IGEL OS Creator

IGEL OS Creator Manual

With the IGEL OS Creator (OSC), you can install IGEL OS 11 on any device that supports it. Moreover, you can use the IGEL OS Creator for recovering a broken installation of IGEL OS which is not able to boot anymore.

- General Information (see page 4)
- Devices Supported by IGEL OS 11 (see page 5)
- Licensing (see page 8)
- Installation (see page 9)

> ⓘ You can roll out IGEL OS also via the IGEL OS Deployment Appliance. For this purpose, you will need to install IGEL OS Deployment Appliance 11.0 or higher. See IGEL OS Deployment Appliance Manual.

IGEL Tech Video

This is how you can reflash a device using IGEL OS Creator. See also How to Reflash Your IGEL UD Pocket.

> Sorry, the widget is not supported in this export.
> But you can reach it using the following URL:
>
> https://www.youtube.com/watch?v=z1Wp51KQ8tI

General Information

The IGEL OS Creator (OSC) software allows the migration of existing hardware to create a functionally standardized IGEL Workspace infrastructure. In the process, the existing operating system is replaced by IGEL OS. The devices can then be administered via the IGEL Universal Management Suite (UMS).

> ⚠ Installing the IGEL OS operating system via OSC destroys all data on the target device's mass storage device (hard disk, flash memory, SSD).

This manual describes the installation of IGEL OS 11 using OSC.

Devices Supported by IGEL OS 11

IGEL Devices

Core Requirements for IGEL OS 11

- CPU with 64-bit support
- CPU speed: ≥ 1 GHz
- Memory (RAM): ≥ 2 GB

> ⓘ RAM size higher than 2 GB is recommended if you use any of the following:
> - Unified Communications optimizations (uses a client-side media engine)
> - High-resolution graphics output
>   For details on the supported graphics-related characteristics of IGEL devices, see Graphics on IGEL Devices or, for older devices, Graphics on Legacy IGEL Devices.
> - More than two monitors

- Storage: 2 GB minimum; ≥ 4 GB recommended

> ⓘ **Storage Requirements for IGEL OS 11.04 or Higher**
>
> IGEL OS 11.04.100 or higher requires at least 2.4 GB storage if the full feature set is applied. Thus, the feature set must be modified accordingly; for more information, see Error: "Not enough space on local drive" when Updating to IGEL OS 11.04 or Higher.

IGEL Devices Supported by IGEL OS 11

IGEL UD (Universal Desktop)

Product Line	Device Type	Hardware ID	64 Bit	Memory (RAM)	Storage	HW Video Acceleration
UD2**** (see page 6)	D220	40	Yes	2 GB	4 GB	Yes
UD2* (see page 6)	M250C	50	Yes	2 GB	4 GB	Yes
UD2	M250C	51 / 52*** (see page 6)	Yes	2 or 4 GB	8 GB	Yes

Product Line	Device Type	Hardware ID	64 Bit	Memory (RAM)	Storage	HW Video Acceleration
UD3* (see page 6)	M340C	50	Yes	2 GB	4 GB	Yes
UD3* (see page 6)	M340C	51	Yes	2 GB	4 GB	Yes
UD3	M350C	60	Yes	4 GB	8 GB	Yes
UD5* (see page 6)	H830C	50	Yes	2 GB	4 GB	Yes
UD6* (see page 6)	H830C	51	Yes	2 GB	4 GB	Yes
UD7	H850C	10	Yes	4 GB	4 GB	Yes
UD7** (see page 6)	H850C	11	Yes	4 GB	4 GB	Yes
UD7	H860C	20	Yes	8 GB	8 GB	Yes
UD9* (see page 6)	TC215B	40 / 41 (Touch)	Yes	2 GB	4 GB	Yes

* IGEL UD3-LX 50 and UD5-LX 50 are supported up to IGEL OS 11.05, incl. private builds.
IGEL UD9-LX 40 / 41 (Touch) devices are supported up to IGEL OS 11.07.910.
IGEL UD2-LX 50 devices are supported up to IGEL OS 11.09.160.
IGEL UD3-LX 51 devices are supported up to IGEL OS 11.09.160.
IGEL UD6-LX 51 devices are supported up to IGEL OS 11.09.160.

** As of December 2019, IGEL UD7 model H850C is equipped with the AMD Secure Processor; for further information, see UD7 Model H850C.

*** IGEL UD2-LX 52 is supported with IGEL OS 11.06.140 and later.

**** UD2-LX 40 (model D220) is supported up to IGEL OS 11.08.200. For an overview of the end-of-sales (EOS) and end-of-maintenance (EOM) dates for IGEL devices, see IGEL OS 11 or Higher (see page 5).

IGEL Zero

> ⓘ **Note on IZ Devices**
>
> The IZ devices listed below can be upgraded to IGEL OS 11. To upgrade your IZ devices to IGEL OS 11, please contact your IGEL sales representative. See also https://www.igel.com/os11migration/.

Product Line	Device Type	Hardware ID	64 Bit	Memory (RAM)	Storage	UEFI Secure Boot Support	HW Video Acceleration
IZ2	D220	40	Yes	2 GB	4 GB	Yes	Yes

Product Line	Device Type	Hardware ID	64 Bit	Memory (RAM)	Storage	UEFI Secure Boot Support	HW Video Acceleration
IZ3	M340C	50	Yes	2 GB	4 GB	Yes	Yes
IZ3	M340C	51	Yes	2 GB	4 GB	Yes	Yes

Third-Party Devices

For an up-to-date list, see https://kb.igel.com/os11-supported-hardware.

Licensing

For information on licensing, see IGEL Software License Overview and Deploying Licenses.

Installation

Installation Requirements

In order to install IGEL OS via OSC, the target device must meet the following requirements:

- 64-bit-capable CPU
- CPU speed ≥ 1 GHz

> ⚠ When using multimedia content (e.g. Unified Communications), a Dual Core CPU with at least 1.5 GHz is recommended.

- Minimum 2 GB RAM; higher RAM size is recommended if you use any of the following:
  - Unified Communications optimizations (uses a client-side media engine)
  - High-resolution graphics output
  - More than two monitors
- Storage: If the full feature set is applied, at least 4 GB of storage is required. For instructions on how to reduce the feature set, see Error: "Not enough space on local drive" when Updating to IGEL OS 11.08 or Higher.
- Intel, ATI/AMD or Nvidia graphics chip

> ⓘ For information about supported graphics chipsets, see the IGEL Linux 3rd Party Hardware Database[1].

- USB 3.0 or 2.0 port from which the device can boot (alternatively a DVD drive)
- Ethernet or wireless adapter

> ⓘ If these requirements are not fulfilled, the full functionality of the device with IGEL OS can not be guaranteed, and technical support will not be provided by IGEL.

> ❗ Installing IGEL OS via OSC destroys all data on the target device's mass storage device (hard disk, flash memory, SSD).

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1 https://www.igel.com/linux-3rd-party-hardware-database/

Create USB installation medium (Windows)

1. Download the ZIP archive for OS Creator from our download server[2]:
   - For new devices, use the standard installer (e. g. OSC_11.01.100.zip).
   - For older devices or if you haven't been able to boot the installer at all, use the legacy installer (e. g. OSC_11.01.100_legacy.zip).
2. Unzip the contents into a local directory.
3. Connect a USB memory stick with at least 4 GB capacity to the computer.

> ❗ All existing data on the USB memory stick will be destroyed.

4. Double-click the `preparestick.exe` file from the unzipped directory.

> ⓘ If you are in the "administrators" group, the program will start after you have confirmed a dialog. If you are not in the "administrators" group, you must enter the administrator password to start the program.
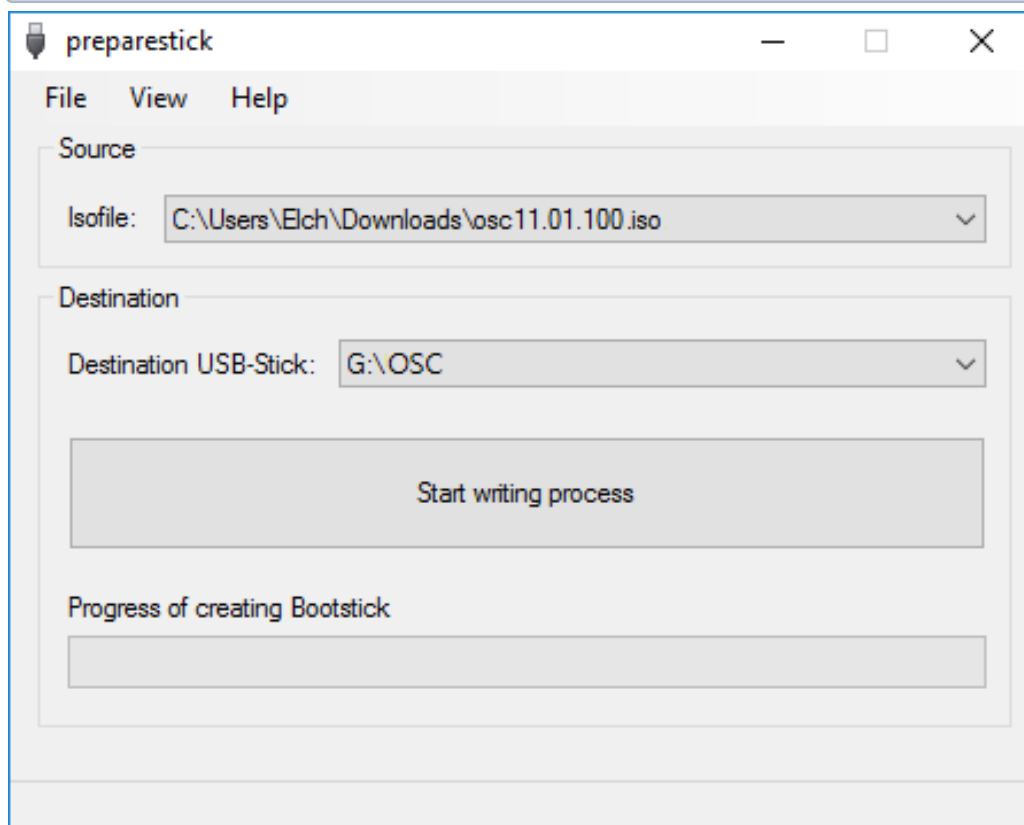
The dropdown menu **Isofile** shows the ISO files contained in the unzipped directory.

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5. Under **Isofile**, select the appropriate ISO file, e. g. `osc11.01.100.iso`
6. Under **Destination USB stick**, select the USB storage medium on which you would like to save the installation data.

> ❗ It is recommended that you only have one USB storage medium connected during this procedure. If you accidentally select the wrong medium, all data on it will be lost.

> ⓘ Generally speaking, the list of available USB storage media is refreshed automatically. If, however, you would like to refresh it manually, click on **View > Refresh USB Device List.**

7. Click on **Start writing process**.
   In the program window, the progress of the process is shown.
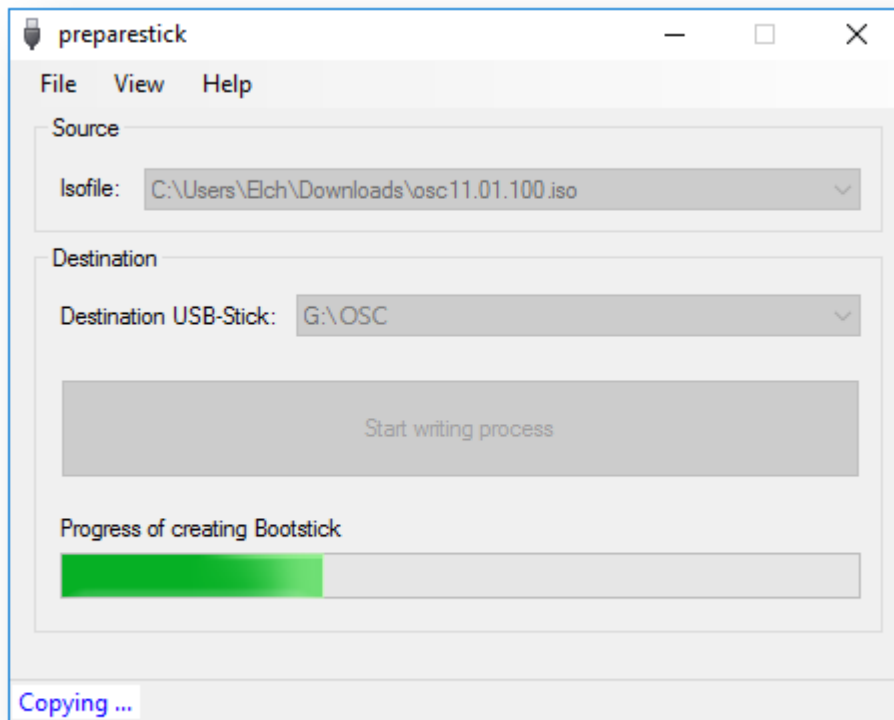
When the process is finished, a message window is displayed.
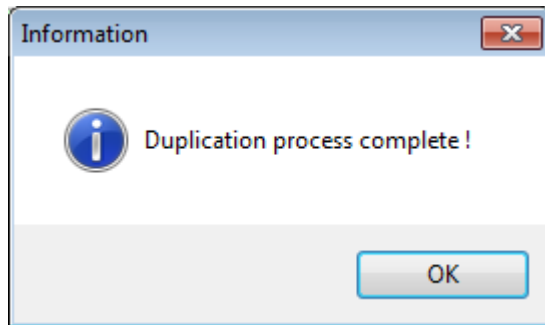
8. Close the message window and the program.
9. After about 3 seconds, remove the USB memory stick.

> ⬥ If you remove the USB memory stick immediately, there is a possibility that the writing process has not been completed. In this case, the data on the memory stick gets corrupted.

Create USB installation medium (Linux)

1. Download the ZIP archive for OS Creator from our [download server](3):
   - For new devices, use the standard installer (e. g. OSC_11.01.100.zip).
   - For older devices or if you haven't been able to boot the installer at all, use the legacy installer (e. g. OSC_11.01.100_legacy.zip).
2. Unzip the contents into a local directory.
3. From this directory, you will need the ISO file (e. g. `osc11.01.100.iso` or `osc11.01.100_legacy.iso`) to create a bootable medium.
4. Connect a USB memory stick with at least 4 GB capacity to the computer.

   > ❗ All existing data on the USB memory stick will be destroyed.

5. Open a terminal emulator and enter the command `dmesg` to determine the device name of the USB memory stick.
   Example output:

   ```
   [...]
   [19514.742229] scsi 3:0:0:0: Direct-Access JetFlash Transcend 8GB
   1100 PQ: 0 ANSI: 6
   [19514.742805] sd 3:0:0:0: Attached scsi generic sg1 type 0
   [19514.744688] sd 3:0:0:0: [sdb] 15425536 512-byte logical blocks:
   (7.89 GB/7.35 GiB)
   [19514.745370] sd 3:0:0:0: [sdb] Write Protect is off
   [19514.745376] sd 3:0:0:0: [sdb] Mode Sense: 43 (0) 00 00 00
   [19514.746040] sd 3:0:0:0: [sdb] Write cache: enabled, read cache:
   enabled, doesn't support DPO or FUA
   [19514.752438] sdb: sdb1
   ```

   In this example, the device name searched for is `/dev/sdb` .

   > ❗ Ensure that you have determined the correct device name. Use of the `dd` command in the next step can destroy your operating system if you use the wrong device name.

6. The following command writes the installation data to the USB memory stick:
   ```
   dd if=osc11.01.100.iso of=/dev/sdX bs=1M oflag=direct
   ```
   Replace `sdX` with the device name of the USB memory stick that you have determined.

   When the `dd` command has terminated, you can see the terminal emulator input prompt again.

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3 https://www.igel.com/software-downloads/workspace-edition/

7. Wait for about 3 seconds after the `dd` command has terminated, and remove the USB memory stick.

> ⬥ If you remove the USB memory stick immediately, there is a possibility that the writing process has not been completed. In this case, the data on the memory stick gets corrupted.

The USB memory stick for OSC installation is ready for use.

Create DVD installation medium

The ISO file in the installation directory for OSC is a so-called hybrid image. It can not only be copied onto USB storage devices but can also be used to create a bootable DVD.

Burn ISO Image (Windows)

1. In Explorer, open the directory that contains the ISO file.
2. Right-click on the ISO file.
3. Select **Burn disc image**.

Burn ISO Image (Linux)

Under Linux, various burning programs with a graphical user interface or for the command line are available.

The Ubuntu Wiki[4] explains how to burn an ISO image onto a DVD using a number of programs.

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4 https://help.ubuntu.com/community/BurningIsoHowto#Burning_from_Ubuntu

Boot Settings

OSC works on systems with BIOS and UEFI.

It is essential that your system supports booting from USB storage media or from DVD. This may already be enabled, or you may have to enable it yourself.

> ⓘ IGEL OS 11 supports UEFI Secure Boot. Refer to the manual of your device's manufacturer to learn whether your device supports Secure Boot and how to enable it. Enabling Secure Boot often consists of two steps. First, the boot mode has to be changed to UEFI Boot in the BIOS; after that, Secure Boot can be activated, also in the BIOS. How to check whether Secure Boot has been properly enabled, you can learn under Verifying that Secure Boot is Enabled.
> For UEFI Secure Boot on IGEL devices, see UEFI Secure Boot Enabling Guides.

> ⓘ If IGEL OS fails to boot in UEFI mode, try it in legacy/BIOS mode. IGEL OS will then be installed in legacy/BIOS mode.

> ⓘ For older devices or if you haven't been able to boot the installer at all, use the legacy installer under https://www.igel.com/software-downloads/workspace-edition/ **> OS 11 > OS CREATOR > LEGACY**.

Third-Party Devices

The required key presses for this may vary from vendor to vendor. However, here are some hints:

▶ While the device is booting, try pressing [F12] (in general), [F10] (Intel devices), or [F9] (Hewlett-Packard devices) in order to access a list of boot devices and select your USB installation medium.

▶ If the above does not work, access the BIOS settings via pressing [Del], [F1], or [F2] during boot and activate booting from USB storage media and/or change the boot order.

▶ See the BIOS/UEFI documentation for your system for details of how to boot from USB storage media.

> ⓘ On modern computers such as secured-core PCs (see e.g. https://www.microsoft.com/en-us/windows/business/devices?col=secured-core-pcs), there may be a BIOS setting related to Secure Boot that allows the use of Microsoft's 3rd party UEFI Secure Boot Certificate. The usual description of such a BIOS setting is "Allow Microsoft 3rd Party UEFI CA". This setting must be set to enabled, as IGEL uses the 3rd party certificate to support UEFI Secure Boot. If UEFI Secure Boot is enabled, but "Allow Microsoft 3rd Party UEFI CA" is not enabled, you may be unable to boot IGEL OS Creator or UD Pocket. Similarly, if the setting "Allow Microsoft 3rd Party UEFI CA" is disabled after a previous installation of IGEL OS, IGEL OS will fail to boot. For how to enable the setting, see Secured-Core PCs: Microsoft 3rd-Party UEFI Certificate for Secure Boot.

IGEL Devices

> ⓘ If the USB installation medium is not found, though the USB boot is enabled, try the following:

- Reconnect the USB installation medium and reboot the endpoint device.
- Use another USB port.

UD7 (H850C and H860C)

1. Power up the device while pressing the [Del] button repeatedly in rapid succession.
2. If a password prompt is shown, enter the BIOS password.
3. Select **Setup Utility**.
4. Select the **Boot** tab.
5. Set **USB Boot** to **<ENABLED>**.
6. Save the settings and exit.
7. Connect the USB stick to the device.
8. Reboot the device while pressing the [Del] button repeatedly in rapid succession.
9. Select **Boot Manager**.
10. Select the USB stick as the boot medium and press **Enter**.
11. You can continue with the installation procedure .

UD6 (H830C)

1. Power up the device while pressing the [Del] button repeatedly in rapid succession.
2. Select **SCU**.
3. If a password prompt is shown, enter the BIOS password.
4. Select the **Boot** tab.
5. Set **USB Boot** to **<ENABLED>**.
6. Save the settings and exit.
7. Connect the USB stick to the device.
8. Reboot the device while pressing the [Del] button repeatedly in rapid succession.
9. Select **Boot Manager**.
10. Select the USB stick as the boot medium and press **Enter**.
11. You can continue with the installation procedure .

UD5 (H830C)

1. Power up the device while pressing the [Del] button repeatedly in rapid succession.
2. If a password prompt is shown, enter the BIOS password.
3. Select the **Boot** tab.
4. Select **Boot Options Priorities**.
5. Select the entry for the USB stick and move it to the first position using the [+] key.
6. Save the settings and exit.
7. You can continue with the installation procedure .

UD3 (M350C)

1. Power up the device while pressing the [Del] button repeatedly in rapid succession.
2. If a password prompt is shown, enter the BIOS password.
3. Select **Setup Utility**.
4. Select the **Boot** tab.

5. Set **USB Boot** to **<ENABLED>**.
6. Save the settings and exit.
7. Connect the USB stick to the device.
8. Reboot the device while pressing the [Del] button repeatedly in rapid succession.
9. Select **Boot Manager**.
10. Select the USB stick as the boot medium and press **Enter**.
11. You can continue with the installation procedure .

UD3 (M340C)

1. Power up the device while pressing [Del] button repeatedly in rapid succession.
2. Select **SCU**.
3. If a password prompt is shown, enter the BIOS password.
4. Select the **Boot** tab.
5. Set **USB Boot** to **<ENABLED>**.
6. Save the settings and exit.
7. Connect the USB stick to the device.
8. Reboot the device while pressing the [Del] button repeatedly in rapid succession.
9. Select **Boot Manager**.
10. Select the USB stick as the boot medium and press **Enter**.
11. You can continue with the installation procedure .

UD2 (M250C)

1. Power up the device while pressing [Del] button repeatedly in rapid succession.
2. Select **SCU**.
3. If a password prompt is shown, enter the BIOS password.
4. Select the **Boot** tab.
5. Set **USB Boot** to **<ENABLED>**.
6. Save the settings and exit.
7. Connect the USB stick to the device.
8. Reboot the device while pressing the [Del] button repeatedly in rapid succession.
9. Select **Boot Manager**.
10. Select the USB stick as the boot medium and press **Enter**.
11. You can continue with the installation procedure .

UD2 (D220)

1. Power up the device while pressing the [F2] (older devices) or [Del] (newer devices) button repeatedly in rapid succession.
2. Select **SCU**.
3. If a password prompt is shown, enter the BIOS password.
4. Select the **Boot** tab.
5. Set **USB Boot** to **<ENABLED>**.
6. Save the settings and exit.
7. Connect the USB stick to the device.

8. Reboot the device while pressing the [F2] or [Del] (newer devices) button repeatedly in rapid succession.
9. Select **Boot Manager**.
10. Select the USB stick as the boot medium and press **Enter**.
11. You can continue with the installation procedure (see page 21).

UD9 (TC215B)

1. Power up the device while pressing the [F2] button repeatedly in rapid succession.
2. If a password prompt is shown, enter the BIOS password.
3. Select the **Boot** tab.
4. Select **Boot Option Priorities**.
5. Select the entry for the USB stick and move it to the first position using the [+] key.
6. Save the settings and exit.
7. You can continue with the installation procedure (see page 21).

Installation Procedure

This article describes the regular installation procedure for single devices with the IGEL OS Creator (OSC). If you are an IGEL third-party endpoint partner (i.e. hardware manufacturer, independent hardware vendor, reseller) that has a factory ID from IGEL, please refer to Installation Procedure for Factory Images (see page 33).

> ⚠ The installation will overwrite all existing data on the target drive.

1. Connect the prepared USB memory stick to the target device and switch the target device on.
2. Select one of the following options from the boot menu:
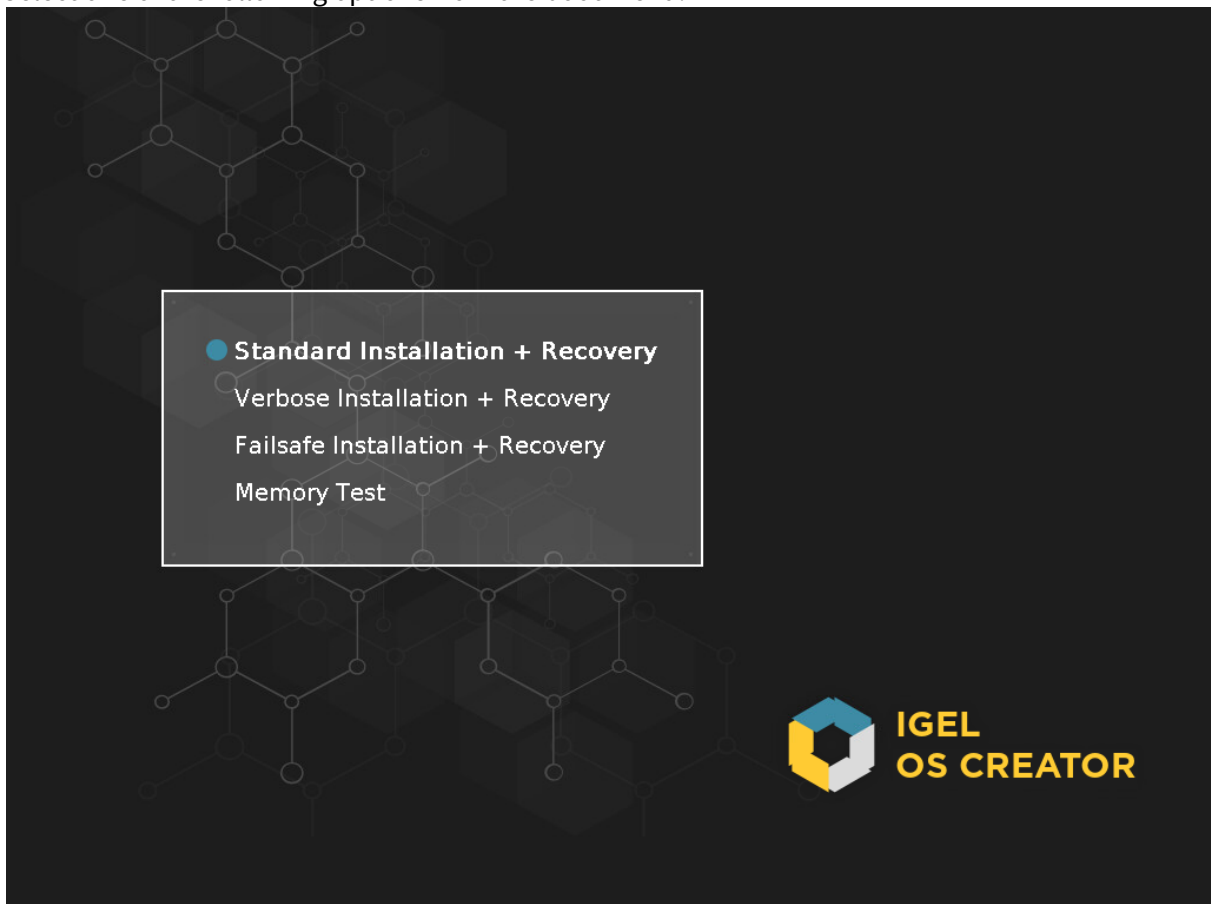
- **Standard Installation + Recovery**: Boots the system with just a few messages from the USB memory stick and launches the installation program. (Default)
- **Verbose Installation + Recovery**: Boots the system from the USB memory stick and shows the Linux boot messages in the process.
- **Failsafe Installation + Recovery**: Fallback mode to be used if the graphical boot screen cannot be displayed.
- **Memory Test**: Memory test, only available in legacy/BIOS mode. This option does not carry out an installation.

- **EFI Debug Shell**: Available only in UEFI boot mode. If the hardware in use is EFI-capable, boot problems can be analyzed with that.

3. Select the language for the installation process.
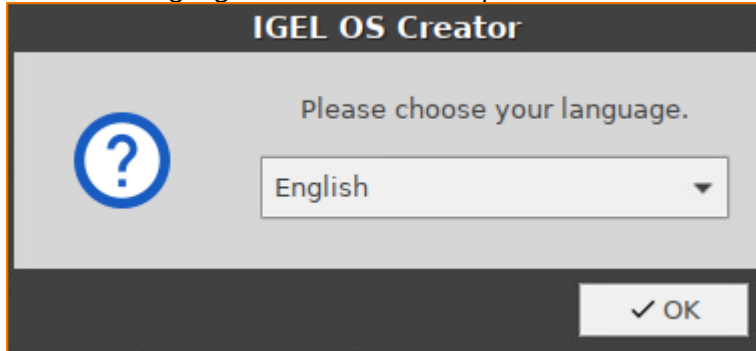
4. Optional, only available if your device has booted in UEFI mode: If you want to install the legacy/BIOS version of IGEL OS 11, activate **Force Legacy Installation**.
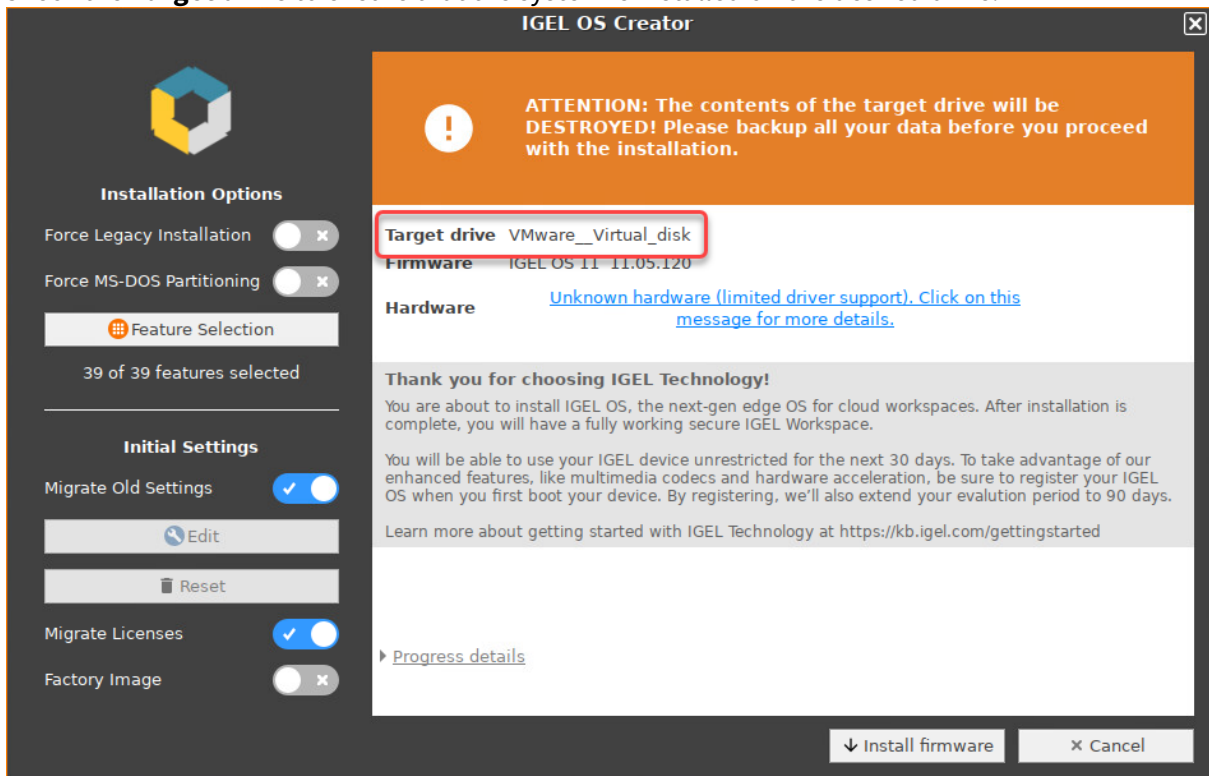
> ⓘ If you have activated **Force Legacy Installation**, remember to set the system to legacy/BIOS mode after installation.
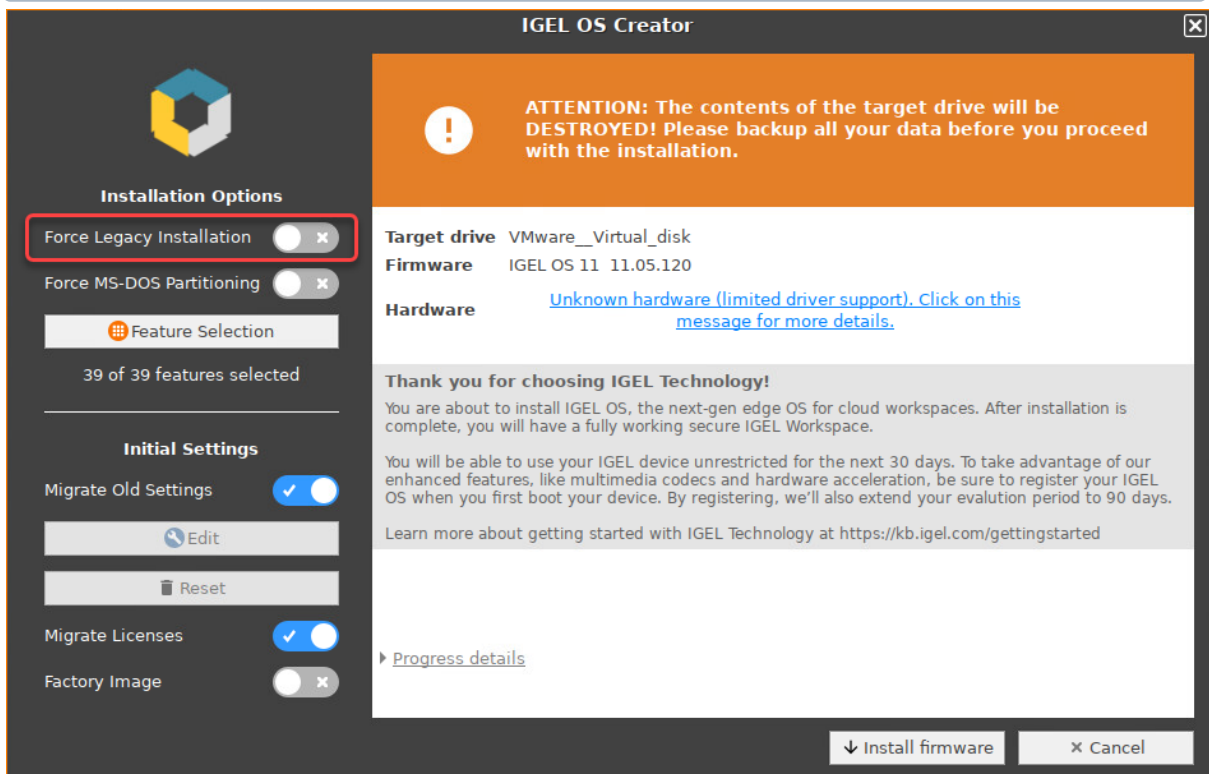
5. Optional, only available if your device has booted in UEFI mode: If you want to use an MS-DOS partition table instead of a GPT partition table, activate **Force MS-DOS Partitioning**.
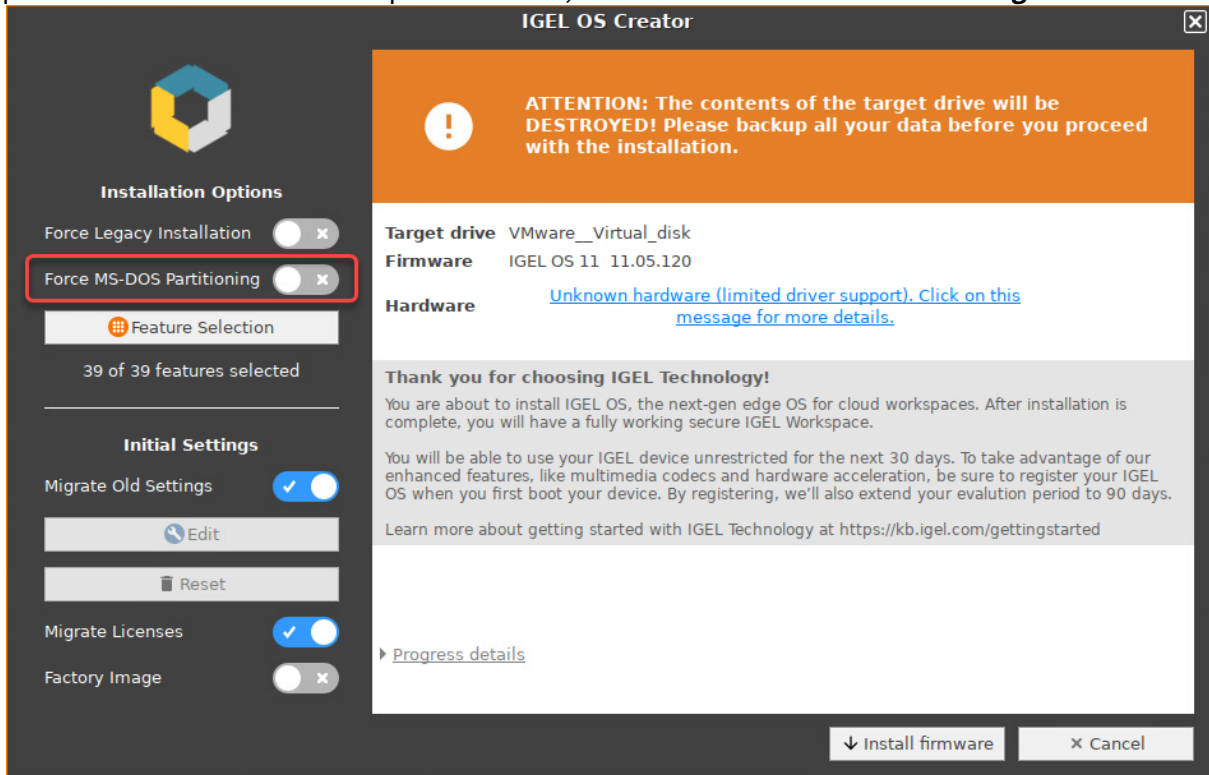
6. Check the **Target drive** to ensure that the system is installed on the desired drive.

7. If you want to exclude features of IGEL OS, e.g. to save storage space, click **Feature Selection** and edit the settings as required.

- **All**: Select all features
- **None**: Select no feature
- **Feature**: Sort the list alphabetically
- **Size**: Sort the list by the memory requirements of the features

8. If you want to change initial settings for the devices you are about to deploy, click **Edit**.
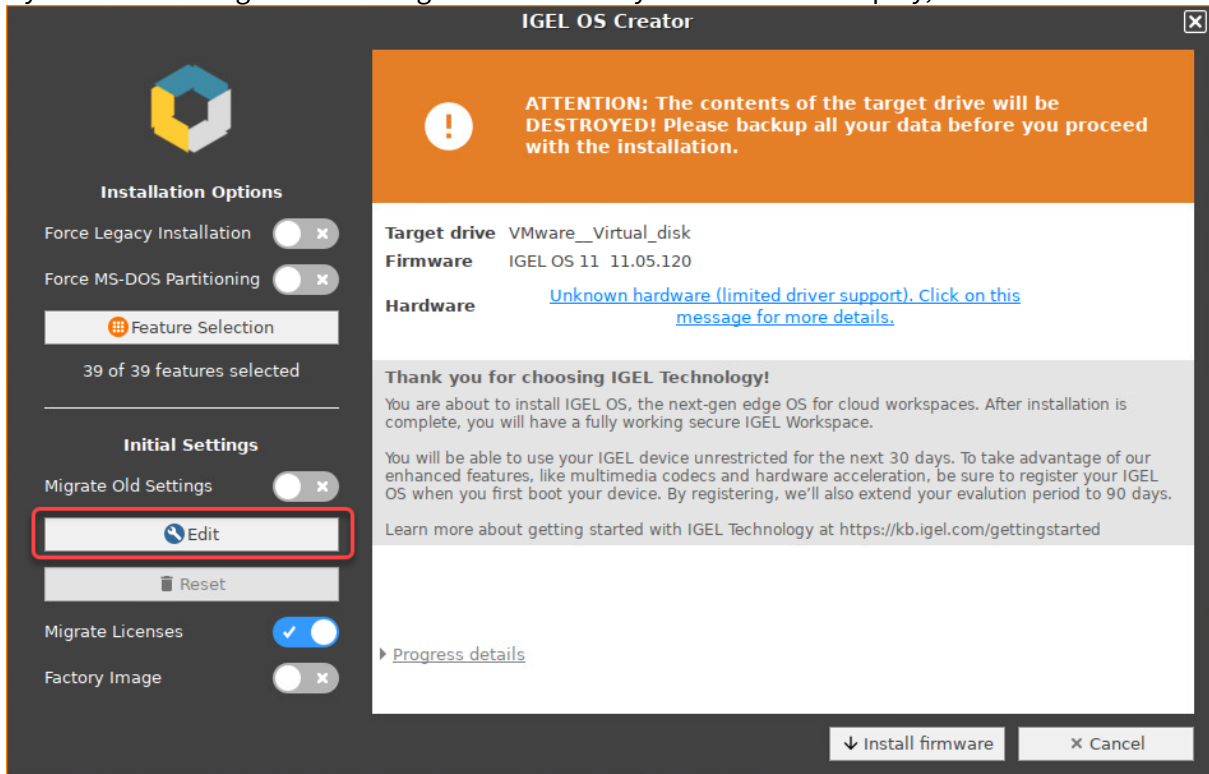

The IGEL Setup opens, enabling you to change the settings in the same way as with a regular IGEL OS installation.

> ✓ The changes are stored on the USB memory stick from which the IGEL OS Creator (OSC) is executed. When you use this USB memory stick for subsequent OSC installations, your custom settings will be re-used. This allows you to easily create a number of IGEL OS installations with custom settings.
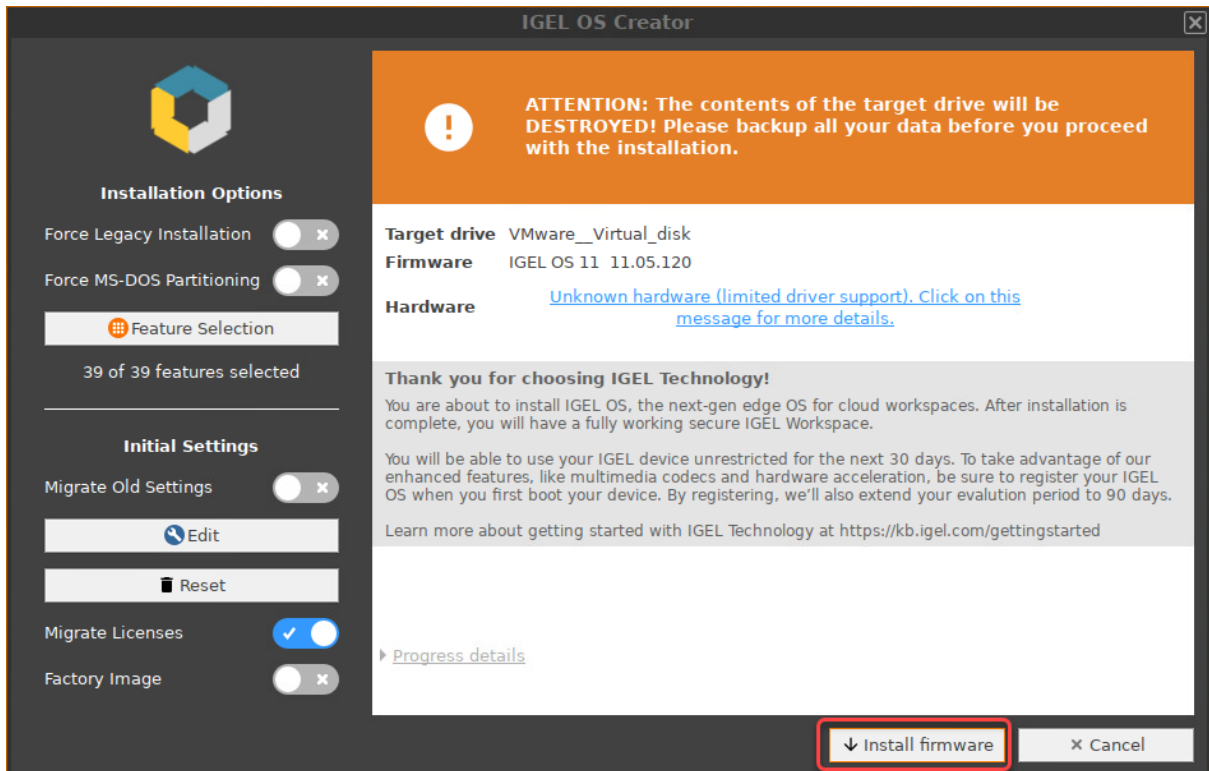
For details about the settings, see the chapters Setup and the subsequent chapters in the IGEL OS
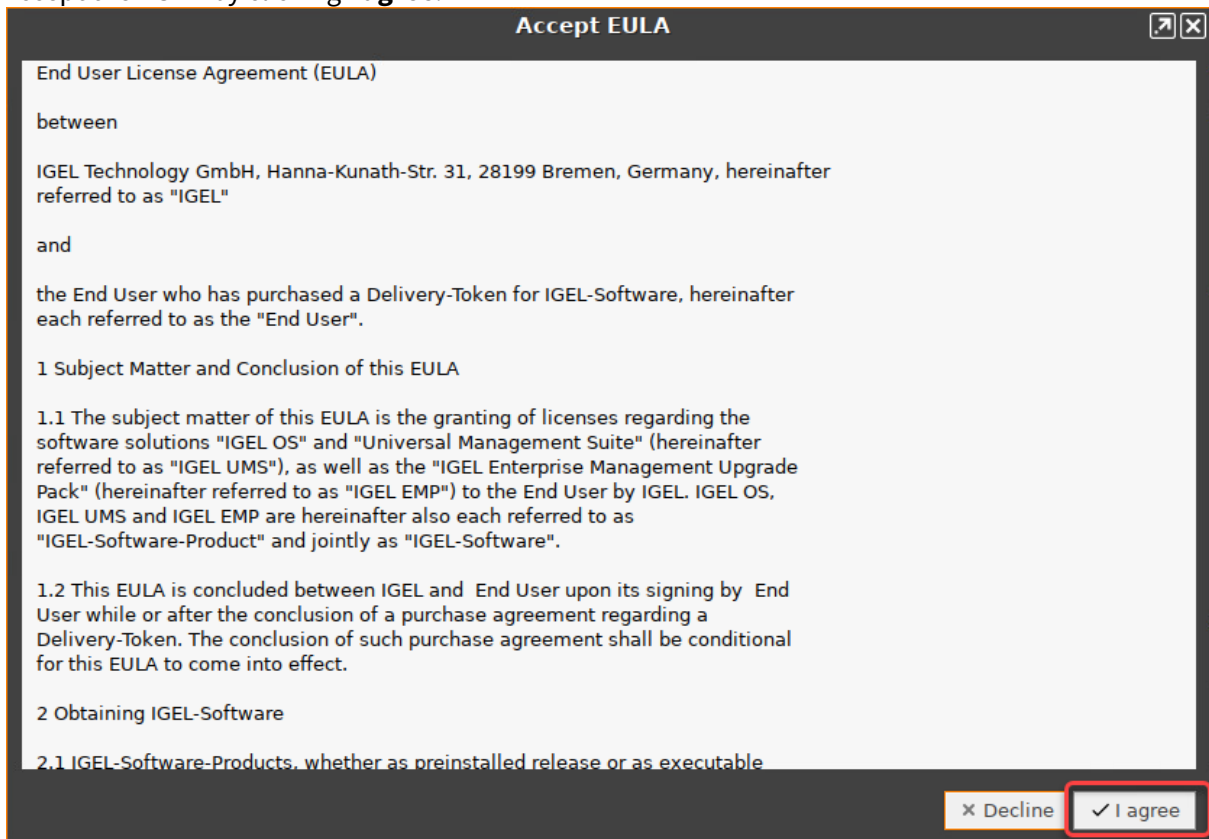Reference Manual.
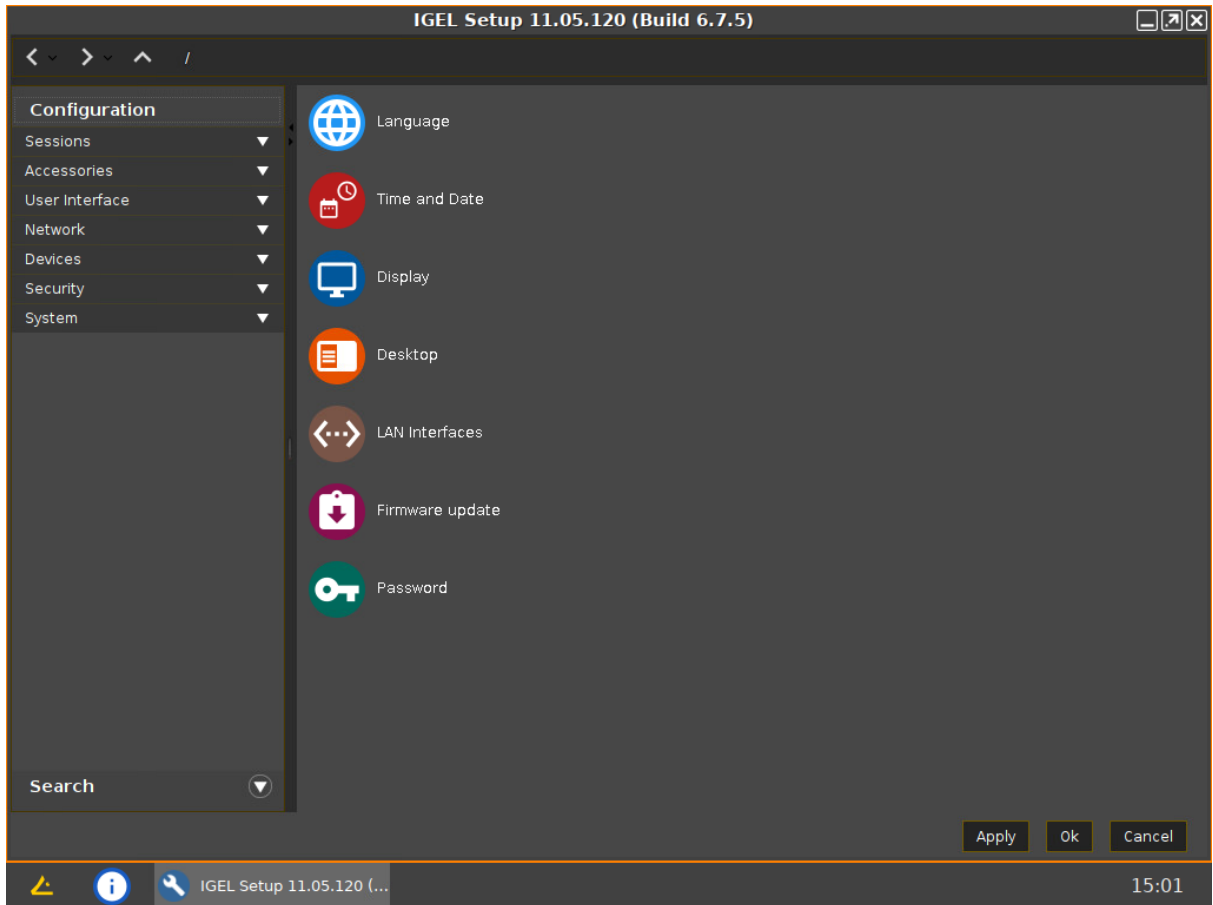
9. If you want to undo your changes and restore the original settings, click **Reset**.
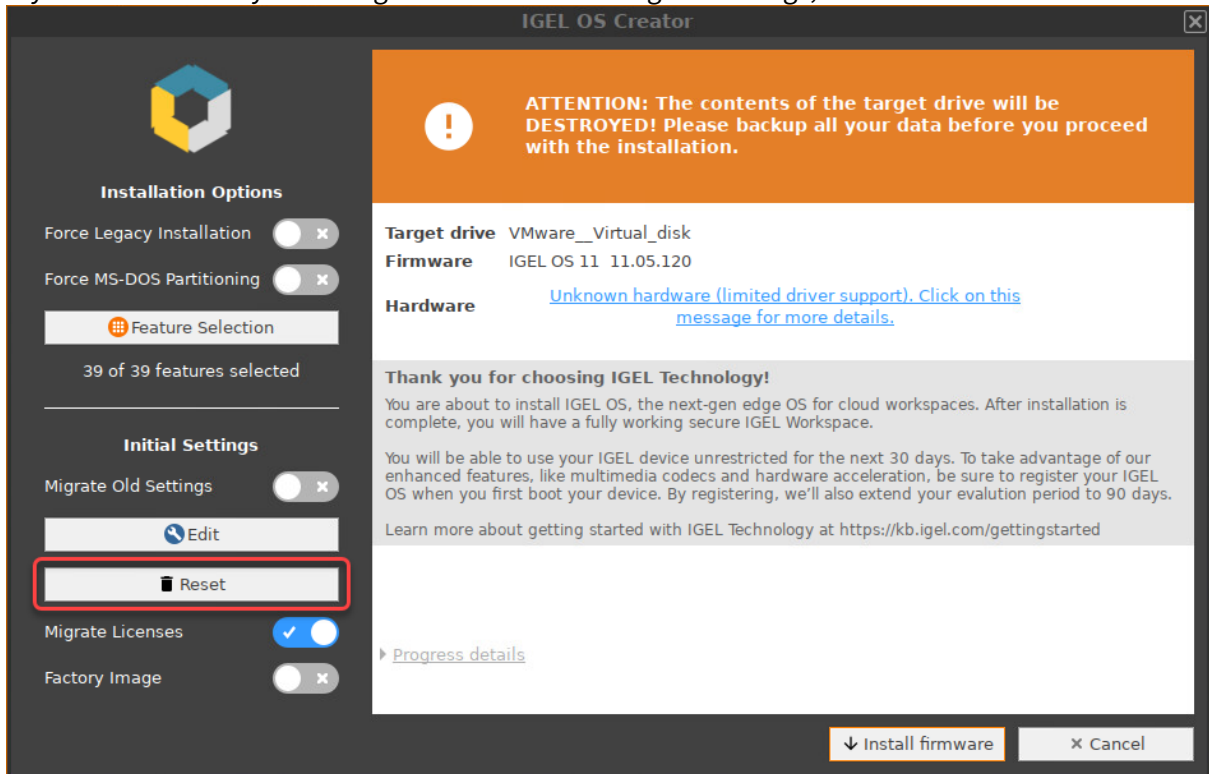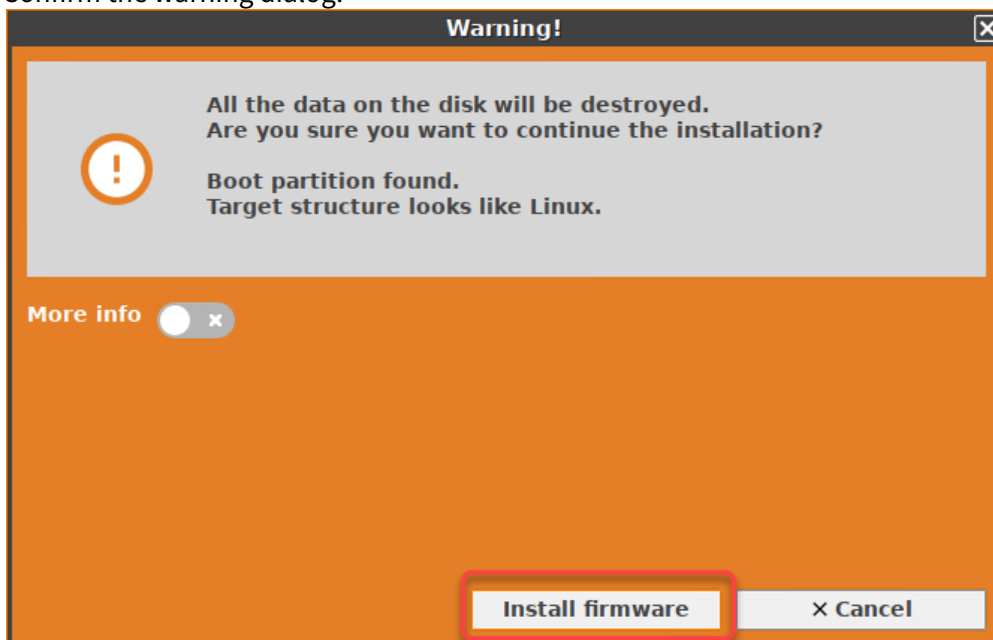

10. Click on **Install firmware**.

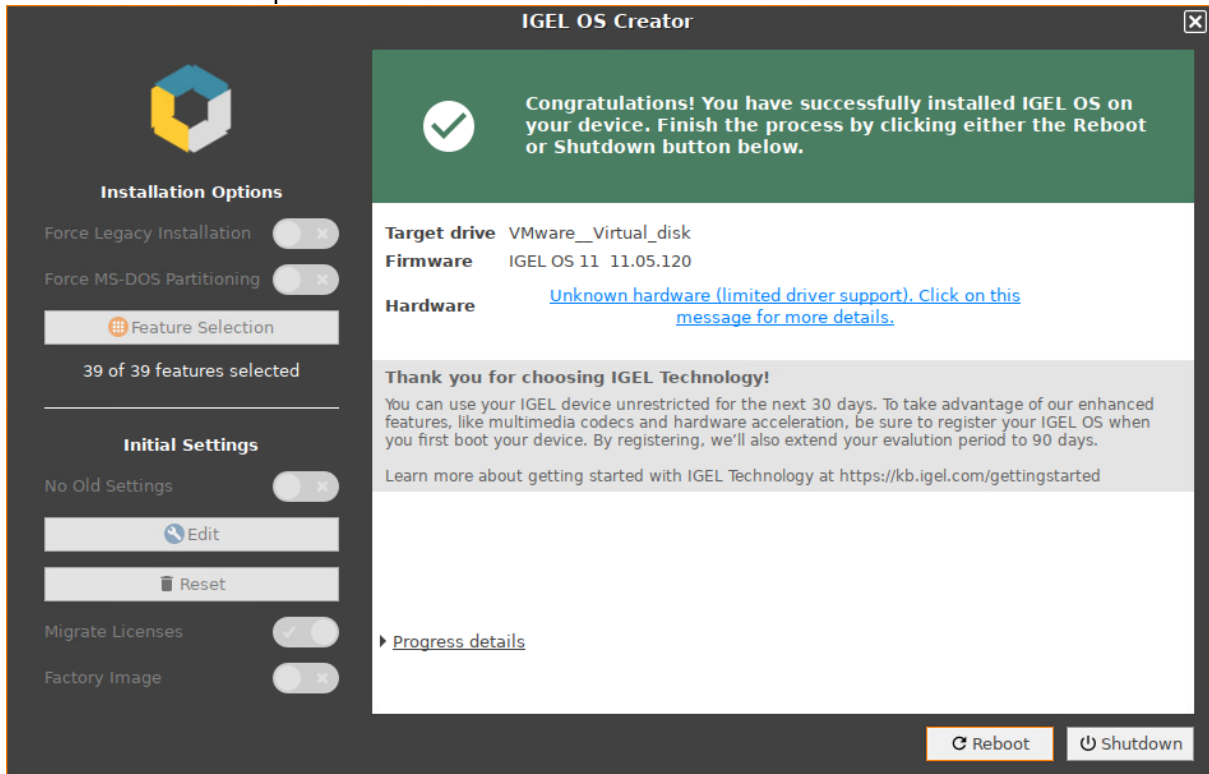11. Accept the **EULA** by clicking **I agree**.

12. Confirm the warning dialog.

The installation program will install IGEL OS 11 on the target drive. If you see the success message,

the installation is complete.

13. Detach any external network adapters from the device.
    In this way, you ensure that the unit ID for the device is derived from the built-in network adapter.
    The unit ID will be saved on the device persistently, regardless of any external network adapter
    that may be used in the future. This is important for licensing.

14. Click on **Reboot**.
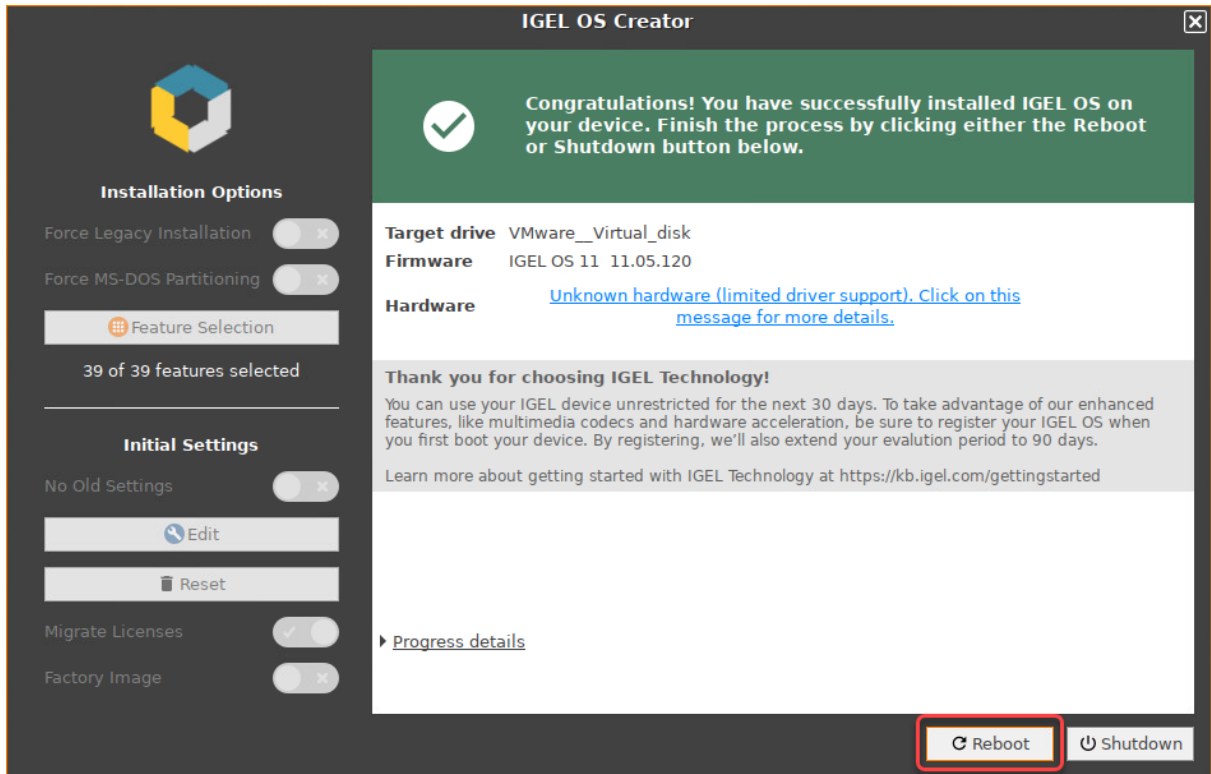
15. Remove the USB memory stick.
16. Close the message window.
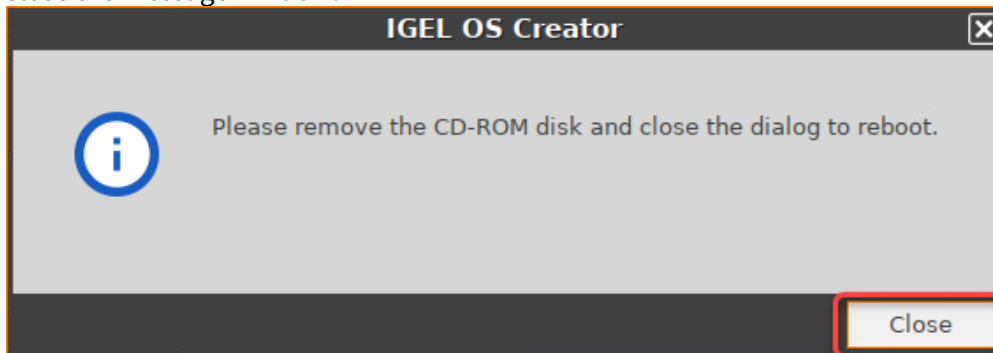
The system will shut down and then boot IGEL OS 11.

Installation Procedure for Factory Images

> ⚠ The installation will overwrite all existing data on the target drive.
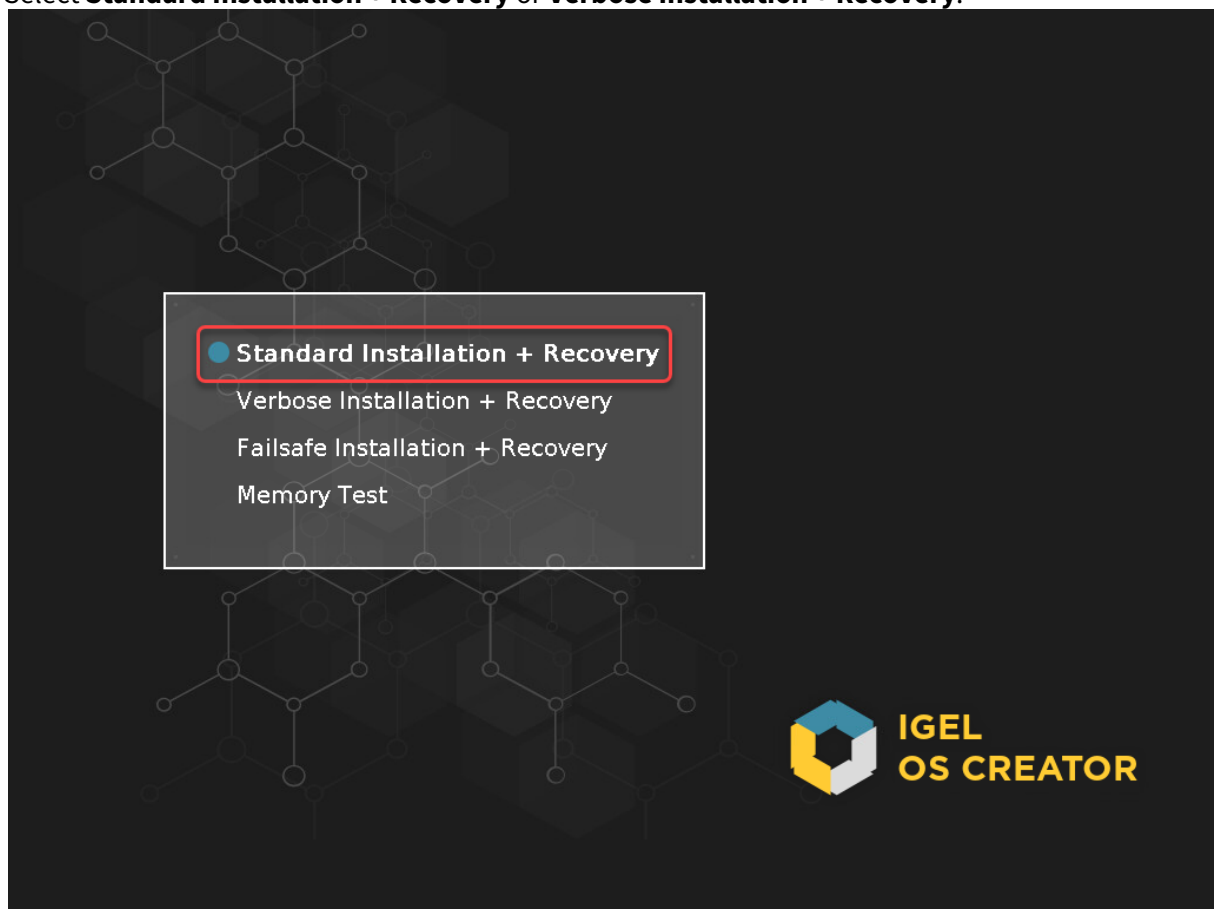
Preparing the Image

1. Connect the prepared USB memory stick to the target device and switch on the target device.

2. Select **Standard Installation + Recovery** or **Verbose Installation + Recovery**.

3. Select the language for the installation process.
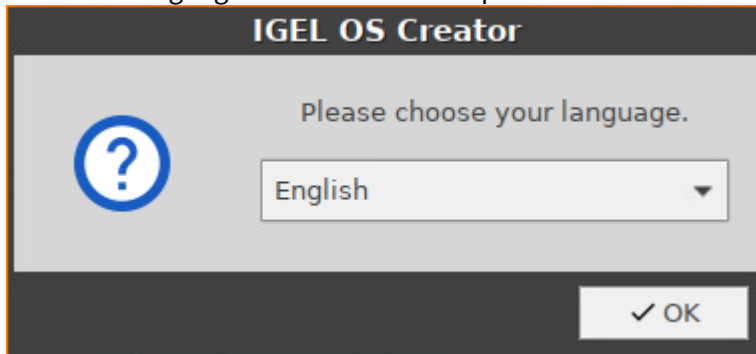
The installation program **IGEL OS Creator** opens. Here, you can configure settings for the installation process and start it.

4. Optional; only available if your device has booted in UEFI mode: If you want to install the legacy/ BIOS version of IGEL OS 11, activate **Force Legacy Installation**.

ⓘ If you have activated **Force Legacy Installation**, remember to set the system to legacy/ BIOS mode after installation.
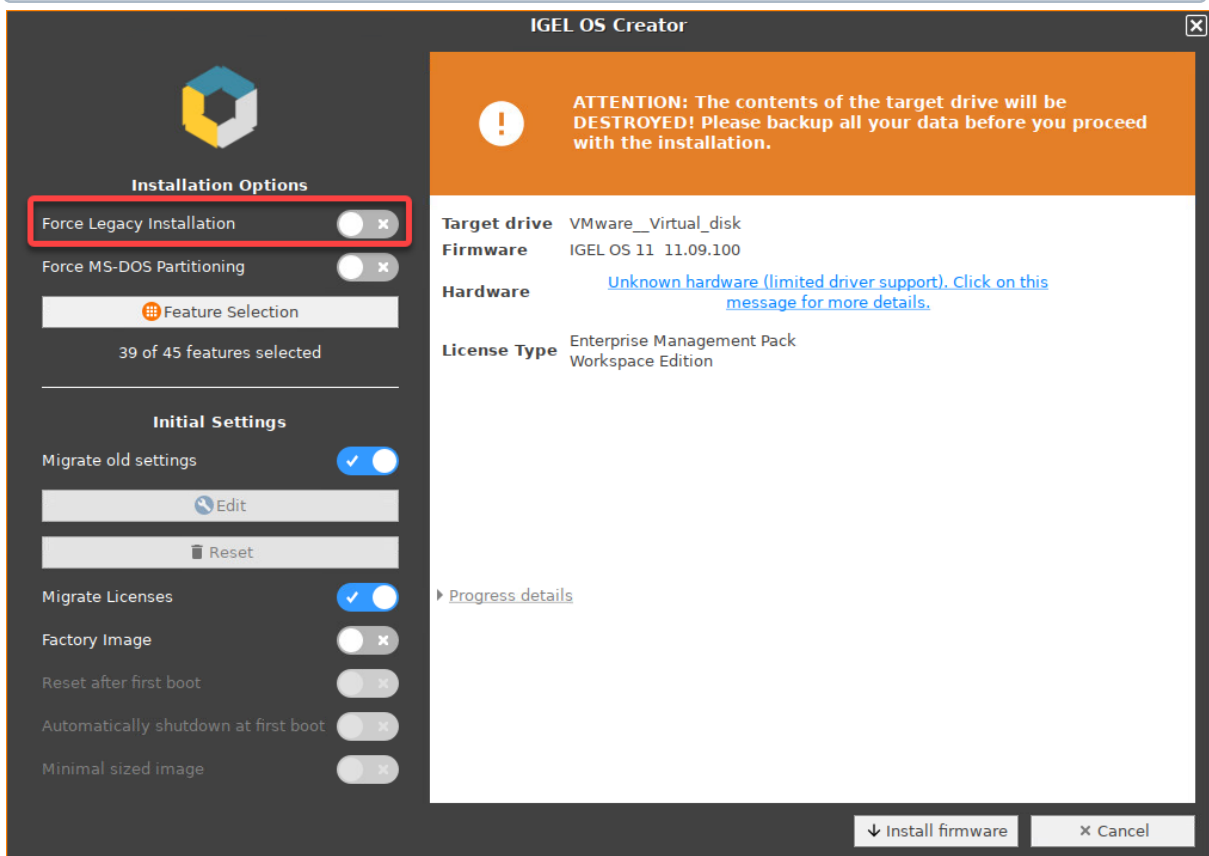
5. Optional; only available if your device has booted in UEFI mode: If you want to use an MS-DOS partition table instead of a GPT partition table, activate **Force MS-DOS Partitioning**.
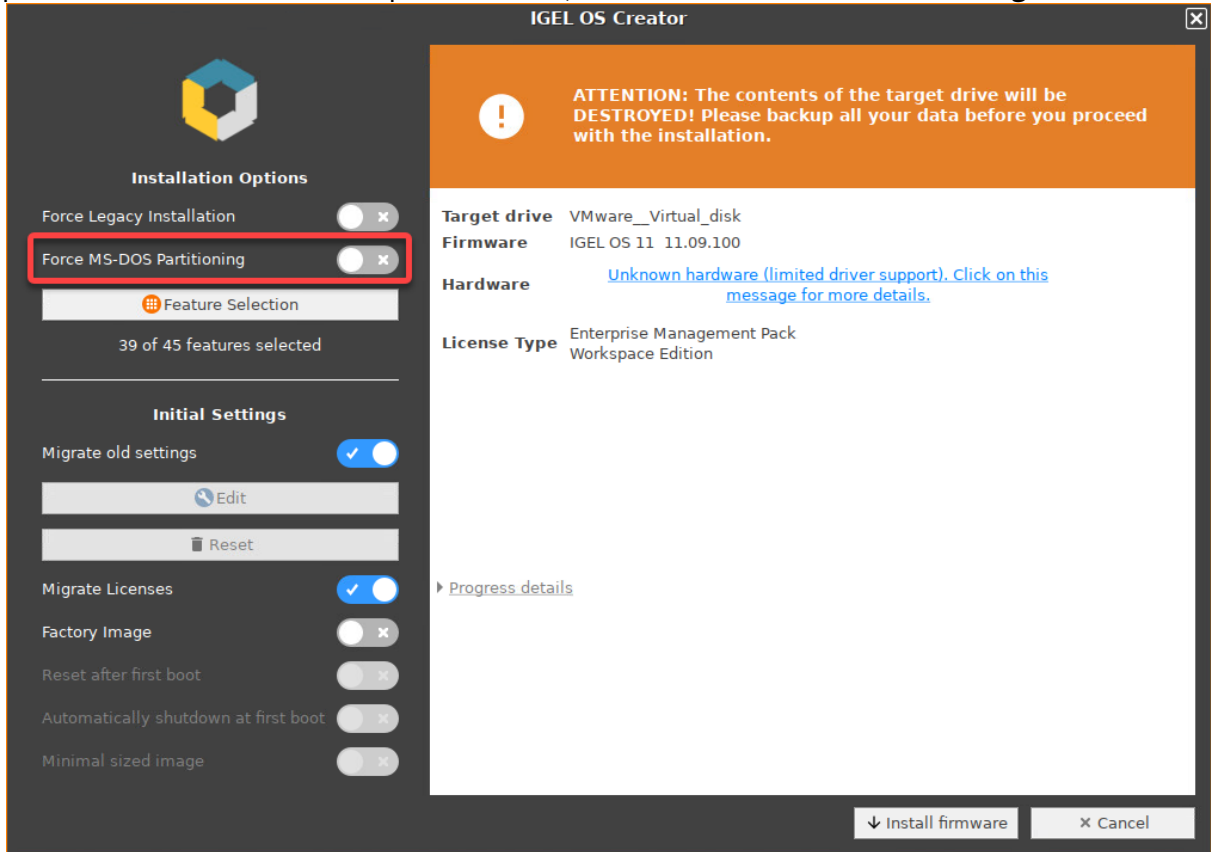
6. Activate **Factory Image** and enter your factory ID.
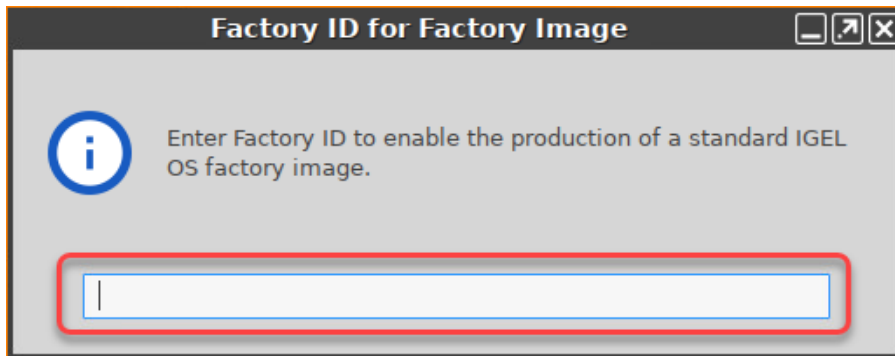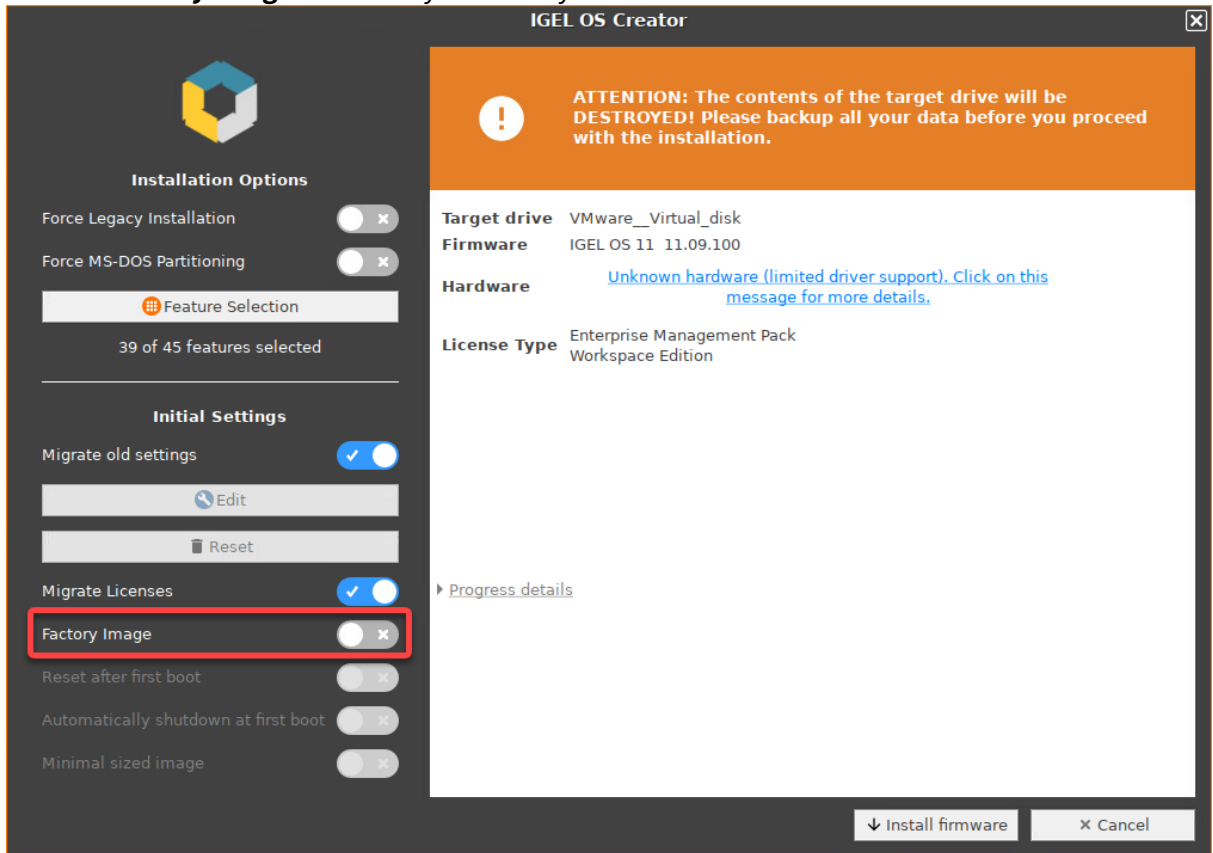
7. Check the **Target drive** to ensure that the system is installed on the desired drive.
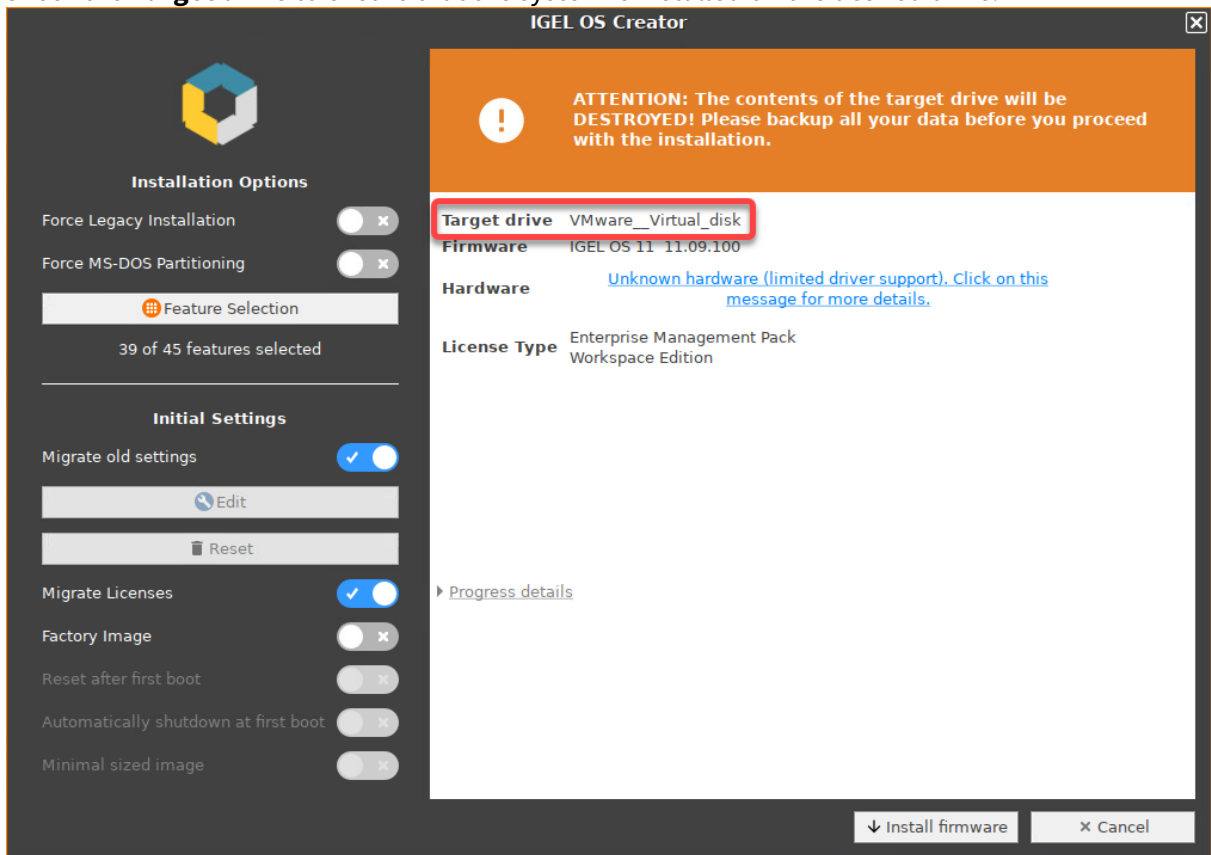
8. If you want to exclude features of IGEL OS, e.g. to save storage space, click **Feature Selection** and edit the settings as required.
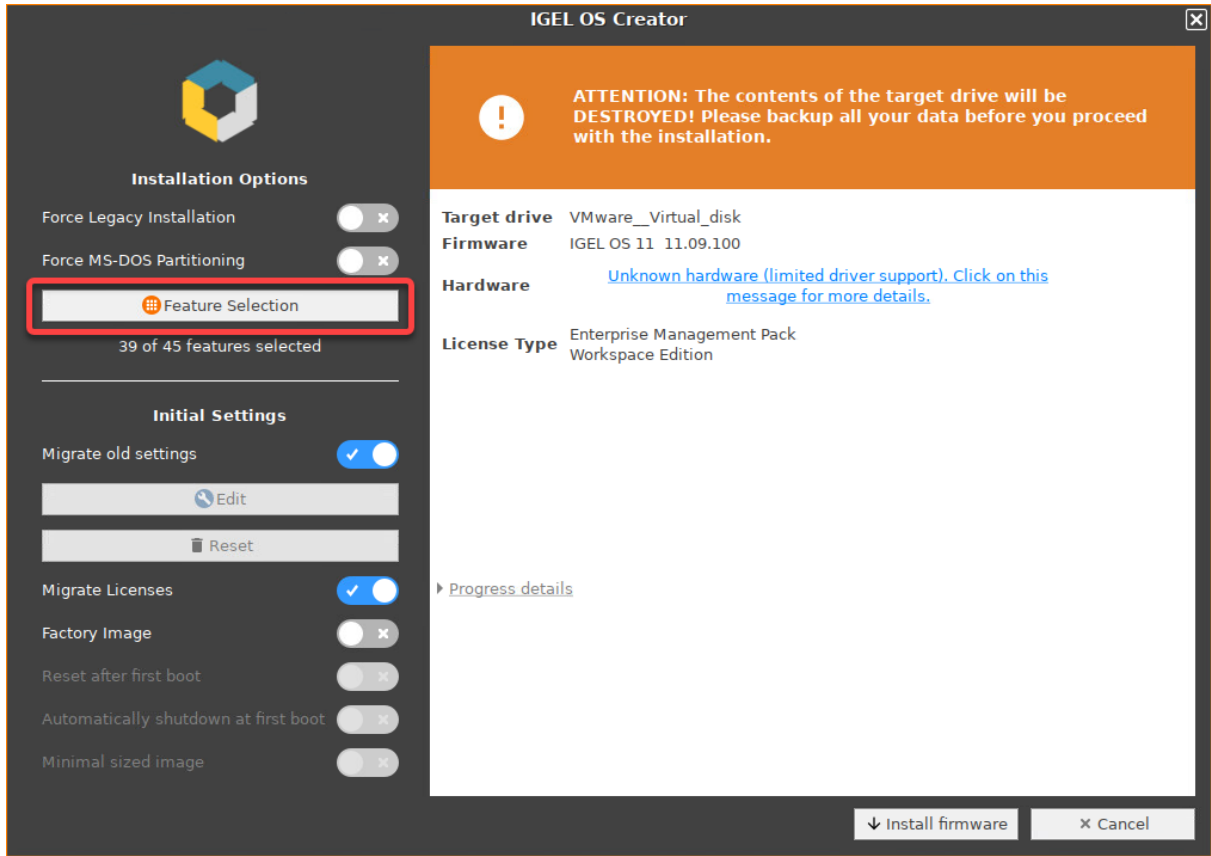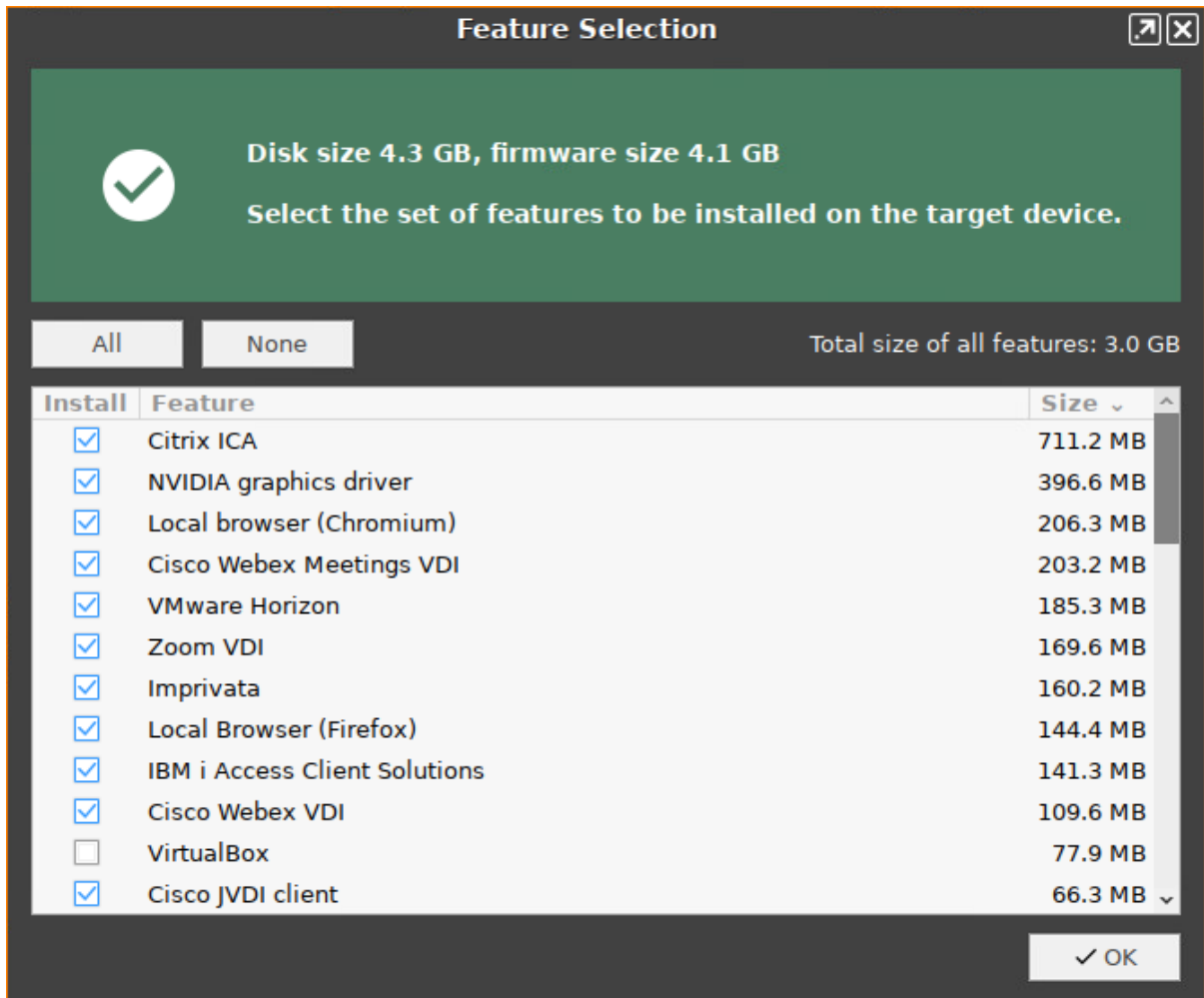
- **All**: Select all features
- **None**: Select no feature
- **Feature**: Sort the list alphabetically
- **Size**: Sort the list by the memory requirements of the features

9. If you want to change the initial settings for the devices you are about to deploy, click **Edit**.
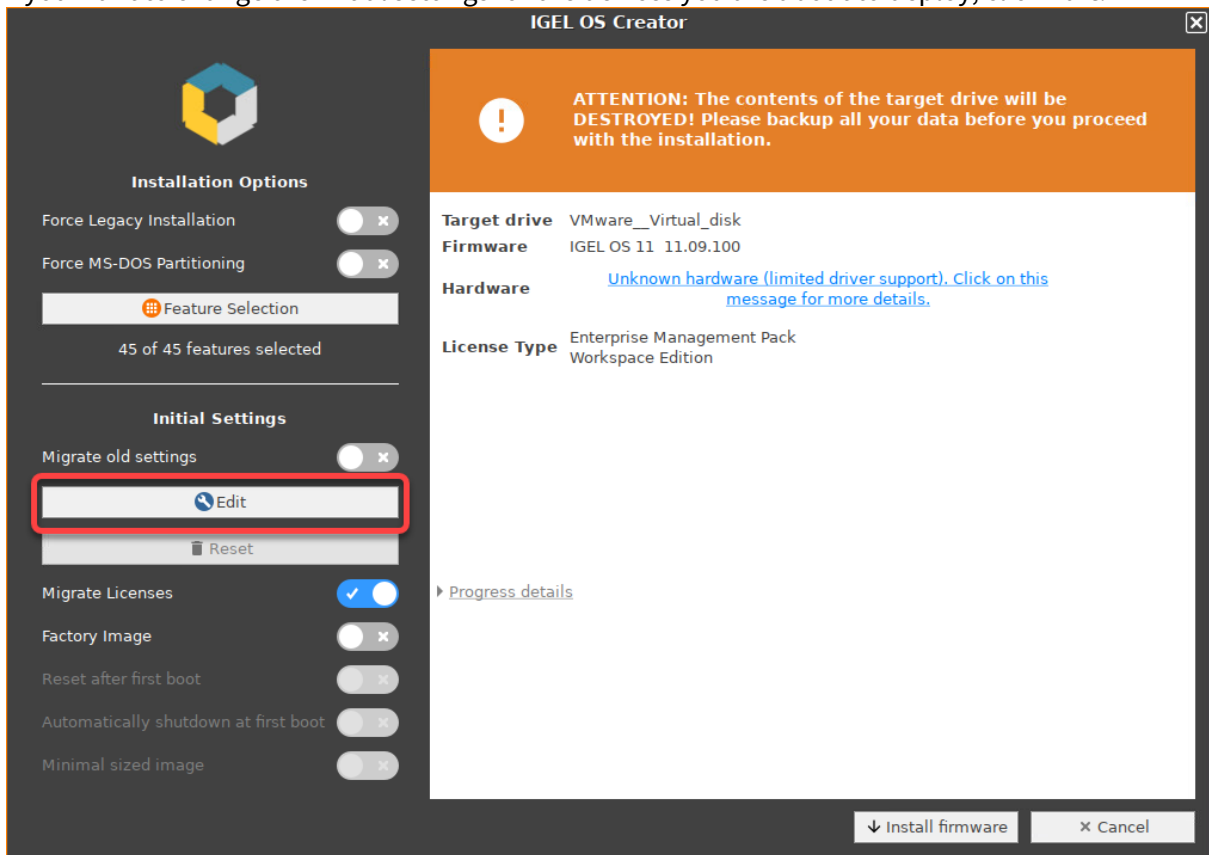
The IGEL Setup opens, enabling you to change the settings in the same way as with a regular IGEL OS installation. The changes are stored on the USB memory stick from which the IGEL OS Creator (OSC) is executed. For details about the settings, see the chapters Setup and the subsequent chapters in the IGEL OS Reference Manual.
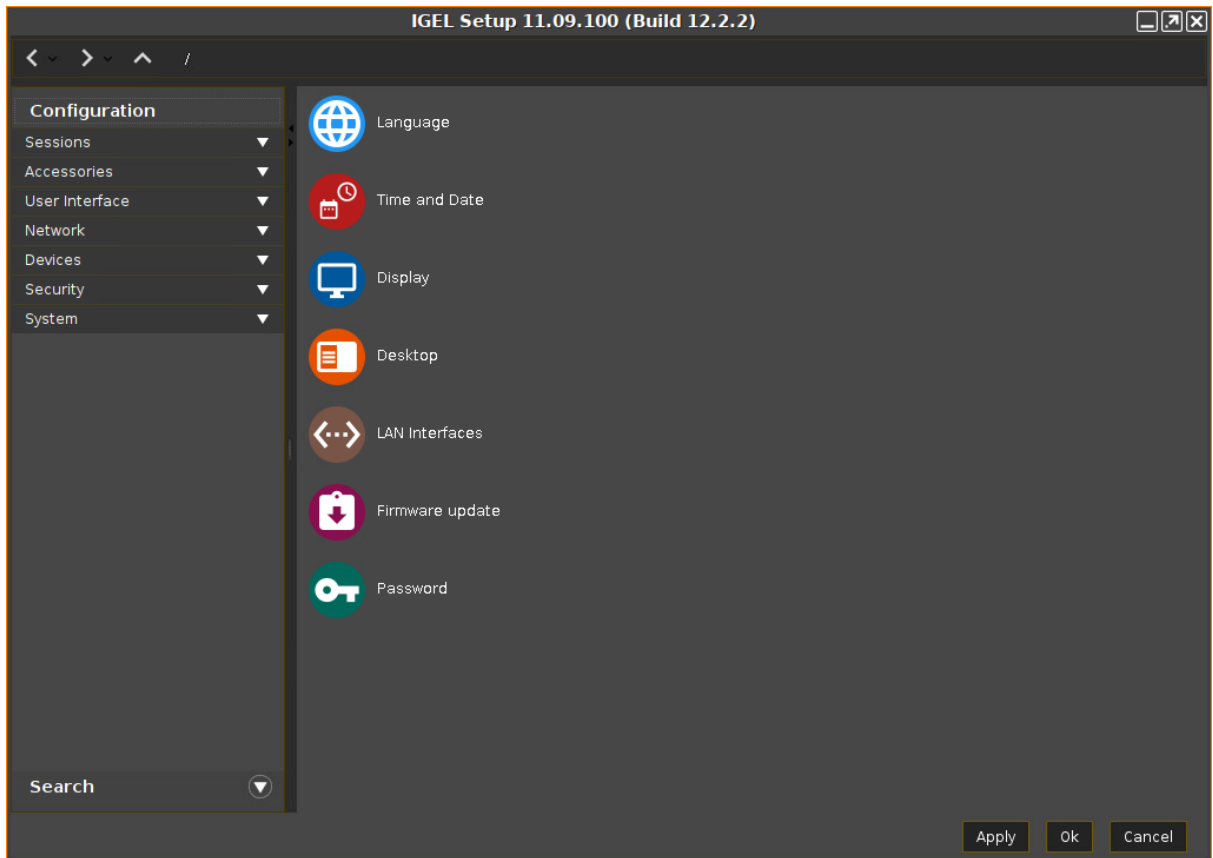
10. If you want to undo your changes and restore the original settings, click **Reset**.
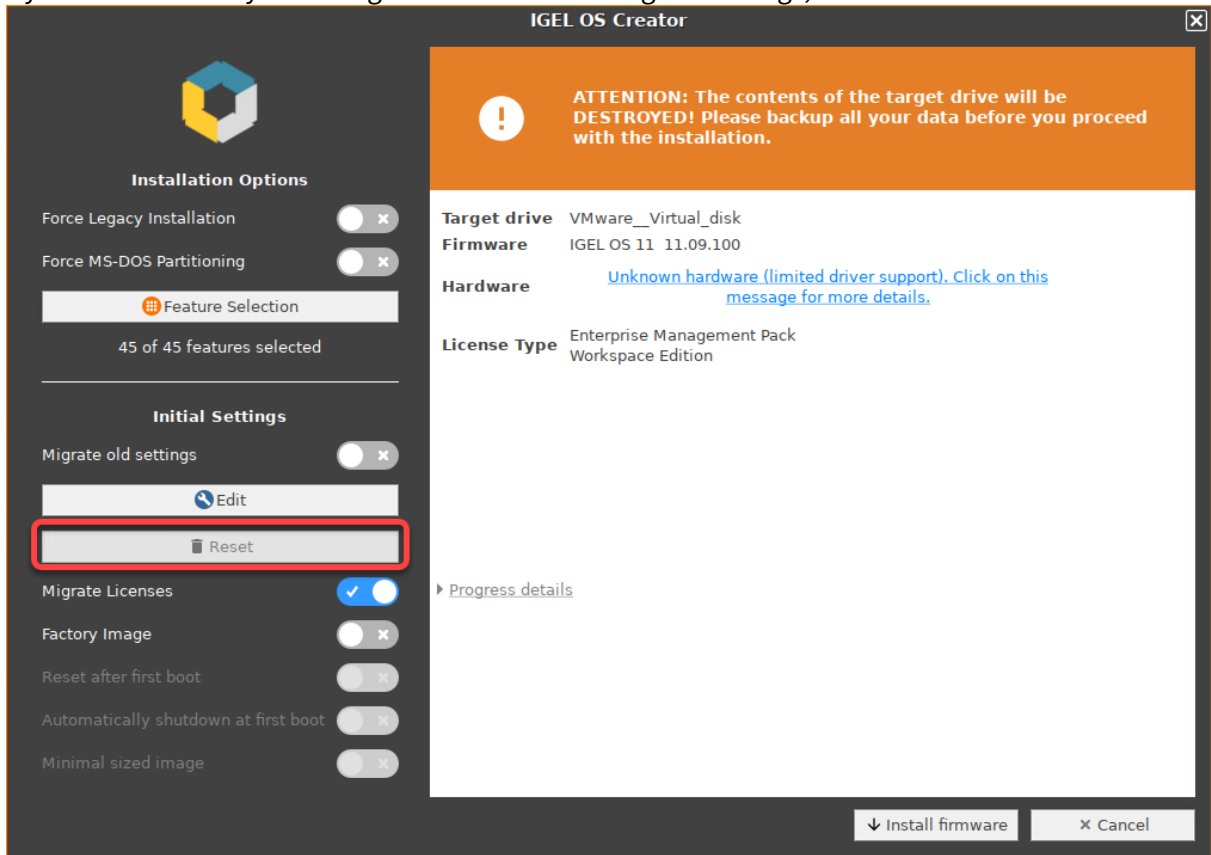
11. If you want to create an image that will resize itself on the first boot, following the device's storage size, enable **Minimal sized image**.
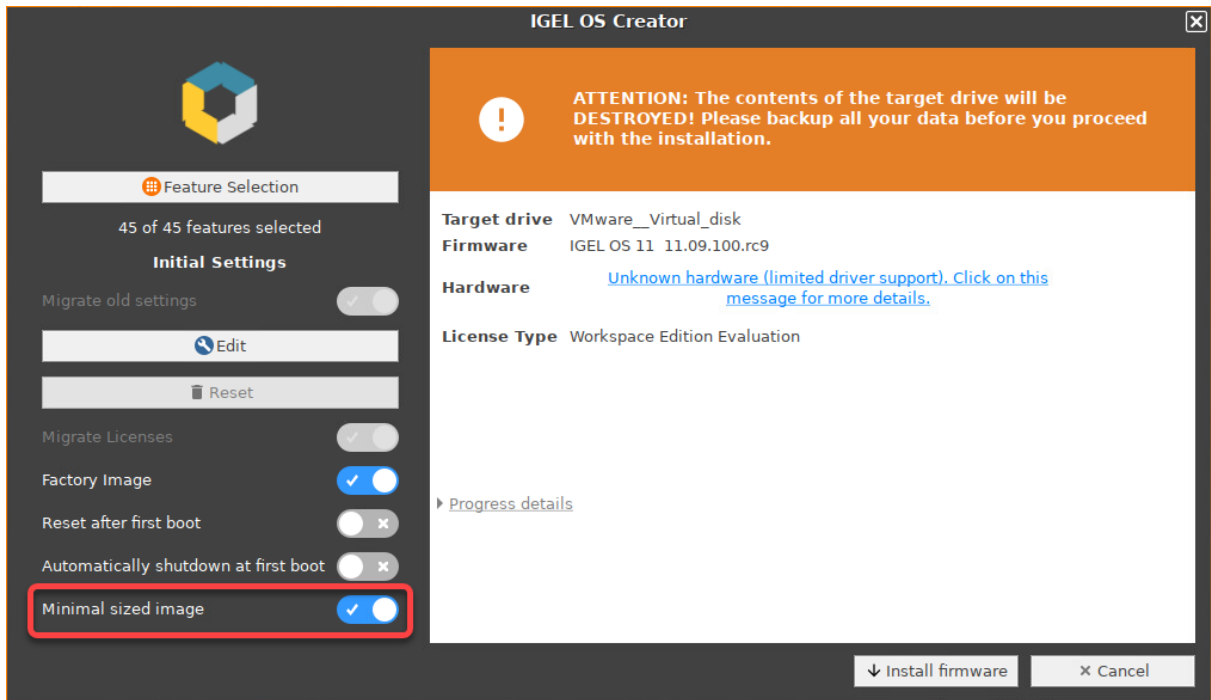
12. If you want to perform a functional test on each device, you have two possibilities:

> ⚠ **Important Note**
>
> If **Reset after first boot** or **Automatically shutdown at first boot** is activated on your factory preload image, the first boot of your devices MUST take place BEFORE shipment to end customers!

- Manual tests with visual feedback on each device: Enable **Reset after first boot**. The test procedure is described under Unit Testing .
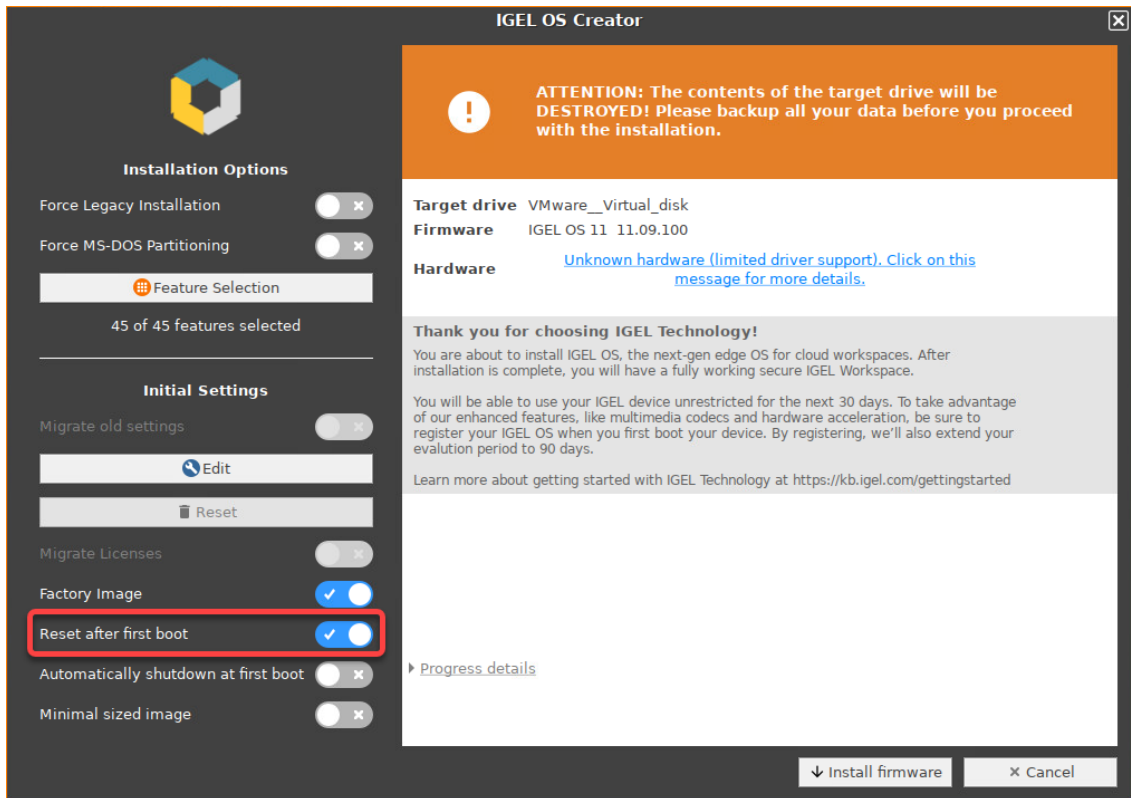
- Automatic tests (unattended): Enable both **Reset after first boot** and **Automatically shutdown at first boot**. The test procedure is described under Automatic Unit Testing (see page 50).
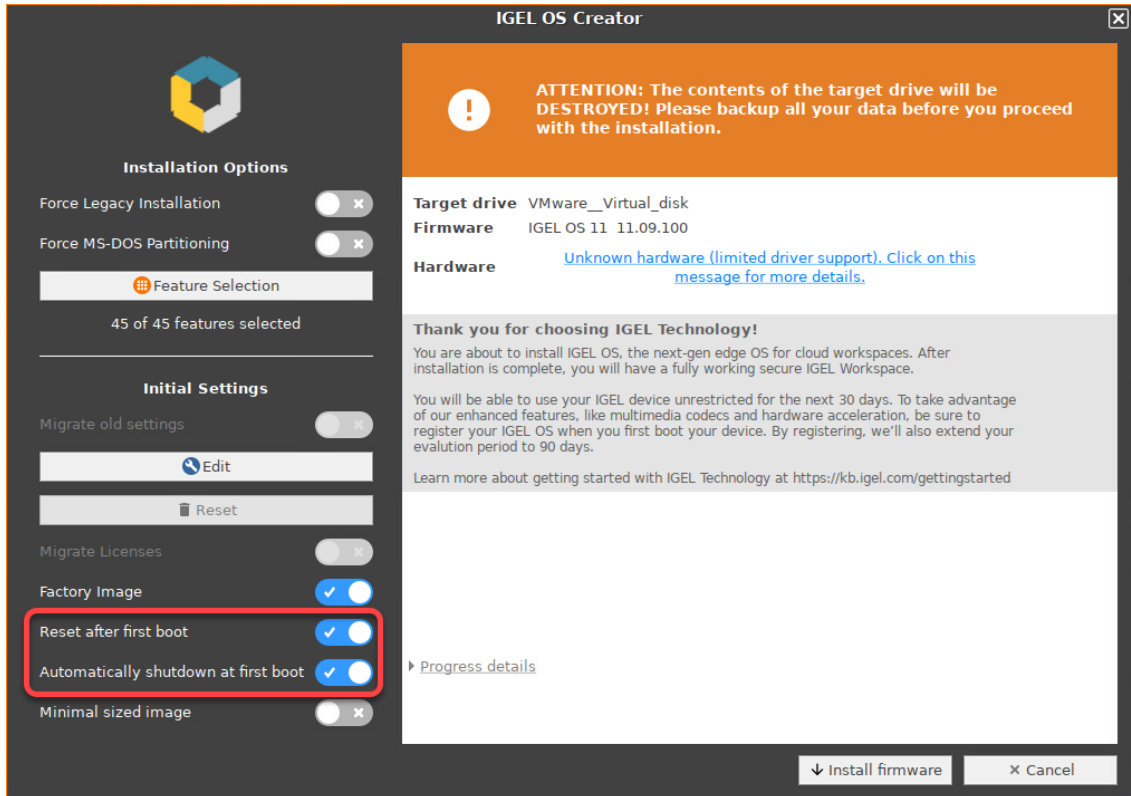
13. To start the installation, click **Install firmware**.
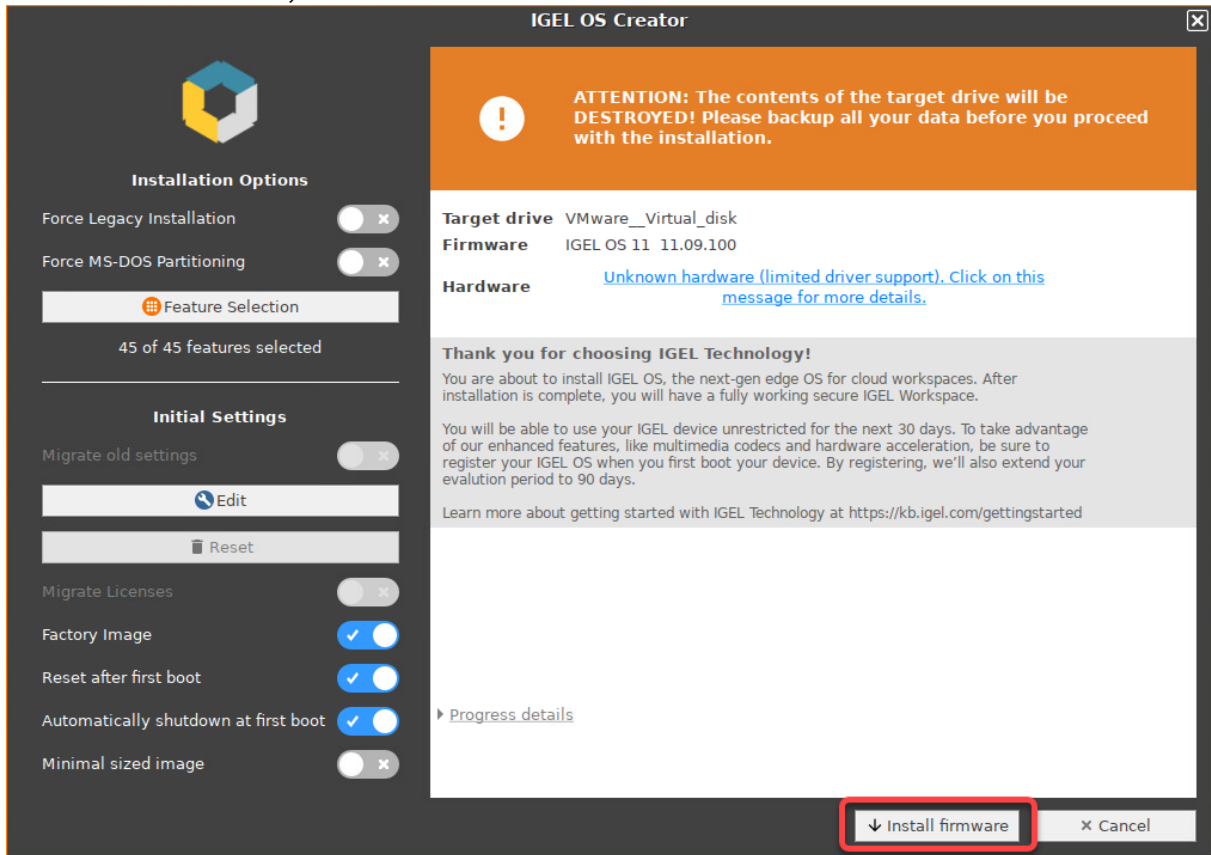
14. Confirm the warning dialog.
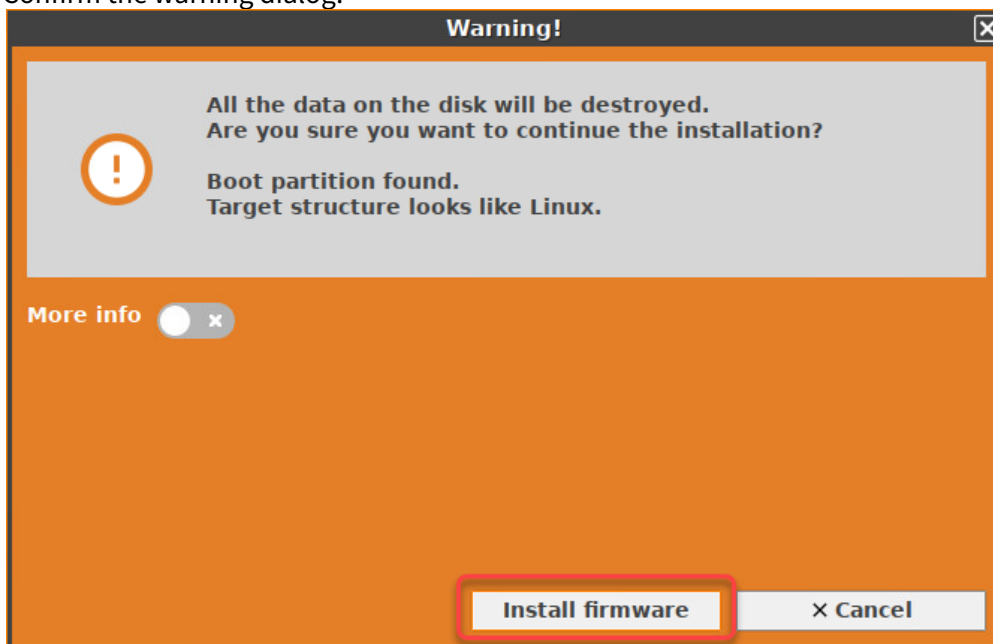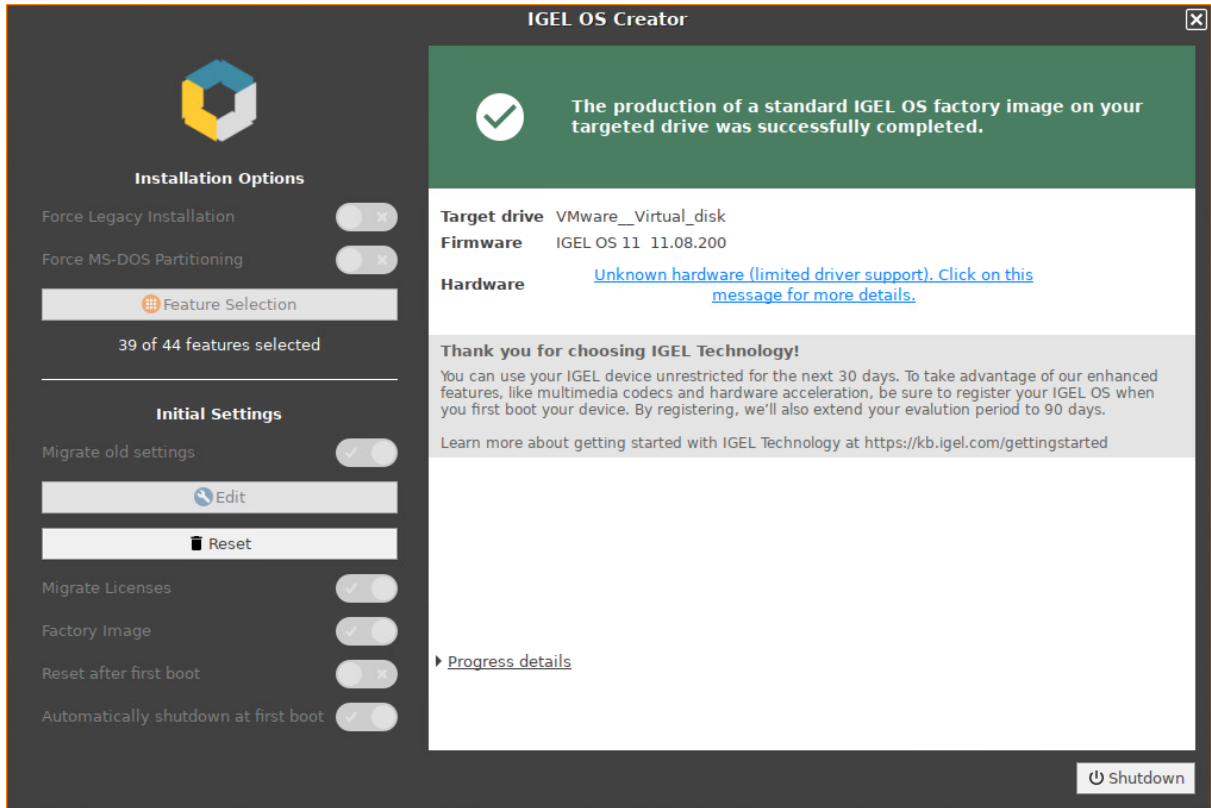
The installation program will set up IGEL OS 11 on the target drive. If you see the success message, the installation is complete.

15. Click on **Shutdown**.
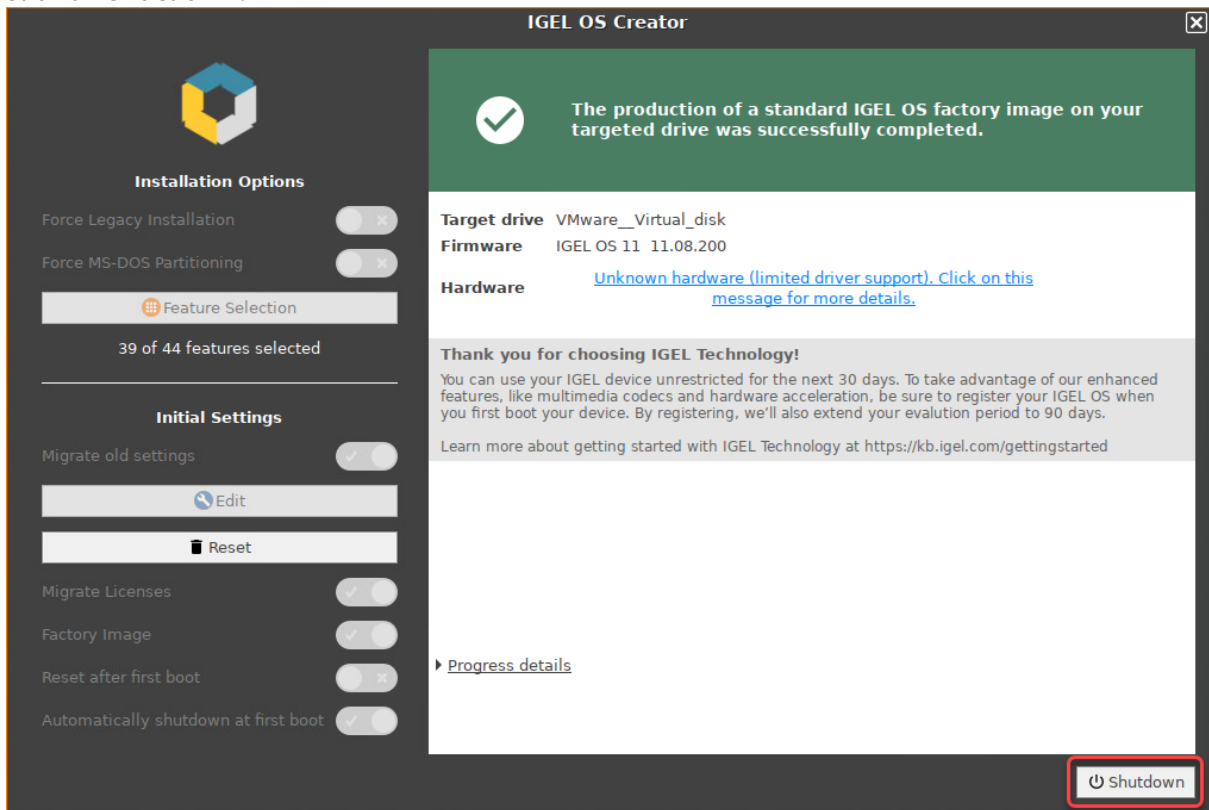
16. Read out the image from your device to deploy it on the units.

> ⚠ **DO NOT BOOT THE EXACT FACTORY IMAGE THAT IS INTENDED FOR DEPLOYMENT ON YOUR DEVICES! ALL DEVICES TO WHICH THIS IMAGE HAS BEEN DEPLOYED WOULD SHARE ONE AND THE SAME UNIT ID. AS A RESULT, YOUR DEVICES WOULD BE PRACTICALLY UNUSABLE.**
> If you want to test the factory image before its deployment, transfer it to your target medium first and then boot the image on the machine on which you created it, or any other test machine. The important thing is that the factory image that will be mass-deployed to your units has not been booted before.

> ✅ **16 GiB Maximum Image Size**
>
> The maximum size of the image that is created by the IGEL OS Creator (OSC) is 16 GiB. Therefore, only the first 16 GiB of your storage medium is needed. If your devices have larger storage, this will allow for faster deployment.

17. To ensure the integrity of the image, you should create checksums of the original image and of the images that are deployed, and then compare them. For details, see IGEL Endpoint Partners: Ensuring Image Integrity with a Checksum.

18. Proceed as appropriate:

- If **Reset after first boot** is inactive, you can deploy the images on the units and roll them out straight away. The deployment should include a comparison of the checksums.
- If **Reset after first boot** has been activated, deploy the images on the units and continue with Unit Testing
- If **Automatically shutdown at first boot** has been activated, deploy the images on the units and continue with Automatic Unit Testing

Visual Unit Testing

Perform the following procedure on the original device and on every unit on which the image has been deployed.

> ⚠ **Important Note**
>
> The first boot test MUST take place with each unit BEFORE it is rolled out. (Otherwise, the device would present the green test screen instead of the IGEL Setup Assistant.)

1. Start the device and review the green test screen.
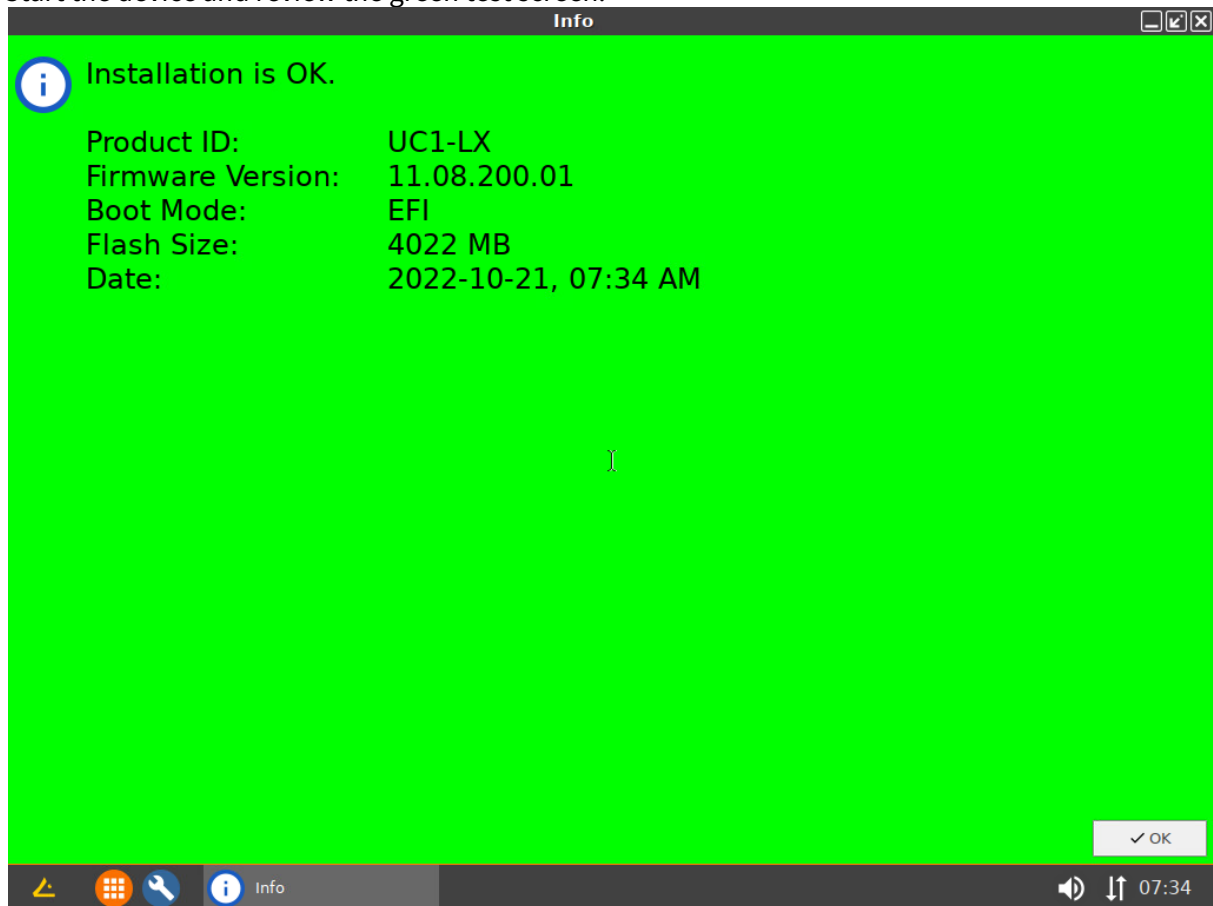
2. Click **OK**.
   You can regularly access IGEL OS and perform your tests.

3. Shut the device down.
    The device is ready for roll-out.

Automatic Unit Testing

When **Reset after first boot** and **Automatically shutdown at first boot** has been enabled, the device writes a log file on its first boot and then shuts down automatically.

Your test routine must perform the following procedure:

1. Start the device.
    The device will perform a check and write the results to a file on the first VFAT partition of the device's storage medium. The file format is JSON, and the file name is `check.log`. After a few seconds, the machine shuts down automatically. During the uptime, the green test screen is shown.
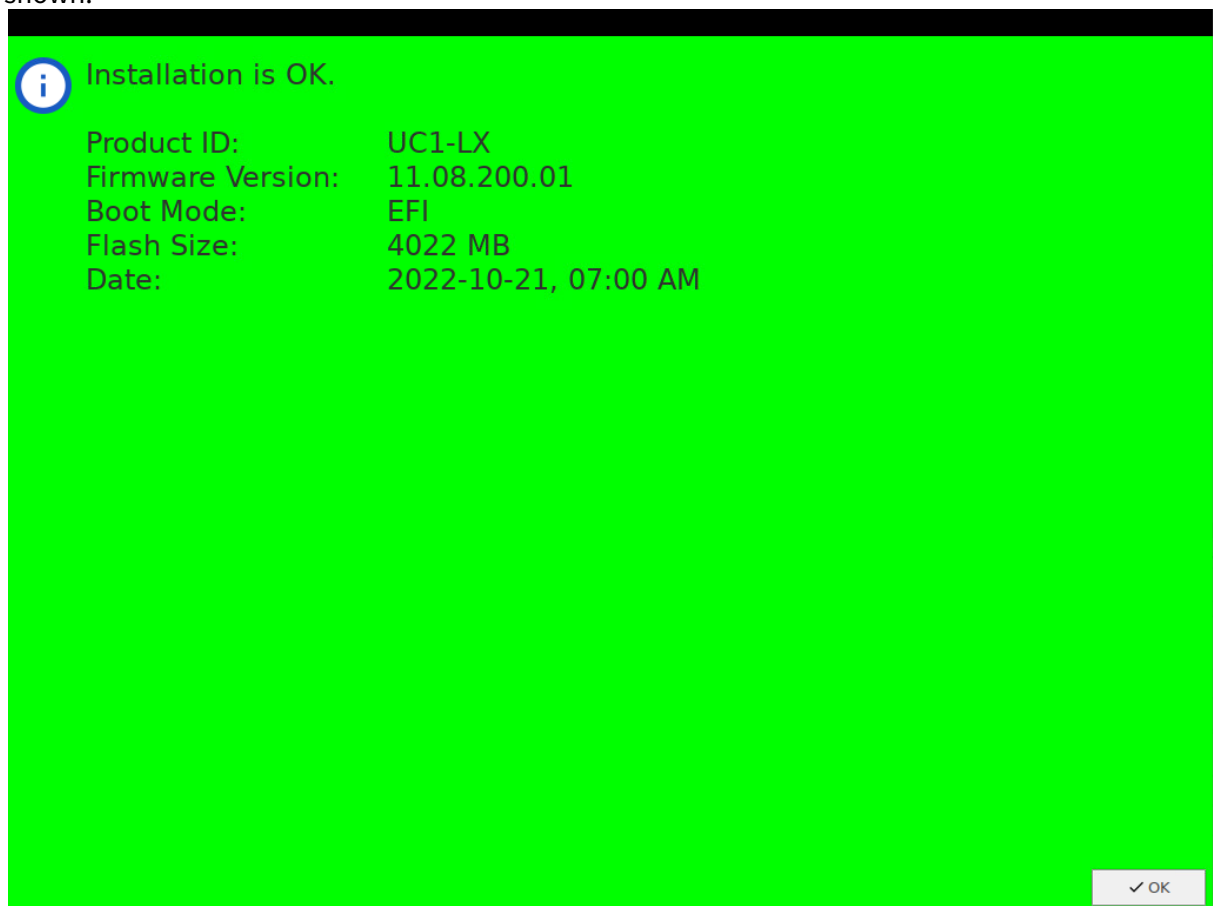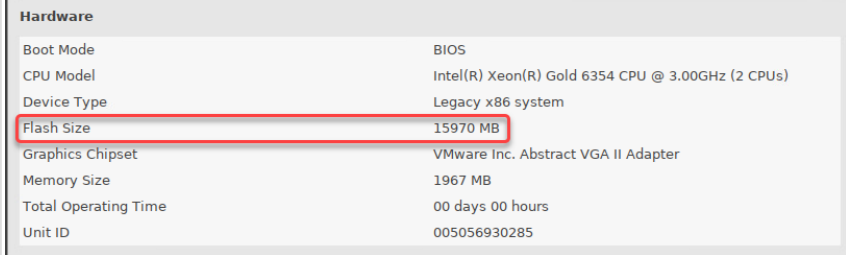
2. Get the file `check.log` from the first VFAT partition of the storage medium and analyze it. The contents of the file are described below.

Example Content of check.log

```json
{
  "product": "34CN65",
  "serial": "601NTXXD009",
  "product_id": "UC3-LX No valid license",
  "version": "11.08.200.01",
  "bootmode": "UEFI Secure Boot",
  "flashsize": "14496 MB",
  "date": "2022-10-19, 07:29 AM",
  "status": "SUCCESS",
  "log": ""
}
```

Explanation of the JSON Fields

Field	Explanation
product	Product id from DMI
serial	Serial number from DMI
product_id	The IGEL product ID which also shown in the **About** window:
version	The version of the IGEL firmware
bootmode	The boot mode: `Legacy`, `UEFI`, or `UEFI Secure Boot`
flashsize	The size of the IGEL partition (not the complete available disk space). This value is also shown in the **About** window:

Field	Explanation
`date`	Time and date of the check
`status`	`SUCCESS` if the check was successful
`log`	Empty if no error has occurred; otherwise, an error description is provided

IGEL OS Creator Articles

IGEL

Café Wireless (Wi-Fi)

When you use your mobile device frequently at different Wi-Fi hotspots, automatic Wi-Fi roaming may be useful. This is what IGEL Café Wireless does. The IGEL Café Wireless feature can be used, for instance, with IGEL UDC3. After you have configured your wireless networks, your mobile device is ready to roam.

For optimizing the network switchover, please see Configuring Wi-Fi Network Roaming.

If the network's SSID is hidden, see Connecting to a Wi-Fi Network with Hidden SSID.

See also the manual chapter "Wireless".

To configure a wireless network with the Wireless Manager:

1. Open **Network > LAN interfaces > Wireless** in the Setup.
2. Enable **Activate wireless interface**.
3. Activate **Enable Wireless Manager**.

4. Click the tray icon and select **Manage wireless networks**.
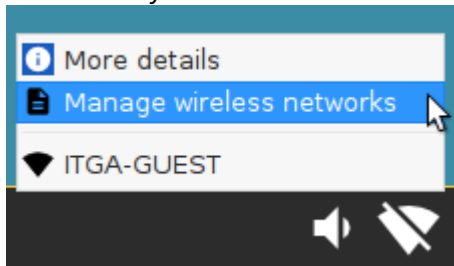
The **Wireless networks** dialog opens. After a few seconds, all wireless networks within reach are shown, sorted by signal strength. Previously configured connections are flagged with a tick in the **Configured** column. The connection currently active is flagged with a symbol under **Connected**.
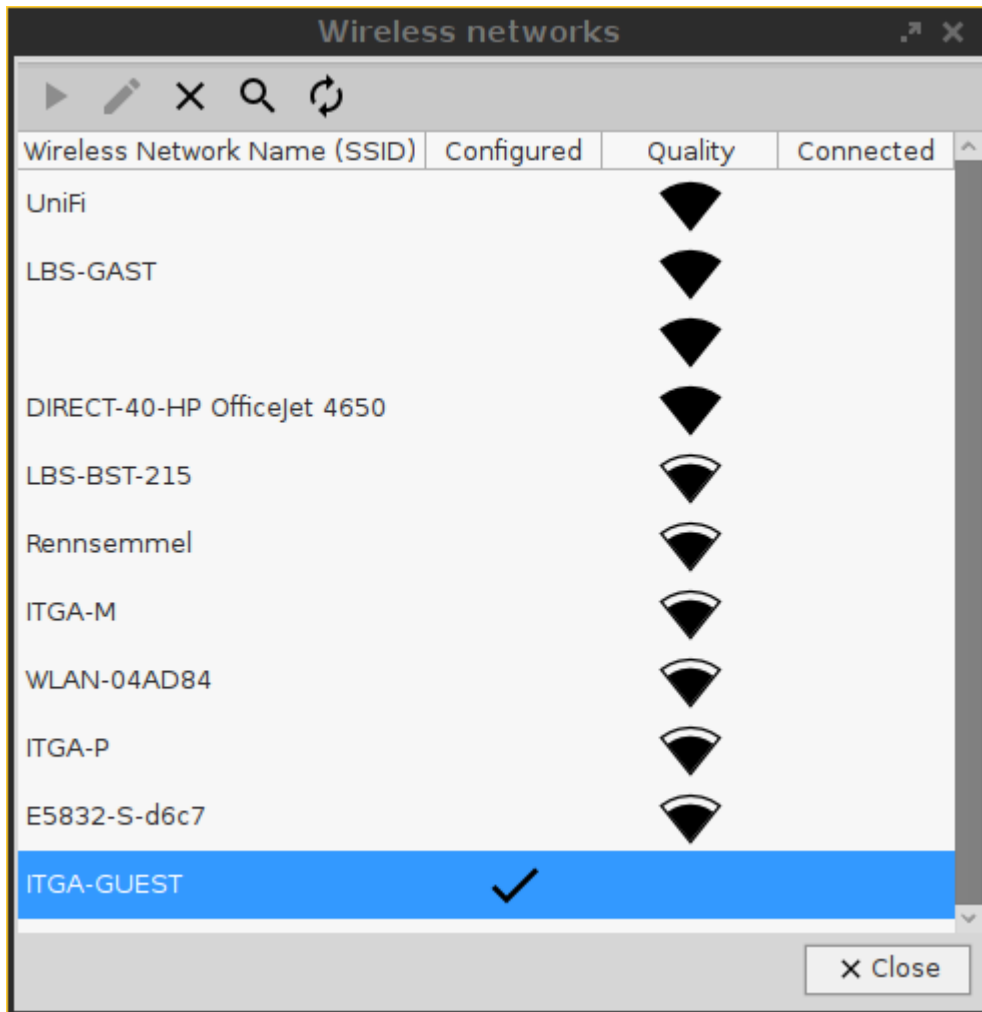
5. Double-click the network to be configured.
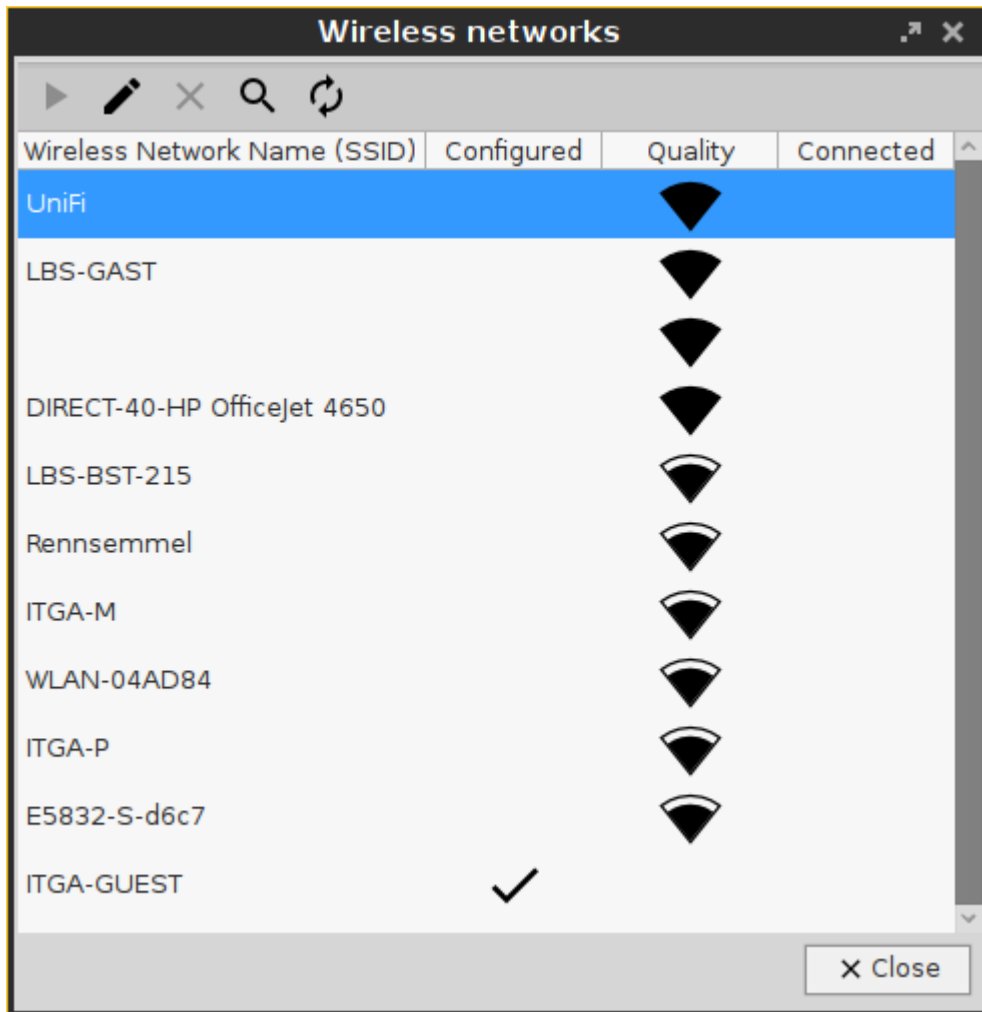
A dialog named with the name (SSID) of the desired network opens.
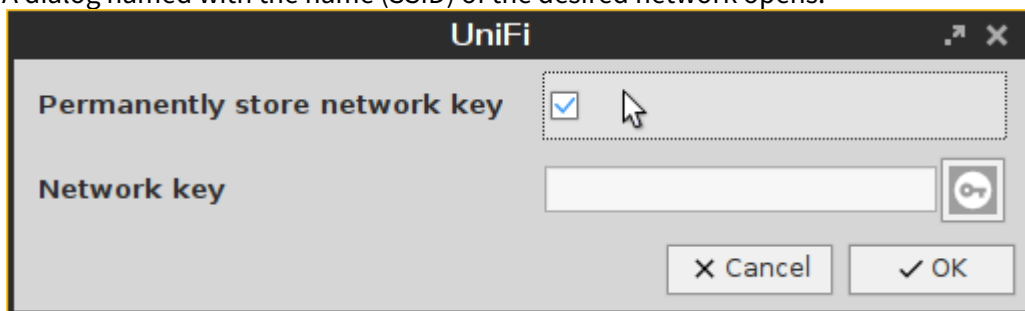
6. Activate **Permanently store network key** so that your mobile device remembers the network key.

7. Enter the **Network key**. To have the network key displayed while typing, click .
8. Click **OK**.
9. Repeat the steps described above for the remaining networks.

To connect to a configured network manually:

▶ Highlight the network and click on ▶ in the **Wireless networks** dialog.
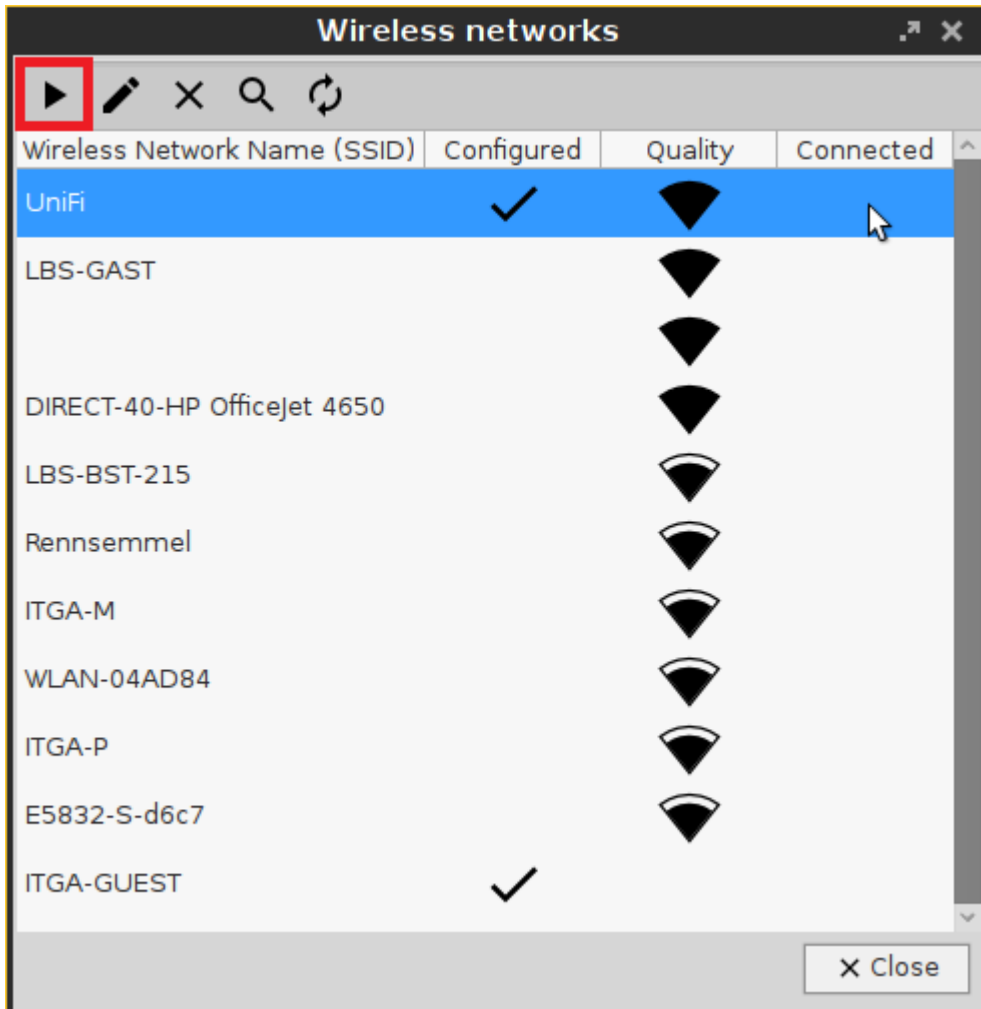
Your mobile device is connected to the wireless network. The icon shows the network's current signal strength.

IGEL

Reduce CPU Power Consumption

Reduce CPU Power Consumption

When you are using the *IGEL Universal Desktop Converter* (UDC2) on a mobile device in battery mode, you might want to reduce power consumption. One major power consumer is your CPU.

You can easily gain some control over the power consumption of your CPU using the tray icon ⌹ (**CPU Power Plan**) on your taskbar.

▶ If the tray icon is not displayed, open the IGEL Setup, go to **System > Power Options > System** and activate **Tray Icon**.

To change the CPU power settings:

1. Click on ⌹.
2. Select the appropriate option. **High Performance** gives you the highest performance, but also the highest CPU power consumption, **Power Saver** results in lowest performance and lowest CPU power consumption. The other options are in between.
   For further information about the power plan settings, see the chapter in the manual.

Installing UDC3 on Secunet SINA Workstation

To install IGEL Universal Desktop Converter 3 on a SINA workstation, proceed as follows:

1. Download the UDC3 zip file under IGEL Software Download[5] and unzip the file.
2. Copy the ISO image to an USB stick.
3. Start the SINA workstation
4. Click **Administration > Volumes** in the navigation bar.
5. Click **+ Add item** at the bottom of the screen to add a new item.
6. Enter a distinct name for the volume in the **Name** field top right.
   The target drive is already specified.
7. Click **New CFS** under **Select volume type**.
   The form expands.
8. Choose the preconfigured **Security domain**, **Cipher algorithm** and **Hash algorithm**.
9. Click **Define Guest system** under **CFS content**.
   The form expands.
10. Enter a distinct name for the system under **Guest system name**.
11. Choose **2 GiB** as minimum for the **Guest system size**.
12. Select **Disabled** under **Quarantine**.
13. Click **Create**.

The system will now create the volume. This may take a while - depending on the size of the guest system.

1. Go to **Administration > Volumes** and click the new volume.
   Next to it a little form opens.
2. Open **Guest systems**.
   You will see the volume you've created.
3. Click **Local** under **Add guest system from...** to add the ISO image to this volume.
   The form expands.
4. Plug the USB Stick with the ISO image into the workstation.
5. Choose the stick as **Device** and the ISO image as **Guest system image**.
6. Click **Add** at the bottom of the form.

The system now adds the ISO image to your new volume. This will take a while.

1. Switch to the **Workplaces** menu.
2. Click **+ Add item** at the bottom of the screen.
3. Enter a distinct name for the workplace in the **Name** field top right.
4. Choose the **Guest system** you've created. It has a small hard disk icon.
5. Choose the ISO image under **Secondary guest system**. It should have a small CD icon.
6. Select **Secured networking** under **Network mode**.
7. Choose your prefered settings under **Display layout**, **Workplace hotkey** and **Audio mode**.
8. Select **CD/DVD** under **Boot order**.
9. Select **Automatic reservation** under **IP to claim** and **MAC to claim**.
10. Select **Ubuntu** as **OS type**.
11. It is not necessary to activate the **Detailed settings**.

---

5 https://www.igel.com/software-downloads/

12. Click **Create**.

The system now creates the workplace.

1. Klick on the new workplace.
   Next to it a little form opens.
2. Click **Launch** to start the workplace.
   The IGEL Universal Desktop Converter starts.
3. After a few second you will see this screen:

4. Keep the first selected item **Boot IGEL UD Converter**.
   The conversion process starts.
   Next you will see the blue IGEL Linux background.
   A little popup appears.
5. Choose your desired **language**.
6. Agree the **license agreement**.
7. Install the IGEL Linux OS to the workspace.

> (i) Be aware, that all data of the volume will be deleted. That's why you should always create a new volume for the IGEL Linux OS.

Setting up IGEL OS on Mobile Devices

IGEL

Multi Monitor Environment

If you use your notebook in an office workstation, you can use a multi monitor environment.

To configure the display for multiple screens, use the **Display Switch**.

Respective Tray Icon:

Tray Icon Name	Icon	Where to configure
Display Switch		Menu path: **Setup > Accessories > Display Switch**

Activating the Display Switch:

1. Enable the **Display Switch** in the **IGEL Setup** under **Accessories > Display Switch**.
2. Select **Quick Start Panel** as a starting method.
   The **Display Switch** icon is shown in the quick start panel.
3. Click the icon to open the display configuration dialogue.
4. Switch between simple and advanced settings.

> ⓘ For a detailed description, see the manual, chapter Display Switch.
> Here you can find additional instructions concerning monitor settings:
> • How-To Dual Screen
> • Manual topic RDP Global > Window

Presentation Mode

You are using your mobile device for a presentation. You neither want the monitor to enter power saving mode nor to start the screensaver during the presentation.

For this situation, use the **Presentation Mode** which disables the DPMS and the screen saver.

Respective Tray Icon:

Tray Icon Name	Icon	Where to configure
Notebook BAT		Menu path: **Setup > System > Power Options > Battery**

Activating the **Presentation Mode**:

1. Right-click the battery symbol in the system tray.
   The context menu opens:
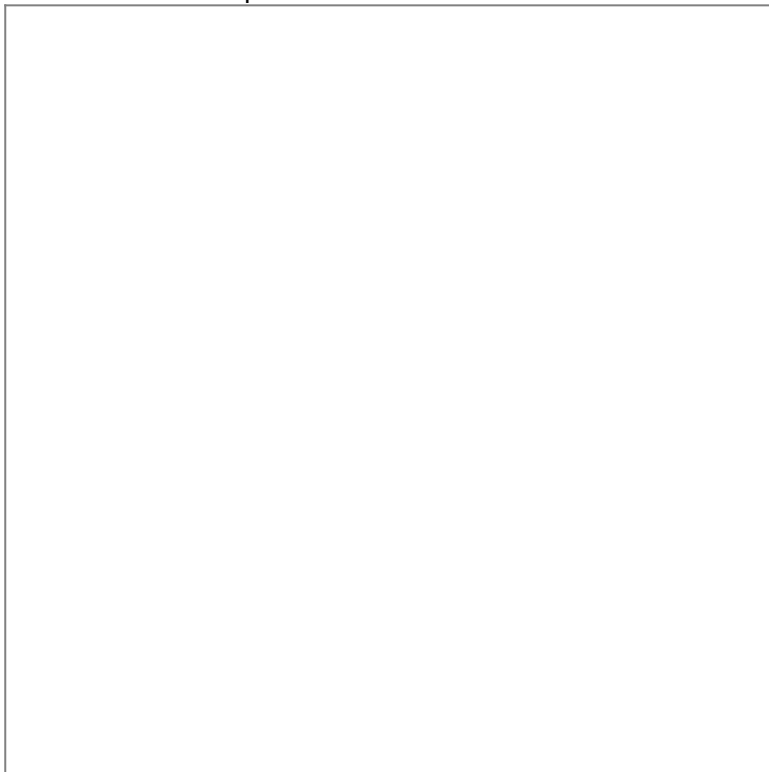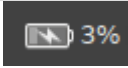
2. Click **Presentation Mode** to enable/disable it.

Display Brightness

In order to preserve the battery you want to reduce the display brightness.

Respective Tray Icon:

Tray Icon Name	Icon	Where to configure
Notebook BAT	3%	Menu path: **Setup > System > Power Options > Battery**

1. Right-click the battery symbol in the system tray.
   The context menu opens.

2. Click the slider of the brightness display to reduce the **Display Brightness**.

IGEL
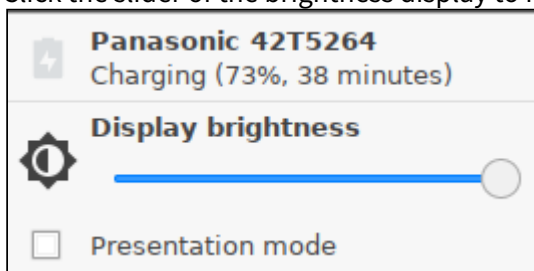
Power Management

You are using your mobile device in battery mode and need to reduce power consumption to preserve the battery.

To save power, set CPU power options to scale the CPU frequency down.

Respective Tray Icon:

Tray Icon Name	Icon	Where to configure
CPU Power Plan		Menu path: **Setup > System > Power Options > System**

Setting CPU power options:

1. Click the CPU Power Plan icon in the system tray.
   The context menu opens.
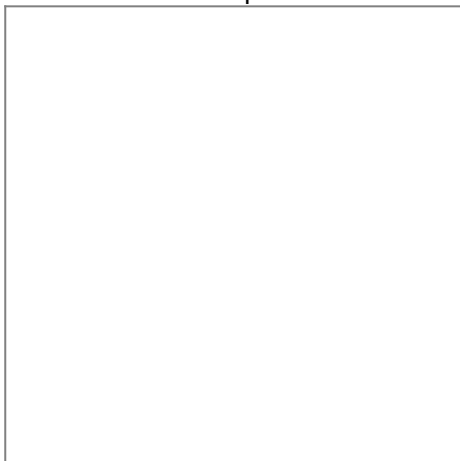
2. Select the appropriate mode.

> ⓘ Here you can find additional instructions concerning the power management:
> - Define the **CPU Power Plan, Critical Battery Level**, **Standby Time** or **Suspend Time, Brightness reduction**, and **Shut-down Options**. See the manual, chapter System > Power Option > System.

Wireless Manager (Café Wireless)

If you are traveling with your notebook, you need to handle different WiFi connections.

You can use **Café wireless** to configure different wireless network connections.

Respective Tray Icon:

Tray Icon Name	Icon	Where to configure
Wireless Network Connection		Menu path: **Setup > Network > LAN Interfaces > Wireless**

Defining **Café wireless**:

1. Enable the **Wireless Manager** under **Network > LAN Interface > Wireless**.
   Set all options:
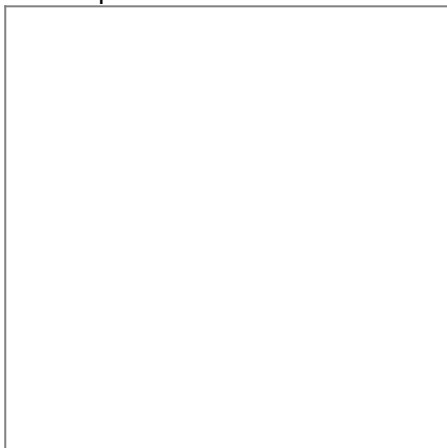
2. Click the WiFi tray icon in the right corner of the panel.
3. Open the **Wireless Manager** dialog.

> ⓘ You can find the complete instruction in the manual, chapter Wireless Manager.

Shortening Network Timeouts in Mobile Scenarios

When on the road with their UDC2 mobile device, users often experience slow system startup. This is due to the system waiting for network connections or the UMS which are not available in the mobile scenario. This document describes how to minimize waiting by shortening various timeouts.

Don't Wait for Wired Network

When an Ethernet interface is configured but not physically connected, startup is delayed by default. The goal is to give the user an opportunity to plug in the network cable. If this is not desired, as of IGEL Linux version 5.10.100waiting can be turned off.

1. In Setup, go to **System > Registry.**
2. Go to the `network.interfaces.ethernet.device[number].nolink_nowait` regist
   ry key. Replace [number] with:
   - 0 for eth0, the first Ethernet interface
   - 1 for eth1, the second Ethernet interface
3. Enable **No waiting without physical link.** By default, this option is disabled.

Don't Contact UMS Unless Specific Network Devices Are Up

Startup is also delayed because the system tries to contact UMS by default, which may not be available in a mobile scenario. You can configure IGEL Linux version 5.10.100 to contact UMS only if one of the network devices in a whitelist is up.

1. In Setup, go to **System > Registry.**
2. Go to the `system.remotemanager.device_whitelist` registry key.
3. Put a space-separated device list into the **Network device whitelist** field. Only if at least one of these devices is up, the system will try to contact UMS. Device names:
   - First Ethernet adapter: `eth0`
   - Second Ethernet adapter: eth1
   - Wireless: wlan0
   - Mobile broadband: `ppp10`
   - OpenVPN: tun0

Don't Contact UMS Unless Specific Networks Are Available

You can configure IGEL Linux version 5.10.100 to contact UMS only if one of the networks in a whitelist is reachable.

1. In Setup, go to **System > Registry.**
2. Go to the `system.remotemanager.network_whitelist` registry key.
3. Enter a space-separated list of networks in CIDR notation into the **Network whitelist** input field, e.g. 172.30.0.0/16 192.168.100.0/24. If there are entries in this field, the system will only try to contact UMS if one of the device's current IP addresses happens to be in one of these ranges.

Shorten the UMS Timeout

When different environments cannot be distinguished by the previous two mechanisms, as of IGEL Linux version 5.10.100 the startup delay can be reduced by setting a shorter timeout for connections to the UMS.

1. In Setup, go to **System > Registry.**

2. Go to the `system.remotemanager.rmagent_timeout` registry key.

3. Enter an integer number of seconds into **IGEL Remote Management Timeout**. The default is 90.

Don't Wait for All Network Interfaces

You can configure IGEL Linux to wait only for one of the network interfaces to be up instead of all. This also means that error messages concerning Ethernet devices will only be displayed shortly.

1. In Setup, go to **System > Registry.**

2. Go to the `network.global.waitfor_interfaces` registry key.

3. Disable **Wait for interfaces to come up**. By default, this option is enabled.

Battery Level Control

Since Linux *version 10.03.100* it is possible to display the battery level of a mobile device via UMS. The frequency of the battery level reports sent by the device to the UMS can be adjusted: A report is triggered when the battery status has changed at a specified percentage compared to the previously reported status. The percentage is specified by the **Battery status update frequency** parameter.

Example use case: The IT administrator in a hospital has to take care of battery-powered medical devices. Using the new feature, he can easily keep track of all these devices via the UMS, without any need of physical access or mirroring VNC.

To adjust the report frequency:
1. In Setup, go to **System > Registry**.
2. Go to the `system.remotemanager.battery_report_frequency` registry key.
3. Select the **Battery status update frequency**:
    - Often
    - <u>Normal</u>
    - Rarely
    - Very Rarely
    - Never
4. Click **Apply** or **Ok**.

Rolling out Initial Settings with IGEL OSC

If you would like to roll out initial settings with your IGEL OS Creator (OSC) installation, you can do it through:

- modifying the OSC ISO file (see page 70)
  Use this method to store initial settings and licenses on the ISO.
- modifying the Master Image (see page 74)
  Use this method if you already have a master image at hand and you want to add initial settings, licenses, ca-certs to it, so that they get rolled out after the first boot.

Modification of an OSC ISO for Rolling out Settings

Overview

Overview of the process for initial settings and license rollout:

1. Extract your ISO.

2. Create initial-settings directory in the extracted ISO.

3. Copy or create a setup.ini with the settings you want to the initial-settings directory.

   > ⚠ Do not add passwords.

4. Copy or create a ca-certs directory with certificates to the initial-settings directory you want to add to the installed system.

5. Copy or create a wfs-template directory in the initial-settings directory with files and directories you want to add to the /wfs directory of the installed system.

6. If you have license files, simply copy them to the initial-settings. All *.lic files in the / directory of the first partition will get copied to the /license/dsa/licenses directory.

   > ⚠ The filesize of the licenses is limited to 1MiB.

7. Repack the ISO again.

> ⓘ • You can gzip, bzip2 or xz the setup.ini file; it will get extracted if no setup.ini is present (if setup.ini is also present the packed file will be ignored).
>   • You can gzip the license file also.

- The setup.ini and the *.lic files which are not packed will go through dos2unix to ensure a UNIX file format.

Detailed Description with Examples

> ℹ️ You will need xorriso to do the below which is not part of the IGEL OS so you will need to use a other Linux system to do this.

1. Extract ISO content.
   This can be done with `xorriso -osirrox on -indev <iso file> -extract <target dir> <target name>`. In the example we use: `/isofiles/osc11.05.100.iso` for `<iso file>`, and . as `<target dir>`, and `osc-data` as `<target name>` which leads to following command line:

   ```
   xorriso -osirrox on -indev /isofiles/osc11.05.100.iso -extract . osc-data
   xorriso 1.4.8 : RockRidge filesystem manipulator, libburnia project.

   Copying of file objects from ISO image to disk filesystem is: Enabled
   xorriso : NOTE : Loading ISO image tree from LBA 0
   xorriso : UPDATE : 414 nodes read in 1 seconds
   xorriso : NOTE : Detected El-Torito boot information which currently is set to
   be discarded
   Drive current: -indev '/isofiles/osc11.05.100.iso'
   Media current: stdio file, overwriteable
   Media status : is written , is appendable
   Boot record  : El Torito , MBR isohybrid cyl-align-off GPT
   Media summary: 1 session, 1458176 data blocks, 2848m data, 45.4g free
   Volume id    : 'IGEL_OSC_TO'
   xorriso : UPDATE : 356 files restored ( 777.9m) in 1 seconds , 588.9xD
   xorriso : UPDATE : 377 files restored (1641.6m) in 2 seconds , 653.9xD
   xorriso : UPDATE : 391 files restored (2578.4m) in 3 seconds , 709.2xD
   xorriso : UPDATE : 414 files restored (2846.4m) in 3 seconds = 653.2xD
   Extracted from ISO image: file ''='/tmp/osc-data'
   ```

   The complete ISO will get extracted to the osc-data directory.

2. Create initial-settings directory in the extracted ISO data.
   Above we extracted the data to `/tmp/osc-data`, so we need to create the directory in this directory:

   ```
   mkdir /tmp/osc-data/initial-settings
   ```

3. Copy your files and directories to the initial-settings directory.
   In our example we use `/tmp/osc-data/initial-settings` as target directory. If, for example, you have the following you want to add to the ISO:
   - a `setup.ini`,
   - a ca-certs file `SSL+VPN+CA.crt`,
   - license files `782DAFC836185589DD6212375DC33C22.lic`
     `D5F47E9338C3A46A0D0F785B9F6A6926.lic`
   - a Wallpaper `wallpaper.jpg`,
     you can do the following:

   ```
   mkdir -p /tmp/osc-data/initial-settings/ca-certs
   mkdir -p /tmp/osc-data/initial-settings/wfs-templates
   cp setup.ini /tmp/osc-data/initial-settings/
   cp 782DAFC836185589DD6212375DC33C22.lic
   D5F47E9338C3A46A0D0F785B9F6A6926.lic /tmp/osc-data/initial-settings/
   cp SSL+VPN+CA.crt /tmp/osc-data/initial-settings/ca-certs/
   cp wallpaper.jpg /tmp/osc-data/initial-settings/wfs-templates
   ```

   The licenses files will get copied to the license partition. The `setup.ini` and `wallpaper.jpg` will be copied to `/wfs/` and the contents of the `ca-certs` directory will be copied to `/wfs/ca-certs`.

4. Repack the ISO again.
   a. First, check if the original ISO was a legacy version or not.
      For this, execute `xorriso -indev <iso file> -find / -name boot 2>&1` and search for the line with `Boot record`. If there is a `GPT` in this line, the ISO is not a legacy ISO.
      Example:

   ```
   xorriso -indev /isofiles/osc11.05.100.iso -find / -name boot 2>&1 | grep
   -E "^Boot record.*GPT"
   Boot record  : El Torito , MBR isohybrid cyl-align-off GPT
   ```

   b. Repack the non-legacy ISO with xorriso and with these additional parameters:
      `xorriso -as mkisofs -rock -omit-version-number -disable-deep-relocation -volid IGEL_OSC_TO -b boot/isolinux/isolinux.bin -c boot/isolinux/boot.cat -no-emul-boot -boot-load-size 4 -boot-info-table -eltorito-alt-boot -e igel_efi.img -no-emul-boot -isohybrid-mbr "<extracted iso dir>/boot/isolinux/isohdpfx.bin"`

```
-isohybrid-gpt-basdat -o "<target iso file>" "<extracted iso
dir>".
```

Example:

```
xorriso -as mkisofs -rock -omit-version-number -disable-deep-relocation
-volid IGEL_OSC_TO -b boot/isolinux/isolinux.bin -c boot/isolinux/boot.cat
-no-emul-boot -boot-load-size 4 -boot-info-table -eltorito-alt-boot -e
igel_efi.img -no-emul-boot -isohybrid-mbr "/tmp/osc-data/boot/isolinux/
isohdpfx.bin" -isohybrid-gpt-basdat -o "osc11.05.100.iso" "/tmp/osc-data"
xorriso 1.4.8 : RockRidge filesystem manipulator, libburnia project.

Drive current: -outdev 'stdio:osc11.05.100.iso'
Media current: stdio file, overwriteable
Media status : is blank
Media summary: 0 sessions, 0 data blocks, 0 data, 43.7g free
Added to ISO image: directory '/'='/tmp/osc-data'
xorriso : UPDATE : 414 files added in 1 seconds
xorriso : UPDATE : 414 files added in 1 seconds
xorriso : NOTE : Copying to System Area: 432 bytes from file '/tmp/osc-
data/boot/isolinux/isohdpfx.bin'
xorriso : WARNING : Boot image load size exceeds 65535 blocks of 512
 bytes. Will record 0 in El Torito to extend ESP to end-of-medium.
libisofs: NOTE : Automatically adjusted MBR geometry to 1024/178/32
libisofs: NOTE : Aligned image size to cylinder size by 432 blocks
xorriso : UPDATE :  2.19% done
xorriso : UPDATE :  29.31% done
xorriso : UPDATE :  60.27% done, estimate finish Wed Feb 24 12:50:05 2021
xorriso : UPDATE :  91.42% done
ISO image produced: 1458176 sectors
Written to medium : 1458176 sectors at LBA 0
Writing to 'stdio:osc11.05.100.iso' completed successfully.
```

c. Repack the legacy ISO with xorriso and with these additional parameters:

```
xorriso -as mkisofs -rock -omit-version-number -disable-deep-
relocation -volid IGEL_OSC_TO -b boot/isolinux/isolinux.bin -c
boot/isolinux/boot.cat -no-emul-boot -boot-load-size 4 -boot-
info-table -no-emul-boot -isohybrid-mbr "<extracted iso dir>/
boot/isolinux/isohdpfx.bin" -isohybrid-gpt-basdat -o "<target
iso file>" "<extracted iso dir>".
```

Example:

```
xorriso -as mkisofs -rock -omit-version-number -disable-deep-relocation
-volid IGEL_OSC_TO -b boot/isolinux/isolinux.bin -c boot/isolinux/boot.cat
-no-emul-boot -boot-load-size 4 -boot-info-table -no-emul-boot -isohybrid-
```

```
mbr "/tmp/osc-data/boot/isolinux/isohdpfx.bin" -isohybrid-gpt-basdat -o
"osc11.05.100.iso" "/tmp/osc-data"
xorriso 1.4.8 : RockRidge filesystem manipulator, libburnia project.

Drive current: -outdev 'stdio:osc11.05.100.iso'
Media current: stdio file, overwriteable
Media status : is blank
Media summary: 0 sessions, 0 data blocks, 0 data, 43.7g free
Added to ISO image: directory '/'='/tmp/osc-data'
xorriso : UPDATE : 414 files added in 1 seconds
xorriso : UPDATE : 414 files added in 1 seconds
xorriso : NOTE : Copying to System Area: 432 bytes from file '/tmp/osc-
data/boot/isolinux/isohdpfx.bin'
libisofs: NOTE : Automatically adjusted MBR geometry to 1024/178/32
libisofs: NOTE : Aligned image size to cylinder size by 432 blocks
xorriso : UPDATE :   2.19% done
xorriso : UPDATE :  29.31% done
xorriso : UPDATE :  60.27% done, estimate finish Wed Feb 24 12:50:05 2021
xorriso : UPDATE :  91.42% done
ISO image produced: 1458176 sectors
Written to medium : 1458176 sectors at LBA 0
Writing to 'stdio:osc11.05.100.iso' completed successfully.
```

Modification of a Master Image for Rolling out Settings after First Boot

Overview

1. Check if the first partition is a VFAT marked partition and make sure that there are 4 partitions present.

   > ⚠ Only the Master Images with 4 partitions support the rollout of initial settings.

2. Format the first partition with VFAT.

3. Mount the first partition.

4. Copy or create a setup.ini with the settings you want to the mounted partition.

   > ⚠ Do not add passwords.

5. Copy or create a ca-certs directory with certificates to the mounted partition you want to add to the master image.

6. Copy or create a `wfs-template` directory on the mounted partition with files and directories you want to add to the `/wfs` directory of the installed system.

> ⓘ Only possible with OS version 11.05.100 and newer.

7. If you have license files, copy them to the first partition. All `* .lic` files in the / directory of the first partition will get copied to the `/license/dsa/licenses` directory.

> ⚠ The filesize of the licenses is limited to 1MiB.

8. Umount the first partition.

> ⓘ
> - You can gzip, bzip2 or xz the setup.ini file; it will get extracted if no setup.ini is present (if setup.ini is also present the packed file will be ignored).
> - You can gzip the license file also
> - The `setup.ini` and the `*.lic` files which are not packed will go through dos2unix to ensure a UNIX file format

Detailed Description with Examples

> ✅ The easiest way is to write the master image to a device and do the changes on the device directly. Keep in mind if you boot once from the device this will not be a master image anymore.

> ❗ Be very careful with choosing the correct `<device>` in the example steps below as this can harm your running system.

1. Check if the device contains 4 partitions and the first is usable for initial settings rollout. For example, use `fdisk -l <device>` to check the partitions from an IGEL system. If `<device>` is replaced with `/dev/sda` then the output should look like the below, which means, there are 4 partitions present and the first one is a FAT32 so this Master Image is capable of rolling out initial settings.

```
fdisk -l /dev/sda
Disk /dev/sda: 4 GiB, 4294967296 bytes, 8388608 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disklabel type: dos
Disk identifier: 0x144ad2c2
```

```
Device     Boot  Start      End Sectors Size Id Type
/dev/sda1         2048   22527   20480  10M  b W95 FAT32
/dev/sda2  *     22528   83967   61440  30M ef EFI (FAT-12/16/32)
/dev/sda3        83968  145407   61440  30M ef EFI (FAT-12/16/32)
/dev/sda4       145408 8382463 8237056   4G 83 Linux
```

2. Try to mount the first partition.

    For example, with `mount <device>1 <target dir>` from an IGEL system. If `<device>` is replaced with `/dev/sda` and `<target dir>` with `/mnt` (you must create the empty directory with `mkdir -p /mnt` first) then there should be no error message.

    If there is an error message like below, then the first partition is not formatted or it is not the correct one.

    ```
    mount /dev/sda1 /mnt
    mount: /mnt: wrong fs type, bad option, bad superblock on /dev/sda1, missing
    codepage or helper program, or other error.
    ```

    In case of an error message:
    a. Check the fdisk output again.

    b. If the mount failed but fdisk output shows 4 partitions and the first is marked as FAT32, format the first partition as VFAT with `mkfs.vfat <device>1` from an IGEL system. If `<device>` is replaced with `/dev/sda` this should look like:

        ```
        mkfs.vfat /dev/sda1
        mkfs.fat 4.1 (2017-01-24)
        ```

    c. If there are no error messages the partition should now be mountable, so call `mount <device>1 <target dir>` again. If `<device>` is replaced with `/dev/sda` and `<target dir>` with `/mnt` you should get no error or warning message at all:

        ```
        mount /dev/sda1 /mnt
        ```

3. Copy your files and directories to the <target> directory.

    In this case `<target>` will be replaced with `/mnt`.

    If, for example, you have the following you want to add to the master image:
    *   a `setup.ini`,
    *   a ca-certs file `SSL+VPN+CA.crt`,

- license files `782DAFC836185589DD6212375DC33C22.lic`
  `D5F47E9338C3A46A0D0F785B9F6A6926.lic` ,
- and a wallpaper `wallpaper.jpg,`
  you can do the following:

```
mkdir -p /mnt/ca-certs
mkdir -p /mnt/wfs-templates
cp setup.ini /mnt/
cp 782DAFC836185589DD6212375DC33C22.lic
D5F47E9338C3A46A0D0F785B9F6A6926.lic /mnt/
cp SSL+VPN+CA.crt /mnt/ca-certs/
cp wallpaper.jpg /mnt/wfs-templates
```

As a result, the licenses files will get copied to the license partition. The `setup.ini` and `wallpaper.jpg` will be copied to `/wfs/` and the contents of the `ca-certs` directory will be copied to `/wfs/ca-certs` .

4. Umount everything again with `umount <target dir>` .
    Example:

```
umount /mnt
```

There should be no error message after executing the command.