



Tutorial Demo Client

Version 2019-May-13

BOTLabs GmbH,
Berlin

KILT Demo Client Walkthrough

Version 2019-May-13

The KILT Demo Client is a sample credential and token wallet application whose purpose is to showcase all features of the KILT Protocol. This document shows new users how the different features of the KILT Protocol work by walking through simple example use cases in the client.

This software is deliberately created in a way that the steps of the claiming-attestation-verification process, as well as the processes related to creating and managing complex trust structures, can be clearly and easily tracked by the users. There are a lot of steps included here (e.g. importing a credential into the wallet) which could be automated in future third-party clients.

The client software is open source, so application developers can look under the hood and use this client as a starting point in their own client development process. They can take it apart and use components they need for their use case while they can also modify the software.

Additionally, this client is also a good tool for business-oriented users or product designers who would like to try out their business ideas or use cases using the KILT Protocol.

The KILT Demo Client is hosted under <https://demo.kilt.io/>. By following the link, the client will open in your browser. Importantly, all client related data (credentials, identity keys, etc.) are stored on the local storage of your browser. Note that currently the client only works in Google Chrome browsers.

Managing Identities

When you open the demo client, you can create a new identity.

Dashboard CTYPEs Claims Attestations Delegations PCRs Contacts
Messages Utilities

KILT Select... | ▾

No identities found. Please [Create a new identity](#).

Here we create a new identity named “Alice” when we click the Add button:

Dashboard CTYPEs Claims Attestations Delegations PCRs Contacts
Messages Utilities

KILT Select... | ▾

Create ID

Name your ID

Seed Phrase  negative nice aspect route ostrich scrap thumb industry later decide unknown trial

Import Seed Phrase

Cancel Add

You can also import an already existing identity by clicking the “Import Seed Phrase” checkbox and inserting the seed phrase into the respective field.

Dashboard CTYPEs Claims Attestations Delegations PCRs Contacts
Messages Utilities

KILT Select... | ▾

Create ID

Name your ID

Seed Phrase

Import Seed Phrase

Cancel Add

On the next page we see that the new ID was created.

Wallet / My Identities

Alias	Alice
Phrase	negative nice aspect route ostrich scrap thumb industry later decide unknown trial
Address	5Er1uk59fv2FzWC5mGuNybaHRQQBrZ2GN3g8E4fjznwzVCBu
Seed (as hex)	0x27e797151762f33e025b97a6b78c0e590bc6a5f6aa783cd1d1b729ead6a5cc03
Public Key	0x7b07482e52a9d07f7c8a1b18eab7f43aebe2745b8e7e403af7e712b9de7a31e5
Encryption Public Key	0x0233f2e51e67b78f053fabbf7b4ae30d97dclaa61ab7361e347efc2fd4bd4469
DID	+

Add Identity

Remove **Select** **★** **Register**

You have to select an identity to use the functions of the client. You can do this on the previous page by clicking “Select” and then you should see this:

Wallet / My Identities

Active identity

Alias	Alice
Phrase	negative nice aspect route ostrich scrap thumb industry later decide unknown trial
Address	5Er1uk59fv2FzWC5mGuNybaHRQQBrZ2GN3g8E4fjznwzVCBu
Seed (as hex)	0x27e797151762f33e025b97a6b78c0e590bc6a5f6aa783cd1d1b729ead6a5cc03
Public Key	0x7b07482e52a9d07f7c8a1b18eab7f43aebe2745b8e7e403af7e712b9de7a31e5
Encryption Public Key	0x0233f2e51e67b78f053fabbf7b4ae30d97dclaa61ab7361e347efc2fd4bd4469
DID	+

★ **Register**

Add Identity

Identities are not selected automatically after creation. If you go back to the Dashboard without any active identity, then you can select one from the dropdown menu in the top right corner:

The screenshot shows the KILT Tutorial Demo Client interface. At the top, there is a navigation bar with links: Dashboard, CTYPEs, Claims, Attestations, Delegations, PCRs, Contacts, Messages, and Utilities. On the far right of the header is a "KILT" logo and a dropdown menu labeled "Create an identity". Below the header, a message says "No identity selected. Please select an identity in the header." A dropdown menu is open, showing two options: "Alice (me)" and "Create an identity".

After selecting an identity the dashboard should look something like this:

The screenshot shows the KILT Tutorial Demo Client interface with the "Alice (me)" identity selected. The header remains the same with the "KILT" logo and "Create an identity" dropdown. The main content area has a title "My Dashboard" with a "My Dashboard" icon. Below it is a section titled "Active identity" containing a table of identity details. At the bottom of this section are two buttons: a yellow star icon and a red "Register" button. At the very bottom of the page is an orange "Manage Identities" button.

Alias	Alice
Phrase	sentence vanish bamboo bar meat between shine anxiety bus tide dove thank
Address	5ETRvpdRgt7PzbL3GxkBNuuAj35mkb6ixEoTQSbWP4h6LRzi
Seed (as hex)	0x49a15d0ee4d9b38aaad4756ecc7c3b71a9835e7299e61e24036d28255a9e86e2
Public Key	0x69cd7dd029dfd11022b9403a4a4880b18b672d852d3381fa4d81a48935e80a52
Encryption Public Key	0xe569cb04a81623283b409587c37f862a124b8d2fd6828edd00ac2c80b6c0b20b
DID	

To register the created ID to the Contact service you have to click the “Register” button.

You can create multiple identities in the demo client with the same steps as above. To switch between these IDs you can either click “Manage Identities” on the dashboard or switch to another one from the dropdown menu in the top right corner.

The screenshot shows the KILT Tutorial Demo Client interface with the "Alice (me)" identity selected. The header and main content area are similar to the previous screenshot, but the dropdown menu in the top right now shows two identities: "Alice (me)" and "Bob (me)".

Managing Contacts

The contact service can be reached from the “Contacts” menu. By default, it shows your “favorised” contacts.



Name
Bob

[All contacts](#)

Select action... |

If you click “All Contacts”, then you see all registered contacts and you can favorize them to import them to your contacts. This shows the step where we favorize Bob.



Name
Alice (me)
Attester_M1
Dept.-of-Motor-Vehicles
Bob
Marci3b (me)

[My contacts](#)

Select action... |

Select action... |

Select action... |

Select action... |

Favorize

Request claims

Request legitimations

Submit claims

Submit legitimations

Invite to delegation(s)

Invite to PCR(s)

Creating a CTYPE

You can reach the CTYPE registry through the “CTYPE” menu. Here are all the registered CTYPEs listed.

CTYPE	Author
ApprovedCertifiedFoodInstitute	5H5Ja2GRWWJMUxvRGR73
hasDriversLicense4	5HkuR4DpepjGczH9J3Wk
hasDriversLicense1	5HkuR4DpepjGczH9J3Wk
FoodContents	5HUm5SSFQ5teck5YzdzM
IsOfficial	5EUIGX6wwXm7rk1Zh4Aa
f1	5EpouSuk7NcAmRLcgjrx
FoodContents2	5HUm5SSFQ5teck5YzdzM
Drivers-License	Dept.-of-Motor-Vehicles
FoodAllergenes	5EXvwodVuFFeGzozG8sq
Abo	Attester_M1
DriversLicense	5FmE4x7CYZfQ4RVY6Pnd
FoodContents	5HUm5SSFQ5teck5YzdzM
AboEinzeln	Attester_M1
T-DriversLicense	5F187DcQbTfRfoDfPo45

[Create new CTYPE](#)

You can create a new CTYPE by clicking the “Create New CTYPE” button.

To create a CTYPE, first you have to input an Identifier and a Title for the CTYPE. The Identifier must not contain spaces. The two fields can be the same.

The screenshot shows the KILT Tutorial Demo Client interface. At the top, there is a navigation bar with links: Dashboard, CTYPEs (highlighted in orange), Claims, Attestations, Delegations, PCRs, Contacts, Messages, and Utilities. To the right of the navigation bar is the KILT logo and a user profile for Alice (me). Below the navigation bar, the main content area has a title "Create CTYPE" next to a document icon. The form itself contains three fields: "Identifier" with the value "FoodContents", "Title" with the value "FoodContents", and a "Data" section with a red plus sign. At the bottom right of the form are "Cancel" and "Submit" buttons.

Identifier	FoodContents
Title	FoodContents
Data	+

Cancel Submit

You can add claim content fields by clicking on the + sign next to the “Data” text.

The screenshot shows a user interface for creating claim content fields. At the top, there are two input fields: 'Identifier' (FoodContents) and 'Title' (FoodContents). Below these, a 'Data' section contains a '+' button. Two expanded sections are shown below:

- Ingredients**:
 - Title: Ingredients
 - Identifier: Ingredients
 - Type: Text
 - Format:
✓ not exists
- IsVegan**:
 - Title: IsVegan
 - Identifier: IsVegan
 - Type: Yes/No
 - Format:
✓ not exists

At the bottom right are 'Cancel' and 'Submit' buttons.

The Title field will be seen when using the CTYPE for creating claims. The Identifier field is used for creating the hash of the CTYPE structure. The Identifier field must not contain spaces and the two fields can be the same. When you click “Submit”, the CTYPE gets created and registered on the chain and stored on the CTYPE service.

Creating a Claim

In this simple example we assume that Alice wants to rent out her weekend house when she is not using it. She claims that her accommodation is top quality and also what amenities she could offer.

You can create a claim by first clicking on the “Claims” menu and then clicking on the “Create Claims” button.

The screenshot shows the KILT Tutorial Demo Client interface. At the top, there is a navigation bar with links: Dashboard, CTYPEs, Claims (highlighted in orange), Attestations, Delegations, PCRs, Contacts, Messages, and Utilities. On the right side of the header, there is a user profile for "Alice (me)" with a dropdown arrow. Below the header, the main content area is titled "My Claims". On the left, there is a sidebar icon consisting of three horizontal bars with a person icon. On the right, there is a large orange button labeled "Create Claim".

Next, you have to select a CTYPE as the claim type.

The screenshot shows a modal dialog box titled "Select cType". Inside the dialog, there is a search input field with the placeholder "Select cType". Below the input field is a list of CTYPE options, each preceded by a small circular icon. The list includes: "aaaaaaa", "ApprovedCertifiedFoodInstitute", "hasDriversLicense4", "hasDriversLicense1", "FoodContents", "IsOfficial", "AccommodationQuality" (which is highlighted with a red background), "f1", "FoodContents2", and "Drivers-License". At the bottom right of the dialog are two buttons: "Cancel" and "OK".

After you filled out the alias and the fields of the claim, you can click on the “Create” button to create the claim.

The screenshot shows the 'New Claim' interface. At the top, there's a navigation bar with links: Dashboard, CTYPEs, Claims (highlighted in orange), Attestations, Delegations, PCRs, Contacts. To the right of the navigation is the KILT logo and a user profile for Alice (me). Below the navigation is a title 'New Claim' with a document icon. The main area contains two input fields: 'CTYPE' set to 'AccommodationQuality' with a small globe icon, and 'Claim alias' set to 'MyWeekendHouse'. Below these are two more fields: 'Quality (1: bad - 5: excellent)' with a value of '5', and 'Amenities' containing the text 'wifi, hair dryer'. At the bottom right are two buttons: 'Cancel' and a larger orange 'Create' button.

Now the claim is stored locally in your client.

The screenshot shows the 'My Claims' table. The table has columns: Alias, CType, Atteste..., and Action. There is one row for the claim 'MyWeekendHouse', which has a CType of 'AccommodationQuality' (with a checked checkbox), a Quality of '5', and Amenities of 'wifi, hair dryer'. The 'Atteste...' column contains a red 'X' icon. The 'Action' column has a 'Select action...' dropdown menu with a red arrow icon. At the bottom right of the table is a large orange 'Create Claim' button.

Requesting and Issuing an Attestation

Following the previous example, Alice has already rented out her weekend house to Bob, who spent a week there and had a great time. Alice asks Bob to attest that her weekend house is excellent, so other people who know and trust Bob would also want to use the accommodation.

As a first step, we select Alice as the active user, and we go to the “Claims” page. Acting as Alice, we then request an attestation from Bob by clicking on the “Select action...” dropdown menu of the claim.

The screenshot shows the 'My Claims' page. A table lists a single claim:

Alias	CType	Atteste...	
MyWeekendHouse	AccommodationQuality	<input checked="" type="checkbox"/>	<input checked="" type="button"/> Select action... <ul style="list-style-type: none"> Request legitimations Request attestation Delete

Next, we select Bob as the receiver of the request. Note that Bob has to be in Alice's contact list (“favorised”) so that she can send him the request.

The screenshot shows the 'Request attestation for claim' dialog. It displays a list of contacts:

- Select contacts...
- Bob (me)

A message at the bottom right says "Please select receivers(s) first".

Here we can overview the details of the claim we are sending for attestation and send it to Bob by clicking the “Request Attestation” button.

Request attestation for claim

1. Select receiver(s)

Bob (me)

My claim 'MyWeekendHouse'
0x8d13669faaa5eabe78d799ba060b63c98fc7e17c22425cccd603b799066be31ed

Ctype	AccommodationQuality <input checked="" type="checkbox"/>
Owner	Alice (me) <input checked="" type="checkbox"/>
Contents	<pre>▼ { 2 items "Quality" : 5 "Amenities" : "wifi, hair dryer" }</pre>

Cancel **Request Attestation**

Now, as a very important step, we have to switch to Bob:

Dashboard CTYPEs Claims Attestations Delegations PCRs Contacts
Messages Utilities

KILT X Alice (me)

My Claims

Alice (me)
Bob (me)
Create an identity

Alias	CTYPE	Atteste...	
MyWeekendHouse	AccommodationQuality <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Select action... <input type="checkbox"/>

Create Claim

If we then go to the Messages, we can see that Bob received a request for attestation. As the next step, to open the message, we can click on either the subject of the message or the eye icon on the right.



Sender	Subject	CType	created	received	
Alice (me) <input checked="" type="checkbox"/>	request-attestation-for-claim	Acco... <input checked="" type="checkbox"/>	⚠ 05/09/2019 19:02:51	⚠ 05/09/2019 19:02:54	<input type="button" value="Delete"/> <input type="button" value="View"/>

We then can see the full message (we can open up the details):

Message from Alice (me)

Subject: request-attestation-for-claim

Decrypted Message Encrypted Message

```
{
  "messageId": "7f6cb5e2-3dd8-4bfd-9d05-e1ffa6...",
  "receivedAt": 1557421374423,
  "body": {
    "content": {
      "claim": {...},
      "ctypeHash": {...},
      "legitimations": [],
      "claimHashTree": {...},
      "hash": "0x6f8828372b750aa7ae36ebaf9b01...",
      "claimerSignature": "0xa2b80129d2cc097576947475a4e6..."
    },
    "type": "request-attestation-for-claim"
  },
  "createdAt": 1557421371836,
  "receiverAddress": "5HnJwCbQz2thRt3U9Bq4fqMhxyXpYF...",
  "senderAddress": "5FgeYE2cD5J1R8vgaVLRXKKnLCF3He...",
  "sender": {...}
}
```

Claim details

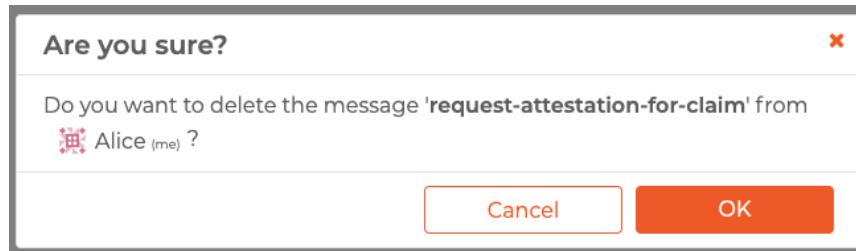
Ctype	AccommodationQuality <input checked="" type="checkbox"/>
Owner	Alice (me) <input checked="" type="checkbox"/>
Contents	<pre>{ "Quality": 5, "Amenities": "wifi, hair dryer" }</pre>

Legitiminations

No legitiminations found.

Now this is the step, where Bob checks if Alice's claim is true, and if yes then he attests her claim by clicking the "Attest Claim" button.

After the previous step, we get a popup dialog asking if we want to keep the “request for attestation” message Bob received from Alice.



By default, we can simply delete these messages to clean up Bob’s inbox. Note that this dialog box pops up in many steps, and in the rest of the walkthrough we omit showing them.

Now, we have to switch back to Alice’s identity, and we see what Bob replied to her:

Sender	Subject	CType	created	received	
Bob (me)	submit-attestation-for-claim	Acco...	05/09/2019 19:34:38	05/09/2019 19:34:41	

We can open the message, and check that Bob really attested the claim Alice intended to have:

Message from Bob (me)

Subject: submit-attestation-for-claim

Decrypted Message Encrypted Message

```
{
  "messageId": "bb24ab49-054c-4655-ad8c-74590e...",
  "receivedAt": 1557423281598,
  "body": {
    "createdAt": 1557423278930,
    "receiverAddress": "5FgeYE2cD5J1R8vgaVLRXKKnLCF3He...",
    "senderAddress": "5HnJwCbQz2thRt3U9Bq4fqMhxyXpYF...",
    "sender": {
      ...
    }
  }
}
```

Claim details

Ctype	AccommodationQuality	<input checked="" type="checkbox"/>
Owner	Alice (me)	<input checked="" type="checkbox"/>
Contents	<pre>{ "Quality": 5, "Amenities": "wifi, hair dryer" }</pre>	

Legitimations

No legitimations found.

Cancel Import Attestation

As the last step we have to import the Attestation into Alice's wallet by clicking the “Import Attestation” button.

After that we can see the green check marking that this claim is attested (from here on we may call it a Credential).

The screenshot shows the 'My Claims' page. At the top, there is a navigation bar with links for Dashboard, CTYPEs, Claims, Attestations, Delegations, PCRs, and Contacts. Below the navigation bar, there is a sub-navigation bar with links for Messages and Utilities. On the right side of the header, there is a user profile for 'Alice (me)' and a dropdown menu. The main content area is titled 'My Claims' and contains a table with one row. The table has columns for Alias, CType, Atteste..., and Select action... (with a dropdown arrow). The 'Alias' column contains 'MyWeekendHouse'. The '(CType)' column contains 'AccommodationQuality' with a checked checkbox. The 'Atteste...' column contains a green checkmark. The 'Select action...' column contains a dropdown menu. At the bottom right of the table is a red 'Create Claim' button.

Alias	CType	Atteste...	Select action...
MyWeekendHouse	AccommodationQuality <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Select action... <input type="button" value="▼"/>

[Create Claim](#)

If we click on the claim alias we can inspect the details of the Credential:

The screenshot shows the 'My claim 'MyWeekendHouse'' details page. At the top, there is a navigation bar with links for Dashboard, CTYPEs, Claims, Attestations, Delegations, PCRs, and Contacts. Below the navigation bar, there is a sub-navigation bar with links for Messages and Utilities. On the right side of the header, there is a user profile for 'Alice (me)' and a dropdown menu. The main content area is titled 'My claim 'MyWeekendHouse''. It shows the claim details: CType 'AccommodationQuality' (checked), Owner 'Alice (me)' (checked), and Contents (a JSON object: { "Quality": 5, "Amenities": "wifi, hair dryer"}).

The screenshot also shows the 'Attested claims' section, which lists one entry: Attester 'Bob (me)', CType 'AccommodationQuality' (checked), Attested status (green checkmark), and a 'View' button.

At the bottom, there are three buttons: 'Cancel', 'Request Legitimation' (with a trash icon), and 'Request Attestation'.

Verifying a Credential

Continuing the previous example, now Carol wants to rent a weekend house for her vacation. She sees Alice's accommodation in an advert, but she would like to make sure that she chooses a top quality house. Here we show the process where Carol (in this case she will be the verifier) requests an attested claim from Alice proving that she is really offering a top quality weekend house for rent.

As the first step (after Carol favorised Alice in her contacts), Carol can send a claim request to Alice:

The screenshot shows the KILT Tutorial Demo Client interface. At the top, there is a navigation bar with links: Dashboard, CTYPEs, Claims, Attestations, Delegations, PCRs, Contacts (highlighted in orange), Messages, and Utilities. To the right of the navigation bar is the user profile 'Carol (me)' and a dropdown menu. Below the navigation bar, the main area is titled 'My contacts'. It lists two contacts: 'Bob (me)' and 'Alice (me)'. Each contact entry has a 'Select action...' button with a dropdown menu. The dropdown menu for 'Alice (me)' is open, showing the following options: Unfavorize, Request claims (highlighted in orange), Request legitimations, Submit claims, Submit legitimations, Invite to delegation(s), and Invite to PCR(s). An 'All contacts' button is located at the top right of the contact list area.

On the next window Carol chooses the “AccommodationQuality” CTYPE and clicks on “Request Claim”:

The dialog box has a title "Request claims for cType". It contains two sections: "1. Select receiver(s)" and "2. Select cType". In "1. Select receiver(s)", there is a list box containing "Alice (me)". In "2. Select cType", there is a dropdown menu showing "AccommodationQuality". At the bottom right are "Cancel" and "Request claims" buttons.

Now we switch to Alice, and go to “Messages”:

The screenshot shows the KILT client interface. The top navigation bar includes links for Dashboard, CTYPEs, Claims, Attestations, Delegations, PCRs, Contacts, **Messages**, and Utilities. The **Messages** link is highlighted in orange. The top right corner shows the user profile "Alice (me)" and the KILT logo. Below the navigation, a section titled "My Messages" is displayed with an envelope icon. A table lists a single message:

Sender	Subject	CTYPE	created	received	
Carol (...)	request-claims-for-ctype	AccommodationQuality	⚠ 05/09/2019 20:14:06	⚠ 05/09/2019 20:14:08	

Here we open Carol's "request-claims-from-ctype" message sent to Alice:

Message from Carol (me)

Subject: request-claims-for-ctype

Decrypted Message Encrypted Message

```
{
  "messageId": "3c6f087a-0b60-44e1-9961-a8e9d4...",
  "receivedAt": 1557425648909,
  "body": {...},
  "createdAt": 1557425646509,
  "receiverAddress": "5FgeYE2cD5J1R8vgaVLRXKKnLCF3He...",
  "senderAddress": "5GY1KBYRRvNuXD12Y9uk24VyrXGN4k...",
  "sender": {...}
}
```

Select attested claim(s)

CType AccommodationQuality

MyWeekendHouse

Select property(s) to include in Claim

Quality (1: bad - 5: excellent)

Amenities

Select attestation(s)

Bob (me)

All

All

Cancel Send attested claims

Now Alice can select which fields of the claim and which attestations she wants to include in the Credential presentation for Carol. Then, by clicking on "Send Attested Claims" Alice sends the Credential to Alice.

Finally, if we switch back to Carol, we can see that she received the Credential and she can inspect it:

My Messages

Sender	Subject	CTYPE	created	received	
Alice (me) <input checked="" type="checkbox"/>	submit-claims-for-ctype	Acco... <input checked="" type="checkbox"/>	⚠ 05/09/2019 20:18:36	⚠ 05/09/2019 20:18:39	

Here she can see that Alice has an Attestation from Bob on her claim:

Message from Alice (me)

Subject: submit-claims-for-ctype

Decrypted Message Encrypted Message

```
{
  "messageId": "548c1cdd-9af6-4f7c-b4b2-ac087f...",
  "receivedAt": 1557425919170,
  "body": {
    "body": "The accommodation is excellent and well-maintained."
  },
  "createdAt": 1557425916627,
  "receiverAddress": "5GY1KBYRRvNuXD12Y9uk24VyrXGN4k...",
  "senderAddress": "5FgeYE2cD5J1R8vgaVLRXKKnLCF3He...",
  "sender": {
    "name": "Bob (me)"
  }
}
```

Attested claims

Attester	CTYPE	Attested
Bob (me) <input checked="" type="checkbox"/>	AccommodationQuality <input checked="" type="checkbox"/>	✓

Since Carol knows Bob, she now believes that Alice's weekend house is excellent so she will rent it out.

Legitimations

In this example a *Food Producer* produces a Chocolate Bar. She wants to have a certificate that her product is consumable for people with special allergies and diets from a trusted institute.

In this example we first see how the *Federal Ministry of Food and Agriculture* legitimizes a *Food Inspector Institute* endowing it with trust that the Institute does a thorough and honest inspection of the food products. We already have the identities and the CTYPEs set up. We first select the *Food Inspector Institute* and create a claim stating that it is an “ApprovedCertifiedFoodInstitute”.

The screenshot shows the KILT Tutorial Demo Client interface. At the top, there is a navigation bar with links: Dashboard, CTYPEs, Claims (which is highlighted in orange), Attestations, Delegations, PCRs, Contacts, and a user dropdown menu showing "FoodInstitue1 (m)". Below the navigation bar, the main area is titled "My Claims". On the right side of this area, there is a red "Create Claim" button. A modal dialog box titled "Select cType" is open in the center. It contains a search input field with placeholder text "Select cType" and a dropdown arrow. A list of cType options is displayed, with one item, "ApprovedCertifiedFoodInstitute", highlighted with a red background. To the right of this list are two buttons: "Cancel" and "OK". The background of the main interface is dimmed, indicating the modal is active.

New Claim

CType	ApprovedCertifiedFoodInstitute
Claim alias	MyInstitueCert
CertificationDate	2019-05-10
FieldOfCertification	Fruits, Vegetables, Grains

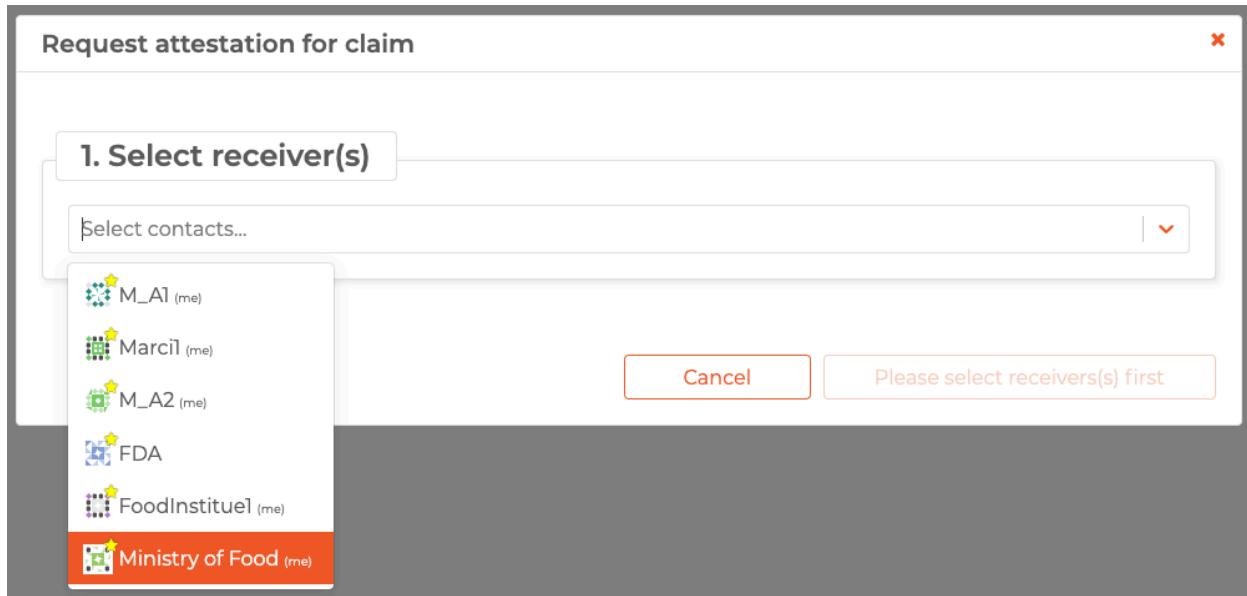
Create

Now that the *Food Inspector Institute* created its claim that it is a Certified Institute, it needs to get it attested by the *Ministry of Food*. For that you have to click on the dropdown menu of the claim and select “Request attestation”.

My Claims

Alias	CType	Atteste...	
MyInstitueCert	ApprovedCertifiedFoodIn... <input type="button" value="▼"/>	<input type="button" value="x"/>	<input type="button" value="Select action..."/> <input type="button" value="▼"/> <div style="background-color: #e0e0e0; padding: 5px; border: 1px solid #ccc; width: fit-content;"> Request legitimations Request attestation Delete </div>

Next, we select the *Ministry of Food* as the attester:



And after inspecting that everything is in order with the claim we are sending, we click on “Request Attestation” and send it to the *Ministry*.

Now, we switch to the *Ministry of Food* identity:

The screenshot shows the KILT application interface. At the top, there is a navigation bar with links: Dashboard, CTYPEs, Claims (highlighted in orange), Attestations, Delegations, PCRs, Contacts, Messages, and Utilities. The KILT logo is on the left, and a user profile icon for "FoodInstitue1 (me)" is on the right. Below the navigation is a section titled "My Claims". A table lists claims with columns: Alias, CType, Atteste..., and Selected. One row is selected, showing "MyInstituteCert" under Alias, "ApprovedCertifiedFoodIn..." under CType, and a checkbox under Atteste... which is checked and has a red "X" icon. A context menu is open over this row, listing "Selected" (highlighted in orange), "FoodProducer1 (me)", "Ministry of Food (me)", "Create an identity", and "Create Claim".

And go to messages:

The screenshot shows the KILT Tutorial Demo Client interface. At the top, there is a dark header bar with several tabs: Dashboard, CTYPEs, Claims, Attestations, Delegations, PCRs, Contacts, and a red-highlighted 'Messages' tab. To the right of the tabs is the KILT logo and the text 'Ministry of Food'. Below the header, the main content area has a title 'My Messages' with a mail icon.

Sender	Subject	CType	created	received	
FoodInstitue (me)	request-attestation-for-claim	ApprovedCerifiedFoodInstitute (me)	05/10/2019 13:53:25	05/10/2019 13:53:28	

We open the “request-attestation-for-claim” message from the *Food Inspector Institute*:

The screenshot shows the detailed view of the message. At the top, it says "Message from FoodInstitue (me)". The subject is "request-attestation-for-claim". Below this, there are two tabs: "Decrypted Message" (selected) and "Encrypted Message". The decrypted message content is displayed as a JSON object:

```

{
  "messageId": "2bcd5b6-0b9b-4c95-98f4-117bad...",
  "receivedAt": 1557489208093,
  "body": {
    "createdAt": 1557489205976,
    "receiverAddress": "5HepzT69VAZiBpdGNcb2DZw7tMWq4r...",
    "senderAddress": "5RGcJwd3qPK4UYSk177BQzapFDrbif...",
    "sender": {
      "name": "ApprovedCertifiedFoodInstitute"
    }
  }
}

```

Below the message content, there are sections for "Claim details" and "Legitimizations". The "Claim details" section shows the following fields:

- Ctype: ApprovedCertifiedFoodInstitute
- Owner: FoodInstitue (me)
- Contents:
 - CertificationDate: 2019-05-10
 - FieldOfCertification: Fruits, Vegetables, Grains

The "Legitimizations" section says "No legitimations found." At the bottom, there are "Cancel" and "Attest Claim" buttons.

Here, the *Ministry* checks which institute is making the claim, and if the details are really true. If everything is in order, then the *Ministry* attests the claim by clicking on the “Attest Claim” button.

Now, we switch back to the *Food Inspector Institute* and go to messages:

Dashboard CTYPEs Claims Attestations Delegations PCRs Contacts KILT FoodInstituel (me) ✓
Messages Utilities

 My Messages

Sender	Subject	CType	created	received		
 Minister... 	submit-attestation-for-claim	 Appro... 	 05/10/2019 14:08:38	 05/10/2019 14:08:41		

We open the “submit-attestation-for-claim” message check if we received the attestation on our claim with the right details and import the attestation by clicking on the “Import Attestation” button:

Message from  Ministry of Food (me)

Subject: submit-attestation-for-claim

Decrypted Message Encrypted Message

```
{
  "items": [
    {
      "messageId": "6ceed7b2-d1cf-41cf-85d9-f94365...",
      "receivedAt": 1557490121038,
      "body": "...",
      "createdAt": 1557490118978,
      "receiverAddress": "5EGcJwd3qPK4UYSk177BQzapFDrbif...",
      "senderAddress": "5HepzT69VAZiBpdGNcb2DZw7tMWq4r...",
      "sender": ...
    }
  ]
}
```

Claim details

Ctype	 ApprovedCertifiedFoodInstitute <input type="checkbox"/>
Owner	 FoodInstituel (me) <input type="checkbox"/>
Contents	<pre>{ "items": [{ "CertificationDate": "2019-05-10", "FieldOfCertification": "Fruits, Vegetables, Grains" }] }</pre>

Legitimations

No legitimations found.

Now we can see the Credential (attested claim) on the Claims page:

Alias	CType	Attested...	Select action...
MyInstituteCert	ApprovedCertifiedFoodIn...	✓	Select action...

Create Claim

Note that the above steps are the same as in the “Creating a Claim” and “Requesting and Issuing an Attestation” sections. Now we show how a general attested claim can be used as a legitimization. This means that we will nest this credential into another credential about a food product.

In the next part of this section, we first create a claim with the *Food Producer* identity about certain properties of a food product.

CType FoodContents

Claim alias Vegan Snack

Ingredients Apple, almonds

IsVegan true false

Cancel **Create**

Next, the *Food Producer* wants to get this claim attested by a certified *Food Inspector Institute*. For this she requests the legitimation to be used for the attestation from a *Food Inspector Institute*:

The screenshot shows the KILT Tutorial Demo Client interface. At the top, there is a navigation bar with links: Dashboard, CTYPEs, Claims (highlighted in orange), Attestations, Delegations, PCRs, Contacts, Messages, Utilities, and a user icon for FoodProducer1. Below the navigation bar is a section titled "My Claims". A table lists a single claim:

Alias	CTYPE	Atteste...	Action
Vegan Snack	FoodContents	<input checked="" type="checkbox"/> <input type="checkbox"/>	Select action... <input type="button" value="▼"/>

A dropdown menu is open next to the "Select action..." button, showing three options: "Request legitimations" (highlighted in red), "Request attestation", and "Delete".

A modal window titled "Request legitimations" is displayed, containing three steps:

1. Select receiver(s): A list box contains "FoodInstitue1 (me)".
2. Select cType: A list box contains "FoodContents".
3. Select claim (optional): A list box contains "Vegan Snack".

At the bottom of the modal are "Cancel" and "Request Legitimation" buttons.

Now we switch to the *Food Inspector Institute* and open the “request-legitimations” message:

The screenshot shows the KILT interface with a dark header bar. The top navigation includes links for Dashboard, CTYPEs, Claims, Attestations, Delegations, PCRs, Contacts, and a dropdown for 'Messages' which is currently selected. To the right of the header is the KILT logo and a dropdown menu for 'FoodInstitutel (me)' with a red checkmark. Below the header, the main area is titled 'My Messages' with a mail icon. A single message card is visible, showing the sender as 'FoodP...' (with a dropdown arrow), the subject as 'request-legitimations' (in red), the recipient as 'FoodC...' (with a dropdown arrow), and two timestamped entries: '05/10/2019 15:49:25' and '05/10/2019 15:49:27'. To the right of the message card are three icons: a trash can, a magnifying glass, and a red warning sign.

My Messages

Sender	Subject	CType	created	received	
FoodP... <input type="button" value="▼"/>	request-legitimations	FoodC... <input checked="" type="checkbox"/>	05/10/2019 15:49:25	05/10/2019 15:49:27	

Here the *Food Inspector Institute* sees for what kind of a claim an attestation is being requested and here we have to click the “Select legitimation(s)” button:

The screenshot shows the message details page for the selected message. At the top, it says "Message from FoodProducer1 (me) ". The subject is "request-legitimations" with a code editor icon to its right. Below this, there are two tabs: "Decrypted Message" (selected) and "Encrypted Message". The decrypted message content is displayed as a JSON object:

```

{
  "messageId": "30686c3b-e14c-49c5-bbda-de5ff9...",
  "receivedAt": 1557496167316,
  "body": {
    "body": {
      "body": "Apple, almonds",
      "isVegan": true
    }
  },
  "createdAt": 1557496165257,
  "receiverAddress": "5EGcJwd3qPK4UYSk177BQzapFDrbif...",
  "senderAddress": "5DdghGp9FW3xdNQZ7F83iqs1NQCoxi...",
  "sender": {
    "name": "FoodProducer1 (me)"
  }
}

```

Below the message content, there is a "Claim details" section. It contains fields for "Ctype" (set to "FoodContents"), "Owner" (set to "FoodProducer1 (me)"), and "Contents". The "Contents" field displays a JSON object with two items: "Ingredients" (set to "Apple, almonds") and "IsVegan" (set to "true"). At the bottom of the "Claim details" section is a large orange button labeled "Select legitimation(s)".

Next the *Food Inspector Institute* selects an attested claim of the CTYPE “ApprovedCertifiedFoodInstitute” as a proposal to be included in the attestation of the Vegan Snack claim and sends it back to the *Food Producer*:

Claim details

Ctype	FoodContents	<input checked="" type="checkbox"/>
Owner	FoodProducer1 (me)	<input checked="" type="checkbox"/>
Contents	<pre>{ "Ingredients": "Apple, almonds", "IsVegan": true }</pre>	

Select legitimation(s)...

CType ApprovedCertifiedFoodInstitute

<input checked="" type="checkbox"/> MyInstitueCert Select property(s) to include in Claim	<input type="checkbox"/> All
<input checked="" type="checkbox"/> CertificationDate	<input type="checkbox"/> All
<input checked="" type="checkbox"/> FieldOfCertification Select attestation(s)	<input type="checkbox"/> All
<input checked="" type="checkbox"/> Ministry of Food (me) <input checked="" type="checkbox"/>	

...and/or a delegation

No eligible delegations found.

We now switch back again to the *Food Producer* and open the “submit-legitimations” message:

Dashboard CTYPEs Claims Attestations Delegations PCRs Contacts
Messages Utilities  FoodProducer1



My Messages

Sender	Subject	CTYPE	created	received	
 FoodIn... <input checked="" type="checkbox"/>	submit-legitimizations	 FoodC... <input checked="" type="checkbox"/>	⚠ 05/10/2019 15:55:57	⚠ 05/10/2019 15:55:59	 

Message from FoodInstituel (me)

Subject: submit-legitimations

Decrypted Message Encrypted Message

```
{ 7 items
  "messageId" : "fcf0613f-c10a-4e8b-afae-ed3ab2..."
  "receivedAt" : 1557496559393
  ▶ "body" : {...} 2 items
  "createdAt" : 1557496557319
  "receiverAddress" : "5DdghGp9FW3xdNQZ7F83iqs1NQCoxi..."
  "senderAddress" : "5EGcJwd3qPK4UYSk177BQzapFDrbif..."
  ▶ "sender" : {...} 2 items
}
```

My claim 'Vegan Snack'
0x915ca698699821430bb1c25510d46039fb9ff9813d5bd4d70811a83d72e57743

Ctype	FoodContents
Owner	FoodProducer1 (me)
Contents	{ 2 items "Ingredients" : "Apple, almonds" "IsVegan" : true }

Legitimations

Attested claims

Attester	CType	Attested	View
Ministry of Food (me)	ApprovedCertifiedFoodInstitute	✓	eye

Delegation

No delegation found.

Cancel Request Attestation

The *Food Producer* now checks and sees that the legitimation of the *Food Inspector Institute* is from the *Ministry of Food* and that it is still valid. He accepts it as a good legitimation so now she requests the attestation from the *Food Inspector Institute* that will include this legitimation.

We switch back to the *Food Inspector Institute* and open the “request-attestation-for-claim” message:

Message from FoodProducer1 (me)

Subject: request-attestation-for-claim

Decrypted Message **Encrypted Message**

```
{
  "messageId": "033552ca-01a6-45ad-a70e-53b1c9...",
  "receivedAt": 1557496773755,
  "body": {
    "body": {
      "body": {
        "body": {
          "body": {
            "body": {
              "body": {
                "body": {
                  "body": {
                    "body": {
                      "body": {
                        "body": {
                          "body": {
                            "body": {
                              "body": {
                                "body": {
                                  "body": {
                                    "body": {
                                      "body": {
                                        "body": {
                                          "body": {
                                            "body": {
                                              "body": {
                                                "body": {
                                                  "body": {
                                                    "body": {
                                                      "body": {
                                                        "body": {
                                                          "body": {
                                                            "body": {
                                                              "body": {
                                                                "body": {
                                                                  "body": {
                                                                    "body": {
                                                                      "body": {
                                                                        "body": {
                                                                          "body": {
                                                                            "body": {
                                                                              "body": {
                                                                                "body": {
                                                                                  "body": {
                                                                                    "body": {
                                                                                      "body": {
                                                                                        "body": {
                                                                                          "body": {
                                                                                            "body": {
                                                                                             ...
```
```

**Claim details**

Ctype FoodContents

Owner FoodProducer1 (me)

Contents

```
{
 "contents": [
 {
 "contents": {
 "contents": {
 "contents": {
 "contents": {
 "contents": {
 "contents": {
 "contents": {
 "contents": {
 "contents": {
 "contents": {
 "contents": {
 "contents": {
 "contents": {
 "contents": {
 "contents": {
 "contents": {
 "contents": {
 "contents": {
 "contents": {
 "contents": {
 "contents": {
 "contents": {
 "contents": {
 "contents": {
 "contents": {
 "contents": {
 "contents": {
 "contents": {
 "contents": {
 "contents": {
 "contents": {
 "contents": {
 "contents": {
 "contents": {
 "contents": {
 "contents": {
 "contents": {
 "contents": {
 "contents": {
 "contents": {
 ...
```
```

Legitimizations

Attested claims

Attester	CType	Attested	View
Ministry of Food (me)	ApprovedCertifiedFoodInstitute	✓	

Delegation

No delegation found.

Cancel **Attest Claim**

Here the *Food Inspector Institute* issues the attestation for the Vegan Snack claim and includes the legitimization from the *Ministry*.

As the last step, we switch back to the *Food Producer* and import the attested claim:

The screenshot shows the KILT Tutorial Demo Client interface. At the top, there is a message from "FoodInstitue1 (me)" with the subject "submit-attestation-for-claim". Below the message, there are tabs for "Decrypted Message" and "Encrypted Message", with "Decrypted Message" selected. The message content is a JSON object with 7 items, including fields like "messageId", "receivedAt", "body", "createdAt", "receiverAddress", "senderAddress", and "sender".

Below the message, there are two sections: "Claim details" and "Legitimations".

Claim details:

- Ctype: FoodContents (checked)
- Owner: FoodProducer1 (me) (checked)
- Contents:
 - 2 items
 - Ingredients: Apple, almonds
 - IsVegan: true

Legitimations:

Attested claims:

Attester	CType	Attested	Details
Ministry of Food (me)	ApprovedCertifiedFoodInstitute (checked)	✓	

Delegation:

No delegation found.

At the bottom right, there are "Cancel" and "Import Attestation" buttons.

Building a Hierarchy of Trust with Delegations

1 Choosing the Root Identity

For creating a Hierarchy of Trust, an identity needs to be chosen, or created which will become the root of the Delegation tree. For initiating this process click in the navigation bar on “Delegations”

The screenshot shows the KILT Tutorial Demo Client interface. At the top, there is a navigation bar with links: Dashboard (highlighted in orange), CTYPEs, Claims, Attestations, Delegations (selected), PCRs, Contacts, Messages, and Utilities. To the right of the navigation bar is the KILT logo and a dropdown menu showing "State Office (Root)".

The main area is titled "My Dashboard" and shows the "Active identity". The active identity is "State Office (Root Attester)" with the alias "start must main finger saddle quick cousin athlete green among swallow enhance". Other details shown include Address (5DGPPUgUPEwXaCKsGo7UbLeweip9SSjMC8mkdULzBcZSGCp4), Seed (as hex) (0x7196018fa49272de024e6716ad9aa9de79703f706cdd2cbb86be6e0c3b9ae047), Public Key (0x3526752f96ff49e1a7e50aca6a8f07687d48f30bf2a023a64d091b98c2dea84), Encryption Public Key (0x13462e8a9cb7c34b0d51b32b7cad4b416251dfcf2f18ad5e84eeb68f20fdf265), and DID.

A yellow star icon is located in the bottom right corner of the identity card. A "Manage Identities" button is at the bottom right of the dashboard area.

2. Initiating the Delegation tree

A delegation is only valid for one CTYPE, therefore for creating the Delegation tree an existing CTYPE must be chosen.

The screenshot shows the KILT Tutorial Demo Client interface. At the top, there is a navigation bar with links: Dashboard, CTYPEs, Claims, Attestations, Delegations (which is highlighted in orange), PCRs, Contacts, Messages, and Utilities. To the right of the navigation bar is the KILT logo and a dropdown menu showing "State Office (Roc)" with a dropdown arrow. Below the navigation bar, the main title "My Delegations" is displayed next to a small icon of three interconnected circles. On the right side of the main area, there is a red button labeled "New Delegation". A modal dialog box is overlaid on the page, titled "Select cType...". It contains a single item in a list: "Drivers-License" with a small icon to its left. At the bottom of the modal are two buttons: "Cancel" (in white text) and "OK" (in white text on an orange background). The background of the main page is dark grey.

The Delegation tree needs to be given a name.

New Root Delegation

Alias	Delegation for Drivers Licenses
Id	0x37663137653065302d353330302d343334362d613539302d3432643837343435
CTYPE	DriversLicense <input type="button" value="▼"/>
Account	State Office (Root Attester) <input type="button" value="▼"/>

The Delegation tree has been created with the identity *State Office* being the root. In a Delegation tree two different rights can be delegated, the right to attest and the right to delegate. As it can be seen in this screenshot under Permissions the root obviously has both rights, A= Attest, D=Delegate, so it can issue attestations and invite other identities to the Delegation tree.

My Delegations

Alias	Type	CType	Permissions	ID	Action
Delegation for Drivers Licenses	root	DriversLic... <input type="button" value="▼"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	0x376631376530...	Select action... <input type="button" value="▼"/>

3. Adding identities to the Delegation tree

The *State Office* (root) can invite additional identities to the Delegation tree by clicking on Invite contact.



My Delegations

Alias	Type	CTYPE	Permissions	ID	Action
Delegation for Drivers Licenses	root	DriversLic...	Ⓐ Ⓛ	0x376631376530...	Select action... ▾

Invite contact

Delete

From the contact list of the *State Office* (as described in Managing Contacts), the root selects the identity it wants to invite to the Delegation tree, in this case the *Driving License Authority Berlin* (Department), for the CTYPE “DriversLicense”, for the delegation “Delegation for Drivers Licenses” with the permissions to attest and to delegate.

Invite to delegation(s) ✖

1. Select receiver(s)

Driving License Authority Berlin (Department) (me) ✖ | ▾

2. Select cType

DriversLicense | ▾

3. Select delegation(s)

Delegation for Drivers Licenses DriversLicense | ▾

4. Select permissions

ATTEST
 DELEGATE

Cancel
Invite

Switching to the identity of the *Driver's License Department* and checking for messages we see it received a message with a request for accepting the delegation from the *State Office*

The screenshot shows the KILT Tutorial Demo Client interface. At the top, there is a dark blue header bar with the following navigation items: Dashboard, CTYPEs, Claims, Attestations, Delegations, PCRs, Contacts, Messages (which is highlighted in red), and Utilities. To the right of the header is a logo for "KILT Driving License" featuring a gear icon and the text "Driving License".

My Messages

Sender	Subject	CType	created	received	
State ... <input type="button" value="▼"/>	request-accept-delegation		05/09/2019 20:04:43	05/09/2019 20:04:43	

The screenshot shows a detailed view of a message from the "State Office (Root Attester) (me)". The subject is "request-accept-delegation". The message content is displayed as JSON:

```
{
  "messageId": "764bc41f-2860-477d-a15d-6ed3c6...",
  "receivedAt": 1557425083736,
  "body": {
    "createdAt": 1557425083476,
    "receiverAddress": "5GKAP5YECdGKnJhBGCsb8Zhq26K3Je...",
    "senderAddress": "SDGptIgUPewXaCksGo7UbLeweip9SS...",
    "sender": ...
  }
}
```

Below the message content, there is a modal dialog titled "Accept invitation to Delegation?". It contains the following information:

- Your permissions:**
- Delegation tree:** CType: DriversLicense
- Delegation for Drivers Licenses** 0x37663137...
 State Office (Root Attester) (me)

At the bottom of the dialog are two buttons: "Cancel" and "Accept Invitation".

By clicking on the corresponding button, the invitation gets accepted.

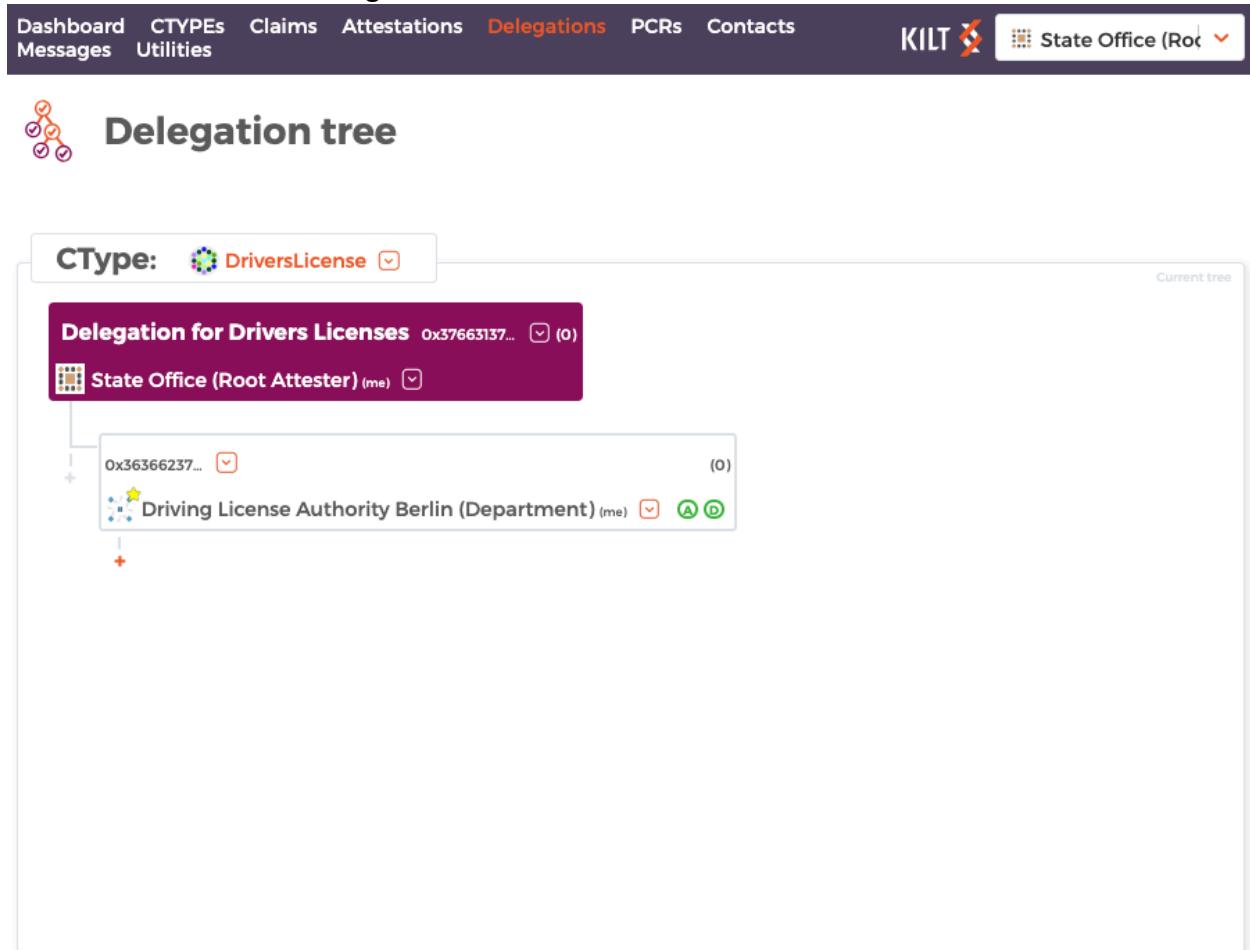
Switching back to the identity of the *State Office*, we see that the *State Office* received a message from the *Driving License Department* confirming that it accepted the request. It is important to create the delegation!

The screenshot shows two overlapping windows. The top window is a message from "Driving License Authority Berlin (Department) (me)" with the subject "submit-accept-delegation". The message content is a JSON object:

```
{
  "messageId": "605d3ff4-0e68-4326-888b-3fc9bc...",
  "receivedAt": 1557425442968,
  "body": {...},
  "createdAt": 1557425442863,
  "receiverAddress": "5DGppUgUPEwXaCKsGo7UbLeweip9SS...",
  "senderAddress": "5GKAP5YECdGKnJhBGCsb8Zhq26K3Je...",
  "sender": {...}
}
```

The bottom window is titled "Create delegation". It has sections for "Invitee" (set to "Driving License Authority Berlin (Department) (me)"), "Invitees permissions" (with options A and D selected), and a "Delegation tree" section. In the delegation tree, "DriversLicense" is selected under "(CType: DriversLicense)". Below it, "Delegation for Drivers Licenses" and "State Office (Root Attester) (me)" are listed. At the bottom of the dialog are "Cancel" and "Create delegation" buttons.

When the *State Office* clicks now on Delegation, we can see that the *Driving License Authority* has been added to the Delegation tree.



Very important is that we switch back to the *Driving License Authority* because they received a message from the *State Office* informing them that the Delegation has been created.



Sender	Subject	CTYPE	created	received	
State ...	inform-create-delegation		05/09/2019 20:13:51	05/09/2019 20:13:51	

The *Driving License Authority* also has to import the delegation! Make sure to name your delegation.

The screenshot shows the 'Import delegation' dialog. At the top, there is a message from 'State Office (Root Attester) (me)' with the subject 'inform-create-delegation'. Below the message is a JSON representation of the delegation object:

```
{ "messageId" : "d4c55e5f-4dae-4bff-b54e-8e7e34...", "receivedAt" : 1557425631180, "body" : { ... }, "createdAt" : 1557425631016, "receiverAddress" : "5GKAP5YECdGKnJhBGCsb8Zhq26K3Je...", "senderAddress" : "5DGPPUgUPEwXaCKsGo7UbLeweip9SS...", "sender" : { ... } }
```

Below the message, there is a section titled 'Name your delegation' with a text input field containing 'Drivers Licenses'.

Further down, there is a 'Delegation tree' section. It shows a delegation path starting from 'Drivers License' (selected), going through 'State Office (Root Attester) (me)', and finally reaching 'Driving License Authority Berlin (Department) (me)'.

At the bottom right of the dialog are two buttons: 'Cancel' and 'Import delegation'.

This is how it looks now from the perspective of the *Driving License Authority*. It is a Node in the Delegation tree, with the Permissions for attesting and delegating.

My Delegations

Alias	Type	CType	Permissions	ID	Action
Drivers Licenses	node	DriversLic...	⊕ ⊖	0x363662376363...	Select action... ▾

New Delegation

This is how the Delegation tree looks from the perspective of the *Driving License Authority*.

Delegation tree

CType: DriversLicense

Current tree

- 0x37663137... (0)
 - State Office (Root Attester) (me)
- + Drivers Licenses 0x36366237... (0)
 - Driving License Authority Berlin (Department) (me) ⊕ A D

As the *Driving License Authority Berlin* got the delegation rights from the *State Office* it can invite other contacts to the Delegation tree, by clicking on the lower arrow.

The screenshot shows the KILT Delegation tree interface. At the top, there is a navigation bar with links: Dashboard, CTYPEs, Claims, Attestations, Delegations (highlighted in orange), PCRs, Contacts, Messages, and Utilities. To the right of the navigation bar is the KILT logo and a dropdown menu labeled "Driving License".

The main area is titled "Delegation tree". On the left, there is a tree structure with nodes:

- DriversLicense** (0)
- State Office (Root Attester)** (me) (selected)
- Drivers Licenses** (0)
- Driving License Authority Berlin (Department)** (me) (selected)

To the right of the tree structure is a context menu with the following options:

- Unfavorize
- Request claims
- Request legitimations
- Submit claims
- Submit legitimations
- Invite to delegation(s)** (highlighted in red)
- Invite to PCR(s)

As the *Driving License Authority* only wants to delegate the right to attest, it only checks the corresponding box.

Invite to delegation(s)



1. Select receiver(s)

Employee 1 DLA Berlin (me) x



2. Select cType

DriversLicense



3. Select delegation(s)

Drivers Licenses DriversLicense



4. Select permissions

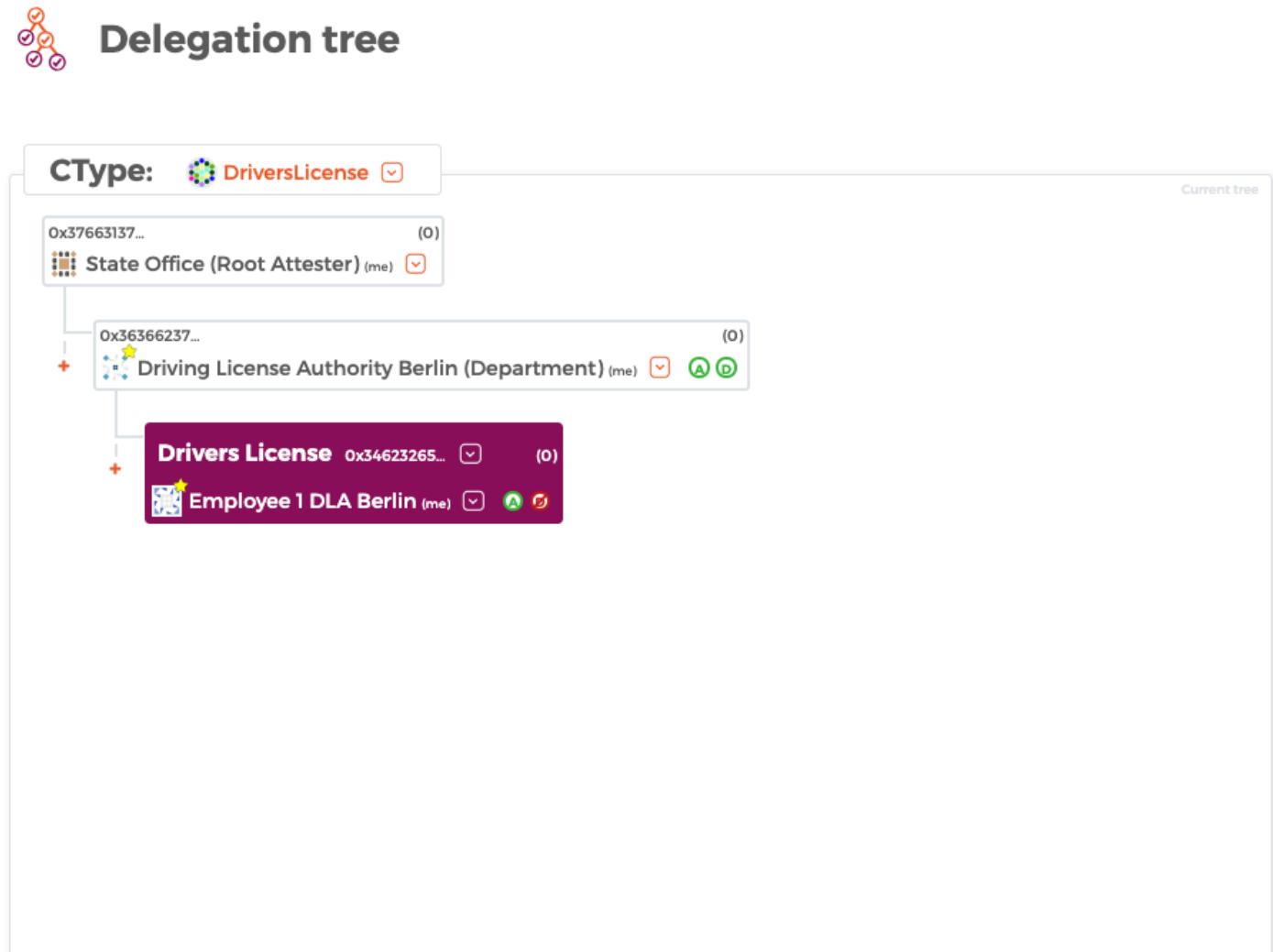
ATTEST

DELEGATE

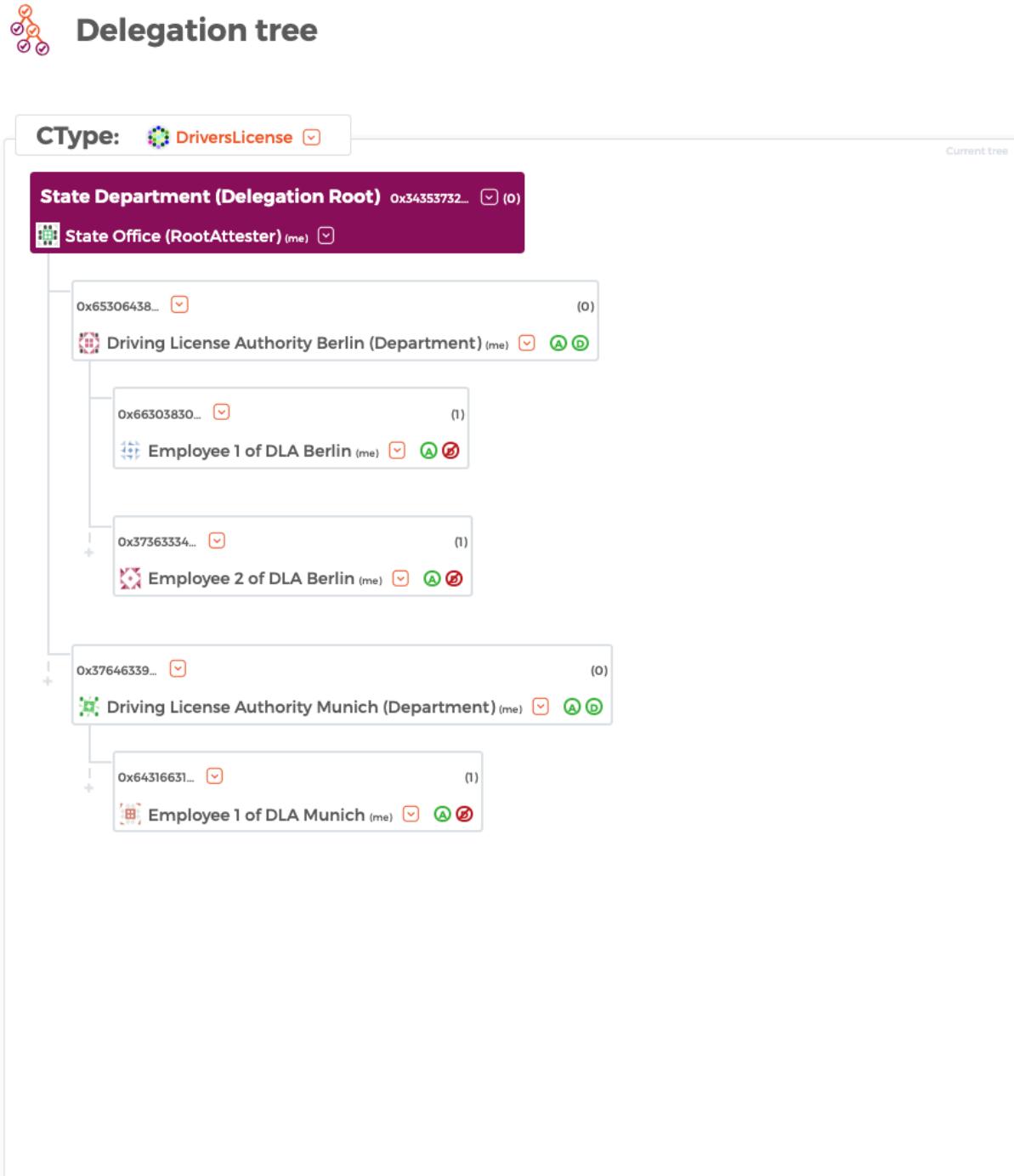
Cancel

Invite

For importing the delegations, the same steps have to be performed as described earlier. Looking now at the Delegation tree one sees, that the Employee only has the right to attest but not the right to delegate as the little D is marked red and crossed out.

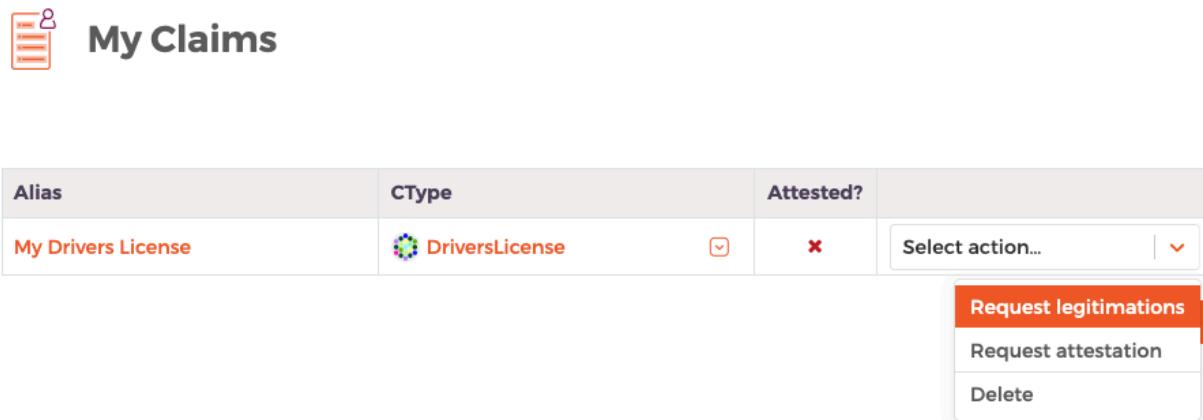


One can build more complex structures.



Step 3 Claiming & Attesting using the Delegation tree

For requesting an attestation that contains the Delegation tree, we have to switch to the Claimers identity (or create one). The claiming process works as described earlier. The claimer has to choose Request legitimations.



Alias	CTYPE	Attested?	
My Drivers License	DriversLicense	<input checked="" type="checkbox"/> <input type="checkbox"/>	Select action... <input type="button" value="▼"/>

Request legitimizations

Request attestation

Delete

The claimer chooses the receiver of the request, in this case the *Employee 1 DLA Berlin*, he chooses the CTYPE and his claim and requests the Legitimation.

Request legitimizations

1. Select receiver(s)

 Employee 1 DLA Berlin (me)

2. Select cType

 DriversLicense

3. Select claim (optional)

My Drivers License

Cancel
Request Legitimation

Switching to the identity of the attester, in this case *Employee 1 DLA Berlin* we see that he has received a message with the request for legitimation.

 **My Messages**

Sender	Subject	CType	created	received	
 Driver ... <input checked="" type="checkbox"/>	request-legitimations	 Drivers... <input checked="" type="checkbox"/>	05/10/2019 12:18:03	05/10/2019 12:18:03	 

Opening the message, it looks like this:

Message from  Driver (Claimer) (me)

Subject: request-legitimations 

[Decrypted Message](#) [Encrypted Message](#)

```
{
  "messageId": "0e7e8b72-bc7c-4739-9c5f-caef58...",
  "receivedAt": 1557483483717,
  "body": {
    "createdAt": 1557483483567,
    "receiverAddress": "5DjjUfiWYMSfwGH5pdueDuojnYK6h...",
    "senderAddress": "5HbyEAMLt9DpxRucFh7b7aTJqXqfnf...",
    "sender": {
      "name": "Matthias",
      "age": 44
    }
  }
}
```

Claim details

Ctype	 DriversLicense <input checked="" type="checkbox"/>
Owner	 Driver (Claimer) (me) <input checked="" type="checkbox"/>
Contents	<pre>{ "name": "Matthias", "age": 44 }</pre>

Select legitimation(s)

After clicking on Select Legitimations *Employee 1 DLA Berlin* can either choose an existing legitimation (he doesn't have one) and/ or an existing delegation. In this case he chooses the

delegation of the “DriversLicense”

Message from  Driver (Claimer) (me) 

Subject: request-legitimations 

Decrypted Message **Encrypted Message**

```
▼ { 7 items
  "messageId" : "0e7e8b72-bc7c-4739-9c5f-caef58..."
  "receivedAt" : 1557483483717
  ▶ "body" : { ... } 2 items
  "createdAt" : 1557483483567
  "receiverAddress" : "5DjjUfiWYMSfwGH5pdueDuojnYK6h..."
  "senderAddress" : "5HbyEAMLt9DpxRucFh7b7aTJqXqfnf..."
  ▶ "sender" : { ... } 2 items
}
```

Claim details

Ctype	 DriversLicense	
Owner	 Driver (Claimer) (me)	
Contents	<pre>▼ { 2 items "name" : "Matthias" "age" : 44 }</pre>	

Select legitimation(s)...

No claims found. [Create claim](#)

...and/or a delegation

Drivers License	 DriversLicense	
-----------------	--	---

Cancel **Send Legitimations**

Switching to the identity of the *Driver* (Claimer). He received a message with the legitimization. Based on this legitimization that contains the delegation he can request the attestation of his claim from *Employee 1 DLA Berlin* that contains the delegation.

Message from  Employee 1 DLA Berlin (raw) 

Subject: submit-legitimations 

Decrypted Message Encrypted Message

```
{
  "items": [
    {
      "messageId": "59ccdd8d-bc34-4274-ac5d-fd682f...",
      "receivedAt": "1557483833515",
      "body": {
        "content": {
          "claim": "...",
          "legitimizations": []
        },
        "delegationId": "0x34623265643063382d646431612d...",
        "type": "submit-legitimizations",
        "createdAt": "1557483833508",
        "receiverAddress": "5ibyEAMlt9DpxRucFh7b7aTJqXqfnf...",
        "senderAddress": "5DjJUUiWYMSfwvGH5pdueDuojnYK6h...",
        "sender": {...}
      }
    }
  ]
}
```

My claim 'My Drivers License'

 Ctype  DriversLicense
 Owner  Driver (Claimer) (raw) 
 Contents 

```
{
  "items": [
    {
      "name": "Matthias",
      "age": 44
    }
  ]
}
```

Legitimizations

Attested claims
No attestations found.

Delegation

CType:  DriversLicense 

```

0x37663137...
  State Office (Root Attester) (raw) 
    0x36366237...
      Driving License Authority Berlin (Department) (raw)   
      0x34623265...
        Employee 1 DLA Berlin (raw)   

```

Switching to the identity of the attester, *Employee 1 DLA Berlin*. He received a message with the request to attest the claim, including the delegation.

The screenshot shows the KILT Tutorial Demo Client interface. At the top, there is a message inbox entry from "Driver (Claimer) (me)" with subject "request-attestation-for-claim". The message content is a JSON object:

```
{
  "items": [
    {
      "messageId": "8a55178f-814b-4795-9559-97eba6...",
      "receivedAt": 1557484169188,
      "body": {
        "createdAt": 1557484169062,
        "receiverAddress": "5DjjuFiWYMSfwwGH5pduoJnYK6h...",
        "senderAddress": "5HbyEAMLt9DpxRucFh7b7aTJqXqfnf...",
        "sender": {
          "name": "Employee 1 DLA Berlin"
        }
      }
    }
  ]
}
```

Below the inbox is a "Claim details" section. It shows the claim type is "DriversLicense" and the owner is "Driver (Claimer) (me)". The contents of the claim include a person named "Matthias" who is 44 years old.

The interface also includes sections for "Legitimations" (which shows no attestations found) and "Delegation". The delegation tree for a "Drivers License" claim is displayed, starting from the "State Office (Root Attester)" and branching down to "Driving License Authority Berlin (Department)" and finally to "Employee 1 DLA Berlin".

At the bottom of the interface are two buttons: "Cancel" and "Attest Claim".

Employee 1 DLA Berlin attests the claim. The *Driver* (Claimer) receives a message with the attestation that includes the delegation, which now should be imported.

Message from  Employee 1 DLA Berlin (me) X

Subject: submit-attestation-for-claim COP

Decrypted Message Encrypted Message

```
{
  "messageId": "7d9b4f1e-b96a-4438-a735-a5ec95...",
  "receivedAt": 1557484281797,
  "body": {
    "content": "...",
    "type": "submit-attestation-for-claim"
  },
  "createdAt": 1557484281621,
  "receiverAddress": "5HbyEAMlt9DgxRucFh7b7aTJqXqfnf...",
  "senderAddress": "5DjjuifiwYNStvwGR5pdueluojnYK6h...",
  "sender": {
    "metaData": "...",
    "publicIdentity": ...
  }
}
```

Claim details

Type	 DriversLicense	X
Owner	 Driver (Claimer) (me)	X
Contents	<pre>{ "name": "Matthias", "age": 44 }</pre>	

Legitimizations

Attested claims

No attestations found.

Delegation

CType:  DriversLicense X

```

0x57665157...
 State Office (Root Attester) (me) X

0x53666237...
 Driving License Authority Berlin (Department) (me) X A D

0x54623265...
 Employee 1 DLA Berlin (me) X A D

```

Cancel Import Attestation

The *Driver* (Claimer) has the imported credential stored in its wallet, the green check indicates that it is attested.

The screenshot shows the 'My Claims' page of the KILT Tutorial Demo Client. At the top, there is a navigation bar with links: Dashboard, CTYPEs, Claims (highlighted in orange), Attestations, Delegations, PCRs, Contacts, Messages, and Utilities. To the right of the navigation bar is the KILT logo and a dropdown menu showing 'Driver (Claimer)' with a green checkmark next to it. Below the navigation bar, the title 'My Claims' is displayed with a document icon. A table lists a single claim entry:

Alias	CType	Attested?	Action
My Drivers License	DriversLicense	✓	Select action...

A red 'Create Claim' button is located at the bottom right of the table area.

This is a detailed view of the credential

 **My claim 'My Drivers License'**
0x582c071d7ef9f7cfcb2d8cd8eb7186ecde301af04e8d50ad5fa7227d18face

Claim details

Ctype	 DriversLicense	<input type="checkbox"/>
Owner	 Driver (Claimer) (me)	<input type="checkbox"/>
Contents	<pre>{ "name": "Matthias", "age": 44 }</pre>	

Attested claim

 Employee 1 DLA Berlin (me)	<input type="checkbox"/>	 DriversLicense	<input checked="" type="checkbox"/>	
name	Matthias			
age	44			

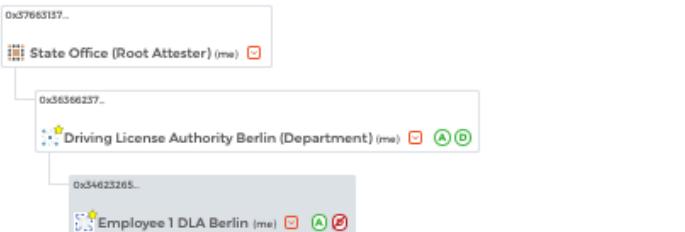
Legitimations

Attested claims

No attestations found.

Delegation

CType:  DriversLicense



  Request Legitimation 

Step 4 Verification

As described earlier the Verifier (*Police Officer*) requests the Claim of a certain CTYPE from the Claimer (*Driver*).

Request claims for cType ✖

1. Select receiver(s)

 Driver (Claimer) (me) ✖ | ▾

2. Select cType

 DriversLicense | ▾

Cancel Request claims

The Claimer (*Driver*) send his credential to the Verifier (*Police Officer*), choosing the information he wants to disclose and which attestation he wants to provide.

Message from  Police Officer (me) 

Subject: request-claims-for-ctype 

Decrypted Message **Encrypted Message**

```
▼ { 7 items
  "messageId" : "cd482240-02f0-48ca-b04b-35ec72..."
  "receivedAt" : 1557484948794
  ▶ "body" : { ... } 2 items
  "createdAt" : 1557484948638
  "receiverAddress" : "5HbyEAMLt9DpxRucFh7b7aTJqXqfnf..."
  "senderAddress" : "5EFkujj5rxQdQS5DgVSfF6m74wmScy5..."
  ▶ "sender" : { ... } 2 items
}
```

Select attested claim(s)

CType  DriversLicense 

My Drivers License All

Select property(s) to include in Claim

name All

age All

Select attestation(s)

 Employee1 DLA Berlin (me) 

Cancel **Send attested claims**

The Verifier (*Police Officer*) receives the credential, including the disclosed information of the claim, the indication that it has been attested, including the information about the attester and the Delegation tree that was used for this attestation.

Message from 🚗 Driver (Claimer) (rw)

Subject: submit-claims-for-ctype

Decrypted Message [Encrypted Message]

```
{
  "messageId": "ealcb065-0cf6-4859-ac72-bfa163...",
  "receivedAt": 1557485000479,
  "body": {
    "createdAt": 1557485000422,
    "receiverAddress": "5EFkuwij5rxQ5DgVSfF6m74wmScy5...",
    "senderAddress": "5HbyEAMt9DpxRucPh7b7aTJqXqnf...",
    "sender": {
      "name": "Employee 1 DLA Berlin",
      "address": "DriversLicense"
    }
  }
}
```

Attested claim

Employee 1 DLA Berlin (rw) DriversLicense ✓

name	Matthias
age	44

Legitimations

Attested claims

No attestations found.

Delegation

CType: DriversLicense

```

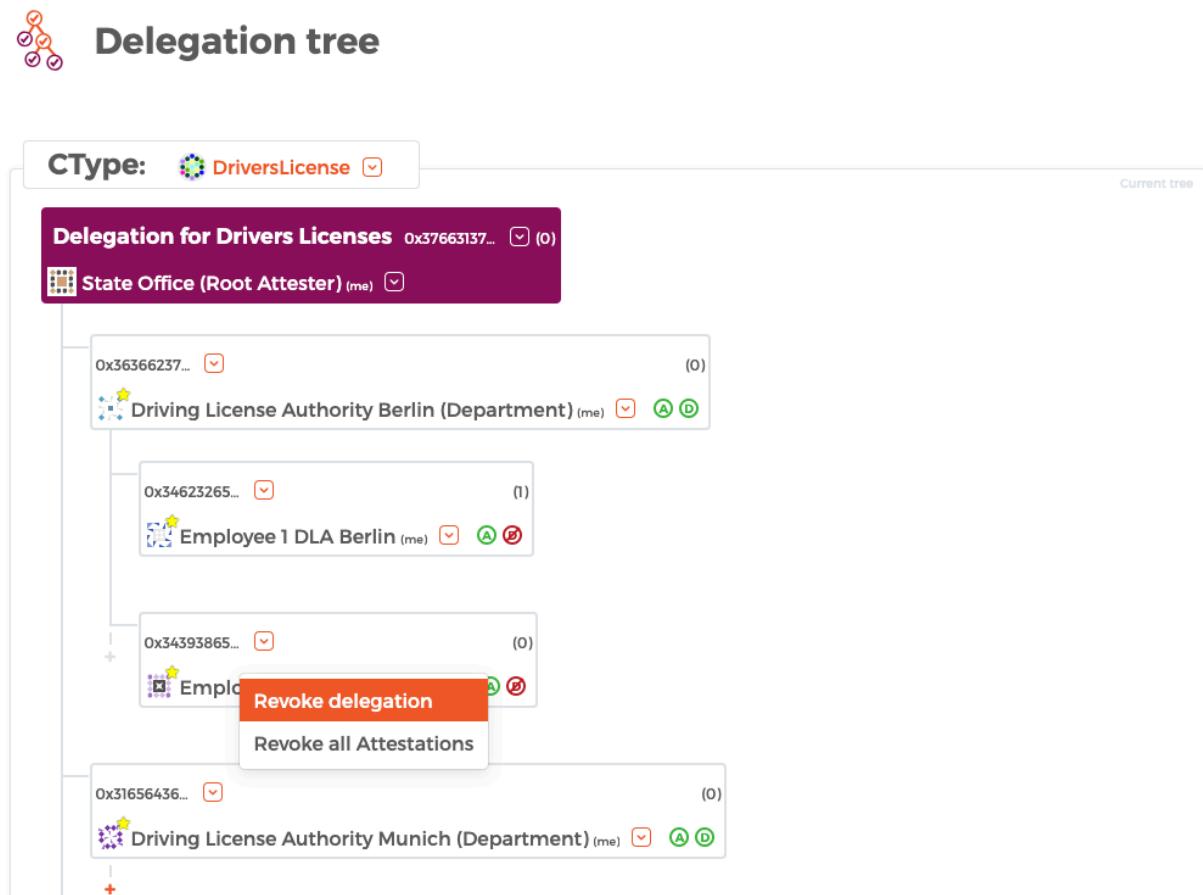
graph TD
    DL[DriversLicense] --> SORoot[State Office (Root Attester)]
    SORoot --> DLA[Driving License Authority Berlin]
    DLA --> Employee[Employee 1 DLA Berlin]

```

Managing Delegations

Revoke Delegations

Switching to the identity of the *State Office* (Root). The root can choose any node in the Delegation tree and revoke its delegation, which basically means that this identity is not part of the Delegation tree anymore and therefore cannot issue attestations that contain the Delegation tree anymore. For doing so it has to click on the upper arrow of the corresponding identity, in this case *Employee 2 DLA Berlin* and choose “Revoke delegation”.



This action needs to be confirmed

Delegation tree

CType: DriversLicense

Delegation for Drivers Licenses 0x37663137... (0)

State Office (Root Attester) (me)

0x36366237... (0)
Driving License Authority Berlin (Department) (me) ⓘ ⓘ ⓘ

0x34623265... (1)
Employee 1 DLA Berlin (me) ⓘ ⓘ ⓘ

Are you sure you want to revoke the Delegation '0x3439386...'?
Cancel Revoke

0x3439386... (0)
Employee 2 DLA Berlin (me) ⓘ ⓘ ⓘ

0x31656436... (0)
Driving License Authority Munich (Department) (me) ⓘ ⓘ ⓘ

The delegation is marked as revoked. Attestations issued by the revoked identity are still valid.

Delegation tree

CType: DriversLicense

Delegation for Drivers Licenses 0x37663137... (0)

State Office (Root Attester) (me)

0x36366237... (0)
Driving License Authority Berlin (Department) (me) ⓘ ⓘ ⓘ

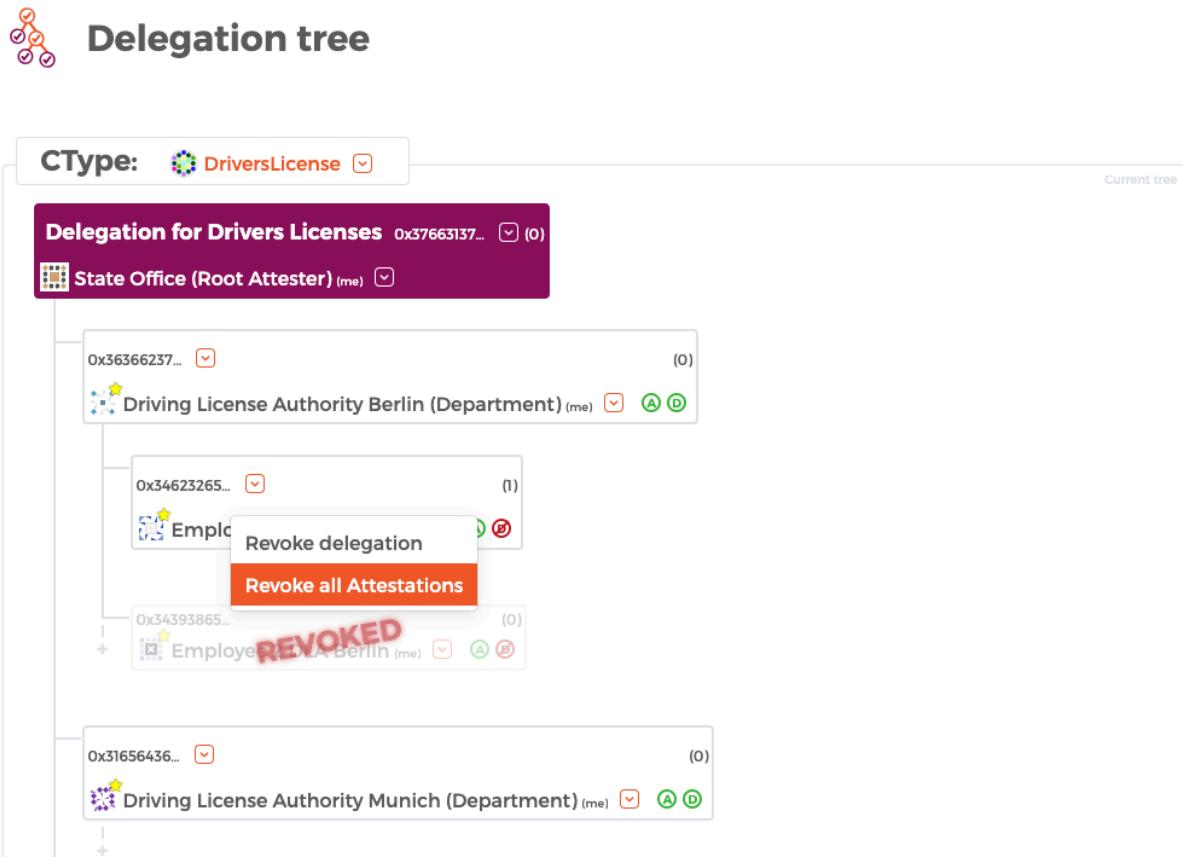
0x34623265... (1)
Employee 1 DLA Berlin (me) ⓘ ⓘ ⓘ

0x3439386... (0)
Employee 2 DLA Berlin (me) ⓘ ⓘ ⓘ

0x31656436... (0)
Driving License Authority Munich (Department) (me) ⓘ ⓘ ⓘ

Revoke Attestations

A node in the Delegation tree can also revoke all attestations of its subordinates. Switching to the identity of the *State Office* (Root). The root can choose any node in the Delegation tree and revoke its attestations. For doing so it has to click on the upper arrow of the corresponding identity, in this case *Employee 1 DLA Berlin* and choose “Revoke all Attestations”.



This action gets confirmed.

The screenshot shows the KILT Delegation tree interface. At the top, there is a search bar labeled "CType: DriversLicense". Below it, a delegation node for "Drivers Licenses" is selected, showing "0x37663137..." and "(0)". Underneath this, the "State Office (Root Attester) (me)" is listed. The tree structure then branches down to "Driving License Authority Berlin (Department)", which has a sub-node "Employee 1 DLA Berlin". A modal dialog box is displayed in the center, titled "SUCCESS" with a green checkmark icon. The message inside the dialog reads "All Attestations revoked for Delegation: 0x34623265...". At the bottom right of the dialog is an "OK" button. The background shows other delegation nodes like "Driving License Authority Munich (Department)" and "Employee 2 DLA Berlin".

Switching to the identity of the *Driver* (Claimer) who got his attestation from *Employee 1 DLA Berlin*, the attestation is now marked as not attested as indicated by the red cross in the column of Attested.

My claim 'My Drivers License'
0x582c671d7ef9f7c1c8d2d8cd8eb7186ecd1e301af64a8d50ad5a7227d18face

Claim details

Ctype	DriversLicense	<input type="checkbox"/>
Owner	Driver (Claimer) (me)	<input checked="" type="checkbox"/>
Contents	<pre>{ "name": "Matthias", "age": 44 }</pre>	

Attested claims

Attester	CType	Attested	
Employee 1 DLA Berlin (me)	DriversLicense	<input checked="" type="checkbox"/>	