

DITIS Application Manual

Version 1.0

Data Intensive Computing Research Lab

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1 Introduction

Welcome to the DITIS Application User Manual. This guide is designed to help you understand and effectively use DITIS Application, ensuring you get the most out of its features

1.1 Purpose of the Manual

] The purpose of this manual is to provide comprehensive instructions on the setup and operation of DITIS Application. Whether you are a new user or looking to enhance your skills, this manual offers detailed information to assist you.

1.2 Intended Audience

The manual is intended only for DITIS users who want to optimize and understand their storage systems. A basic understanding of how DITIS framework works is recommended.

1.3 How to Use This Manual

The manual is structured to guide you through each aspect of DITIS Application, from initial setup to advanced operations. Each section is organized to provide step-by-step instructions, supported by illustrations.

1.4 Contact Information

For additional support, visit the DITIS website at <https://dicl.cut.ac.cy> or contact Herodotos Herodotou at herodotos.herodotou@cut.ac.cy .

2 Getting Started

2.1 Installation and Setup

1. Open the Ditis Setup 1.0.0 application
2. The installer will start automatically, as shown in Figure 1

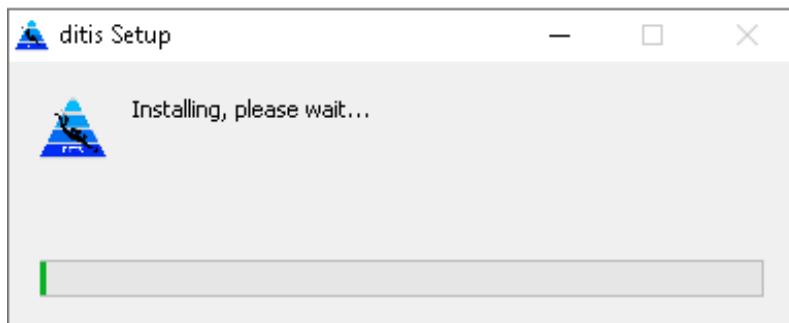


Figure 1: DITIS Setup

3. Once the installer has completed, the application will automatically open.

2.2 Initial Configuration

2.2.1 Online Mode

Adding a server

To use the Application, a server must be added. There are 3 steps involved:

1. Step 1 is entering the server address. All types of addresses are supported (http,https). Once the address is entered, click the **Ping Server** as shown in figure 5. If the server is found, then the popup in Figure 2, otherwise an error is shown like in Figure 3.

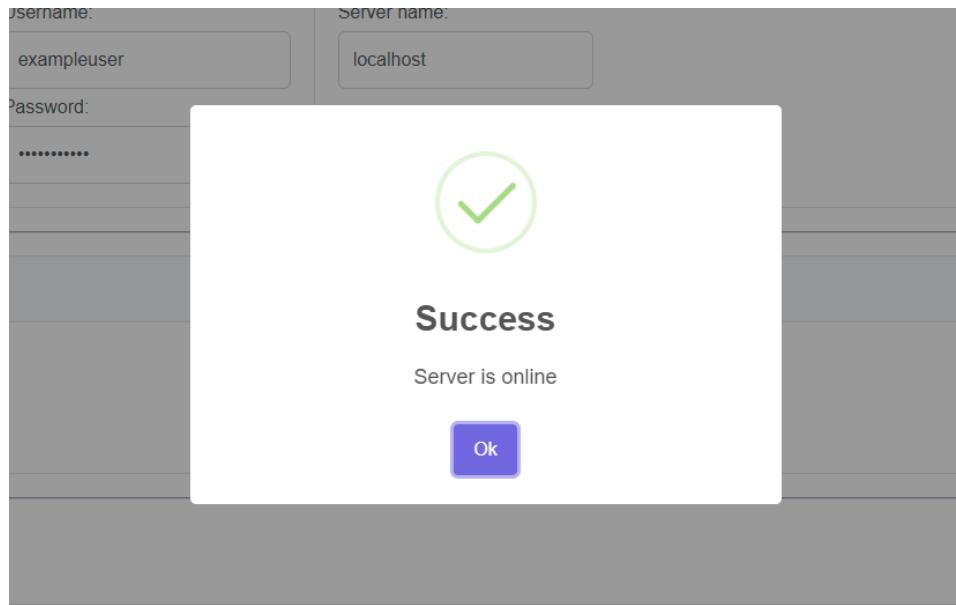


Figure 2: Successfully found server

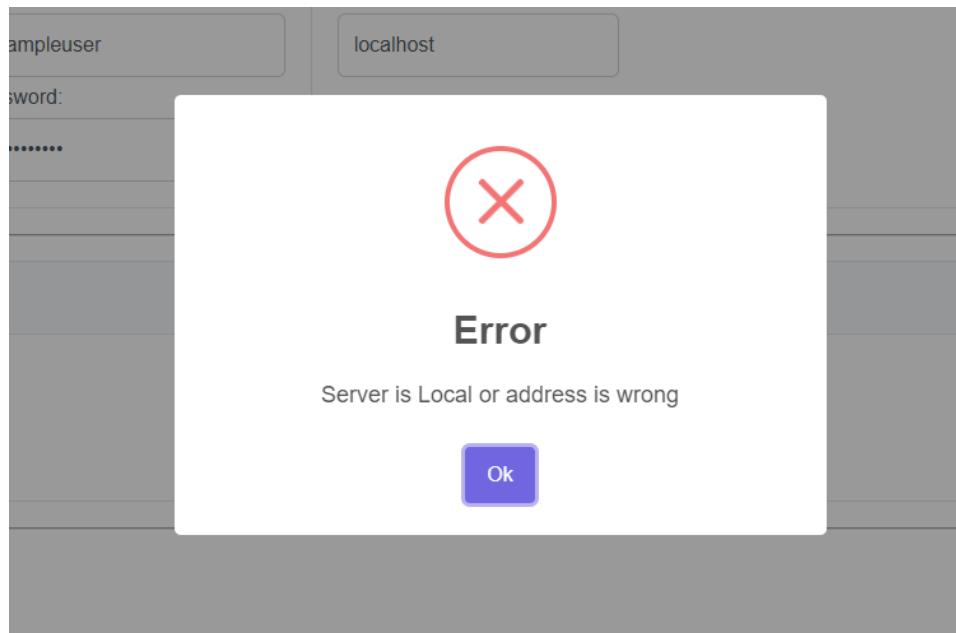


Figure 3: Failed to find server

2. The next step (2) is creating an account, or logging into an already existing account if one was provided to you. Simply, fill in the fields found in the Step 2 section of the form.

3. The final step is entering a name for the server. This is entirely user preference and can be anything.

Once the form is filled out, simply click the **Add** button. If the username and password are correct, you will be logged in. If no account is found, you will be prompted to create an account.

The screenshot shows a three-step form titled "Add new server".
Step 1: Server address: A text input field containing "http://localhost:443". Below it is a blue "Ping Server" button.
Step 2: Username: A text input field containing "exampleuser".
Step 3: Server name: A text input field containing "localhost".
A large blue "Add" button is located at the bottom right of the third step.

Figure 4: Adding a server

The screenshot shows the same three-step form as Figure 4, but with a cursor pointing at the "Ping Server" button in Step 1.

Figure 5: Filling out the server form

Creating an account

If there was no user found, then you can create one. To be able to create an account however, you need to enter a key that is provided by the server administrator, as shown in Figures 6, 7.

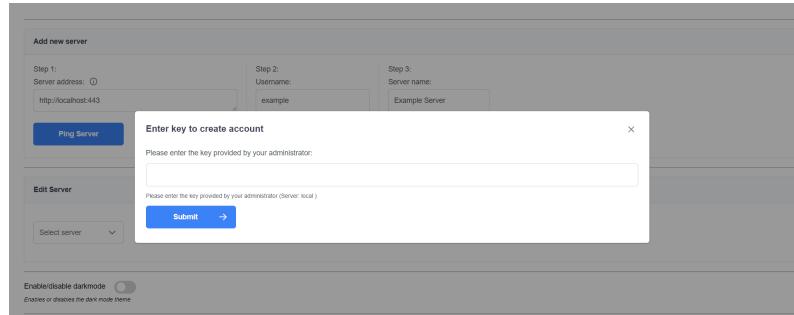


Figure 6: Key request for user creation

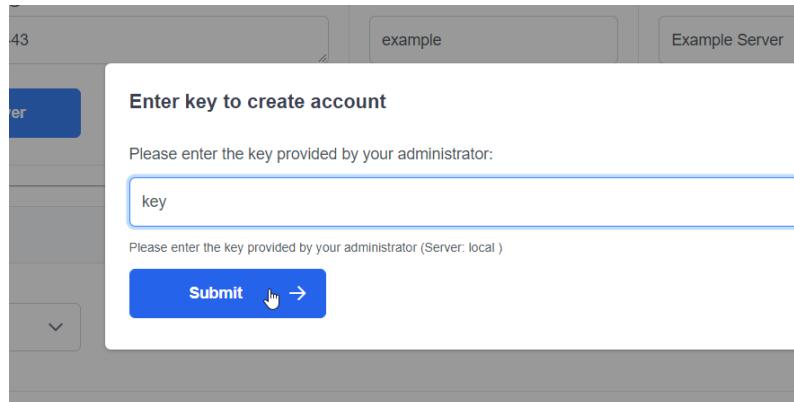


Figure 7: Entering a key provided

If an invalid key is entered, you will be prompted to contact your administrator.

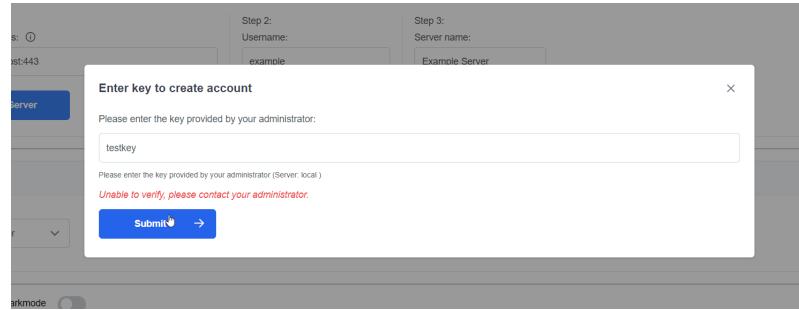


Figure 8: Invalid key entered

If the key was accepted, the account is created successfully, and the server is added.

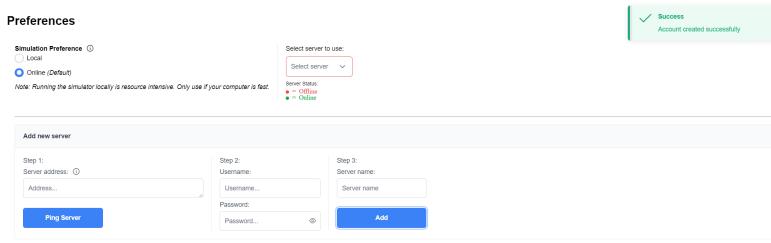


Figure 9: Key was correct and user was created

Server Selection

Once a server is added, it must be selected in the **Simulator Preferences** section.

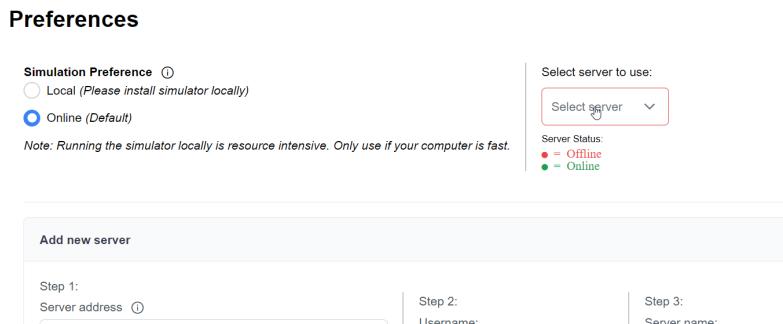


Figure 10: Select a server to use drop-down

If the option has a green circle, that means the server is online. If it is red, then that means the server is unreachable.

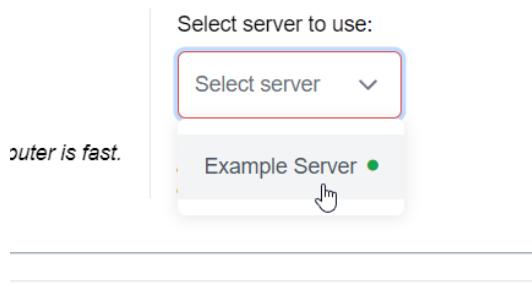


Figure 11: Selecting a server

Once a server is selected and is online, then the sidebar will update, showing the server you are currently connected to, as well as your username in square brackets.

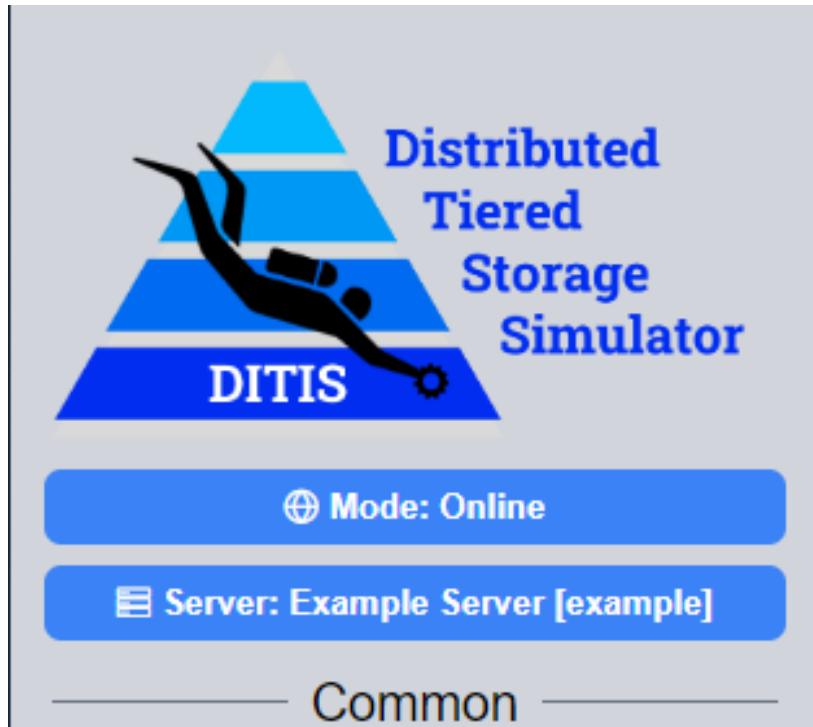


Figure 12: Successfully selected a server

2.2.2 Offline Mode

If you want to run the application in offline mode:

Using the Simulator Manager

1. Repeat all steps discussed above for the online mode
2. Select **Local** mode in simulation preference

Preferences

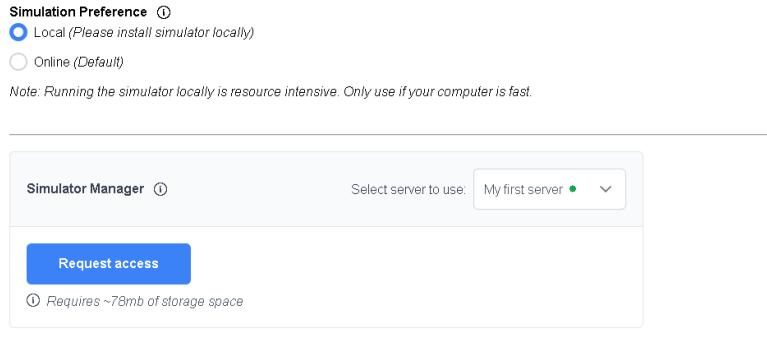


Figure 13: Local Mode selected

3. Click the **Request Access** button.
4. Enter the key provided by the administrator and then click the **Submit** button

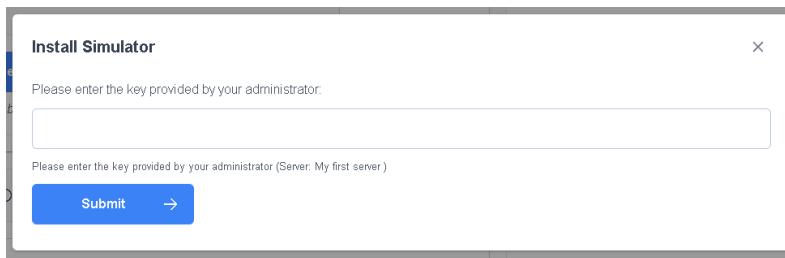


Figure 14: Requesting Access

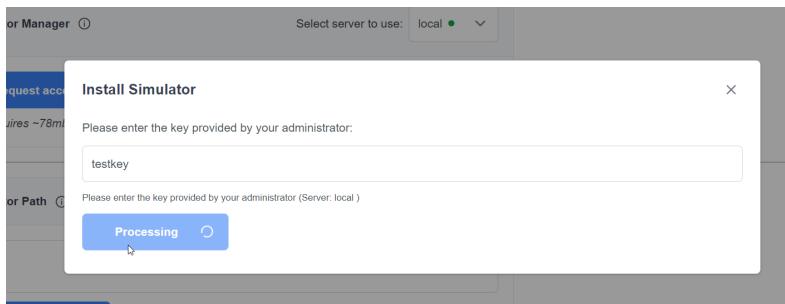


Figure 15: Submitting the key

5. If the key is invalid, then an error will appear.

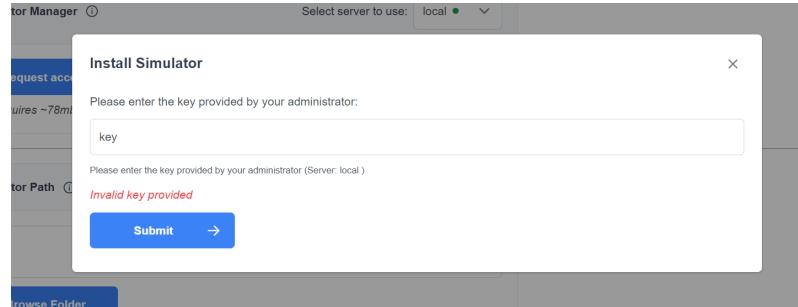


Figure 16: Key entered is invalid

6. If the key is correct, the JAR files will be downloaded to the applications data directory, allowing you to use the application in local mode.

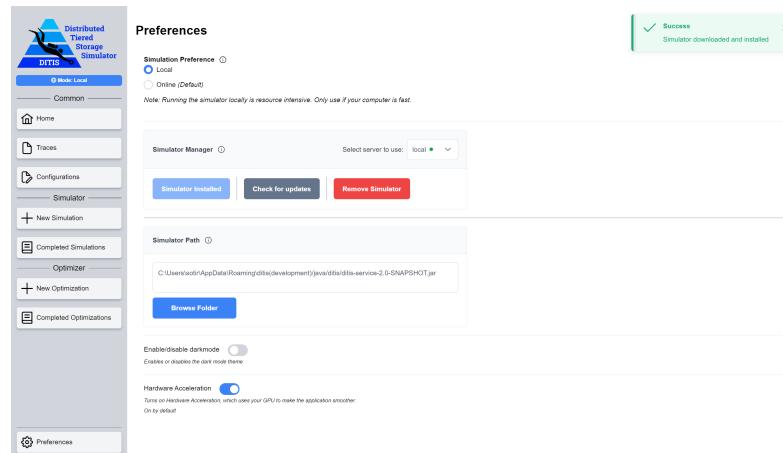


Figure 17:

Using Simulator Path (Advanced)

This section is for more advanced users. If you have direct access to DITIS Distribution and you would like to use that, then this is where you select the path to the distribution (specifically the bin) folder, either by pasting the path in the box, or by using the browse folder.

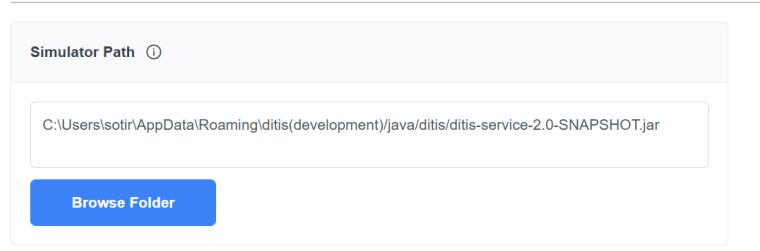


Figure 18: Specifying the simulator path

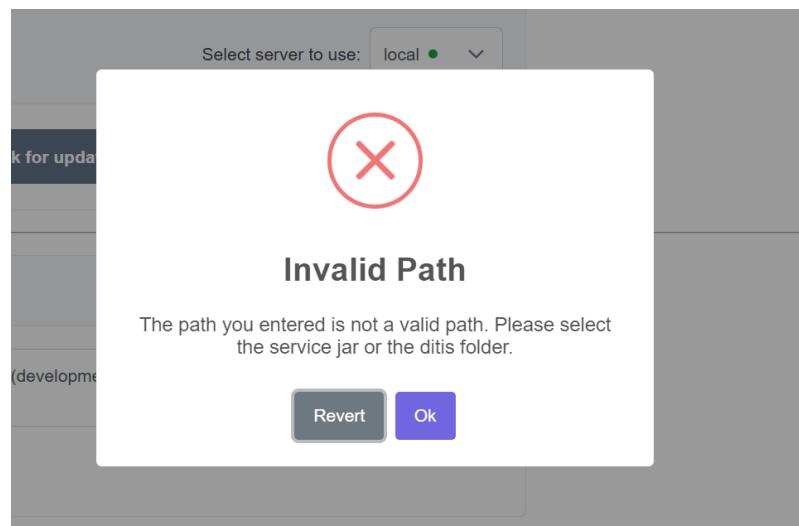


Figure 19: Invalid path specified

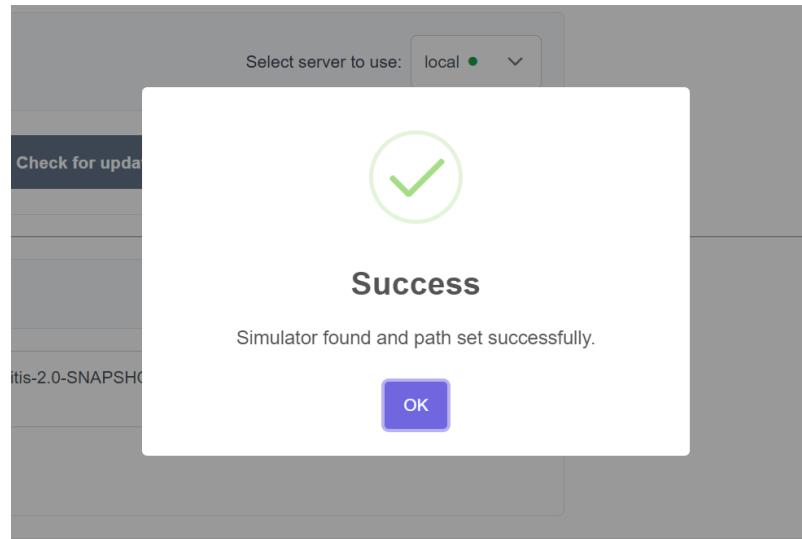


Figure 20: Valid path specified

3 Traces

The configuration section of the application is where the user can create, upload, and manage their storage configurations as shown in Figure 21

Name ↑↓	Type ↑↓	Lines ↑↓	Date Added ↓↑	Actions
trace5	Huawei	54416	28/05/2024 19:15	
trace4	Huawei	41823	28/05/2024 19:15	
trace3	Huawei	49924	28/05/2024 19:15	
trace2	Huawei	5646	27/05/2024 12:17	
trace1	Huawei	4888	19/05/2024 20:33	

In total there are 5 trace files stored.

Figure 21: Traces Page

3.1 Uploading Trace Files

To upload a trace file, click on the Upload button in the top right of the screen as shown in Figure 22.

	Date Added ↓↑	Actions
	28/05/2024 19:15	
	28/05/2024 19:15	

Figure 22: Uploading a trace

Then a dialog opens so a file can be selected. Once selected a new popup will appear asking the user to enter a name for the trace as shown in Figure 23.

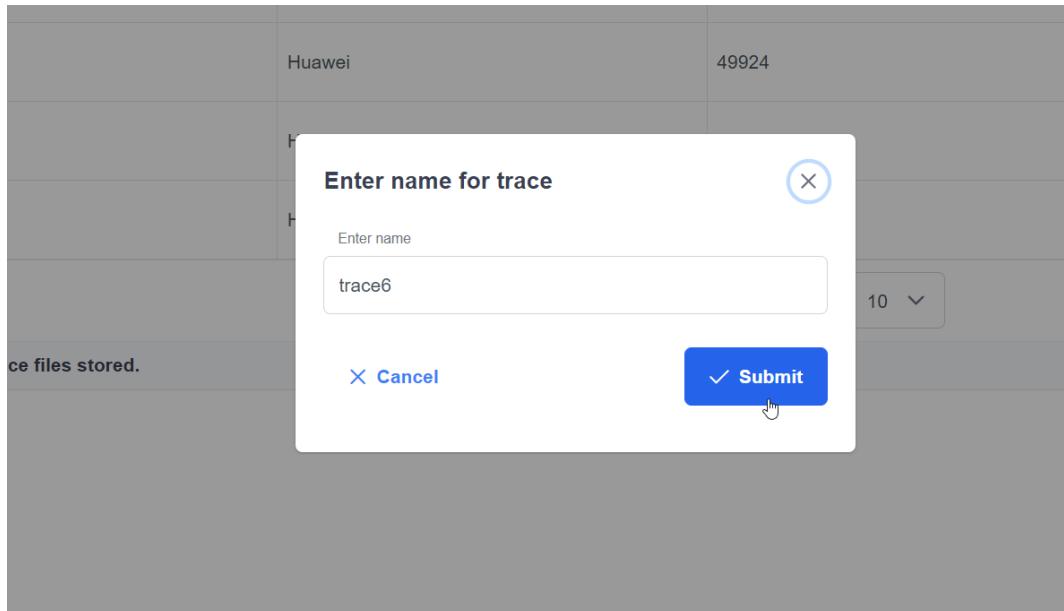


Figure 23: Naming a trace

If a trace already exists with the same name, then an error will appear prompting the user that a trace with the same name already exists.

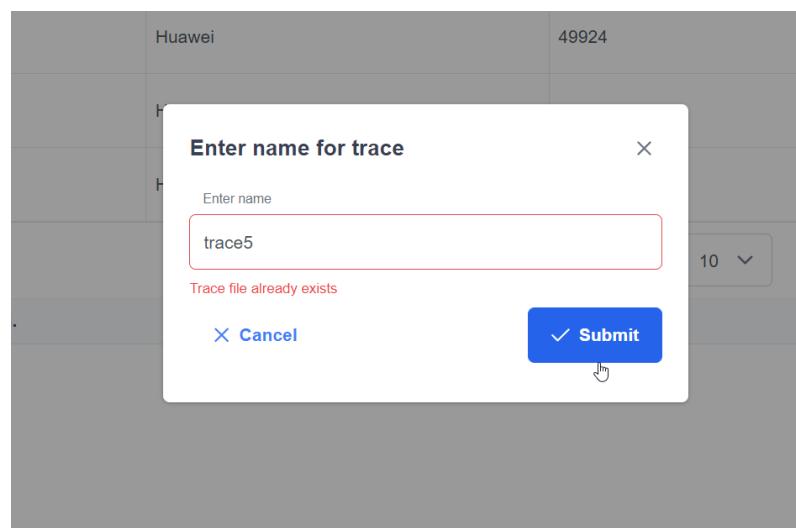
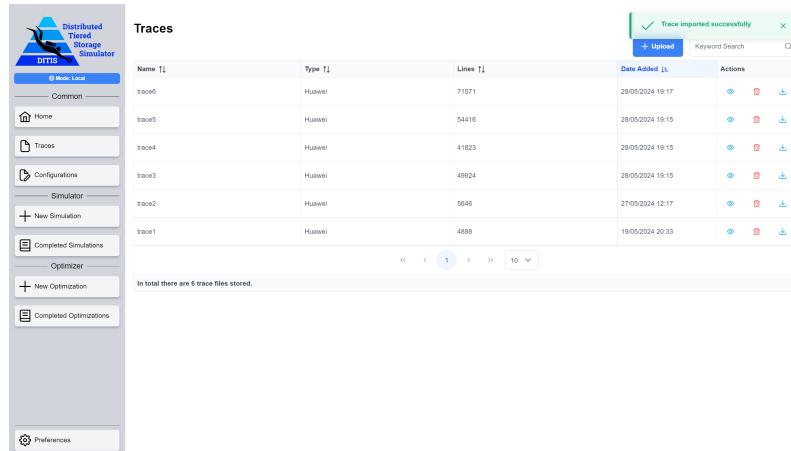


Figure 24: Trace with the same name

Once a name is given and is accepted by the system, it will be added to the table and a confirmation message will appear in the top right of the screen like in Figure 25



The screenshot shows the DTSI (Distributed Tiered Storage Simulator) interface. On the left is a sidebar with options: Home, Traces, Configurations, Simulator, New Simulation, Completed Simulations, Optimizer, New Optimization, and Preferences. The main area is titled 'Traces' and contains a table with the following data:

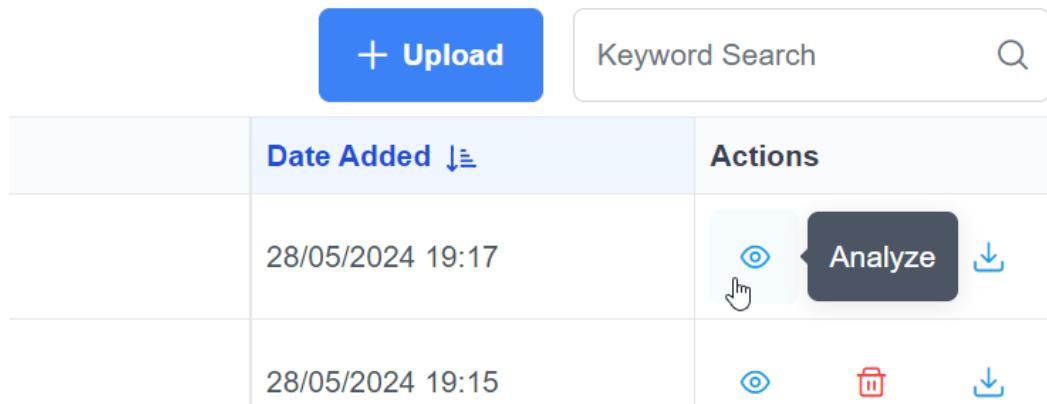
Name	Type	Lines	Date Added	Actions
trace6	Huawei	71571	28/05/2024 19:17	
trace5	Huawei	54410	28/05/2024 19:15	
trace4	Huawei	41823	28/05/2024 19:15	
trace3	Huawei	49924	28/05/2024 19:15	
trace2	Huawei	5646	27/05/2024 12:17	
trace1	Huawei	4888	19/05/2024 20:33	

In total there are 6 trace files stored.

Figure 25: Trace uploaded successfully

3.2 Analysing Traces

To analyze a trace the user needs to click on the first action icon (eye).



The screenshot shows a table with two rows of trace data. The columns are 'Date Added' (sorted descending), 'Actions', and another unnamed column. The first row has a 'Date Added' of '28/05/2024 19:17'. The 'Actions' column for this row contains three icons: a blue eye icon, a dark grey 'Analyze' button with white text, and a blue download icon. A hand cursor is hovering over the 'Analyze' button. The second row has a 'Date Added' of '28/05/2024 19:15'. The 'Actions' column for this row contains three icons: a blue eye icon, a red delete bin icon, and a blue download icon.

Figure 26: Opening an analysis

Once clicked, the Trace Analysis window appears. The next four figures (27,28,29,30), showcase the statistics generated.

The first report is the Workload statistics. This shows how the workload played out in 3 separate pie charts to give the user a high level overview of the distribution of requests.

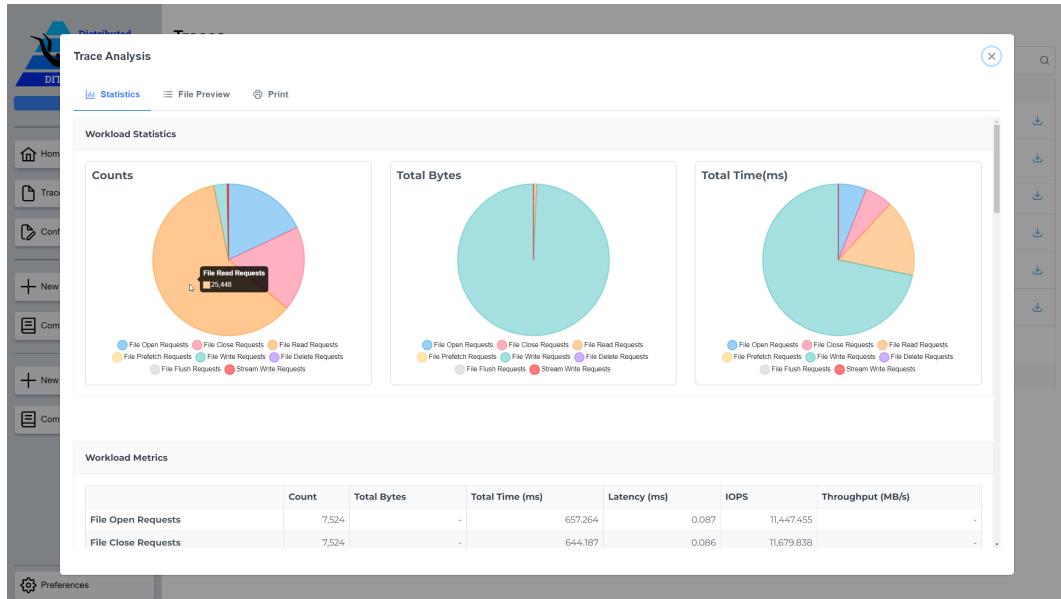


Figure 27: Analyzing a trace, part 1

The second report is the Workload Metrics table, which is similar to the Workload Statistics, but with more comprehensive.

The screenshot shows the 'Trace Analysis' application window with a 'Workload Metrics' table. The table provides detailed statistics for various request types:

	Count	Total Bytes	Total Time (ms)	Latency (ms)	IOPS	Throughput (MB/s)
File Open Requests	20	-	7,563	0.378	2,644.453	-
File Close Requests	20	-	22,913	1.146	872.867	-
File Read Requests	113	836,783	154,093	1.364	733.323	5.179
File Prefetch Requests	0	0	0	-	-	-
File Write Requests	49,770	394,325,566	6,141,694	0.123	8,103.627	61.230
File Delete Requests	0	0	0	-	-	-
File Flush Requests	0	0	0	-	-	-
Total Requests	49,923	-	-	-	-	-

Figure 28: Analyzing a trace, part 2

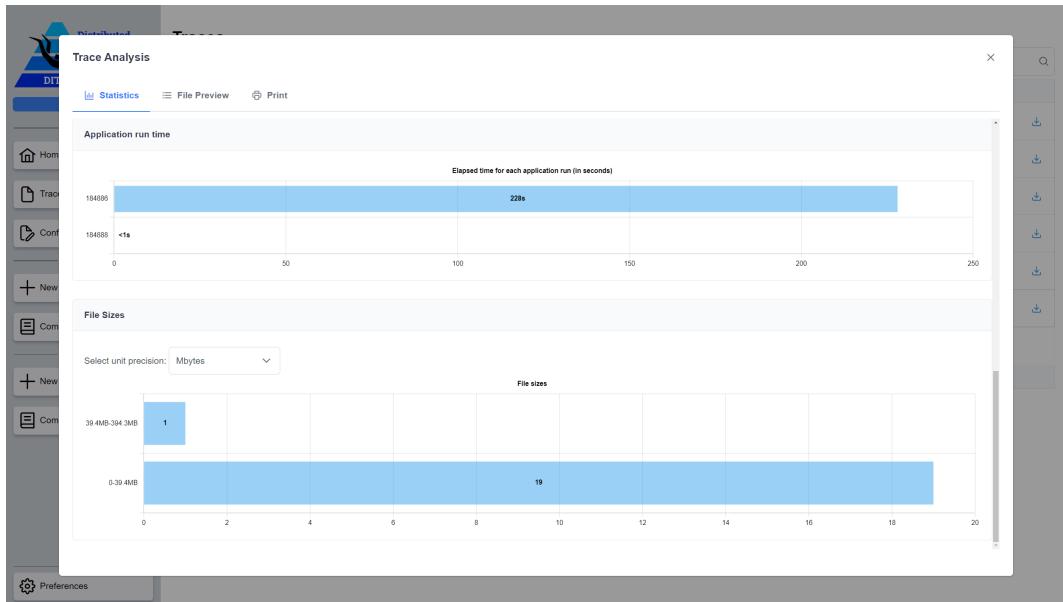


Figure 29: Analyzing a trace, part 3

The file size unit precision gets calculated automatically based on the size of the largest file, but it can be manually changed by the user using the dropdown.

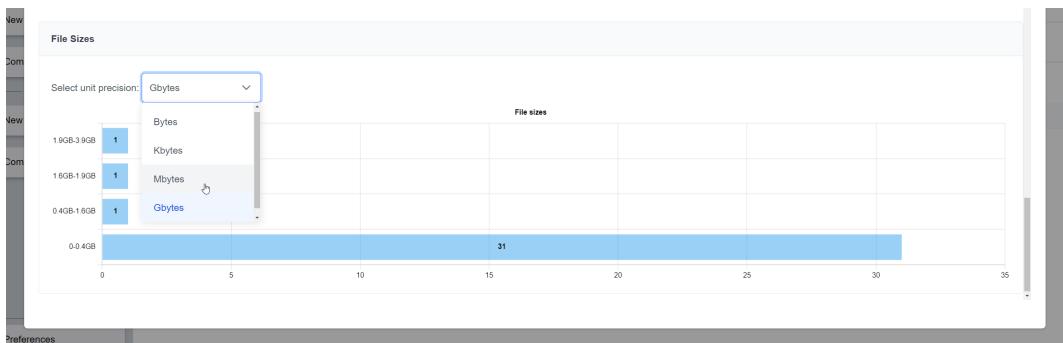


Figure 30: Analyzing a trace, part 4

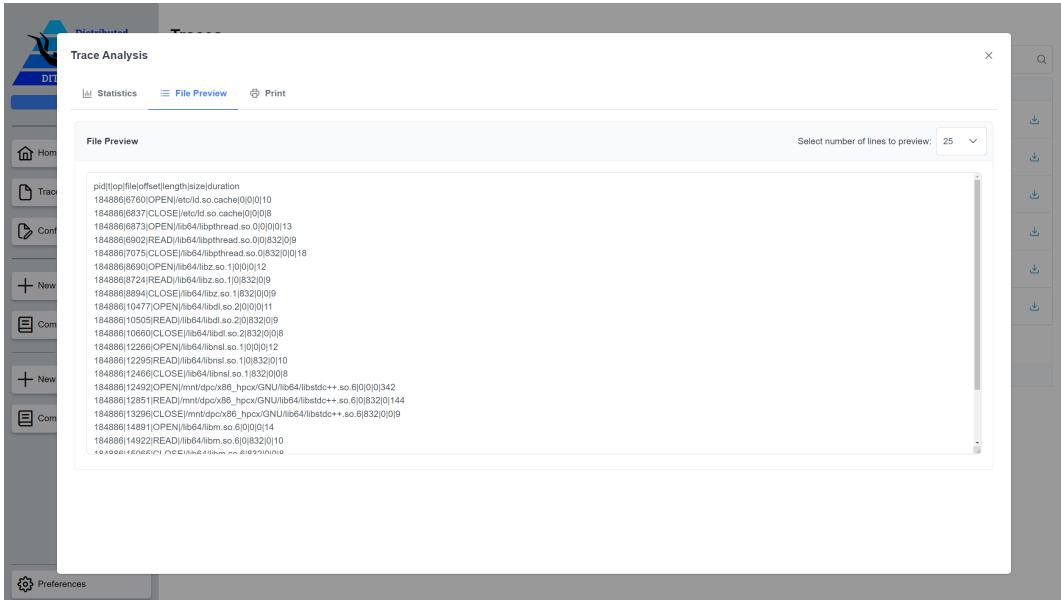


Figure 31: Previewing a trace

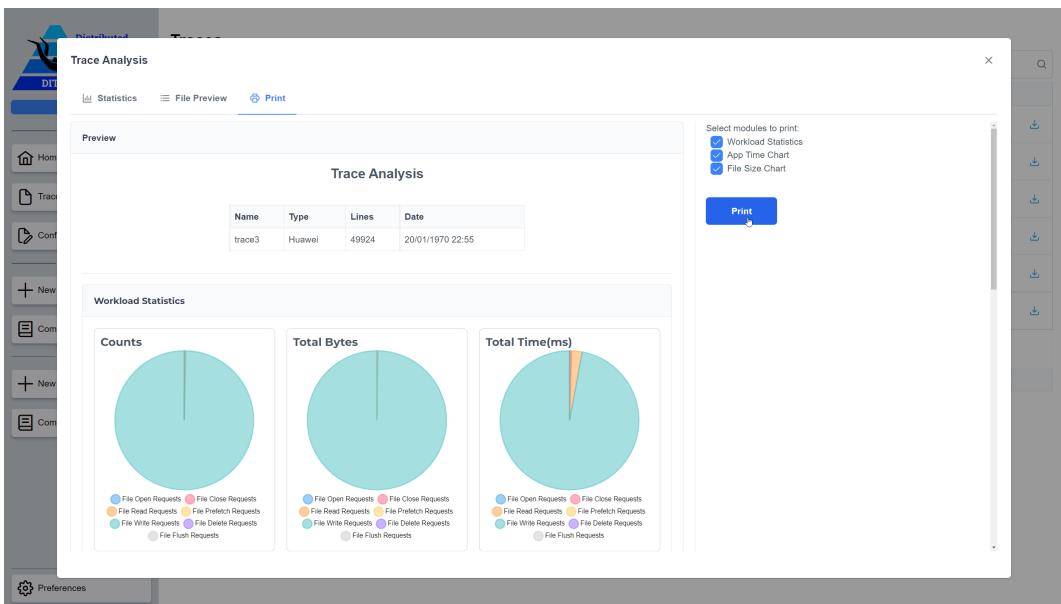


Figure 32: Exporting a trace report

3.3 Downloading a trace

To download a trace,

1. Click on the download icon in the traces table as shown in Figure 33.
2. Define the location to download the file.

	Date Added ↓	Actions
	28/05/2024 19:17	
	28/05/2024 19:15	
	28/05/2024 19:15	

Figure 33: Downloading a trace

3.4 Deleting a trace

To delete a trace:

1. Click on the Bin icon.
2. Click **Yes**.

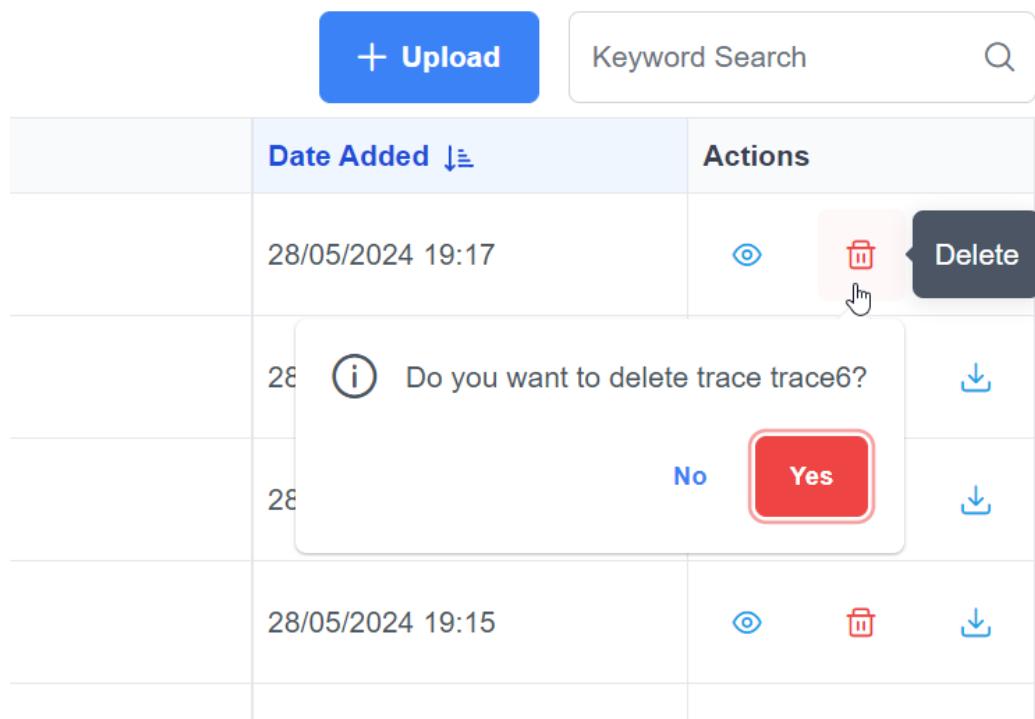


Figure 34: Deleting a trace

4 Configurations

To navigate to the configuration section click the **Configurations** option from the sidebar on the left

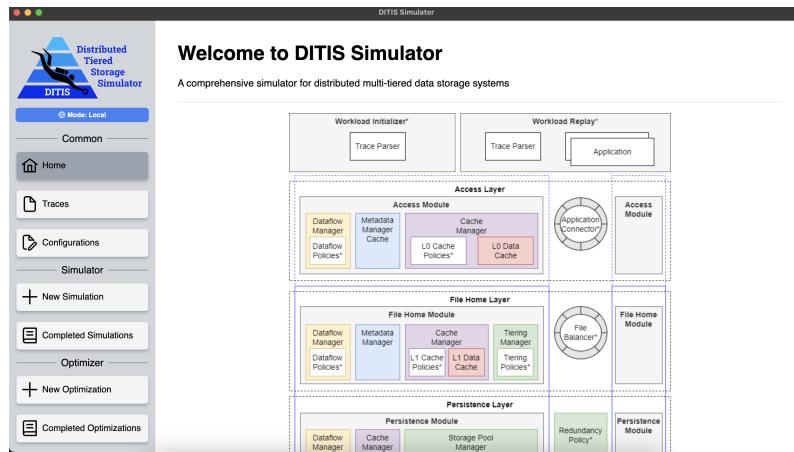


Figure 35: Enter Caption

The configuration section of the application is where the user can create, upload, and manage their storage configurations as shown in Figure 36.

The screenshot shows the 'Configurations' page. At the top are tabs for Storage, Optimizer, and Variance, followed by '+ Create' and '+ Upload' buttons, and a Keyword Search bar. A table lists configurations:

Name ↑↓	Description ↑↓	Date Created ↑↓	Date Last Modified ↑↓	Action
basic-config	No description added for this configuration file	12/03/2024	12/03/2024	

Below the table are navigation controls: <<, <, >, >>, and a page number indicator (1, 10, < >).

Figure 36: Configuration Page

4.1 Creating Configuration Files

Users can create three(3) types of configurations to use for simulations and optimizations.

Common steps for Storage and Optimizer Configuration

1. Click the create button at the top right section of the page
2. Select the type of configuration file you want to create: **Storage, Optimizer**

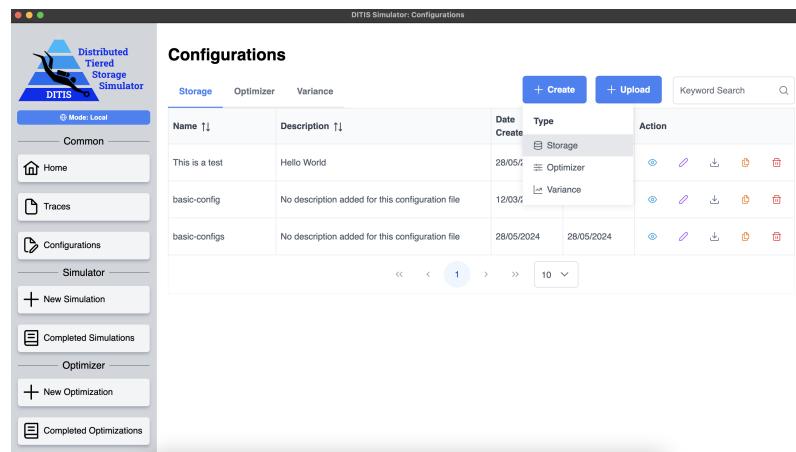


Figure 37: Create Configuration Options

- The configuration form comprises multiple categories and parameters. Change any parameters desired.

This screenshot shows the Storage configuration page of the DITIS Simulator. At the top, there is a horizontal navigation bar with numbered tabs from 1 to 13. Tab 1 is highlighted in blue and labeled 'Storage'. Below the navigation bar, the title 'Storage' is displayed. There are two input fields: 'System name' containing 'Ditis Default Storage' and 'System number of nodes' containing '3'. At the bottom of the form are three buttons: 'Cancel', 'Report →', and 'Save'.

Figure 38: Storage Configuration Form

This screenshot shows the Optimizer configuration page of the DITIS Simulator. On the left, there is a sidebar with various simulation and optimization options. The main area has four numbered tabs at the top: 1 General, 2 Recursive Random Search, 3 Genetic Algorithm, and 4 Termination Criteria. The 'General' tab is selected. It contains three dropdown menus: 'Search algorithm class' set to 'cy.ac.cut.ditis.optimizer.search.algorithm.GridSearch', 'Objective class' set to 'cy.ac.cut.ditis.optimizer.search.objective.MaxTotalThroughput', and 'Report statistics output' set to 'ALL'. At the bottom are three buttons: 'Cancel', 'Recursive Random Search →', and 'Save'.

Figure 39: Optimizer Configuration Form

- Navigate through the form using the navigation buttons at the bottom of the screen or by clicking the number associated with the category you want to navigate to.
- Once you have customized settings to your preference, click the **Save** button at the bottom of your screen.

6. Fill out the name and description fields for your configuration file.
7. Click the **Create configuration file** button to save it to your local or online directory.

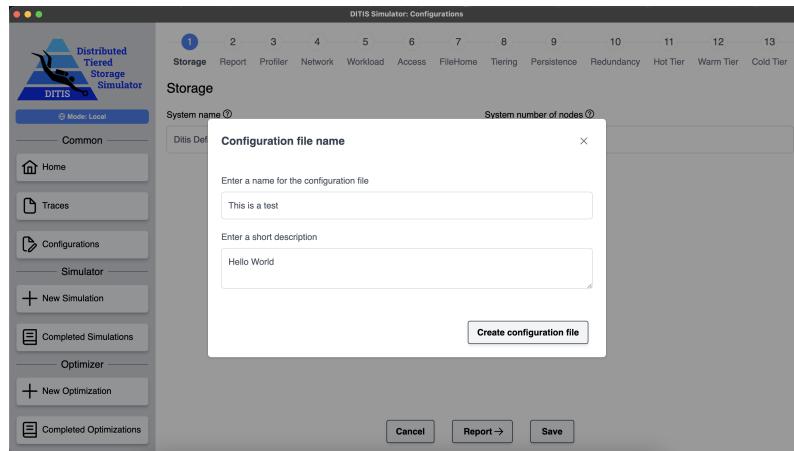


Figure 40: Save storage configuration

8. If the file gets created successfully, you will be prompted a confirmation message as seen in Figure 41.

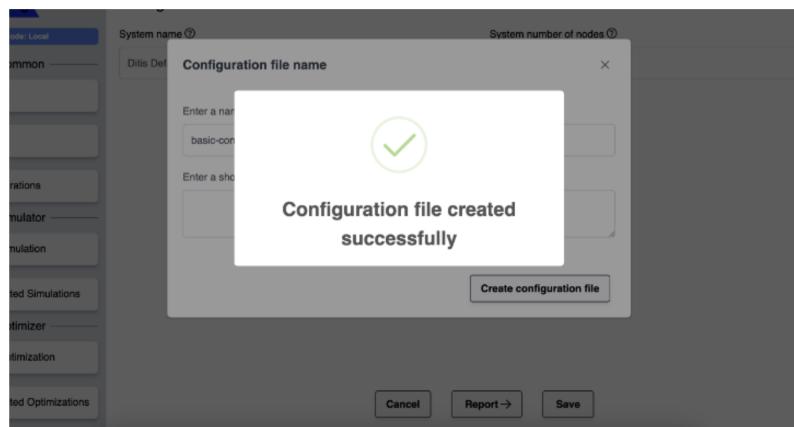


Figure 41: Successfully saving file

- If there is an error or a problem, you will be prompted an error message as seen in Figure 42.

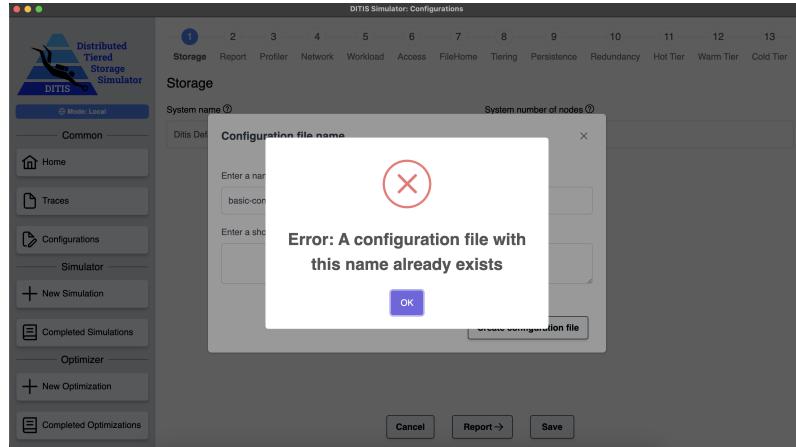


Figure 42: Error saving file

Variance Configuration

- Click the create button at the top right section of the page
- Select **Variance** from the dropdown as seen in Figure 43.

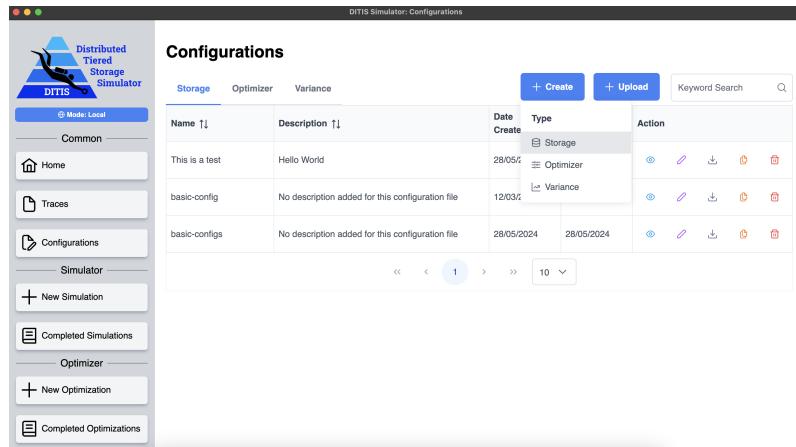


Figure 43: Create Configuration Options

- The variance configuration form has two(2) sections, the parameter domains section and the parameter groupings section.

Figure 44: Variance Configuration Form

4. To specify parameter domains select a category, a parameter of that category and then select the domain type. You will then need to provide either a list of options separated by a comma

Figure 45: Variance parameter domain example

5. Or a start point, jump, and end point for addition and multiplication domain types

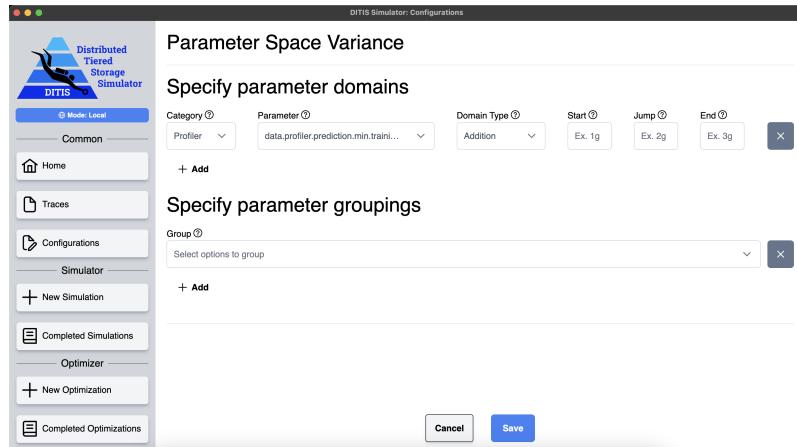


Figure 46: Addition domain type

- To specify parameter groupings click the dropdown arrow and select the parameters you want to group together.

Note: For A, B, C parameters, if A<->B are grouped together B<->C or A<->C cannot be grouped together.

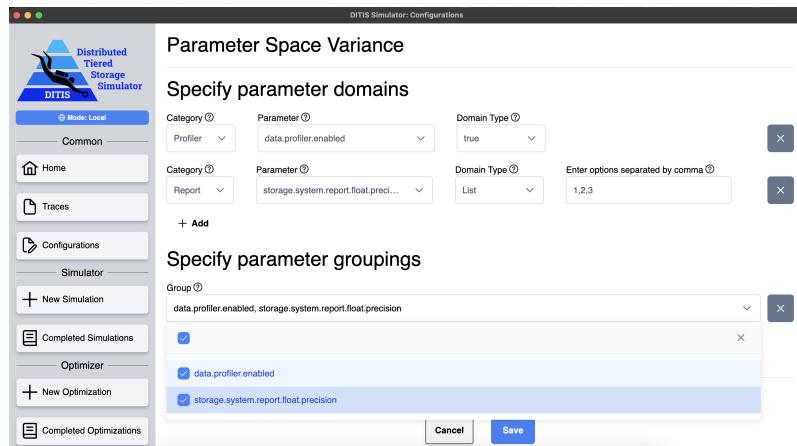


Figure 47: Grouping parameters

- Once you have configured the parameter domains and groupings click the **Save** button at the bottom of your screen.

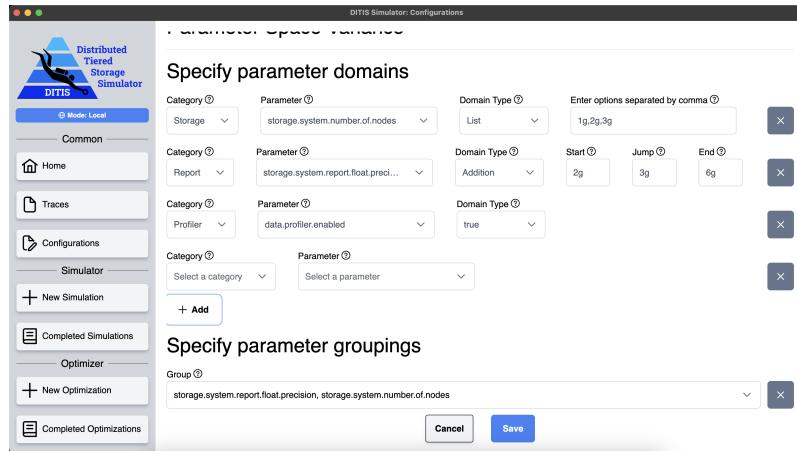


Figure 48: Variance Configuration form

- Fill out the name and description fields for your configuration file.
- Click the **Create configuration file** button to save it to your local or online directory.

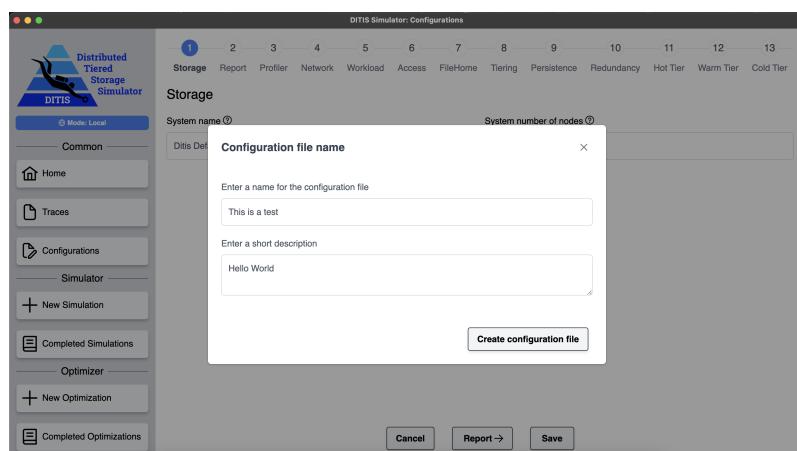


Figure 49: Save storage configuration

Exiting a form

To exit a configuration form

1. Click the **Cancel** button at the bottom of the screen.
2. Click **Yes** to exit or **Cancel** to go back to the form

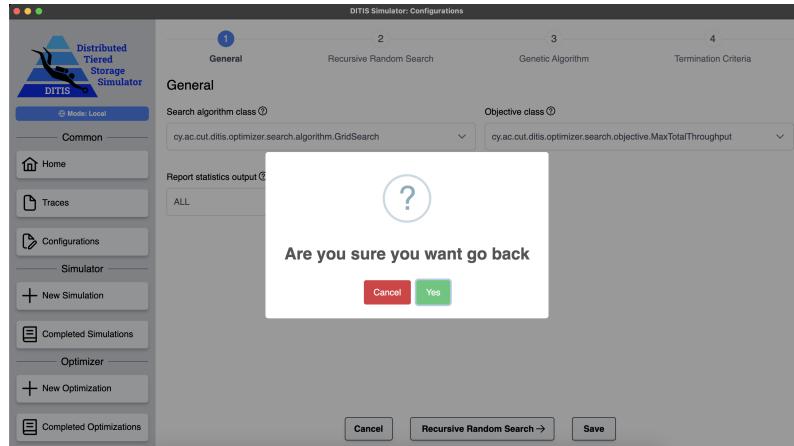


Figure 50: Exiting a configuration form

4.2 Uploading Configuration Files

Users can upload three(3) types of configurations to use for simulations and optimizations.

To upload a configuration

1. Click the **Upload** button at the top right area of the screen.

Configurations					
Storage	Optimizer	Variance	+ Create	+ Upload	Keyword Search
Name ↑↓	Description ↑↓	Date Created ↑↓	Date Modified ↑↓	Type	
This is a test	Hello World	28/05/2024	28/05/2024	Storage	
basic-config	No description added for this configuration file	12/03/2024	12/03/2024	Optimizer	
basic-configs	No description added for this configuration file	28/05/2024	28/05/2024	Variance	

Figure 51: Upload Configuration Options

2. Select the type of configuration you are going to upload
3. Select the file to upload

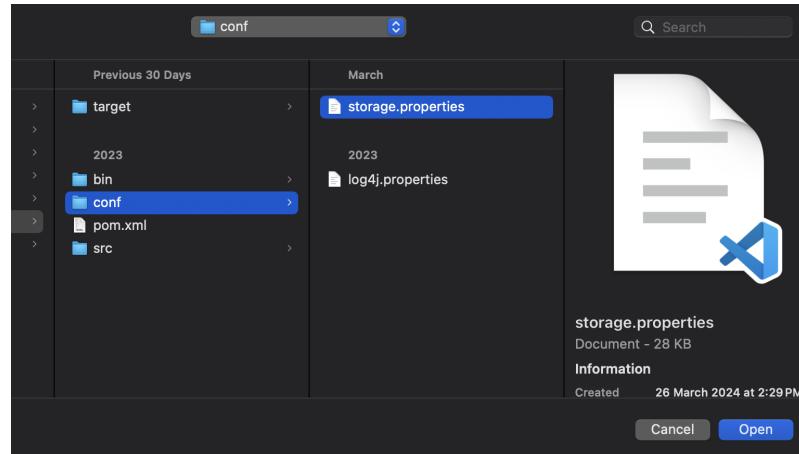


Figure 52: Configuration file selection example

4. On successful upload of a configuration file a toast will be displayed as shown in Figure 53

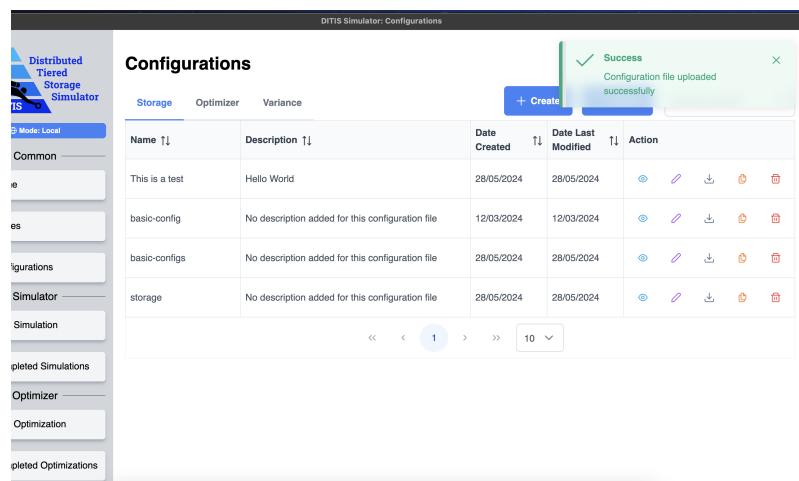


Figure 53: Upload Success

4.3 Table Actions

Users have access to multiple actions in the configurations datatable. Users can (i) view a configuration file in read only mode; (ii) edit a configuration file; (iii) download a configuration file to the local file system; (iv) duplicate a configuration file; and (v) delete a configuration file.

Configurations					
Storage	Optimizer	Variance	+ Create	+ Upload	Keyword Search
Name ↑↓	Description ↑↓	Date Created ↑↓	Date Last Modified ↑↓	Action	
This is a test	Hello World	28/05/2024	28/05/2024		
basic-config	No description added for this configuration file	12/03/2024	12/03/2024		
basic-configs	No description added for this configuration file	28/05/2024	28/05/2024		
storage	No description added for this configuration file	28/05/2024	28/05/2024		

Figure 54: Table containing configuration files

4.3.1 View in read-only mode

To view a configuration file in read only mode

1. Click the Eye icon

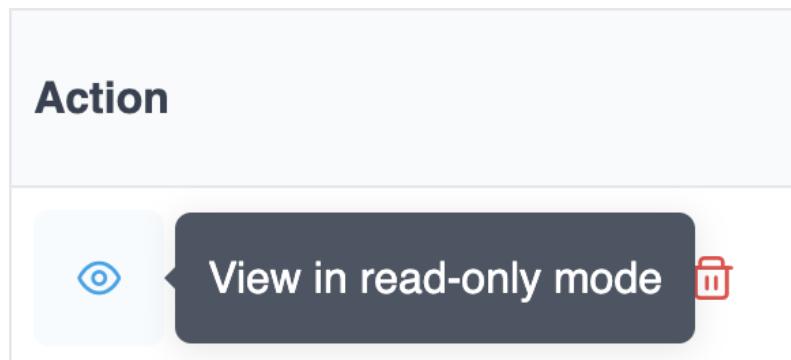


Figure 55: View in read-only mode action

2. You can navigate the configuration file using the buttons at the bottom of the screen

The screenshot shows the 'DITIS Simulator: Configurations' interface. At the top, there is a horizontal navigation bar with numbered buttons from 1 to 13. The first button, labeled 'Storage', is highlighted with a blue circle. Below the navigation bar, the word 'Storage' is displayed in bold. There are two input fields: 'System name' with the value 'Ditis Default Storage' and 'System number of nodes' with the value '3'. At the bottom of the form, there are three buttons: 'Cancel', 'Report →', and 'Save'.

Figure 56: Read-only mode form

3. Once you are done and want to go back to the configuration page click the **Cancel** button and click **Yes** to go back.

4.3.2 Edit Configuration file

To edit a configuration file

1. Click the **Pencil** icon

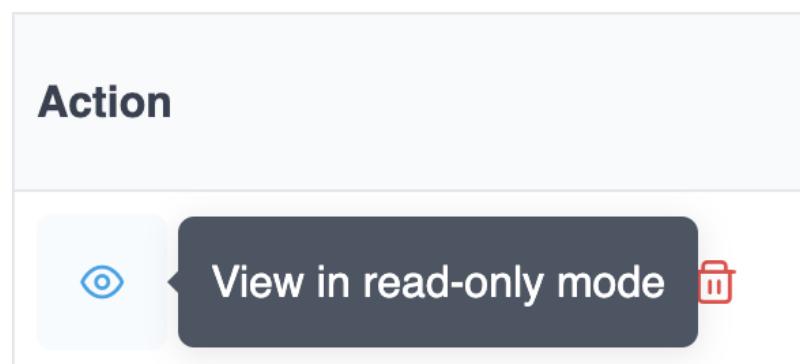


Figure 57: Edit configuration file

2. You can navigate the configuration file using the buttons at the bottom of the screen
3. Make any desired changes to the parameters of the configuration file.
4. To save your changes start by clicking the **Save** button at the bottom of the screen.
5. Make any changes to the name or description and click the **Save Changes** button to save your changes to the file and store it.

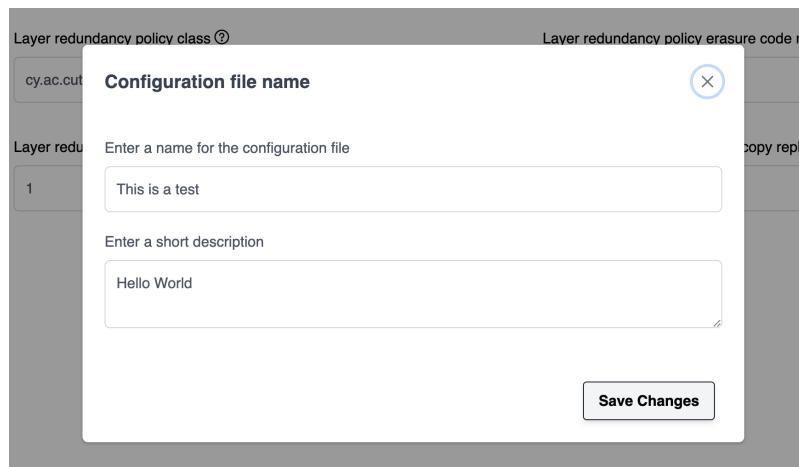


Figure 58: Save Changes

4.3.3 Download Configuration file

To download a configuration file

1. Click the **Downwards arrow** icon

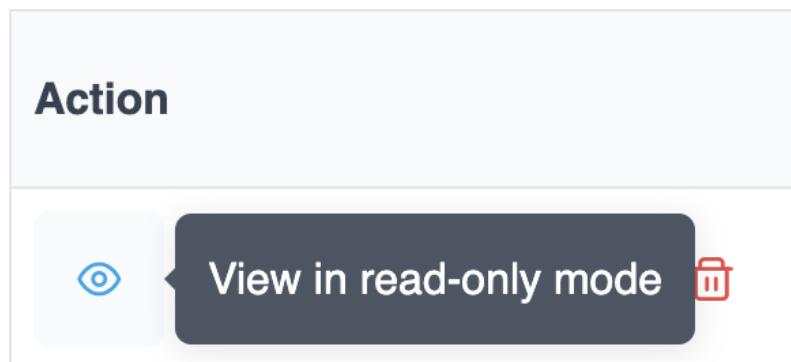


Figure 59: view-read-only

2. Specify the directory to download the configuration file

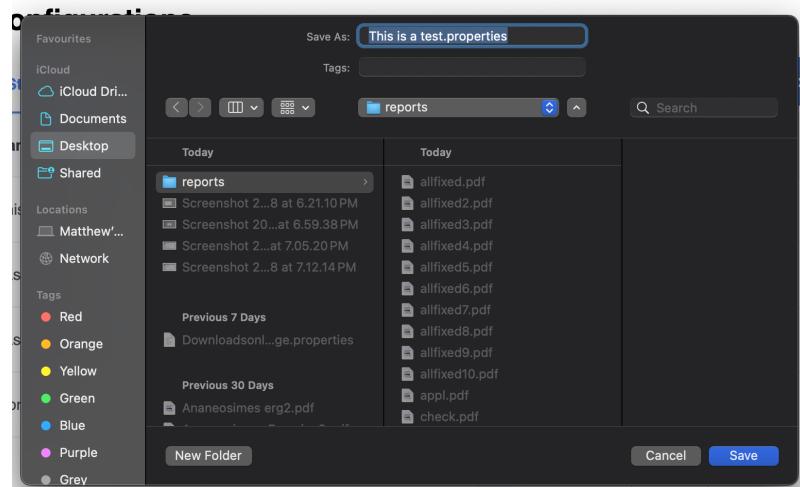


Figure 60: Specifying download directory

3. Upon successful download a confirmation toast will be displayed at the top right of the screen

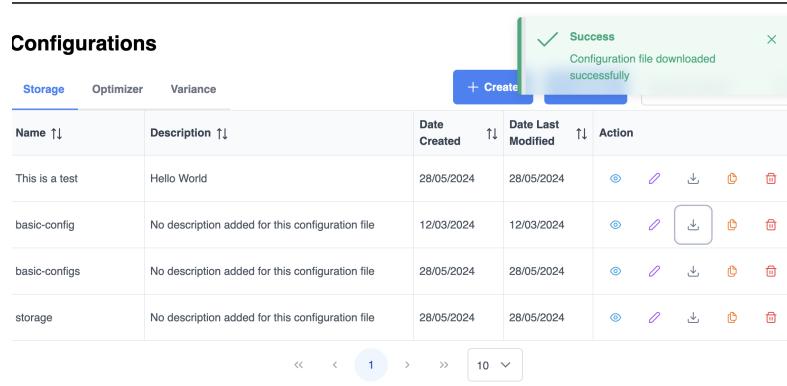


Figure 61: Successful download

4.3.4 Duplicate Configuration file

To duplicate a configuration file

1. Click the **Double file** icon
2. Fill out the name and description fields

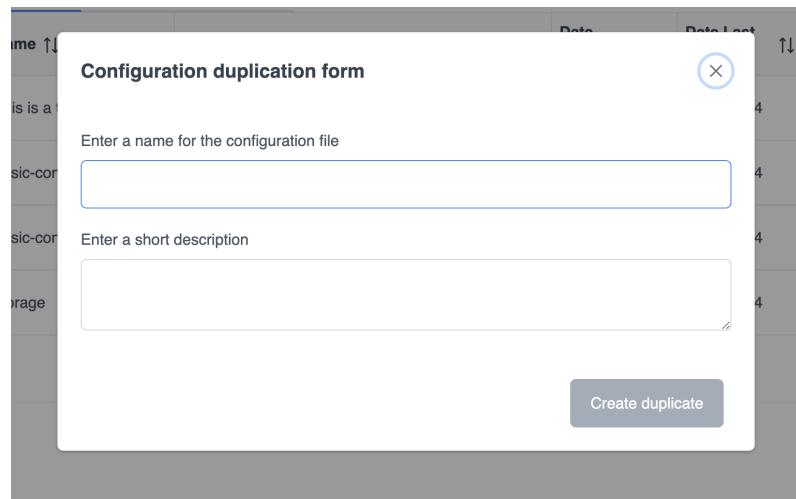


Figure 62: Configuration duplication form

3. Click the **Create duplicate** button to create a duplicate file of the selected configuration file

4.3.5 Delete Configuration file

To delete a configuration file

1. Click the **Bin** icon
2. Click **Yes** to confirm deletion of the configuration file or **No** to cancel.

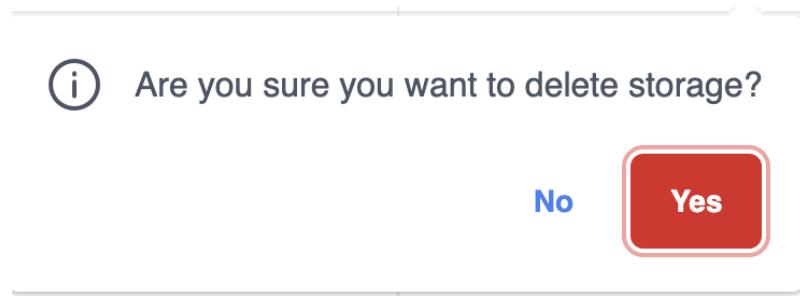


Figure 63: Deleting a configuration file

5 Simulations

There are two sections of the application in which you can do something related to simulations: (i) run a new simulation; (ii) view a list and results of a previous simulations.

5.1 New Simulation

To navigate to the new simulation section click the **New Simulation** option from the sidebar on the left

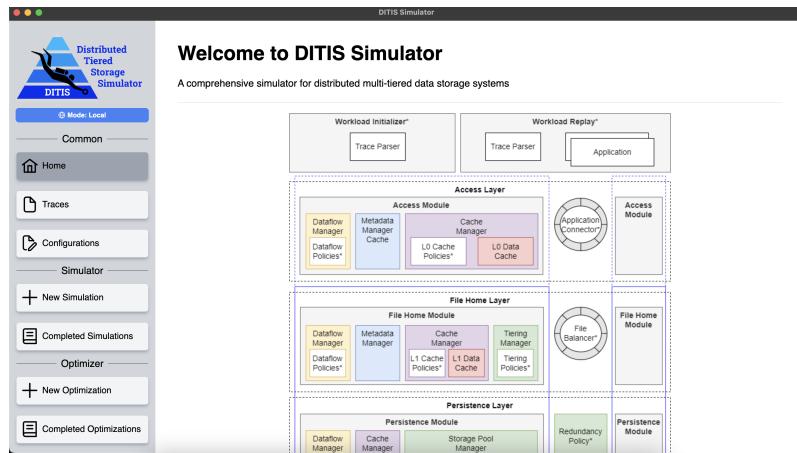


Figure 64: Navigating to new simulation

To run a new simulation

Required

1. Select a storage configuration using the dropdown list.
2. Select a trace using the dropdown list.
3. Click the **Start Simulation** button to run a simulation.

Optional

1. Enter a name for your simulation.
2. Enter the maximum number of events in the trace you want to be executed, leave blank if you want to execute the whole trace.
3. Enter the maximum memory allocated to the JVM.

4. Tick the checkbox named **Export ML files** to enable the generation of ML files.

Note:Data profiler must be enabled in the configuration

5.1.1 Running Simulation

After clicking the **Start Simulation** button you should see something like this in the **Running Simulations** table. You can either: (i)wait for the simulation to end; or (ii) terminate the simulation for any reason.

Running Simulations					
ID ↴	Name ↑↓	Status ↑↓	Date of simulation ↑↓	Process ID	Actions
6	Test	Running	28/05/2024 20:50	42857	<button>X Terminate</button>
<small><< < > >> 10 ▾</small>					

In total there are 1 simulations running.

Figure 65: Running Simulation

To terminate a simulation click the red **Terminate** button and click the **Terminate** button in the dialog again to confirm.

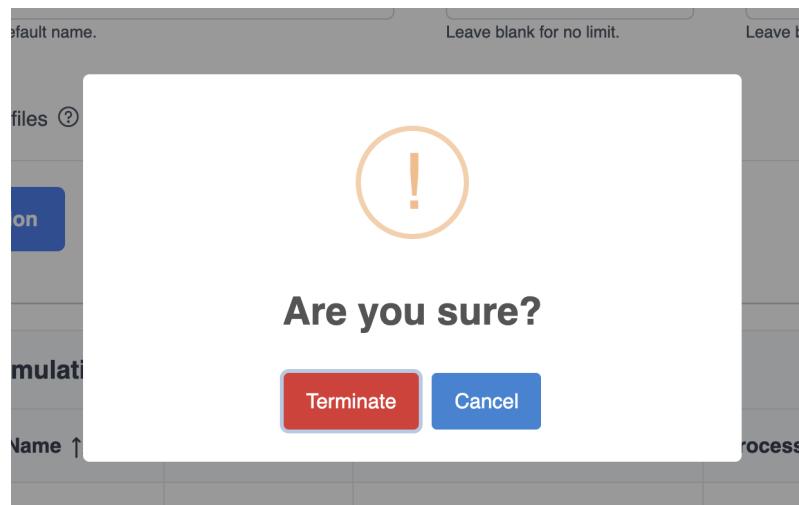


Figure 66: Terminate Simulation Dialog

5.1.2 Simulation Run Completed

After your simulation has ran the **Running Simulations** table will look like the table in Figure 67

Running Simulations					
ID ↴	Name ↑↓	Status ↑↓	Date of simulation ↑↓	Process ID	Actions
4	Test	Finished	28/05/2024 20:46	N/A	
<p>« < 1 > » 10</p> In total there are 1 simulations running.					

Figure 67: Completed Simulation

5.2 Simulation Actions

Users have access to multiple actions in the simulations datatable. Users can (i) view a detailed analysis of the simulation; (ii) analyze the output trace generated by the simulation; (iii) clear the simulation from the table; (iv) delete a simulation run.

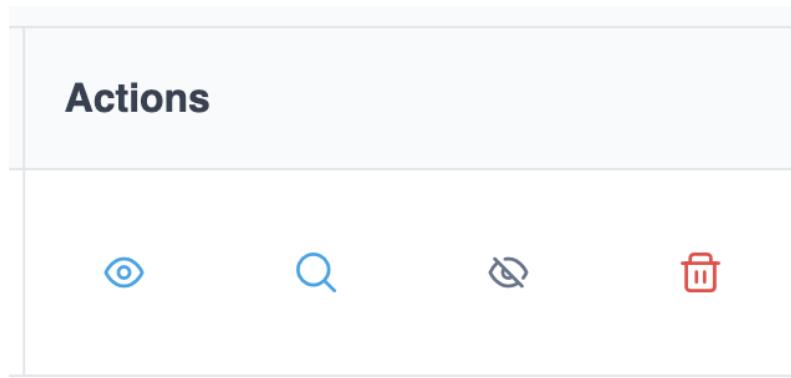


Figure 68: Simulation Actions

5.2.1 View Detailed Analysis

To view a detailed analysis

1. Click the **Eye** icon.
2. After clicking the icon a dialog containing the below screen will appear.

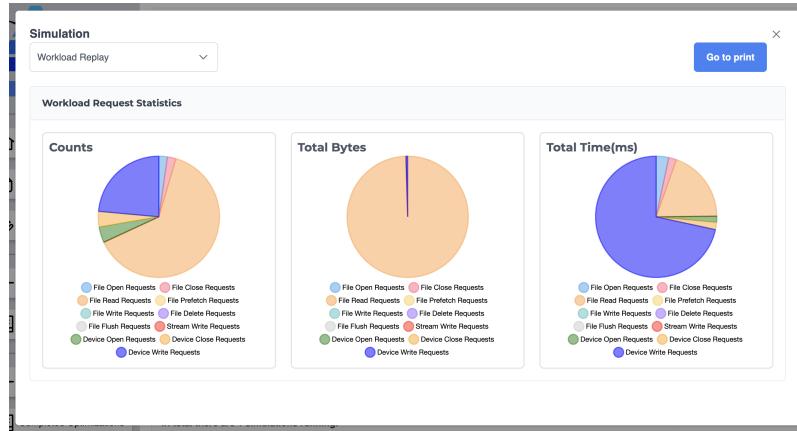


Figure 69: Initial Report View

- To view other reports click the dropdown at the top left of the dialog and select the report to view.

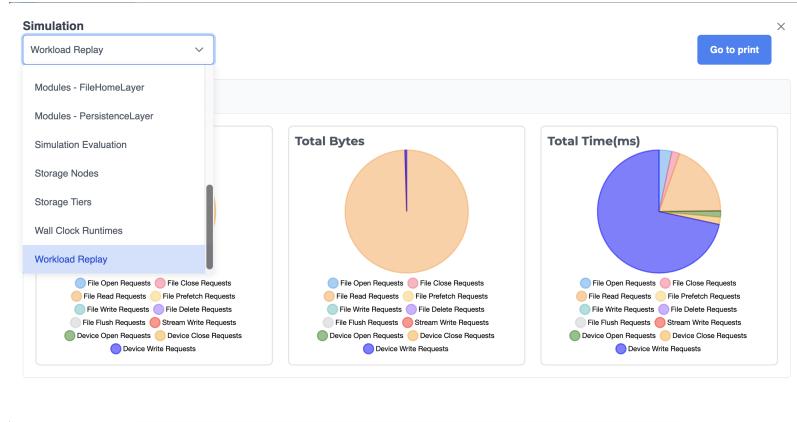


Figure 70: Dropdown with Other Reports

Printing Reports

To print a report

1. Click the **Go to print** button at the top right of the dialog

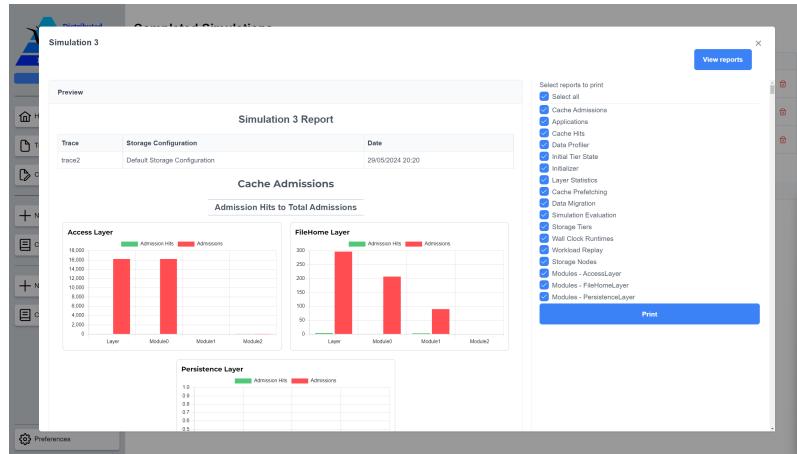


Figure 71: Printing Preview

2. Select the reports you want to include in the final report

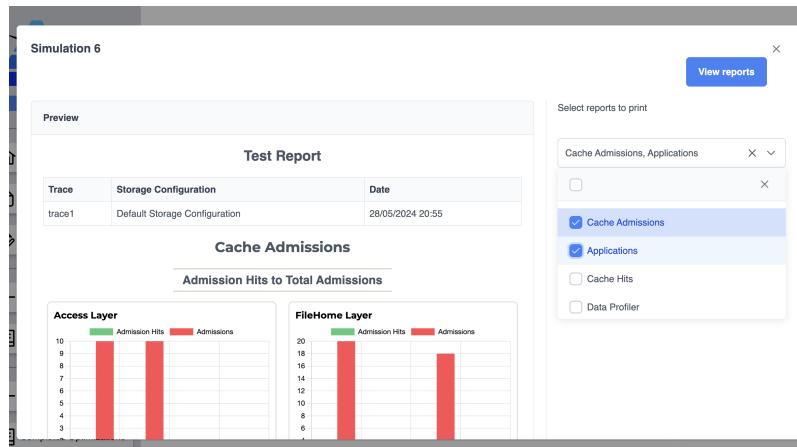


Figure 72: Selecting reports

3. Click the **Print** button

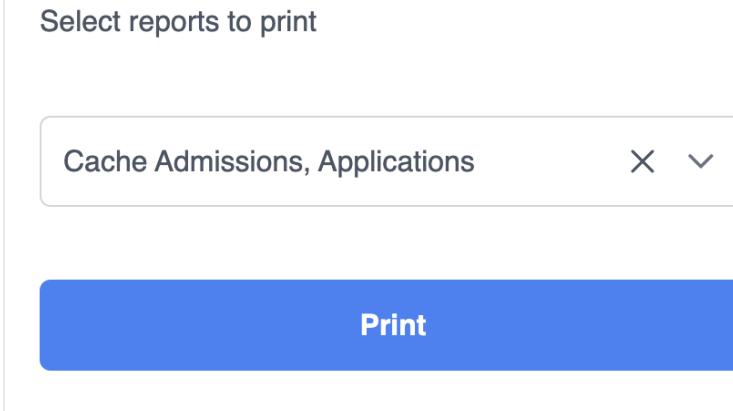


Figure 73: Print button

4. Select the directory you want to save the report in and give a name to the report.

5. Click **Save**

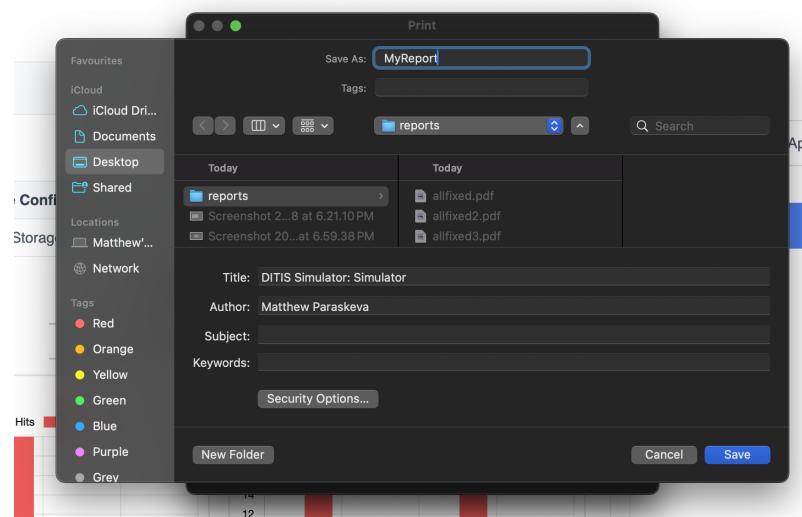


Figure 74: Selecting directory to save report

- Upon successful save of the report a toast will be displayed as shown in 75

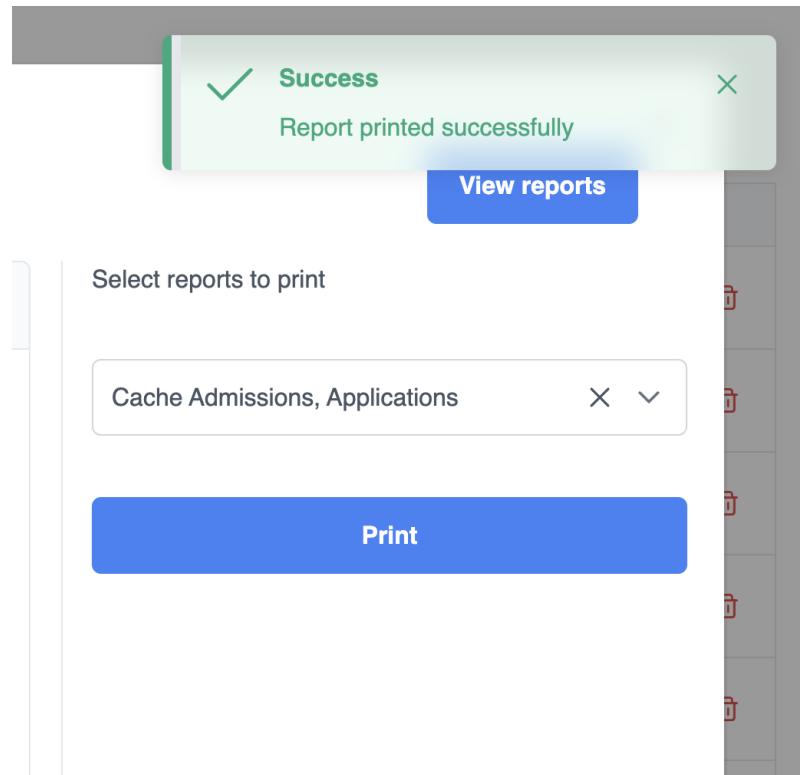


Figure 75: Print confirmation

5.2.2 Analyze output trace

To analyze an output trace click the **Magnifying Glass** or else known as **Search** icon. The usage of this feature is covered in section 3.2.

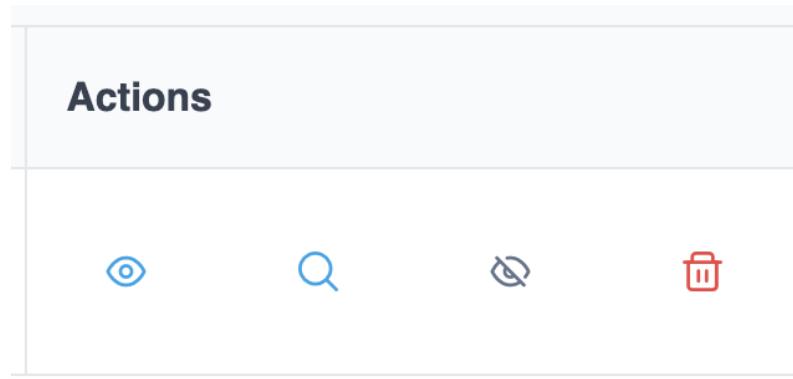


Figure 76: Simulation Actions

5.2.3 Clear Simulation

By clicking the **Crossed Eye** icon users can remove the simulation from the table so it won't be visible in that table anymore. The simulation is still stored.

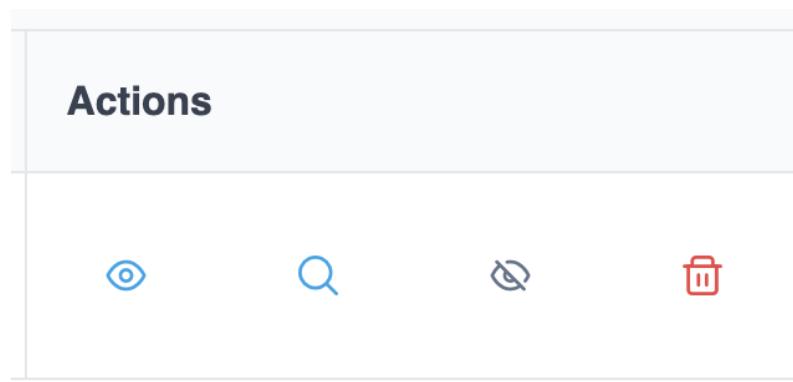


Figure 77: Simulation Actions

5.2.4 Delete Simulation

To delete a simulation

1. Click the **Bin** icon

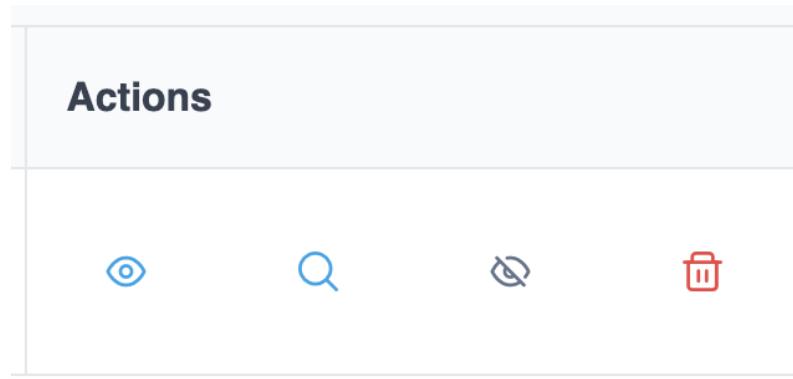


Figure 78: Simulation Actions

2. Click **Yes** to confirm deletion of the simulation or click **No** to cancel.

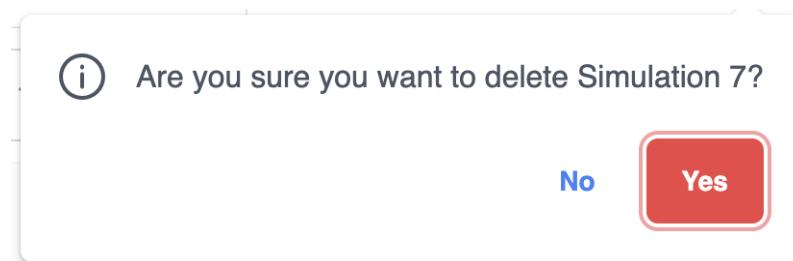


Figure 79: Delete Simulation

5.3 Completed Simulations

To navigate to the completed simulations section where all previous saved simulations are stored click the **Completed Simulations** option from the sidebar on the left

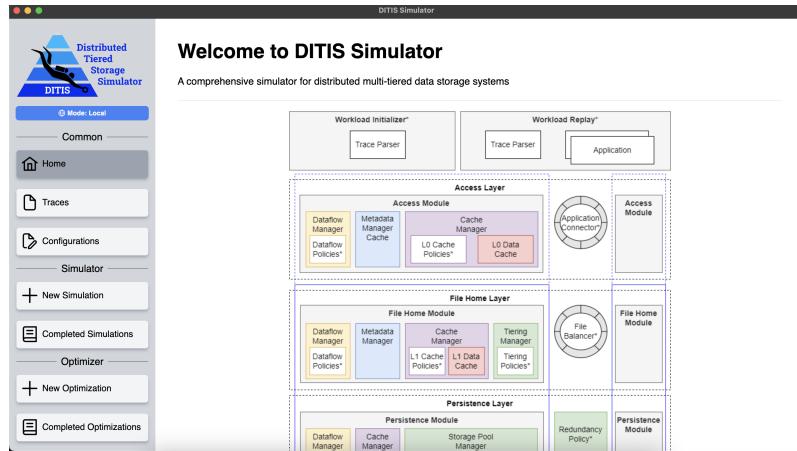


Figure 80: Navigating to new simulation

The actions in the datatable are the same and work in the same way described in section 5.2, except for the **Clear** option.

Completed Simulations						
ID ↴	Name ↑↓	Date ↑↓	Trace ↑↓	Configuration ↑↓	ML Files Enabled	Actions
7	Simulation 7	28/05/2024 21:13	trace1	Default Storage Configuration	✗	🕒 🔍 🗑
6	Test	28/05/2024 20:55	trace1	Default Storage Configuration	✗	🕒 🔍 🗑
5	Test	28/05/2024 20:50	trace1	Default Storage Configuration	✗	🕒 🔍 🗑
4	Test	28/05/2024 20:46	trace1	Default Storage Configuration	✗	🕒 🔍 🗑
3	storage	28/05/2024 20:28	trace1	Default Storage Configuration	✗	🕒 🔍 🗑
2	Simulation 2	28/05/2024 15:09	trace2	Default Storage Configuration	✗	🕒 🔍 🗑
1	Simulation 1	28/05/2024 14:19	trace1	Default Storage Configuration	✗	🕒 🔍 🗑
In total there are 7 simulator runs stored. << < 1 > >> 10 ⏮						

Figure 81: Completed Simulations

6 Optimizations

To start a new optimization, click on the "New Optimization" button in the sidebar. This will take you to the form in Figure 82.

6.1 New Optimization

The screenshot shows the 'New Optimization' form in the DETIS interface. The sidebar on the left is titled 'Mode Local' and contains links for Home, Traces, Configurations, Simulator, New Simulation, Completed Simulations, Optimizer, New Optimization (which is highlighted), and Completed Optimizations. The main area is titled 'New Optimization'. It has four main sections: 'Configurations' (with a dropdown for 'Select Storage Configuration' showing 'Default Storage Configuration'), 'Options' (with fields for 'Name of Optimization' (Please enter name), 'Max Events' (Max Events), 'Max JVM Memory (GB)' (Max JVM Memory (GB)), and checkboxes for 'Generate report files' and 'Generate output trace files'), 'Running Optimizations' (a table with no available options), and 'Trace' (a dropdown for 'Select Trace'). A 'Start Optimizer' button is located at the bottom left of the form.

Figure 82: New Empty Optimization form

The form has four(4) required inputs. The first three(3) are the configurations (storage, optimizer, variance) to be used. The fourth one is the workload trace. All of the above can be selected using the drop-downs as shown in Figure 83.

This screenshot shows the 'New Optimization' form in the DETIS interface, similar to Figure 82 but with the 'Select Variance Configuration' dropdown set to 'GridDefault'. The rest of the form is identical to Figure 82, including the 'Configurations' section with 'Default Storage Configuration' selected, the 'Options' section with the same input fields, the 'Running Optimizations' table, and the 'Trace' section with the 'Select Trace' dropdown.

Figure 83: New Optimization form

Everything that is located in the **Options** window, is not required.

- **Name:** If a name is not given then the application will give it a default "Optimizer " + ID.
- **Max Events:** This puts a limit on how many events (or lines) will be executed from the workload trace. If empty, the entire trace will be executed.
- **JVM Mem:** Should be used in the event that the optimization is too big and runs out of memory.
- **Generate:** The 2 check boxes tell the optimizer to generate the report (creates a report for each simulation that was run) and the output trace files.

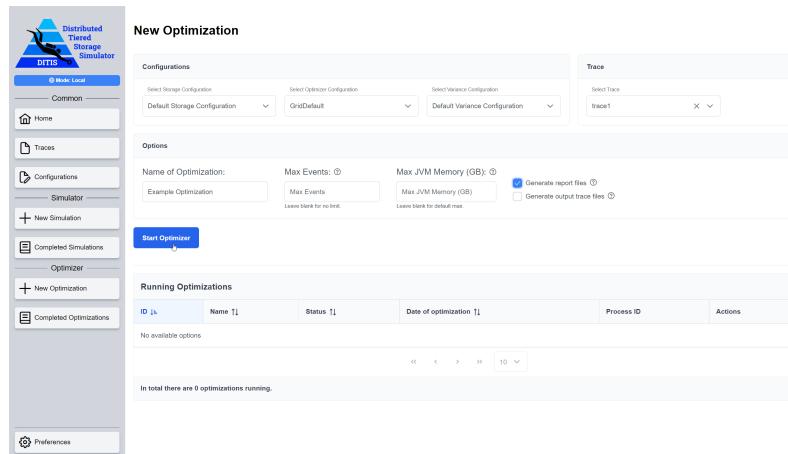


Figure 84: Example Optimization form

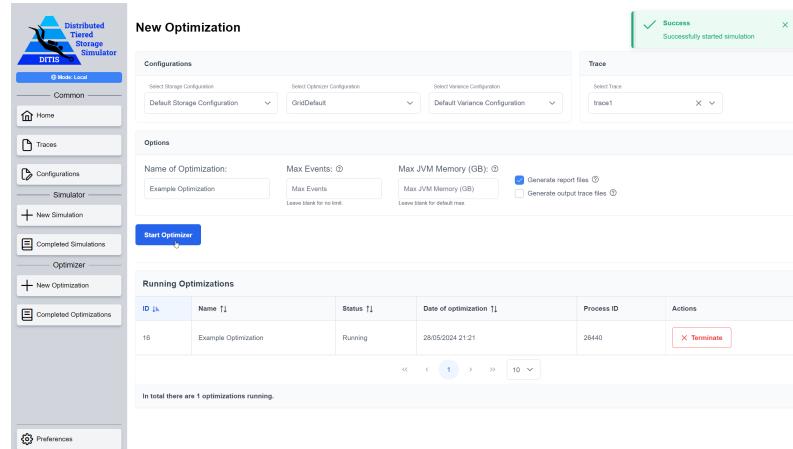


Figure 85: Starting an Optimization

Running Optimizations					
ID	Name	Status	Date of optimization	Process ID	Actions
16	Example Optimization	Running	28/05/2024 21:21	26440	X Terminate
In total there are 1 optimizations running.					

Figure 86: Optimization Finished

The user then has 3 available actions presented to them:

1. The **Magnifying Glass** (1st) is the analyze button that will open the results dialog.
2. The **Eye** (2nd) will clear the optimization from the table. It can be found in the **Completed Optimizations** page.
3. The **Trash** (3rd) will delete the optimization completely.

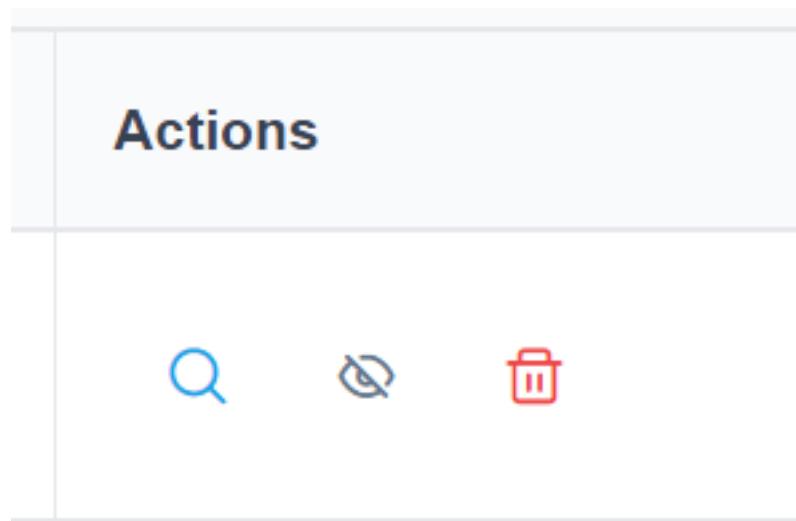


Figure 87: Available Actions

In the event of an error occurring during the optimization, the user has only 2 available options.

1. The **Warning Triangle** (1st) opens a window explaining to the user what the error was (Figure 89), and give him choices in how to proceed.
2. The **Crossed Eye** (2nd) is the clear action, which will just remove the optimization from the table.

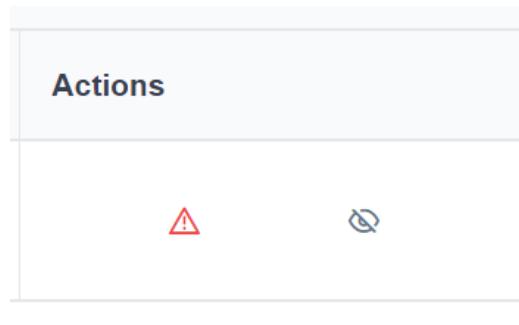


Figure 88: Available Error Actions

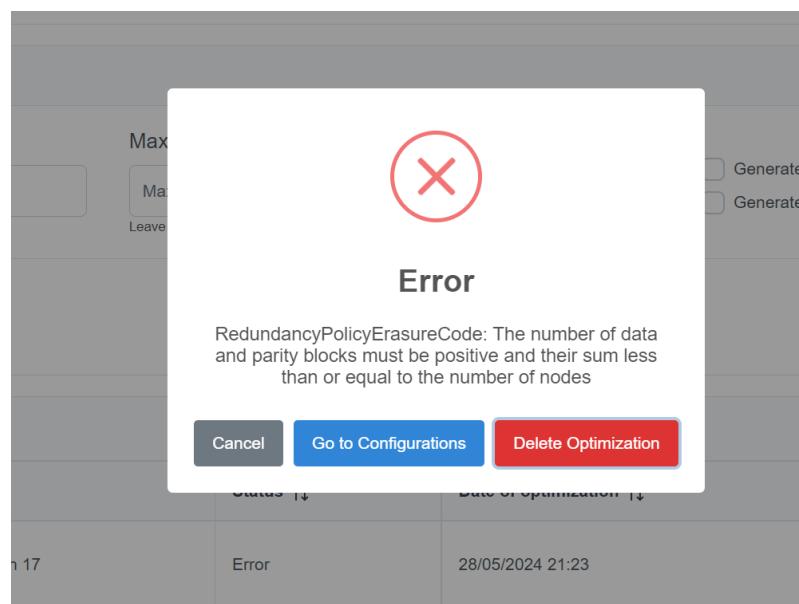


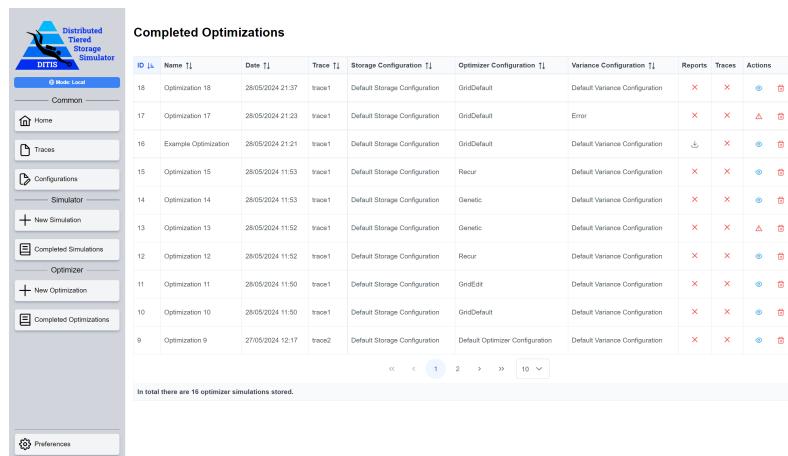
Figure 89: Error popup

6.2 Completed Optimizations

To view all of the completed optimizations, click on the **Completed Optimizations** button in the sidebar. This will take you to the table shown in Figure 90.

Here, there are three available actions:

1. Downloading the reports/traces generated, by pressing the **Download** icon in each respective column.
2. Analysing the optimization using the **Eye** icon. In the case of an error, the analyze icon becomes a **Warning** icon (see Optimization 13) to indicate something went wrong, which brings up the same window as before in Figure 89.
3. Deleting the optimization.



The screenshot shows the 'Completed Optimizations' table within the DITIS interface. The table lists 16 completed optimizations, each with a unique ID, name, date, trace, storage configuration, optimizer configuration, variance configuration, and status regarding reports and traces. The interface includes a sidebar with various navigation options like Home, Traces, Configurations, and Completed Simulations.

ID	Name	Date	Trace	Storage Configuration	Optimizer Configuration	Variance Configuration	Reports	Traces	Actions
18	Optimization 18	28/05/2024 21:37	trace1	Default Storage Configuration	GridDefault	Default Variance Configuration	X	X	⊕ ⊖
17	Optimization 17	28/05/2024 21:23	trace1	Default Storage Configuration	GridDefault	Error	X	X	△ ⊖
16	Example Optimization	28/05/2024 21:21	trace1	Default Storage Configuration	GridDefault	Default Variance Configuration	↓	X	⊕ ⊖
15	Optimization 15	28/05/2024 11:53	trace1	Default Storage Configuration	Recur	Default Variance Configuration	X	X	⊕ ⊖
14	Optimization 14	28/05/2024 11:53	trace1	Default Storage Configuration	Genetic	Default Variance Configuration	X	X	⊕ ⊖
13	Optimization 13	28/05/2024 11:52	trace1	Default Storage Configuration	Genetic	Default Variance Configuration	X	X	△ ⊖
12	Optimization 12	28/05/2024 11:52	trace1	Default Storage Configuration	Recur	Default Variance Configuration	X	X	⊕ ⊖
11	Optimization 11	28/05/2024 11:50	trace1	Default Storage Configuration	GridEdit	Default Variance Configuration	X	X	⊕ ⊖
10	Optimization 10	28/05/2024 11:50	trace1	Default Storage Configuration	GridDefault	Default Variance Configuration	X	X	⊕ ⊖
9	Optimization 9	27/05/2024 12:17	trace2	Default Storage Configuration	Default Optimizer Configuration	Default Variance Configuration	X	X	⊕ ⊖

In total there are 16 optimizer simulations stored.

Figure 90: Completed Optimizations Table

6.3 Optimization Results

Upon click the Analyze button, the user is greeted with this comprehensive table. There are four(4) available options for this table, showcased in the following figures.

Final Results	Columns to Display:	SimulationID Persistence La...	Columns to Freeze:	SimulationID	Extended table
1	60K	2G	120K	4G	4G
2	100K	4G	120K	4G	4G
3	60K	2G	150K	6G	6G
4	100K	4G	150K	6G	6G
5	60K	2G	180K	8G	8G
6	100K	4G	180K	8G	8G
7	60K	2G	120K	4G	4G
8	100K	4G	120K	4G	4G
9	60K	2G	150K	6G	6G
10	100K	4G	150K	6G	6G
11	60K	2G	180K	8G	8G
12	100K	4G	180K	8G	8G
13	60K	2G	120K	4G	4G

Figure 91: Results of the Optimization

6.3.1 Selecting columns to display

The first drop-down (Columns to Display) allows the user to handpick the columns they want to see.

Final Results	Columns to Display:	SimulationID Persistence La...	Columns to Freeze:	SimulationID	Extended table
1	60K	2G	120K	4G	4G
2	100K	4G	120K	4G	4G
3	60K	2G	150K	6G	6G
4	100K	4G	150K	6G	6G
5	60K	2G	180K	8G	8G
6	100K	4G	180K	8G	8G
7	60K	2G	120K	4G	4G
8	100K	4G	120K	4G	4G
9	60K	2G	150K	6G	6G
10	100K	4G	150K	6G	6G
11	60K	2G	180K	8G	8G
12	100K	4G	180K	8G	8G
13	60K	2G	120K	4G	4G

Figure 92: Select the columns to show

6.3.2 Freezing columns

The second drop-down (Columns to Freeze) lets the user freeze columns so when they scroll horizontally the stay visible on the screen.

The screenshot shows the 'Example Optimization Results' interface. At the top, there are tabs for 'Results', 'Analysis', 'Best Config', 'Best Report', and 'Print'. Below these are dropdown menus for 'Columns to Display' and 'Columns to Freeze'. A 'Extended table' toggle switch is also present. The main area displays a table with 13 rows and several columns. A context menu is open over the first two columns of the table, listing options: 'SimulationID', 'Persistence Layer Tiering Hot Tier Media Iops', 'Persistence Layer Tiering Hot Tier Avg Read Bytes Per Sec', and 'File Home Layer Cache Iops'. The 'SimulationID' and 'Persistence Layer Tiering Hot Tier Media Iops' options are selected, indicated by blue checkmarks.

SimulationID	Persistence Layer Tiering Hot Tier Media Iops	Persistence Layer Tiering Hot Tier Avg Read Bytes Per Sec	File Home Layer Cache Iops
1	60K	2G	
2	100K	4G	
3	60K	2G	
4	100K	4G	
5	60K	2G	180K
6	100K	4G	180K
7	60K	2G	120K
8	100K	4G	120K
9	60K	2G	150K
10	100K	4G	150K
11	60K	2G	180K
12	100K	4G	180K
13	60K	2G	120K

Figure 93: Select the columns to freeze

6.3.3 Extended Table

The third option which is a toggle, enables/disables the extended table. The extended table includes both the parameter (blue) columns as well as the metric (green) columns, while when disabled, only the metric columns are shown.

The screenshot shows the 'Example Optimization Results' interface with the 'Extended table' toggle switch turned on. This results in a table with 13 rows and 10 columns. The columns are labeled: SimulationID, Workload Read Latency, Workload Write Latency, Workload Read Iops, Workload Write Iops, Workload Read Throughput, Workload Write Throughput, and Workload Simulated Runtime. The first two columns (SimulationID and Workload Read Latency) are frozen, while the remaining eight columns are metric columns.

SimulationID	Workload Read Latency	Workload Write Latency	Workload Read Iops	Workload Write Iops	Workload Read Throughput	Workload Write Throughput	Workload Simulated Runtime
1	013	0	541	0	373	0	991
2	013	0	698	0	813	0	991
3	016	0	239	0	693	0	991
4	016	0	816	0	684	0	991
5	017	0	481	0	470	0	991
6	017	0	318	0	117	0	991
7	011	0	902	0	866	0	991
8	011	0	311	0	470	0	991
9	014	0	384	0	555	0	991
10	014	0	577	0	818	0	991
11	015	0	369	0	550	0	991
12	015	0	669	0	987	0	991
13	011	0	573	0	389	0	991

Figure 94: Show Extended table

6.3.4 Downloading results

The final action available to the user is a button that lets them download the table in the form of a csv file for any other uses they like.

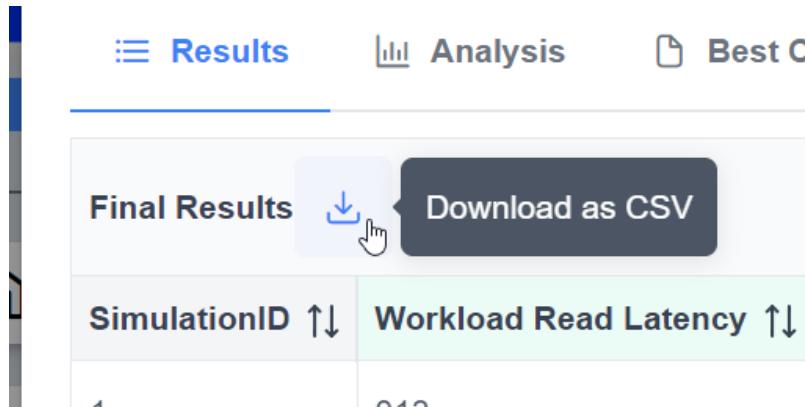


Figure 95: Download the table as a csv file

6.4 Optimization Analysis

6.4.1 Setting up views

When the analysis view is opened for the first time it will be empty like the one in Figure 96

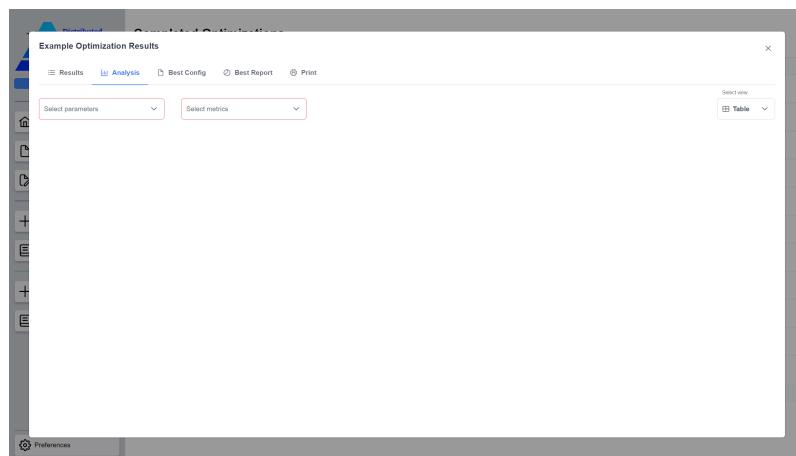


Figure 96: Empty analysis view

Selecting parameters and metrics

The first required drop-down are the parameters that are used for the comparison.

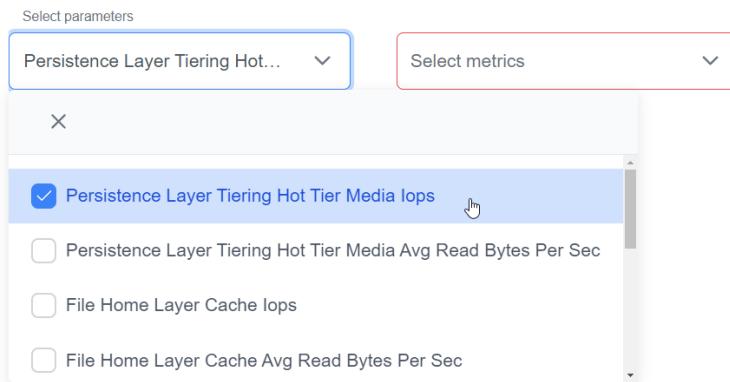


Figure 97: Selecting parameters to compare

The second required drop-down are the metrics that are available to the user.

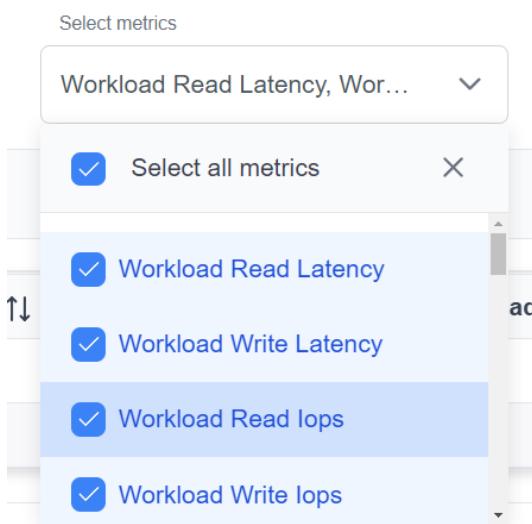


Figure 98: Selecting metrics to show

Selecting view

By default the first view shown are tables, but there is the option of bar charts, and box-plots.

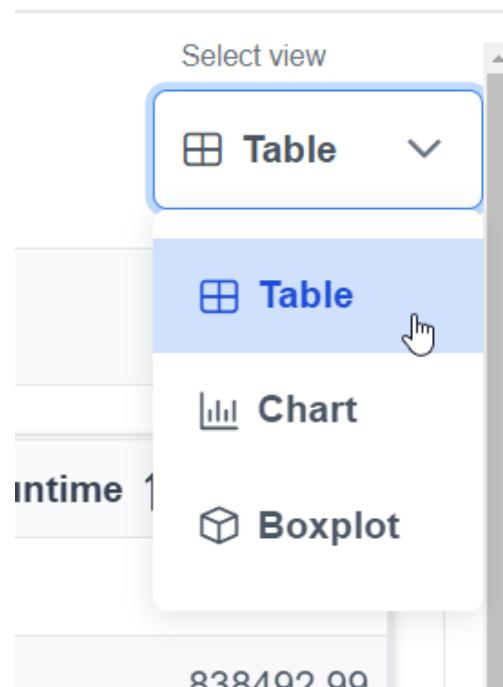


Figure 99: Selecting the type of view

Selecting chart size

For the bar charts and box-plots, their size can be selected using chart size drop-down. Small means there will be 4 charts per row, Medium will be 3, up to Extra Large which is one graph per row.

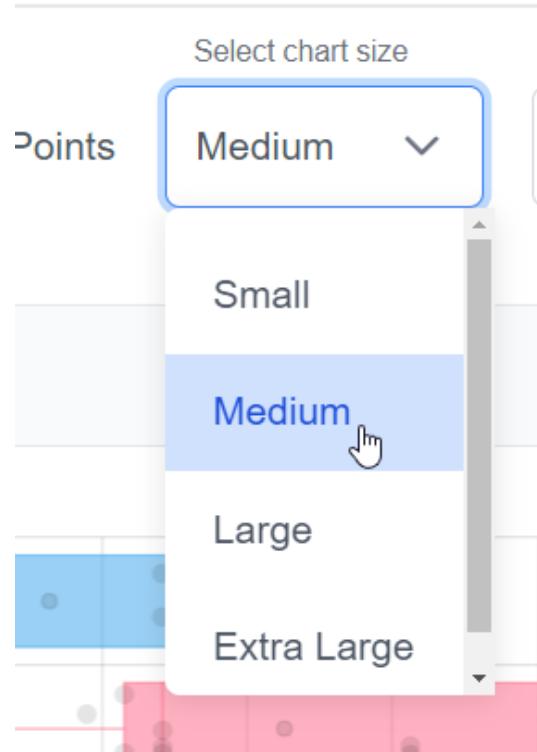


Figure 100: Selecting the size

6.4.2 Available views

The first view as mentioned earlier is the results in a table view, where columns can be sorted as preferred.

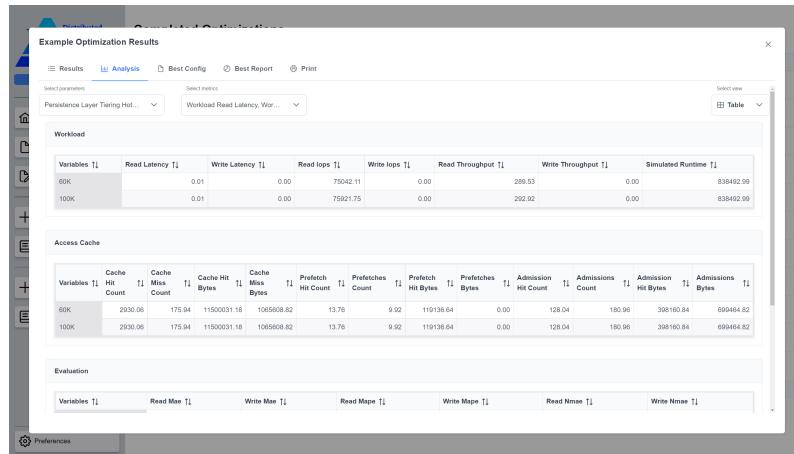


Figure 101: Table view

The second view, shows the results in bar charts, where the results are averaged.

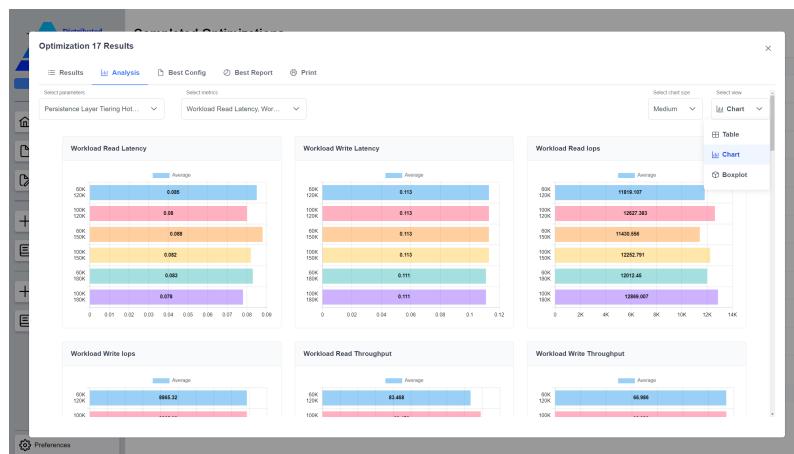


Figure 102: Bar chart view

The third and final view option, are box-plots, which have a lot more detail and are more comprehensive.

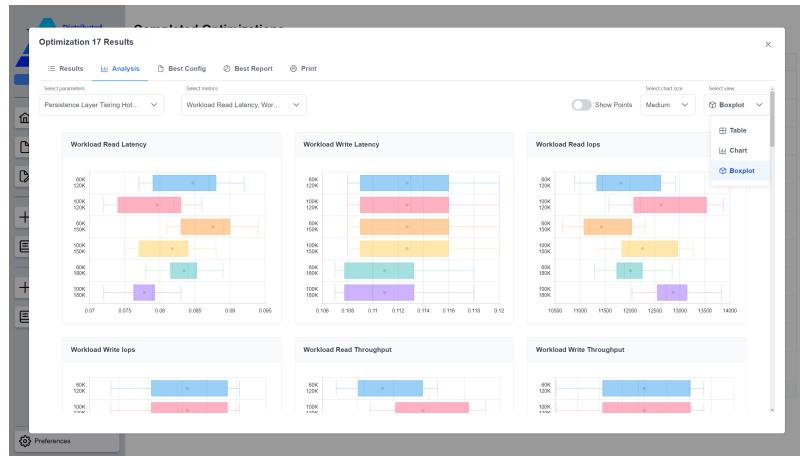


Figure 103: Box-plot view

Upon hovering over a box, the user can get all of the statistics they need such as minimum, maximum, mean and more.

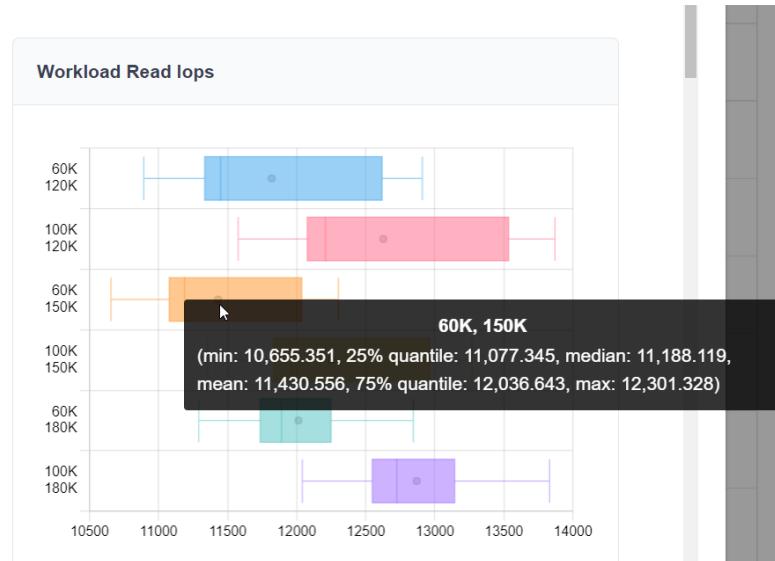


Figure 104: Hovering over a box shows details

6.5 Best Configuration

The **Best Config** tab loads the configuration form, of the best simulation found by the Optimizer. This form is explained in detail in section 4.1.

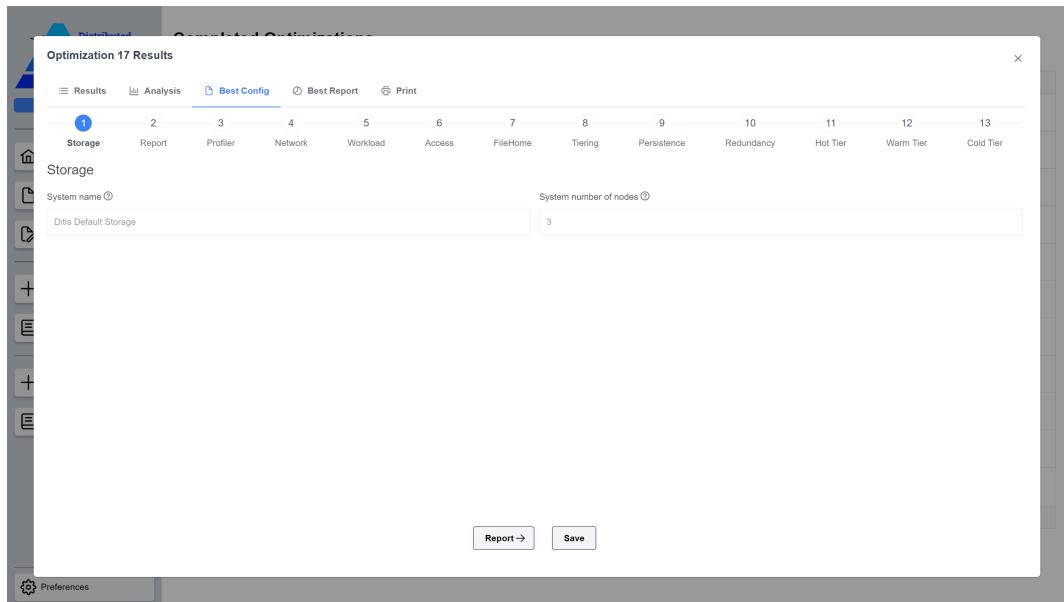


Figure 105: Best Config Tab

6.6 Best Simulation Report

The **Best Report** tab loads the report of the best simulation that was found by the Optimizer. This report is explained in detail in section 5.2.1.

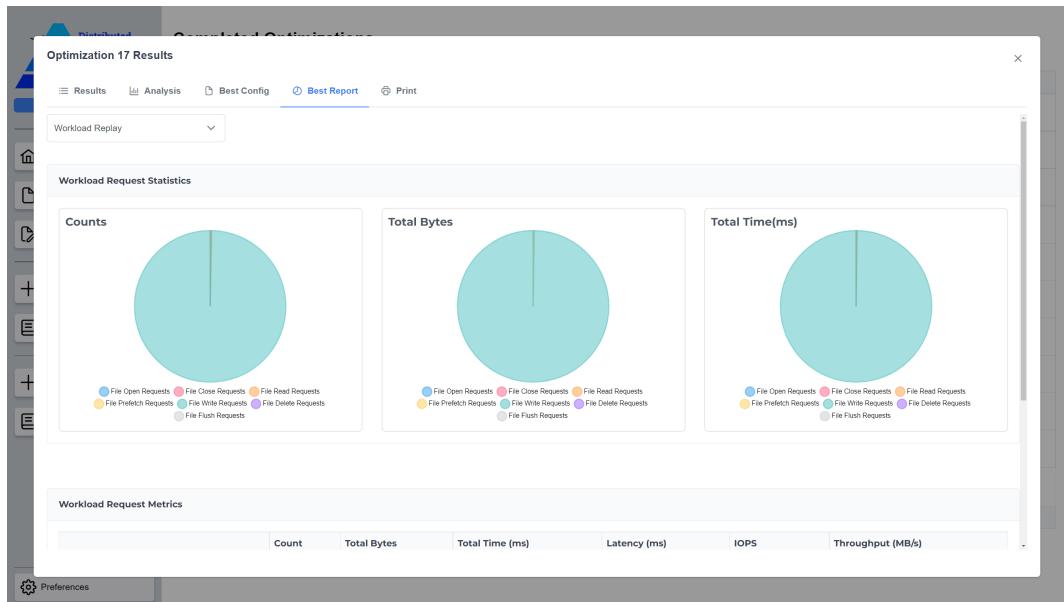


Figure 106: Best Simulator Tab

6.7 Exporting Optimization Report

To export an analysis report, the user must select the modules (views) they want. Just like in the Analysis tab, the parameters and metrics are selected for the report.

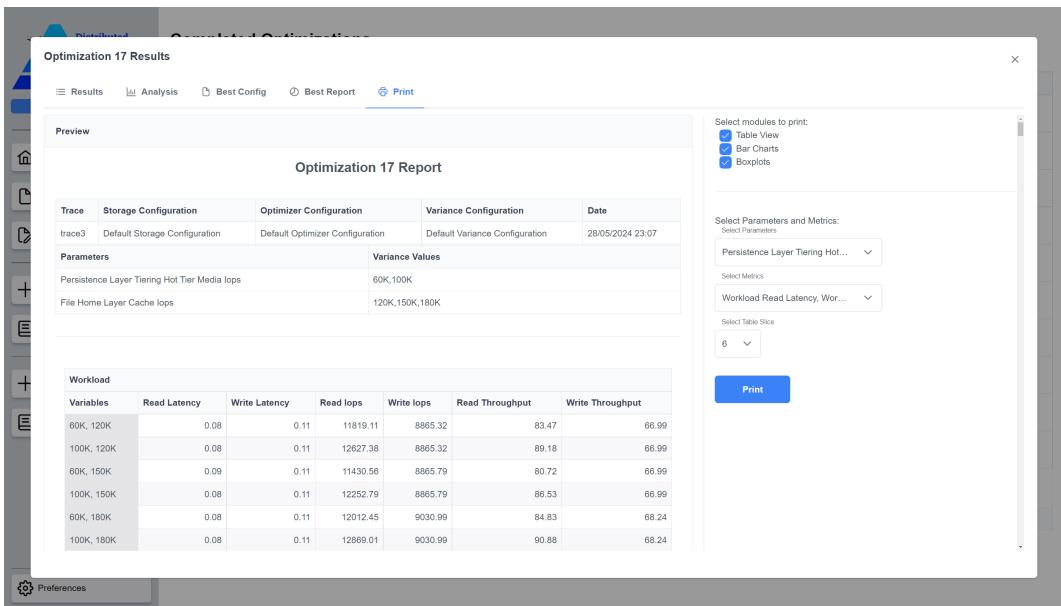
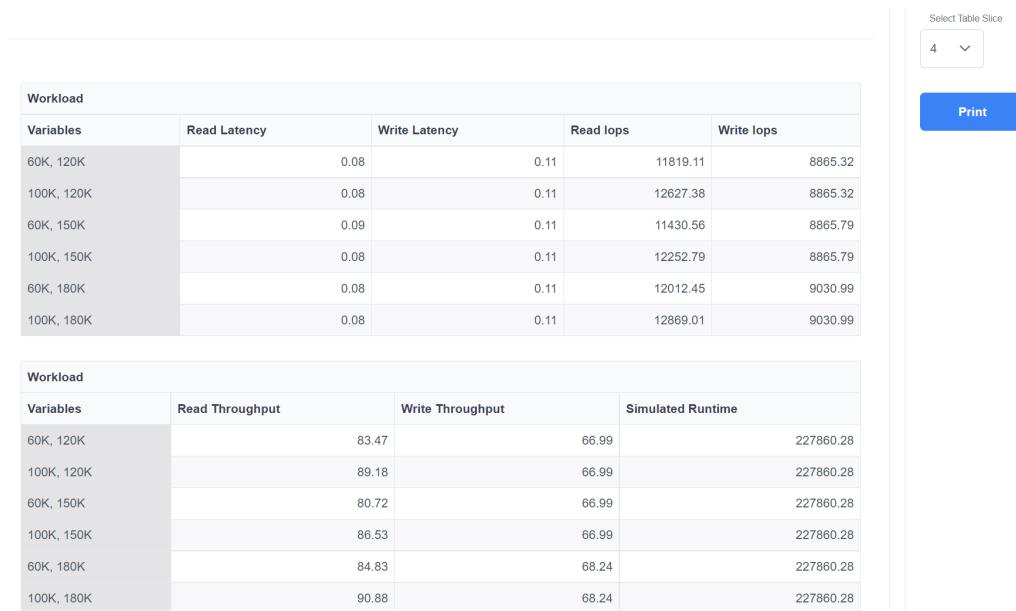


Figure 107: Export Tab

6.7.1 Table slice

The Table slice option, is used in the case of data being too big for the table. As there is no overflow in reports, we need to limit the amount of columns in a table and split it into two. This table slice is the limit of the columns allowed. In the Figure 108, the slice of 4 is used, so the first table only has 4 columns excluding the Variables column.



The screenshot shows a software interface with two tables and a configuration panel. The top table is titled 'Workload' and contains data for various variable combinations (e.g., 60K, 120K; 100K, 120K) across four metrics: Read Latency, Write Latency, Read IOPS, and Write IOPS. The bottom table is also titled 'Workload' and contains data for the same variable combinations across three metrics: Read Throughput, Write Throughput, and Simulated Runtime. A dropdown menu labeled 'Select Table Slice' is open, showing the value '4'. A blue 'Print' button is visible on the right.

Workload				
Variables	Read Latency	Write Latency	Read Iops	Write Iops
60K, 120K	0.08	0.11	11819.11	8865.32
100K, 120K	0.08	0.11	12627.38	8865.32
60K, 150K	0.09	0.11	11430.56	8865.79
100K, 150K	0.08	0.11	12252.79	8865.79
60K, 180K	0.08	0.11	12012.45	9030.99
100K, 180K	0.08	0.11	12869.01	9030.99

Workload			
Variables	Read Throughput	Write Throughput	Simulated Runtime
60K, 120K	83.47	66.99	227860.28
100K, 120K	89.18	66.99	227860.28
60K, 150K	80.72	66.99	227860.28
100K, 150K	86.53	66.99	227860.28
60K, 180K	84.83	68.24	227860.28
100K, 180K	90.88	68.24	227860.28

Figure 108: Export Slice option

7 Preferences

To navigate to the preferences page, click on the "Preferences" button in the sidebar at the bottom as shown in Figure 109.

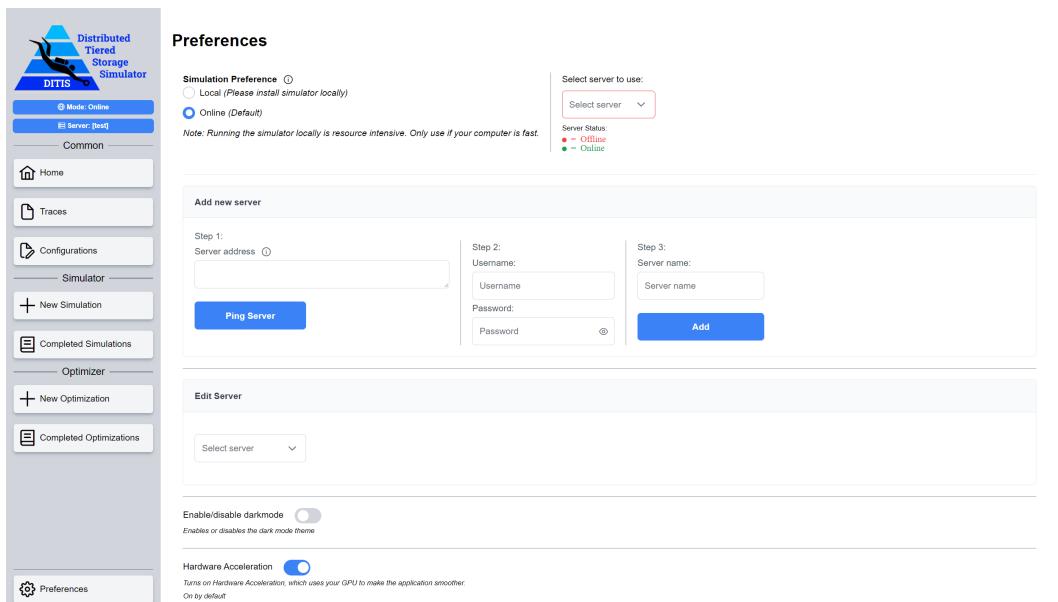


Figure 109: Preferences Page

7.1 Online Mode

By default, the Simulation Preference is set to Online. This can be changed by selecting the **Local** mode instead.

- Simulation Preference** ⓘ
- Local (*Please install simulator locally*)
 - Online (*Default*)

Figure 110: Simulation Preference set to Online

7.1.1 Adding a server

This section is discussed in detail in section 2.2.1.

7.1.2 Editing a server

To edit a server, click on the drop-down and select the server you want to edit.

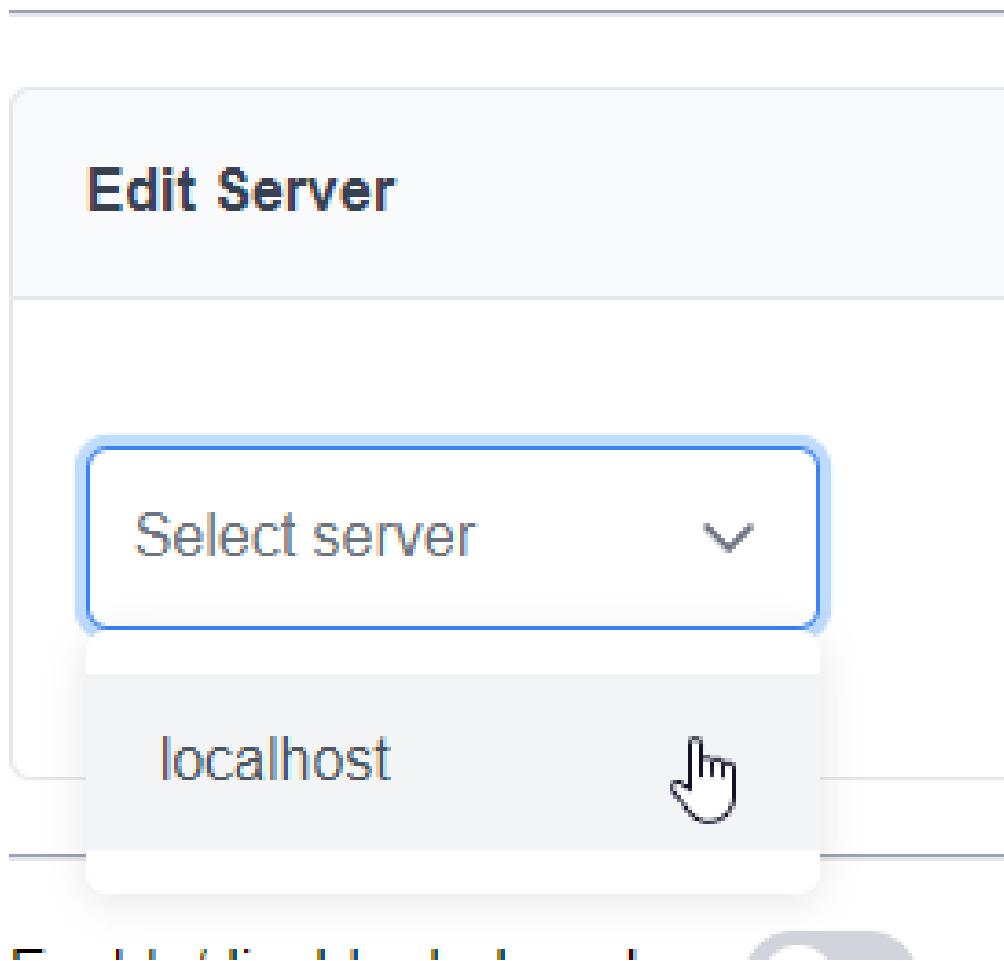


Figure 111: Selecting a server to edit

There are a few options in this form.

1. **Changing user:** Here you can change accounts that are on the same server.
2. **Server address:** If the server address changed, then this is where you change it.
3. **Server Name:** The stored server name can be changed as well using the field.
4. **Deleting the server:** Using the button you can remove the server from the list.

The screenshot shows a web-based 'Edit Server' form. At the top left is a title 'Edit Server'. Below it is a dropdown menu showing 'localhost' with an 'X' and a downward arrow icon. To its right are two buttons: a blue 'Change user' button with a person icon and a red 'Delete Saved Server' button with a trash bin icon. The main area contains two input fields. On the left, a 'Server address' field with a help icon (ⓘ) contains the value 'http://localhost:443'. On the right, a 'Server name:' field contains the value 'localhost'. At the bottom left is a blue 'Ping Server' button, and at the bottom right is a blue 'Save Changes' button.

Figure 112: Edit form

7.1.3 Changing user

Once the **Change user** button is pressed, the following window appears (Figure 113). Here the same rules apply as when adding a server. You can log in to an existing account, or create one using the key provided by the administrator as shown in Figure 114.

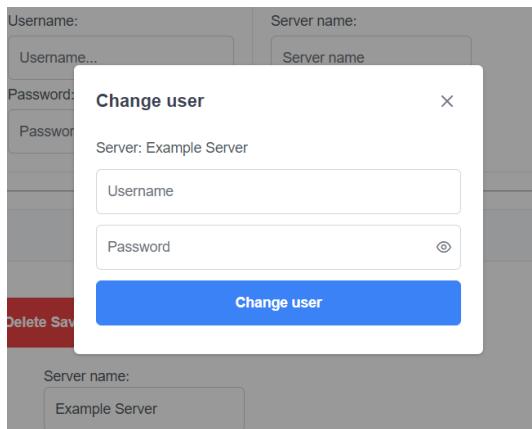


Figure 113: Change user form

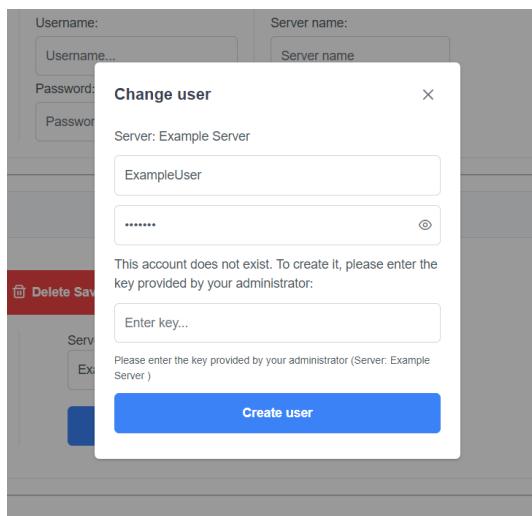


Figure 114: Creating a new user

7.1.4 Deleting a server

To delete a server, simply click select the **Delete Saved Server** in the Edit form, and click **Yes**.

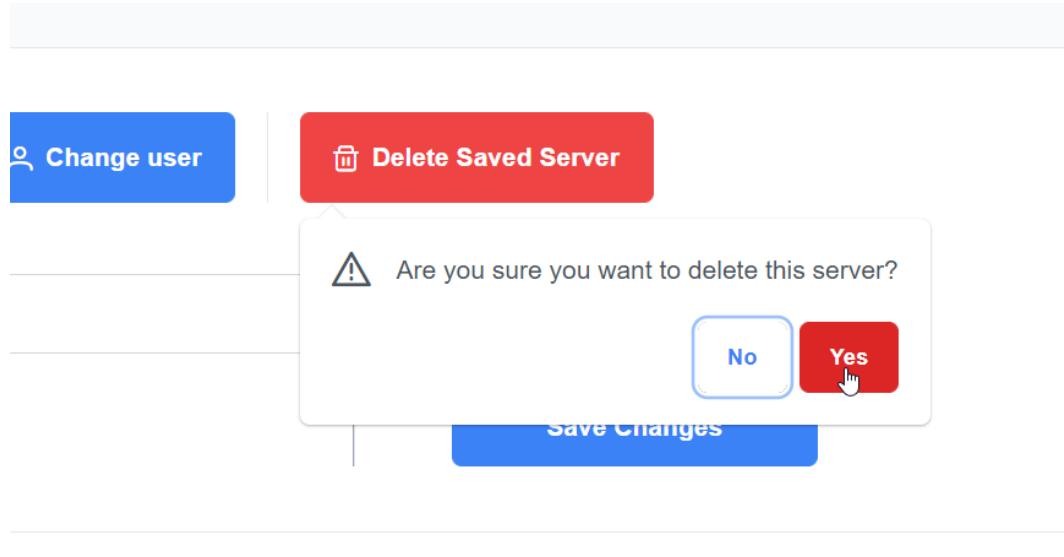


Figure 115: Deleting a server

When deleting a server, a choice appears on the screen. Here you can delete the server from your list, but maintain the data on the server, or you can also delete/clear your data on the server.

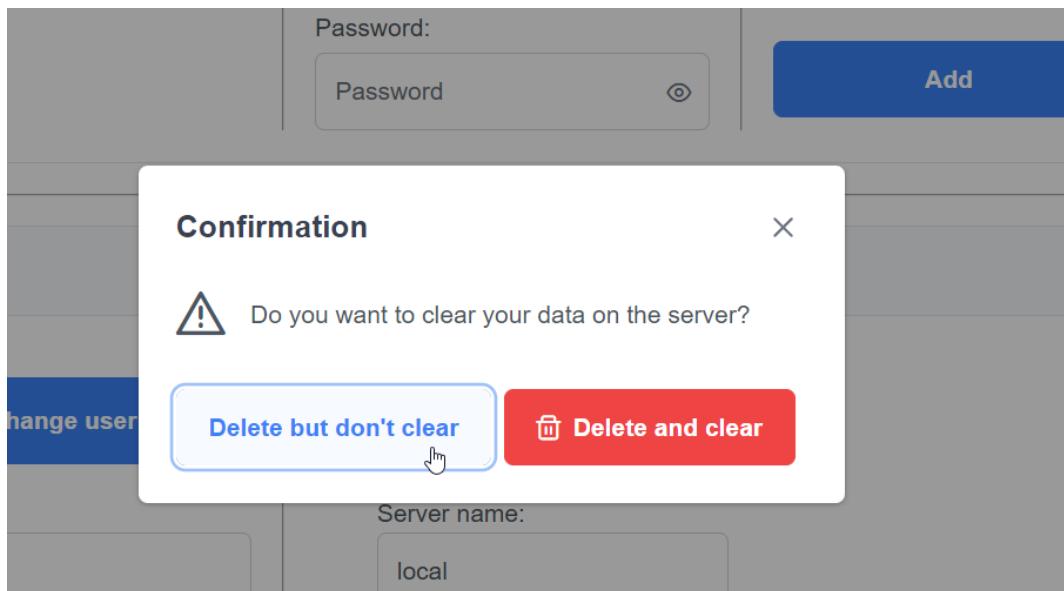


Figure 116: Clearing stored data

If the server deleted was in use, then a warning will appear in the top right of the screen as shown in Figure 117.

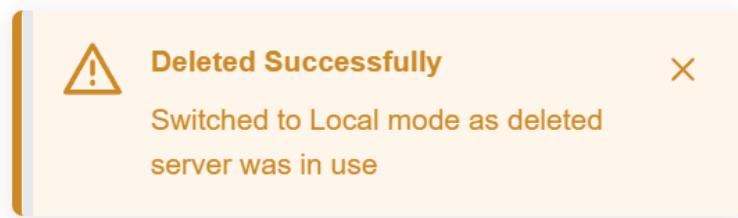


Figure 117: Deleted server was being used

7.2 Local Mode

7.2.1 Simulator Manager

This section is discussed in detail in section 2.2.2.

One additional feature of the Manager, is the ability to check for any updates to the simulator. If your version is up to date then popup like the one in Figure 118 is shown.

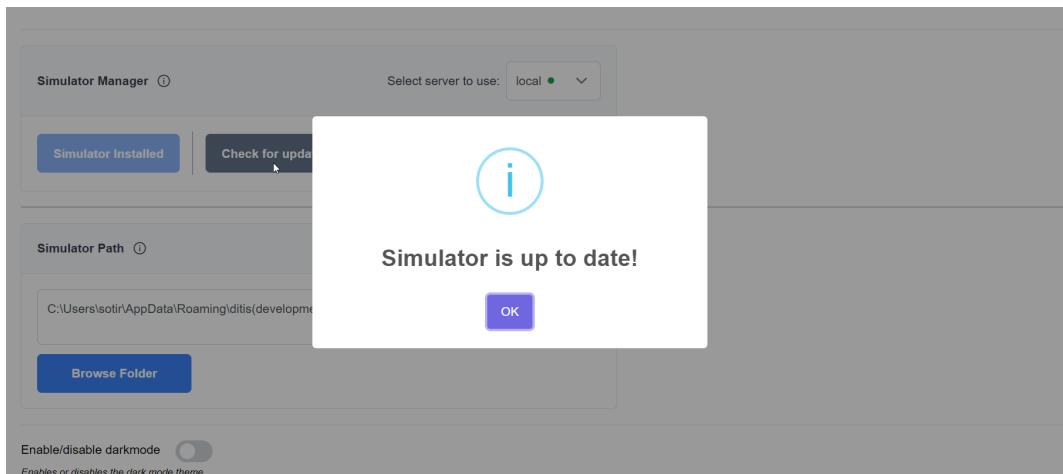


Figure 118: Simulator up to date

7.2.2 Removing the Simulator

To remove the Simulator from the Application, click on the **Remove Simulator** button on the Simulator Manager as shown in Figure 119. If you click **Yes**, there are two possible scenarios:

1. If the Simulator was installed via the Manager, then it will be unlinked and the files will be deleted.
2. If the Simulator was added manually through the **Simulator Path** section, then it will be only unlinked from the Application, but files will **not** be deleted.

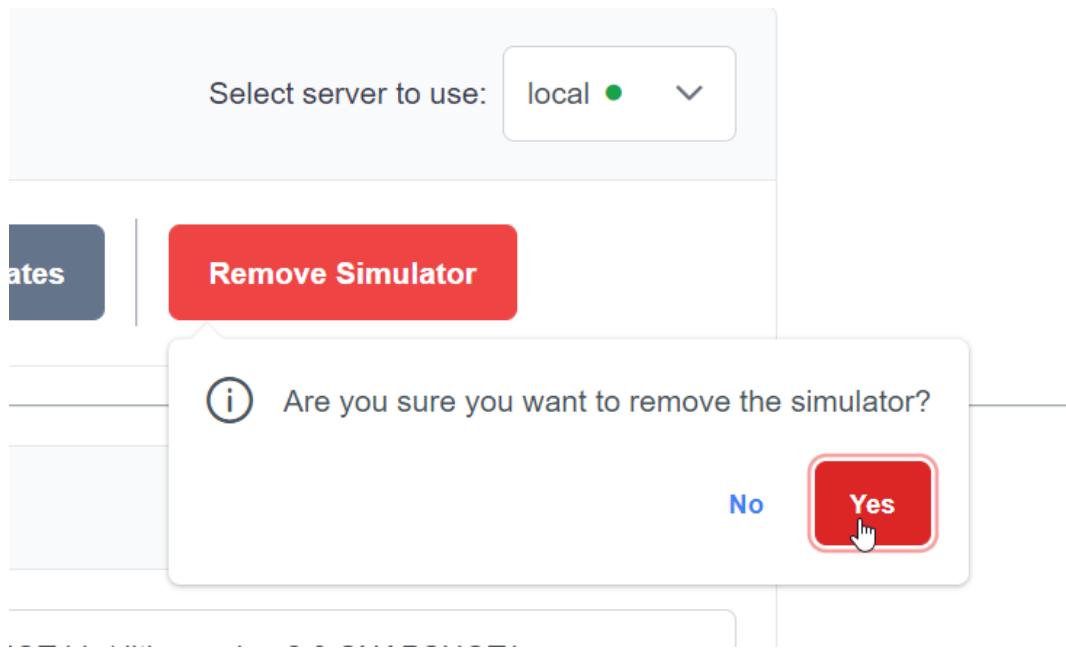


Figure 119: Removing the simulator

7.2.3 Simulator Path

This section is discussed in detail in section 2.2.2.

7.2.4 Other Options

At the bottom of the preferences page, there are two available general options

1. The first one enables the darkmode theme of the application.
2. The second one, disables (enabled by default) hardware acceleration for rendering. Only to be used for compatibility.

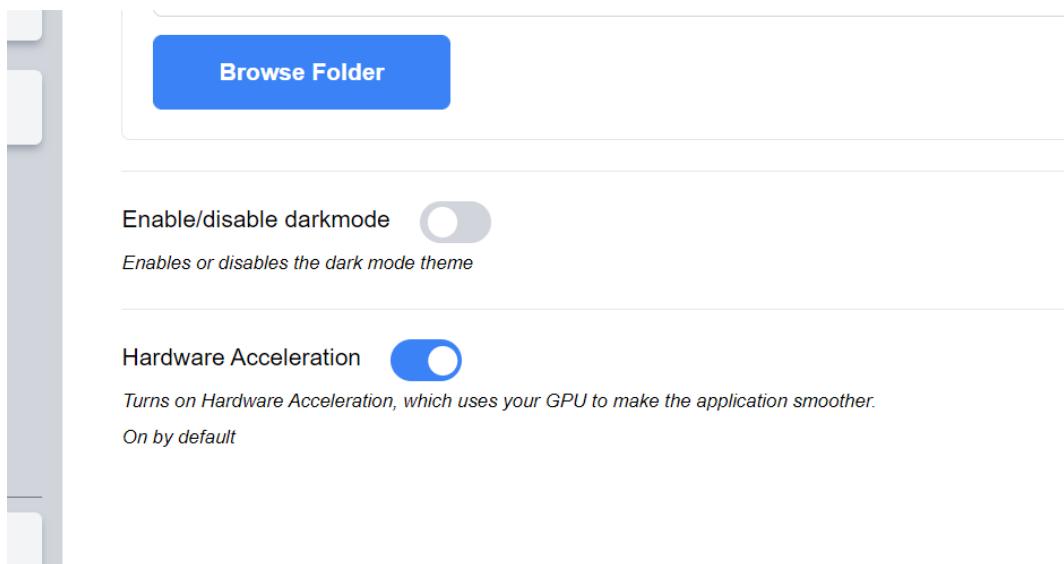


Figure 120: Other options available