# Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>2</td>
</tr>
<tr>
<td>List of Acronyms and Definitions</td>
<td>3</td>
</tr>
<tr>
<td>List of Acronyms</td>
<td>3</td>
</tr>
<tr>
<td>List of Definitions</td>
<td>3</td>
</tr>
<tr>
<td>Administrators</td>
<td>4</td>
</tr>
<tr>
<td>User Administration</td>
<td>5</td>
</tr>
<tr>
<td>User Management</td>
<td>5</td>
</tr>
<tr>
<td>User Registration Activation</td>
<td>6</td>
</tr>
<tr>
<td>Statistics</td>
<td>7</td>
</tr>
<tr>
<td>User Statistics</td>
<td>7</td>
</tr>
<tr>
<td>Demo Statistics</td>
<td>8</td>
</tr>
<tr>
<td>Performance Statistics</td>
<td>8</td>
</tr>
<tr>
<td>UCON Performance Statistics</td>
<td>10</td>
</tr>
<tr>
<td>Issues Management</td>
<td>11</td>
</tr>
<tr>
<td>Register Service</td>
<td>12</td>
</tr>
<tr>
<td>View Existing Services</td>
<td>13</td>
</tr>
<tr>
<td>View Existing Service Interfaces</td>
<td>14</td>
</tr>
<tr>
<td>Modify Existing Services</td>
<td>15</td>
</tr>
<tr>
<td>Modify Existing Service Interfaces</td>
<td>15</td>
</tr>
<tr>
<td>Remove Existing Services</td>
<td>15</td>
</tr>
<tr>
<td>Remove Existing Service Interfaces</td>
<td>15</td>
</tr>
<tr>
<td>Add/ Register New Services</td>
<td>15</td>
</tr>
<tr>
<td>Add/ Register New Service Interfaces</td>
<td>15</td>
</tr>
<tr>
<td>References</td>
<td>16</td>
</tr>
</tbody>
</table>
Introduction

Cloud storage services have become increasingly popular in recent years. Users are often registered to multiple cloud storage services that suit different needs. However, the ad-hoc manner in which data sharing between users is implemented leads to issues for these users. For instance, users are required to define different access control policies for each cloud service they use and are responsible for synchronizing their policies across different cloud providers. Users do not have access to a uniform and expressive method to deal with authorization. Current authorization solutions cannot be applied as-is, since they cannot cope with challenges specific to cloud environments.

In order to address these challenges we have developed SAFAX [1], an extensible authorization framework offered as a service. SAFAX provides a novel XACML-based architectural framework tailored to the development of extensible authorization services for clouds. The key design principle underlying SAFAX is that all components are loosely coupled services, thus providing the flexibility, extensibility and scalability needed to manage authorizations in cloud environments. SAFAX’s architecture allows users to: a) deploy their access control policies in a standard format; b) in a single location; and c) augment policy evaluation with information from user selectable external trust services.

In order to ease the management of policies and configuration of policies, SAFAX provides users with a Graphical User Interface (referred as SAFAX GUI) that communicates with the SAFAX services.

This document presents the functionalities for administrators provided by the SAFAX GUI.
List of Acronyms and Definitions

List of Acronyms

CH: Context Handler

GUI: Graphical User Interface

PAP: Policy Administration Point

PEP: Policy Enforcement Point

PIP: Policy Information Point

SAFAX: eXtensible Authorization Framework As a Service

UDF: User Defined Function

List of Definitions

Administrator: a user who is responsible for the management of SAFAX.
Administrators in SAFAX are users responsible for the management of users and SAFAX configurations. They can activate user registration requests, add a user to a group, view statistics, manage the issue tracker and change service registry settings.

An administrator account is a registered account that is assigned to an admin group (see Section ‘User Management’).

Functionalities for administrators are accessible through the Administration tab in the header of the SAFAX GUI (Figure 1).

The following sections are then displayed (Figure 2):

- User Admin
- Statistics
- Issues
- Register Service
User Administration

User Management

All users within SAFAX are displayed in the scrollable vertical list. Administrators can type a user name to search for a certain user (Figure 3).

![Figure 3 A list of Users under User Management Tab](image)

When a user is selected, administrator can view and/or edit user information:

- **Username**
- **Full Name**
- **Email**
- **Group**

Administrators can also change a user’s password (Figure 4).

![Figure 4 Detailed View of a Specific User](image)
User Registration Activation

When a new user registers an account in SAFAX, the name, user id and email are displayed in the Activation Requests.

An administrator can approve or delete the request as shown in Figure 5.

![Activation Requests](image)

Figure 5 Activation Request under User Management Tab
Statistics

The Statistics Tool allows administrators to view statistics about the use of SAFAX by selecting the Statistic pannel (Figure 6). Statistics concerns:

- User statistics: provides information about SAFAX users.
- Demo statistics: which provides information about the demos created in SAFAX.
- Performance statistics: which provides information about the performance of SAFAX.

User Statistics

This view holds statistics about SAFAX users (Figure 7). Registered users are grouped into:

- Administrators: responsible for establishing and managing user accounts and demos.
- Students: responsible for creating demos and uploading XACML policies.
- Staff: responsible for creating demos and uploading XACML policies.
- Partners: responsible for creating demos and uploading XACML policies.

The view also provides statistics about unregistered users (bottom of Figure 7). In particular:

- Total guest: the total number of guess sessions, including both active and not active guests.
- Active Guests: guess sessions that are currently using SAFAX. After 16.6 minutes of inactivity, an active guest is removed.

Figure 6 SAFAX Statistics Tool

Figure 7 User Statistics View
Demo Statistics
This view holds statistics about SAFAX projects and demos (Figure 8). In particular, this view provide information about:

- **Total Project**: the total number of projects created
- **Total Demos**: each project contains many demos. This is the total number of demos created.
- **Demos per Project**: the average number of demos per project
- **Demos per User**: the average number of demos created by users
- **Demos with Trust Policies**: the total number of demos configured with trust policies
- **Demos with Requests**: the total number of demos configured with XACML request

![Figure 8 Demo Statistics View](image)

Performance Statistics
This view holds statistics about SAFAX services performance time (Figure 9). Administrators can choose all users or a specific user to view the evaluation time relating to these users. Administrators can also choose a period of time.

The view displays information of the policy evaluation performed within SAFAX:

- **Number of evaluations**
- **Total evaluation time**

It also shows the average performance for each service component: PEP, PIP, PAP, CH, PDP, and UDF.

The performance of the PEP starts when the PEP receives an XACML request from the SAFAX GUI. It ends when the PDP finishes evaluates the request, send back the result to the CH, and finally the CH send back the result to the PEP.

The performance of the CH starts when the CH receives an XACML request from the PEP. It ends when the PDP finishes evaluates the request and send back the result to the CH.

The performance of the PIP starts when the PIP receives a request from the CH to get additional attributes. It ends when the PIP finishes getting the values of the attributes.

The performance of the UDF starts when the UDF receives a calling function request from the PDP. It ends when the UDF finishes calling the function.
The performance of the PDP starts when the PDP received an XACML request from the CH. It ends when the PDP finishes evaluates the request and is going to send back the result to the CH.

### Performance Statistics

<table>
<thead>
<tr>
<th>Select User</th>
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<tr>
<td>Start: 12/02/2015</td>
<td>End: 22/01/2016</td>
</tr>
</tbody>
</table>

- **Select PDP**
- **Select PEP**
- **Select PIP**
- **Select CH**
- **Select UDF**

**View Statistics**

- Number of Evaluations: 154
- Total Evaluation Time: 5.257 seconds
- PDP Evaluation Time: 0.672 seconds
- PEP Evaluation Time: 4.276 seconds
- PIP Evaluation Time: 0.246 seconds
- CH Evaluation Time: 3.212 seconds
- UDF Evaluation Time: 0.288 seconds

**Figure 9 Average Statistics View**

To view the statistics of the evaluations performed using particular service instances, click a service type (PDP, PEP, PIP, CH, or UDF) and tick the service instances of interest from the drop down menu as shown in Figure 10.
UCON Performance Statistics
The performance of a UCON session instance starts when the PEP UCON receives an XACML request from the SAFAX GUI. It only ends when the users request to stop or restart the UCON session. The evaluation time of a UCON session is then calculated (Figure 11).

UCON Performance Statistics

Number of UCON Sessions: 3

UCON Session Time: 36.869 seconds
Issues Management

SAFAX provides an integrated issue reporting tool. It is accessible by selecting the Issue panel (Figure 12). Administrators can view a list of reported issues or requested new features by clicking Issues icon in the Administration tab.

![Figure 12 SAFAX Issues Tool](image)

A list of reported Issues is displayed on the screen (Figure 13) and an administrator can mark an issue as resolved by clicking Mark as Resolved button on the bottom right of the issue description. Resolved issues are then displayed in the Issue Tracker menu (Figure 14).

![Figure 13 SAFAX Reported Issues waiting for Administrator to resolve](image)
Register Service

A service must be registered with SAFAX in order to be used in the authorization process. Functionalities concerning service registration are accessible through Register Service in the Administration tab (Figure 15).

Administrators can choose to (Figure 16):

- View existing services
- View existing service interfaces
- Modifying existing services
- Modifying existing service interfaces
- Remove existing services
- Remove existing service interfaces
- Add/ register new services
- Add/ register new service interfaces
**View Existing Services**

A list of existing services are then displayed in the left of the GUI as shown in Figure 177.

![List of Existing Services](image)

Administrators can click a specific service to see more details. In particular, the following information are displayed (Figure 18):

- Service ID
- Service Name
- Service Component
- Service Provider
- Service URL
- Service Description
- Service Dependencies
View Existing Service Interfaces

A service can contain many service interfaces. Administrators can click the arrow button to expand service interface nodes under an existing service. Administrators can click a specific service interface (Figure 19) to see more details such as:

- Service Interface Name
- Endpoint URL
- Service Type
- Service Parameters
- Return Type
- Service Interface Description
Modify Existing Services
While an existing service is displayed, click Modify Service button. Click Save to confirm changes. Or click Cancel to cancel the action.

Modify Existing Service Interfaces
While an existing service interface is displayed, click Modify Interface button. Click Save to confirm changes or click Cancel to cancel the action.

Remove Existing Services
While an existing service is displayed, click Remove Service button. Click Ok to confirm changes or click Cancel to cancel the action.

Remove Existing Service Interfaces
While an existing service is displayed, click Remove Interface button. Click Ok to confirm changes or click Cancel to cancel the action.

Add/ Register New Services
While an existing service is displayed, click Register New Service button. Enter the following information:

- Service ID
- Service Name
- Service Component
- Service Provider
- Service URL
- Service Description
- Service Dependencies

Finally, click Save to confirm changes or click Cancel to cancel the action.

Add/ Register New Service Interfaces
While an existing service is displayed, click Register New Service Interface button. The new service interface belongs to the currently selected service. Enter the following information:

- Service Interface Name
- Endpoint URL
- Service Type
- Service Parameters
- Return Type
- Service Interface Description

Finally, click Save to confirm changes or click Cancel to cancel the action.
References