

JobServer and TaskServer Security

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1 Introduction

The JobServer is designed to facilitate data exchange between the user interface and the TaskServer; it also allows you to get quick access to monitor the progress of your computations, even if you are away from the originating machine. You can equally share results and models with your coworkers.

The JobServer offers both insecure and secure communication (HTTP and HTTPS, respectively). The latter requires that you install a proper security certificate on JobServer and TaskServers. *MedeA* provides a placeholder certificate, which works to show functionality, but does not offer any security at all.

In addition to securing the communication, the JobServer can require usernames and password, and restricts each user to see and control his or her jobs only.

If security reasons require you to keep results confidential, consider certain possibilities when installing *MedeA*, including to limit access to compute servers involved in generating and executing your calculations and secure the communication between those compute nodes and require usernames.

Please keep in mind that if you forget the password to access and administrate the JobServer you would not be able to access the JobServer at all. Your results and calculations unless an admin user resets your password. An admin user can also delete the `Users.dat` file in *MD/JobServer* to wipe out the saved usernames and passwords.

2 Securing the JobServer and TaskServer with HTTPS

The following section is for IT administrators and persons with a solid understanding of securing web server.

Before securing the JobServer, make sure that the installation works for more than one user. Once this setup is sufficiently tested, you can continue to secure the *MedeA Environment* with the following steps:

1. Obtain a valid SSL certificate and save that on the
 - JobServer as the file *JobServer.pem* in the directory *JobServer/certificates* of the JobServer installation directory
 - TaskServer as the file *TaskServer.pem* in the directory *TaskServer/certificates* of the TaskServer installation directory

Each *.pem* file must contain a private key and an SSL certificate.

2. Change the communication protocol of every TaskServer from HTTP to HTTPS
3. Edit the URL of every TaskServer that is registered at the JobServer such that the communication protocol is HTTPS

4. Change the communication protocol of the JobServer from HTTP to HTTPS
5. In the *MedeA GUI* change the communication protocol of the JobServer from HTTP to HTTPS.

2.1 TaskServers: Change Their Address from HTTP to HTTPS

1. In a web browser navigate to the administration section of a TaskServer, e.g., open the URL <https://localhost:23000/ServerAdmin/manager.tml>
2. In the administration section add a mark to the check box of the option Use https rather than the less secure http

https	<input checked="" type="checkbox"/> Use https rather than the less secure http.
Webmaster	<input type="text" value="Support@MaterialsDesign.com"/>

3. Confirm the modification with **Apply** button. The resulting page should look as follows:

TaskServer Home	Tasks	Administration	http://
Users	JobServers	Log	
<p>The TaskServer needs to restart to switch to https. It will stop now, and you will need to restart the TaskServer and go to https://localhost:23000/ServerAdmin/manager.tml to continue!</p>			
Users	JobServers	Log	
TaskServer Home	Tasks	Administration	http://

4. Follow the instructions and restart the TaskServer
5. After the restart use a web browser to access the TaskServer with the URL <https://localhost:23000>

Note: In case you are using the placeholder certificate then the web browser informs you about a potential security risk to open the URL. Accept the risk and continue. On the final page a section of the upper and lower bars are highlighted in red to indicate that the used certificate has an issue and does not guarantee the expected security.

TaskServer Home	Tasks	Administration	https://localhost:23000/ServerAdmin/manager.tml 2023-04-21 06:26:31
Users	JobServers	Log	
<p>This page allows you to manage the TaskServer on this machine. Use the area below to change the settings of parameters that affect how the TaskServer runs.</p>			

2.2 JobServer: Change the Address of TaskServers from HTTP to HTTPS

1. In a web browser navigate to the administration section of the JobServer, e.g., <http://localhost:32000/ServerAdmin/manager.tml>
2. In the green bar click on the link **Manage** TaskServers; that opens the URL <http://localhost:32010/ServerAdmin/taskserver.tml>

JobServer Home	Summary	Jobs	Administration	Documentation	http://Precision-7550 -- v3.7.0.19278	2023-04-21 06:48:01
Manage TaskServers	Queues	TaskServers	Users	Log		

This page allows you to manage the Task Servers this Job Server uses.

Add Task Server

Use this section to add a new task server. The name is a convenient description that is used just for display. The url should have the form `http://<machine or ip address>.port`. By default, task servers listen on port 23000.

Name:	<input type="text"/>
Url:	<input type="text" value="http://<machine>:23000"/> <input type="button" value="Add"/>

Name	URL	Active	Status	Check?	Change?
local	http://localhost:23000	✓	up	<input type="button" value="Check"/>	<input type="button" value="Change"/>

JobServer Home	Summary	Jobs	Administration	Documentation	http://Precision-7550 -- v3.7.0.19278	2023-04-21 06:48:01
Manage TaskServers	Queues	TaskServers	Users	Log		

- In the table of registered TaskServers at the bottom of the page, click on the **Change** button. In the next page change the communication protocol from e.g., `http://localhost:23000` to `https://localhost:23000`.

Change Task Server

Use this section to change the information about the task server. The name is a convenient description that is used just for display. The url should have the form `http://<machine or ip address>.port`. By default, task servers listen on port 23000.

Name:	<input type="text" value="local"/>
Url:	<input type="text" value="http://localhost:23000"/>
Active:	<input checked="" type="checkbox"/>
<input type="button" value="Update"/>	

- Confirm the modification with the **Update** button.
- In the table of registered TaskServers at the bottom of the next page, click on the **Check** button to see whether the modified TaskServer is up, active, and accessible. You can check the latter by clicking the link that is in the table cell of the column **Name**.

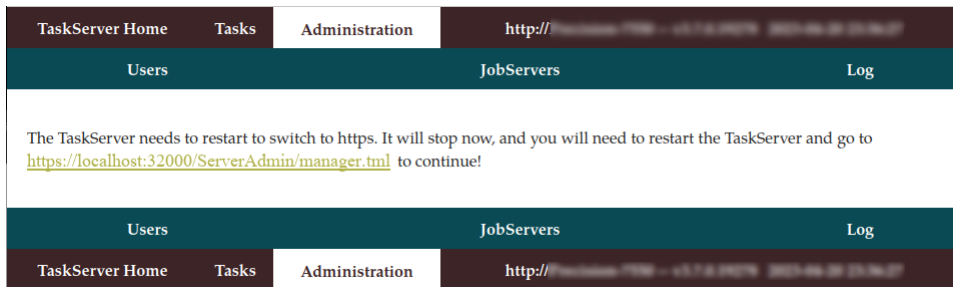
2.3 JobServer: Change the Address from HTTP to HTTPS

- In a web browser navigate to the administration section of the JobServer, e.g., open the URL `http://localhost:32000/ServerAdmin/manager.tml`
- In the administration section add a mark to the check box of the option **Use https rather than the less secure http**

Control Parameters

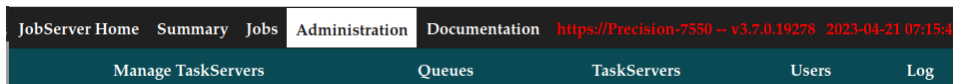
Parameter	Value
Whether to automatically restart interrupted jobs	<input type="checkbox"/>
Log Level	notice <input type="button" value="v"/>
Host address	<input type="text" value="localhost"/>
Port	<input type="text" value="32010"/> The port to listen on (default is 32000).
Use https rather than the less secure http.	<input checked="" type="checkbox"/>
Jobs directory	<input type="text" value="/apps/MedeAJobs/Jobs"/>
Webmaster	<input type="text" value="Support@MaterialsDesign.com"/>

3. Confirm the modification with **Apply** button. The resulting page should look as follows:



4. Follow the instructions and restart the JobServer
5. After the restart use a web browser to access the JobServer with the URL <https://localhost:32000>

Note: In case you are using the placeholder certificate then the web browser informs you about a potential security risk to open the URL. Accept the risk and continue. On the final page a section of the upper and lower bars are highlighted in red to indicate that the used certificate has an issue and does not guarantee the expected security.



2.4 MedeA GUI: Change the Address of the JobServer from HTTP to HTTPS

In the *MedeA GUI* modify the address (URL) of the JobServer:

1. **File** >> **Preferences...**
2. Click on **Add** to create a new row with empty fields
3. In the JobServer tab register the secure JobServer: add an informative name (e.g. `SecureJobServer` and the URL `https://localhost:32000`
4. Confirm the modification with **OK**

3 Securing the JobServer and TaskServer with Username/Password Authentication

The following section is for IT administrators and persons with a solid understanding of securing web server.

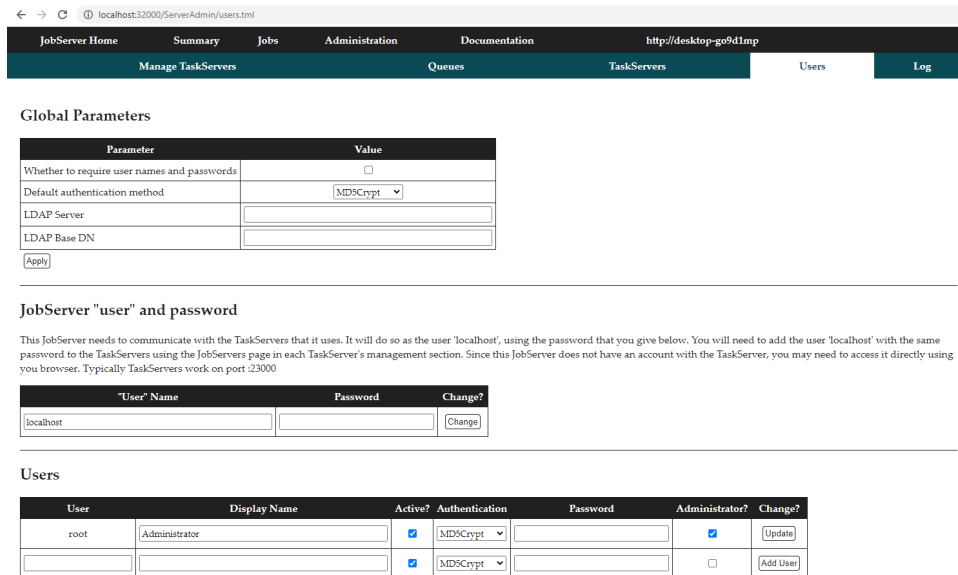
Before securing the JobServer, make sure that the installation works for more than one user and the queuing system integration is completed, which means each user needs at least one separate TaskServer. You can use the MDMaintenance program to set up multiple TaskServers from a shared directory and run them as different user instances. Once this setup is sufficiently tested, you can continue to secure the *MedeA Environment* with the following steps:

1. Add usernames to the JobServer
2. Add usernames to the TaskServers
3. Turn on username/password authentication on JobServer
4. Turn on username/password authentication on TaskServer

Note: Using usernames and passwords does not require to enable the secure communication protocol HTTPS.

3.1 JobServer: Users Administration to Define Authorized Users

Navigate to the *Users* page of the JobServer (<http://localhost:32000/ServerAdmin/users.tml>).



The screenshot shows the JobServer administration interface. At the top, there is a navigation bar with tabs for JobServer Home, Summary, Jobs, Administration, Documentation, TaskServers, Users, and Log. The 'Users' tab is selected. Below the navigation bar, there are three main sections:

- Global Parameters:** A table with two columns: Parameter and Value. It includes fields for 'Whether to require user names and passwords' (checkbox), 'Default authentication method' (MD5Crypt dropdown), 'LDAP Server' (text input), and 'LDAP Base DN' (text input). An 'Apply' button is at the bottom.
- JobServer "user" and password:** A section with a text block explaining that the JobServer needs to communicate with TaskServers using a 'localhost' user. Below this is a table with columns for 'User Name', 'Password', and 'Change?'. The 'User Name' field contains 'localhost' and there is a 'Change' button.
- Users:** A table with columns: User, Display Name, Active?, Authentication, Password, Administrator?, and Change?. It shows a 'root' user with 'Administrator' as the display name, active status, MD5Crypt authentication, and administrator privileges. There is an 'Update' button for the root user and an 'Add User' button at the bottom right.

In the first section, **Global Parameters**, define whether and how to require usernames and passwords. You can choose between the authentication methods `md5crypt`, `apachecrypt`, or `LDAP`. In case of the two former methods you can set the credentials of users in the *Users* pages of the JobServer administration. If the authentication method is set to `LDAP` then the credentials of users is defined by your system-wide directory of user credentials.

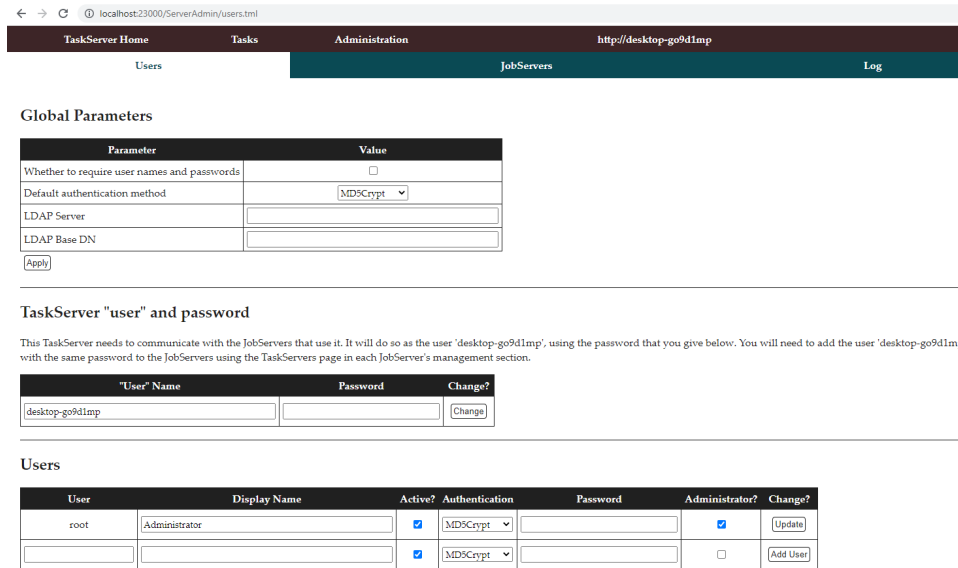
Note: Currently, JobServer and TaskServer only support *OpenLDAP* and not *Microsoft Active Directory*.

When requiring usernames, you must provide a shared entity to communicate between JobServer and TaskServers in the central section **JobServer "user" and password**, that is the "JobServer" "user".

In the section **Users** at the bottom, you can add the users allowed to work on this JobServer; if not provided by *LDAP*, the usernames and passwords must be entered here.

3.2 TaskServer: Users Administration to Define Authorized Users

Continue with defining users for the TaskServer. Navigate to the User page of the TaskServer (<http://localhost:23000/ServerAdmin/users.tml>).



The screenshot shows the 'users.html' page in the TaskServer administration interface. It includes a navigation bar with 'TaskServer Home', 'Tasks', 'Administration', and 'http://desktop-go9d1mp'. The 'Users' tab is active. Below the navigation bar, there are three main sections:

- Global Parameters:** A table with columns 'Parameter' and 'Value'. Parameters include 'Whether to require user names and passwords' (checkbox), 'Default authentication method' (MD5Crypt dropdown), 'LDAP Server' (text input), and 'LDAP Base DN' (text input). An 'Apply' button is at the bottom.
- TaskServer "user" and password:** A section with a text box for 'User Name' (containing 'desktop-go9d1mp') and a 'Password' field with a 'Change?' button.
- Users:** A table with columns: User, Display Name, Active?, Authentication, Password, Administrator?, and Change?. It lists the 'root' user and has an 'Add User' button.

In the first section, **Global Parameters**, define whether and how to require usernames and passwords. You can choose between the authentication methods `md5crypt`, `apachecrypt`, or `LDAP`. In case of the two former methods you can set the credentials of users in the *Users* pages of the TaskServer administration. If the authentication method is set to `LDAP` then the credentials of users is defined by your system-wide directory of user credentials.

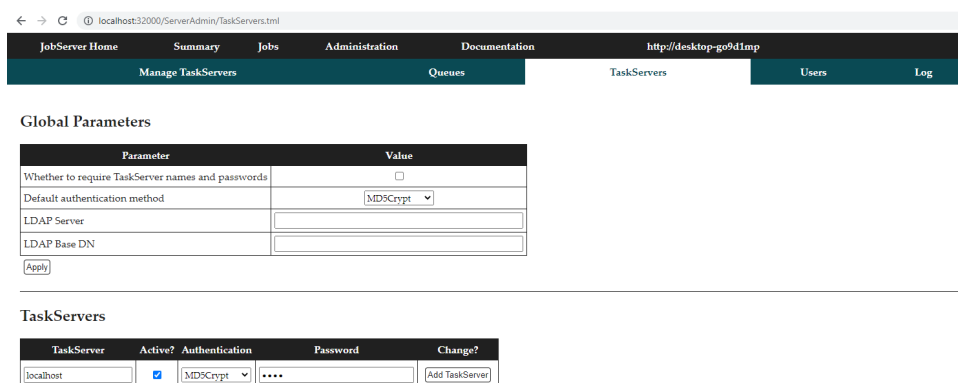
Note: Currently, JobServer and TaskServer only support *OpenLDAP* and not *Microsoft Active Directory*.

When requiring usernames, you must provide a shared entity to communicate between JobServer and TaskServers in the central section **TaskServer "user" and password**, that is the "TaskServer" "user".

In the section **Users** at the bottom, you can add the users allowed to work on this TaskServer; if not provided by *LDAP*, the usernames and passwords must be entered here.

3.3 JobServer: TaskServers Administration to Enable Secure Communication

Navigate to the JobServer page from the web browser interface for the TaskServer (<http://localhost:32000/ServerAdmin/TaskServers.html>). This page sets the "username" and "password" the JobServer uses to communicate with the TaskServer.



The screenshot shows the 'TaskServers.html' page in the TaskServer administration interface. It includes a navigation bar with 'JobServer Home', 'Summary', 'Jobs', 'Administration', 'Documentation', and 'http://desktop-go9d1mp'. The 'TaskServers' tab is active. Below the navigation bar, there are two main sections:

- Global Parameters:** A table with columns 'Parameter' and 'Value'. Parameters include 'Whether to require TaskServer names and passwords' (checkbox), 'Default authentication method' (MD5Crypt dropdown), 'LDAP Server' (text input), and 'LDAP Base DN' (text input). An 'Apply' button is at the bottom.
- TaskServers:** A table with columns: TaskServer, Active?, Authentication, Password, and Change?. It lists 'localhost' and has an 'Add TaskServer' button.

3.4 TaskServer: JobServers to Enable Secure Communication

Navigate to the JobServers page of the TaskServer (<http://localhost:23000/ServerAdmin/JobServers.html>). This page sets the "username" and "password" the TaskServer uses to communicate with the JobServer.

← → 🌐 localhost:23000/ServerAdmin/JobServers.html

TaskServer Home Tasks Administration http://desktop-go9d1mp

Users JobServers Log

Global Parameters

Parameter	Value
Whether to require JobServer names and passwords	<input type="checkbox"/>
Default authentication method	MD5Crypt
LDAP Server	
LDAP Base DN	

JobServers

JobServer	Active?	Authentication	Password	Administrator?	Change?
localhost	<input checked="" type="checkbox"/>	MD5Crypt		<input checked="" type="checkbox"/>	<input type="button" value="Add JobServer"/>