Client-Side Connector with Finster

Version 5.12

Manual

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Content

1 General

1.1 Goal of this manual

This manual explains the installation of the client-side connector (CSC) with the Finster client of FORCAM FORCE IIOT. The CSC is a prerequisite for the Detailed Order Scheduling (DOS) module; therefore, its execution is also briefly described (chapter 6).

ⓘ This manual assumes knowledge in the use of FORCAM FORCE IIOT.
If you do not have any knowledge of using FORCAM FORCE IIOT, take the time to familiarize yourself with the basics.

We recommend that you use our Academy.

The FORCAM Academy (https://forcam.com/academie/) provides the knowledge to effectively use the methods for digital transformation and the technologies for the Smart Factory.
Based on lean manufacturing and TPM methods, our institute team will guide you to initiate changes in the company and to use the technologies correctly.

⚠ Deviations from this manual can lead to errors.

1.2 Concept

There are some instances where FORCAM FORCE IIOT applications such as Shop Floor Terminal or the Workbench need access to physical, client-side resources. These could be barcode scanners, printers, external file systems, and so on.
In other instances, third-party programs must be called up, such as the Detailed Order Scheduling module.

However, there are some limitations of HTML-based applications. One example is that they cannot access the client computer and its resources for unavoidable technical reasons such as security. This makes it impossible to operate devices or call up an EXE without elaborate modifications.
The Client-Side Connector application was developed as a solution for this HTML limitation.

The CSC is installed on the client computer. This client application is responsible for accessing the appropriate resources on the client computer to perform the specified functions.

Example using the Shop Floor Terminal (SFT):

Accessing and operating the SFT is done via HTTP through the browser. The CSC also communicates with the browser via HTTP and is able to receive data from external devices of the client computer and send data back. The data can then be sent back to the SFT server via the application.

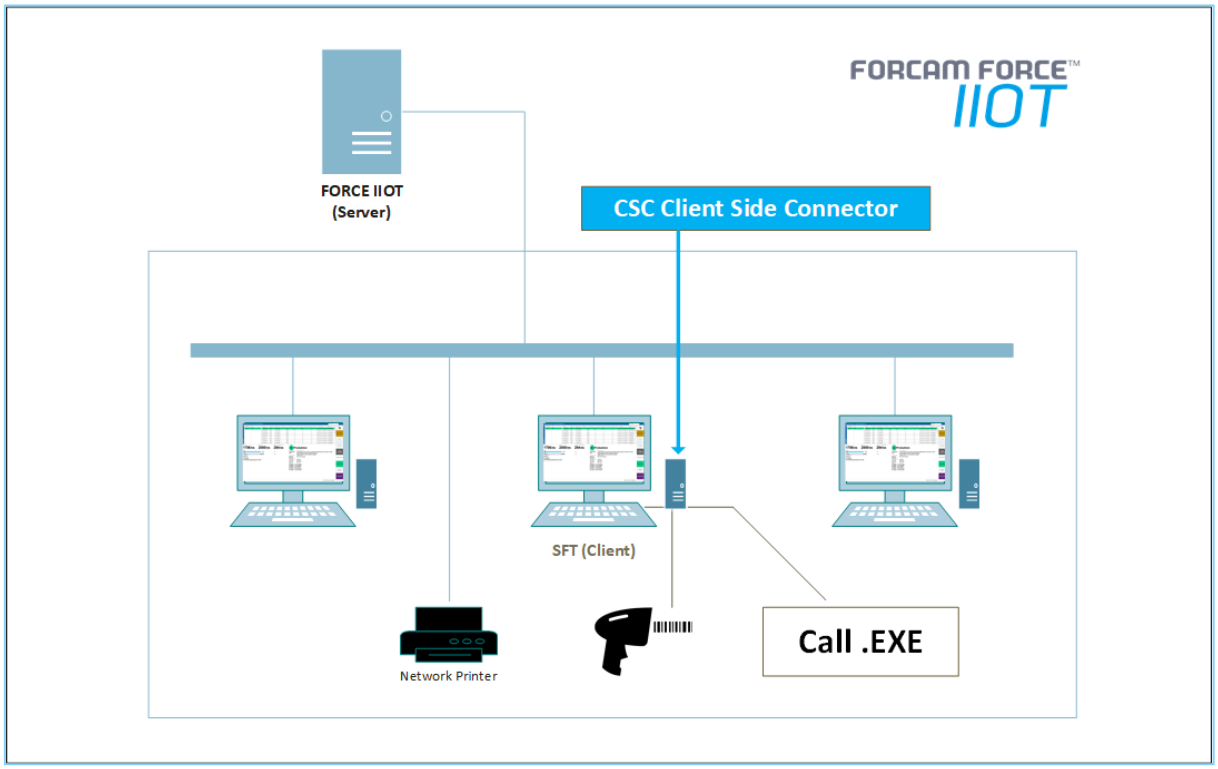

Fig. 1: CSC functionality with the Shop Floor Terminal

2 When is the CSC used?

2.1 Function overview

The CSC becomes necessary when any of the following scenarios or functions are required on the SFT:

Topic	Description	Example
Files	Access to the file system on the terminal: Upload files Download files Edit/delete files	
PDM (Production data management)	Organize documents Edit packages/elements in PDM. Common formats of documents (e. g. PDF) are displayed in the browser. Access to terminal file system.	**see** Fehler! Verweisquelle konnte n icht gefunden werden. Connecting devices - barcode scanner
Call external programs	Starting an additional application at the terminal, e. g. 3rd party/"exe".	**see** 6.2 Running an external program
DOS (Detailed Order Scheduling)	Launch the DOS application on the terminal	**see** 6.1 Start Detailed Order Scheduling
Print	Connect printer in network Printing on the terminal, e. g. labels	
Connection of devices	Connection of devices via the serial interface on the terminal: Scanner, e. g. chip card reader ⓘ Due to the numerous scanner types, different configurations are possible. Please contact FORCAM Technical Support for more information.	**see** 6.3 Connecting devices - barcode scanner
Additionally	Upload "Terminal ID" for client-side file for physical identification of a terminal. Uploading the "Client" configuration	

3 Update or new installation - Java version

3.1 Update for existing systems

Existing client computers with a CSC application and Java version 8 can continue to operate.

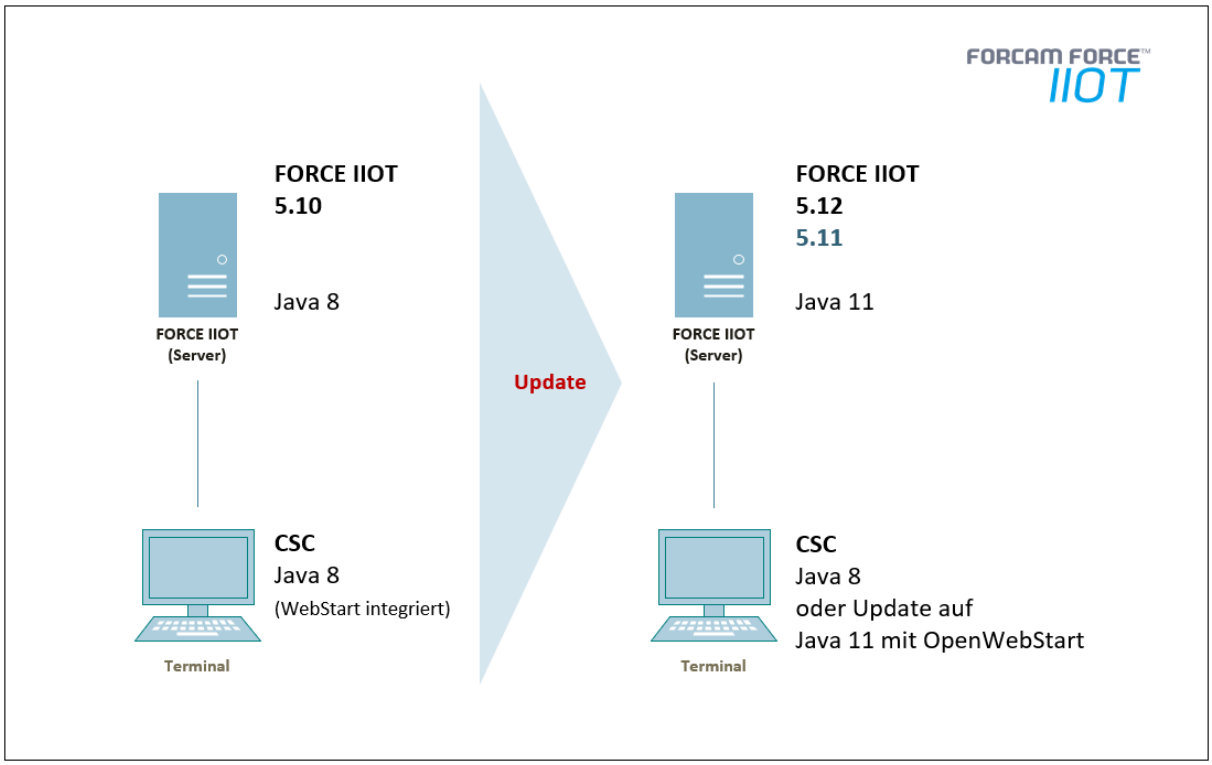

Fig. 2: CSC Update Scenario

3.2 New installation on client computers

For new installations, Java 11 with OpenWebStart should be used.
The following description refers to this configuration.

4 Installing Java

The CSC was developed as a standalone Java desktop application that can be downloaded and started on the client computer.
Before the CSC can be installed, Java must first be installed.

4.1 Java Version

The CSC requires either Java 11 from **Java SDK** Oracle or **Open JDK** from Sun.

ⓘ Oracle
There is no longer a JRE version available from Oracle for Java 11. The JDK version is used. For these versions Oracle has "Commercial Licenses".

ⓘ Sun Microsystems
OpenJDK is the free successor of the Java Development Kit from Sun Microsystems. AdoptOpenJDK provides a pre-built JDK/JRE for all standard platforms.

During initial installation of Java Development Kit, the JAVA_HOME variable is set.
For this purpose, it is possible to set or manually maintain this variable in the setup of the Development Kit (see Installation Guide for FORCAM FORCE from version 5.11).

Example:
JAVA_HOME= C:\Program Files\Eclipse Adoptium\jre-11.0.16.8-hotspot

4.2 JAVA certificate

Ongoing security improvement is taking place in Java environments. For the browser and Java web start applications, the security policies must be set. In the case of the CSC application, "jar signing" is performed by FORCAM GmbH. This means that in the case of an online connection (Internet), the certificate is checked and deemed to be valid.

If there is no online connection (Internet): The "public key" must be stored in the central company keystore. In this case, validation takes place via the company network (WAN).

Further information on warnings or safety instructions:
https://www.java.com/de/download/help/appsecuritydialogs.html

5 Installing and configuring the CSC

5.1 Installation with FINSTER

The CSC is installed via the Finster client, which ensures a secure and stable installation.
The Finster version must match the FORCAM FORCE IIOT version.

ⓘ The Finster client is only available in English.

⚠ Precondition: Java runtime environment is installed (see chapter "Installing Java").

Step 1
Start by double-clicking on "ForcamForce-Client-5.12-xxx-install.jar".

Step 2
Panel/Dialog
Please read the license agreement and accept the terms.

Step 3
Selection of the installation directory (default „C:\ForcamForce“)

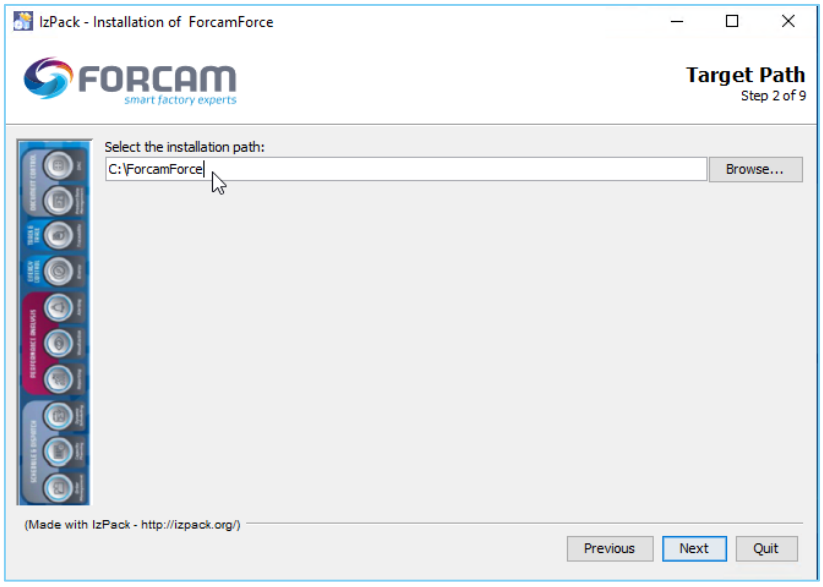

Fig. 3: Finster - Selection of the installation directory

Step 4

Selection of installation packages

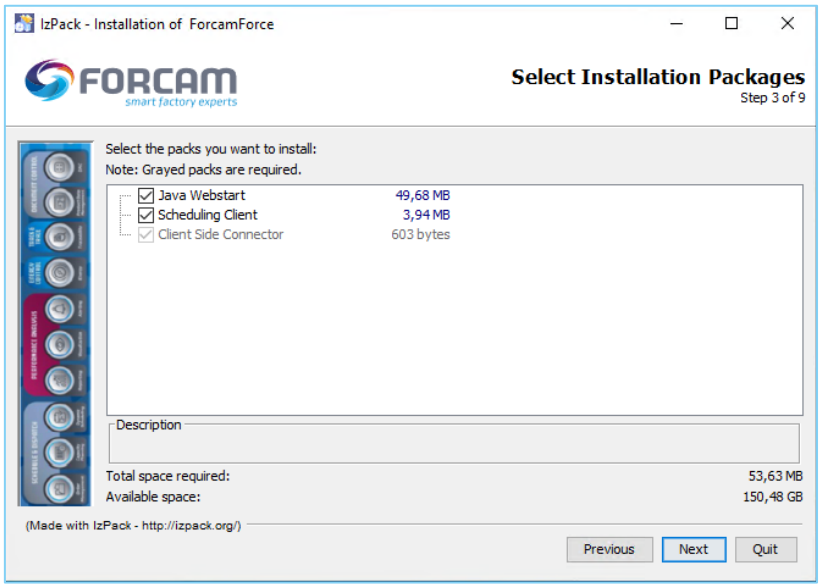

Fig. 4: Finster - Installation package selection

Step 5

Entering the server's name and selecting the connection type

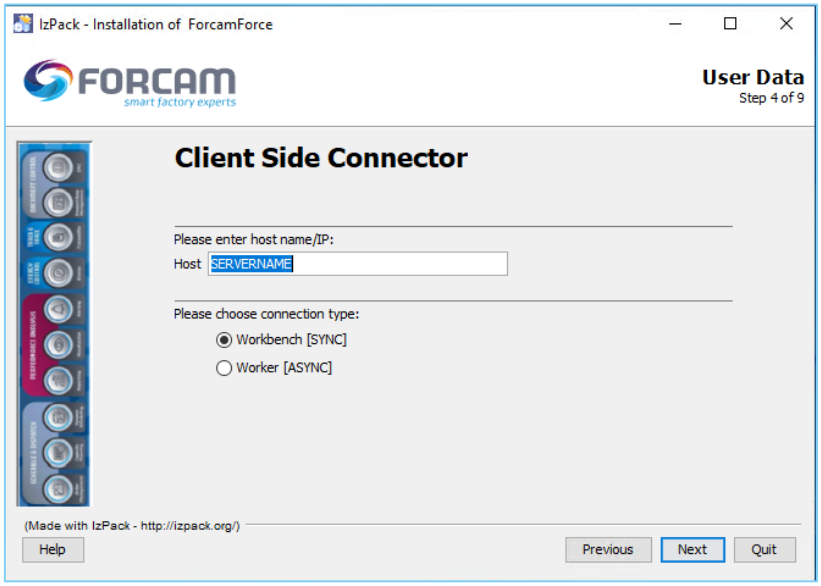

Fig. 5: Finster - Enter the server's name and select the connection type

Step 6

Results of the connection URL to the Force IIOT

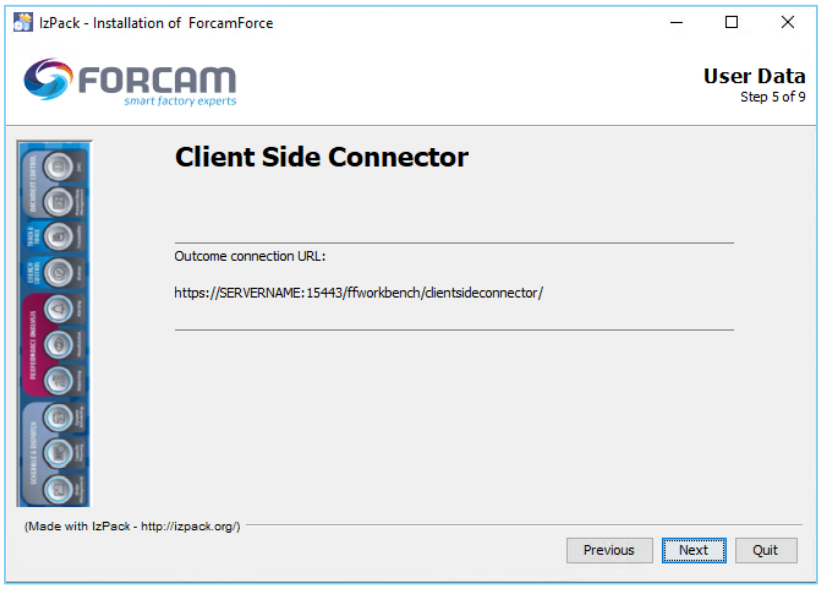

Fig. 6: Finster - Results of the connection URL to the Force IIOT

Step 7

Overview of the installation settings - Click on "Next" to continue.
Installation is performed - Progress overview appears.

Step 8

Installation was performed successfully.
(Optional:)
Click **Generate an automatic installation script** to save all the settings you made in a script.

Fig. 7: Finster - Installation was performed successfully

Step 9

Installing **OpenWebStart**

Double click on "OpenWebStart_windows-x64_1_6_0.exe" in the directory

C:\ForcamForce\sft\ tmp\OpenWebStart Installer

Dialog window appears. Perform the installation.

ⓘ Once the installation is complete, the CSC can be started. See also chapter "Starting the CSC on the terminal".

5.2 Installation directories

C:\ForcamForce\sft **- csc** **ClientSideConnector.jnlp**
- jws **OpenWebStart**
- sch **FLS**
- tmp **OpenWebStart Installer**

C:\Users\YourAccount\FORCAM_CSC
- logs
clientsideconnectorconfig.properties

C:\Users\YourAccount\.cache\icedtea-web
- … clientsideconnectorconfig.jar

If the CSC was installed as described in chapter 3, an XML file can be created in the last dialog:

ⓘ A "Generate an automatic installation script" was created and saved.

This file contains all parameters configured during the first installation, such as paths and ports. Additionally, selected or unselected options are stored here (e. g. selection of the components to be installed).

To install the CSC with the same configuration on a new machine, it is sufficient to run the Finster jar file from the command prompt, for example, and the XML file can be given as an argument. The CSC is then automatically installed without using Finster and the parameters are set according to those defined in the XML.

Example for a cmd-box:
C:\Downloads> ForcamForce-Client-5.xx-install.jar auto-install.xml.

The parameters can be edited directly in the „auto-install.xml”.

auto-install.xml

```
1  <?xml version="1.0" encoding="UTF-8" standalone="no"?>
2  <AutomatedInstallation langpack="eng">
3  <com.izforge.izpack.panels.licence.LicencePanel id="licence"/>
4  <com.izforge.izpack.panels.target.TargetPanel id="TargetPanel_1">
1  <installpath>C:\Users\MMustermann</installpath>
6  </com.izforge.izpack.panels.target.TargetPanel>
7  <com.izforge.izpack.panels.treepacks.TreePacksPanel id="TreePacksPanel_2">
8  <pack index="0" name="JWS" selected="true"/>
2  <pack index="1" name="SCH" selected="true"/>
10 <pack index="2" name="CSC" selected="true"/>
11 </com.izforge.izpack.panels.treepacks.TreePacksPanel>
12 <com.izforge.izpack.panels.userinput.UserInputPanel id="csc">
3  <entry key="SFT_PORT" value="15080"/>
14 <entry key="SFT_HOST" value="servername.domain.com"/>
15 </com.izforge.izpack.panels.userinput.UserInputPanel>
16 <com.izforge.izpack.panels.summary.SummaryPanel id="SummaryPanel_4"/>
17 <com.izforge.izpack.panels.install.InstallPanel id="InstallPanel_5"/>
18 <com.izforge.izpack.panels.process.ProcessPanel id="ProcessPanel_6"/>
19 <com.izforge.izpack.panels.finish.FinishPanel id="FinishPanel_7"/>
20 </AutomatedInstallation>
21
```

Fig. 8: Finster - Auto-install.xml

Configuration settings of auto-install.xml:

(Step 1) Installation path

(Step 2) Selected or unselected components

- JWS: Java Webstart
- SCH: Scheduling Client
- CSC: Client-side Connector

(Step 3) Server name and port

5.3 Deployment by Java Web Start

A Java Web Start application checks at each start whether a new version of the CSC is available on the server. Once a version of the CSC has been downloaded, it remains in the cache on the terminal's hard disk until the check detects that a new version is available and must be loaded. This means that the current version is always used on the client and is automatically provided centrally by the server to all terminals. This prevents unnecessary downloads and still ensures that the current program version of the CSC is always running.

More information:
https://de.wikipedia.org/wiki/Java_Web_Start
https://de.wikipedia.org/wiki/OpenWebStart
https://openwebstart.com

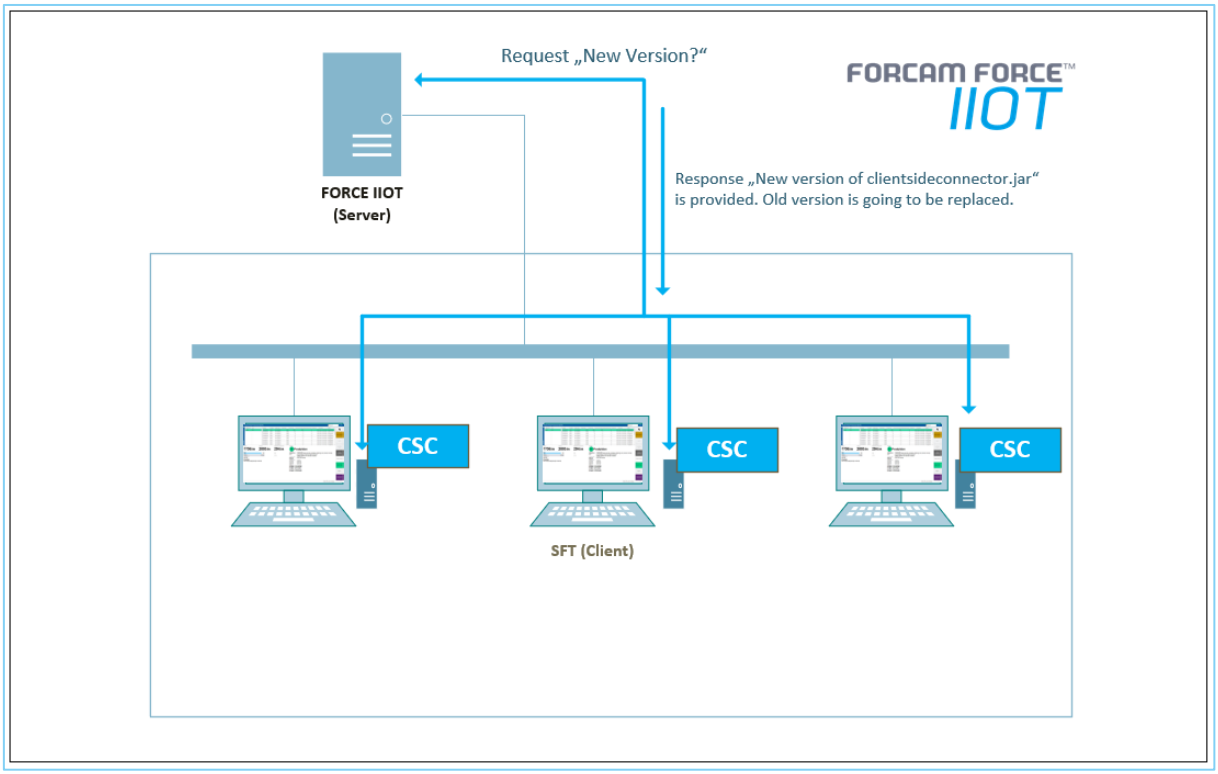

Fig. 9: CSC Java Web Launch

5.4 Secure connection with HTTPS (TLS)

The ClientSideConnector.jnlp file configures the connection to the Force server.

Example path:
C:\Forcam\ForcamForce\sft\ClientSideConnector.jnlp.

Example of a URL with HTTPS (TLS) and the connection to the SFT application (ffworker):
"https://servername.com:11443/ffworker/clientsideconnector/"

or for connection to the Workbench:
"https://servername.com:15443/ffworkbench/clientsideconnector/"

```
<?xml version="1.0" encoding="utf-8"?>

<jnlp spec="1.0+" codebase="https://fctestinfr.northeurope.cloudapp.azure.com:15443/ffworkbench/clientsideconnector/">
  <information>
    <title>Client Side Connector Web Start</title>
    <vendor>FORCAM</vendor>
    <description>Client Side Connector: Client application to access client resources used for FORCAM</description>
    <offline-allowed/>
  </information>

  <resources>
    <j2se version="1.8+" />
    <jar href="clientsideconnector.jar" />
  </resources>

  <application-desc main-class="com.forcam.na.clientsideconnector.ClientSideConnector" />

  <security>
    <all-permissions />
  </security>
</jnlp>
```

Fig. 10: ClientSideConnector.jnlp

5.5 CSC starts at the terminal

The CSC should initially be started manually after a new installation.
Double-clicking the ClientSideConnector.jnlp file opens the OpenWebstart application.

A green circle appears in the taskbar of the desktop  ; the CSC is active with it.

Is not loaded automatically after a restart of the CSC:
A link to the ClientSideConnector.jnlp file can be placed in the Windows auto start directory. This should start the CSC automatically when the terminal is booted.

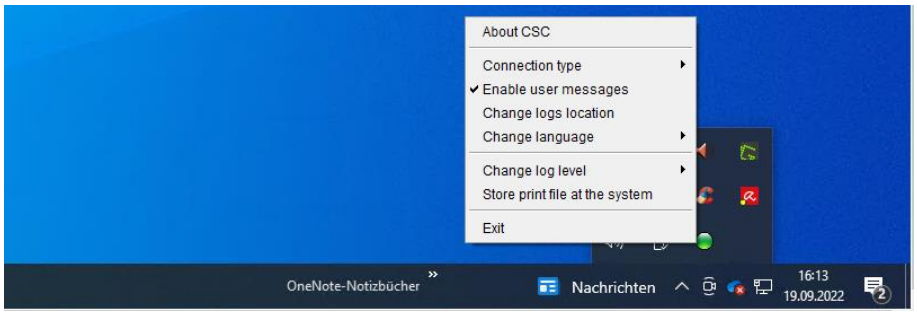

Fig. 11: CSC Active taskbar

ⓘ Recognize the "JNLP" application from the terminal.
If the "ClientSideConnector.jnlp" file is not recognized as a Webstart application, the file association must be configured via the system with the "javaws.exe".

- Example:
  C:\ForcamForce\sft\jws\javaws.exe

Further configurations to OpenWebStart via the control panel on the terminal:

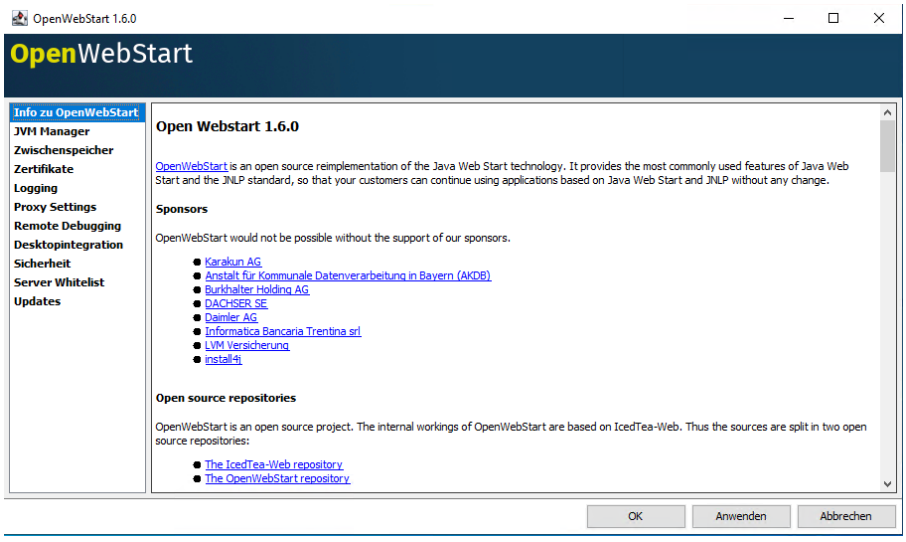

Fig. 12: OpenWebStart Configuration Control

ⓘ More information about Java Web Start (JWS): **https://openwebstart.com/**

5.6 SYNC or ASYNC connection type

The CSC is adapted to different browser types. The configuration is different for ffWorker and ffWorkbench. CSC configuration settings:

C:\Users\YOURACCOUNT\FORCAM_CSC\clientsideconnectorconfig.properties

Configuration uses the applications of the ffWorker (SFT terminals):

csc.connectionType=ASYNC → ffWorker

Configuration uses the applications of the ffWorkbench (FLS):

csc.connectionType=SYNC → ffWorkbench

The configuration can be changed via the file "clientsideconnectorconfig.properties" or at the menu of the application and subsequent restart.

Menu by right-clicking on the green dot:

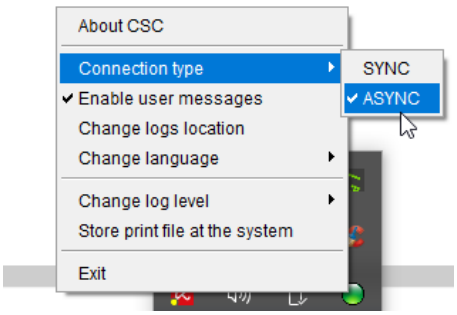

Fig. 13: Switching CSC connection type

5.7 Activate SSC - Profile for Terminal Template

If the CSC is used at the SFT with a terminal template, the corresponding assigned profile must be activated at "CSC required?

- Set "CSC required?" as "active" in the corresponding profile.

Workbench > Configurations >Shopfloor Terminal

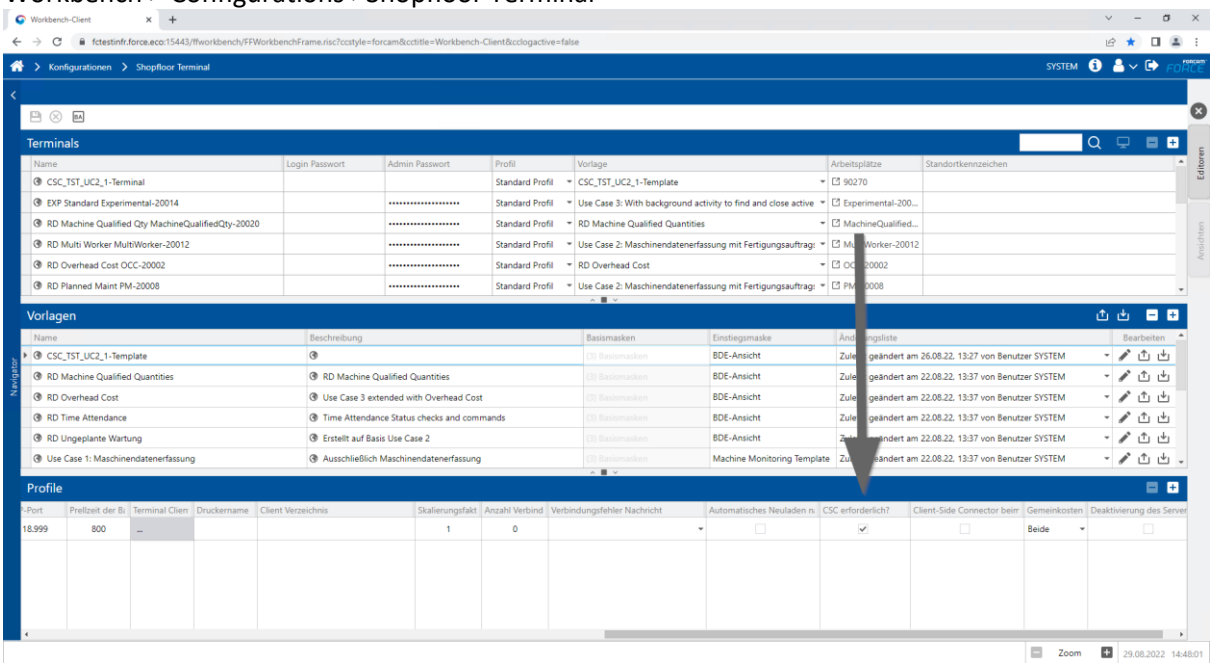

Fig. 14: Workbench profile - CSC required?

6 Example use cases

6.1 Start Detailed Order Scheduling

Application example:

- The CSC is used to start the production control station at the SFT.
- The settings are made in the Workbench.

Precondition:

- The CSC is active, and the "green dot" is displayed in the taskbar:
- CSC configuration type: csc.connectionType=ASYNC
- FORCE IIOT service "ffscheduling" is started and running.

The path to the script at the terminal is configured in the Workbench:
C:\ForcamForce\sft\sch\DetailedSchedulingStartClient.cmd

Workbench > Configurations> Workbench > Detailed Order Scheduling

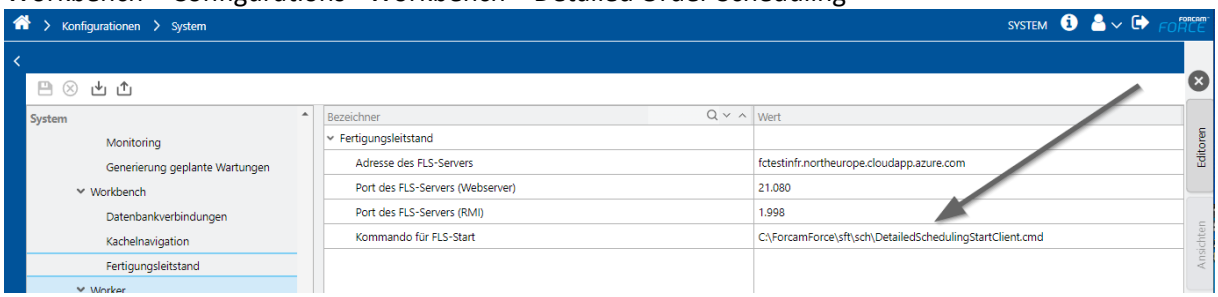

Fig. 15: Command for FLS start

Navigate to Production Control Station in the Workbench and click on "Start DOS".
After a few seconds the DOS will start in a new window.

Workbench > Detailed Order Scheduling

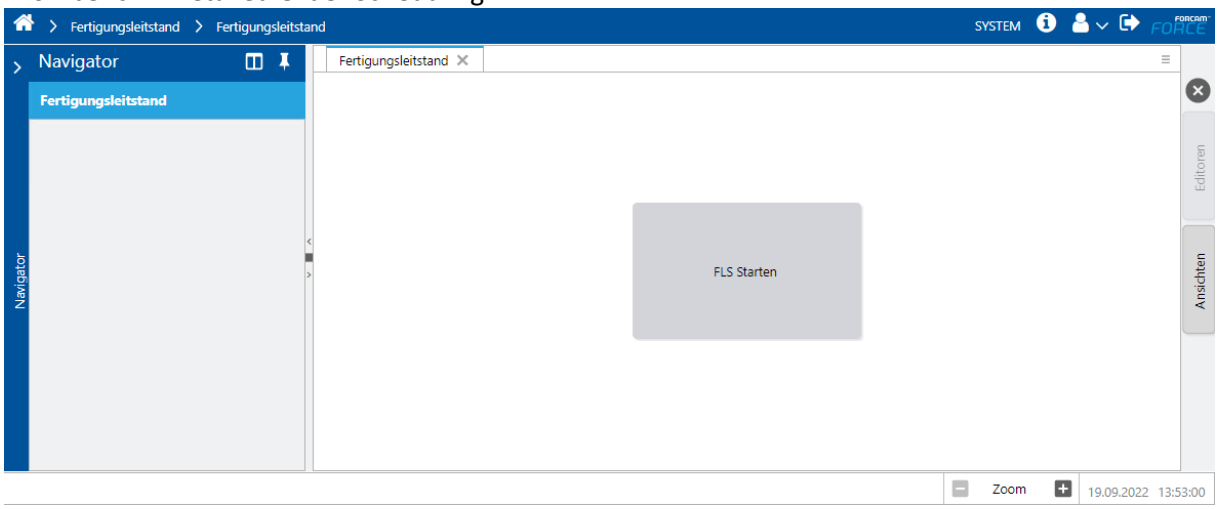

Fig. 16: Start DOS

In case of initial installation:
The configuration file ClientSideConnector.jnlp is downloaded after clicking the button "Start DOS" will be downloaded.

A new window appears:

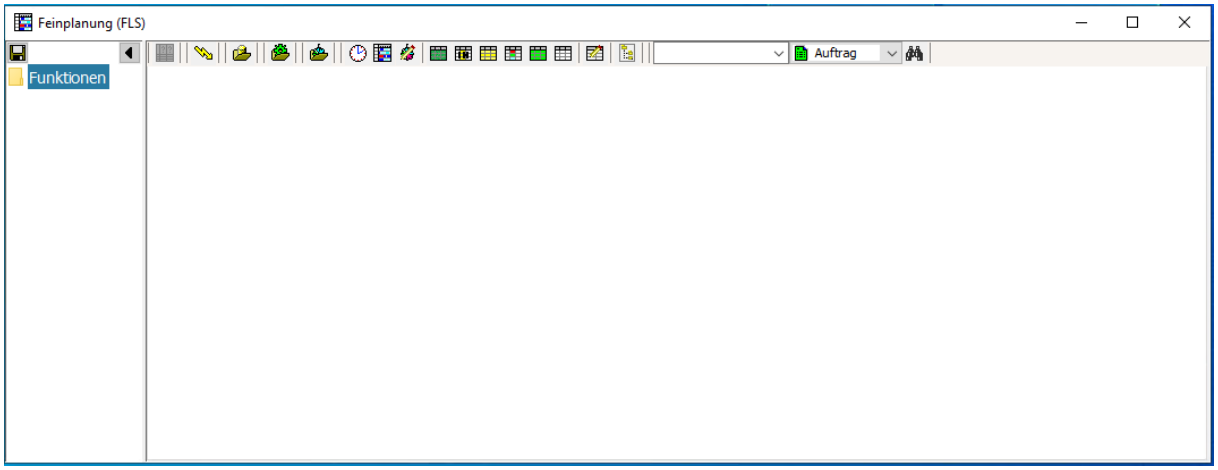

Fig. 17: Detailed planning (DOS)

6.2 Running an external program

The "External Program Plugin" is used to start at the operating system level via a command with arguments.
The command is executed on the terminal.
The "External Program Plugin" can send execution information (logging) to the server.

Application example:

- Clicking on the "Run external command" button calls a program "example.exe" on the SFT
  The program creates a folder **„tmp“ („C:\Testing\tmp“)**.
  In addition, a file "**created-by-csc.txt**" is created by the program and saved in the "tmp" folder.

Precondition:

- The CSC is active, and the "green dot" is displayed in the taskbar:
- Configuration "CSC required?" is marked as active in the assigned profile.
- CSC- Configuration type: csc.connectionType=ASYNC
- At the terminal is created:
  Directory "C:\Testing\tmp".
- Command script "start-example.cmd (calls executable file)
- Demo program "example.exe”

Terminal > Operating system (Windows 10)

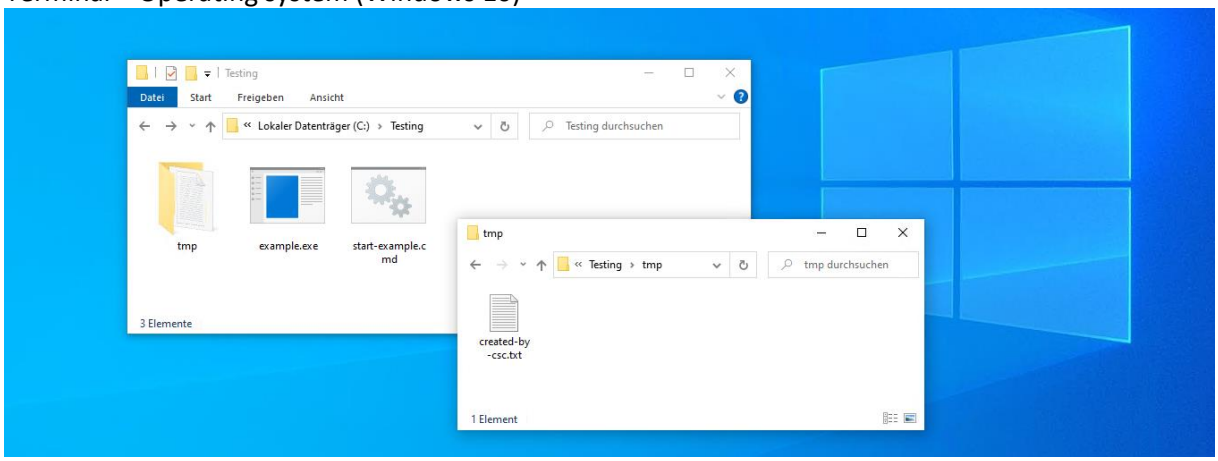

Fig. 18: SFT - Executable file

- Configure a template (in Workbench) that contains a base "Operation View" page.
- Edit the template by "Insert activity" (posting) in the button bar: "Start program".
  See the image below.

Workbench > Configurations > Shopfloor Terminal > Template Editor

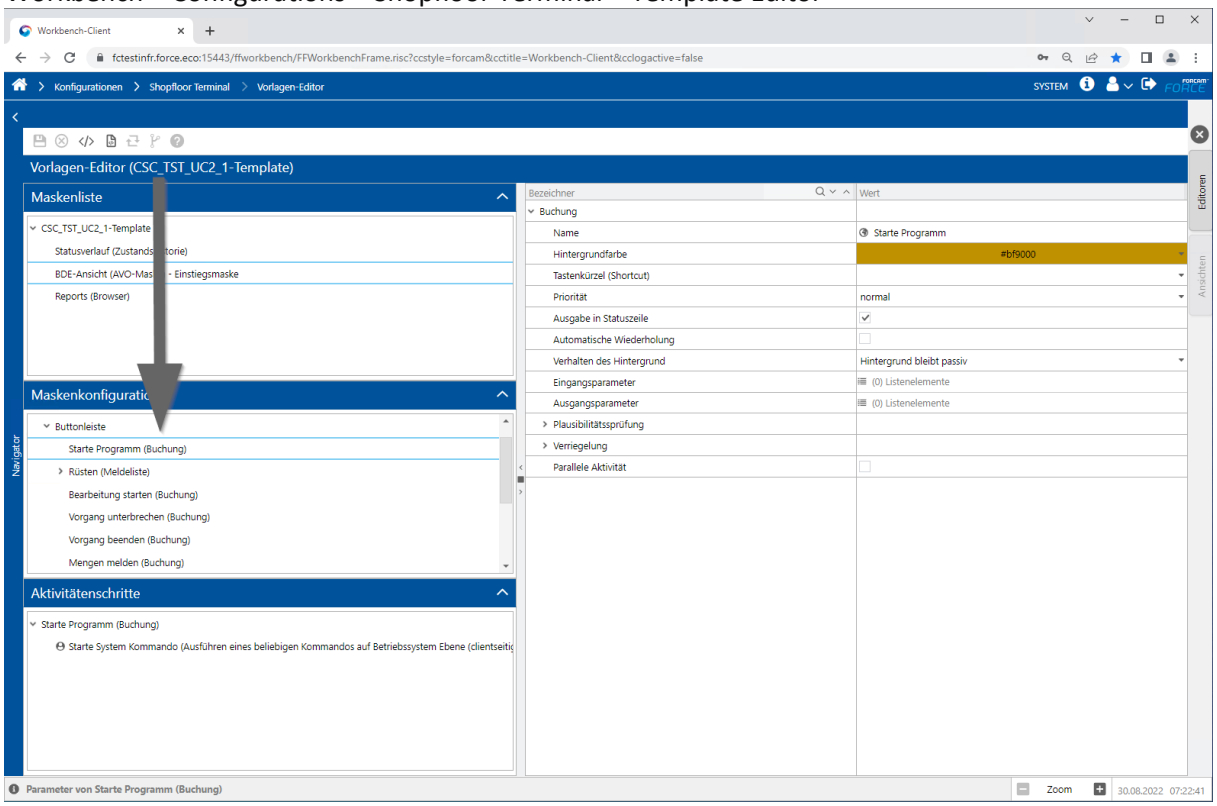

Fig. 19: Add "Execute external command" button

- Add activity step: "Start system command
  (execute any command on operating system level (client side))"
- Add sample activity Value at "Commands on operating system level".
  Value: "C:\Testing\start-example.cmd"

Workbench > Configurations > Shopfloor Terminal > Template Editor

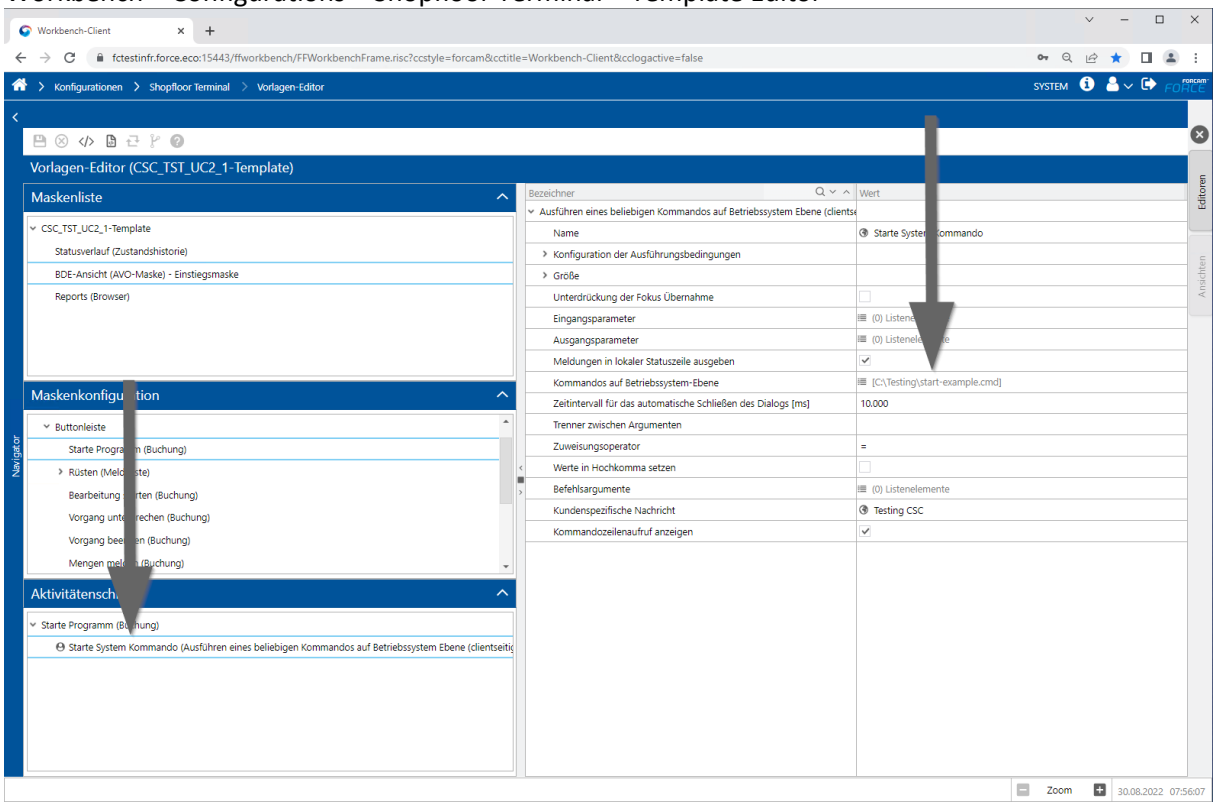

Fig. 20: Add activity step "Execute system command

- Logging on to the SFT and selecting the sample template
  Click on the "Start program" button

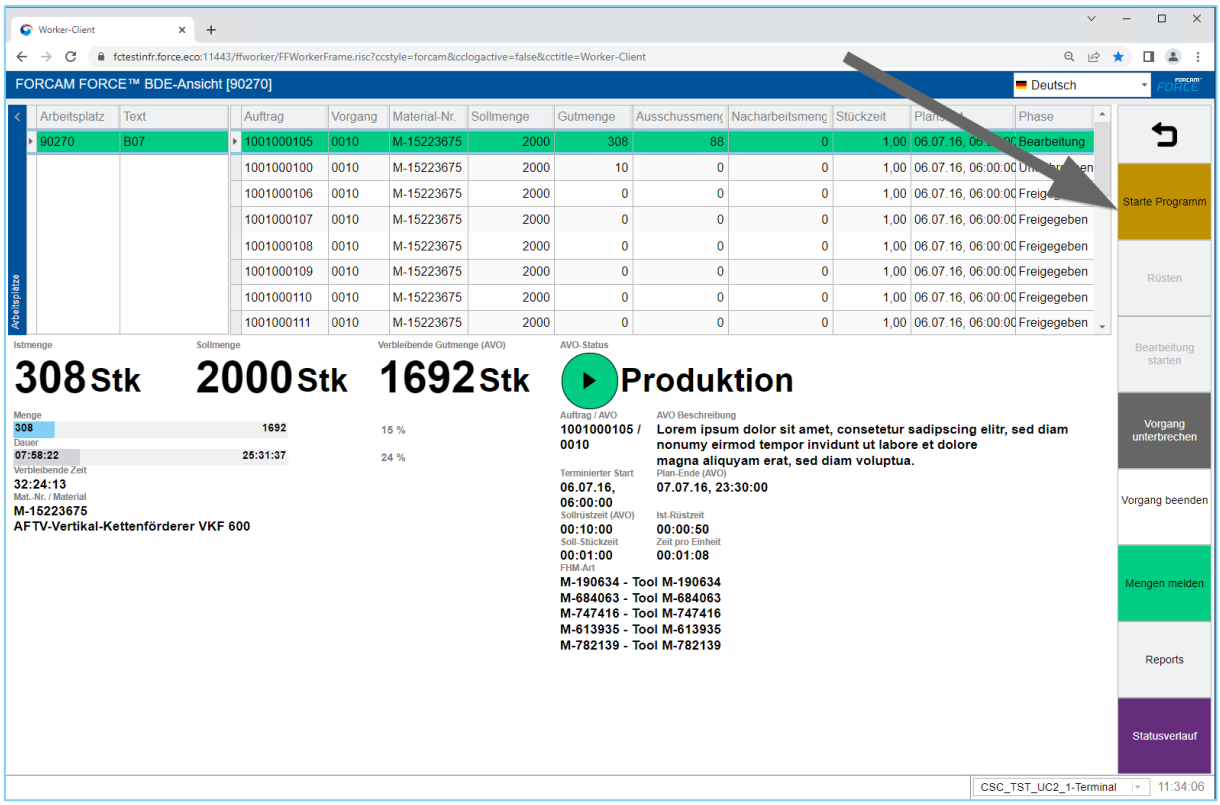

Fig. 21: SFT Start command button

The command is executed at the terminal. Further information can be found in the worker log file At the server or at the terminal log "clientsideconnector_current.log".
Example:
Shopfloor Terminal > Operating System (Windows 10) > C:\Users\"Your-Account"\FORCAM_CSC\logs

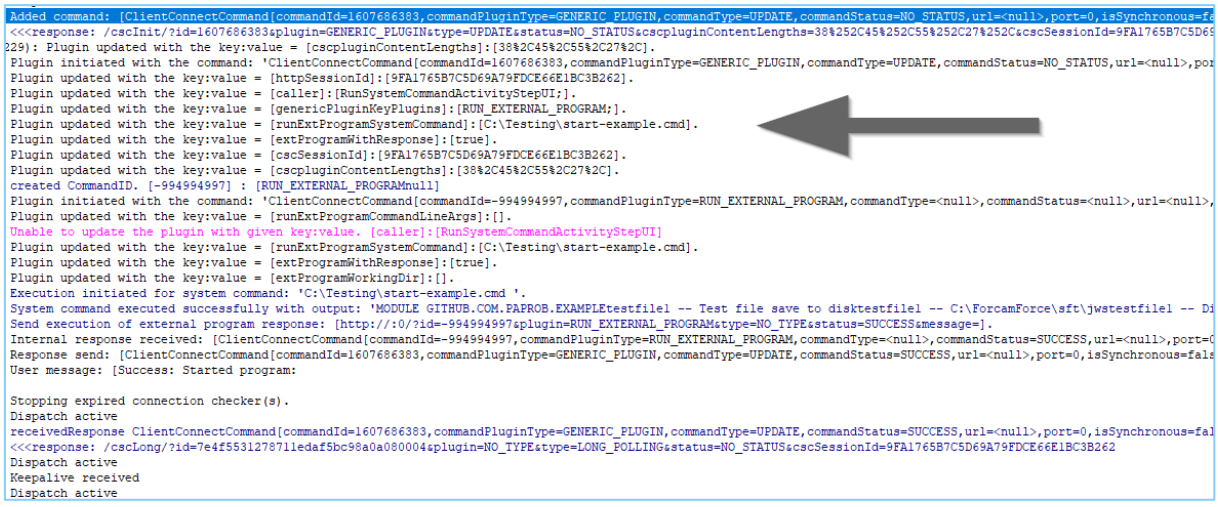

Fig. 22: CSC log file

Result:

- A directory "tmp" ("C:\Testing\tmp") is created at the terminal.
- A file "created-by-csc.txt" in the directory "tmp" has been created by the program.

6.3 Connecting devices - barcode scanner

Scan functionality with UDB or USB barcode scanner.

Application example:

- Barcode Scan by USB-Scanner
- The customer wants to search and select an operation at SFT in the operation table creation dialog by scanning a barcode.

Precondition:

- The CSC is active, and the "green dot" is displayed in the taskbar:
- Configuration "CSC required?" is active in the assigned profile.
- A barcode scanner is connected to the terminal via UDP or USB.

Configuration of a "single value" scan. Enable barcode scanning and set reference value for barcode search.

- ✓ Exact match of the barcode
- ✓ Reference for barcode scan: attribute (e. g. order number) that is compared with the barcode scan value.
- ✓ Check: Input parameter assignment "Input barcode"

Workbench > Configurations > Shopfloor Terminal > Template Editor – Edit „Operation View“

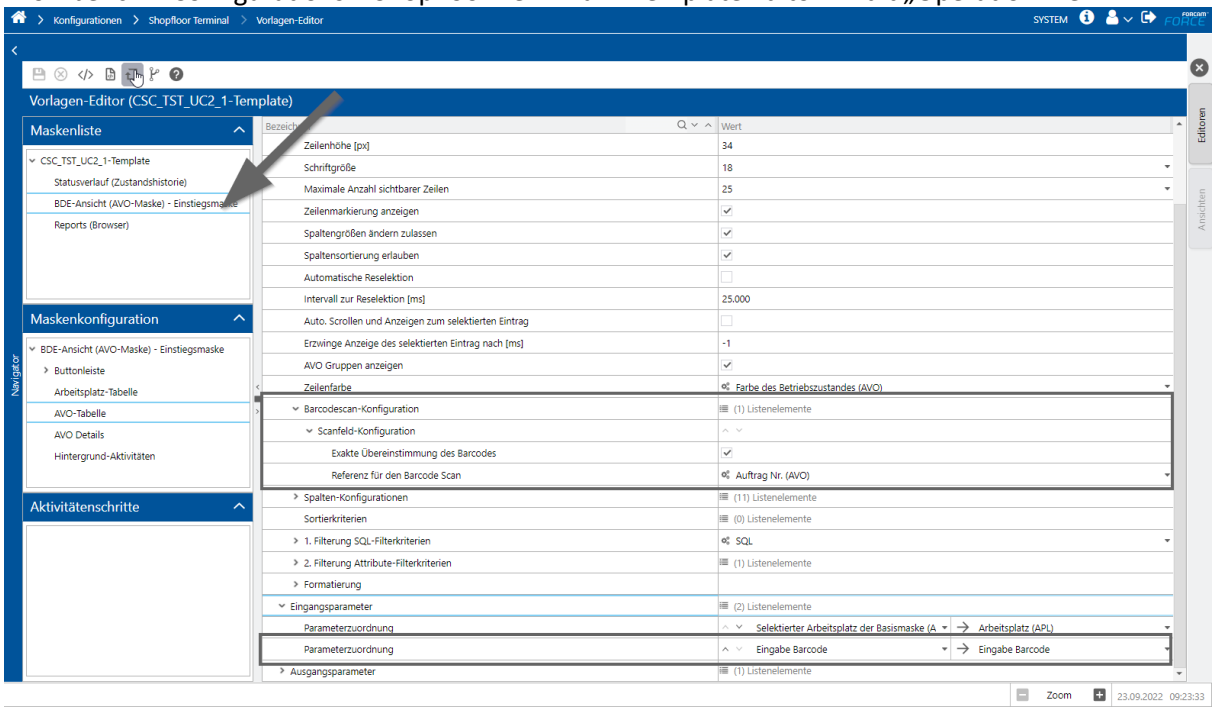

Fig. 23: Operation view - Barcode scan configuration

Example of barcode scan with automatic assignment to order number on SFT.

Barcode Scanner

Code 128 – Operation No

After scanning the barcode, the job is automatically highlighted and selected in the job table.

The barcode icon appears in the taskbar at the bottom.

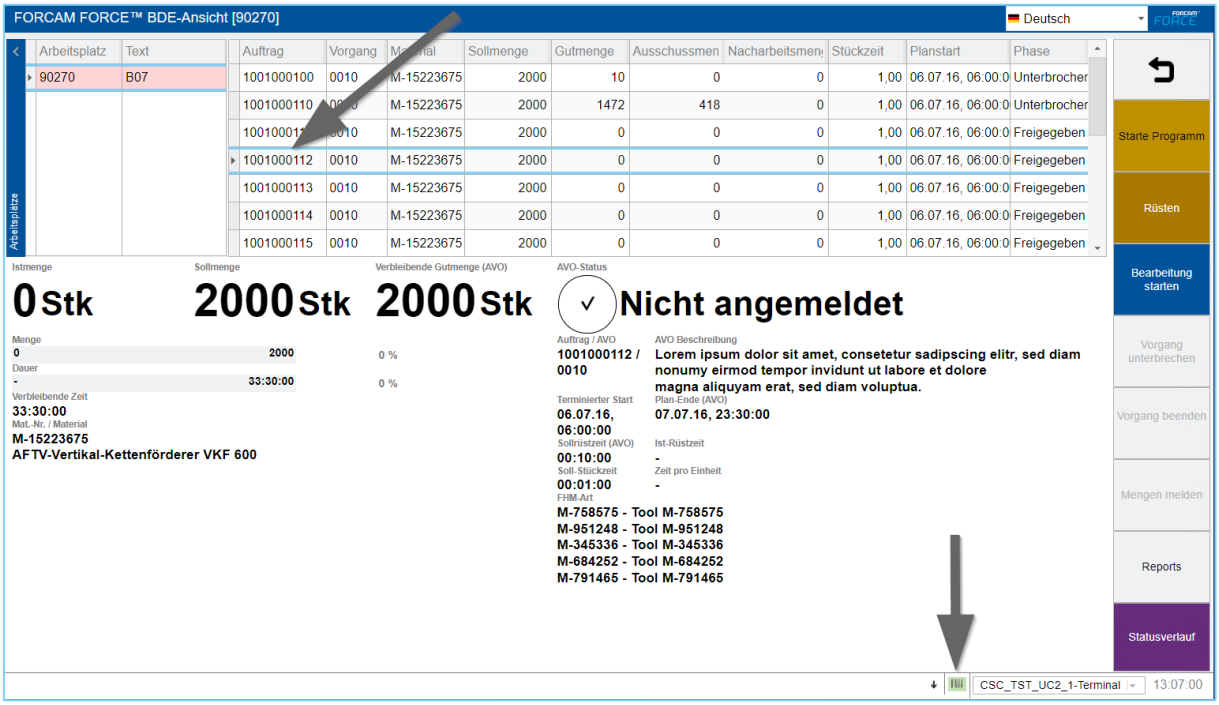

Fig. 24: SFT - Selected operation by scanning

6.4 Downloading and uploading files

6.4.1 Download file

The File Downloader plugin is used to download a specific file to the client machine. This plugin needs the file name and content (encoded in Base64 format) to be downloaded to the client machine. In addition to downloading a file, the plugin is also responsible for opening the downloaded file (if configured to do so via input). It creates the file in the directory (if configured otherwise, in the default Temp-OS directory) on the client machine.

Application example:

- NC element display

Precondition:

- The CSC is active, and the "green dot" is displayed in the taskbar: 
- Configuration "CSC required?" is active in the assigned profile.
- Make sure that there is a valid package for a workstation (to be checked) that contains at least one element that can be displayed in an external viewer.

Configuration:

- Configure a template (in Workbench) that contains the base page "NC View" (NCViewUI).
- Add the "Show item" activity button.
- Add the activity step "Dialog for displaying a NC element in the external viewer" (DisplayNCElementByExternalViewerActivityStepUI) to the button added in the previous step and configure it as required (normal configuration, no special configuration required).
- In SFT, go to the page view of the NC view and select an element (that can be displayed in the configured external viewer).
- Click the "Show item" activity button".
- The element file is downloaded and opened in the external viewer on the client computer.
- The downloaded element file can be displayed in the configured client directory (if configured, otherwise in the default directory of the temporary operating system).

6.4.2 Upload file

The File Uploader plugin is used to upload a specific file from the client machine to the server (e. g. SFT). This plugin requires the name and full path (path of the directory on the client machine with the file name) of the file to be uploaded to the server. The plugin then reads the contents of the file and encodes it using the Base64 format before sending it to the server. After uploading the file, the plugin can also delete the file from the client machine (if it is configured to do so).

Application example:

- Uploading a specific file from the client computer to the server with terminal identification

Precondition:

- The CSC is active, and the "green dot" is displayed in the taskbar: 
- Configuration "CSC required?" is active in the assigned profile.
- Make sure that there is a valid package for a workstation (to be checked) that contains at least one element that can be displayed in an external viewer.

Configuration:

- Configure (in Workbench) a template that contains the basic Operation View page (OperationViewUI).
- Configure the "Client Directory" in the corresponding profile.
- Enable the terminal identification feature (configure Operation View Terminal identification Using terminal identification true).
- Configure a valid file name for the terminal identification.
- Ensure that the terminal identification file exists in the configured client location.
- Log in to SFT.
- After logging in, the terminal identification file is uploaded to the SFT server. This can be seen in the worker log files.

6.5 Printing documents

The file printer plugin is used to print a specific file to the client printer connected to the client machine. This plugin requires the name of the client printer, the file name, and the content (encoded in Base64 format) to be printed. A temporary file is created on the client machine in the default Temp-OS directory. This temporary file is deleted as soon as the printing process is completed.

Application example:

- Printing a file (PDF)

Precondition:

- The CSC is active, and the "green dot" is displayed in the taskbar: 
- Configuration "CSC required?" is active in the assigned profile.
- Make sure that there is a valid package for a workstation (to be checked) that contains at least one element that can be displayed in an external viewer.

Configuration:

- Configure a template (in Workbench) that contains the Operation View base page (OperationViewUI).
- Configure "Printer Name" with the valid name of the client printer in the respective profile.
- Add the "Print File" activity button.
- Add the "Print a document" activity step (PrintPDFDocumentActivityStep) to the button added in the previous step and configure it with the document template to print as needed (no special configuration required, normal configuration).
- Log in to SFT and click on the "Print File" button.
- The file will be printed on the client printer.

7 Prerequisites and Restrictions

Few limitations of the CSC that should be considered when using it at the terminal (SFT):

- The terminal environment used complies with the FORCE IIOT system requirements. These include, for example, Java version, operating system, browser.
- Each terminal should have **only one active browser** as a connection to the CSC. Inconsistent results may occur with multiple active browsers.

8 Annex

8.1 Change log

Table 1: Changes in version 5.12

Date	Version	Doc.-- Version	Chapter	Change
08.08.22	5.12	1		

8.2 Abbreviations and terms

Table 2: Abbreviations and terms

Abbreviation/Term	Description
CSC	Client-Side Connector
Finster	**F**ORCE **Inst**all**er**: Client for the installation of FORCAM FORCE™
PDM	Production Data Management
DOS	Detailed Order Scheduling
SFT	Shop Floor Terminal

8.3 List of Figures