



Lab: Transfer assets in a business network

Overview

In this lab, you learn the basic concepts of a blockchain by seeing how a blockchain can be used to transfer assets between participants in a business network. You use car leasing as a scenario for the demo.

The lab runs inside the IBM Bluemix environment; however for this lab, you will ignore Bluemix and focus on the car leasing demo itself. There is a follow-on lab that will properly introduce you to the Bluemix environment and allows you to create and monitor the IBM Blockchain service and application.

Tip: This lab shows some screen captures in the IBM Bluemix interface in the classic view. If you log in to Bluemix and want to work in the classic view, click the avatar in the upper right and select **Switch to Classic** at the bottom of the avatar window.

Important: Because the IBM Blockchain service is in beta, it might be temporarily unavailable or at capacity. If you experience problems in the lab when you deploy the demo application, try accessing the application later.

Prerequisites

It's recommended that you use Firefox or Chrome web browsers.

You need a [Bluemix account](#) to create the sample application.

Step 1. Deploy and configure the sample application

To deploy the sample application:

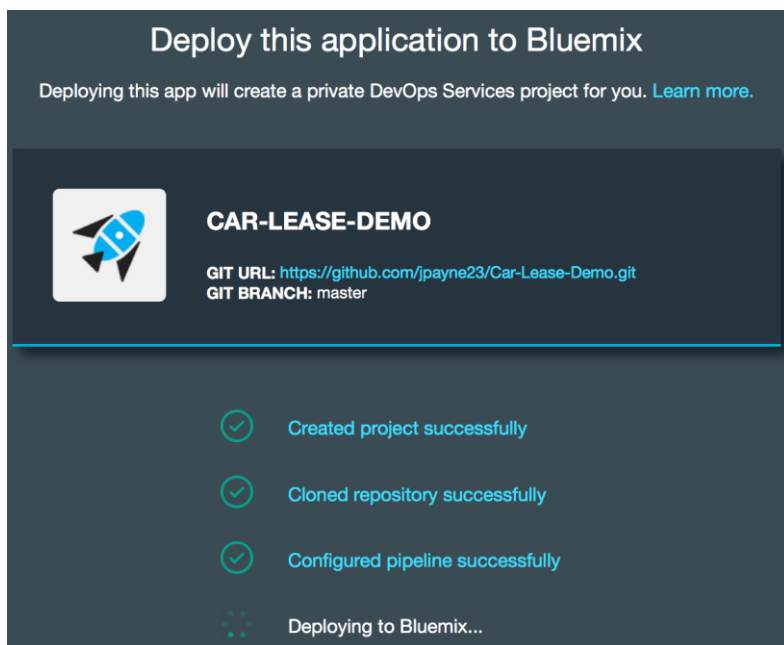
1. Open your browser and go to [http://www.ibm.com/developer/preview/bluemix.net](http://www.ibm.com/developer/preview/bluemix).
2. Click **Sign up** or **Log in** to create a new Bluemix account or log into your existing account.
3. After you have successfully signed up and logged into Bluemix, click **CATALOG** from the top bar.
4. Enter **Blockchain** in the search bar. When the service icon is displayed, click it to open the service information page.
5. Click **View Docs** on the left side of the page to open the service documentation.
6. Expand **Samples and Tutorials** on the right side of the page to view the available apps.
7. Select the **Using Car Lease demo** item from the list of apps
8. Click the **Deploy to Bluemix** button displayed at the end of the Car-Lease-Demo overview paragraph. Click the **Log In** button that is displayed on the next screen.

If this is your first time using Bluemix DevOps services, you will be prompted to create an alias for the DevOps Services Git repository that will link to your IBMid. This could be the first part of your email address; add a number afterward if needed to make it unique. Click **Create** after providing the alias.



The screenshot shows the 'Pick an alias' screen in the IBM Bluemix DevOps Services interface. At the top is the IBM Bluemix DevOps Services logo. Below it, the heading 'Pick an alias' is displayed. A paragraph explains that to set up a Git repository, an IBM ID must be associated with an alias. Another paragraph defines an alias as a unique, publicly visible short name used in Git repository paths, Track & Plan, and desktop and command line clients. There is a text input field with a speech bubble icon and the placeholder text 'Pick an alias'. Below the input field is a checkbox labeled 'I accept the DevOps Services Terms of Use.' with a link to the terms of use. At the bottom is a blue 'Create' button.

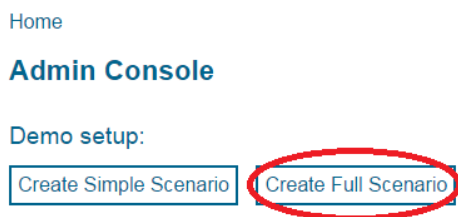
9. In the next window, you can leave the App Name, Region, Organization, and Space attributes with their default values (it can take a few seconds for the default field values to be populated). Click **Deploy**. This will cause the Car-Lease-Demo to be copied into a project in Bluemix DevOps services profile and then deployed to your Bluemix environment. It might take a few minutes to complete.



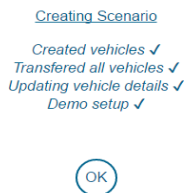
When you see the “Success!” message, click **VIEW YOUR APP** to open the sample application in your web browser.

To configure the sample application:

1. Click **Admin Console > Create Full Scenario** to load the initial set of assets into the blockchain. This will take several minutes to complete.



The scenario setup is complete when “Demo setup” is displayed.



If an error occurs when creating the scenario, read “Remove the sample application” at the end of this document for instructions about how to delete the service.

Step 2. Run the asset transfer and disposal scenarios

In the following scenarios, you discover how blockchain technology can be used to track ownership of an asset across multiple parties. The scenario describes how blockchain technology can be used to model the lifecycle of vehicle ownership and control between the following participants:

- Manufacturer to Dealership
- Dealership to Leasing Company
- Leasing Company to Lessee
- Leasing Company to Scrap Merchant

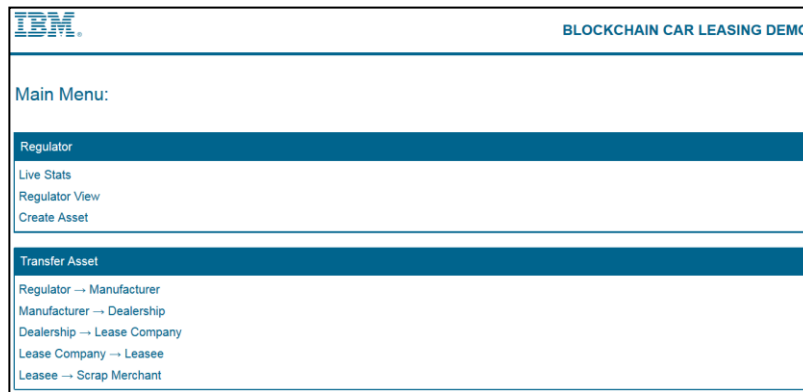
The Scrap Merchant's role in this scenario also demonstrates how asset disposal can be represented by using blockchain technology.

In this business scenario, each participant has entered into a business agreement with each other and all parties are known and trusted by each other. The process of transferring vehicles has been negotiated and agreed to by all participants. As a result, the order in which the processes take place is strictly defined within the demo showing that, for example, a Manufacturer cannot transfer directly to a Lessee by skipping the Dealership and Leasing Company transfers.

This demo has been simplified so that by default each role, such as the Manufacturer, shows only one participant, such as Martin (Manufacturer: Alfa Romeo), in the transfer assets page.

1.2. Start the Asset Transfer Demo

1. Click **OK** after the demo setup is completed and click **Home** to return to the home page of the Car Leasing Demo.



1.1. Scenario: Transferring an Asset to a Dealership

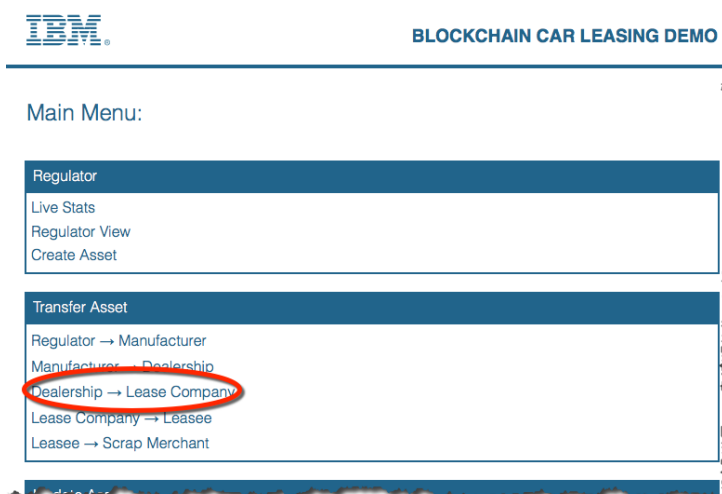
In this scenario, you transfer the ownership of a vehicle from a Manufacturer to a Dealership (known as “Beechvale Group”) by using the blockchain.

Before transferring the vehicle to the dealership, you verify which assets the target dealership currently owns.

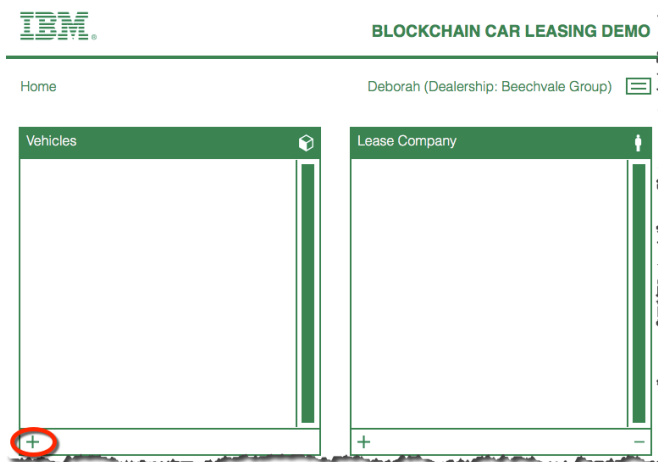
1.1.1. Verify the target Dealership Assets

In this section, you act as a Dealership and verify which assets the Beechvale Group dealership owns and is permitted to transfer.

1. From the main demo application page, click **Dealership > Lease Company**.



2. In the Dealership Transfer window, click the plus sign in the Vehicles window to verify which vehicles are owned by the dealership known as Beechvale Group according to the blockchain.



The demo application interrogates the blockchain to identify all vehicles that are owned by the dealership and will present a window with the results. The dealership user Deborah will see only vehicles owned by the dealership.

-
-
3. You should see a number of vehicles displayed. (There might be more or fewer depending on the scenario that has been set up.)

Vehicles		
948881310167423	Toyota Celica, Silver, DG16 FVG	<input type="checkbox"/>
549523556856725	Jaguar F-Type, Red, HE16 WDZ	<input type="checkbox"/>
523447019546831	Land Rover Defender, Silver, EY16 FRV	<input type="checkbox"/>

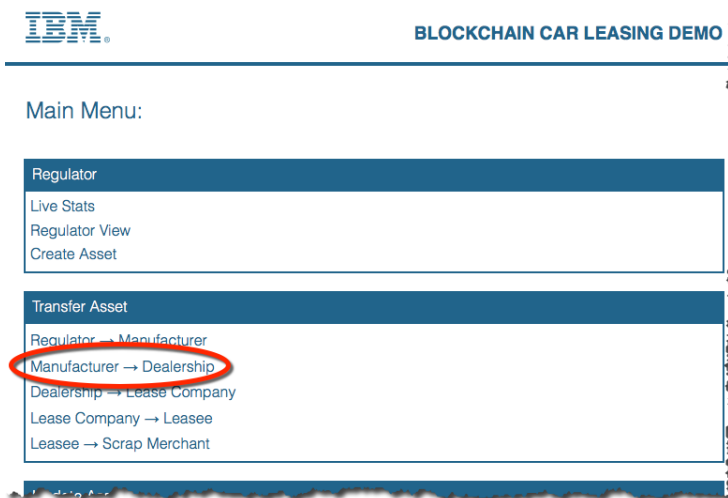
According to the blockchain, the Beechvale Group dealership owns three cars, none of which are Alfa Romeos.

4. Click the X to close the window and **Home** to return to the main menu.

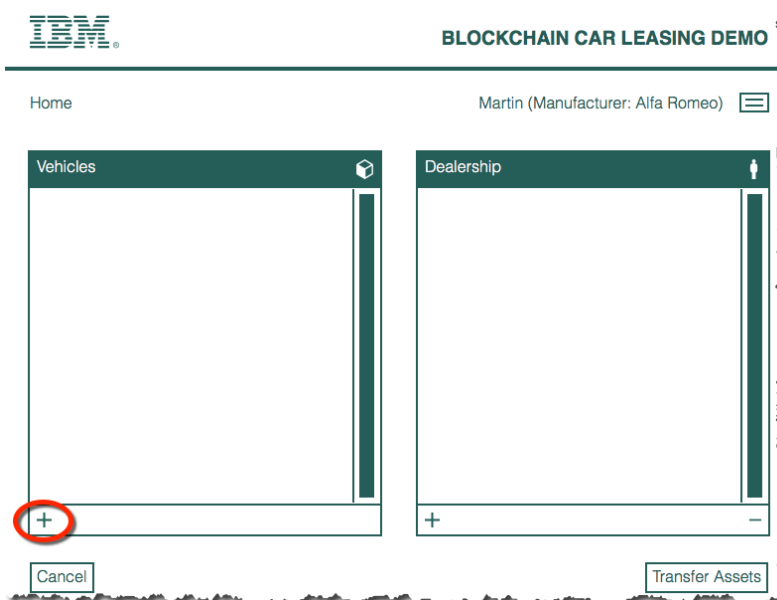
You will now transfer an Alfa Romeo car to the Beechvale Group dealership from the cars owned by Alfa Romeo (the Manufacturer).

1.1.2. Transfer the asset (from Manufacturer to Dealership)

1. From the demo main menu, click **Manufacturer > Dealership** in the Transfer Asset window.



2. You are now viewing the application as Martin, who works for Alfa Romeo.). Click the plus sign in the Vehicles window.



The demo application collects details from the blockchain on cars that Martin (the Alfa Romeo manufacturer) owns and presents the results.

3. Click the checkbox of the first car in the list to include it in the transfer request.

Vehicles	
546303780997253	Alfa Romeo Giulietta, White, JU65 XMH <input checked="" type="checkbox"/>
128994473011261	Alfa Romeo MITO, Black, YD65 FTB <input type="checkbox"/>
747542562791231	Alfa Romeo 4C, Red, RX65 RNG <input type="checkbox"/>
880352730316924	Alfa Romeo MiTo, Blue, NL65 DTU <input type="checkbox"/>
<div> <div>×</div> <div>✓</div> </div>	

4. Click the checkmark at the bottom of the list of Vehicles to save the choice.

The Alfa Romeo with VIN number “546303780997253” now appears in the list of vehicles to be transferred:

IBM®

BLOCKCHAIN CAR LEASING DEMO

Home Martin (Manufacturer: Alfa Romeo)

Vehicles

546303780997253	Alfa Romeo Glu...
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+

Dealership

+

Cancel Transfer Assets

- Click the plus sign in the Dealership window.
- From the list of Dealerships, choose Beechvale Group and then click the checkmark to confirm your choice.

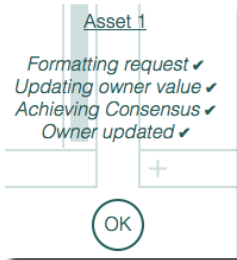
Dealerships		X
Beechvale Group	<input checked="" type="radio"/>	
Milescapc	<input type="radio"/>	
Viewers Alfa Romeo	<input type="radio"/>	

7. Click **Transfer Assets**.

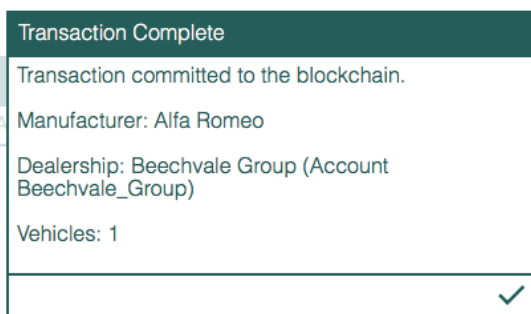
This adds a transaction to the blockchain that will transfer ownership of the Alfa Romeo car to the Beechvale Group.

The nodes in the blockchain network will now confirm the transaction; this takes a few seconds to complete.

- Click **OK** to acknowledge the transfer status messages.



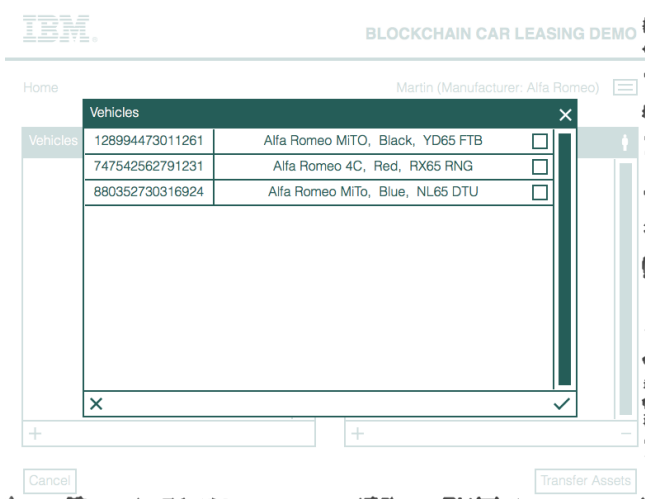
- Click the checkmark to acknowledge the Transaction Complete message.



1.1.3. Verify that Manufacturer has no control over transferred asset

The manufacturer's ability to control the asset has now been removed.

- Click the plus sign in the Vehicles window to verify that the manufacturer can no longer see the asset that you transferred.



The manufacturer now controls only three assets; the transferred vehicle is no longer visible to the manufacturer. Click the X to close the window.

- Click **Home** to return to the application main menu.

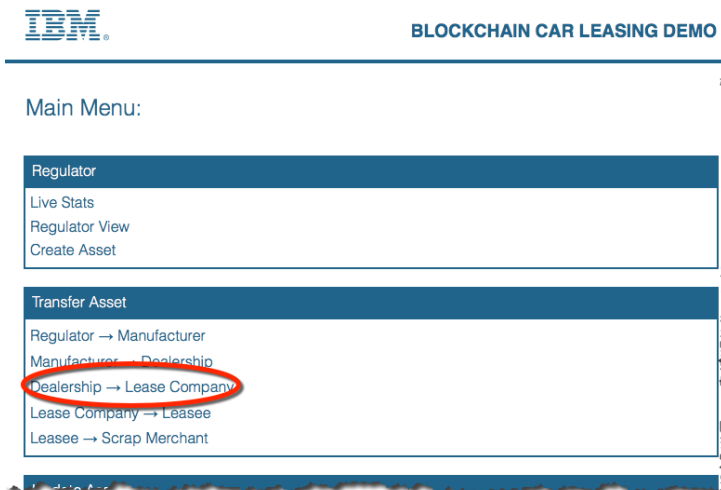
1.2. Scenario: Transferring an Asset to a Leasing Company

In this scenario, you act as the Dealer. First, verify that the asset that you transferred earlier is now available to you to transfer. Then, transfer the asset to the Leasing Company.

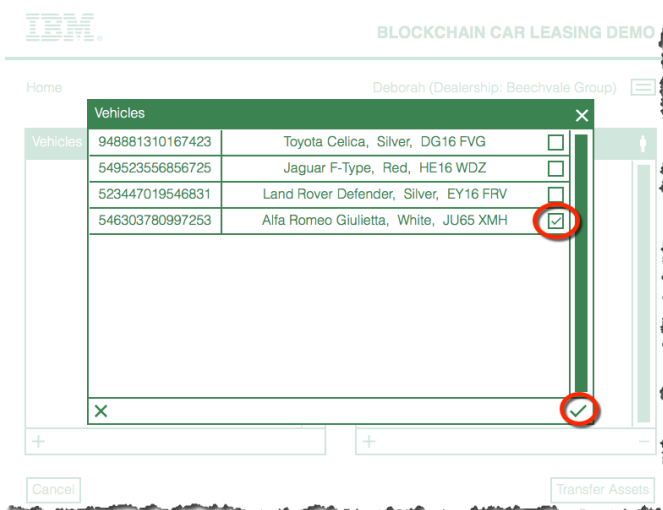
1.2.1. Verify the Dealership can now control the asset

In the previous section, you transferred the ownership of the vehicle 546303780997253 from the Alfa Romeo manufacturer to the dealership Beechvale Group. The vehicle now appears in the list of vehicles that Beechvale Group is able to control.

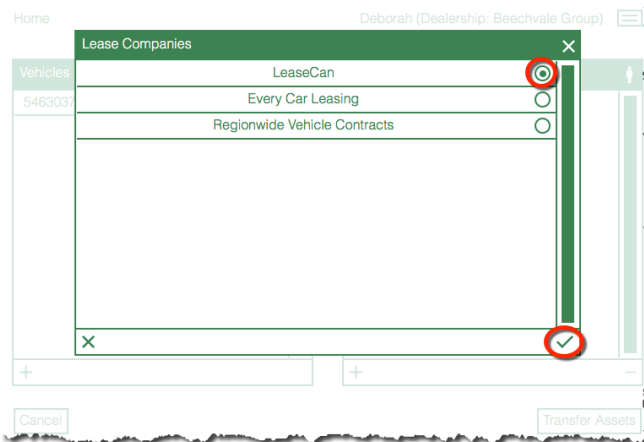
1. From the demo Main Menu click **Dealership > Lease Company**.



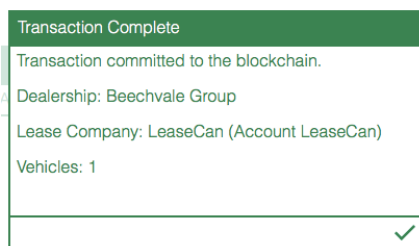
2. In the Dealership page, click the plus sign in the Vehicles window to show the list of vehicles controlled by the dealer.
3. You should see that the vehicle 546303780997253 is now under the control of the Dealership. Select the vehicle 546303780997253 and click the checkmark at the bottom of the window.



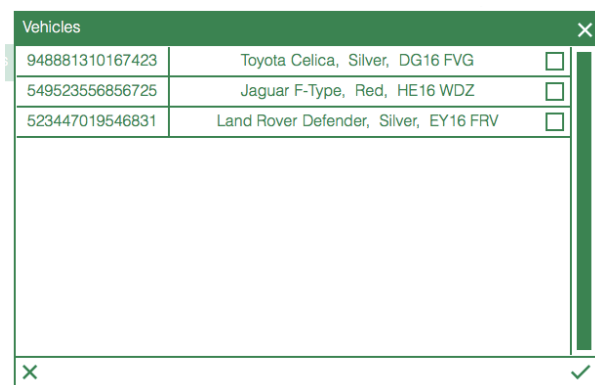
4. In the Lease Company window, click the plus sign and then select **LeaseCan** in the Lease Companies window.



5. Verify that the Vehicle and Lease Company details are correct and then click **Transfer Assets** and wait for the transaction to be validated
6. Click **OK** and then dismiss the Transaction Complete window



7. Click the plus sign in the Vehicles window to verify that the asset is no longer available to the Beechvale Group dealership. The vehicle that you just transferred to the Lease Company should not appear.



8. Close this window and click **Cancel** to return to the main menu.

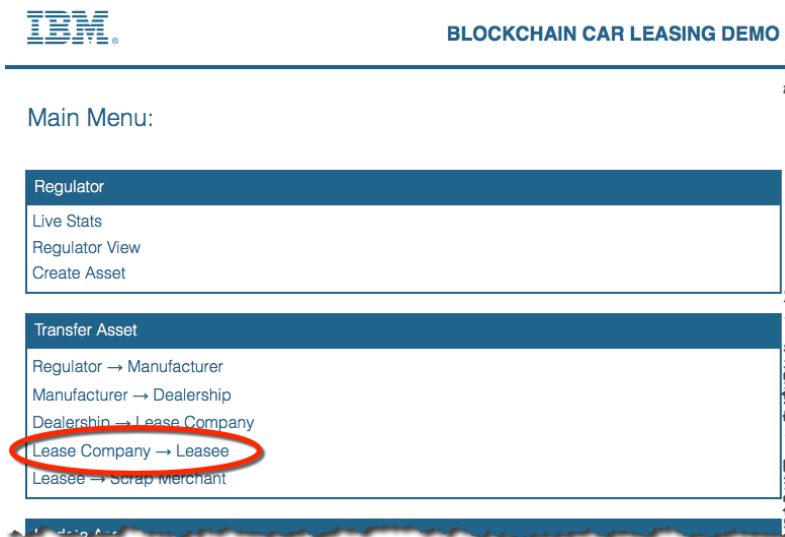
1.3. Scenario: Transferring an Asset to a Lessee

In this scenario, you act as the Lease Company. First, verify that the asset you transferred earlier is now available to you acting as the Lease Company to transfer then you will transfer the asset to a Lessee.

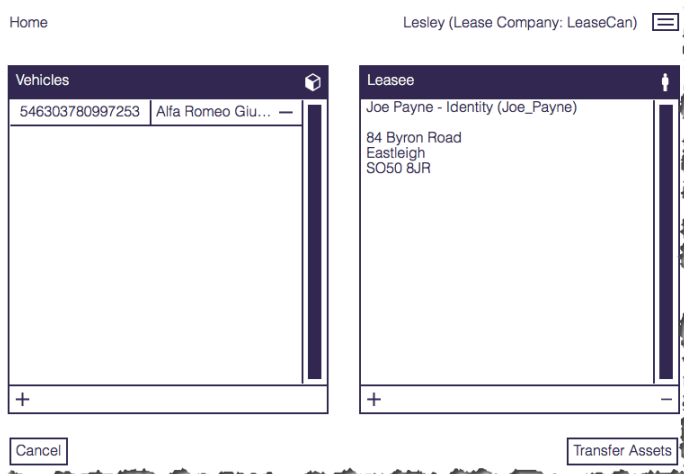
1.3.1. Verify the Lease Company can now control the asset

In the previous section, you transferred the ownership of the vehicle 546303780997253 from the Dealership Beechvale Group to the Lease Company LeaseCan. The vehicle now appears in the list of vehicles LeaseCan is able to control.

1. From the demo Main Menu, click **Lease Company > Lessee**.



2. Use the plus signs to prepare a transfer as shown. Click **Transfer Assets** when you're ready.



3. When consensus has been achieved, click **OK**.
4. Close the Transaction Complete message by clicking the checkmark.
5. Verify that the vehicle is no longer available to the Lease Company. Click the plus sign in the Vehicles window. The vehicle 546303780997253 should not appear in the list of vehicles.
6. Click **Cancel** to return to the application main menu.

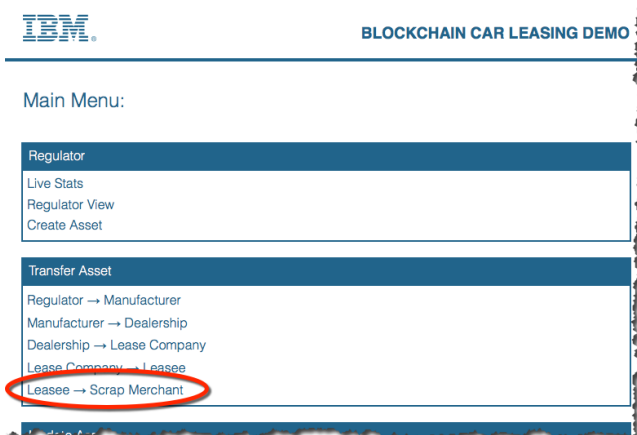
1.4. Scenario: Transferring an Asset to a Scrap Merchant

In this scenario, you act as the Lessee (individual). First, verify that the asset you transferred earlier is now available to you acting as the Lessee to transfer. Then, transfer the asset to a Scrap Merchant.

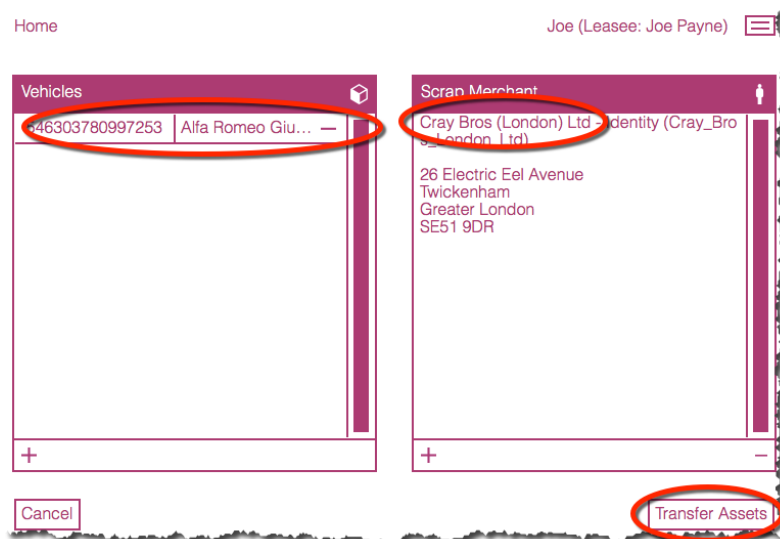
1.4.1. Verify the Lessee can now control the asset

In the previous section, you transferred the ownership of the vehicle 546303780997253 from the Lease Company LeaseCan to the individual Joe Payne. The vehicle now appears in the list of vehicles that Joe is able to control.

- From the demo Main Menu, click **Lessee > Scrap Merchant**.



- Use the plus signs to prepare a transfer. Click **Transfer Assets** when you're ready.



- When consensus has been achieved, click **OK**.
- Close the Transaction Complete message by clicking the checkmark.
- Verify that the vehicle is no longer available to Joe Payne. Click the plus sign in the Vehicles window. The vehicle 546303780997253 should not appear in the list of vehicles.
- Click **Cancel** to return to the application main menu.

1.5. Scenario: Disposing of an Asset

In this scenario, you act as the Scrap Merchant (individual) and dispose of the asset. First, verify that the asset you transferred earlier is now available to you acting as the Scrap Merchant. Then, dispose of the asset.

1.5.1. Verify the Scrap Merchant can control the asset

In the previous section, you transferred the ownership of the vehicle 546303780997253 from Joe Payne to the Scrap Merchant. The vehicle now appears in the list of vehicles that the Scrap Merchant is able to control.

1. From the demo Main Menu, click **Scrap Merchant > Scrap**.



2. Use the plus sign to prepare for the disposal of the asset. Click **Scrap Assets** when you're ready. There is no destination for this page.



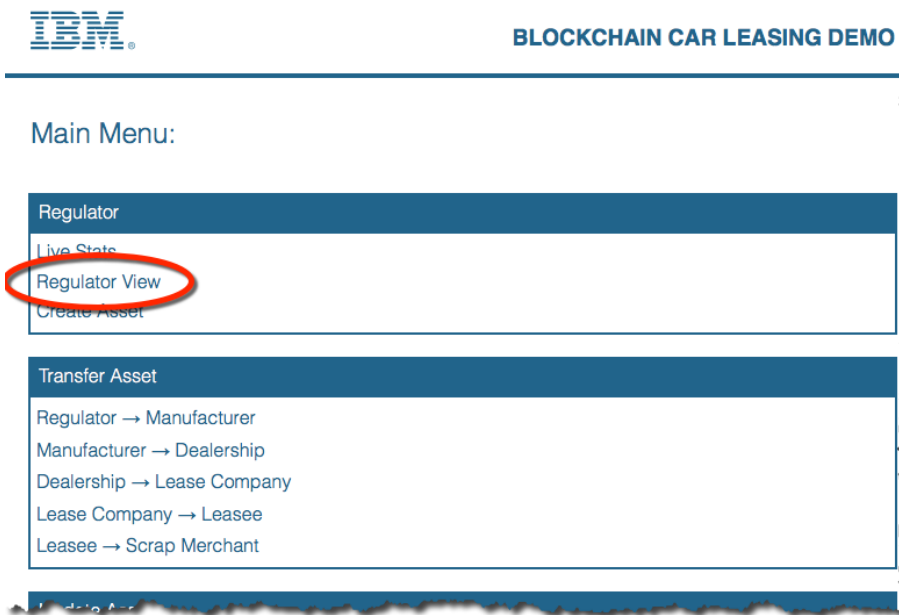
3. When consensus has been achieved, click **OK**.
4. Close the Transaction Complete message by clicking the checkmark.
5. Verify that the vehicle is no longer available to the scrap merchant. Click the plus sign in the Vehicles windows. The vehicle 546303780997253 should not appear in the list of vehicles.
6. Click **Cancel** to return to the application main menu.

Once the asset has been transferred it is not removed from the blockchain; it has merely been marked as “scrapped”. In the next section we will demonstrate that the asset can still be viewed in the transaction logs.

1.6. Scenario: Viewing Transactions

The regulator view has unrestricted access to all activities on the Blockchain. In this section we will act as the Regulator and view all asset transfer and disposal activity. We will then act as another user who has a more restricted view of the transactions.

1. From the demo Main Menu, click **Regulator View**. Wait for the view to gather the activity from the blockchain.



2. You will see the activity in chronological order, with the most recent activity at the top of the list of transactions. The Regulator can see *all* blockchain transactions. The entire history of the vehicle may be seen in this view.

The screenshot shows the IBM Blockchain Car Leasing Demo Regulator View. The table displays a list of transactions in chronological order, with the most recent activity at the top. The table has columns for Transaction ID, Description, V5C ID, Vehicle Details, and Timestamp.

Transaction ID	Description	V5C ID	Vehicle Details	Timestamp
[HB0556295]	Scrap: Cray_Bros_London_Ltd	Scrap V5C		02/11/2016 15:15:43
[HB0556295]	Transfer: Joe_Payne → Cray_Bros_London_Ltd	[546303780997253]	Alfa Romeo Giulietta, JU65 XMH, White	02/11/2016 15:09:40
[HB0556295]	Transfer: LeaseCan → Joe_Payne	[546303780997253]	Alfa Romeo Giulietta, JU65 XMH, White	02/11/2016 14:52:03
[HB0556295]	Transfer: Beechvale_Group → LeaseCan	[546303780997253]	Alfa Romeo Giulietta, JU65 XMH, White	02/11/2016 14:42:42
[HB0556295]	Transfer: Alfa_Romeo → Beechvale_Group	[546303780997253]	Alfa Romeo Giulietta, JU65 XMH, White	02/11/2016 14:21:13
[QX9386285]	Transfer: Jaguar_Land_Rover → Beechvale_Group	[523447019546831]	Land Rover Defender, EY16 FRV, Silver	02/11/2016 12:05:16
[QO9895085]	Transfer: Jaguar_Land_Rover → Beechvale_Group	[549523556856725]	Jaguar F-Type, HE16 WDZ, Red	02/11/2016 12:05:10
[BK3350947]	Transfer: Beechvale_Group → LeaseCan	[181255391772389]	Jaguar XJ, FM65 ESL, Black	02/11/2016 12:05:05
[BK3350947]	Transfer: Jaguar_Land_Rover → Beechvale_Group	[181255391772389]	Jaguar XJ, FM65 ESL, Black	02/11/2016 12:05:00
[RK3290457]	Transfer: Toyota → Beechvale_Group	[948881310167423]	Toyota Celica, DG16 FVG, Silver	02/11/2016 12:04:55
[FI3253857]	Transfer: Beechvale_Group → LeaseCan	[287437467447767]	Toyota Auris, LM16 YHU, Blue	02/11/2016 12:04:50
[FI3253857]	Transfer: Toyota → Beechvale_Group	[287437467447767]	Toyota Auris, LM16 YHU, Blue	02/11/2016 12:04:45

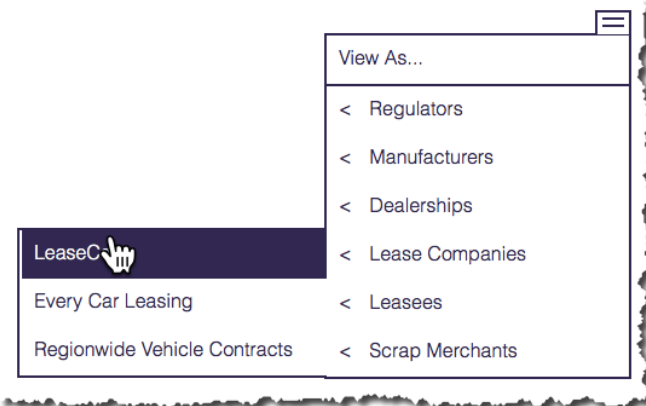
In your copy of the car leasing application, the V5C ID will be different from the one shown in the figure. In the example here this is **HB0556295** but your ID might be different

- Start typing the vehicle identifier into the search box to show only records from the Alfa Romeo that was transferred in this lab.

HB					Filters v	Sort v
[HB0556295]	Scrap: Cray_Bros_London_Ltd	Scrap V5C				02/11/2016 15:15:43
[HB0556295]	Transfer: Joe_Payne → Cray_Bros_London_Ltd	[546303780997253]	Alfa Romeo	Giulietta, JU65 XMH, White		02/11/2016 15:09:40
[HB0556295]	Transfer: LeaseCan → Joe_Payne	[546303780997253]	Alfa Romeo	Giulietta, JU65 XMH, White		02/11/2016 14:52:03
[HB0556295]	Transfer: Beechvale_Group → LeaseCan	[546303780997253]	Alfa Romeo	Giulietta, JU65 XMH, White		02/11/2016 14:42:42
[HB0556295]	Transfer: Alfa_Romeo → Beechvale_Group	[546303780997253]	Alfa Romeo	Giulietta, JU65 XMH, White		02/11/2016 14:21:13
[HB0556295]	Update: Alfa_Romeo	Registration: undefined → JU65 XMH				02/11/2016 12:03:08
[HB0556295]	Update: Alfa_Romeo	Colour: undefined → White				02/11/2016 12:03:03
[HB0556295]	Update: Alfa_Romeo	Model: undefined → Giulietta				02/11/2016 12:02:58
[HB0556295]	Update: Alfa_Romeo	Make: undefined → Alfa Romeo				02/11/2016 12:02:54
[HB0556295]	Update: Alfa_Romeo	VIN: undefined → 546303780997253				02/11/2016 12:02:49
[HB0556295]	Transfer: DVLA → Alfa_Romeo	Vehicle Template				02/11/2016 12:00:07
[HB0556295]	Create: DVLA	Create V5C				02/11/2016 11:59:19

Other users can see only part of the lifecycle of the vehicle. They are able to see what happened to the vehicle before their ownership and while they owned it, but they cannot see what happened to the vehicle after they transferred it.

- Click the three lines in the top right corner of the page to view the ledger as another user. In the drop-down menu, hover over **Lease Companies** and then click **LeaseCan**.




The view now changes to show all transactions that:

- relate to cars currently owned by LeaseCan, or
- relate to cars once owned by LeaseCan, up to the point that they were transferred away.

- Start typing the identifier of the Alfa Romeo once more (HB0556295 in the example, but again your ID will vary).

Note how the transactions shown against this car are restricted to the ones up to the point that LeaseCan transferred the car to Joe Payne

Home Lesley (Lease Company: LeaseCan) 

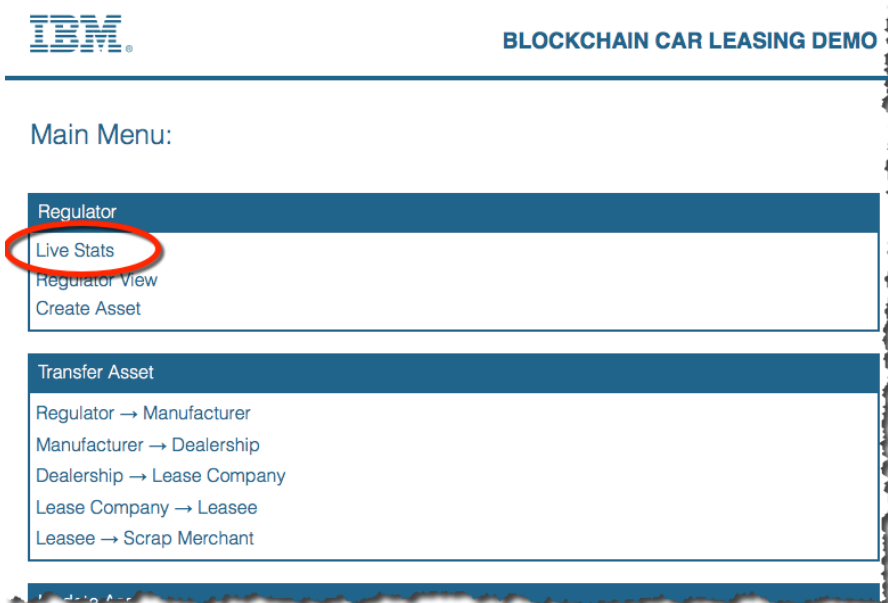
Filters v Sort v

[HB0556295]	Transfer: LeaseCan → Joe_Payne	[546303780997253] Alfa Romeo Giulietta, JU65 XMH, White	02/11/2016 14:52:03
[HB0556295]	Transfer: Beechvale_Group → LeaseCan	[546303780997253] Alfa Romeo Giulietta, JU65 XMH, White	02/11/2016 14:42:42
[HB0556295]	Transfer: Alfa_Romeo → Beechvale_Group	[546303780997253] Alfa Romeo Giulietta, JU65 XMH, White	02/11/2016 14:21:13
[HB0556295]	Update: Alfa_Romeo	Registration: undefined → JU65 XMH	02/11/2016 12:03:08
[HB0556295]	Update: Alfa_Romeo	Colour: undefined → White	02/11/2016 12:03:03
[HB0556295]	Update: Alfa_Romeo	Model: undefined → Giulietta	02/11/2016 12:02:58
[HB0556295]	Update: Alfa_Romeo	Make: undefined → Alfa Romeo	02/11/2016 12:02:54
[HB0556295]	Update: Alfa_Romeo	VIN: undefined → 546303780997253	02/11/2016 12:02:49
[HB0556295]	Transfer: DVLA → Alfa_Romeo	Vehicle Template	02/11/2016 12:00:07
[HB0556295]	Create: DVLA	Create V5C	02/11/2016 11:59:19

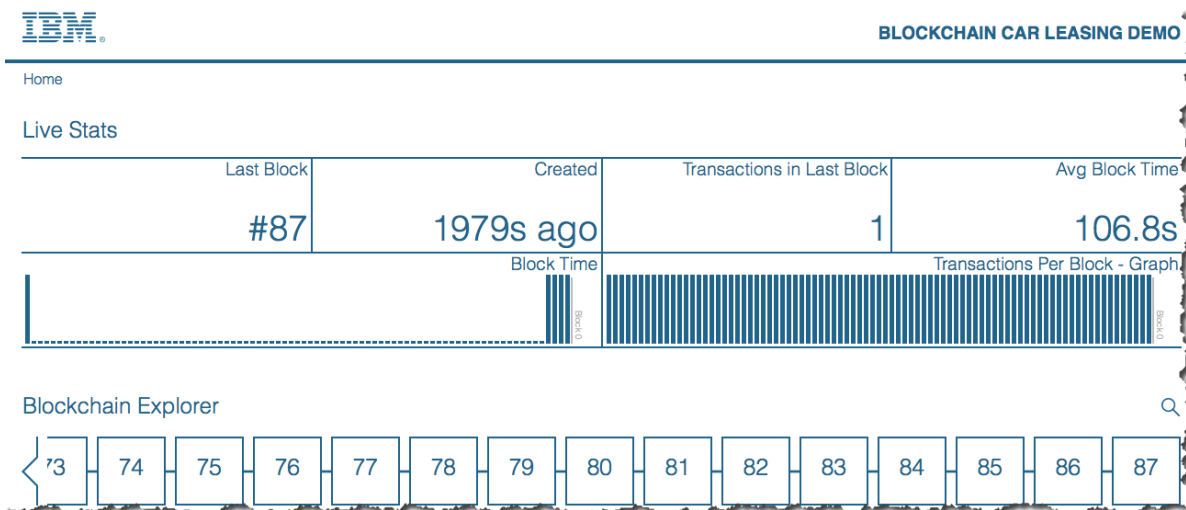
As you can see, the user can see the entire lifecycle of the car from before he or she owned it until they transferred it.

Step 3. Viewing the Blockchain

1. From the demo application main menu, click **Live Stats**.

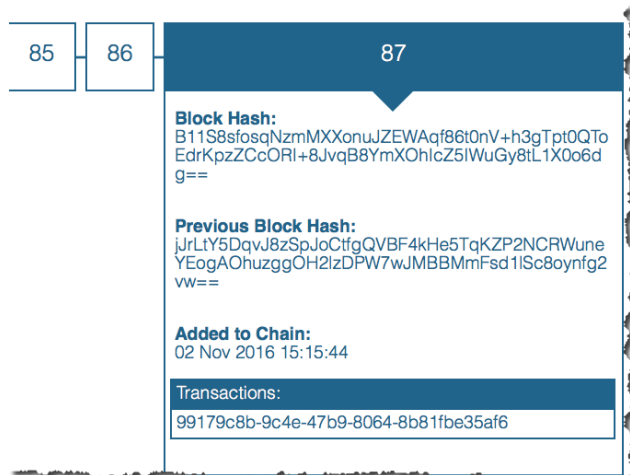


The blockchain statistics page shows the transfer activity as a vertical bar in the Transactions window.



- **Last Block:** the block number of the last committed block.
- **Created:** how long ago since the last block was committed.
- **Transactions in Last Block:** the number of transactions in the last block.
- **Avg Block Time:** the average time between each block being committed.
- **Block Time:** a graph showing how much time occurred between each block. It also shows Block 0 if the scale allows.
- **Transactions Per Block:** a graph that shows how many transactions were in each block. It also shows Block 0 if the scale allows.
- **Blockchain Explorer:** allows you to look at a specific block's details in the blockchain. You will see a more detailed explanation in the next lab.

2. Click a block in the Blockchain Explorer pane to see more information about it.



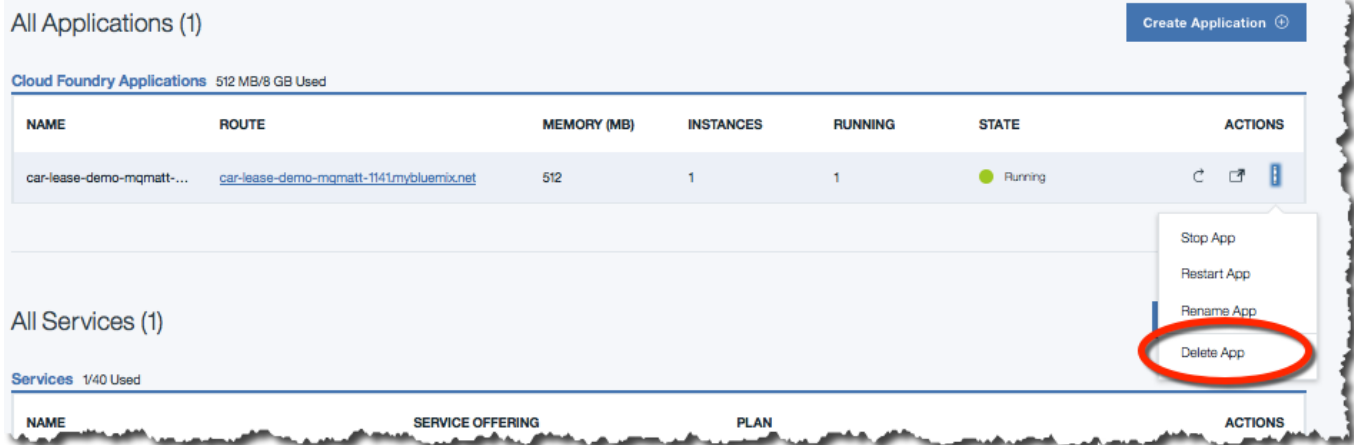
We will look at the blocks in more detail in the follow-on lab: “Blockchain Explored”.

If you are planning to continue to the next lab, you will need to use this application, so do not follow the next step, “Supplemental: Remove the sample application.”

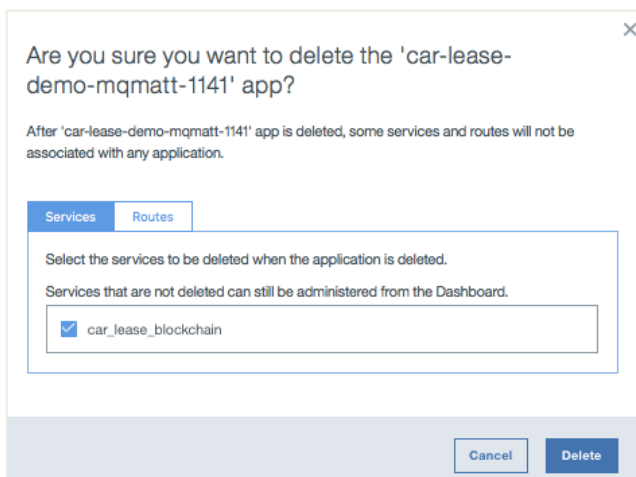
Supplemental: Remove the sample application

If the blockchain service that you created crashes, here's how you can stop and remove it.

1. Click **Dashboard** to return to the Bluemix dashboard.
2. Click the three vertical dots on the right side of the car lease demo application row.



3. Select **Delete App** from the menu.
4. Ensure that the car_lease_blockchain service is also selected for deletion and click **Delete**.



Wait for the items to stop and be deleted. After this is done, both the application and the associated service will no longer be visible in the Bluemix dashboard.