidaDBFakeXX.tar.gz**, containing a set of fake data for demonstration purposes.
3. Uncompress the DBs and code files:
 - a. The name of the three directories (two for DBs and one for code, respectively) can be arbitrarily set. But it is important to make the two AIDA directories case sensitive (not required for the fake data DB). This is particularly required in case of an OS not case sensitive (such as MS Windows). To do that, there is a specific command line. For instance, in MS Windows, by running a powershell as administrator:
 - `fsutil.exe file SetCaseSensitiveInfo <YourLocalFolder>/aida enable`
 - `fsutil.exe file SetCaseSensitiveInfo <YourLocalFolder>/mysqlData enable`
 - b. In Linux you need to uncompress the folder as root to correctly preserve the ownership of the code directory (`sudo tar -xvzf aidaCodeXXtar.gz`).
4. Specify the location of the folders (DBs and code) in docker-compose.yml (see Appendix A);
5. Change, if needed, the exposed ports for AIDA (web application and SQL) in docker-compose.yml. This is required only if you already are exposing different services on the default ports (80 for AIDA and 3306 for SQL, see appendix in Appendix A);
6. Launch docker-compose using your docker-compose.yml. This could depend on the OS. On Ubuntu: from the folder where you downloaded docker-compose.yml **AND** Dockerfile launch: `docker-compose up -d -build`

⁴<https://github.com/pepric/aida/tree/main/installation>

NOTE: in <root>/dockerinstall directory, the latest version of Dockerfile (see Appendix B), php.ini and apache2.conf files are located. Moreover the docker-compose-generator.py script is provided, to automatically generate the docker-compose.yml file

2.2 First access configuration

Once installed, AIDA can be accessed by any web browser at the dedicated url. On first access, an introductory page is shown in order to start the definition of some primary settings (Figure 2):

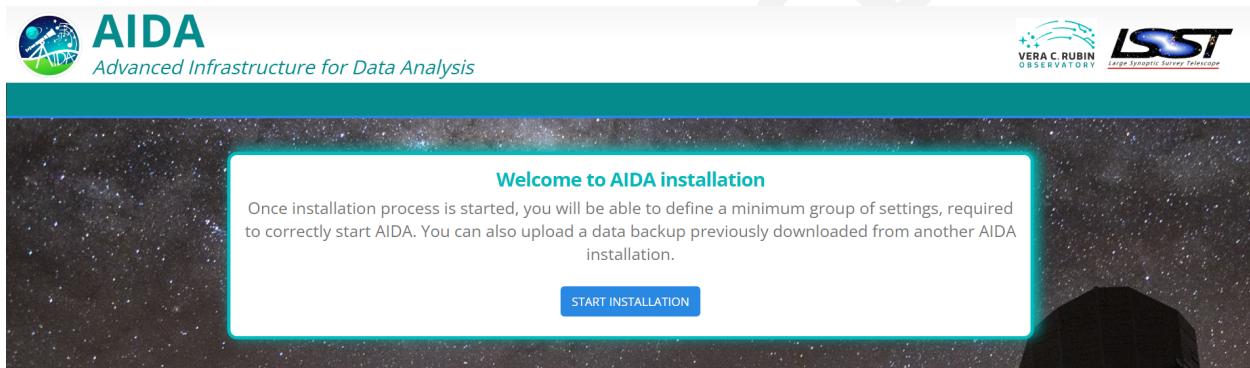


Figure 2: AIDA landing page at first access.

By clicking on "START INSTALLATION" button, a multi-step configuration wizard starts.

2.2.1 Backup Import

At this stage, the user can import a backup previously created on a previous AIDA instance (Figure 3). This optional step can be skipped by clicking on the "Skip" button. To import an existing backup (as a tar.gz archive), the user can easily browse the local machine and upload it. Once uploaded, the user can select the sections to import (Figure 4). If the option "SMTP settings" is not checked, then the AIDA SMTP server should be configured (step 2). If the option "Users" is not checked, then the first AIDA administrator should be registered (step 3). If this step is skipped, then both SMTP server and first administrator should be defined in next steps.

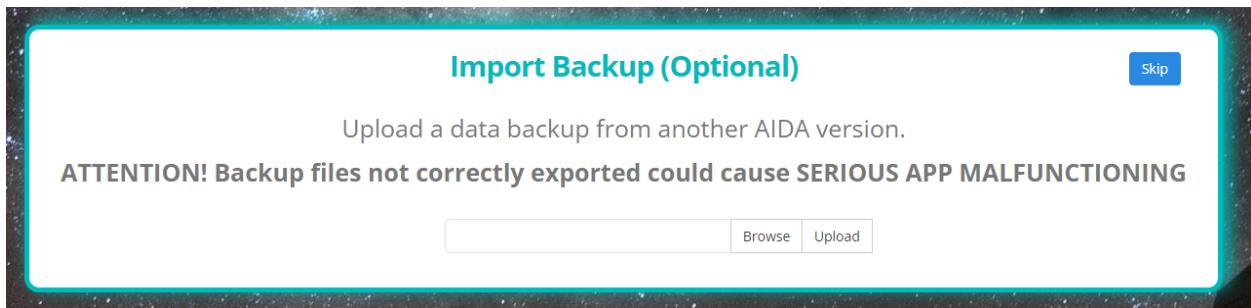


Figure 3: First step of backup import stage of AIDA installation.

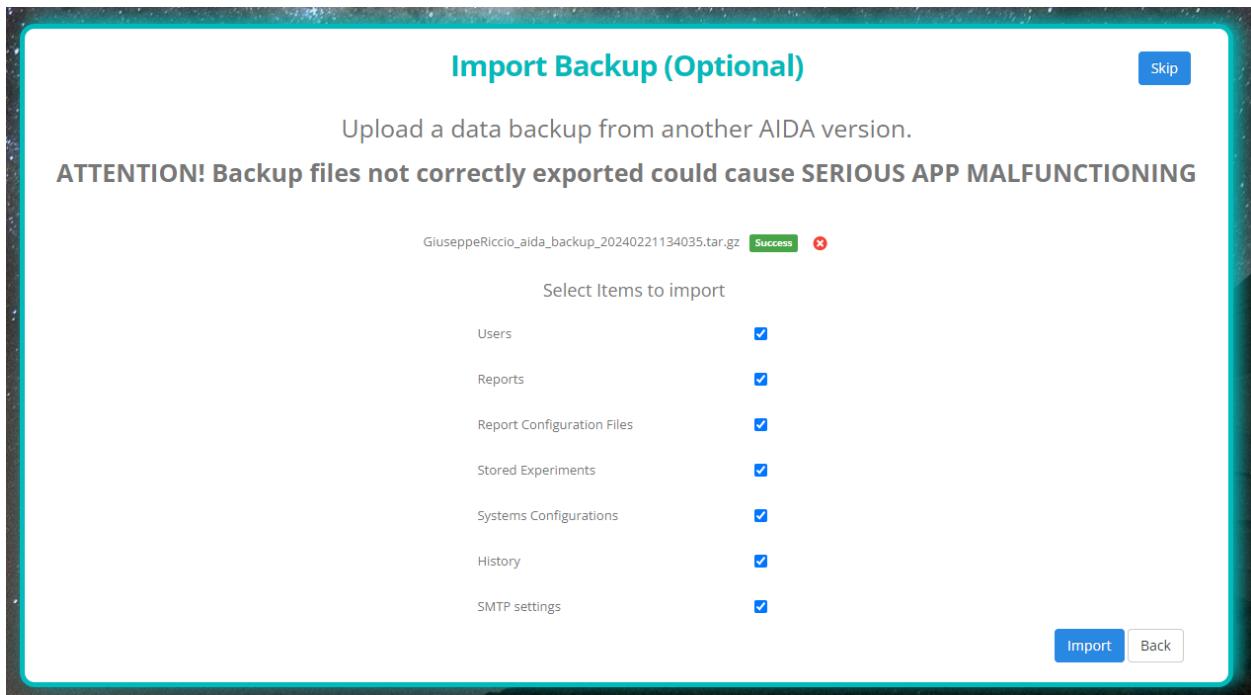
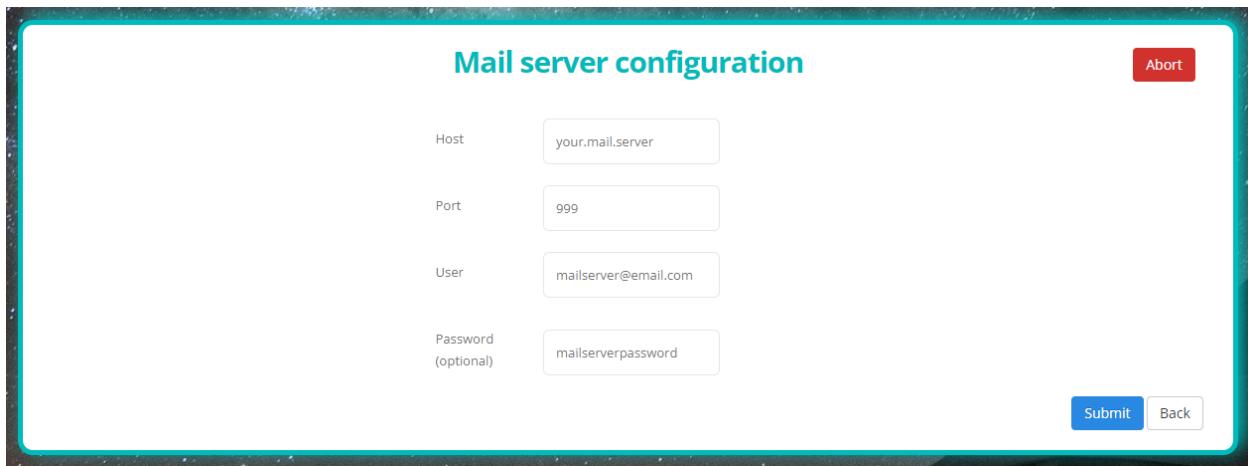


Figure 4: Second step of backup import stage of AIDA installation.

2.2.2 Mail Server Configuration

In order to send e-mails to the users (communications and analysis results), AIDA requires access to a mail server. If not already imported, SMTP server data must be defined by filling this form (Figure 5) with server name, port, username and, if needed, the password.

NOTE: DO NOT USE Google SMTP because of its policy on external apps.



Mail server configuration

Host: your.mail.server

Port: 999

User: mailserver@email.com

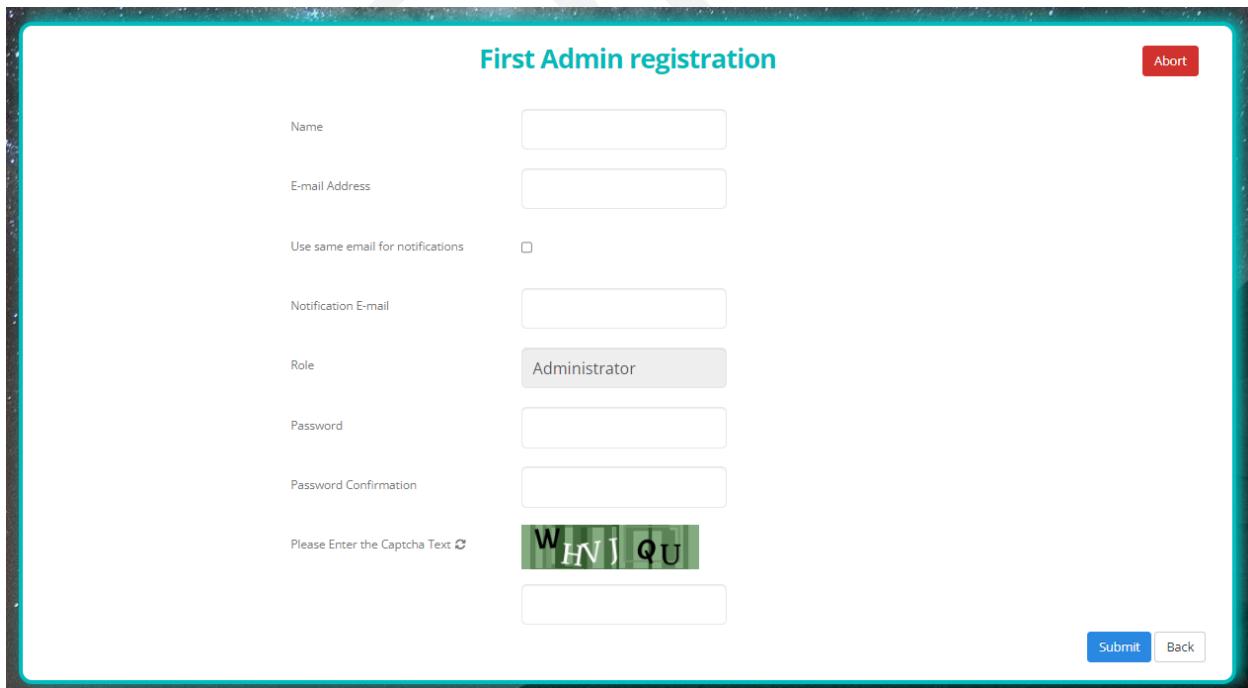
Password (optional): mailserverpassword

Abort Submit Back

Figure 5: Mail server configuration stage of AIDA installation.

2.2.3 First Administrator registration

Administrator data must be inserted into the AIDA DB by filling the related form (Figure 6). The user can use its own email address in order to receive AIDA notifications on new user registration and generated reports, or use a different one by acting on the related checkbox.



First Admin registration

Name:

E-mail Address:

Use same email for notifications

Notification E-mail:

Role: Administrator

Password:

Password Confirmation:

Please Enter the Captcha Text: W HV J QU

Abort Submit Back

Figure 6: First Admin registration stage of AIDA installation.

Once the form is submitted, if all the inserted data are correct, the user will receive an activation email to confirm its email address (Figure 7). By confirming, AIDA will be opened into a new tab notifying the completion of installation procedure.

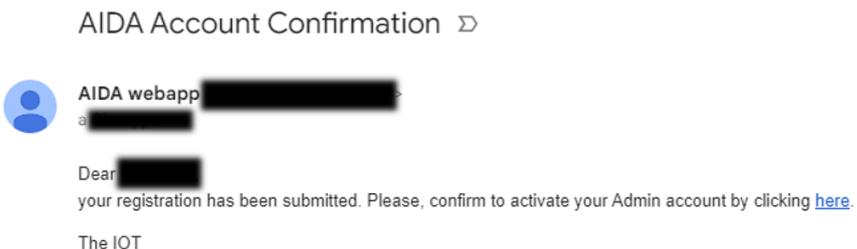


Figure 7: Activation email for the first administrator.

3 User access management

AIDA, as a Rubin-LSST analysis tool, will enable in next versions the access to LSST EFD⁵ data through Sasquatch⁶ APIs. This aspect imposes a safe and protected user accounting and access supervision. For this purposes, AIDA foresees two levels of users, accessing with login and password:

- **Administrator(s):** super user(s) with full privileges on the AIDA application, able to exploit all AIDA functionalities and services, but also enabled to monitor and control the activities of all other users, including the possibility to see and manage all user files and running processes (even killing such processes), as well as the responsibility to enable/disable users from the application;
- **Users:** authenticated users, able to exploit all AIDA functionalities and services, but restricted to see and handle only their own files, products and running processes. They performed the registration and obtained the authentication by the administrators.

3.1 Browser compatibility

In terms of web browser compatibility, AIDA has been tested and validated on:

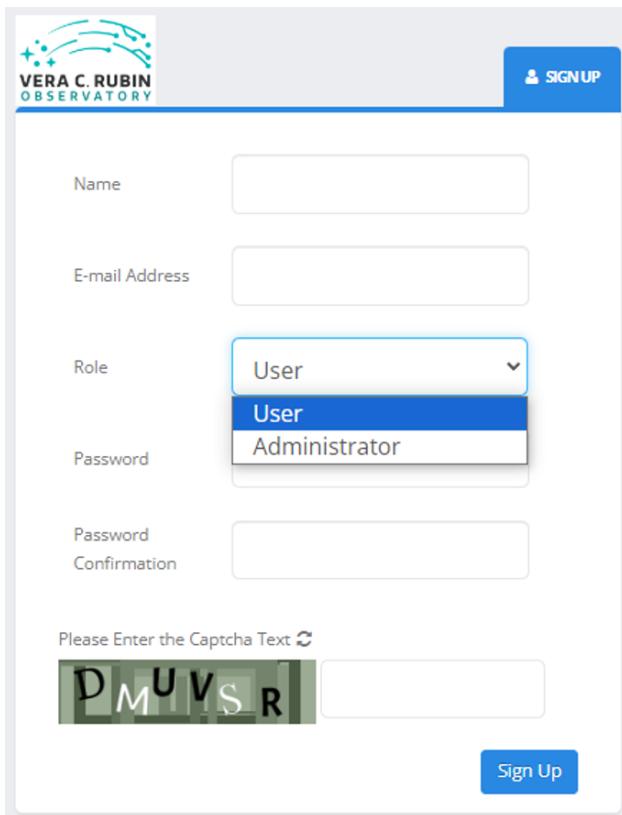
- Chrome v123;
- Microsoft Edge v114;
- Firefox v114;
- Opera v100;

3.2 Registration

In Figure 8 the registration form panel is shown. The procedure designed to register and authenticate AIDA users is the following:

⁵<https://obs-controls.lsst.io/Control-User-Interfaces/EFD.html>

⁶<https://sasquatch.lsst.io/>

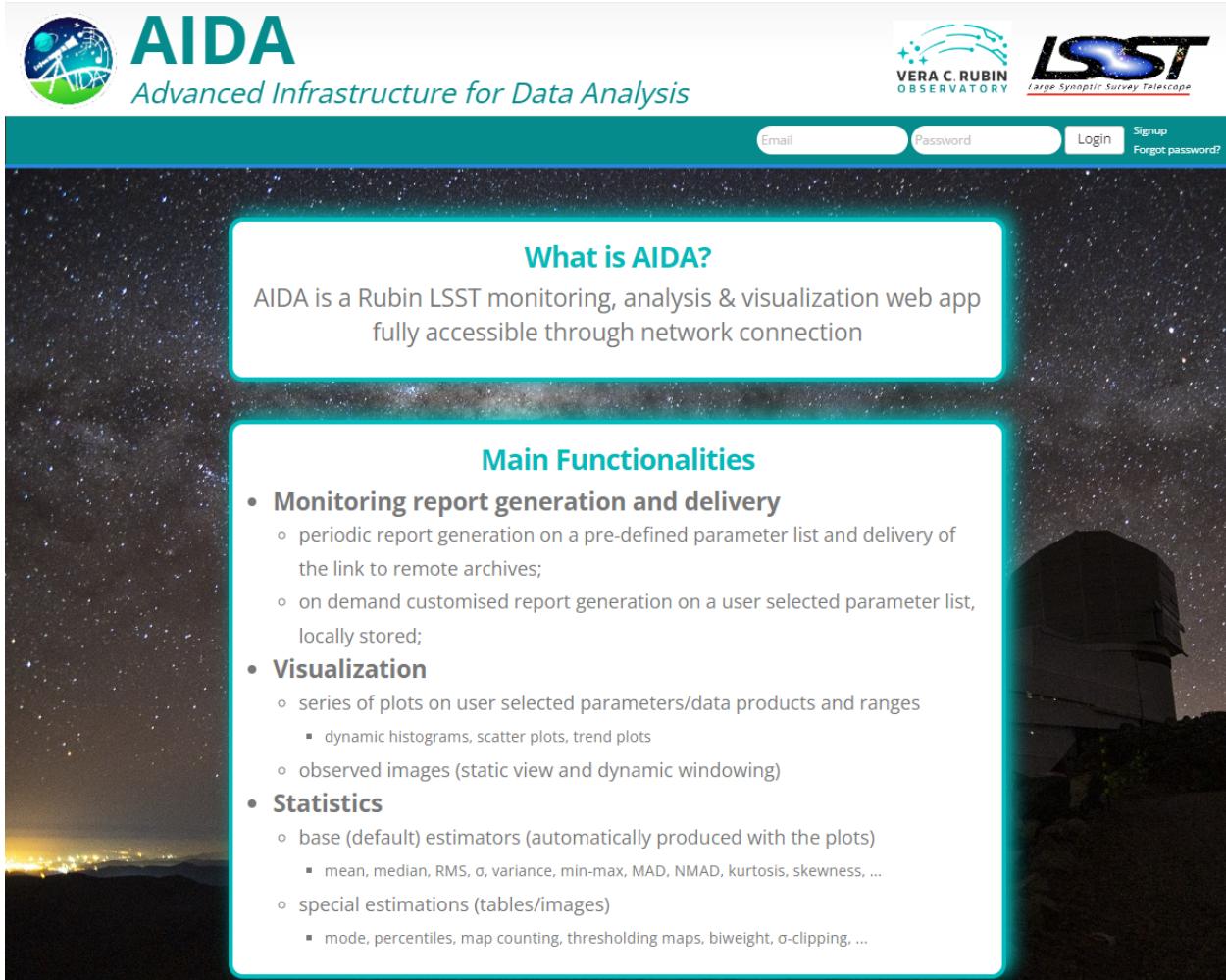


The screenshot shows a registration form for the AIDA User Manual. At the top right is a blue 'SIGN UP' button. Below it are fields for 'Name' and 'E-mail Address'. A dropdown menu for 'Role' has 'User' selected. Below that are fields for 'Password' and 'Confirmation'. At the bottom is a Captcha input field containing the text 'P M U V S R'.

Figure 8: The registration form.

1. From the intro page the interested user opens (through the “Signup” link, Figure 9) and fills the resulting registration form, indicating also the desired level of privileges (user/administrator). Once pressed the “Sign Up” button and only if all form fields have been correctly compiled, the request is delivered and a new record is added in the AIDA local DB with “pending” status, indicating that a new user requested the access authentication, but not yet enabled. The requesting user receives a feedback via e-mail (Figure 10);
2. An e-mail with the registration request is automatically delivered to AIDA administrator(s);
3. AIDA GUI makes available a view panel, available exclusively for administrator level user(s), in which the list of enabled/disabled/pending users is shown. Through this panel, the administrator(s) could manage the authentication requests (see Section 4.2.4 for further details);
4. If and only if the user is enabled by an administrator, the access will be granted, through an automatic e-mail delivered to the user (Figure 11), using the login (e-mail) and pass-

word indicated in the form at the registration time.



The screenshot shows the AIDA landing page. At the top, there are logos for VERA C. RUBIN OBSERVATORY and LSST. Below the LSST logo is the text "Large Synoptic Survey Telescope". There are input fields for "Email" and "Password", and buttons for "Login", "Signup", and "Forgot password?". The main content area has a dark background with a starry sky image. It features a teal-colored callout box with the title "What is AIDA?" and the text: "AIDA is a Rubin LSST monitoring, analysis & visualization web app fully accessible through network connection". Another teal-colored box contains the title "Main Functionalities" and a bulleted list of features:

- **Monitoring report generation and delivery**
 - periodic report generation on a pre-defined parameter list and delivery of the link to remote archives;
 - on demand customised report generation on a user selected parameter list, locally stored;
- **Visualization**
 - series of plots on user selected parameters/data products and ranges
 - dynamic histograms, scatter plots, trend plots
 - observed images (static view and dynamic windowing)
- **Statistics**
 - base (default) estimators (automatically produced with the plots)
 - mean, median, RMS, σ , variance, min-max, MAD, NMAD, kurtosis, skewness, ...
 - special estimations (tables/images)
 - mode, percentiles, map counting, thresholding maps, biweight, σ -clipping, ...

Figure 9: AIDA landing page.

New Registration Request on RUBIN LSST

 AIDA admin [REDACTED]
a [REDACTED]

Dear User,
your registration request has been submitted. You will receive the confirm of your activation as soon as possible.
The IOT

Figure 10: Example of registration feedback sent by AIDA via e-mail.

Your AIDA account has been activated

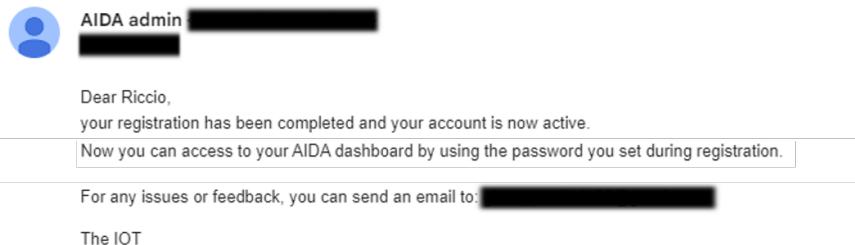
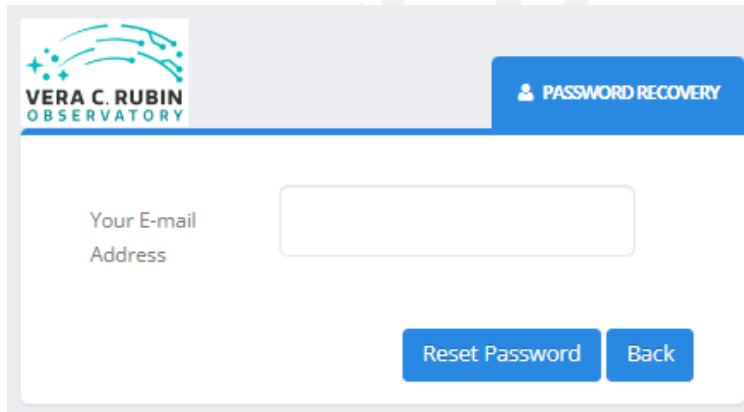


Figure 11: Example of activation feedback sent by AIDA via e-mail.

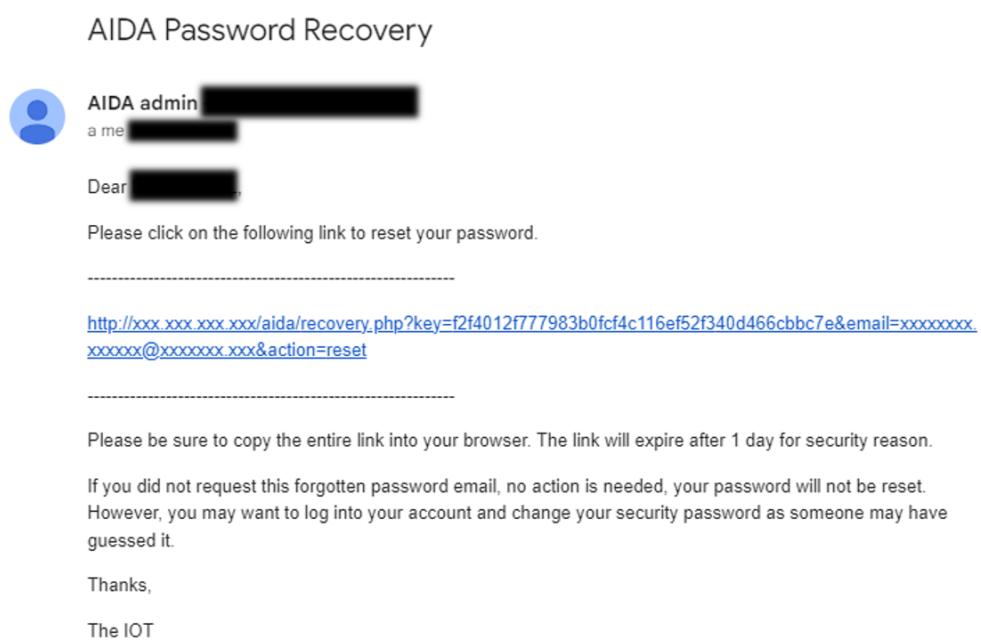
3.3 Password Reset

It is possible to reset the password by clicking on the “Forgot password?” link on the landing page (Figure 9), a simple form requiring your email will popup (Figure 12). After that, the user will receive through mail the link to actually reset your password (Figure 13).



The image shows a web-based password recovery interface. At the top left is the Vera C. Rubin Observatory logo. To the right is a blue button labeled "PASSWORD RECOVERY" with a user icon. The main area has a light gray background. It features a text input field with the placeholder "Your E-mail Address". At the bottom are two blue buttons: "Reset Password" on the left and "Back" on the right.

Figure 12: Reset password panel.



AIDA Password Recovery

AIDA admin [REDACTED]
a me [REDACTED]

Dear [REDACTED],

Please click on the following link to reset your password.

<http://xxx.xxx.xxx.xxx/aida/recovery.php?key=f2f4012f777983b0fcf4c116ef52f340d466cbbc7e&email=xxxxxx.xxxxxx@xxxxxxxxx.xxxx&action=reset>

Please be sure to copy the entire link into your browser. The link will expire after 1 day for security reason.

If you did not request this forgotten password email, no action is needed, your password will not be reset. However, you may want to log into your account and change your security password as someone may have guessed it.

Thanks,

The IOT

Figure 13: Example of reset password e-mail sent by AIDA.

4 Main Page

Once logged in, the user dashboard is shown. It consists on two sections:

1. a sidebar to navigate the web app and access to all AIDA functionalities;
2. a number of tabs (3 for users, 5 for administrators), reporting summaries about activities, generated plots, reports, and settings.

4.1 Sidebar

AIDA sidebar allows users to navigate the web app and access all AIDA functionalities. It is divided into the following sections (Figure 14):

- **General Info:** in this section the user can find all the information about available systems, parameters and analysis tools (see Section 8);
- **Local Data:** in this section, the user can generate plots from data uploaded from local machine (therefore not interfaced with the remote archives), and to visualize data and experiments stored on the AIDA DB (see Section 9);
- **HKTM:** from this section, the user can generate plots, statistics and **perform machine learning experiments** on HKTM data available on remote archives;
- **Images:** images can be uploaded and visualized by the tool in this section or **analyzed through advanced image analysis tools**;
- **Reports:** in this section, the user can manage reports functionalities (configuration, running, list of generated reports and configuration files).

Finally, the AIDA installed version is reported at the bottom of the sidebar.

4.2 Dashboard

The dashboard shows the operating mode currently active on AIDA, and a number of tabs (3 for users, 5 for administrators), reporting summaries about activities, generated plots, reports, and settings:

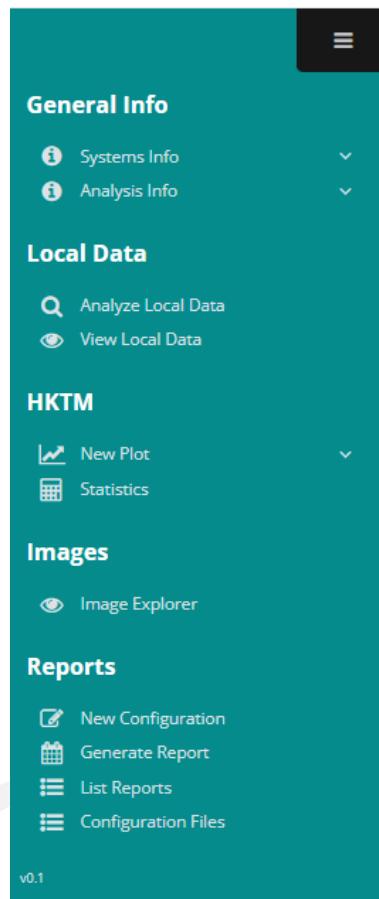


Figure 14: AIDA sidebar.

- Reports
- History
- Stored Experiments
- Administration - Users
- Administration - Settings

4.2.1 Reports tab

Reports tab consists on 4 panels (Figure 15, 16 and 18):

- **Running Reports Generation:** in this panel (Figure 15), the user can see the list of per-

sonal reports currently running (administrators can see all reports running). Reports can be stopped at any time by clicking on the related icon. In addition, administrators can pause and resume periodic reports at any time.

- **Flagged Reports:** this panel (Figure 16) shows the list of flagged reports. By clicking on the info icon, a panel with additional info about the selected report is displayed (Figure 17). For further details about the AIDA flagging system, see Section 10.
- **Available Reports:** In this panel, the tree of all available reports on AIDA are listed, divided for period (Figure 18, left panel);
- **Configuration Files:** In this panel, the tree of all available reports configuration files on AIDA are listed, divided for period (Figure 18, right panel).

Running Reports Generation						
<input type="button" value="10"/> records per page <input type="text" value="Search:"/>						
ID	User	Period	Config File	Current Report Start Date	Progress	
13841	[REDACTED]	ondemand	config_ondemand_long.json	2023-01-01 04:00:00	<div style="width: 56.0%;">56.0</div>	
13840	[REDACTED]	daily	daily_long.json	2023-01-08 04:00:00	<div style="width: 73.7%;">73.7</div>	
13839	[REDACTED]	weekly	weekly.json	2023-01-01 12:00:00	<div style="width: 0%; background-color: #ccc;">paused</div>	

Showing 1 to 3 of 3 entries

Figure 15: AIDA Dashboard - Reports Tab - Running Reports Generation panel.

Flagged Reports						
<input type="button" value="10"/> records per page <input type="text" value="Search:"/>						
Flag	Report ID	Period	Start Date (UTC)	End Date (UTC)		
	IREP_20240419T132520_13840-daily-20230115040000_20230116040000_EFD	daily	2023-01-15 04:00:00	2023-01-16 04:00:00		
	IREP_20240419T132424_13840-daily-20230109040000_20230110040000_EFD	daily	2023-01-09 04:00:00	2023-01-10 04:00:00		
	IREP_20240419T132305_13839-weekly-20230101120000_20230108120000_EFD	weekly	2023-01-01 12:00:00	2023-01-08 12:00:00		
	IREP_20240419T132415_13841-ondemand-20230101040000_20230121040000_EFD	ondemand	2023-01-01 04:00:00	2023-01-21 04:00:00		

Showing 1 to 4 of 4 entries

Figure 16: AIDA Dashboard - Reports Tab - Flagged Reports panel.

4.2.2 History Tab

In this tab (Figure 19), the history of activities on the web app are displayed. The number of records stored and displayed is defined in the web app settings (see Section 4.2.5 for further details). An user can see his/her activities in the “User” panel, while the “Global” panel, showing

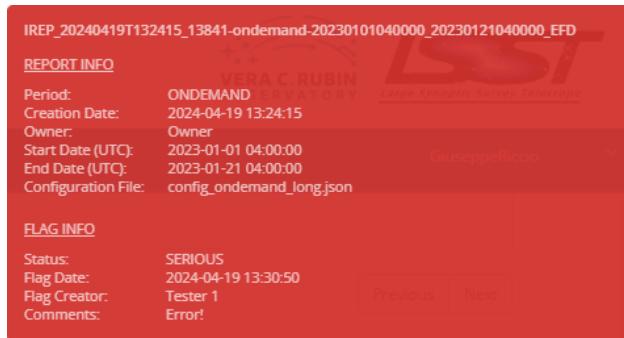


Figure 17: Details on flagged report.

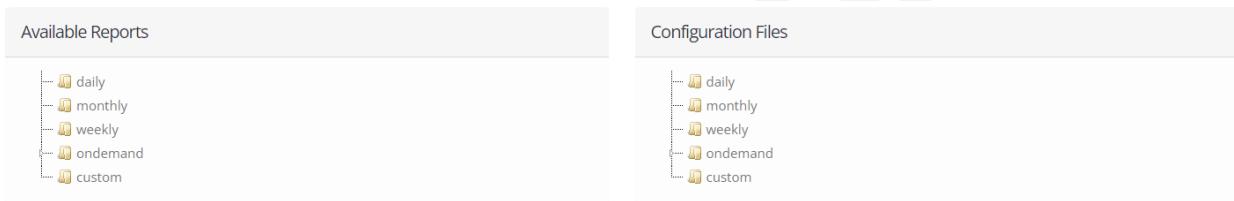


Figure 18: AIDA Dashboard - Reports Tab - Available Reports and Configuration Files panels.

the activities for all users, is available for administrator(s) only. Further details about a specific event can be seen by clicking on the related line. In addition, an user/admin can download the complete history (personal and/or, for admin, global) as text file, by using the related button.

4.2.3 Stored Experiments Tab

In the Stored Experiments tab, detailed information about flagged experiments are shown. Experiments are divided in two panels, depending whether the experiment has been flagged as “public” (“Public Archive” panel) or “private” (“Private Archive” panel). Data can be visualized “By Experiment” (Figure 20), i.e. aggregated and ordered by experiment, or “By Parameter” (Figure 21). In the latter case, the list of parameters which have been specifically flagged during an experiment are listed.

In the “By Experiment” visualization, the following info are reported:

- Experiment flag;
- Experiment file name (by clicking it, the experiment pdf is displayed in a separate window)

History

Refresh

User

Download Full User History

- › 2024-04-19T13:31:13 : Report Flagged
- › 2024-04-19T13:30:50 : Resumed report generation
- › 2024-04-19T13:30:34 : Report generation paused
- › 2024-04-19T13:24:05 : Launched report generation from existing configuration file
- › 2024-04-19T13:23:00 : Trend analysis
- › 2024-04-19T13:22:57 : Login

Global

Download Full History

- › 2024-04-19T13:31:13 - Tester 1 : Report Flagged
- › 2024-04-19T13:30:55 - User 2 : Logout
- › 2024-04-19T13:30:52 - Tester 1 : Login
- › 2024-04-19T13:30:50 - Owner : Resumed report generation
- › 2024-04-19T13:30:34 - Owner : Report generation paused
- › 2024-04-19T13:25:27 - User 2 : Scatter plot
- › 2024-04-19T13:24:05 - Owner : Launched report generation from existing configuration file
- › 2024-04-19T13:23:00 - Owner : Trend analysis
- › 2024-04-19T13:22:57 - Owner : Login
- › 2024-02-19T12:33:36 - User 2 : Login
- › 2024-02-05T10:57:51 - Admin : Logout
- › 2024-02-04T19:23:38 - Admin : Histogram
- › 2024-02-04T19:01:03 - Admin : Login

Figure 19: AIDA Dashboard - History Tab.

- Experiment type (plot, report, statistics, image);
- Experiment start date and end date (for plots);
- Flag creation date;
- Flag creation user (for “Public” archive);
- Comments, eventually divided for parameter
- a number of available actions:
 - View plot, the stored plot is displayed on AIDA in a separate window;
 - View image, the stored image is displayed on AIDA Image Explorer in a separate window (only available for images from remote archives).

In the “By Parameter” visualization, the following info are reported:

Stored Experiments By Experiment By Parameter

Public Archive

Flag	Experiment	Exp Type	Experiment Start Date (UTC)	Experiment Stop Date (UTC)	Generation Date (UTC)	User	Comments
🔴	IREP_20240419T132415_13841-on-demand-202301040000_20230121040000_EFD	report	-	-	2024-04-19 13:30:50	GiuseppeRiccio	Error!
🟡	exp_image_20240419_140155.pdf	image	-	-	2024-04-19 14:02:01	GiuseppeRiccio	External Image example 
🟡	IREP_20240419T132305_13839-weekly-20230101120000_20230108120000_EFD	report	-	-	2024-04-19 13:31:12	GiuseppeRiccio	Warning comment
🟢	exp_trend_20240419_140026.pdf	plot	2023-01-01 00:00:00	2023-01-15 00:00:00	2024-04-19 14:00:27	GiuseppeRiccio	SysA.temperature: Test plot 
🟢	IREP_20240419T132424_13840-daily-20230109040000_20230110040000_EFD	report	-	-	2024-04-19 13:30:34	GiuseppeRiccio	All OK
⚫	IREP_20240419T132520_13840-daily-20230110040000_20230116040000_EFD	report	-	-	2024-04-19 13:30:06	GiuseppeRiccio	-
⚫	exp_statistics_20231205_100403.pdf	statistics	2023-01-02 00:00:00	2023-01-03 00:00:00	2023-12-05 10:04:03	GiuseppeRiccio	-

Showing 1 to 7 of 7 entries

Filters Reset

by Flag by Experiment by Exp Type

By Start Date By End Date By Experiment Date By User

Previous 1 Next

Figure 20: AIDA Dashboard - Stored Experiments Tab - Public Archive sorted by Experiment.

Personal Archive

Flag	Parameter	System	Experiment	Exp Flag	Experiment Start Date (UTC)	Experiment Stop Date (UTC)	Generation Date (UTC)	Comments
⚫	SysA.temperature	EFD	exp_trend_20240221_124606.pdf	🟡	2023-01-01 00:00:00	2023-01-14 00:00:00	2024-02-21 12:46:06	
⚫	SysB.current	EFD	exp_statistics_20231201_141239.pdf	🟢	2023-01-02 00:00:00	2023-01-03 00:00:00	2023-12-01 14:12:39	

Showing 1 to 2 of 2 entries

Filters Reset

by Flag By Parameter By System

by Experiment by Exp Flag

By Start Date By End Date By Experiment Date

Previous 1 Next

Figure 21: AIDA Dashboard - Stored Experiments Tab - Personal Archive sorted by Parameter.

- Parameter flag;
- Parameter name;
- Parameter system
- Experiment file name (by clicking it, the experiment pdf is displayed in a separate window);
- Experiment flag;

- Experiment start date and end date (for plots);
- Flag creation date;
- Flag creation user (for “Public” archive);
- Comments.

4.2.4 Administration - Users tab

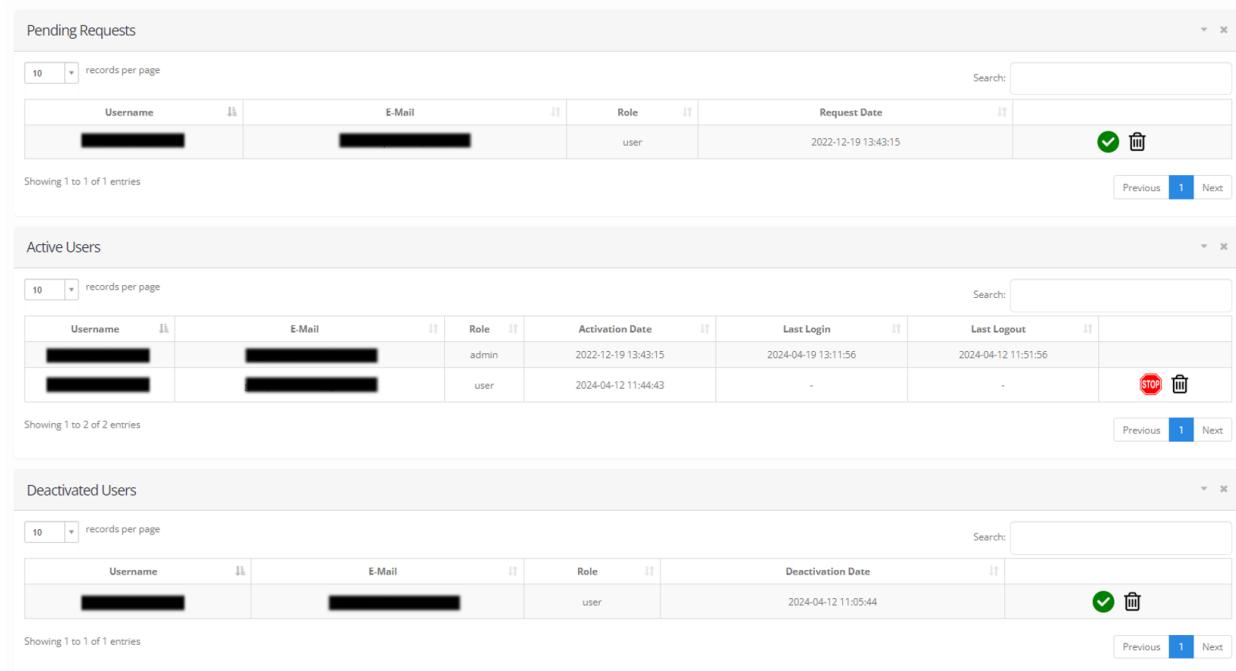
Through this exclusive tab (Figure 22), the administrator(s) could monitor and manage users accesses and registration requests, through 3 panels:

- “Pending Requests” panel: accessing to this panel, administrator(s) can see all pending registration requests, and confirm or reject them;
- “Active Users” panel shows info about active users, giving the possibility to administrator(s) to temporarily deactivate or definitely remove an user;
- “Deactivated Users” panel shows the list of temporarily deactivated users, giving the possibility to administrator(s) to re-activate or definitely remove them.

4.2.5 Administration - Settings tab

In this administrators’ exclusive tab (Figure 23), three panels are available, each one devoted to specific aspects of AIDA configuration:

- “Operating Modes”: administrator(s) can change operating mode, choosing among “Nominal”, “Contingency” and “Commissioning”. By changing the current operating mode, AIDA will automatically connect to the related repository;
- “Systems”: in this panel all the systems available for the current operating mode are listed. Administrator(s) have the possibility, for each system, to activate/deactivate a specific kind of monitored data;
- “Web App Settings”: through this panel, administrator(s) can change AIDA main settings **and remote repositories connection data**, configure a new SMTP server to use or



Pending Requests

Username	E-Mail	Role	Request Date
[REDACTED]	[REDACTED]	user	2022-12-19 13:43:15

Showing 1 to 1 of 1 entries

Active Users

Username	E-Mail	Role	Activation Date	Last Login	Last Logout
[REDACTED]	[REDACTED]	admin	2022-12-19 13:43:15	2024-04-19 13:11:56	2024-04-12 11:51:56
[REDACTED]	[REDACTED]	user	2024-04-12 11:44:43	-	-

Showing 1 to 2 of 2 entries

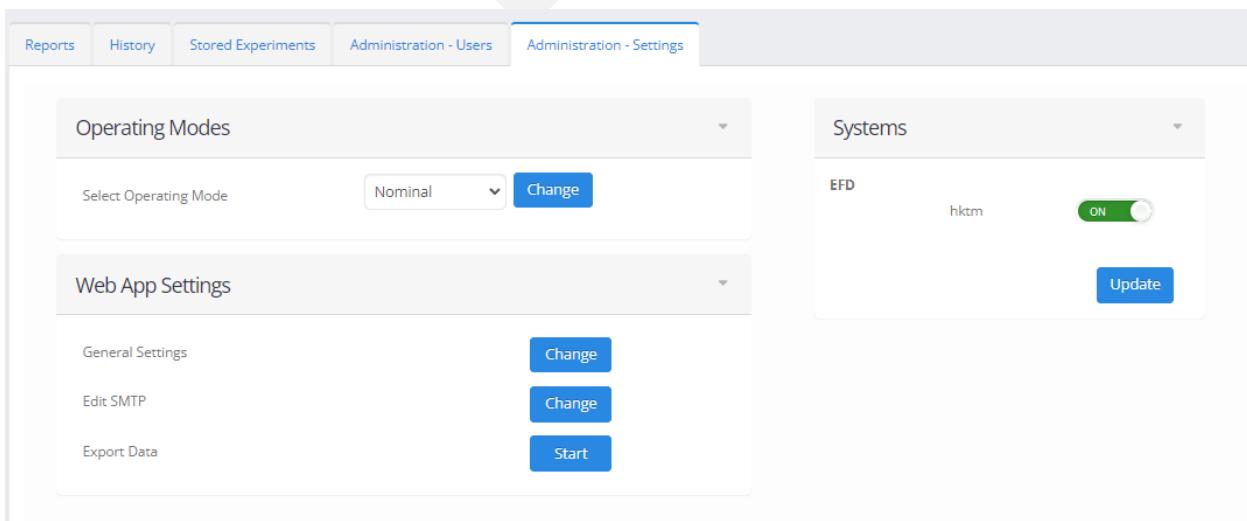
Deactivated Users

Username	E-Mail	Role	Deactivation Date
[REDACTED]	[REDACTED]	user	2024-04-12 11:05:44

Showing 1 to 1 of 1 entries

Figure 22: The supervision panel of administrator(s).

export existing data for a future new brand installation (see Section 2.2). By clicking on the related button, a modal window will open in which the user can proceed with the selected operation. **Every operation of this section (except for "Export Data") requires the administrator to retype their password.**



Operating Modes

Select Operating Mode: Nominal

Systems

EFD hktm

Web App Settings

General Settings
 Edit SMTP
 Export Data

Figure 23: Administration - Settings tab.

General Settings

Available settings in “General Settings” panel are reported in Figure 24:

- **Report Offset:** time to wait, since start date, before starting data acquisition for report generation (it depends on the time delay to have data available on EFD since telescope’s acquisition);
- **History records per user:** number of history records to store into AIDA DB for each user;
- **Processors per system:** number of processor to use for parallel analysis for each system (it depends on the machine hosting AIDA)
- **Communications email:** One or more email addresses to use to notify new user requests or report generation (see Section 2.2 for further details);
- **Time Window Threshold for Offline Plots:** in order to avoid the user waiting plot generation for a long time because of the huge amount of data to analyze, AIDA can perform the analysis offline, then notifying its completion by e-mail to the user. This setting defines the maximum time window for a plot to be generated online; values higher than this will drive AIDA to generate plots offline. If set to 0, then the experiment will be performed exclusively online for the related usecase.

Edit SMTP

The “Edit SMTP” modal panel includes the same form shown in Figure 5 and the procedure to update the SMTP server settings is the same as the one described in Section 2.2.

Export Data

By starting the “Export Data” procedure, the modal panel of Figure 25 will be shown. In such a panel, the administrator(s) can select which info to export. By confirming the export, a tar.gz file will be created and downloaded, containing all AIDA configuration and setting files, stored experiments files and AIDA DB tables required to restore data. This file could be used to import stored data into a new AIDA configuration (see Section 2.2). The tar.gz archive includes

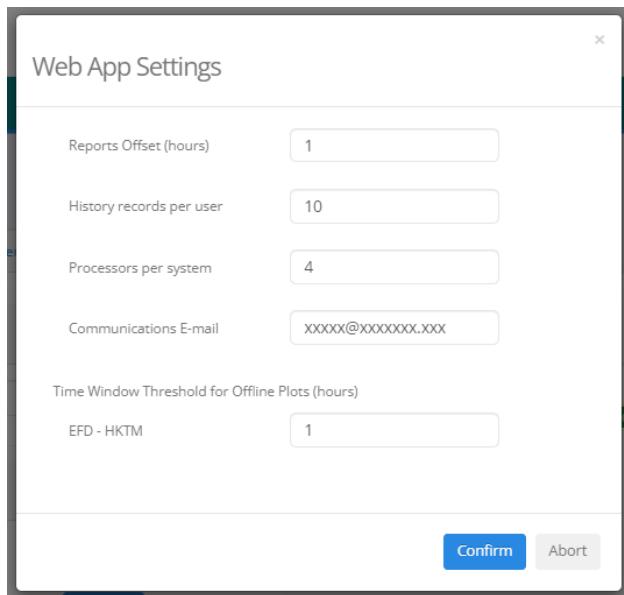


Figure 24: General settings modal window.

text files (pdf, configuration, user folders etc.), related to the user's operation performed during working session. No retrieved data will be stored in this archive, since all data are automatically deleted at the end of the user's session. Therefore, the dimension of such an archive will depend on the user's operations, but it will never reach critical sizes (maximum few GB in the worst case).

NOTE: Any modification of this file could cause SERIOUS malfunctioning and/or data loss.

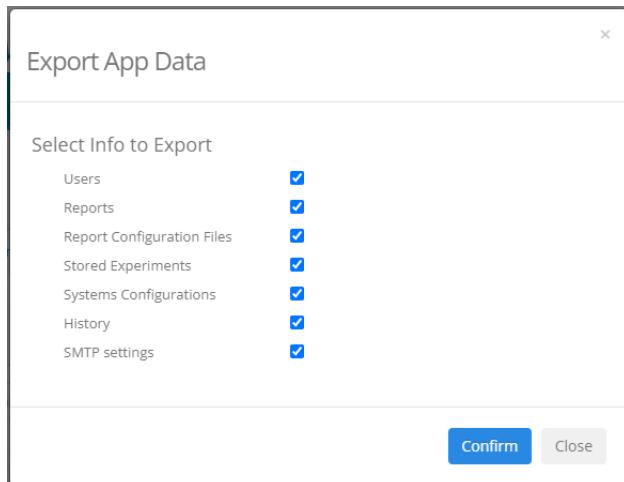


Figure 25: Export data modal window.

5 Plots generation

Current types of standard plots available, under left menu "HKTM" section, are 2D histograms (option "Histogram"), scatter plots (option "Scatter Plot") and trend analysis plots (option "Trend Analysis"). Each of them foresees a setup form, specifically designed for each available system, type of plot and operating mode.

5.1 Standard plots

All the standard plots (trend, scatter and histogram) require to be configured through online forms. Even though forms are specific for each kind of plot, some fields are in common among them:

- **Data source:** the involved system;
- **Parameter:** the parameter to monitor;
- **Date range (UTC) :** start date and end date of plotted data.

Main parameters to plot are identified as "Y axis parameters" (for trend and scatter plots) or "Parameters" (for histogram).

In addition, for a scatter plot, the "X" parameter has to be configured (fields are the same as for "Y" parameter), while the user has to define the bin size (or the number of bins) for a histogram.

To completely characterize parameters, one or more additional fields are present (for example, the specific subsystem to which the parameter refers).

Finally, the user can optionally select which statistical analysis to produce together the plot, by clicking on "Advanced Statistics", otherwise a basic statistics will be provided (see Section 6 for further details).

Some examples of such setup forms for each plot type are shown, respectively, in Figure 26 for trend analysis, Figure 27 for scatter plots and Figure 28 for histograms.

Trend Analysis

Select Data to Plot

Data source: EFD

Y axis parameters: SysA

Parameter: temperature - Example of Temperature parameter

Date range (UTC): 2023-01-01 00:00:00 to 2023-02-12 00:00:00

Advanced Statistics, Submit, Reset

Statistical Tools:

- Select/Deselect All
- Mean
- Standard Deviation
- Median
- Min
- Max
- RMS
- Variance
- Kurtosis
- Skewness
- MAD
- NMAD
- Percentile
- Mode
- Sigma Clip
- Biweight Mean

Figure 26: The form panel for the setup of a trend analysis task.

Scatter Plot

Select Data to Plot

Data source: EFD

X axis parameter: SysA, temperature - Example of Temperature parameter

Y axis parameters: SysB, current - Example of Current parameter; SysC, voltage - Example of Voltage parameter

Date range (UTC): 2023-01-01 00:00:00 to 2023-02-12 00:00:00

Advanced Statistics, Submit, Reset

Figure 27: The form panel for the setup of a scatter plot.

The results of the form submission are shown in two tabs:

1. plot displaying data points;
2. statistical analysis results (defaults or advanced) for each involved parameter;

If the range between start and end date is larger than the "Time Window Threshold for Offline

Histogram

Select Data to Plot

Data source	EFD	
Parameters	SysA	
	temperature - Example of Temperature parameter	
Bin size/Number of Bins	<input type="radio"/> Bin Size <input checked="" type="radio"/> Number of Bins	
Date range (UTC)	2023-01-01 00:00:00	2023-02-12 00:00:00
<input type="button" value="Advanced Statistics"/> <input type="button" value="Submit"/> <input type="button" value="Reset"/>		

Figure 28: The form panel for the setup of a histogram.

Plots (hours)" settings for the specific case (Figure 24), AIDA will show a message, communicating that the plot will be generated offline. Once the plot is generated, the user will receive an e-mail reporting the summary of the experiment and the link to visualize the plot (Figure 29)

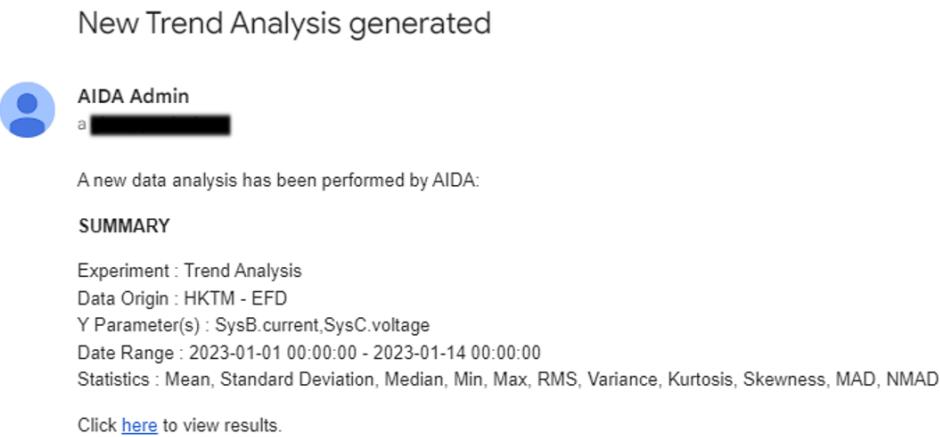


Figure 29: Example of e-mail sent by AIDA after offline plot generation.

An example of generated plots is shown, respectively, in Figure 30 for trend analysis, Figure 31 for scatter plot and Figure 32 for the histogram.

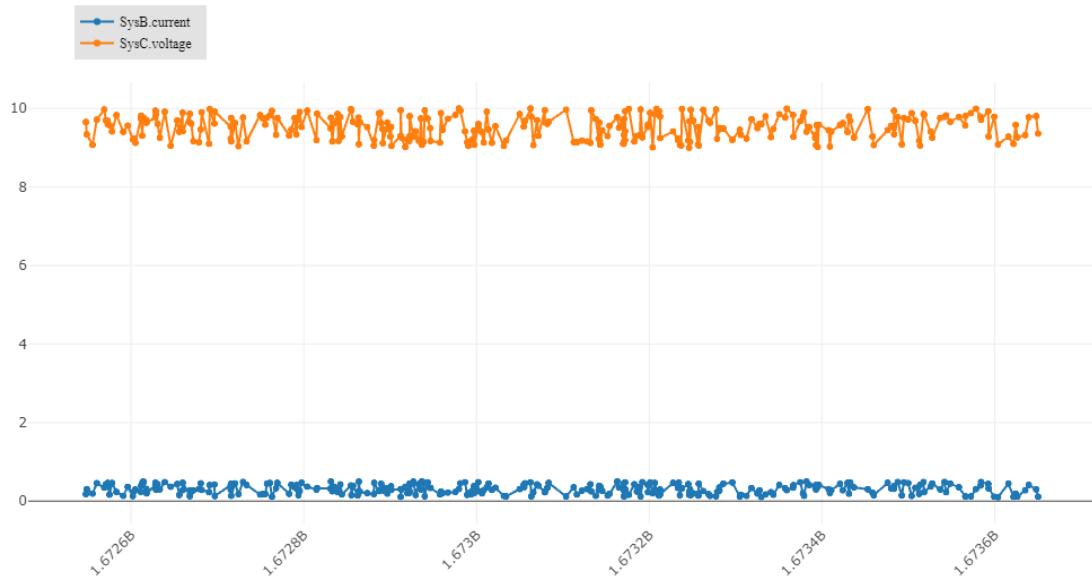


Figure 30: Example of trend analysis plot.

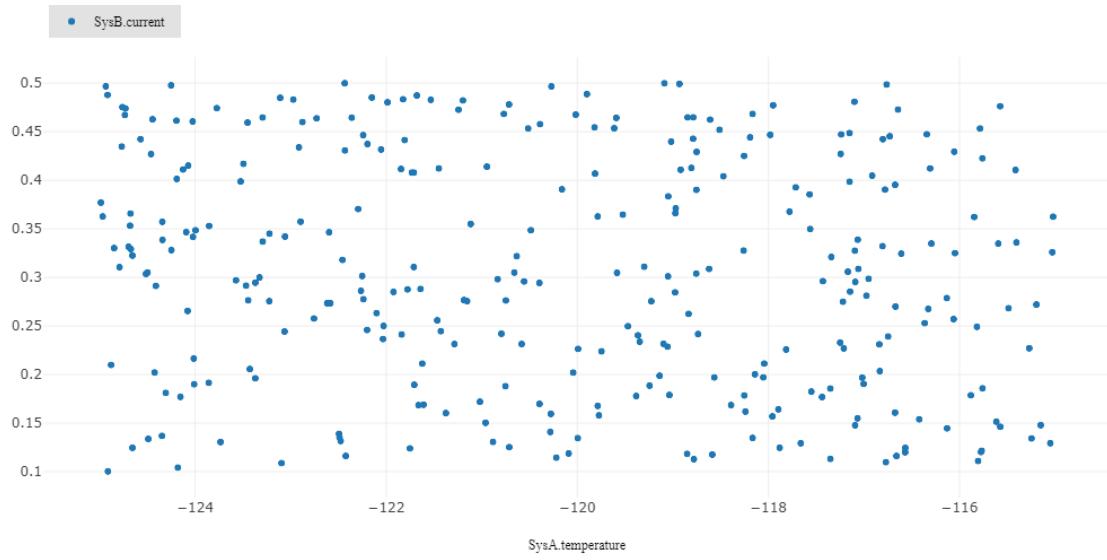


Figure 31: Example of scatter plot.

5.2 Plot navigation bar

Once a plot is generated, it is possible to execute some operations to navigate into it, to generate some products and to customize plot graphics, through a navigation bar in the top-right

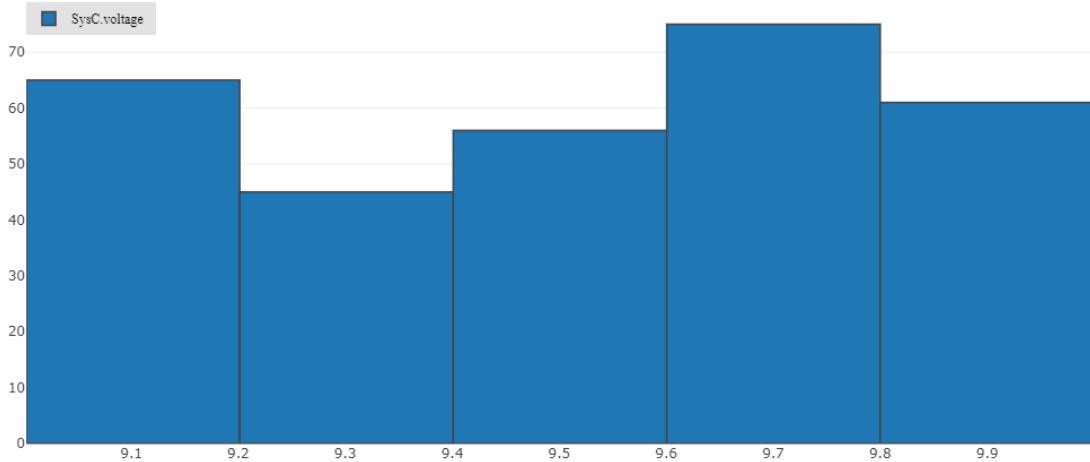


Figure 32: Example of histogram.

corner of the plot (Figure 33). With reference to Figure 33, from left to right, the user can find the following buttons:

- **Download Plot as Image:** the plot is downloaded as PNG image, as it is visualized;
- **Save experiment as PDF:** the plot and the statistical analysis are downloaded as a PDF report file, after optionally having assigned a flag to the plot (see Section 10 for further details on the flagging system);
- **Save results as CSV:** points displayed into the plot are downloaded as a CSV file;
- **Zoom:** the plot can be zoomed, by selecting a specific area or rolling the mouse wheel;
- **Pan;**
- **Box Select:** the user can highlight a specific area of the plot;
- **Zoom in;**
- **Zoom out;**
- **Autoscale:** the plot is auto-scaled to display all the points;

- **Reset axes:** the plot axes are restored to default settings;
- **Toggle Spike Lines:** spike lines are toggled when the mouse is over a point;
- **Show closest data on hover:** when the mouse is over a point, the related pair of values (X,Y) is displayed;
- **Compare data on hover:** when the mouse is over a point, all the values Y corresponding to the related X are displayed;
- **Customize Plot:** a side panel is displayed to customize plot graphics;



Figure 33: Navigation bar for plots graphics customization.

6 Statistical analysis

Currently, the available statistical estimators are:

- Mean, Median;
- Min, Max;
- Mode: if the precision is greater than 0, data will be arranged into bins of width = 2*precision and the median of values in each bin is taken for calculation. Otherwise the single values will be considered;
- RMS, Standard Deviation, Variance;
- Kurtosis, Skewness, Percentiles;
- MAD, NMAD: Median Absolute Deviation and the normalized version (1.4826*MAD);
- Sigma Clip, defined as a way to avoid the effect of outliers, which could significantly bias the measurement of noise statistics. This estimator performs an iterative process removing all data distribution points lower or higher than $f+\alpha\sigma$, where f is the function used to compute the center value and σ the function used to clip the data distribution, while α is the multiplicative constant parameter. Currently, during configuration it is possible to set f and α ; **In next releases σ definition will be available too. Moreover, outliers and not clipped percentages will be shown;**
- Robust mean, based on biweight⁷, a transformation used in robust analysis. It combines the properties of statistical robustness with relatively high efficiency. Here, robustness means that changes in a small portions of data do not cause large changes in the mean estimate.

Statistical analysis can be accessed by clicking "Statistics" on the left menu in the dashboard. The user has to configure the experiment by filling the usual form on parameters selection and checking the statistical estimators to compute among the listed ones. The same estimators list is displayed when the "Advanced Statistics" button on plot configuration forms is clicked.

⁷"Data Analysis and Regression" Mosteller and Tukey, Addison-Wesley, 1977

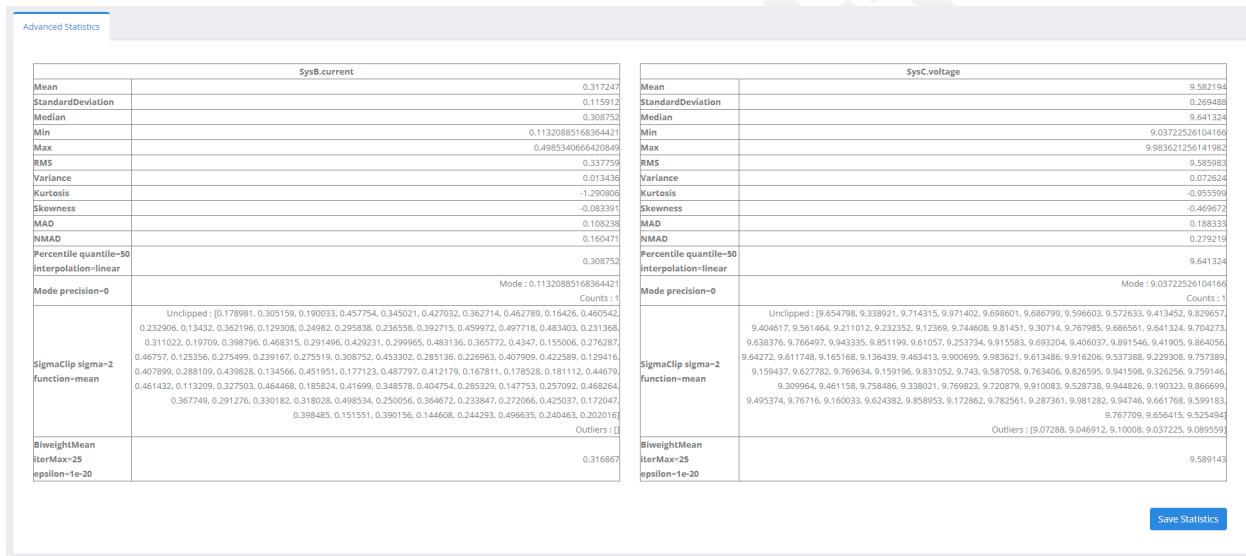


Figure 34: Example of advanced statistical analysis.

7 Image Explorer

In terms of statistical evaluation of the loaded images, the Image Explorer tool is able to load and display any image and to dynamically navigate into it. It provides a number of advanced features, such as image statistics, tiling, blinking, geometric markers, arbitrary zoom, rotation, pan, and a variety of coordinate systems. making also possible to select an arbitrary sub-region, including borders, to get coordinate ranges and export any kind and shape of thumbnails. The overall view of the Image Explorer is shown in Figure 35.

The AIDA Image Explorer tool is based on JS9 Javascript library⁸ (v3.6.2): refer to the official user manual⁹ for a description of general features.

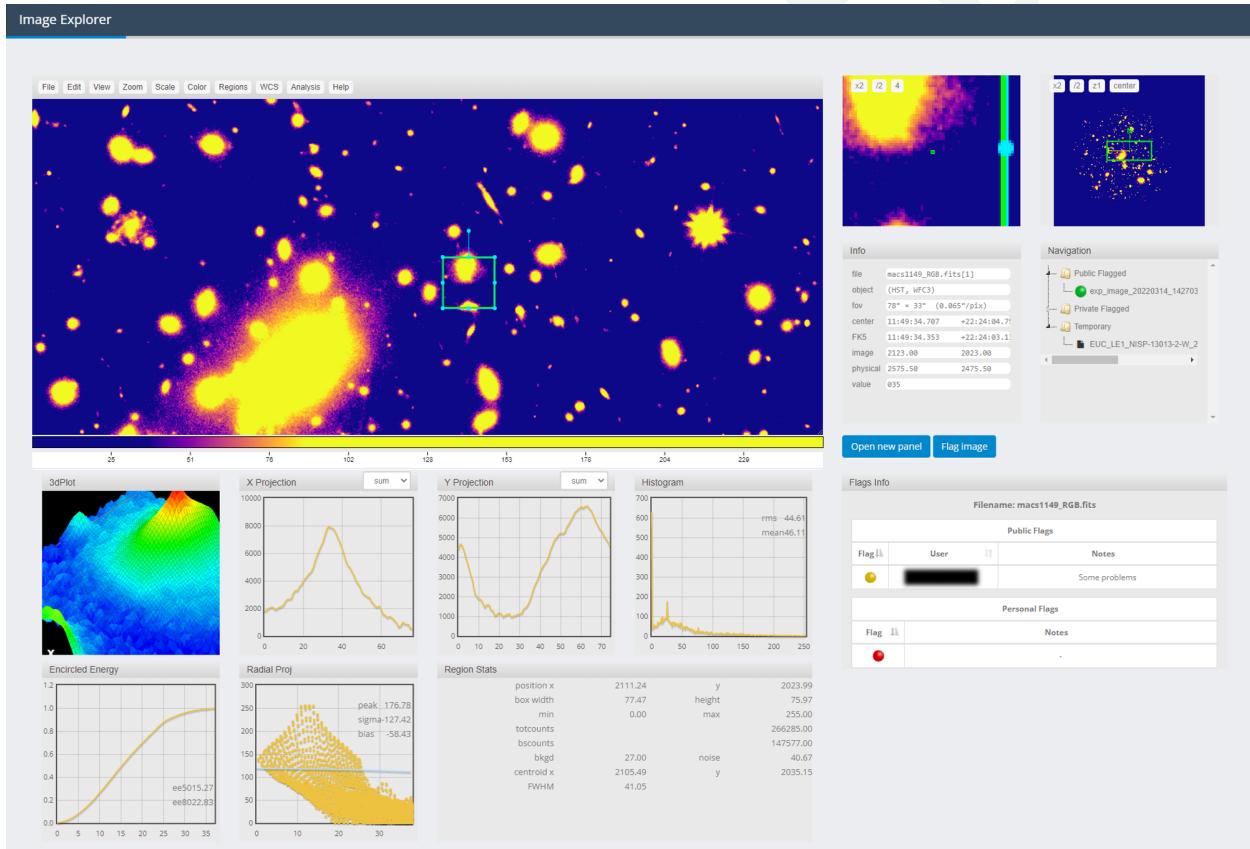


Figure 35: Image Explorer overall view.

The tool can be accessed by the left menu (Figure 14).

⁸<https://js9.si.edu>

⁹<https://js9.si.edu/js9/help/user.html>

The Image Explorer consists of several panels, displaying image details, info and analysis results (Figure 35):

1. **Top-left panel:** the image container, displaying by default the central region of the image (if it is too large to be fully displayed);
2. **Top-right panel:** four mini-panels (from top-left, clockwise):
 - Panner, dynamically displaying the image region centred on the mouse position;
 - Magnifier, which displays the whole image, highlighting the region shown in the main panel;
 - Navigation, showing images already stored on AIDA (flagged or temporary) which can be loaded on click;
 - Info, about the displayed image and the pixel dynamically pointed by the mouse;
3. **Bottom-left panel:** seven mini-panels, implementing a number of plugins dedicated to the analysis of a specific selected region of the image.
4. **Bottom-right panel:** Flags Info, showing details on the flags already assigned to the image (see Section 10 for further details).

Besides the default navigation bar on the top of the image container, two other buttons are available to allow the user to open a new panel in a new window and to start the flagging procedure of the image (Section 10).

8 Report generation

One of main AIDA tools is the generation, handling and delivery of instrument data reports. In the AIDA framework, two different kinds of report are foreseen:

- **Periodic (Short/mid/long term data) report**: this is a pre-configured (through the compilation of a JSON configuration file) collection of monitored/analysed data, periodically produced by AIDA through automatic processes;
- **On demand report**: this is a collection of monitored/analysed data selected by any AIDA authenticated user, through the compilation of a JSON configuration file, produced on specific request.

All the generated reports are stored in the AidaHM local DB and accessible to all authenticated users.

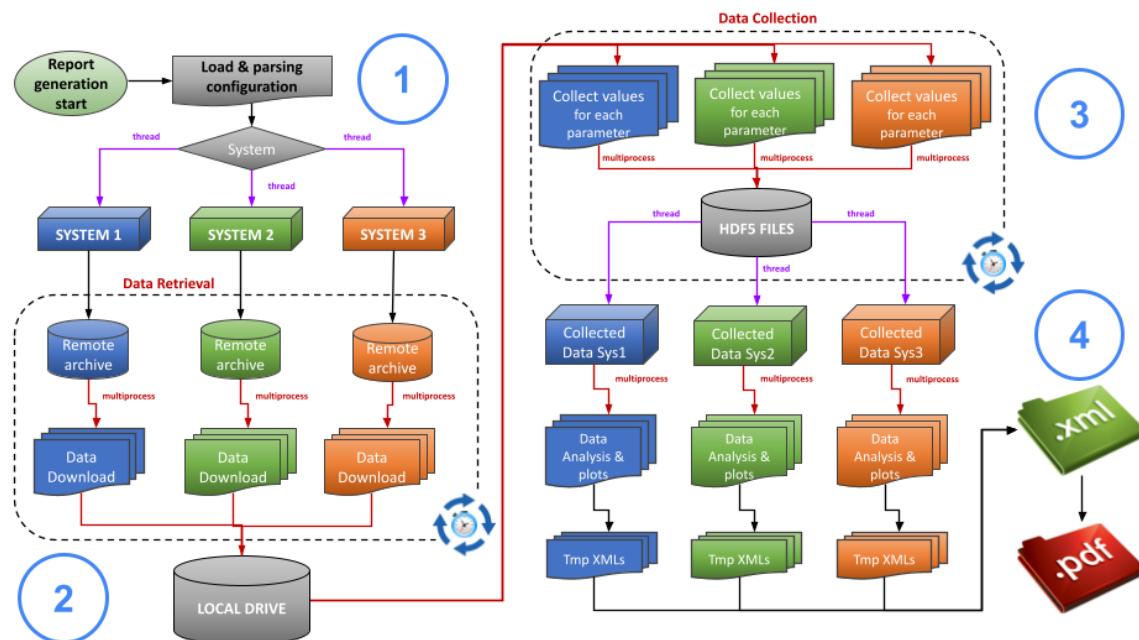


Figure 36: Reports generation flow: 1) The created configuration file is read by AIDA; 2) each system has a dedicated thread to retrieve metadata and files from the remote archives (with a pre-defined cadence to optimize performance) and store them on the AidaHM; 3) Data are extracted from metadata/files and stored in HDF5 files; 4) When all data have been stored for the related period, they are collected, elaborated and arranged into the XML and PDF outputs.

The common aspect among report types is the internal workflow mechanism, described in Figure 36, except for the execution timing (single execution chosen by the user in the case of on demand type, while periodically executed by an automatic process in the case of periodic type) and the setup performed by the user through the editing of a JSON configuration file.

Periodic reports

In the case of periodic reports, the AIDA system will periodically execute an autonomous process at a specified date and time, by collecting and organizing a predefined set of data, from any authorized data repository, under the form of a report document in PDF and XML formats. Such files will be then stored within the AidaHM filesystem and indexed in AIDA DB, depending on the operative conditions of the monitored system and the related context of AIDA execution. The setup and contents of periodic reports (systems, subsystems, parameters, time window and list of analysis tasks) are preliminary specified by any AIDA authenticated user, through a dedicated JSON configuration file, to be prepared via AIDA specific services.

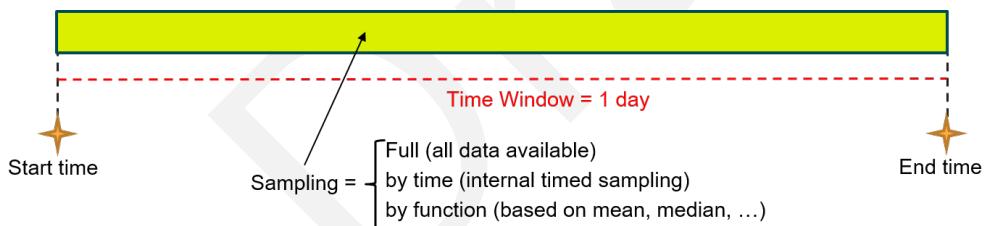


Figure 37: Schematic view of the data acquisition mode for periodic reports. The example is referred to a daily report. Yellow area indicates the time window valid for data acquisition.
Sampling is related to the modes of data collection applicable within the Time Window.

The Figure 37 shows a typical data retrieval/collection mode for the generation of a periodic report.

The information required to specify the range of reported data are provided by the user during the configuration file preparation:

- **Starting time** : date and time (UTC) from which to start the data retrieval and collection from the remote archive;
- **Time Window** : the duration (decimal hours) of the period in which existing data must

be searched and collected. For a periodic report, this can be custom (user defined), daily, weekly or monthly;

- **Sampling mode** : the sampling to be used within the time window. This parameter can be selected from three types:

- **Full**: all data physically acquired for the selected system available in the remote archive are collected and reported;
- **By time**: the data collected and monitored are taken at selected regular time steps within the Time window;
- **By function**: within the time window, the selection step is done using a cumulative function acting on all data taken between two successive steps. The function is chosen by user among mean (average), median, mode and other statistical functions made available;

NOTE: Currently, only the option "full" is allowed. It is foreseen to implement the other sampling options.

On demand reports

In the case of on demand reports, any AIDA authenticated user is left free to prepare and generate an arbitrary number of customized report generations about any allowed system and its parameters, with any arbitrary date and time and related to any kind of data acquisition period. An on demand report execution, differently from the periodic type, can be executed only one-shot, i.e. not scheduled to be executed at regular time intervals.

Figure 38 shows an example of data retrieval and collection mode for the generation of an on demand report.

The information required to specify the range of reported data are provided by the user during the configuration file preparation and includes some specific additional parameters, with respect to periodic type:

- **Starting time** : date and time (UTC) from which to start the data retrieval and collection from the remote archive;

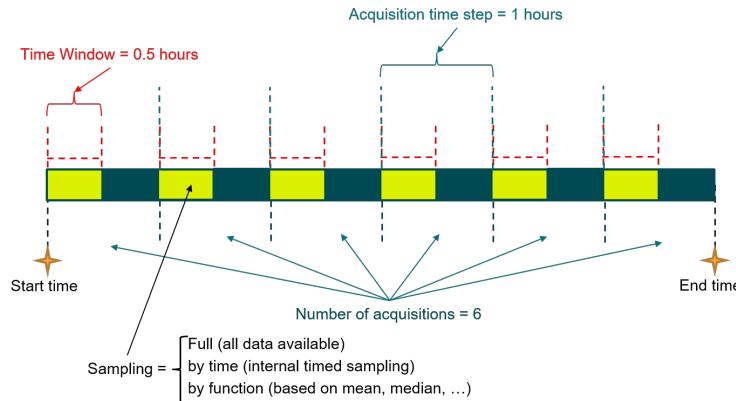


Figure 38: Schematic view of the data acquisition mode for on demand reports. The example is referred to a report generation composed by 6 consecutive acquisitions with a frequency of 1 hour (Acquisition time step) and a duration of each acquisition of 0.5 hours (Time Window). Yellow area indicates the time window valid for data acquisition, while dark green to the off-line time period. **Sampling is related to the three modes of data collection applicable within the Time Window.**

- **Time Window** : the duration (decimal hours) of the period in which existing data must be searched and collected;
- **Sampling mode** : the sampling to be used within the time window;
- **Number of acquisitions** : the total amount of acquisitions that must be repeated from starting date and time;
- **Acquisition Time Step** : the frequency (decimal hours) of the acquisition repetitions. Within each acquisition time step, the time window specifies the time percentage of the real data selection interval.

8.1 Report web application menu

Within the AIDA GUI, there are specific menu options dedicated to the setup and execution of report generation.

- Left Menu section “**Reports**”, four options are available:
 - “**New Configuration**”: used for the setup, editing and generation of the JSON configuration file (Figure 39). From this panel it is possible to edit and save configuration files, either as temporary (uncompleted) or completed, but also to execute the new report generation;

- “**Generate Report**”: used to execute a report generation process, by selecting the related configuration file through any of existing files or by uploading a new one (Figure 40). Only reports based on completed configuration files can be generated (all configuration files stored and registered as uncompleted are not listed here);
- “**List Reports**”: used to list and download the reports already generated by all authenticated users (Figure 41). From this page the user can also flag a specific report by clicking on the related button (see Section 10 for further details on the flagging system);
- “**Configuration Files**”: used to list various types of configuration files (including the uncompleted type) as compiled by all authenticated users (Figure 42).
- Left Menu section “**General Info**”: In order to simplify the editing of any report configuration file, the user can access to the list of systems, parameters and analysis operations that can be monitored and analyzed. Four options are available:
 - “**Systems Info**” (an example in Figure 43)
 - “**HKTM Parameters**”: list of subsystems and related HKTM parameters suitable for collection and analysis/monitoring operations;
 - “**Analysis Info**”
 - “**Available plots**”: list of available plot types within AIDA suitable for analysis on selected systems and parameters (Figure 44, left panel);
 - “**Available Statistics**”: list of available statistical estimators within AIDA suitable for analysis on selected systems and parameters (Figure 44, right panel);

8.2 Configuration of a report

Any kind of AIDA report requires the preliminary setup, through the editing of a JSON configuration file. This file will be stored in the AidaHM and indexed in the local DB. **The standard report setup procedure** to generate a new report configuration requires the following steps:

1. Select left menu option “New Configuration”
2. From the form “New Report Configuration” (as in Figure 39) the user must indicate the report type (periodic or on demand), starting date and time, time window, frequency, duration and **sampling** of data to be retrieved, downloaded and processed. This information will populate the header of the JSON file;

New Report Configuration

Basic Configuration Settings

Periodicity	On Demand
Start Date (UTC)	2023-01-01 00:00:00
Sampling	Full
Time Window (decimal hours)	0.5
Number of Acquisitions	6
Acquisition time step (decimal hours)	1

Basic Configuration Settings

Periodicity	On Demand
-------------	-----------

```

1 {
  "General_Info": {
    "Start_Time": "2023-01-01T00:00:00",
    "Time_Window": 0.5,
    "Number_of_acquisitions": 6,
    "Sampling": "full",
    "Acquisition_time_step": 1
  },
  "EFD": {
    "HKTW": {}
  }
}

```

Configuration Editor

JSON File Name: config.json

Generate Configuration JSON **Reset**

Figure 39: The configuration form activated by the Report menu option “New Configuration” and the internal editor (automatically opened by pressing the “Generate Configuration JSON” button) for the setup of a new report (both periodic or on demand).

Report Generation

Select Configuration File Origin

Run from Existing Configuration File Upload New Configuration File

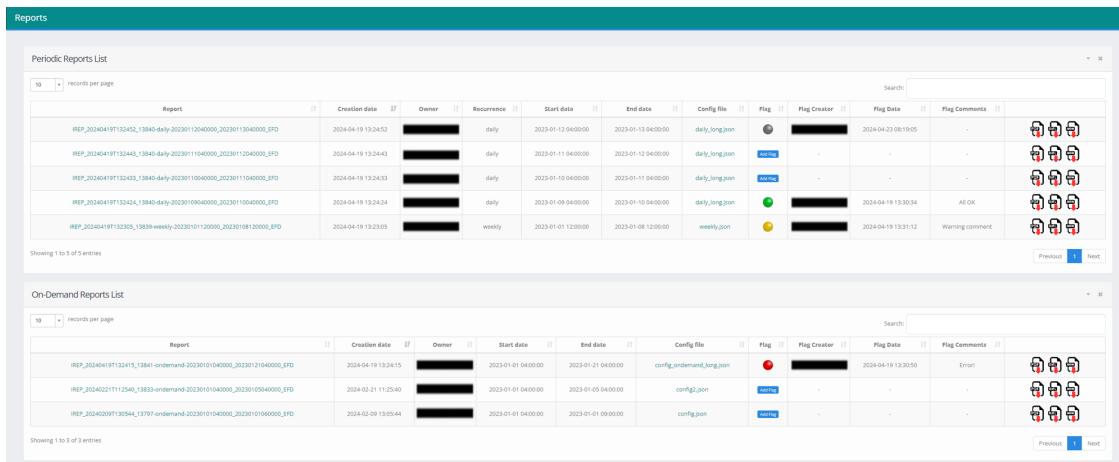
Generate Report from Existing Configuration File

Configuration File	Creation date	Last update	Owner	Recurrence	Start date	Operating Mode	Actions
weekly.json	2024-04-19 13:22:43	2024-04-19 13:22:43	[REDACTED]	weekly	2023-01-01 12:00:00	NOMINAL	
daily_long.json	2024-04-19 13:21:11	2024-04-19 13:21:11	[REDACTED]	daily	2023-01-01 04:00:00	NOMINAL	
config_ondemand_long.json	2024-04-19 13:20:16	2024-04-19 13:20:16	[REDACTED]	ondemand	2023-01-01 04:00:00	NOMINAL	
config2.json	2024-02-21 11:09:29	2024-02-21 11:09:29	[REDACTED]	ondemand	2023-01-01 04:00:00	NOMINAL	
config.json	2024-02-08 14:18:28	2024-02-09 14:48:51	[REDACTED]	ondemand	2023-01-01 04:00:00	NOMINAL	

Showing 1 to 5 of 5 entries

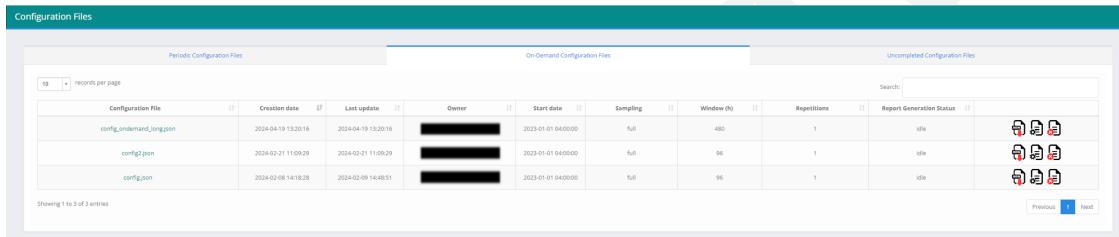
Previous **1** Next

Figure 40: The panel to execute a report generation task (opened by the Report menu option “Generate Report”). It is possible to execute an already configured report or a new one. An existing configuration can be used only if the system is in the same operating mode as indicated in the “Operating Mode” column.



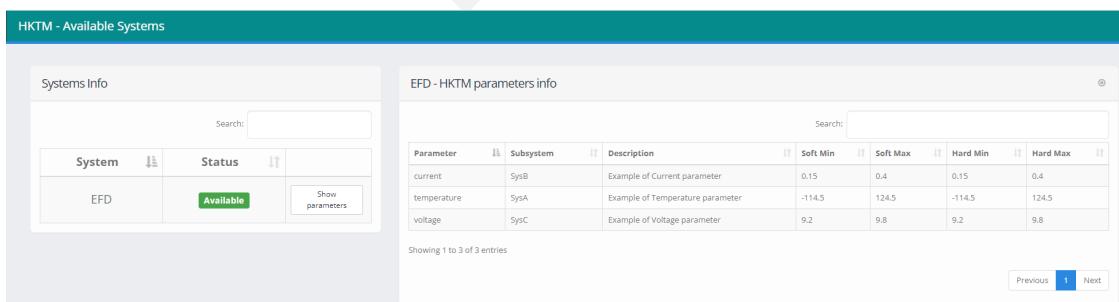
The screenshot shows the 'Reports' panel with two main sections: 'Periodic Reports List' and 'On-Demand Reports List'. Both sections have a header with a 'Search:' field and a dropdown for 'records per page' (set to 10). The 'Periodic Reports List' table has columns: Report, Creation date, Owner, Recurrence, Start date, End date, Config file, Flag, Flag Creator, Flag Date, and Flag Comments. It lists five entries. The 'On-Demand Reports List' table has similar columns and lists three entries. At the bottom of each section, there are 'Showing 1 to 5 of 5 entries' and 'Showing 1 to 3 of 3 entries' messages, along with 'Previous' and 'Next' navigation buttons.

Figure 41: Example of report list panel (opened by the Report menu option “List Reports”).



The screenshot shows the 'Configuration Files' panel with three tabs: 'Periodic Configuration Files', 'On-Demand Configuration File', and 'Uncompleted Configuration Files'. The 'Periodic Configuration Files' tab is active, showing a table with columns: Configuration File, Creation date, Last update, Owner, Start date, Sampling, Window (h), Repetitions, and Report Generation Status. It lists three completed configuration files: 'config_onemand.json', 'config1.json', and 'config.json'. The 'On-Demand Configuration File' tab shows one entry for 'config2.json'. The 'Uncompleted Configuration Files' tab shows one entry for 'config3.json'. At the bottom, there is a 'Showing 1 to 3 of 3 entries' message and 'Previous' and 'Next' navigation buttons.

Figure 42: The panel opened by the Report menu option “Configuration Files”. It shows the list of all existing report configuration files (with the status of associated report generation task, e.g. idle/scheduled/running), either periodic, on demand and uncompleted, the latter referred to configuration files partially edited but still to be completed. Only completed and idle configuration files can be launched. Each user can edit or delete his/her configuration files while administrator(s) can edit/delete every file.



The screenshot shows the 'HKTM - Available Systems' panel. The left side has a 'Systems Info' table with columns: System and Status. It shows one entry: 'EFD' with 'Available' status. The right side has a 'EFD - HKTM parameters info' table with columns: Parameter, Subsystem, Description, Soft Min, Soft Max, Hard Min, and Hard Max. It lists three parameters: 'current' (SysB), 'temperature' (SysA), and 'voltage' (SysC). At the bottom, there is a 'Showing 1 to 3 of 3 entries' message and 'Previous' and 'Next' navigation buttons.

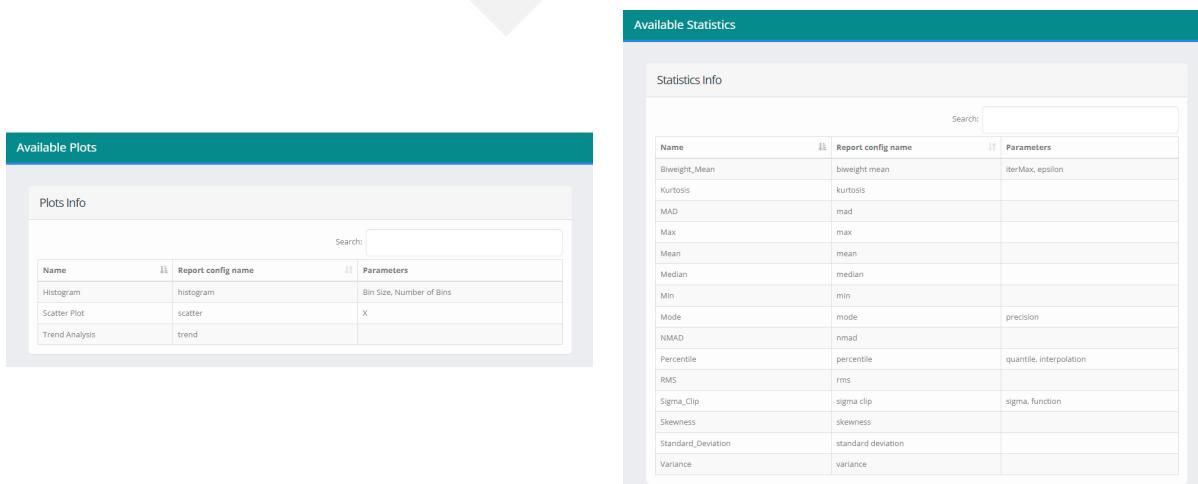
Figure 43: Example of "System Info" table, reporting la list of parameters suitable for collection and analysis/monitoring operations.

3. After pressing the button “Generate Configuration JSON”, an editor panel will open, in which the user must list the system, subsystems and parameters to be collected, as well as the list of analysis operations to be applied to retrieved data and included in the

report;

4. During the editing of the JSON file, the user can see the list of all allowed HKTM systems and parameters and the allowed analysis tools (plots/statistics) that can be used by AIDA, using the left menu “General Info” options;
5. Once the user has finished to edit the JSON file, he can perform three actions by clicking on the related button:
 - a. **“Store Temporary JSON” button** allows the user to suspend the editing and to resume it in a second time. In this case the temporary file is stored in the AidaHM and flagged into the local DB as “uncompleted”. The reports based on configuration files registered as uncompleted cannot be generated (no report generation processes can be launched).
 - b. **“Save Completed JSON” button** allows to store the final version of the configuration file into the AidaHM, indexed in the local DB, flagged as “completed”, without launching the report generation process. The report generation can be started at any time by accessing to the “Generate Report” page (Figure 40);
 - c. **“Generate Report” button** allows to store the configuration file into the AidaHM and launch the process in charge to retrieve remote data and generate the report;

The configuration files, as representatives of related reports (any report is always associated



The screenshot shows two panels from the "General Info" section of the AIDA interface.

Available Plots:

Name	Report config name	Parameters
Histogram	histogram	Bin Size, Number of Bins
Scatter Plot	scatter	X
Trend Analysis	trend	

Available Statistics:

Name	Report config name	Parameters
Biweight_Mean	biweight mean	iterMax, epsilon
Kurtosis	kurtosis	
MAD	mad	
Max	max	
Mean	mean	
Median	median	
Min	min	
Mode	mode	precision
NMAD	nmad	
Percentile	percentile	quantile, interpolation
RMS	rms	
Sigma_Clip	sigma clip	sigma, function
Skewness	skewness	
Standard_Deviation	standard deviation	
Variance	variance	

Figure 44: "Available Plots" (**left panel**) and "Available Statistics" (**right panel**) tables from "General Info" section. In each row, item name, key to use to tag an operation and setting keys to configure each operation in a report configuration file.

with a configuration file), can be monitored in terms of report generation process status. In such terms, a report generation job can be in **idle** status if not running, **scheduled** if launched but still not running, or **running** if under execution. The scheduled status is always referred to a report generation process in which the starting time, indicated in the associated configuration file, is projected into the future. This is particularly frequent in case of the generation of periodic reports.

The list of all configuration files, generated by all authenticated users, their report generation status (idle/scheduled/running) and other related metadata can be accessed through specific panels, divided into three tabs (periodic/ondemand/uncompleted) (see Figure 42).

Once a report is generated, an e-mail will be sent to the user to notify the report creation, with a link to directly access to its XML and PDF version (Figure 45).

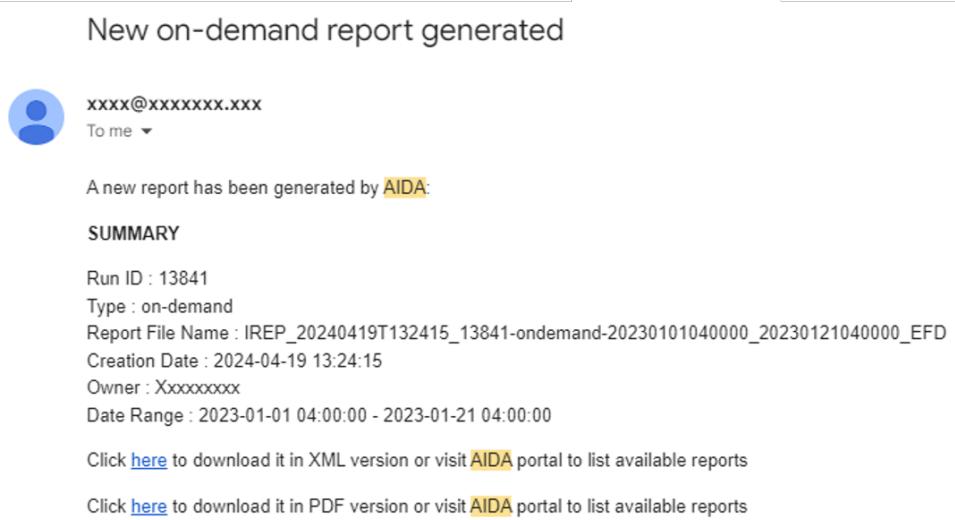


Figure 45: Example of new generated report notification email.

All data included in the configuration file will be collected and organized in the report in the most readable way, by subdividing data based on the specific reference instrument and sub-system. As showed in the bottom-left panel of Figure 46, each parameter is listed with its status, organized as a traffic light, in which a green status indicates a normal condition, yellow a warning and red a failure or severe anomaly detected. The status is assigned based on the comparison between the assumed values and any anomaly conditions supplied with the parameter or as the result of any correlation/thresholding operation as specified by the user within the configuration file.



AIDA

Advanced Infrastructure for Data Analysis

On-Demand Report Id: 13833

IREP_20240221T112540_13833-ondemand-20230101040000_20230105040000_EFD

Report Periodicity	ONDEMAND
Report generation time :	2024-02-21 11:25:40
Generated by :	GiuseppeRiccio
Configuration file :	config.json
Owner :	GiuseppeRiccio
Operating Mode :	NOMINAL

***** Configuration**

Date Start :	2023-01-01 04:00:00
Date Stop :	2023-01-05 04:00:00
Time Window (hours) :	96
Sampling :	full
Number of acquisitions :	1

***** Notes**

EFD Status : Detected 2 error(s)

EFD Error List

Level	Origin	Description
●	HKTM	39 values out of HARD limits for parameter SysB.current during acquisition #1
●	HKTM	95 values out of HARD limits for parameter SysA.temperature during acquisition #1



AIDA

Advanced Infrastructure for Data Analysis

SysA.temperature

Parameter : SysA.temperature
 Name : SysA
 Subsystem : SysA
 Description : Example of Temperature parameter
 Soft Limits: [-114.5, 124.5]
 Hard Limits: [-114.5, 124.5]
 Error status : ●

Errors/Warnings Details

Status	Acquisition #	Category	Description
●	1	out of range	Error occurred 95 time(s). See XML version for detailed info.

List of performed analysis

Analysis	Op_ID	Additional parameters : SysB.current	Acq#1
Trend	1		●
Histogram	2	Bin Size : 30.0	●
Statistics	3	Mean	●
Statistics	4	Max	●
Statistics	5	Median	●
Statistics	6	Variance	●
Statistics	7	Percentile (quantile = 50, interpolation = linear)	●
Statistics	8	Sigma clip (sigma = 3, function = mean)	●
Statistics	9	Standard deviation	●
Statistics	10	Min	●
Statistics	11	Rms	●
Statistics	12	Kurtosis	●
Statistics	13	Skewness	●
Statistics	14	Mad	●
Statistics	15	Nmad	●
Statistics	16	Mode (precision = 0.01)	●
Statistics	17	Biweight mean (iterMax = 25, epsilon = 1e-20)	●
Scatter	18	X parameter : SysC.voltage	●

Operation 1 TREND ANALYSIS - SysA.temperature

Additional Parameters : SysB.current

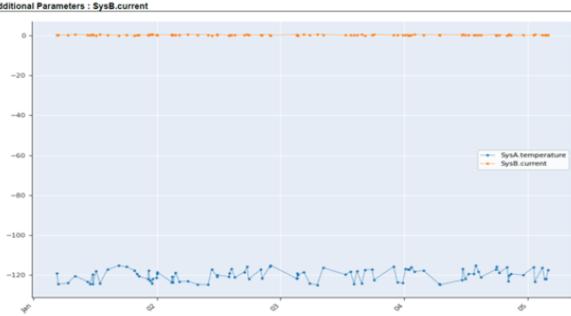


Figure 46: Example of an on demand report PDF output file (same layout for periodic reports).

8.3 Reports JSON configuration files editing guide

In a report configuration file all the info required to configure the experiment is collected as a JSON data format, basically information is nested along a dedicated branch. The main structure of a report JSON configuration file is common for each use case but, due to the wide range of DPs, subsystems, parameters and options, the single branch can strongly vary from case to case. The general structure can be divided into two parts: i) a **General Info** section, storing some general experiment settings; ii) one or more **System branches**, section specifically structured to configure experiments on each system. Even if the single *System branch* has a unique structure depending on the system to configure, all the branches have a

general common structure:

- **First key:** name of the system ("EFD");
- **Second key:** name of data origin ("HKTM");
- **Inner settings:** a number of nested pairs (key-value) collecting all the required info to characterize the parameters to monitor;
- **Operations:** for each configured parameter, the list and settings of operations to perform on it.

A complete list of parameters and analysis tools available for configuration file creation is reported in the pages linked in "General Info" section of the sidebar (Figures 43 and 44).

Below is a more in-depth description of the configuration files.

8.3.1 General Info

As already mentioned in Section 8.2, some general settings must be defined and stored under the "General Info" branch for every configuration file:

- **Start time:** date and time (UTC) from which to start the data retrieval and collection from the remote archive;
- **Time Window:** the duration (decimal hours) of the period in which existing data must be searched and collected;
- **Number of acquisitions:** (Required only for on demand reports) the total amount of acquisitions that must be repeated from starting date and time;
- **Acquisition time step:** (Required only for on demand reports if *Number of acquisitions > 1*) the frequency (decimal hours) of the acquisition repetitions;
- **Sampling:** the sampling to be used within the time window. **For the current version, only value "full" is allowed;**

```

"General Info": {
    "Start Time": "2023-01-01T04:00:00",
    "Time Window": 24,
    "Number of acquisitions": 1,
    "Sampling": "full"
}

```

8.3.2 Inner settings

The central part of a use case (System-Data origin) branch is devoted to the definition of the parameters to monitor. It strongly depends on the related use case, but tries to follow the part related to parameter configuration in the analogous form for plot generation (see Section 5 for further details), except for few filters in the form, used to simplify its filling.

For "Fake" data, currently available, the structure of the inner part is the following:

```

"EFD": {
    "HKTM": {
        "<subsystem#1>": {
            "<parameter#1>": {
                "Operation_1": {
                    <operation info. See dedicated section.>
                },
                ...
                "Operation_<N>": {
                    <operation info. See dedicated section.>
                }
            },
            ...
        }
    }
}

```

```

    "Operation_<N>": {
        <operation info. See dedicated section.>
    }
},
}

...
}

"<subsystem#n>" : {
    ...
}
}
}

```

NOTE: in each branch, at the same nested level, more than one configuration tag can be used (for example, one or more <Parameter>, <Data product>, ...), obviously following the JSON typing rules.

8.3.3 Operations

For each listed parameter, it is needed to define the operations to perform. They must be listed by using the tag "Operation_<n>" as key, where <n> is a progressive number starting from 1. For each "Operation_<n>" key, the related value will be a nested dictionary containing all the info needed to set up the operation itself and summarized in Table 1.

The lists of all available plots and statistics and their tags and settings are shown on the pages linked in *General Info* → *Analysis Info* (see Figure 44)

Key	Required/Option	Allowed values	Notes
"Type"	Always required	"trend"	"Additional parameters" applicable
		"scatter"	"Additional parameters" applicable "X" required
		"histogram"	"Additional Parameters" applicable "Bin Size" or "Number of Bins" required
		"biweight mean"	"Parameters" required
		"kurtosis"	-
		"mad"	-
		"max"	-
		"mean"	-
		"median"	-
		"min"	-
		"mode"	"Parameters" required
		"nmad"	-
		"percentile"	"Parameters" required
		"rms"	-
"Additional Parameters"	plots only - optional	see Section 8.3.4	-
"X"	"scatter" only - required	see Section 8.3.4	-
"Bin Size"	"histogram" only - required (see notes)	see Section 8.3.4	alternative to "Number of Bins"

Key	Required/Option	Allowed values	Notes
"Number of Bins"	"histogram" only - required (see notes)	see Section 8.3.4	alternative to "Bin Size"
"Parameters"	required for some statistics	see Section 8.3.4	-

Table 1: List of allowed keys for operation configuration.

```

"Operation_1" : {
    "Type" : "trend",
    "Additional Parameters" : <See dedicated section>,
},
"Operation_2" : {
    "Type" : "scatter",
    "X" : <See dedicated section.>,
    "Additional Parameters" : <See dedicated section>
},
"Operation_3" : {
    "Type" : "histogram",
    "Bin Size" : <See dedicated section.>,
    "Additional Parameters" : <See dedicated section>
},
"Operation_4" : {
    "Type" : "histogram",
    "Number of Bins" : <See dedicated section>,
    "Additional Parameters" : <See dedicated section>
},
"Operation_5" : {
    "Type" : <statistics WITHOUT additional settings>
},
...
"Operation_<N>" : {
    "Type" : <statistics WITH additional settings>,
    "Parameters" : {
        <See dedicated section>
    }
}

```

```
}
```

```
}
```

8.3.4 Additional Settings

Some operations requires other settings to be defined. In particular:

- All the plots ("trend", "scatter", "histogram") give the possibility to display more than one parameter on the same plot or on adjacent subplots, by defining the "**Additional Parameters**" item;
- "scatter" plot requires that the parameter on x axis to be defined ("**X**" item);
- "histogram" plot requires to define the size of the bins ("**Bin Size**" item) or the number of bins to populate ("**Number of Bins**");
- some statistics (namely "biweight mean", "mode", "percentile" and "sigma clip") requires other settings to be defined, by adding the "**Parameters**" dictionary.

Additional Parameters

In order to plot other parameters together with the one under monitoring, the user has to use the "**Additional Parameters**" key under the "Operation_<#N>" section. The value associated to the key is a list of all the parameters to use (see below). All parameters will be arranged in a unique plot and/or adjacent subplots, depending on its type.

```
"Operation_1" : {
    "Type" : "trend",
    "Additional Parameters" : [<add_param #1>, <add_param #2>, ... <
        add_param #N>]
}
```

An *additional parameter* string must contain all the info characterizing the parameter, and depends on the use case, similarly to the main parameter. For "Fake" data, the structure for an additional parameter is:

<subsystem>.<parameter>

Scatter *x* axis

The definition of the parameter to use on the scatter plot *x* axis is made by the <X> key and a string as value. The structure of the string is the same as for an additional parameter.

```
"Operation_1" : {
    "Type" : "scatter",
    "X" : "<X parameter>"
}
```

Bins characterization

The binning is required to configure a histogram operation. The user can choose between two different tags:

- "**Bin Size**" : width of bins. Its format is *float*;
- "**Number of Bins**" : the number of bins to use (format *int*);

```
"Operation_1" : {
    "Type" : "histogram",
    "Bin Size" : 0.05
},
"Operation_2" : {
    "Type" : "histogram",
    "Number of Bins" : 15
}
```

Statistical Parameters

There are some statistical indicators that require to be configured by using additional settings. This settings are collected into a dictionary associated to the "**Parameters**" tag under the "Operation_<#N>" section: the name of the setting will assume the role of key of the dictionary.

All required extra settings are listed on the page linked to *General Info* → *Analysis Info* → *Available Statistics* (Figure 44) and summarized in Table 2.

Statistics Tag	Extra settings	Format	Required/optional	Description
"biweight mean"	"iterMax"	int	optional (default 25)	Maximum number of iterations to approximate the standard deviation of the distribution
	"epsilon"	float	optional (default 1e-20)	Minimum value of the standard deviation to continue iterations
"mode"	"precision"	float	optional (default 0)	Precision for mode evaluation. If precision is greater than 0, data will be arranged into bins of width = 2*precision and the median of values in each bin will be considered for calculation. Otherwise the single values will be considered.
"percentile"	"quantile"	float in [0,100]	required	Percentile to compute, which must be between 0 and 100 inclusive
	"interpolation"	"linear" "lower" "higher" "nearest" "mid-point"	required	Interpolation method to use when the desired quantile lies between two data points $i < j$
"sigma clip"	"sigma"	float	required	The number of standard deviations to use for both the lower and upper clipping limit

	"function"	"biweight" "mad" "median" "mean" "nmad"	required	The statistics used to compute the center value for the clipping
	sigmafunc ¹⁰	"std" "mad" "nmad"	required	The statistics used to compute the sigma value for the clipping

Table 2: List of statistical indicators which require extra settings.

8.4 An Example

In this section, an example of configuration file created for "Fake" data is shown, compiled by following the rules described in Section 8.3. **In the next updates, this section will be populated with new examples for new use cases.**

8.4.1 Fake data example

```
{
    "General Info": {
        "Start Time": "2023-01-01T04:00:00",
        "Time Window": 24,
        "Number of acquisitions": 1,
        "Sampling": "full"
    },
    "EFD" : {
        "HKTM" : {
            "SysA": {
                "temperature": {
                    "Operation_1" : {
                        "Type" : "trend",
                        "Additional Parameters" : ["SysB.current"]
                    }
                }
            }
        }
    }
}
```

¹⁰Available in next releases

```

} ,
"Operation_2" : {
    "Type" : "histogram",
    "Bin Size" : 30
},
"Operation_3":{
    "Type" : "mean"
},
"Operation_4":{
    "Type" : "max"
},
"Operation_5":{
    "Type" : "median"
},
"Operation_6": {
    "Type": "variance"
},
"Operation_7": {
    "Type": "percentile",
    "Parameters" : {"quantile" : 50, "interpolation": "linear"}
},
"Operation_8": {
    "Type": "sigma clip",
    "Parameters" : {"sigma" : 3, "function": "mean"}
},
"Operation_9": {
    "Type": "standard deviation"
},
"Operation_10": {
    "Type": "min"
},
"Operation_11": {
    "Type": "rms"
},
"Operation_12": {
}

```

```

        "Type": "kurtosis"
    },
    "Operation_13": {
        "Type": "skewness"
    },
    "Operation_14": {
        "Type": "mad"
    },
    "Operation_15": {
        "Type": "nmad"
    },
    "Operation_16": {
        "Type": "mode",
        "Parameters" : {"precision":0.01}
    },
    "Operation_17": {
        "Type": "biweight mean",
        "Parameters" : {"iterMax" : 25, "epsilon":"1e-20"}
    },
    "Operation_18": {
        "Type": "scatter",
        "X" : "SysC.voltage"
    }
}

},
"SysB":{

    "current":{

        "Operation_1" : {
            "Type" : "trend"
        },
        "Operation_2" : {
            "Type" : "histogram",
            "Number of Bins" : 3
        }
    }
}

```

```
        }  
    }  
}
```

```
    }  
}  
}
```

Draft

9 Analyze local data

AIDA allows to generate plots and statistics from FITS table or CSV files from local machine. The user can upload a new local file (Figure 47, left panel) or select an already existing file, previously uploaded during the current user session (Figure 47, right panel), by clicking "Analyze Local Data" from left menu.

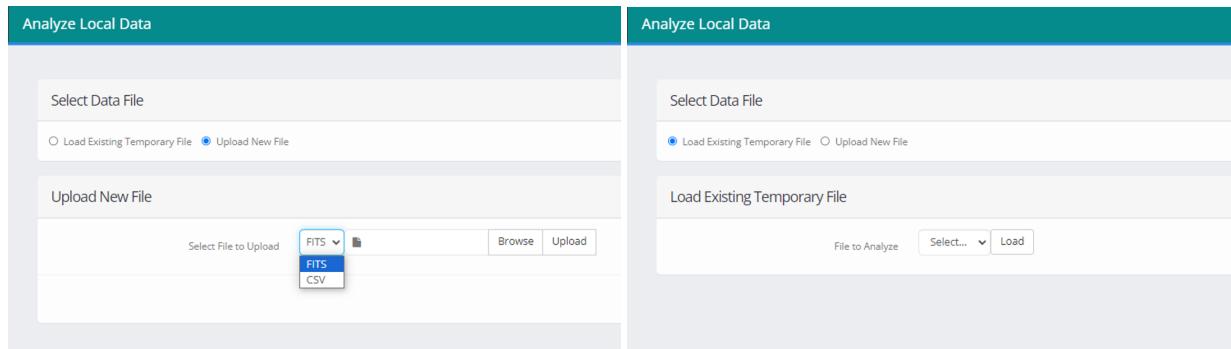
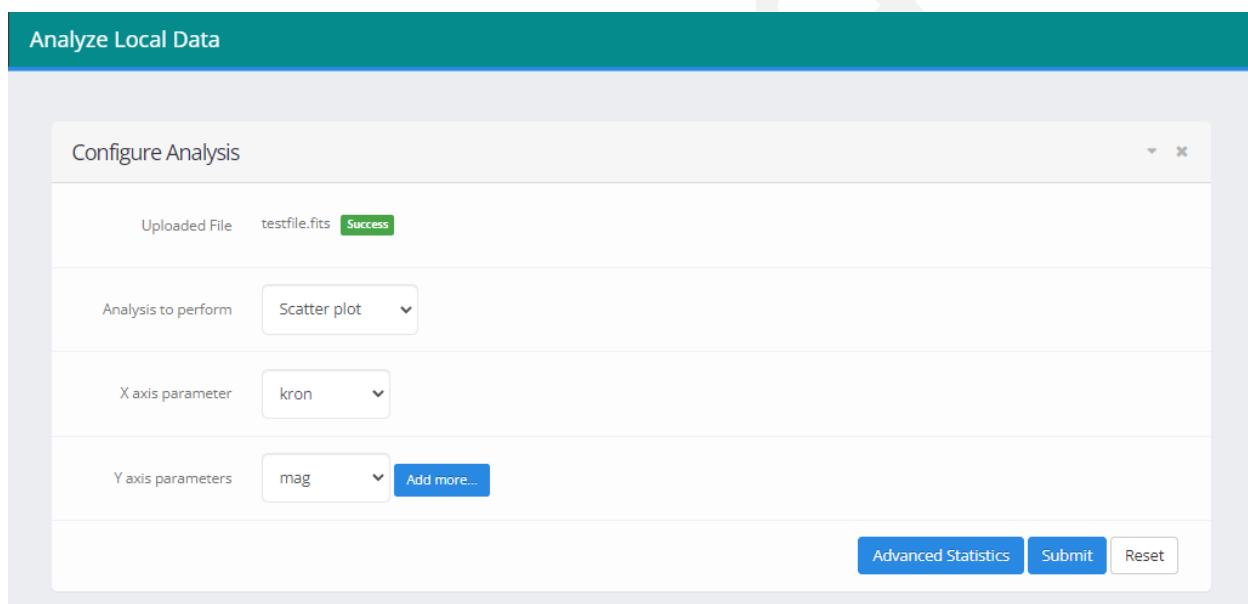


Figure 47: File selection form for "Analyze Local Data" usecase.

Once the file is selected/uploaded, the user can configure the experiment by defining the analysis type, parameter(s) to show, statistics to perform and all the required info for the selected analysis (see Section 5). Fields for parameter configuration are automatically extracted from the selected/uploaded file.

An example of form for trend analysis is shown in Figure 48.



The screenshot shows the 'Analyze Local Data' interface with a teal header bar. Below it is a configuration dialog titled 'Configure Analysis'. The dialog contains the following fields:

- Uploaded File: testfile.fits (Success)
- Analysis to perform: Scatter plot
- X axis parameter: kron
- Y axis parameters: mag (with an 'Add more...' button)
- Buttons at the bottom: Advanced Statistics, Submit, Reset

Figure 48: Example of configuration for local file plot generation. Fields for parameter configuration are automatically extracted from the selected/uploaded file.

10 Flagging system

It is possible to associate a semaphore-like flag to all AIDA products, except for plots generated from local data, by clicking on the related button, located as follows:

- “**Plots**”: Disk icon on the plot navigation bar (Figure 33);
- “**Statistics**”: "Save Statistics" button (Section 6);
- “**Images**”: "Flag image" button (Section 7);
- “**Reports**”: related "Add flag" button in reports lists (Figure 41).

On click, a modal window will open, specific for each product (Figure 49).

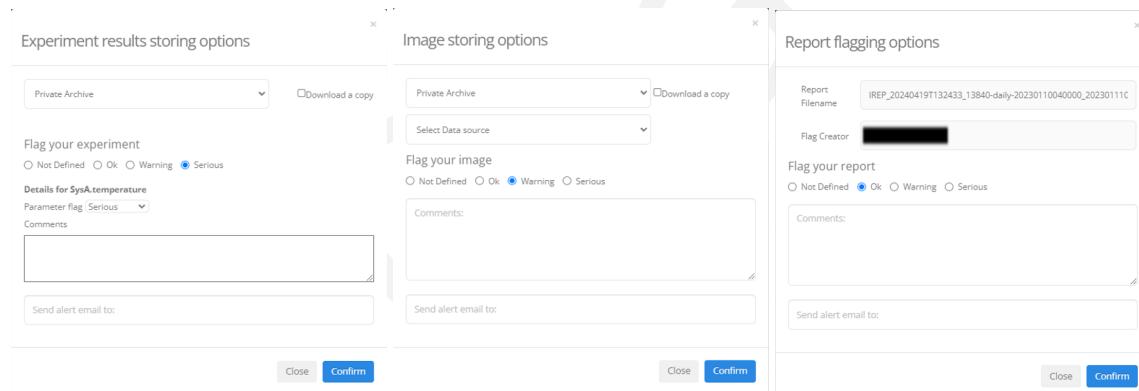


Figure 49: Flags modal window for different products: plots and statistics (**left**), images (**center**), reports (**right**).

Depending on the product, the user can fill the displayed form with some general info (for example if the stored experiment is public or personal) while some other fields are pre-compiled by AIDA (for example the report filename). A copy of the PDF experiment report can be downloaded too, except for reports. Then, it is possible to set the flag, add some comments describing the assigned flag and send an alert e-mail to a potentially interested person (Figure 50). If the product is a plot or a statistical analysis (Figure 49, left panel), it is possible to add a flag and related comment for each involved parameter.



Report flagged



xxxx@xxxxxxxx.xxx

To me ▾

A new report has been flagged in AIDA repository by user User_1.

For additional info, please contact User_1 directly.

Report Name : IREP_20240419T132443_13840-daily-20230111040000_20230112040000_EFD

Status: OK

Comments : Report flag test

Figure 50: Example of flag alert email for reports.

11 Machine Learning integrated tool

According to the wide and always increasing use of data-driven methods to handle and explore huge amounts of multi-dimensional data, a specific analytics module, based on machine/deep learning paradigms and models, is going to be integrated within AIDA, currently still under development and testing. All data (tables/images) available within AIDA local DB can be in principle used as input for training/validation/testing and out-of-sample experiments related to regression, prediction, classification, clustering, dimensional reduction and anomaly detection functional use cases. In order to make the user able to organize the available data as input for such kind of experiments, a number of options are currently under design and/or development:

- Selection and generation of customized thumbnails from available fits images, to provide training/test datasets for supervised/unsupervised deep learning models;
- Selection of columns of tabular data to provide training/test datasets for supervised/unsupervised experiments with machine/deep learning models;
- Selection of dedicated statistical estimators and graphical plots to be automatically generated evaluation criteria for any machine/deep learning experiment (such as confusion matrix for classification tasks and derived statistics);
- Selection of the machine/deep learning model from a list of more than 100 available models, setup and configuration of model hyper-parameters;
- Dedicated help pages dedicated to all available models, including tips for the hyper-parameter setup.

The following figures show what is **currently under development and testing** for the AIDA Machine Learning tool: selection of the model (Figure 51), selection of tabular input data and configuration of model hyper-parameters (Figure 52) and the analysis of the parameter space (Figure 53).

Machine Learning

Model Selection

Machine Learning Model

ARDRegression

OrthogonalMatchingPursuitCV

OutputCodeClassifier

PLSCanonical

PLSRegression

PassiveAggressiveClassifier

PassiveAggressiveRegressor

Perceptron

Pipeline

PoissonRegressor

QuadraticDiscriminantAnalysis

RANSACRegressor

RFE

RFECV

RadiusNeighborsClassifier

RadiusNeighborsRegressor

RandomForestClassifier

RandomForestRegressor

RandomizedSearchCV

RegressorChain

Ridge

Select
Help

Help - RandomForestClassifier

```
Help on class RandomForestClassifier in module sklearn.ensemble._forest:
class RandomForestClassifier(ForestClassifier)
| RandomForestClassifier(n_estimators=100, *, criterion='gini', max_depth=None,
|   min_samples_split=2, min_samples_leaf=1, min_weight_fraction_leaf=0.0,
|   max_features='auto', max_leaf_nodes=None, min_impurity_decrease=0.0,
|   min_impurity_split=None, bootstrap=True, oob_score=False, n_jobs=None,
|   random_state=None, verbose=0, warm_start=False, class_weight=None,
|   ccp_alpha=0.0, max_samples=None)

| A random forest classifier.

| A random forest is a meta estimator that fits a number of decision tree
| classifiers on various sub-samples of the dataset and uses averaging to
| improve the predictive accuracy and control over-fitting.
| The sub-sample size is controlled with the 'max_samples' parameter if
| 'bootstrap=True' (default), otherwise the whole dataset is used to build
| each tree.

| Read more in the User Guide.
```

Figure 51: The panel to select the machine learning model to use and the related help page.

Machine Learning - RandomForestClassifier

Machine Learning

Data source	NISP
Features	GWA-PWA ▾ NIST0257 - PWA Position (degrees from home sensor) Add more... GWA-PWA ▾ NIST0230 - GWA Motor phase B current Remove last... GWA-PWA ▾ NIST0258 - PWA Motor Activated Add more... GWA-PWA ▾ NIST0257 - PWA Motor phase A current Remove last...
Label	NI-CU ▾ NIST0488 - NI-CU LED44 Voltage
Date range (UTC)	<input type="button" value="Previous Month"/> <input type="button" value="Next Month"/>

Configuration of RandomForestClassifier

n_estimators	100
criterion	gini
max_depth	None
min_samples_split	2
min_samples_leaf	1
min_weight_fraction_leaf	0.0
max_features	auto
max_leaf_nodes	None
min_impurity_decrease	0.0
min_impurity_split	None
bootstrap	True
oob_score	False
n_jobs	None
random_state	None
verbose	0
warm_start	False
class_weight	None
ccp_alpha	0.0
max_samples	None

Train - Test Split Percentage of data to be used as Train: 70

Random Seed for the Split None

Submit Reset

Figure 52: Left: the panel to select the input tabular data for machine learning experiments; Right: the panel to configure the model hyper-parameters.



Figure 53: Example of graphical analysis of the parameter space, with respect to the correlation among input features and target labels.

12 Logging system

This is a section dedicated to describe the logging system designed and developed to inform users about the internal status of AIDA and interaction results. The logging system is strictly connected with the handling of all errors generated by AIDA, either in terms of errors due to users and due to internal module operations. At a higher level, since AIDA is a web application, the logging system is based on the message system as provided by Apache. AIDA is provided with a logging system to report different information about its activity. In the current version, three different kinds of logs are available:

1. Reports logging: for each report generation pipeline, a log file is stored, identified by the report runID and reporting the status and the duration of each operation running step. In the log file the tracebacks of eventual run anomalous events (warnings/errors) are also reported, while specific errors about data acquisition and analysis are reported in the generated reports themselves. This logs are available in `<root>/scripts/logs` directory¹¹
2. History: the history of the user actions is stored into the AIDA local DB, as a stack with a limit per user defined by administrator(s) (see Section 4.2.5). Reported actions include:
 - a Login/Logout;
 - b Plot/Statistics/ML experiment status;
 - c Creation of configuration files (both temporary and complete);
 - d Update of configuration files;
 - e Report generation from just a created, already existing or uploaded configuration file;
 - f Pause/Kill/Resume of a report generation (only for administrators);
 - g Operations on images from Image Explorer;
 - h Experiment flagging and storing into AIDA DB.
3. Web App errors: all the errors/warnings generated by the AIDA web application malfunctioning are reported into two kinds of file:
 - a Apache error.log file, for all the errors concerning the server engine;

¹¹It is foreseen to provide a link to report logs in "List Reports" page in a future release

- b) HTML files into the directory scripts/cgi-scripts for all CGI errors related to the client-server interaction with AJAX and Python.

In addition to the logging system, the user action history is displayed on the “History” tab of the user dashboard (Section 4.2.2).

Draft

13 Error handling system

In terms of error handling, the strategy is to distinguish between warnings and errors. The following tables report the error handling lists, divided by functionality.

Draft

13.1 Web Application Navigation

ID	Use case	Action catching error	Error	Handling action	Message	After message	Action location
E-WAN-01	login	user try to login	user not registered	message	Error Logging In! Please retry	Redirect to index	alert box
E-WAN-02	login	user try to login	bad credentials	message	Error Logging In! Please retry	Redirect to index	alert box
E-WAN-03	signup	user try to register	user already exists	message	Registration failed! User already present in AIDA DB. Please, change name and/or e-mail address or contact AIDA admin.		alert box
E-WAN-04	signup, installation	user compiles registration form	not valid email address	error text appears	Please enter a valid email address.		form
E-WAN-05	signup, installation	user compiles registration form	password without a digit or/and an uppercase letter	error text appears	An upper case letter and a digit required		form
E-WAN-06	signup, installation	user compiles registration form	password with length < 8 characters	error text appears	At least 8 characters required		form
E-WAN-07	signup, installation	user compiles registration form	wrong password confirmation	error text appears	Please enter the same value again		form
E-WAN-08	signup, installation	user compiles registration form	wrong captcha	error text appears	Registration failed! Incorrect CAPTCHA		form
E-WAN-09	signup, installation	user try to register	unable to connect to local DB	message	Registration failed! Impossible to connect to database. Please contact AIDA admin	Redirect to index	alert box

ID	Use case	Action catching error	Error	Handling action	Message	After message	Action location
E-WAN-10	dashboard view - tab "Reports"	try to show "Available Reports" tree	unable to connect to local DB	error text appears	Unable to load directory tree. Please retry or contact AIDA admin		text in related div
E-WAN-11	dashboard view - tab "Reports"	try to show "Configuration Files" tree	unable to connect to local DB	error text appears	Unable to load directory tree. Please retry or contact AIDA admin		text in related div
E-WAN-12	dashboard view - tab "Reports"	try to show "Running Reports Generation" table	unable to connect to local DB	error text appears	Unable to retrieve Running Reports data. Please retry or contact AIDA admin		text in related div
E-WAN-15	dashboard view - tab "History"	try to show "User" history tree	unable to connect to local DB	error text appears	Unable to retrieve History data. Please retry or contact AIDA admin.		text in related div
E-WAN-16	dashboard view - tab "History"	try to show "Global" history tree	unable to connect to local DB	error text appears	Unable to retrieve History data. Please retry or contact AIDA admin.		text in related div
E-WAN-17	dashboard view - tab "Stored Experiments"	try to show "Public Archive" table by parameter	unable to connect to local DB	error text appears	Unable to retrieve data. Please retry or contact AIDA admin.		text in related div
E-WAN-18	dashboard view - tab "Stored Experiments"	try to show "Personal Archive" table by parameter	unable to connect to local DB	error text appears	Unable to retrieve data. Please retry or contact AIDA admin.		text in related div
E-WAN-19	dashboard view - tab "Stored Experiments"	try to show "Public Archive" table by experiment	unable to connect to local DB	error text appears	Unable to retrieve data. Please retry or contact AIDA admin.		text in related div
E-WAN-20	dashboard view - tab "Stored Experiments"	try to show "Personal Archive" table by Experiment	unable to connect to local DB	error text appears	Unable to retrieve data. Please retry or contact AIDA admin.		text in related div

ID	Use case	Action catching error	Error	Handling action	Message	After message	Action location
E-WAN-21	dashboard view - tab "Administration - Users"	try to show "Pending Requests" table	unable to connect to local DB	error text appears	Unable to retrieve data. Please retry or contact AIDA admin.		text in related div
E-WAN-22	dashboard view - tab "Administration - Users"	try to show "Active Users" table	unable to connect to local DB	error text appears	Unable to retrieve data. Please retry or contact AIDA admin.		text in related div
E-WAN-23	dashboard view - tab "Administration - Users"	try to show "Deactivated Users" table	unable to connect to local DB	error text appears	Unable to retrieve data. Please retry or contact AIDA admin.		text in related div
E-WAN-24	"View Local Data"	try to show "User Files" table	unable to connect to local DB	error text appears	Unable to retrieve data. Please retry or contact AIDA admin.		text in related div
E-WAN-25	"View Local Data"	try to show "Global Files" table	unable to connect to local DB	error text appears	Unable to retrieve data. Please retry or contact AIDA admin.		text in related div
E-WAN-26	"List Reports"	try to show "Periodic Report List" table	unable to connect to local DB	error text appears	Unable to retrieve Reports data from local DB. Please retry or contact AIDA admin.		text in related div
E-WAN-27	"List Reports"	try to show "On-Demand Report List" table	unable to connect to local DB	error text appears	Unable to retrieve Reports data from local DB. Please retry or contact AIDA admin.		text in related div
E-WAN-28	"Configuration Files"	try to show "Periodic Configuration Files" table	unable to connect to local DB	error text appears	Unable to retrieve Configuration Files data from local DB. Please retry or contact AIDA admin.		text in related div

ID	Use case	Action catching error	Error	Handling action	Message	After message	Action location
E-WAN-29	"Configuration Files"	try to show "On-Demand Configuration Files" table	unable to connect to local DB	error text appears	Unable to retrieve Configuration Files data from local DB. Please retry or contact AIDA admin.		text in related div
E-WAN-30	"Configuration Files"	try to show "Uncompleted Configuration Files" table	unable to connect to local DB	error text appears	Unable to retrieve Configuration Files data from local DB. Please retry or contact AIDA admin.		text in related div
E-WAN-31	"Generate Report"	try to show "Generate Report from Existing Configuration File" table	unable to connect to local DB	error text appears	Unable to retrieve data. Please retry or contact AIDA admin.		text in related div
E-WAN-32	dashboard view - tab "Administration - Users"	administrator inserts wrong password on changing General Settings, Edit Remote Repositories, Edit STMP, Ingestion Settings	wrong password confirmation	message	ERROR! Invalid password		alert box
E-WAN-33	forgot password	user try to reset their password	user not registered	message	ERROR! No user is registered with this email address!	Redirect to index	alert box
E-WAN-34	forgot password	user try to reset their password	user not active	message	ERROR! User is not active	Redirect to index	alert box

ID	Use case	Action catching error	Error	Handling action	Message	After message	Action location
E-WAN-35	forgot password	user try to reset their password	unable to connect to local DB	message	ERROR! Impossible to connect to DB. Please retry in few minutes or contact AIDA Admin!	Redirect to index	alert box
E-WAN-36	forgot password	user try to reset their password	unable to send recovery link by email	message	ERROR! Impossible to send password recovery link. Please, contact AIDA Admin	Redirect to index	alert box
E-WAN-37	forgot password	user try to reset their password	unable to complete request	message	ERROR! Impossible to complete your request. Please, try later or contact AIDA Admin	Redirect to index	alert box
E-WAN-38	password reset	AIDA try to reset user password	unable to connect to local DB	message	ERROR! Impossible to connect to local DB. Please retry or contact AIDA admin.	Redirect to index	alert box
E-WAN-39	dashboard view - tab "Administration - Settings"	administrator try to change operating mode	unable to update	message	ERROR! Impossible to update settings. Please, retry later or contact AIDA Admin.		alert box
E-WAN-40	dashboard view - tab "Administration - Settings"	administrator tries to Export data	unable to export data	message	ERROR! Impossible to create backup file. Please, retry later or contact AIDA Admin		alert box
E-WAN-41	dashboard view - tab "Administration - Settings"	administrator tries to enable/disable system	unable to update settings	message	ERROR! Impossible to update systems enabled. Please retry later or contact AIDA admin		alert box
E-WAN-42	dashboard view - tab "Administration - Settings"	administrator tries to update general settings	unable to update settings	message	Error updating settings! <error description>		alert box

ID	Use case	Action catching error	Error	Handling action	Message	After message	Action location
E-WAN-43	dashboard view - tab "Administration - Settings"	administrator tries to update SMTP settings	unable to update settings	message	Error updating SMTP settings! Impossible to store SMTP configuration file		alert box
E-WAN-44	dashboard view - tab "Administration - Settings"	administrator tries to update ingestion settings	unable to update settings	message	Error updating SMTP settings! Impossible to store Ingestion configuration file		alert box
E-WAN-45	dashboard view - tab "Administration - Settings"	administrator tries to update system settings	unable to update settings	message	Error! Impossible to update configuration file		alert box
E-WAN-46	dashboard view - tab "Administration - Users"	administrator tries to activate/deactivate/remove user	unable to update user status	message	Error! Impossible to complete the requested operation		alert box
E-WAN-47	dashboard view - tab "Administration - Settings"	administrator changes settings in "General Settings" and submits	a field is not filled	error text appears	This field is required.		form
E-WAN-48	dashboard view - tab "Administration - Settings"	administrator changes "Communication E-mail" in "General Settings" and submits	wrong e-mail(s) format	error text appears	Please, enter valid email addresses separated by commas		form

ID	Use case	Action catching error	Error	Handling action	Message	After message	Action location
E-WAN-49	dashboard view - tab "Administration - Settings"	administrators changes "History records per user" in "General Settings"	inserted number less than 0	error text appears	Please enter only digits.		form
E-WAN-50	dashboard view - tab "Administration - Settings"	administrators changes "Processors per system" in "General Settings"	inserted number less than 1	error text appears	Please enter a value greater than or equal to 1.		form

Table 3: Web Application Navigation errors

ID	Use case	Action catching error	Error	Handling action	Message	After message	Action location
I-WAN-01	dashboard view - tab "Administration - Settings"	administrator try to change operating mode	submission without changing operating mode	message	INFO: Operating mode unchanged. Nothing to do.		alert box
I-WAN-02	dashboard view - tab "Administration - Settings"	user try to Export data	impossible to store operation to history	message	impossible to store operation to history		alert box
I-WAN-03	dashboard view - tab "Administration - Settings"	user try to Export data without selecting any items	no item selected	message	Nothing to backup. Please, select at least one item to backup		alert box

ID	Use case	Action catching error	Error	Handling action	Message	After message	Action location
I-WAN-04	dashboard view - tab "Administration - Settings"	administrator tries to update system settings without changing any items	no item selected	message	INFO: Systems unchanged. Nothing to do		alert box
I-WAN-05	dashboard view - tab "Administration - Settings"	administrator tries to update general settings without changing any items	no item selected	message	INFO: Systems unchanged. Nothing to do		alert box
I-WAN-06	dashboard view - tab "Administration - Settings"	administrator tries to update system settings	impossible to store operation to history	message	Impossible to store the operation in History		alert box

Table 4: Web Application Navigation info

ID	Use case	Action catching error	Error	Handling action	Message	After message	Action location
W-WAN-01	signup	user try to register	unable to send confirmation email	message	WARNING! Your request has been successfully submitted but it is not possible to access to the mail server. Please, directly contact AIDA admin to check your request	Redirect to index	alert box
W-WAN-02	dashboard view - tab "Administration - Settings"	user try to Export data	export completed but missing stored items	message	WARNING! Backup file has been generated but the following items have been not exported: <list of missing items>		alert box

Table 5: Web Application Navigation warnings

13.2 Plots Generation

ID	Use case	Action catching error	Error	Handling action	Message	After message	Action location
E-PG-01	trend / scatter /histogram / statistics / machine learning	user fills configuration form and submit	user does not fill a required field	error text appears	This field is required		form
E-PG-02	trend / scatter /histogram / statistics / machine learning	user fills configuration form and submit	user fills a field with a value having not allowed format	error text appears	This field must be <right format>		form
E-PG-03	trend / scatter /histogram / statistics / machine learning	user fills configuration form and submit	user fills a field with a value having not allowed format	error text appears	message with instructions on right format		form
E-PG-04	trend / scatter /histogram / statistics / machine learning	user fills configuration form and submit	AIDA configuration files are not in JSON format	message	ERROR! Unable to read configuration file. Please contact AIDA admin		alert box
E-PG-05	trend / scatter /histogram / statistics / machine learning	user fills configuration form and submit	AIDA configuration files are not in properly set	message	ERROR! Unable to read configuration file. Please contact AIDA admin		alert box
E-PG-06	trend / scatter /histogram / statistics / machine learning	user fills configuration form and submit	unable to connect to local DB	message	ERROR! Unable to connect to AIDA local database. Please retry or contact AIDA admin		alert box

ID	Use case	Action catching error	Error	Handling action	Message	After message	Action location
E-PG-07	trend / scatter /histogram / statistics / machine learning	plot generation	unable to connect to remote DB	message	ERROR! Unable to connect to remote database. Please retry or contact AIDA admin		alert box
E-PG-08	trend / scatter /histogram / statistics / machine learning	plot generation offline	unable to store plot into local DB	mail	subject: ATTENTION: Failed <plot> generation. In text also reported : "Impossible to store data in local DB"		mail
E-PG-09	trend / scatter /histogram / statistics / machine learning	user tries to download csv file	unable to download	message	Error! Impossible to download file. Please, retry later or contact AIDA admin		alert box
E-PG-10	trend / scatter /histogram / statistics / machine learning	user tries to display image in Image explorer by using links in "Files" tab	unable to download image	message	ERROR! Impossible to download image from repository		alert box
E-PG-11	trend / scatter /histogram / statistics / machine learning	user fills configuration form and submit	user selects "Aggregated" both for CCD row and CCD col fields	error text appears	Aggregate option not allowed for both coord at the same time		form
E-PG-12	trend / scatter /histogram / statistics / machine learning	user fills configuration form and submit	wrong format for PID extra filter field	error text appears	This field must be a sequence of integer numbers separated by return		form

ID	Use case	Action catching error	Error	Handling action	Message	After message	Action location
E-PG-13	trend / scatter /histogram / statistics / machine learning	user fills configuration form and submit	user sets End Date equal to Start Date	error text appears	End Date must be greater than Start Date		form
E-PG-14	trend / scatter /histogram / statistics / machine learning	user fills configuration form and submit	wrong format for "coeff" field	error text appears	Invalid format. Only single integer >0, comma separated integers >0 or range of integers >0 (a-b) are allowed		form
E-PG-15	trend / scatter /histogram / statistics / machine learning	plot generation	unable to get metadata from remote DB	message	ERROR! Impossible to query remote archive to get metadata		alert box

Table 6: Plot Generation errors

ID	Use case	Action catching error	Error	Handling action	Message	After message	Action location
I-PG-01	trend / scatter /histogram / statistics / machine learning	plot submission	date range is larger than defined settings	message	Data range is too large to compute online. An email will be send when analysis is completed		alert box
I-PG-02	trend / scatter /histogram / statistics / machine learning	plot generation	no data to plot	message	No available data for requested period		alert box

ID	Use case	Action catching error	Error	Handling action	Message	After message	Action location
I-PG-03	trend / scatter /histogram / statistics / machine learning	plot generation	impossible to store operation to history	message	Impossible to store the operation in History		alert box
I-PG-04	view offline plot	page loading	user not logged on the web app	message	You must be logged to view plot. Please, login in a separate tab and then refresh this page.		text in related div
I-PG-04	view image analysis	page loading	user not logged on the web app	message	You must be logged to view results. Please, login in a separate tab and then refresh this page.		text in related div
I-PG-05	view image analysis	page loading	experiment expiration date has passed	message	No data to display. Expiration date has passed.		alert box

Table 7: Plot Generation info

ID	Use case	Action catching error	Error	Handling action	Message	After message	Action location
W-PG-01	trend / scatter /histogram	user fills configuration form and submit	user does not choose any statistical function in "Advanced Statistics"	message	No statistical operation selected! Proceed anyway?		alert box
W-PG-02	trend / scatter /histogram / statistics / machine learning	plot generation	unable to connect to remote files archive by FTP	message	WARNING! Unable to download files by FTP. Analysis could be incomplete. Please, check connection parameters or contact AIDA admin.		alert box

ID	Use case	Action catching error	Error	Handling action	Message	After message	Action location
W-PG-03	trend / scatter /histogram / statistics / machine learning	plot generation	unable to download remote files by FTP	message	WARNING! One or more files cannot be downloaded. Analysis could be incomplete		alert box
W-PG-04	trend / scatter /histogram / statistics / machine learning	plot generation	file cannot be opened to get data	message	WARNING! One or more files cannot be opened. Analysis could be incomplete		alert box

Table 8: Plot Generation warnings

13.3 Report Generation

ID	Use case	Action catching error	Error	Handling action	Message	After message	Action location
E-RG-01	report generation by editor/update config file	configuration file validation	missing configuration filename	error text appears	This field is required.		form
E-RG-02	report generation by upload	upload file confirmation	uploaded file is not with allowed extension	message	Impossible to upload file! Extension not allowed: <filename>(<extension type>)		alert box
E-RG-03	report generation by upload	upload file confirmation	file not uploaded	message	Unable to upload the file. Try later. If the problem persists please contact AIDA admin.		alert box
E-RG-04	report generation by upload	upload file confirmation	configuration data not stored in local DB	message	Impossible to store configuration data in the local DB. Try later. If the problem persists please contact AIDA admin.		alert box

ID	Use case	Action catching error	Error	Handling action	Message	After message	Action location
E-RG-05	report generation by upload-/configuration file creation by editor/update config file	configuration file validation	config file not valid JSON	message	JSON Error! The configuration is not a valid JSON text		alert box
E-RG-06	report generation by upload-/configuration file creation by editor/update config file	configuration file validation	config file not valid GENERAL INFO	message	Value Value Error! Error reading "General Info" data. Please check the syntax and required keys		alert box
E-RG-07	report generation by upload-/configuration file creation by editor/update config file	configuration file validation	config file DATES for on-demand report are greater than today	message	Value Error! Start date and/or calculated stop date must be before today. Please check.		alert box
E-RG-08	report generation by upload-/configuration file creation by editor/update config file	configuration file validation	config file contains empty branches	message	ERROR! Branch <hktm/science if applicable> for system <system> is empty. Please, remove it from configuration file.		alert box

ID	Use case	Action catching error	Error	Handling action	Message	After message	Action location
E-RG-09	report generation by upload-/configuration file creation by editor/update config file	configuration file validation	config file not valid SYSTEMS	message	Key Error! <system_name> is not an allowed key		alert box
E-RG-10	report generation by upload-/configuration file creation by editor/update config file	configuration file validation	config file not valid HKTM-/SCIENCE origin	message	Key Error! <origin_name> is not an allowed key for system <system_name>		alert box
E-RG-11	report generation by upload-/configuration file creation by editor/update config file	configuration file validation	config file not valid detector (when applicable)	message	Key Error! Invalid syntax <detector> as Detector key in: <system>/<origin>		alert box
E-RG-12	report generation by upload-/configuration file creation by editor/update config file	configuration file validation	config file not valid subsystem (when applicable)	message	Key Error! '<subsystem>' is not an allowed key for system ' <system>'		alert box

ID	Use case	Action catching error	Error	Handling action	Message	After message	Action location
E-RG-13	report generation by upload-/configuration file creation by editor/update config file	configuration file validation	missing required keys in experiment configuration (for example type of analysis)	message	Key Error "<key>" not found in <branch>		alert box
E-RG-14	report generation by upload-/configuration file creation by editor/update config file	configuration file validation	missing required settings (for example, X key for scatter plot, Bin Size/Number of Bins for histogram)	message	Missing required parameters in <branch>		alert box
E-RG-15	report generation by upload-/configuration file creation by editor/update config file	configuration file validation	required settings not allowed	message	Unrecognized filter "<wrong filter>" in <branch>		alert box
E-RG-16	report generation by upload-/configuration file creation by editor/update config file	configuration file validation	missing required "Parameters" section for statistical functions	message	Missing required "Parameters" section in <branch>		alert box

ID	Use case	Action catching error	Error	Handling action	Message	After message	Action location
E-RG-17	report generation by upload-/configuration file creation by editor/update config file	configuration file validation	config file not valid parameter	message	Key Error! '<parameter>' is not an allowed key for <system>/<origin>		alert box
E-RG-18	report generation by upload-/configuration file creation by editor/update config file	configuration file validation	config file not valid "Operation" key	message	Key Error! Invalid syntax for one or more "Operation" keys in <branch>		alert box
E-RG-19	report generation by upload-/configuration file creation by editor/update config file	configuration file validation	config file not valid plot	message	Value Error! "Type" value not allowed in <branch>		alert box
E-RG-20	report generation by upload-/configuration file creation by editor/update config file	configuration file validation	invalid format for required settings	message	Value Error! "<required>" is not <right_format> in <branch>		alert box

ID	Use case	Action catching error	Error	Handling action	Message	After message	Action location
E-RG-21	report generation by upload-/configuration file creation by editor/update config file	configuration file validation	invalid format for additional parameters list	message	Value Error! "Additional Parameters" value must be a list in <branch>		alert box
E-RG-22	report generation by upload-/configuration file creation by editor/update config file	configuration file validation	invalid additional parameter	message	Value Error! One or more "Additional Parameters" in <branch> are not allowed		alert box
E-RG-23	report generation	launch/resume run report	unable to reconnect to local DB	message	ERROR! Impossible to start report generation.Impossible to connect to local DB. Please, contact AIDA admin		alert box
E-RG-24	report generation	report running	unable to connect to local DB	message	Impossible to connect to local DB		XML - PDF error list
E-RG-25	report generation	report running	unable to get metadata from remote DB	message	Impossible to download file list from remote DB for dates in <date_range>		XML - PDF error list
E-RG-26	report generation	report running	xml not created	mail	subject: ATTENTION: Failed <period> report generation. In text also reported : "No XML report generated"		email

ID	Use case	Action catching error	Error	Handling action	Message	After message	Action location
E-RG-27	report generation	report running	all analysis for a specific <system> cannot be performed during xml generation	message	Impossible to store results in XML file. Analysis cannot be performed.		XML - PDF error list
E-RG-28	report generation	report running	During xml generation, missing connection to local DB for all processes	message	Impossible to connect to retrieved data. Analysis can not be performed		XML - PDF error list
E-RG-29	kill/pause report	report stopping	unable to connect to local DB	message	Impossible to stop report <id>. ERROR : Impossible to connect to local DB. Please, contact AIDA admin		alert box
E-RG-30	kill/pause report	report stopping	unable to stop process	message	Impossible to stop report <id>. ERROR : Impossible to stop process with PID = <pid>. Please, contact AIDA admin		alert box
E-RG-31	re-enabling ingestion	administrator try to re-enable ingestion for a report	AIDA can not update local DB	message	Error! Impossible to re-enable to ingestion Report <report name>		alert box
E-RG-32	configuration file deletion	user try to delete report configuration file	unable to delete file	message	Error deleting file <filename> : <error> SQL: <query> PATH: <filepath>		alert box

ID	Use case	Action catching error	Error	Handling action	Message	After message	Action location
E-RG-33	report generation by upload-/configuration file creation by editor/update config file	configuration file validation	invalid format for Time Window	message	"Time Window" Type Error! Input value is not a number		alert box
E-RG-34	report generation by upload-/configuration file creation by editor/update config file	configuration file validation	Invalid Sampling value	message	Value Error! Not allowed value for "Sampling"		alert box
E-RG-35	report generation by upload-/configuration file creation by editor/update config file	configuration file validation	Invalid Start Time format	message	Date Format Error! Incorrect date format, should be yyyy-mm-ddThh:mm:ss		alert box
E-RG-36	report generation by upload-/configuration file creation by editor/update config file	configuration file validation	"Time Window" is less or equal to 0	message	"Time Window" Value Error! Input values is not greater than 0		alert box

ID	Use case	Action catching error	Error	Handling action	Message	After message	Action location
E-RG-37	report generation by existing config file	configuration file validation	configuration file not created for current operating mode	message	Error! Impossible to use config file in current Operating Mode<current opmode>. Configuration file created for <config file opmode> Operating Mode		alert box
E-RG-38	report ingestion	user tries to ingest report to EAS	impossible to ingest	message	Error! Impossible to store report into remote archive. Please retry or contact IOT team.		alert box
E-RG-39	report ingestion	user tries to ingest report to EAS	impossible to create metadata xml	message	Error! Impossible to create metadata XML. Please contact IOT Team.		alert box
E-RG-40	report ingestion	user tries to ingest report to EAS	impossible to upload reports file	message	Impossible to ingest reports files. Please contact IOT Team		alert box
E-RG-41	report ingestion	user tries to ingest report to EAS	impossible to ingest metadata xml	message	ERROR! Impossible to ingest XML file		alert box

Table 9: Report Generation errors

ID	Use case	Action catching error	Error	Handling action	Message	After message	Action location
W-RG-01	report generation by upload-configuration file creation by editor	configuration file validation	uploaded filename already exists	message	A file with name '<filename>' already exists. The new file has been changed in <filename>_<current_datetime>		alert box

ID	Use case	Action catching error	Error	Handling action	Message	After message	Action location
W-RG-02	report generation	report running	unable to download data files from remote DB (data from file branch)	message	Impossible to download one or more files from data DB. Analysis could be incomplete		XML - PDF error list
W-RG-03	report generation	report running	unable to read data from downloaded files (data from file branch)	message	Impossible to read one or more data files. Analysis could be incomplete		XML - PDF error list
W-RG-04	report generation	report running	unable to connect to remote data db (data from db branch)	message	Impossible to connect to remote DB for dates in <date range>		XML - PDF error list
W-RG-05	report generation	report running	unable to read data from remote DB (data from DB branch)	message	Impossible to read data from remote DB. Analysis could be incomplete.		XML - PDF error list
W-RG-06	report generation	report running	pdf not created	mail	PDF version is not available. Contact AIDA admin for further info.		email

ID	Use case	Action catching error	Error	Handling action	Message	After message	Action location
W-RG-07	report generation	report running	some analysis for a specific <system> cannot be performed during xml generation	message	Impossible to store some results in XML file. Analysis could be incomplete.		XML - PDF error list
W-RG-08	report generation	report running	During xml generation, missing connection to local DB for some processes	message	Impossible to connect to some retrieved data. Analysis could be incomplete.		XML - PDF error list
W-RG-09	report generation	report running	no data for a key parameter	message	No data available for parameter <parameter> during acquisition #<acquisition>		XML - PDF error list
W-RG-10	report generation	report running	no data for X parameter for scatter plot	message	Parameter : <key parameter>. 'X' parameter has no data available for Acquisition #<acquisition>, Operation #<operation_id>		XML - PDF error list
W-RG-11	report generation	report running	a parameter has out-of-range values	message	<out-of-range number> values out of range for parameter <parameter> during acquisition #<acquisition>		XML - PDF error list

ID	Use case	Action catching error	Error	Handling action	Message	After message	Action location
W-RG-12	report generation	report running	no data for an additional parameter	message	Parameter : <key parameter>. One or more additional parameters have no data available for Acquisition #<acquisition>, Operation #<operation_id>		XML - PDF error list
W-RG-13	report generation	report running	one of the foreseen plots for an operation cannot be produced	message	Impossible to generate all the foreseen <plot type plots> for Parameter <parameter>, Acquisition #<acquisition>, Operation #<operation_id>		XML - PDF error list
W-RG-14	report generation	report running	impossible to perform a statistical analysis	message	Impossible to perform Operation #<operation_id> for parameter <parameter>, Acquisition #<acquisition>		XML - PDF error list
W-RG-15	kill/pause report	report stopping	report stopped but some subprocesses still running	message	Report generation <id> stopped. WARNINGS : Subprocesses with pids = <pid> are still running. Please, contact AIDA admin		alert box
W-RG-16	kill/pause report	report stopping	report stopped but it's impossible to remove temporary data from DB	message	Report generation <id> stopped. WARNINGS : Impossible to remove temporary data from local DB. Please, contact AIDA admin		alert box

ID	Use case	Action catching error	Error	Handling action	Message	After message	Action location
W-RG-17	kill/pause report	report stopping	report stopped but it's impossible to remove temporary directory	message	Report generation <id> stopped. WARNINGS : Impossible to remove report temporary directory. Please, contact AIDA admin		alert box
W-RG-18	kill/pause report	report stopping	report stopped but it's impossible change configuration file status from running to idle	message	Report generation <id> stopped. WARNINGS : Impossible to update config file status. Please, contact AIDA admin		alert box
W-RG-19	kill/pause report	report stopping	report stopped but it's impossible update running reports table	message	Report generation <id> stopped. WARNINGS : Impossible to update running reports status. Please, contact AIDA admin		alert box
W-RG-20	report ingestion	user tries to ingest report to EAS	report ingestion ok, but files could have not been uploaded	message	WARNING! Something has gone wrong during ingestion, but data could be successfully uploaded. Please check or contact IOT team.		alert box

ID	Use case	Action catching error	Error	Handling action	Message	After message	Action location
W-RG-21	report ingestion	user tries to ingest report to EAS	report ingestion ok, but one or more files have not been uploaded	message	Warning! Report ingested but one or more files could not be uploaded		alert box

Table 10: Report Generation warnings

13.4 Flagging

ID	Use case	Action catching error	Error	Handling action	Message	After message	Action location
E-FLA-001	image flagging	submitting image flag	flag not assigned	message	Impossible to store image into the AIDA archive. Please retry later or contact AIDA admin		alert box
E-FLA-002	report flagging	submitting report flag	flag not assigned	message	Impossible to flag report into the AIDA archive. Please retry later or contact AIDA admin.		alert box

Table 11: Flagging errors

ID	Use case	Action catching error	Error	Handling action	Message	After message	Action location
I-FLA-001	image flagging	submitting image flag	impossible to send email to contact person	message	Image has been successfully stored into the AIDA archive but it is impossible to send an email to: <email>		alert box

ID	Use case	Action catching error	Error	Handling action	Message	After message	Action location
I-FLA-002	image/report flagging	storing operation in history	Impossible to store the operation in History	message	Impossible to store the operation in History		alert box
I-FLA-003	report flagging	submitting report flag	impossible to send email to contact person	message	Report has been successfully stored into the AIDA archive but it is impossible to send an email to: <email>		alert box

Table 12: Flagging info

13.5 Analyze Local Data

ID	Use case	Action catching error	Error	Handling action	Message	After message	Action location
E-ALD-01	file upload	user tries to upload not FITS or CSV file	file format not allowed	message	Error! Impossible to upload the file	page reloaded	alert box
E-ALD-02	file upload	user tries to upload a file with right format but indicating another file type	wrong file format	message	Error! Impossible to upload the file	page reloaded	alert box
E-ALD-03	file upload	user tries to upload file	impossible to server to load file	message	Error! Impossible to upload the file	page reloaded	alert box
E-ALD-04	file upload	user uploads empty file	empty file	message	Error! No data in uploaded file	page reloaded	alert box

ID	Use case	Action catching error	Error	Handling action	Message	After message	Action location
E-ALD-05	analysis from local file	user fills configuration form and submit	user does not fill a required field	error text appears	This field is required		form
E-ALD-06	analysis from local file	user fills configuration form and submit	All data of a selected column are NULL or strings	message	No data to plot! Data are NULL or STRINGS		alert box

Table 13: Analyze Local Data errors

ID	Use case	Action catching error	Error	Handling action	Message	After message	Action location
I-ALD-01	load local data	user does not select file to load	no file selected	message	Please, select a valid file		alert box

Table 14: Analyze Local Data info

ID	Use case	Action catching error	Error	Handling action	Message	After message	Action location
W-ALD-01	file upload	user uploads file	impossible to store file info into local DB	message	Warning! File has been uploaded, but it is impossible to store it in the local temporary files DB.		alert box
W-ALD-02	file upload	user uploads an already existing file	file already uploaded	message	Warning! A file with name <filename> already exists in local temporary files. It has been overwritten.		alert box

Table 15: Analyze Local Data warnings

13.6 Web Application Installation

ID	Use case	Action catching error	Error	Handling action	Message	After message	Action location
E-WAI-01	installation	user try to upload backup file	uploaded file is not a valid tar.gz	message	ERROR! Uploaded file is not a valid tar.gz		alert box
E-WAI-02	installation	user try to import data from uploaded backup file	impossible to read backup file or to import all the data	message	ERROR! Impossible to import data from backup file. Please, retry later or contact AIDA Admin.		alert box
E-WAI-03	installation	user try to import data from uploaded backup file	general communication error between frontend and back-end	message	ERROR! Something has gone wrong. Impossible to finalize installation. Please, retry or contact AIDA staff.		alert box
E-WAI-07	installation	user submits Mail server configuration form	inserted data are not correct	message	ERROR! SMTP connection check failed. Please check your settings.		alert box
E-WAI-04	installation	user submits Mail server configuration form	smtp configuration file creation fails	message	Error storing SMTP data. Please retry or contact AIDA support team.		alert box
E-WAI-05	installation	user tries to abort installation	impossible to restore initial AIDA configuration	message	ERROR! Impossible to restore application. You can start a brand new installation to overwrite stored settings.		alert box
E-WAI-06	installation	user confirm account activation by email link	impossible to activate user	message	ERROR! Impossible to activate user. Please contact AIDA support team.		alert box

ID	Use case	Action catching error	Error	Handling action	Message	After message	Action location
E-WAI-07	installation	user try to install web app	unable to connect to local DB	message	ERROR! Impossible to connect to local database. Installation aborted		alert box

Table 16: Web Application Installation errors

ID	Use case	Action catching error	Error	Handling action	Message	After message	Action location
I-WAI-01	installation	user try to import data from uploaded backup file	user does not select any section	message	Nothing to import. Please, select at least one item to import.		alert box
I-WAI-02	installation	user try to import data from uploaded backup file	user does not select "Users" section to import	message*	<default message success/import> + INFO : No Users data imported. You will have to set the first Administrator in the following steps.		alert box
I-WAI-03	installation	user try to import data from uploaded backup file	user does not select "SMTP settings" section to import	message*	<default message success/import> + INFO : No SMTP server settings imported. You will have to set it in the following steps.		alert box
I-WAI-04	installation	administrator tries to install while at the same time another administrator has started installation procedure	installation already started	message	Installation process already completed while this windows was open. Redirecting...	Redirect to index	alert box

Table 17: Web Application Installation info.

*both in case of success and warning import

ID	Use case	Action catching error	Error	Handling action	Message	After message	Action location
W-WAI-01	installation	user try to import data from uploaded backup file	some data can not be imported	message	WARNING! Data import has been completed but the following items have been not imported: <list of not imported sections>		alert box
W-WAI-02	installation	user try to import data from uploaded backup file	"Users" section is not available in backup file	message	Missing Users data. Once import is completed, you should register the first admin. Proceed anyway?	wait for confirm	alert box
W-WAI-03	installation	user confirm account activation by email link	impossible to set notification email	message	WARNING! Impossible to set notification email. You can set it from admin dashboard successively.		alert box
W-WAI-04	installation	user sets info for first admin registration	impossible to set notification email	message	WARNING! Impossible to set notification email. You can set it from admin dashboard successively. Now you can close this page.		alert box

Table 18: Web Application Installation warnings

APPENDIX

A docker-compose

```

version: "2.4"

services:
  ioda:
    image: httpd
    build: .
    ports:
      - "HostAidaPort:80"
    command: apache2ctl -D FOREGROUND
    volumes:
      - YourLocalAidaCodeDirectory:/var/www/html/aida
    links:
      - "db:mysql-aida"
    environment:
      UPLOAD_LIMIT: 10G
    cpus: numberOfCpusThatYouWantToDedicateToAida

  db:
    image: mysql:8.0.31
    hostname: mysql-aida
    command: --default-authentication-plugin=mysql_native_password
    --sql-mode=STRICT_TRANS_TABLES,NO_ZERO_IN_DATE,NO_ZERO_DATE,ERROR_FOR_DIVISION_BY_ZERO,
    NO_ENGINE_SUBSTITUTION --max_connections=1000
    security_opt:
      - seccomp:unconfined
    restart: always
    volumes:
      - YourLocalAidaDbDirectory:/var/lib/mysql
    environment:
      - MYSQL_ALLOW_EMPTY_PASSWORD=1
      #- MYSQL_RANDOM_ROOT_PASSWORD=1
    ports:
      - "HostDBPort:3306"

```

```
dbfake:  
  image: mysql:8.0.31  
  hostname: aida-fake  
  command: --default-authentication-plugin=mysql_native_password --sql-mode=STRICT_TRANS_TABLES  
  security_opt:  
    - seccomp:unconfined  
  environment:  
    - MYSQL_ALLOW_EMPTY_PASSWORD=1  
  restart: always  
  volumes:  
    - YourLocalFakeDataDbDirectory:/var/lib/mysql  
  ports:  
    - "3307:3306"  
  expose:  
    - 3307  
  cpus: 1
```

B Dockerfile

```
FROM httpd:bullseye

RUN apt-get update && apt-get install -y \
php \
libapache2-mod-php \
php-mysql \
php7.4-gd \
python3 \
python3-pip \
python-is-python3 \
saods9 \
xvfb

RUN a2enmod cgid

RUN phpenmod mysqli

RUN pip3 install \
astropy==4.2.1 \
certifi==2021.10.8 \
cffi==1.14.5 \
charset-normalizer==2.0.7 \
cryptography==3.4.7 \
cssselect2==0.4.1 \
cyclone==0.10.0 \
DBUtils==2.0.1 \
h5py==3.2.1 \
idna==3.3 \
joblib==1.0.1 \
kiwisolver==1.3.1 \
lxml==4.6.3 \
matplotlib==3.4.1 \
memory-profiler==0.58.0 \
numpy==1.20.2 \
```

```
Pillow==8.2.0 \
psrecord==1.2 \
psutil==5.8.0 \
pycparser==2.20 \
pyerfa==1.7.2 \
PyMySQL==1.0.2 \
pyparsing==2.4.7 \
pypdf2==3.0.1 \
python-dateutil==2.8.1 \
reportlab==3.5.67 \
requests==2.26.0 \
scikit-learn==0.24.1 \
scipy==1.6.2 \
six==1.15.0 \
sklearn==0.0 \
svglib==1.1.0 \
threadpoolctl==2.1.0 \
tinycc==1.1.0 \
urllib3==1.26.7 \
webencodings==0.5.1
```

```
COPY apache2.conf /etc/apache2/apache2.conf
COPY php.ini /etc/php/7.4/apache2/php.ini
RUN export DISPLAY=:1
RUN Xvfb :1 -screen 0 1024x768x16 &
```

```
EXPOSE 80
EXPOSE 3306
```

```
CMD apache2ctl -D FOREGROUND
```

C Troubleshooting

- If AIDA is installed in a Virtual Machine the URL sent from AIDA will be meaningless if used outside from the VM itself;
- If AIDA is installed behind a firewall that blocks its port the URL sent from AIDA could be accessed only from machine behind the firewall;
- We noticed that if Podman is used in the place of Docker it could happen that the alias of the machine could be wrong, in this case you should replace the name of the db in the config.json file in the main root of AIDA:

```
"host" : "mysql-aida",
```

should become:

```
"host" : "db",
```

- AIDA needs to open some pop-up windows during data exploration. Enable pop-up windows for AIDA website in your browser.
- After the update to a new version, it could be necessary to refresh the browser cache to make the changes effective.

END OF DOCUMENT